ARCHAEOLOGY IN WESTERN SAMOA

VOLUME 1

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PREFACE

For the last five years an investigation of Samoan prehistory has formed one part of a co-ordinated programme of Polynesian Culture History (Emory 1962, Anon. 1965). This over-all programme, the outgrowth of some fairly detailed planning at the 1961 Tenth Pacific Science Congress, began largely as a series of archaeological investigations in selected island groups of Polynesia, but as it developed came to embrace studies in comparative linguistics as well as archaeology for the entire Polynesian area including Fiji. From inception, sponsorship of the programme and its supervision has rested with the Bernice P. Bishop Museum in Hawaii. However, it has depended heavily on the co-operation of personnel from the Universities of Auckland and Otago, the Auckland Institute and Museum, and the Canterbury Museum in New Zealand, the Fiji Museum, and the State University of New York at Buffalo and University of Hawaii in the U.S.A. The principal financial support has derived from two National Science Foundation grants (No. G-21572 and No. GS/903) to Dr K. P. Emory and Dr Roland W. Force which have been administered by the Bernice P. Bishop Museum. These grants have been supplemented by the various co-operating institutions in a variety of ways — personnel, leave for staff, salaries, equipment, space for processing and storing materials, and a host of ancillary services. In this respect the Samoan part of the programme is no exception. While the main research funds are those from the National Science Foundation grants, the University of Auckland has supplemented the research in most of the ways described above, along with the State University of New York at Buffalo, which made two small additional grants to Dr S. D. Scott in connection with his work, and the Auckland Institute and Museum, which now holds the collections on deposit for the Government of Western Samoa. Thus various contributors to these volumes owe no little measure of appreciation to the Anthropology Departments of Universities of Auckland and New York at Buffalo, and the Auckland Institute and Museum, for the generous support in their endeavours. Their greatest debt lies, however, with the people and Government of Western Samoa, who not only made the work possible, but contributed so much to it. More specific recognition of a multitude of instances in which various contributors received invaluable assistance are to be found in appropriate acknowledgements associated with particular pieces of research.

All contributors are indebted to Mr K. M. Peters who has done all the illustrations for this volume except where noted. Any archaeological volume demands illustrative materials on a more lavish scale than publication outlets normally permit. Thus it is a pleasure to acknowledge a grant from the Wenner-Gren Foundation for Anthropological Research which has permitted us to prepare and publish illustrations on the present scale. It is also a pleasure to acknowledge additional assistance from the research funds of the State University of New York at Buffalo to assist with the publication of Dr Scott's materials.

The structure of this volume and that to follow requires some comment. An immense amount of data was accumulated in the course of these investigations carried out at various points in time by some 17 archaeologists representing some nine institutions. Fourteen of these people have prepared or are preparing some 33 separate reports, all but four of which record results from particular projects in which the author is primarily interested in presenting and interpreting his findings. Each report in this sense stands on its own and contributes, we believe, essential data which will be of use to those who follow us in Samoa, as well as to all who wish to use such data in comparative syntheses on a larger scale.

The reports have fallen naturally into two groups: those relating to initial surveys on Upolu and Savai'i and the project areas of Vailele, Luatuanu'u, and Lotofaga, and those describing intensive excavations carried out in connection with a settlement pattern survey in the Falefa Valley. The first group of reports was fairly well completed by the end of 1967, while the second group, based primarily on work done at the beginning of 1967, was still in various stages of preparation. It seemed unnecessary, however, to delay publication of the completed reports until the others came to hand, especially as it was evident that the entire collection would have to be issued in two volumes. It was therefore decided to proceed with the publication of this first volume before the manuscripts for the second were complete, and to reserve for the second volume those four reports intended to provide (1) a summary of research on Samoan prehistory, (2) a prehistoric sequence for the island group, (3) a typology of the principal structural forms and their functions, and (4) a discussion of Samoan prehistory in relationship to that of Polynesia. Some may regret our decision to defer such conclusions to the second volume, but we believe that this will prove to be a wise decision. Our views continue to be integrated into commentaries and syntheses of Polynesian prehistory currently appearing elsewhere, while new data relevant to the task of synthesis is constantly and rapidly accumulating from other island groups. Moreover the data reports, rather than any synthesis of the material, are likely to have more permanent value, especially at this stage in our knowledge of Polynesian prehistory when good comparative material for West Polynesia is so sadly lacking. In fact it might be claimed that by providing the basic data now we are enabling those who wish to do so to formulate their own conclusions and syntheses in advance of our own.

We hope, finally, that as editors we have done justice to our other authors in presenting their materials as well as our own in a way that enables each report to stand on its own, and is yet so integrated that when the second volume is complete an outline for a prehistory of Western Samoa may be said to have been written.

Roger C. Green,
Janet M. Davidson.

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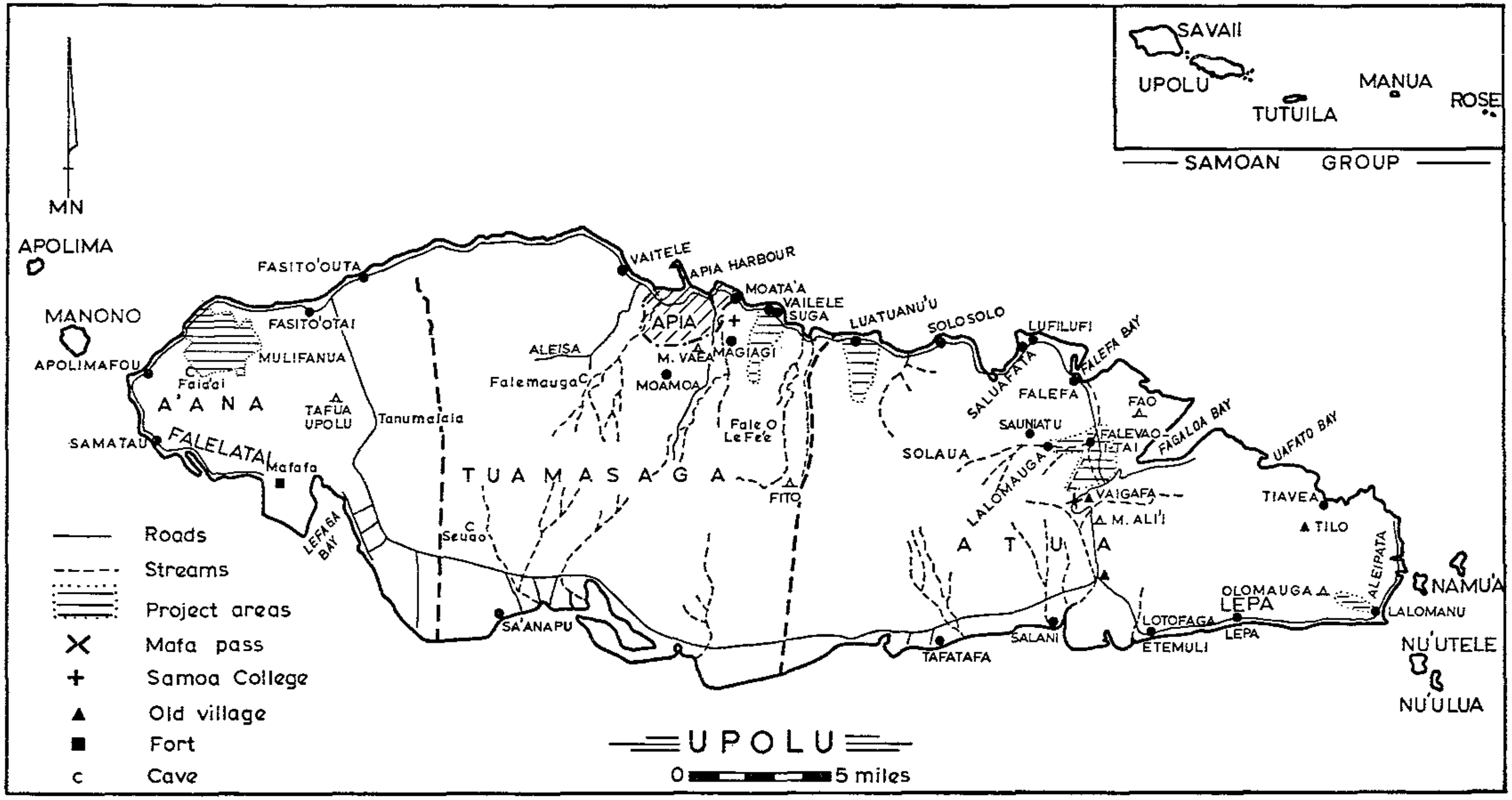

Fig. 1. Upolu, Western Samoa, showing principal areas investigated.

ARCHAEOLOGICAL INVESTIGATION OF WESTERN SAMOAN PREHISTORY

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BERNICE P. BISHOP MUSEUM

FORMULATION OF THE RESEARCH PROGRAMME

Investigation of Samoan prehistory by means of modern surface and sub-surface archaeology began in 1957. Before then most accounts were based on the traditional evidence and studies of the material culture (Krämer 1902, Handy and Handy 1924, Buck 1930). A few of the more imposing Samoan field monuments had also been described (Thompson 1927, Freeman 1943, 1944a, b, c), but no serious archaeological survey had ever been undertaken in the group in the way that numerous expeditions from the Bernice P. Bishop Museum had done for many other island groups of Polynesia. In 1957 Mr J. Golson, then attached to the Anthropology Department at the University of Auckland, spent nearly six weeks on the island of Upolu in Western Samoa carrying out an initial survey and some limited test excavations. Most of our own programme has built on this work and for this reason the Samoan part of his "Report to the Tri-Institutional Pacific Program on Archaeological Field Work in Tonga and Samoa" is reproduced in this volume (Report 1). Through his report, the photographs of his work held in the files at the University of Auckland Department of Anthropology, and through personal communication with him, I first gained knowledge of the potential for a full scale investigation of Samoan prehistory. Through an opportunity provided by Dr D. L. Oliver to return to the United States by way of Western Samoa on completion of fifteen months of field work in French Polynesia in 1960, I was able to spend a week on Upolu assessing this potential at first hand. Plans, however, for a Samoan programme were still but dimly formulated.

When the prospectus for a co-ordinated attack on Polynesian prehistory was formulated at the Tenth Pacific Science Congress in 1961 (Green 1961a : 480-81), all assembled were agreed on the need to achieve a better balance between the rapidly accumulating evidence from East Polynesia and the meagre evidence from West Polynesia. However as discussion of the research interests of various institutions and their personnel developed, it became apparent that this balance was unlikely to be forthcoming unless the resources of some of the institutions were directed away from East Polynesia and into West Polynesia. A decision was therefore made to follow the lead already given by Golson and to exploit the close political, social, and geographical ties which New Zealand has with Western Samoa to conduct additional investigations in Western Samoa from the University of Auckland. At the same meeting and in much the same spirit, the Bernice P. Bishop Museum and its staff agreed to undertake additional surveys in American Samoa basing their work on a survey of surface sites carried out by W. K. Kikuchi in 1961 and submitted to the University of Hawaii as a thesis (Kikuchi 1963). Once funds were assured through grants from the National Science Foundation, these proposals were translated into a programme of field research that began in October 1962, and continued in a series of archaeological investigations throughout the Samoan Island group which ended in March 1967. The primary aim in the field research was to lay an initial foundation for some valid formulations about Samoan prehistory. As a secondary concern, it was hoped that the results, when set within the wider context of the other related investigations, would yield new perspectives in the field of Polynesian culture history.

Owing to a wide variety of factors, the research efforts have, of course, not been continuous, and may usefully be divided into three distinct periods. Only during the last of these periods was it possible to invest the various research projects with that sense of continuity and co-ordination that seemed to yield a sense of unity and reasonable success, although this was an aim from the beginning. One reason for this was that the investigations have involved a variety of personnel from various institutions in several countries, each often engaged in a separate research project, so that until preliminary results were available to others similarly involved, a sense of unity was difficult to achieve. For this reason, as well as the necessity of submitting regular reports to the Bernice P. Bishop Museum, a practice of issuing short mimeographed preliminary reports (Green and Davidson 1964, Scott 1965, Buist 1966, Terrell 1966, Buist 1967a) has been employed. As well, preliminary accounts of the various aspects of the work have appeared in publications (Green 1964a, Davidson 1965, Green and Davidson 1965, Green, Davidson and Peters 1967, Buist 1967b, Davidson, Green, Buist and Peters 1967, Green 1968, Ishizuki 1968 and Scott 1968).

Another reason for the lack of any sense of unity in the programme in its initial stages lay in the fact that Samoa was, archaeologically, a blank on the map of Polynesia and for a long time our task was simply one of accumulating data without always being able to assess its relevance to other data similarly accumulated. In this situation, the sheer abundance of field monuments throughout Samoa, both ancient and modern, the lack of an easy means for placing these sites within even the most general chronological framework, and the close structural similarity between those which are prehistoric and those which are historic or even modern, offered many problems and no immediate solutions. Thus a wide variety of choice existed as to objectives, which sites to tackle first, and which problems to single out for more detailed investigation as work proceeded. In short on a minimum of knowledge it was necessary to decide where to begin, and even after some tentative objectives, outlined below, had been formulated, they were not always readily accomplished.

A final reason for our difficulties lies, I believe, in the Samoan environment, both physical and social. The physical environment is one that constantly impedes most archaeological tasks. Of primary importance is the climate. Curry in discussing the physiological climate of Western Samoa has written:

> The sea-level mean temperature of the warmest month is 80.4°F and the highest mean maximum temperature for a month is 85.7°F. Employing a corresponding monthly 9 a.m. wet-bulb temperature of 77.3°F, . . . and assuming a wind velocity of twenty feet per minute, corresponding effective temperatures may be calculated as 78.5°E.F. and 81.0°E.F. respectively. These values are almost on the upper limit of thermal comfort for half-naked men at rest, and well above the limit of comfort for persons doing heavy work. These values change little through the year, the mean for the lowest month being 77°E.F.
>
> While these absolute figures tend to be misleading, since they refer to un-acclimatised persons, it seems evident that the climate imposes a real thermal burden on the human body (Curry 1962: 61).

This it certainly did on the un-acclimatised archaeologist. When coupled with the high rainfall, no really distinct dry season in many of the areas covered, and the lush vegetative cover, especially of various grasses and mile-a-minute or *fue saina (Mikania micrantha)* which quickly invade all cleared areas and obscure surface evidence, the physical environment often made the archaeologist's task an onerous one.

The social environment too presented its problems. Archaeology is a relatively new concept to Samoans, although many of the better educated are well aware of the work of geologists, biologists, anthropologists, geographers, and other social and natural scientists. Hence one of our tasks was to educate Samoans about the nature of our work and the kinds of information which they might supply that would be of greatest use to us. As Samoans also supplied the great bulk of the labour, this implied training them in a variety of skills, including excavation, that were entirely new to them. More to the point, however, was the fact that our work threw us into continual contact with Samoans and Samoan custom. In this situation it was necessary to define to them the rather novel role of the archaeologist, who did not seek immediate economic gain, in ways which could be accommodated within the more usual forms of European-Samoan relationships. That we were usually successful in this hinges, I believe, on the fact that as archaeologists we shared with them a mutual curiosity and interest in a subject familiar to and close to the heart of many Samoans, namely their culture and its history, and we were able to reveal to them new ways of obtaining reliable information on that subject. This bond often carried us over many of the more mundane difficulties that are the lot of any expedition working on customary lands and employing labour from villages where kinship obligations and political and economic factors often structure the relationships. Still, effective communication was a thing which one had to work at continually, and often results were not what one anticipated.

In summary then, a variety of reasons may be cited for not attempting too tight a research design throughout the investigations. These reasons contributed to a result with obvious gaps, unfinished or abandoned research projects, and unfulfilled objectives. Yet in reviewing the entire programme and assessing those results which it achieved, I now have the feeling that in the end, the over-all coherence is greater than was initially anticipated and certainly more than sometimes seemed apparent during the direction of various operations. In no little measure this is due, I believe, to the efforts expended by my colleagues, associates, and students in accomplishing what were often exacting tasks under difficult conditions. It is also due to the fact that results from any programme involving a number of personnel from several institutions, each engaged in different projects, necessarily results in different approaches to similar problems. The outcome is a more rounded picture of Samoan prehistory than would be the case were a single investigator and a handful of students involved.

MAIN OBJECTIVES

Two factors seemed of importance in directing and developing the research programme. One was continual modification of the actual programme so that at its conclusion it would have accomplished some among a number of formulated objectives. The other was a flexibility in over-all organisation which permitted the maximum use of personnel, equipment, and knowledge already won, to achieve these ends. It will be useful, therefore, before outlining the course of the investigations in detail, to examine the various objectives that were formulated at different times and to end with a summary of those objectives to which the various projects actually seem to have contributed most.

On the basis of Golson's work and my own knowledge of current problems in Polynesian prehistory, I initially set out six general goals to which I thought we might provide some preliminary answers. The first two of these were structured by Golson's results from the test excavation at mound Va-1 in Vailele where he had encountered pottery and two adzes dating to the 1st century A.D. in a layer at the base of that mound, and by my 1960 records of a second mound, Va-2, near the first excavated by Golson, which had more recently been sectioned by a bulldozer. The goals were (1) the development of some typological and functional interpretations of earthen mounds as a result of excavations in selected examples and (2) the definition of all aspects of the portable artifact assemblage stratigraphically associated with the Samoan pottery dated to the 1st century A.D. and the documentation of changes in those items in the periods that followed up to the time of European contact. It seemed to me that these two goals could best be accomplished by returning to the same locality, continuing with excavations on these two mounds, and extending to others in the same cluster if that proved feasible.

Two other goals grew out of the survey work by Golson and my own experience in conducting a settlement pattern survey in the 'Opunohu Valley of Mo'orea in French Polynesia (Green *et al.* 1967). These were (3) a more detailed study of all forms of visible field monuments so as to extend and refine the classification outlined by Golson (Report 1) and (4) intensive site surveys in project areas to provide the basis for settlement pattern analysis and in particular to assist in assessing a commonly acknowledged and presumably recent shift of many villages from traditional and known sites well in the interior to locations on the coast. In the Vailele area, this goal would be enhanced by a more systematic survey of all sites which would extend the brief records made by Thompson (1927), Freeman (1944c) and Golson (Report 1, p. 19) and so help to relate the sites they describe to those we were excavating. As well, a second project in the area behind Luatuanu'u was initiated with these goals more specifically in mind. The same was true for the Lotofaga inland area.

The last two goals were conceived firstly as a result of the experience of Davidson's (1964 a, b, c) work on the middens of New Zealand and the contrast they presented to my experience of middens in Tahiti and those we were able to identify in Samoa, and secondly as a result of excavation in East Polynesia of large collections of fishing gear, often in forms unknown in West Polynesia, showing cultural change. The two goals formulated were (5) to develop more suitable techniques for sampling the non-concentrated type of beach midden encountered in many parts of Polynesia so as to recover information on this aspect of the prehistoric Samoan economy and (6) to develop an archaeological definition of the nature of Samoan fishing gear, especially that which might be found in the earlier sites. To this end a third project was carried out by Davidson in the Lotofaga area.

As will be seen in the Vailele section of our report, we have been reasonably successful in the first goal, and somewhat more successful in the second. However, a major gap between the one certain early assemblage associated with the pottery and the several later assemblages associated with the mound building was identified. From our surveys and general reconnaissance we were also able to achieve an extension and expansion of the types of visible field monuments in Samoa which would assist in their classification, the third goal in our list. But the three remaining objectives had not been achieved with the same success. We had certainly laid a basis for future settlement pattern studies, but our samples were still too small to permit of any far-reaching conclusions, and our control over the temporal factor was extremely limited. However we now knew the nature of the data that was there to be exploited and had some notions of how to formulate a series of projects which would be likely to achieve this objective. As for the last two goals, the Lotofaga report by Davidson makes clear both the nature of the problems and how much we have been able to achieve so far in identifying and sampling non-concentrated beach middens, while the lack of fishing gear in archaeological sites in Samoa continues to remain a problem.

With these results in hand I again attempted to formulate the major problems of Samoan prehistory and outline some future programmes which might help in their solutions. The problems I selected among many choices were:

1. To find at least one pottery-bearing site earlier than any we had yet encountered and excavate it fully;
2. To excavate extensively in another locality so as to develop a chronological sequence that could be compared to Vailele;
3. To document fully the nature of changes in Samoan settlement pattern with its shifts in site distribution and changes in structural types;
4. To trace the origin and history of fortification in Samoa;
5. To sample sufficient beach middens to define the nature of prehistoric Samoan fishing gear, and any changes it exhibits, while at the same time acquiring sufficient data on the midden aspect of Samoan economy; and
6. To excavate a sufficient number of mounds of varying sizes to make possible some interpretation of their possible range of functions.

I then went on to sketch some future programmes and five projects which might achieve some of these ends (Green and Davidson 1964: 48-49), but these had to be modified to some extent according to the personnel available to carry them out and the actual amount of research time and funds which were available. Still the first three projects were retained largely intact. They were (1) the mapping and recording of major fortifications in Samoa and excavation in some of them (2) 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 and (3) further excavations in the earthern mounds at Vailele, investigation of the stone mounds at Palauli, and excavation in a set of mounds in another project area (here the Mulifanua area had been suggested but in the event the project was carried out instead in the upper Falefa valley). The fourth project, however, of extensive excavations in beach midden sites has never yet been undertaken, though we still have plans for attempting this project and now believe a midden on Apolima most suitable for it. The fifth project, an interdisciplinary approach to site distribution on Savai'i, had to be abandoned in favour of a simpler general reconnaissance of its field monuments. A sixth project, not listed, but which experience of settlement pattern study in the 'Opunohu Valley of Mo'orea convinced us was necessary, was extensive excavation in a few selected sites of one of three project areas chosen for settlement pattern study. These then constituted the major objectives of the final portion of our Samoan programme, and form a background against which an account of the investigations may be projected.

SEQUENCE OF INVESTIGATIONS

The first period of investigation into Samoan prehistory is the Bernice P. Bishop Museum's survey of American Samoa carried out by Y. H. Sinoto and W. K. Kikuchi in a five week period during October-November 1962 (Emory and Sinoto 1965 : 40-49). When taken in conjunction with previous work by Kikuchi (1963, 1964), it provides a fairly thorough reconnaissance type of archaeological survey for American Samoa and is most useful for its data on types of field monuments, surface collections of adzes and graters, and petroglyphs. The Bishop Museum however, did not expand their programme as originally planned. Instead, as a result of this survey and the "realization that the prehistory of Samoa could be developed more appropriately from the experience and knowledge gained by the University of Auckland's group in Western Samoa," the remaining time, personnel and funds allotted to American Samoa in 1963 and 1964 were shifted to the Marquesas Islands (Emory and Sinoto 1965: 1-2). The work in American Samoa has contributed directly only to one of the major results of the over-all programme, that is completing the reconnaissance survey of the entire Samoan group. Thus excavation evidence from American Samoa is still much to be desired.

The initial Western Samoan programme marks a second period of research effort and one to which the initial set of six goals discussed above applies. This programme involved seven months of continuous field work utilising an overlapping series of personnel. A party from the University of Auckland led by myself, accompanied by my wife Kaye, and Stuart D. Scott, then a Fulbright scholar at the University, began the investigations, concentrating our efforts on two mounds at Vailele. One was Va-1 in which Golson had excavated previously and recovered 2,000-year-old pottery from the lowest layer, and the other was that more recently opened by a bulldozer cut which I had recorded in 1960. We were joined by George Boraman, a science graduate of the University of Canterbury, whose plans called for him to gain experience with us before moving on to the Cook Islands where he was to work with a Canterbury Museum party led by Dr Roger Duff on investigations that were also a part of the over-all Polynesian Culture History programme (Duff 1965). Later we were joined by Janet M. Davidson, who had completed her M.A. training at Auckland University and Eleanor B. V. Crosby, then a graduate student at the University.

Scott initiated the Luatuanu'u project, and with the assistance of Boraman, mapped the large fortification furthest inland in that area. Field work in the project area then went on to mapping of sites, systematic collection of surface artifacts from recorded structures, and some excavations at the fort. These were carried out by Boraman, Davidson and Green.

In the meanwhile the Vailele project was continued until it covered a period of five months from December 9, 1963 to May 8, 1964. In large part this work was directed by myself with assistance at various points from all other members of the expedition. I supervised a large portion of the work at Va-1, with the assistance first of Davidson and then of Crosby. Operations at Va-2 were supervised largely by Scott, and then by Boraman and myself. On the third and fourth mounds tested, Va-3 and 4, the supervision of excavations was largely in the hands of Crosby.

During March and April 1964 Davidson initiated the Lotofaga project. During the first five weeks her efforts were concentrated on the beach midden in Lotofaga village, and were followed by intensive surveys in areas inland from Lotofaga, particularly at Vaigafa and Mauga Ali'i.

Woven in around these specific projects were numerous reconnaissance surveys around most of the coastal areas of Upolu and on the adjacent offshore islands of Manono, Apolima, Nu'utele and Namu'a as well as some exploration of inland zones at Mulifanua and Sauniatu. Also included was a brief reconnaissance trip around Savai'i in which the Palauli area and the extensive ruins on the Letolo Plantation were first seen and identified as worthy of further investigation.

With the results of these investigations we were now in a position to formulate more precisely some of the major problems in Samoan prehistory as discussed above and outline a set of projects that could be combined into a more continuous series that would, it was felt, lay a firmer foundation for our initial formulations of Samoan prehistory. The third period of field research therefore achieved a greater continuity of operation and a more integrated structure than the previous efforts.

The third portion of the field work began in June 1965 with Scott, now at the University of New York at Buffalo. Until August 1965, he concentrated his efforts on the Letolo Plantation in the Palauli District on the south coast of Savai'i. This was the beginning of a concentrated effort by Scott and A. G. Buist, a New Zealand archaeologist, to make a general reconnaissance survey of Savai'i, a project necessary in completing a general survey of sites throughout the entire Samoan group. Scott also completed certain additional excavations on the fortification at Luatuanu'u which he had previously mapped, and ascertained the nature of several other fortifications that had recently been brought to our attention by local residents on Upolu. From the end of November 1965 to the beginning of January 1966, Buist conducted his first survey in Savai'i, while Scott returned in June of 1966 to extend this work along the south coast of Savai'i over the course of the next two months. Buist returned for a further month in August 1966 so as to continue on from Scott and complete the task of general reconnaissance along the east and north coast. As private transport is essential to any attempt at survey and reconnaissance in Savai'i, these efforts by Scott and Buist were planned not to overlap seriously with other projects on Upolu, so that the expedition vehicle could be shipped to Savai'i.

Another pair of major objectives in the set outlined above was the study of settlement patterns, particularly those inland, in Samoa, and in one study area, the excavation of a number of sites selected as the result of that survey. The first step in these investigations may best be described by quoting from Davidson (Green, Davidson, and Peters 1967: 28-29):

> The first area surveyed was the inland part of the extensive valley lying between Falefa village and the Mafa pass. This large valley with its fertile soils and abundant water supply, appeared to offer optimum conditions for inland settlement. The full extent of the valley proved too great to be covered in the time available, so that work was concentrated on the larger eastern arm, while the western arm, including the old settlement of Pago, visited by Green in 1964, was not further investigated.
>
> The second project area selected was a portion of the Mulifanua group of plantations of the Western Samoa Trust Estates Corporation. In much of the Western portions of Upolu, the land is formed by the more recent Mulifanua volcanics, which provide very different conditions from those offered by the older land forms of the eastern portion of the island. The Mulifanua plantations were selected as a project area representative of this environment for two reasons. The plantations were among the first obtained by the firm of Godeffroy & Sons and their European history is well documented, providing a *terminus ante quem* for much of the structural remains. Secondly the plantations provided open-grazing conditions, in which archaeological remains could be relatively easily discovered.
>
> The third project area was selected on historical as well as geographical grounds. In 1787 La Pérouse sailed past Upolu, and remarked on the vast settlement, extending far inland, which he observed in what is generally accepted as the Aleipata district [but see Pirie 1964 : 20-21]. The third project area, then, involved the plateau extending from Lalomanu village inland as far as Mount Olomauga. This appeared most likely to be the area described by La Pérouse, and at the same time involved yet another environment, less fertile than Falevao, less rugged than Mulifanua, offering reasonable conditions for settlement except for a rather serious lack of water.
>
> In addition to these major surveys, minor reconnaissances were carried out in secondary areas, as a spot check on the findings in the project areas.

From her survey information, Davidson chose the upper eastern arm of the Falefa valley from the Lalomauga road inland as that area containing sites most worthy of excavation. With her survey notes as a basis, she also selected six of the named settlements as the actual places in which we were to excavate one or more of the structural features which she had already mapped in some detail. I directed the excavation programme which carried out these investigations between mid-December 1966 and March 1967, during the last few weeks of which I had the assistance of Davidson in order that both of us could be sure of a thorough first hand understanding of all aspects of the project.

Actual investigations at each of the settlements were carried out by Kisao Ishizuki, a Ph.D. candidate from Doshisha University in Kyoto, Japan, two M.A. students from the University of Auckland, J. R. McKinlay and Trevor Hansen, and two undergraduates from the same university, Jacqueline Fagan and Kathryn DeNave. They were assisted by K. M. Peters, Technical Officer at the Anthropology Department at the University of Auckland, Davidson and myself. In general one individual supervised each excavation at a particular structure and has been made responsible for reporting on it. The main exceptions are the settlement of Sasoa'a[1], where McKinlay is dealing with the early European period materials from three house structures on which a number of us worked, and I am dealing with the prehistoric materials from under one of these structures, and the settlement of Leuluasi where Davidson and Fagan are handling one site and DeNave the other. Finally DeNave and I are describing excavations at one site each in Te'auailoti, Ishizuki one site at Folasa-a-lalo, and Hansen a site at Puna. To these may be added small excavations by Davidson, principally for datable charcoal from ovens and fireplaces, at the settlements of Vaimaga, Folasa-a-lalo (Davidson, Green, Buist and Peters 1967: 225-26), and in an earthen ring on the alluvial flat at Leuluasi.

These investigations, I believe, have permitted us to accomplish in fair measure our two objectives, namely the investigation of settlement patterns in three project areas in Samoa under different environmental situations, and the excavation of sufficient sites in one of them to give us some control over the temporal factors, portable artifactual assemblages, and structural types which characterise these settlements. Unexpectedly, in a sense, it has allowed us to accomplish with better results than anticipated, one of our more general aims, "the outline of a chronological sequence that could be compared to Vailele" by the finding of another pottery site which has materials very like those at the base of Va-1, and under them a yet earlier pottery-bearing stratum.

The identification of numerous field monuments labelled for convenience "star mounds" on both Upolu by Davidson, and Savai'i by Buist and Scott, led us to seek a suitable structure of this type for excavation. Through one of our foremost Samoan field assistants, Atonio Maiava, our attention was directed to such a mound inland from Luatuanu'u village, a project area in the previous research period. This site was selected and excavated between

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[1]This area has previously been published as Saisoa'a. The more correct spelling Sasoa'a is adopted here and in future reports and the individual site designations changed from Sai- to Sa-.

December 1966 and the end of January 1967. It proved to be a major excavation and yielded information not only on the "star mound" but also on a long sequence of occupations on the earthen terrace under it, a terrace which was in many ways similar to those terrace sites we had already mapped in the area. As such it has fitted well into our previous work in this project area, and provides us with additional excavation control for still another area of inland settlement situated in yet another geographical environment.

Field work in the second period of research around the mounds at Vailele had raised a number of problems in need of solution, if possible, by additional excavation. For this reason more field work was carried out in this area during the third research period. The first problem was a clearer definition of the sequence at Va-4 including datable materials for chronological control over the various events implied, and an enlarged sample from the pottery-bearing layer at its base. This research was conducted by John Terrell, who had been a Fulbright scholar at the University of Auckland from the University of Pennsylvania, over a period of five weeks in November-December 1965 on his way back to the United States. In his preliminary report of this research (Terrell 1966), he recommended certain additional excavations in the pottery-bearing layer at the base of the mound, which it was felt might add to an understanding of this site. These were carried out by M. P. Hougaard (née Nicholls), a New Zealand archaeologist resident in Samoa, and myself over several discontinuous periods amounting in total to about four weeks.

A second investigation involved additional survey mapping of inland field monuments at Vailele by Hougaard in an area not previously covered and also a small test excavation in one of the larger inland mounds sectioned by a plantation road. This last was undertaken to gain some idea of the processes involved in the formation of these larger mounds, their function, and some datable charcoal in order to assess the length of time they represented. This excavation and a similar one in a disturbed mound at Moamoa, from which pottery had been reported, was carried out by Hougaard in the interval between September 1966 when Buist left the field, and the arrival of the large party in December of that year.

It will be evident from the above account that in the third period of field research covering some 21 months from June 1965 to March 1967, almost continuous investigation into some aspect of Western Samoa's prehistory was in operation by one or more of a variety of personnel. While the order of operations was but loosely integrated, the actual projects undertaken combine well with the previous work and with each other in reaching a good many of the objectives outlined for this period. The one for which we must admit no success is that concerned with beach middens, while for fishing gear our results are largely of a negative kind.

ORGANISATION

In most reports of archaeological excavations some account should be given of the methods employed in a particular piece of research. With the range of personnel, backgrounds, and tasks involved in this programme, the methods adopted varied considerably. Such details are given in each report so that others may judge the degree of control in particular cases. Here I wish to comment generally on the over-all organisation, particularly that which involved excavation.

The field work was run on a basis in which five days of each week were devoted to excavation or concentrated survey and mapping. Six to seven hours per day were allowed for on site work by archaeologists and their crews, while transportation to and from the site, and lunch breaks at midday normally consumed another three hours. Under the conditions described above, these hours proved quite sufficient to exhaust the unacclimatised archaeologist, and the weekend break was necessary for additional notes, drawings, labelling and processing materials, for personal matters, and for relaxation. Sunday in Samoan custom is a day on which no unnecessary work is permitted; this is fortunate for the archaeologist.

It has been my policy throughout to deploy the trained archaeologists as widely as possible rather than to concentrate their efforts all at one site. This provided certain problems in transportation, circulation and division of equipment, and general supervision, but greatly increased the range of projects it was possible to undertake. One reason for this policy is the inability of trained archaeologists to carry out efficiently the range of mundane physical tasks required by excavation in Samoa. In fact the relatively untrained Samoan, familiar with his environment and able to cope with a wide range of these tasks with ease, is superior in most cases to the archaeologist. From clearing sites, to erecting shelters, shifting dirt, spotting unusual or unfamiliar objects in yards of soil, he has a natural advantage which is a part of his background. On the other hand, in actual excavation techniques, in following layers, in distinguishing features within the soil, in assessing the significance of findings from day to day, he is at a real disadvantage, as is to be expected. Some workmen, to be sure, never do overcome any of these disadvantages, even after close supervision and training, but others become quite capable excavators. A few, some of whom like Atonio Maiava, worked for us almost throughout the entire two research periods, became quite good amateur archaeologists in their own right and were able to discuss the stratigraphy and sequence, as well as excavate, survey and map with a fair degree of sophistication. Supervising archaeologists were quick to spot those who exhibited these abilities and most of them were promoted to crew leaders or employed in the more difficult excavation and recording tasks where fine control was called for. Still it cannot be denied that some precision is lost by the employment of local labour rather than pooling skilled archaeologists though I am quite convinced that the loss in precision is more than offset by the advantages gained in time, extent, and variety of the tasks that can be performed with small crews and supervising archaeologists. Except in special instances such as clearing, removing turf and debris from pavements, and shifting spoil, no one archaeologist was allowed to supervise more than six workmen, and crews normally averaged between four and six labourers to an archaeologist where detailed excavations were in progress. Actual recording, drawing, labelling, and mapping were always in the hands of the archaeologist, though he was often assisted by one or more skilled labourers. Also much of the detailed trowelling, definition of features, and initial determinations of layers or levels was done by him, with the tasks of removing the spoil and cleaning up left to the labourers.

A certain amount of the photography of excavations and structures was carried out by each of the supervising archaeologists, but a larger portion of the black and white photography was done by Scott, Peters, and myself, except where individual archaeologists were either working on their own or engaged in field survey. All photographs of the research have been processed and are now filed, along with those taken by Golson in 1957, in the files of the Department of Anthropology at the University of Auckland. They include 35 mm., 120 mm. (the majority), and 4 x 5 inch plate camera photographs in black and white, and colour slides, almost exclusively in 35 mm.

Recording in the form of written field notes was done in duplicate or triplicate in manifold notebooks from which one or more copies could be detached. In this way a file of all field notebooks has been assembled at the Auckland Institute and Museum, where the portable artifacts are also held on deposit for the Government of Western Samoa until such time as the country acquires a suitable Museum. Two types of field notes were kept, one a day by day diary of work on each site by the supervising archaeologist, one copy of which he retained for writing up his final report, and the other a general itinerary diary kept largely by myself, of over-all activities. Besides these notes, detailed maps, drawings, plans and sections were made either in graph paper lined notebooks or on large sheets of graph and mapping paper. These are on file at the Auckland Institute and Museum. From these graphic materials most of the plans, maps, and sections have been drawn by K. M. Peters along with the artifact illustrations. Obviously the published materials must often include only a small fraction of the total sections and plans actually recorded and available.

Sites in Western Samoa have been numbered according to a system in wide practice in Polynesia, in which an initial set of letters is used to indicate the major island group and islands within that group on which the site is found, while a second set of letters designates the local area, usually a district, settlement, valley or other well known named locality (Suggs 1961: 22; Green *et al.* 1967: 117). Sites in each such local division are then numbered consecutively as they are identified and recorded.

In the initial group of letters used for Samoan sites, the first 'S' stands for the whole Samoan Island group and is followed by a second letter, either 'S' for Savai'i, 'U' for Upolu, 'T' for Tutuila, 'A' for Apolima, according to the principal islands in the group. A second series of letters followed by a number then indicates the site itself, so that Va- indicates sites in the Vailele area, Lu- sites in the Luatuanu'u area and Lo- sites in the Lotofaga area for instance, with individual sites within these localities each having a separate following number. A complete designation for the first site excavated by Golson at Vailele then is SU-Va-1. Normally where context makes it clear, sites are referred to by the second set of letters and the number alone, i.e. Va-1, Lu-21, Lo-2, etc. With the assistance of New Zealand, Western Samoa is gradually acquiring a set of 25 gridded Topographical Map Sheets at 1:20,000. When these are completed, it will probably be more practical to adopt a site numbering system based on these maps similar to that in use in New Zealand (Golson and Green 1958). Until these maps are completed, however, this is not practicable.

Portable artifacts, in so far as was possible, were processed in the field, the data on the field labels being transferred to the general catalogue and to separate 4 x 6 inch catalogue cards on which sketch drawings of each artifact were often made. Field numbers were assigned to all artifacts and written on them whenever possible. Again the duplication in records was designed to overcome any possible loss of the written information and to insure some control where field numbers were subsequently obliterated in shipment or rendered unclear by other means. Several times we have found these precautions of utmost value. Museum numbers have not been assigned to this collection until such time as their final disposition is resolved.

During the second period of investigation the processing of the materials was distributed among the entire group, but this arrangement was found not to be very satisfactory, where the individuals were already committed to so many other tasks during the course of the week. Thus in the third period of field research, when the final major excavation phase was under way, one member of the expedition, first Mrs Laura McKinlay and then Kathryn DeNave did the cataloguing. Still the volume of material at the end of the excavation period in February 1967 proved so great that the remainder of the material, especially pottery, had to be processed on our return to New Zealand. Other materials, collected by individuals over the course of the third period of investigation, were all processed at the Department of Anthropology at the University of Auckland.

Finally in those two periods when major parties were in the field excavating, December 1963 to May 1964, and December 1966 to March 1967, it was necessary that someone spend large amounts of time supervising the running of the household, the cooking, and the washing and seeing to the daily round of personal errands, mail, payrolls, and contacts with members of the Government of Western Samoa and other official bodies as well as various businesses who provided goods and services. In Samoa this was no small or easy task and I know that all contributing to this programme join me in thanking my wife, Kaye, who so efficiently performed these services.

SUMMARY

Our knowledge of West Polynesian prehistory is only now beginning to take shape as results of recent surveys and excavations in Tonga, Samoa and Fiji are published. As a result it seems unprofitable to make yet another review of such preliminary material as is available (see Davidson 1965, Green 1968, Palmer 1968, and Poulsen 1968). Rather I have attempted to outline the general basis for the particular research programme which we undertook in Western Samoa because it seems more germane to an understanding of the relationships between the detailed reports which follow. These reports provide, I believe, a basis for some preliminary formulations about Samoan prehistory and its position within the general culture history of Polynesia. More concretely they serve to complete the reconnaissance survey of the entire Samoan group, and provide data in reasonable depth for four project areas on the island of Upolu: Vailele, Luatuanu'u, Lotofaga, and Falevao. Here the similarities and contrasts between the coastal materials from Vailele and Lotofaga and the inland materials from Luatuanu'u and Falevao should not be lost sight of as important controls for both situations. Equally important, the excavation data from one of these project areas, Falevao, is intimately tied in with the intensive survey data gathered for a separate study of proto- and prehistoric Samoa settlement patterns, and forms an essential part of that study, while the data from the other project areas also contributes to this goal. Finally from these materials it now seems possible to extract the initial outlines of a historic and prehistoric sequence for Western Samoa starting with the early European contact period and an immediately preceding prehistoric period and extending back at different sites for various intervals until one reaches the two early pottery periods.

II. PRELIMINARY PAPERS

PRELIMINARY RESEARCH: ARCHAEOLOGY IN WESTERN SAMOA, 1957

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This report is abstracted from the mimeographed "Report to Tri-Institutional Pacific Program on Archaeological Field Work in Tonga and Samoa, August to October, 1957." It reprints the Samoan section of that report almost in its entirety. Mr Golson, accompanied by Mr W. Ambrose, then technician at the Department of Anthropology at the University of Auckland, arrived in Apia on Friday, September 20th, 1957 and left on Monday, October 28th, 1957. In Golson's introduction to the report, he states that the aim he set himself in field work was threefold:

1. "To get a broad acquaintanceship with the visible field monuments in the areas visited, to evolve some sort of general classification of these monuments, to attempt an interpretation of them on the basis of their distribution, the circumstances of their occurrence, traditional data relating to them and possibly limited excavation of them."
2. "To see and record such archaeological material as might have been incidentally recovered in the course of gardening or roadmaking and preserved in collections of one kind or another."
3. "To look for potential sites for excavation with particular regard to sites of early settlement."

He therefore organised the following report under these headings.

FIELD MONUMENTS IN SAMOA

Our activities in Samoa were restricted to the island of Upolu, and though each district was visited and the aerial cover thoroughly worked over attention was concentrated on three main areas:

1. The Apia district.
2. The alluvial flats round Falevao.
3. The Vaigafa and Fagatoloa valleys.

These were chosen because of the known or discovered presence of monuments on cleared land and in places of relatively easy access. Specific visits were, however, paid to other areas where particular monuments were reported or discovered on aerial photographs.

No review of field evidence exists for Samoa similar to McKern's for Tonga. Incidental field observations are made by Buck (1930) and particular features are described in articles by Thomson (1927), and Freeman (1943 and 1944a, b, c).

The striking thing was the broad similarity in the forms of field monument in Tonga and Samoa, the main differences being:

(i) that in Samoa with its lava strewn terrain structures which in Tonga would be built of earth were built of stone;

(ii) that whereas in Tonga the mound was raised and elaborated in honour of the dead, in Samoa it was pressed into the service of the living.

GRAVES

Buck (1930: 322) mentions cairns of unworked stone raised over the graves of the dead. We found few well authenticated prehistoric examples. One of these, Tia o Nene, at Tafatafa on the south coast, was of considerable size. Graves allegedly belonging to the Tuiatua family at Lufilufi, the chief village of Atua district, were low rectangular structures of loose stone. Here too was seen a loose and sprawling stone pavement said to cover prehistoric graves. Buck makes mention of this practice (1930: 322).

Pigeon Mounds

A considerable number of pigeon mounds *(tia seu lupe)* was seen. The type is very similar to the Tongan examples. A circular mound of earth is retained by a vertically built stone wall. On none of the Samoan examples, however, was the Tongan feature of a stone-lined central pit observed. Also in place of the external causeway giving access to the top of the mound commonly reported in Tonga, the Samoan practice was to leave one or more internal ramps. As Buck records (1930: 321-322) some mounds are merely built up on three sides, the fourth being formed by the ground level of the ridges at the end of which the mounds are commonly sited.

Variants include, if we are to trust local identifications, structures built entirely of piled rocks, sometimes rectangular in form.

House Platforms

These are possibly the commonest class of monument in Samoa. They are rectangular mounds of earth or stone, depending on the nature of the terrain in which they are situated. The stone examples have usually kept their original shape better than the earthen ones, but some of these latter, for example the huge ones in the Vailele complex described by Freeman (1944c), still display flat tops and straight sides. Great variations in size are to be observed.

The following points can tentatively be made:

(i) The modern practice in house platform *(paepae)* construction is to make the living surface habitable by putting down a layer of small coral or small water worn pebbles in the house area. This feature is to be observed on some prehistoric mounds where the original surface is exposed. However, some rectangular platforms of loosely piled lava rubble were locally interpreted as *paepae,* whose surface, though level over-all, was extremely uneven and showed no indication of a finishing layer of smaller smoother materials.

(ii) The modern practice of defining the perimeter of the house between the posts with stones is in favourable circumstances also to be observed on prehistoric *paepae.* Since, as will be discussed below, the period of occupation of habitation sites is sometimes traditionally remembered, it should theoretically be possible for field archaeology to document the evolution of the round-ended and the so-called round house in Samoa. On the basis of our limited observations, the latter would appear to be a late feature. Only one indubitable example was recognised in the field, on a traditionally late site near Falevao.

(iii) A feature of the modern Samoan village is the variety and elaboration of the house platforms. This variety and elaboration was not observed on prehistoric sites. Thus only one example of circular house platform was seen in the field, on the late site near Falevao mentioned above. All the rest of the structures are rectangular. On any site a few are very large and impressive, the vast majority smaller and all roughly the same size. This may denote a time when village authority was more clearly defined than today.

Villages

House platforms occur very rarely in isolation but, as suggested by the last paragraph, usually in groups representing the site of an ancient village.

Such village sites are the most remarkable feature of Samoan field archaeology and form the major point of contrast between Samoa and Tonga, where neither archaeological, traditional nor historical evidence gives any indication of nucleated settlement in prehistory.

The existence of old village sites in such numbers and such clarity offers a most fruitful avenue of investigation into Samoan prehistory. Mr Ambrose and myself devoted considerable attention to the question in the field, to see the sort of information that it would be possible for the field worker to discover.

(i) There are the sites themselves. The rockiness of the terrain has led to the fossilisation of some villages in the form of varieties of above ground structure in stone: not only house platforms, but stone pathways, stone wall enclosures perhaps for pigs, stone lines and stone heaps, perhaps for clearance, stone heaps and loose stone pavements, perhaps for burial. Good examples of this type of site were visited near Ti'avea (the old village of Tilo, now under bush) and in the Fagatoloa valley some miles north of Lotofaga where an old village site is to be found in the partially cleared dairy pastures of the Honourable Fonoti.

In less stony areas village sites assume a rather different form. The earthen house platforms are sometimes built up in such a way that "hollow ways" are formed between one house and its neighbours. True sunken roadways are present on some sites and on one site near Samoa College the hillside has been terraced for habitation.

The village sites are commonly very extensive. Topographical considerations doubtless imposed the strikingly regular pattern exhibited by some village remains, for example on the narrow plateaux between gorges on the slopes southeast of Apia, but elsewhere, where such topographical limitations are not present, the impression of orderliness in village layout is strong. Mention has already been made of the presence of a few imposing *paepae* differentiated from the mass of smaller and identical house sites.

(ii) There are considerations in any such survey of old village sites of distribution and chronology. Virtually all Samoan villages today are situated on the coast. Most of the old village sites visited or reported are back from the coast and a large number are some distance inland. This difference of settlement pattern is well appreciated by the Samoans themselves and a common explanation met with of village earthworks is that they represent the old site of a village now on the coast.

The investigations we were able to carry out were too limited to allow of generalisations, but the impression we gained was that a considerable number of the present villages have an old inland representative. Some villages indeed proved to have a number of old inland sites. Thus in the two miles of sloping ground from sea coast to bush line behind the present village of Vailele bounded east and west by the gorges of two streams, there are traces of at least three extensive village sites, allegedly all ancestors of the present coastal village.

An effort was made to document the history of these village shifts and a number of old village sites were selected for study:

(a) Tilo, near Ti'avea, a site reported by Charles Wright.
(b) Sites in the Vaigafa and Fagatoloa valleys reported by Charles Wright, Ward Barrett and Susan Hirsh.
(c) Sites on the alluvial flats at Falevao discovered on aerial photographs.
(d) A site near Sauniatu, discovered in the field.
(e) The well-known sites near Apia, particularly those on the Vailele plantations of Samoan Estates.
(f) A site behind Fasito'o-uta discovered in the course of field work.

Visits were paid to the modern villages on whose land the old sites are to be found and an effort made to discover by questioning:

(a) The name of the old village;
(b) The period of its occupancy;
(c) The relationship of the old village to the present village (in terms of continuity of titles etc.);
(d) The age of the present coastal village (in terms of how many holders of such and such a title had lived on the coast);
(e) The presence of other old village sites and the period of their occupation;
(f) Incidental traditions about the old village sites involved; and at the very end of the discussion,
(g) Reasons for inland settlement and for the move to the coast.

We attempted to compile a number of case histories for the villages we were interested in by holding such discussions at Ti'avea, Lotofaga, Falevao, Saluafata, Vailele, Moata'a and Fasito'o-uta. Results were patchy. Where discussions were held with the assembled *matai* of the village, as at Ti'avea, Saluafata and Fasito'o-uta, little of value was obtained since questions of titles and genealogy were involved. At Lotofaga, Vailele and Moata'a, however, we had for interpreter a chief of the village and for informant the leading *matapule* and discussions were held in private. Good information was forthcoming from these meetings.

The general impression we obtained was that coastal settlement was quite recent, perhaps coincident with the time of European contact. It was apparent however that the shift to the coast was only the final stage in a quite complex series of village movements, the reasons for which the information recovered would suggest are equally complex.

Strongpoints

One blanket explanation for inland villages, stone walls and other archaeological features commonly met with from informants was the Tongan wars or the Tongan occupation.

None of the inland villages described in the last section, however, appeared to owe their position or their features specifically to the requirements of defence.

Nevertheless Charles Wright (see for instance Wright 1963: 91-94) has reported evidence of occupation so far inland, for example in the craters of the extinct volcanoes of the central plateau, that some explanation in terms of refuge areas seems in order. The only site of this character visited, near Tanumalala, had a number of low stone platforms on the crater rim and a paved causeway inside the crater.

Apart from sites of this character Wright noted the presence of defensive earthworks and classified these as follows:

(i) Ring ditches on steep isolated hills. He notes this as an uncommon feature.

(ii) Cross trenches on a narrow ridge, sometimes associated with artificially flattened tops and scarped slopes.

We did not see any examples of type (i) but sites of type (ii) were reported or discovered:

(i) On a steep and narrow ridge in the bush behind Moamoa, the site of the Catholic mission southwest of Apia, two frontal cross trenches cut off a flattish area on top of the ridge, which shows one or two transverse stone walls but nothing in the way of rear defence.

(ii) Behind one of the old village sites southeast of Apia a cross trench with inner bank runs a considerable distance between two gorges to cut off an area where because of luxuriant second growth no archaeological features could be discovered beyond a low stone wall. No trace of rear defence was seen.

(iii) Behind another of the old villages in the same area the narrowing steepening ridge had been levelled and scarped into a number of cross terraces. No rear defences were seen.

(iv) The whole northward trending ridge falling into Apia from Mount Vaea has been transversely terraced and scarped and shows evidence of *paepae*.

(v) A special visit was made to see a fort overlooking the pass between Falelatai and Lefaga Bay. The complex system of

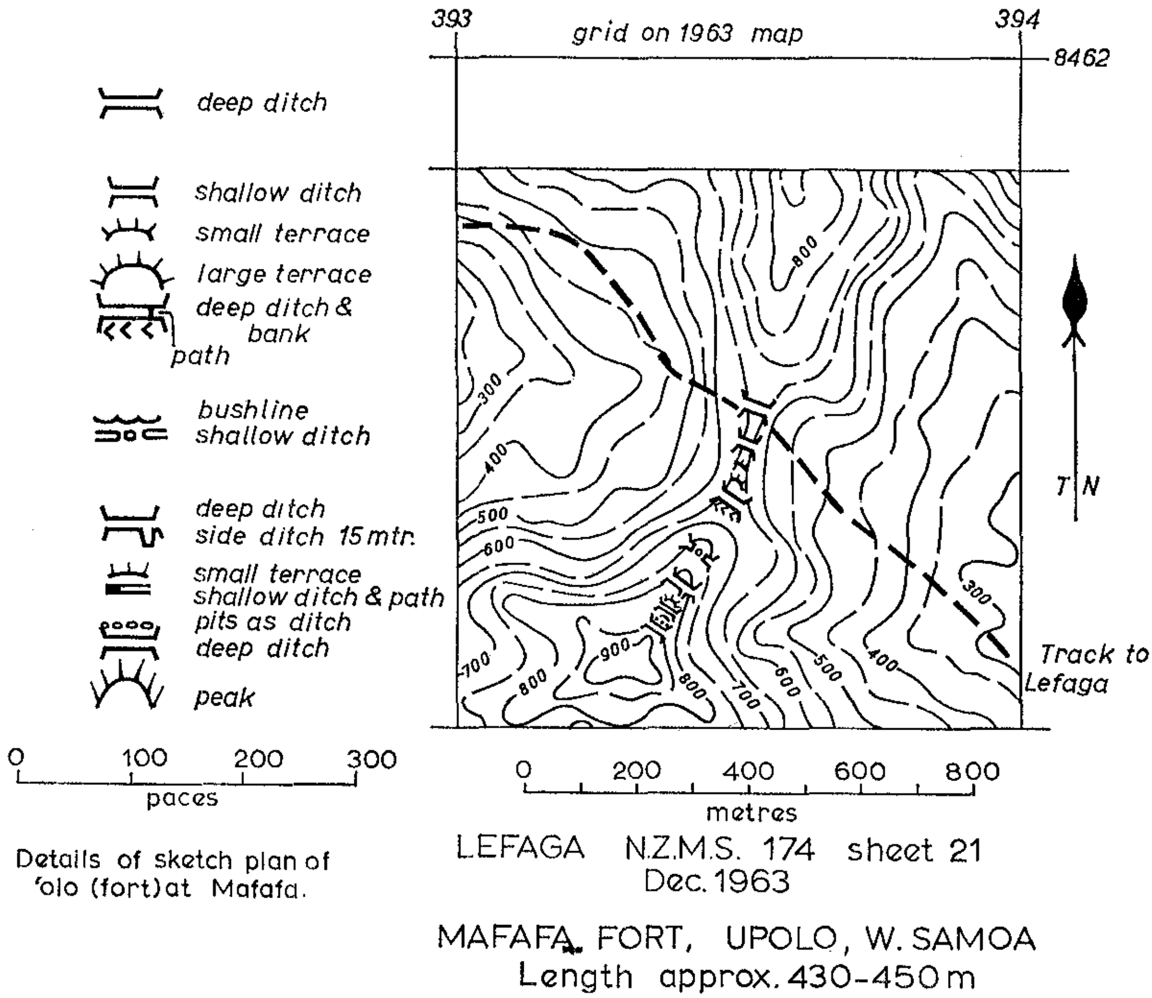

Fig. 2. Plan of Mafafa Fort, Falelatai, Upolu.

cross trenches and banks, cross scarps and terraces, was seen under execrable conditions of weather and terrain. A skirmish took place in this area (Mafafa) in the late 19th century, associated with a rivalry of the Great Powers in Samoa. Local intelligence persisted in identifying the earthworks with the gunfight, but the field indications are that the site is considerably older (fig. 2).

Though the information gained on fortification was meagre, it was interesting to see that terracing and scarping for defensive and habitation purposes were practised by the Samoans. Because of the radically different nature of the terrain in Tonga and Samoa, it seems a little rash to base cultural contrasts between Tonga and Samoa on differences in fortification, as does McKern (1929: 122).

Agricultural Evidences

As persistent a feature of the field record as old villages are stone walls or rows.

The presence and possible function of stone walls on village sites have already been mentioned. They exist in large numbers, however, apart from village sites, and the only explanation of them seems to be in terms of agricultural clearance.

They vary in size and extent. Some seem to follow no particular plan. Others, for example a very fine complex on the Mulifanua plantations of Samoan Estates, seem to enclose definite areas. They are most extensive in distribution and examples were seen high up on the central plateau above Aleisa.

With them must be associated the stone cairns which are less common but very numerous on some sites (see section on excavations below).

Particularly interesting was the evidence discovered of terraced cultivation at Moamoa near Apia and on the Mulifanua plantations. The terraces have the appearance of large garden areas stepped on slightly different levels down quite a gentle slope, the scarp between any two formed by a loosely piled revetment of rubble cleared from the adjoining ground.

Mention of two other field features will complete this catalogue of Samoan field archaeology.

Circular Pits with Raised Rim

Four examples of this feature were seen. Two were in association with an old village site on alluvial flats near Falevao, one in the vicinity of pigeon mounds on Toso clearing, inland from Salani, the fourth glimpsed from a bus window by the roadside at Apolima Fou.

No traditional explanation of the feature was then obtained, but those subsequently excavated by Davidson (Green and Davidson 1964: 38-39) in Vaigafa have confirmed the traditional explanation she received that they are earth ovens *(umu ti)* for cooking the roots of the *ti (Cordyline fruticosa L.)* plant.

Roads

These are of two types:

(i) Raised and paved. Examples were seen at old village sites.

(ii) Sunken ways. These were quite numerous, often covered considerable distances and were present not only on village sites, but in connection with pigeon mounds and prehistoric plantations. They may be compared with the roads recorded by McKern for Tonga (1929: 89).

Archaeological Collections

None was found in Samoa. Individual adzes in private possession were seen and drawn. Two fruitless afternoons were spent searching the lower western slopes of Mount Vaea for a stone tool workshop discovered by Mr P. W. H. Kelly, General Manager of Samoan Estates, many years ago, material from which was apparently sent to Dr Skinner at the Otago Museum. A visit by Davidson in June 1964 to the quarry, showed that the use of a stone crusher has destroyed most traces of prehistoric activity. Sixteen adzes from Upolu presented by Mr Kelly are now in the Otago Museum, but a more precise location is not recorded. An appeal to school children at Samoa College by Mr Ward Barrett and at Apia Primary School by Miss Mabel Hewes produced a number of adzes for inspection. Nothing unexpected in the way of adze types turned up.

Excavations

Much the same considerations apply to excavation in Samoa as in Tonga. The rareness of beach exposures was as marked, and there was a complete absence of visible traces of shell midden deposits.

Five sites were visited with a view to excavation:

Ti'avea

A likely looking section was exposed in the sea bank near the village school at Ti'avea. With the permission of a village meeting of family heads a small excavation 6 feet by 3 feet was made into the deposits.

These proved to consist of a number of layers indicative of cooking or burning, separated by layers of coral sand, the whole sealed in by a thick mantle of sand. Samples of charcoal were taken at each level of burning. There were indications of postholes at the base of the deposits 4 feet below ground surface.

Aleisa

High up on the hills behind Aleisa and stretching over the central plateau towards Tanumalala, Samoan Estates maintain a cattle ranch at the time under the management of Mr Heise.

We visited this ranch to look at examples of stone walls and heaps and a small number of associated house foundations in cleared conditions. We excavated half one of the stone heaps. It proved to be a simple heap of stones, presumably from agricultural clearance. There was no disturbance of the ground below it.

Thanks are due to Mr P. W. H. Kelly, General Manager of Samoan Estates, and to Mr Heise of the Aleisa station for permission to excavate.

Falemauga Caves

We visited these caves as a result of Freeman's report (1944a) of thick ash layers and midden deposits associated with built up sleeping and living platforms stretched out along the lava tunnels.

In company with Mr McKenzie on whose property the caves are found, Otto Nelson of Apia and Etene Sa'aga of Malua, we made a thorough search of all the galleries.

Surprisingly none of the evidences of prolonged or intensive occupation described by Freeman were seen. Charcoal from fires was common on top of the *paepae* and samples were collected.

Seuao Cave, Sa'anapu

The same considerations applied to this cave, described by Freeman (1943). Charcoal samples were taken. One was submitted for analysis because one of the most famous of Samoan traditions dates occupation of the cave to the 15th century (19 generations). The result was 240 ± 50 years before 1950 placing some occupation somewhere between 1610 and 1810 A.D. at a 95 per cent level of confidence.

Vailele

Our attention had early been attracted to an extensive series of village earthworks on both sides of the main road east of Apia just past the village of Vailele and actually on the Vailele plantation of Samoan Estates. A number of large earthen mounds and traces of hollow ways lying between the road and the sea looked particularly interesting.

Providentially one of the larger mounds proved to have had a deep bulldozer cut made into it, the soil being needed to level up the ground for new abattoirs nearby. A tangless triangular adze of Type VIb was picked up on the floor of the bulldozer cut (fig. 58a) and the exposed section disclosed evidence of a number of periods of occupation of the site. Mr P. W. H. Kelly, General Manager of Samoan Estates, whose house is close by, gave us permission to excavate and during preliminary cleaning up of the spoil against the walls of the bulldozer cut pottery came to light.

A trench 20 feet long and 5 feet wide was excavated alongside the bulldozer cut. Immediately beneath the thin topsoil were the small water worn pebbles of a house floor. Postholes were found which seemed to belong to this level.

The pebbles had been laid on a 3 feet thick earth fill which sealed in a complex of pebble layers indicating one or more house floors and stages in their repair and renewal. A pit and postholes served further to complicate this horizon. The layer of earth on which these pebbles rested presumably represents the original mound.

Sealed in at the base of these deposits was a blackish habitation layer and from this layer pottery was recovered in fair quantity. Two broken adzes of Type V were also found (fig. 50b, c). (See Report 7a, p. 111 for their discussion). On the surface of the subsoil was the record of much building activity in the form of postholes deriving from a number of levels.

The pottery-bearing black layer seemed to be totally unconnected with the mound construction that sealed it in. According to informants from Vailele village, the visible remains which represent the latest stage of settlement on the site belong to the village of Salima, who appears in the genealogies about 13 generations ago, say 325 years. Allowing for a period of settlement before this, the traditional indications are of a tolerably early date for the pottery horizon. Three carbon samples which were taken from the layer have since been dated to the 1st century A.D. (Grant-Taylor and Rafter 1963: 158, Green and Davidson 1965: 64-65).

The discovery of pottery in Samoa, even though at present finds are restricted to one spot, is important. It is possible, of course, that the pottery is of Tongan manufacture and dates from that famous event in Samoan traditions, the Tongan occupation of about the 13th century. On present, and subsequent evidence, however, this would not seem to be the case.

ACKNOWLEDGEMENTS

While I was in Tonga I met, through Acting-Premier Havea, an old Samoan Chief, Tofa I'iga Pisa, who holds his title from Pu'apu'a, in Fa'asaleleaga district, eastern Savai'i. I'iga most generously offered accommodation and help to Mr Ambrose and myself during our stay in Samoa and we made his house near Apia our headquarters throughout our visit. The success and pleasantness of our work in Samoa owes much to I'iga and his family. In addition I'iga is somewhat of an authority on Samoan traditional history and ways of life. He was thus able to be of considerable help in our work by laying his knowledge at our disposal and by arranging the meetings with other traditional leaders.

One of these I would like to single out for particular mention. Asi Filiva'a, chief of Moata'a village (though resident at Vaiala), offered his services as interpreter during a series of evening discussions which we had with village leaders in the district east of Apia.

Thanks are also due to officers and employees of the New Zealand administration:

1. to the High Commissioner, Sir Guy Powles, who took a lively personal interest in our work;
2. to Mr Ian Stirling, Director, Lands and Survey Department, who made an office available to us, put maps and aerial photographs freely at our disposal and provided transport for long distance reconnaissance on a number of occasions;
3. to Mr Eddie Stehlin, Assistant Secretary, District Affairs, who took pains to recommend us to leaders of the villages we visited and provided the interpreter whose services we utilised most;
4. to this man, Etene Sa'aga, we are indebted for the cheerfulness with which he acquitted the rather unusual tasks we involved him in.

From the following private individuals we acknowledge invaluable assistance:

1. Vaiao Alailima and his American wife Fay, who housed and helped us during field work in the Vaigafa Valley, behind Lotofaga and Salani.
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I have to thank the following people for their practical help in excavations:

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DESCRIPTION AND CLASSIFICATION OF SAMOAN ADZES

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The surface artifacts are discussed in three separate reports (Nos. 5, 12, 17) while excavated materials are presented as part of the individual site reports. Adzes are by far the most numerous artifacts in the surface collections, and together with potsherds and stone flakes are the most common artifacts from excavations. In order to maintain over-all consistency in typological references to adzes throughout the reports, it is therefore necessary to provide a discussion of Samoan adze classification at this point.

While we do not dispute the value of adze classifications which attempt to cover the whole of Polynesia (Duff 1956, 1959, Emory 1968) we feel that there is a need for classifications of adzes from individual island groups. Distinctions that may prove important in Samoa tend to appear minor in contrast to distinctions between, for instance, Samoan and East Polynesian adzes. In order to describe the Samoan collections as fully as possible, we have therefore followed the lead set by Suggs (1961: 107) for the Marquesas, and adopted a classification that refers only to Samoan adzes. Unlike Suggs, however, we possess insufficient information about the names for adzes or their function to use these as a basis for their classification (see Buck 1930: 332-333, 356-362). Thus we have adopted a typology that while it is primarily based on formal criteria (see table 1) appears also to yield useful results in the analysis of persistence and change among excavated Samoan adzes.

There was already in existence a morphological classification of Samoan adzes by Buck

TABLE 1

DISTINGUISHING CRITERIA FOR CLASSIFICATION OF SAMOAN ADZES

Flaked and partially ground finish							Fully ground finish	
Quadrangular cross-section			Rounded		Triangular		Quadrangular section	
Back > front		Front > back	Back flat		Apex up	Apex down	Back > Front	
Thin	Thick	Thin	Thin	Thick			Thin	Thick
I II[1]	IX	IV	Va	Vb	VI VII[2]	VIII	III	X

[1]further distinguished by median ridge on back.
[2]further distinguished by consistently greater thickness in relationship to width of cross-section.

(1930: 333-356) and its application to our collections yielded promising results. Our experience parallels that of Poulsen who also used a modified version of Buck's classification for Tongan adzes. Buck's classification emphasises a close analysis of the geometric form of the cross-section and its shape based on the relationship between the width of the back and front of the adze and its thickness at that point. It also takes into account the degree of finish, but neglects features like butt modification, lugs, or curvature of the back that are seldom found in collections of adzes from West Polynesia. Thus it appeared that a modified version of Buck's classification had greater utility for our purpose than Duff's, which by employing broader definitions for the cross-section groupings and concerning itself equally with variations in butt modifications, has a definite East Polynesian orientation. It should also be noted that Duff's classifications are intended to reveal the relationship between the early adzes from New Zealand and those of East Polynesia, or between the various East Polynesian adze forms and their Pacific and Asian counterparts, and are not designed for describing the adzes of a single island group, with the possible exception of New Zealand.

Nevertheless the Samoan adze collection is typically Polynesian in all those features usually employed in characterising adzes from this area. Many of the types appear to have their closest relatives among the early adze assemblages from the Maupiti burial site in the Society Islands and the adzes from the early end of the sequence for the Northern Marquesas (Emory 1968) rather than the early adzes from New Zealand (Duff 1959).

A modified version of Buck's morphological classification was devised for the Samoan collections by Green and Davidson. Based initially on the Savai'i collection (Report 5) which is the largest, it was extended to the other surface collections, and then used on Samoan collections at the Bernice P. Bishop Museum, including those studied by Buck.

A statistically oriented study of the measurements of length, width and thickness and their inter-relationships using all complete adzes from both our surface collections and those of the Bernice P. Bishop Museum was also performed. Six excavated adzes of Type V from layer 5 of the Sasoa'a (Sa-3) site were included to supplement the small number of complete adzes of this type in the surface collections (Green and Dessaint [MS]). This study examined the degree to which measurements for each of our adze types exhibited a cohesive patterning or clustering in relation to other types in the classification, as one basis for adjusting the classification in cases where clustering did not occur. As well this study allowed us to test the consistency with which Samoan adzes conformed to the Central Polynesian pattern established for these measurements by Green and Purcell (1961) and for similar measurements on adzes from New Zealand. The results reveal that Samoan adzes conform very closely indeed to what appears to be a general Polynesian pattern, at least with respect to these three measurements and the relationships between them (Green and Dessaint [MS]).

After much discussion and the several steps outlined above which produced successive modifications, the adze classification presented here has resulted and is used throughout the reports in describing both excavated adzes and surface finds. The types are defined below following Buck (1930: 334-356) and have the same numbers as his, although the definition of some of his types and several of the variations within his types have been altered. Also two new types have been added and some of the varieties given names where they are especially prominent in a particular site or locality.

In any classification of this kind there are some items which could equally well be assigned to either of two types, or which appear to fit into none. We are confident, however, that the majority of Samoan adzes can with reasonable certainty be assigned to one of the types described below. Moreover, we have found that there is a high rate of agreement between the authors concerning the category any given adze should be assigned to.

The terminology used in describing the adzes follows that outlined by Davidson (1961: 6-10) based on the early conventions established by Buck *et al.* (1930).

TYPE 1
(fig. 3)

This type corresponds to Buck's Type I, with some restrictions (Buck 1930: 334-338). It has a low flat trapezoidal section with the front narrower than the back in which there is a close correlation between width and thickness as length increases. The back usually narrows from cutting edge to poll, and the front usually narrows more markedly. The sides are distinct and slope inwards to the front. The bevel is short. The front and bevel are usually ground, while the sides may or may not be ground. The back is flat and is usually flaked but not ground. We have transferred Buck's thick variety from Type I to our new

Type IX, making Type I more uniform. Despite the fact that Type I forms approximately 40 per cent of the Samoan collections, it shows less variability between width and thickness or shoulder index than some of our other types.

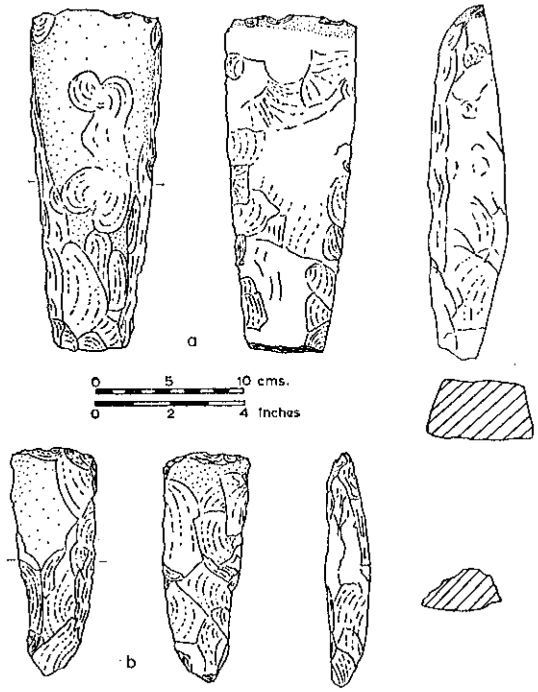


Fig. 3. Adzes, Type I. a. A 16/17, Taga (purchased). b. A 12/209, Luatuanu'u.

Type II
(fig. 4)

This also corresponds to Buck's Type II (1930: 339-342). Adzes of this type are often less regular and more roughly finished than Type I. This is reflected by their shoulder index, which, although largely falling within the same range as Type I, exhibits a greater variability and less cohesive distribution. This is partly because adzes of this type possess a five-sided section, with a median ridge down the back, rather than the flat back of Type I. The sides slope more obtusely away from the front, and the curved or V-shaped back means that these adzes are thicker in relation to width than those of Type I. The finish is similar to Type I, with a short ground bevel, ground front and flaked sides and back.

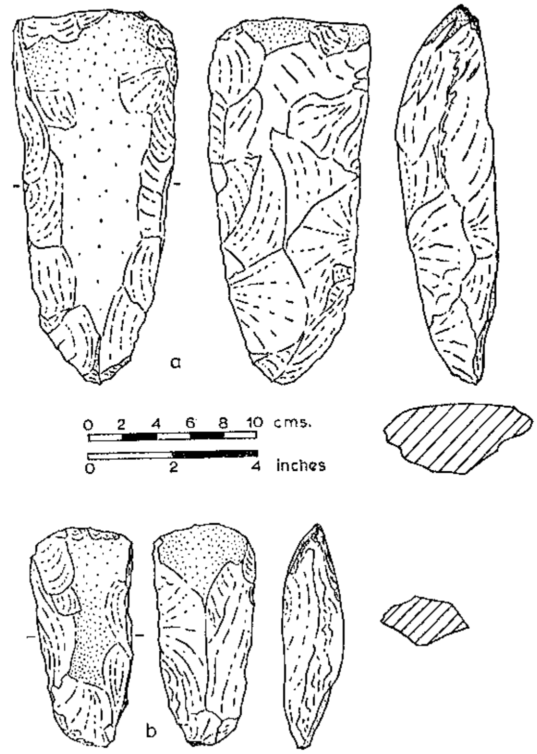


Fig. 4. Adzes, Type II. a. A 13/5, Satupa'itea. b. A. 16/207, Faletagaloa.

Type III
(fig. 5)

Type III as defined by Buck (1930: 343-44) is ground on every surface except the poll, and also has the front narrower than the back, although not so markedly as in Type I. Type III has been retained as defined, although we have found other adzes which might be placed in this type on the basis of their over-all finish and trapezoidal section. They are, however, more markedly trapezoidal and much thicker in relation to width than Buck's Type III adzes, and the study of the distributions of their shoulder indexes and those of Type III (Green and Dessaint [MS]) convinces us that they form a second cluster and should not be included in Type III, but placed in a new Type X. It should be stressed that in distinguishing these two types we are using over-all finish as a first order criterion for demarcating the two types, rather than the shape of the cross-section, so that each has correlates in the adzes of Types I and IX respectively which do not possess this fine finish. We have done this because we believe this distinction may prove to have some chronological significance. Adzes of Type III also tend to be small in size (51 to 131 mm.) and possess a low shoulder index (26 to 64).

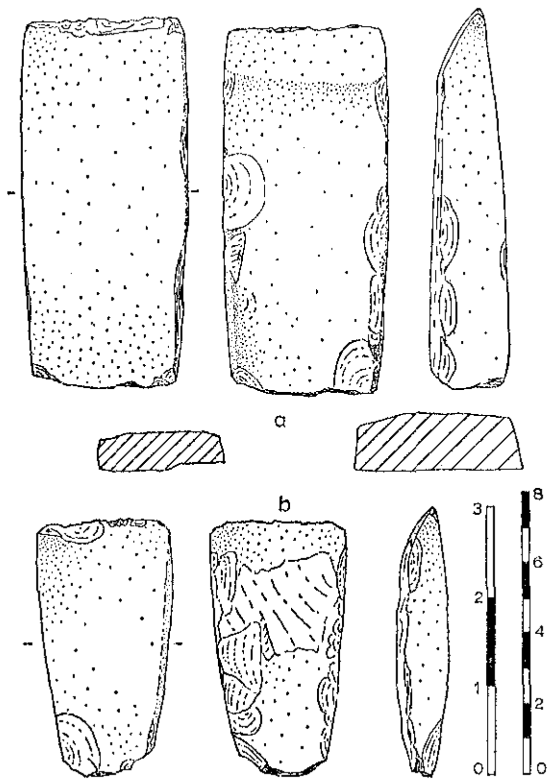


Fig. 5. Adzes, Type III. a. A 16/213, Safotu. b. A 16/59, Avao.

TYPE IV
(fig. 6)

According to Buck (1930: 345-46) this type is distinguished by having the front wider than the back, in contrast to the first three types, and we have retained his differentiation and type. Adzes of this type are usually ground all over and those in our collections tend to be small with little variation in length (50 to 110 mm.) or width in relationship to thickness, the shoulder index ranging between 35 and 60. Buck defined two varieties of this type: IVa has distinct sides and back which meet with clearly defined edges to form a trapezoidal section, while IVb has a rounded back and sides which merge into each other and are not distinguished by edges. Were this variety more numerous, (we have only one complete specimen which can be regarded as Type IVb and Buck had only a few examples), it might be regarded as a separate type with a reversed cross-section of the same form as Type V, but in the present circumstances it does not seem warranted. There are several fragments with plano-convex cross-sections but lacking bevels, that could belong either to this type or to Type Va.

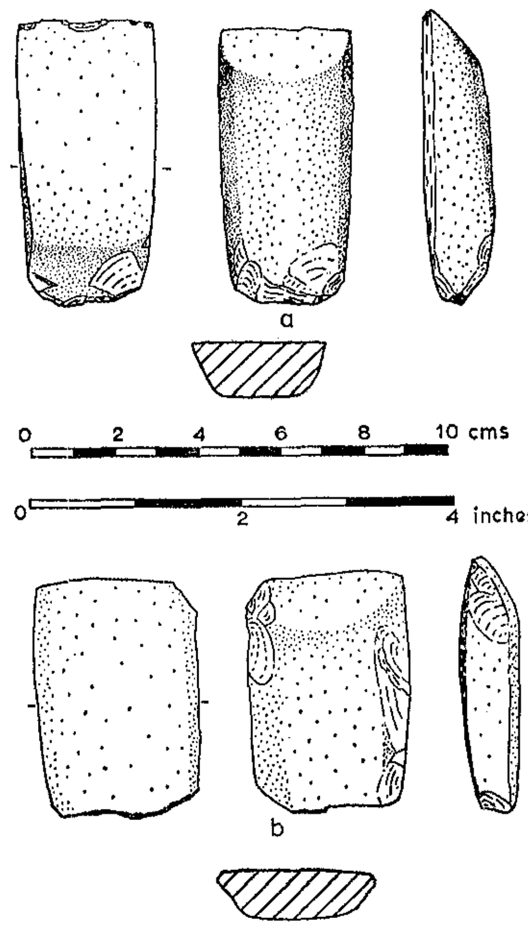


Fig. 6. Adzes, Type IV. a. A 15/8, Sala'ilua. b. A 10/136, Luatuanu'u.

TYPE V
(fig. 7)

Buck defined this type on the basis of only three specimens, one of which he regarded as an only slightly modified water worn stone (1930: 346-348). As he defined it, the type has a rounded front which merges into the

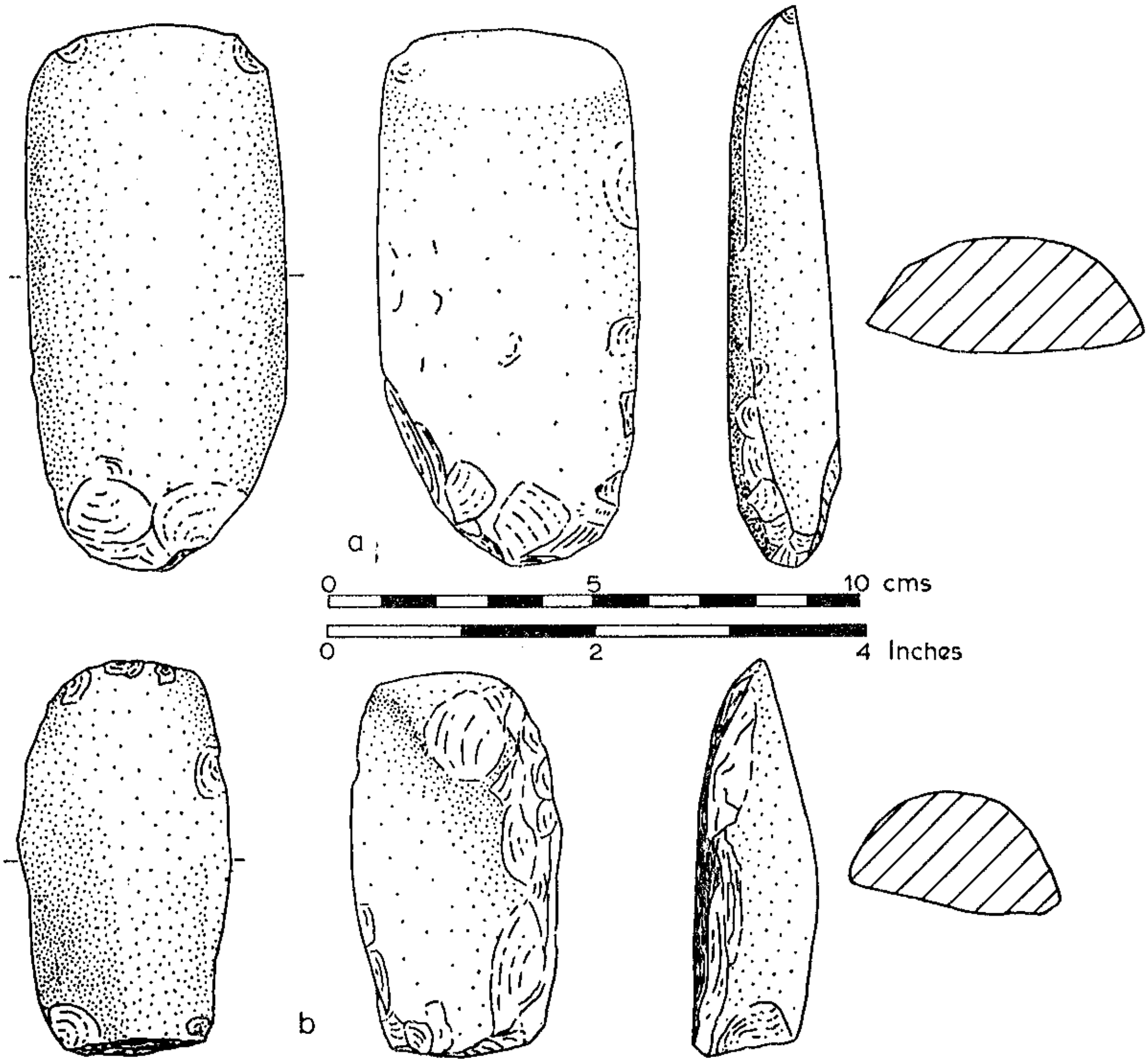


Fig. 7. Adzes, Type V. a. Vailele Variety, A 16/182, Saipipi. b. Sasoa'a Variety, A 16/181, Saipipi.

sides without front edges. The back has a well ground surface which is bounded on the sides by distinct edges. We would add that the back is almost flat, a point not made explicit by Buck. We have divided the type into two varieties, each named from the excavated site at which it was first recovered. The problems concerned with the recognition of this type as one of the most important early Polynesian adze forms are discussed in Report 7a, p. 111.

Type V, Vailele variety, was first recovered from early contexts at SU-Va-1. It corresponds to Buck's Type V variation (1930: fig. 194) and is relatively wide and thin. Type V, Sasoa'a variety, is narrower and thicker, more closely resembling Buck's original specimen. This variety was first recovered from SU-Sa-3, where adzes of the Vailele variety also occurred. Type V is distinguished by its plano-convex cross-section in which the width of the section does not increase as much in proportion to the thickness as it does in adze types with other geometric forms of cross-section. Thus thin and thick varieties of these adzes have fairly uniform widths, with the shoulder index for the Vailele variety of 35 to 70 clustering at the lower end of the range and that for the thicker Sasoa'a variety of 75 to 95 clustering at the upper end of the range. These distinctions are correlated with length as well, lengths of the Vailele variety of adze ranging from 70 to 140 mm. and of the Sasoa'a adze from 110 to 190 mm.

TYPE VI
(fig. 8)

According to Buck (1930: 349-50), Type VI embraces triangular adzes with apex to the front, which have a fairly wide back and a median ridge in front. Some of these adzes are large and heavy. The common variety of Type VI is as illustrated by Buck.

Within this type we have singled out as the Lotofaga variety adzes possessing a single additional feature, although the distinction can only be drawn for complete or almost complete specimens of the type (plate 1, left). The feature is a specialised development in which the front of the adze is concave owing to the fact that the expanded portion of the front which forms the cutting edge turns slightly upward above the plane of median line which forms the remainder of the front (see fig. 8). Existing examples of this variety are large and heavy. The majority of Type VI specimens in our collections, however, are small and fragmentary. We have therefore not split the type into two separately designated varieties, but merely characterise as Lotofaga variety, those complete specimens having the specialised feature. Complete examples of the Lotofaga variety are also distinctive in having a length of over 315 mm. and shoulder index of over 100, which set them apart from the smaller common variety.

TYPE VII
(fig. 9, plate 1 centre and right)

While a number of adzes in our collections resemble Buck's Type VII, our complete specimens all differ significantly from that illustrated by Buck (1930: fig. 197). Also we found it difficult to discriminate between adzes of Type VI and those of Type VII along the lines suggested by Buck, and have therefore decided to modify the typology so as to make the distinction clear. Thus we regard our Type VII as similar but not identical to Buck's Type VII.

Both Buck's Type VII and ours are distinguished primarily by being extremely thick in relationship to width, although exhibiting a triangular cross-section with apex to the front which also characterises Type VI. In this our definition agrees with Buck's (1930: 351) and is borne out by the lack of overlap in shoulder indexes for the two types. Type VI as now defined has a shoulder index of between 65 and 110 whereas Type VII has an index of greater than 140, the only adze type in which the thickness is always greater than the width.

Our complete specimens, however, differ from the specimen Buck illustrates in being thickest at the bevel shoulder while thinning markedly towards the poll, and in having a median ridge for much of the front surface which widens only slightly to form a narrow cutting edge in relation to the adze's length and weight. Some kind of specialised chiseling or gouging function seems to be implied. There is a great range in size, from one of the largest of all our adzes, to one of the smallest, with several intermediate sizes. Also adzes of this type exhibit a high development of flaking as a finishing technique, which is unusual in Samoan adzes.

Several fragments in our collection are apparently closer to the type Buck described, and may represent a separate variety, of which we have no complete examples. While they retain the high shoulder index they are distinguished by having a subtriangular section and a greater degree of surface finish.

TYPE VIII
(fig. 10)

As our collections include several specimens of this type, we are able to define it more thoroughly than did Buck (1930: 351-52), who had only one example. It includes all adzes of triangular section with apex downwards in which the back is represented for much of its length by a median ridge. Variation in the type occurs along two lines. Some of the specimens are thick, although most tend to be rather thin, so that their shoulder indexes are less than 76 and form a group which does not overlap with that of either Type VI or VII which are also of triangular shape. Secondly, some are ground on all surfaces, while others are largely flaked. We have tentatively grouped them into two varieties according to the latter characteristics, as the thicknesses do not fall naturally into two clusters as was the case with Types Va and Vb although there is a tendency for the VIIIa adzes to be of shorter length and have a lower shoulder index. Type VIIIa is ground all over, and Type VIIIb is not. While it may be that this distinction will prove not to be important, and should eventually be withdrawn, it is also possible that the distinction is as significant as that between Types I and III, or IX and X, and that eventually two separate types, rather than two varieties, may be warranted.

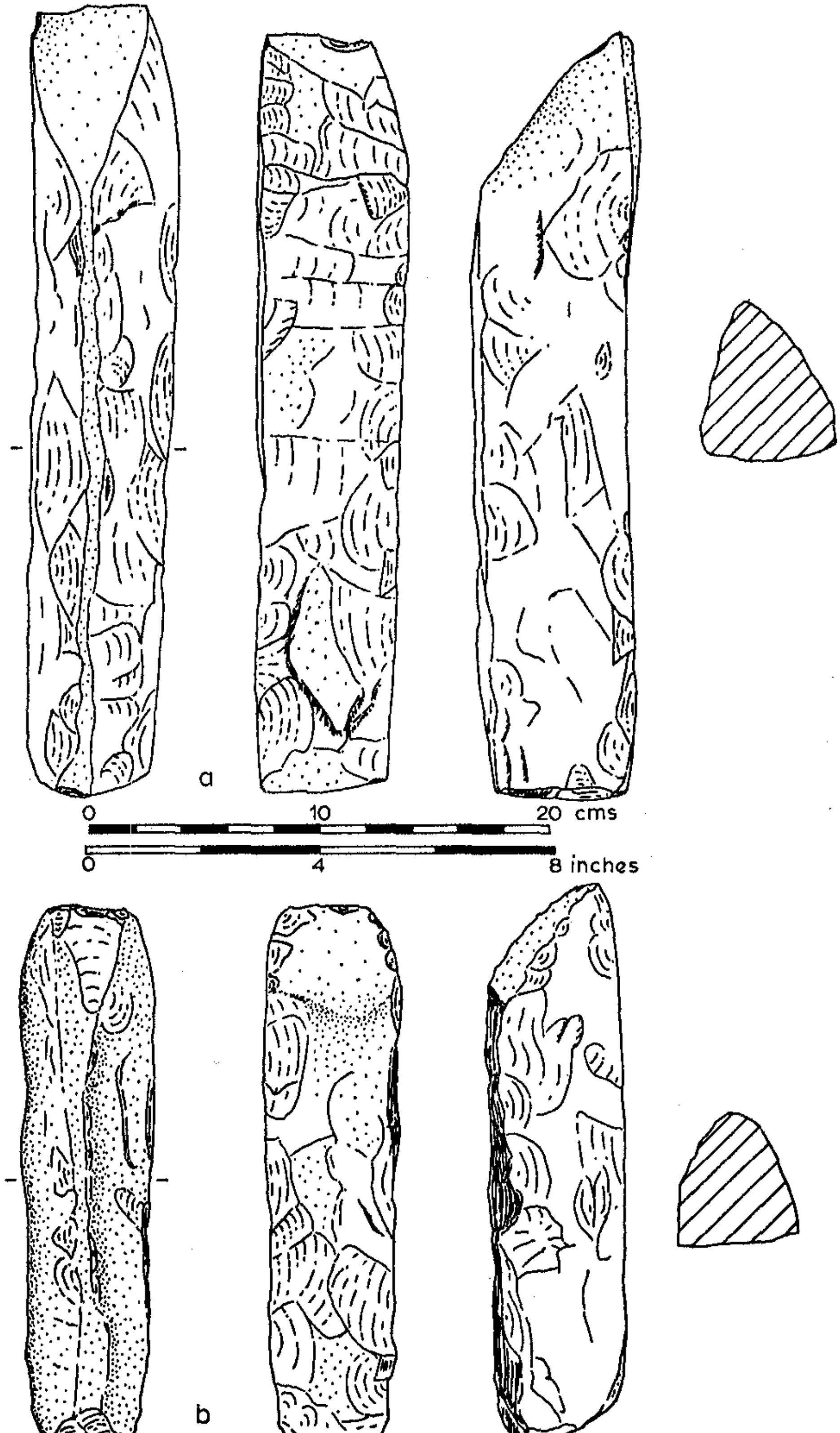


Fig. 8. Adzes, Type VI. a. Lotofaga Variety, A 11/8, Lotofaga. b. normal variety, A 16/150, A'opo.

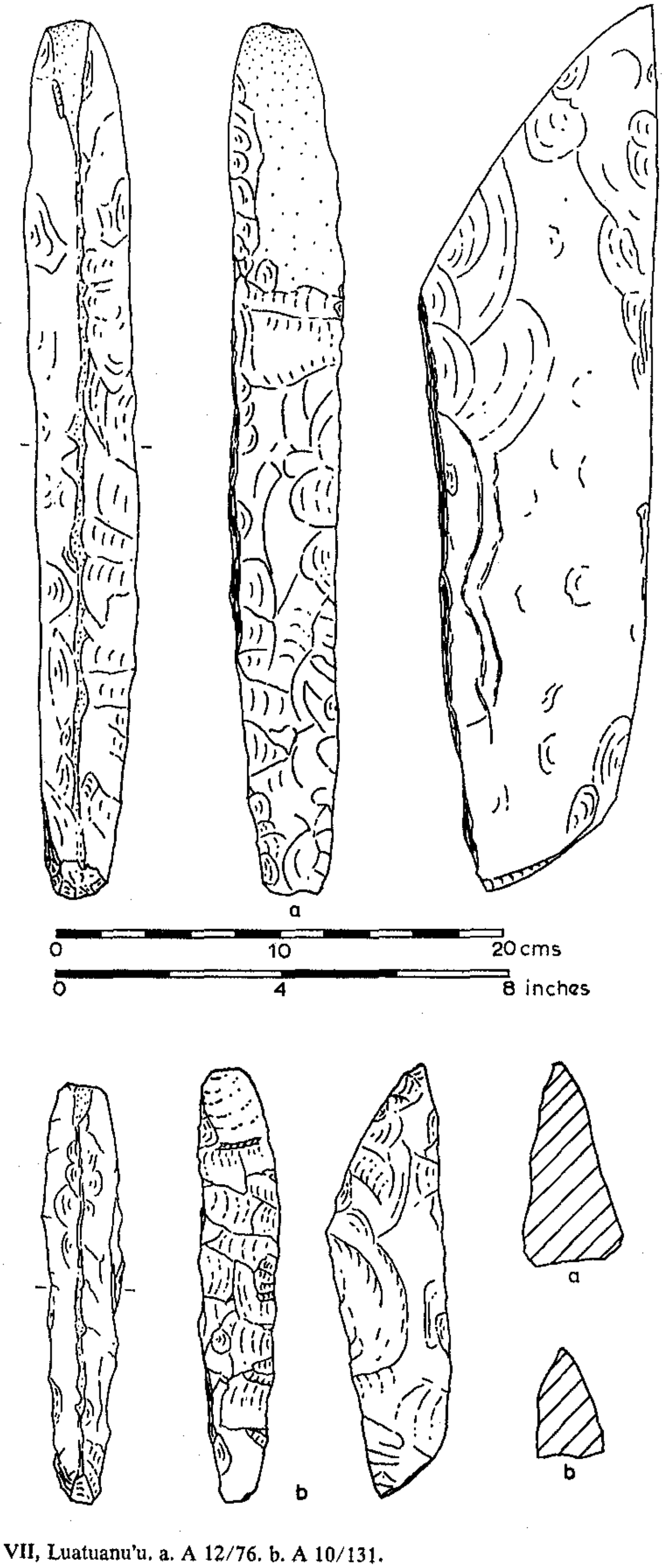


Fig. 9. Adzes, Type VII, Luatuanu'u. a. A 12/76. b. A 10/131.

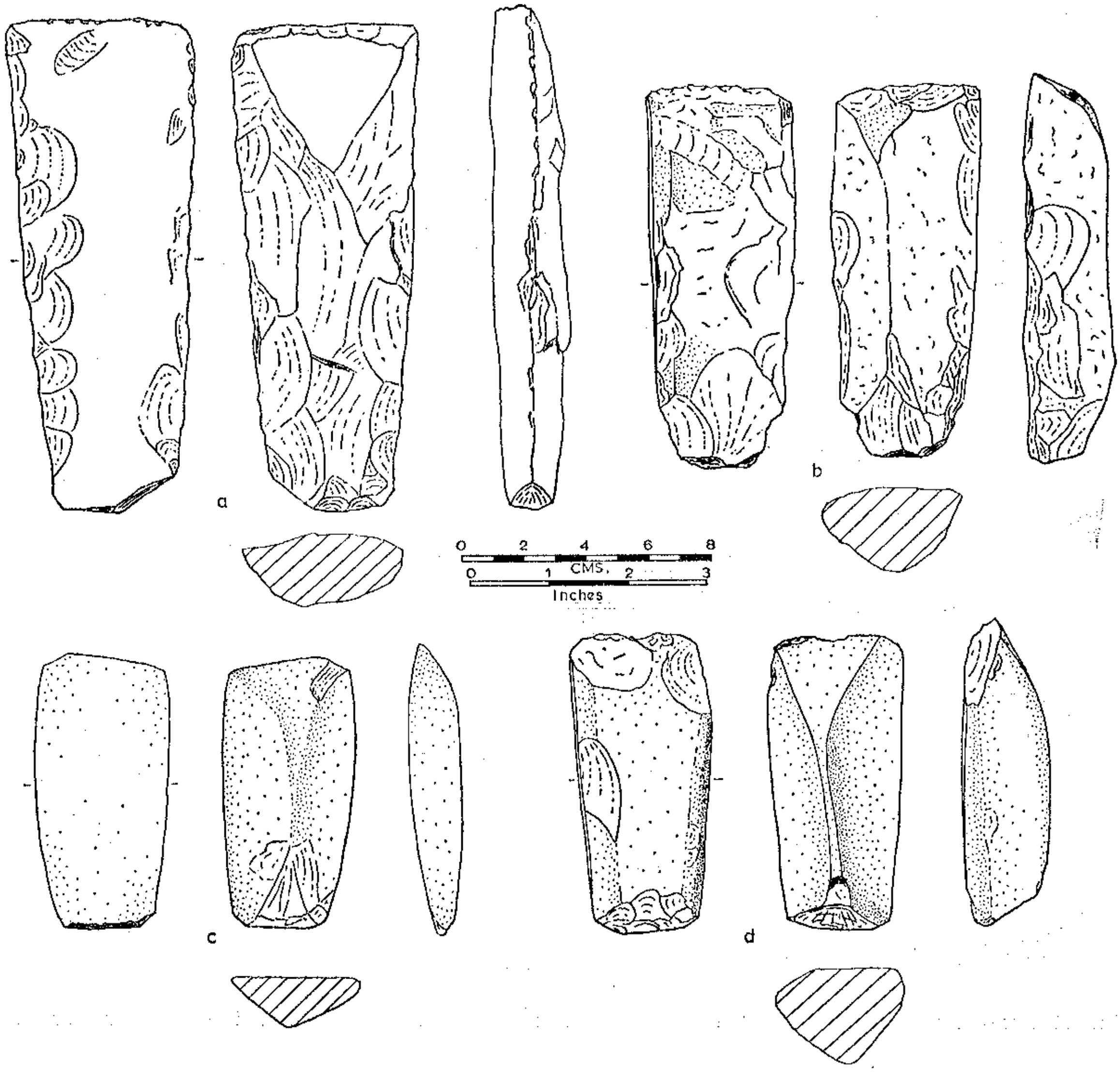


Fig. 10. Adzes. Type VIII, Luatuanu'u. a-b, Variety A. c-d, Variety B. a. A 12/23. b. A 12/221. c. A 10/39. d. A 12/216.

Type IX
(fig. 11)

This is a new type, which we have created to accommodate certain adzes which were grouped by Buck into Types I and VI, types into which they seemed to fit uneasily. Type IX adzes are based on Buck's thick variety of Type I (1930: 336). They are trapezoidal to sub-triangular in section; the thickness may be equal to the width. Thus their shoulder index only partially overlaps with Type I. They have high distinct sides which slope in towards the narrower front. The front itself narrows markedly from cutting edge to poll, and may end in a median ridge. The treatment of these adzes is very similar to that of Types I and II, but they are not as well finished as Type X, which they otherwise resemble in shape.

Type X
(fig. 12)

Type X is an addition not in Buck's classification but recognised and described by Kikuchi (1963: 141) as a new type. He be-

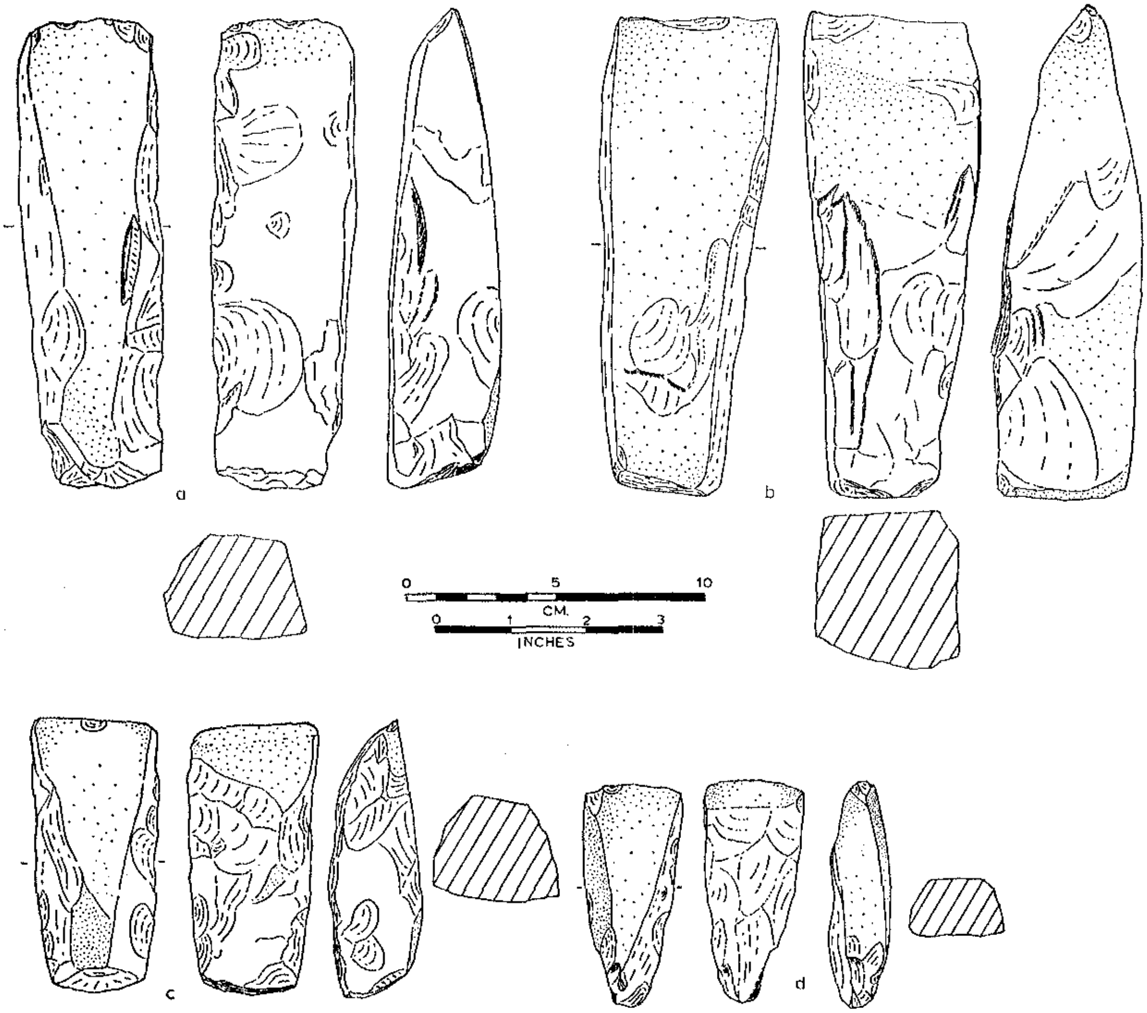


Fig. 11. Adzes, Type IX. a. A 16/57, Avao. b. A 13/7, Luatuanu'u. c. A 16/79, Matavai. d. A 10/64, Luatuanu'u.

lieved the type was confined to Manu'a in the Samoan group, but should be recognised because it closely resembled examples from Tonga and the Lau Islands. While the adze might be placed among those of Type III on the basis of its highly ground finish and trapezoidal section, it could equally well be placed with Type IX as a finely finished variety of that type because both Type IX and Type X possess a greater thickness relative to width than is common to cross-sections of Types I and III. Both alternatives were considered, and it was decided that finish, as in the case of Type III, was of over-riding importance. Thus Type X was set up as a type separate from its closest formal correlate, Type IX, and was not included in Type III because it formed a distinct cluster of length, width and thickness measurements.

Intermediate Types

Buck mentions the existence of a number of adzes intermediate between Types I and II (1930: 355) and indicates close inter-relationships between certain other types (1930: 350). On the whole we have found Type I and II to be fairly easily distinguishable as they are now defined, although they appear to be closely related. There are, however, a few small adzes

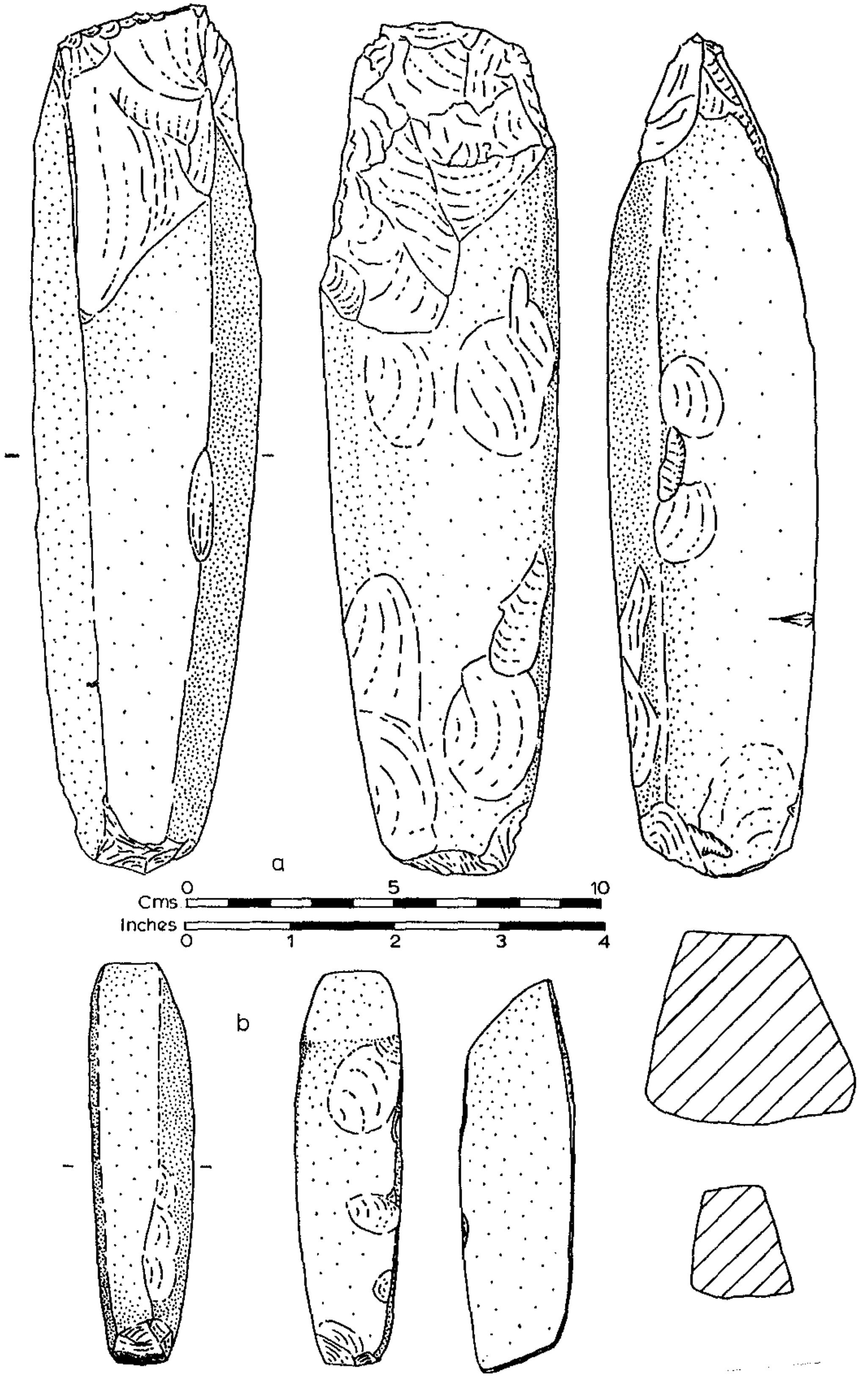


Fig. 12. Adzes, Type X. a. A 16/56, Sala'ilua. b. A 10/78, Luatuanu'u.

from early excavated contexts in Samoa which do exhibit this intermediate form. They have been placed in Type I because they possess thin flat cross-sections, although the sides have two lateral facets, one sloping to the front, and the other to the back rather than a single side sloping to the front. Between certain other types there is also considerable similarity, and in some cases overlap. In particular, Type IX overlaps with Type I at one extreme and with Type VI at the other, while Type III differs from Type I, and Type X from Type IX, mainly in surface treatment. Also thin examples of Type VIII may be rather similar to the few known specimens of Type IVb.

Unclassifiable Specimens

In any morphological classification of this kind there will be some specimens which do not appear to fit any established type. A few are merely large flakes which have been ground on one portion to form a cutting edge. Some are apparently fragments of larger tools which have been reused. Two of these latter in our collection would fit into Buck's category of chisels, a category which we are not using, as we have no knowledge of how these or other specimens were actually used. Finally there are several complete specimens, not merely edge ground flakes, which are unique. These are described according to their localities. New types have not been created for them, because they are unique.

Chronology

Our knowledge of the position of the various types in a chronological sequence is still very incomplete. Nevertheless, in order to understand the significance of the surface collections, certain points concerning the numerical importance, and chronological position of each type should be made.

Type I is by far the most numerous in the collection, and was probably the standard tool in the late prehistoric adze kit of the Samoans, together with the closely related Type II, which is also common. These types can be traced back to small specimens occurring in the early pottery-bearing horizons, although they are not common there.

Type IV is rare in the surface collection. Type IVa was present in two early sites associated with pottery, and may prove to be an exclusively early form. Type V is another rare type in surface collections. Both of its varieties are well represented in early adze assemblages associated with pottery, and there is some evidence that the Vailele variety was the most important early type. Both varieties were probably rare or absent at later stages.

Type VI is known from the upper part of the early pottery horizon and was probably present throughout the sequence as it is quite common in surface collections. The known early examples are small; the large heavy forms and the Lotofaga variety are probably later developments. Also at Vailele in the early pottery horizon is a distinctive fragment that can only be the cutting edge and bevel of a Type VII adze which is one of the rarest types in the surface collection. It probably disappeared before the end of the sequence. Type VIII is not represented by any certain examples from early contexts in Samoa and is very rare in the surface collection and excavated sites. It may be an early type but certainly was never a common form of Samoan adze.

Type IX is numerous in the surface collection and was probably fairly popular in later times. Type X, a related form, was found in an early pottery level at Va-1.

In sum, all the types except VIII and IX appear to be present at early levels, either in forms identical to, or closely related to adzes in the surface collection. Of the types which were apparently common in later times, Type III and Type VI are identical in early and late contexts, while Types I and II tend to be represented at earlier levels by smaller, related but not always identical forms, which could probably be identified as varieties of these types. In a few cases differences between the early and late examples of these types, however, are probably partly due to the weathered state of early specimens, which blurs distinctions between front and sides, and between flaked and ground surfaces.

The rarer types in surface collections, IV, V, VII and X are all known from early levels and only Type VIII is uncertainly placed. Their presence in the surface collection from a given locality, therefore, may suggest a somewhat earlier site than would a preponderance of Types I, II, and IX, for instance. At present, however, we do not feel our knowledge of the sequence is sufficient to make any closer identifications of the age of sites solely on the basis of adzes found on their surface.

III. GENERAL RESEARCH ON SAVAI'I

FIELD ARCHAEOLOGY ON SAVAI'I

A. G. BUIST
HAWERA

INTRODUCTION

The island of Savai'i, 47 miles by 27 miles in size, consists primarily of broad dome-shaped uplands, the south side falling more steeply to the sea than the north side. There are numerous volcanic cones, probably over 500, the highest of which rise to over 6,000 feet (Kear and Wood 1959: 49). Some are prominent and steep sided whilst others are low, having been buried by later lava flows. One such crater was found above and south-east of the village of Safotu and its presence was explained by a local legend (see below). Most cones have craters with steep inner sides and flat bottoms, but some are domes with no visible crater. Most of the cones are in the highlands, running in an east-west direction, but there are many near the coast, especially on the east side of the island.

There have been three historic lava flows. The first, 1760, flowed from Mauga (Mt.) Afi craters above and west of the present village of A'opo in north-central Savai'i to the sea coast. The second, 1902, was relatively small and occurred from fissures in Mauga Mu east of Mauga Afi. The third, 1905-11, was east from the other two and flowed northeast to the sea where it spread north and south in the lagoonal area (Kear and Wood 1959: 45). This last flow submerged parts of the village of Sale'aula while other villages near it were abandoned.

Lava tunnels are common in Savai'i, and, it was found, were commonly said to have been occupied.

Although stream beds are common in all parts of the island, the only constant and substantial surface water flows in the stream beds on the southeast side in the Palauli-Gataivai area. Springs occur in the upper slopes, but the almost universal source of water is from springs which emerge from lava tunnels or other conduits which "concentrate the emerging fresh ground water into strong tidal springs", near or on the coast (Kear and Wood 1959: 28). Only a small portion of the population enjoys a rudimentary adequate water-supply; the majority rely on children with buckets.

The coast is for the greater part lined with cliffs from 10 feet to 200 feet high. Low-lying parts of the coast are, however, bordered by a narrow strip of coral sand. Sandy "raised" beaches, 5 feet above sea level, occur in these low-lying parts and on these the present villages are built. These level low-lying areas are distributed in the main along the east coast, a small part of the mid-north coast, an even smaller part of the west north coast, the western end of the island and two small strips on the south coast. Virtually all the present day occupation is confined to the strips of raised beaches.

The greater part of the island is in heavy bush, with low scrub, bare ridges and flats over the historic volcanic lava flows (see map in Fox and Cumberland 1962: fig. 65a). Coconut plantations are not as extensive as in Upolu and are scattered. The most extensive areas of coconut lie on the Fa'asaleleaga (east) area, at Palauli (south) and Safune (mid-north) areas with one large plantation in the western part of the north coast at Fagasa which reaches the top of the highland ridge. Some more recent bush felling has taken place and the clearings have bananas, cocoa trees, and young coconut trees, with small areas of taro. The rate of regrowth of cut scrub and of weed is very rapid. This pattern of land utilisation raises some difficulties both in the act and in the interpretation of field archaeology.

A. C. S. Wright after an extensive soil survey of Western Samoa in 1956 during which he covered both islands thoroughly came to certain conclusions which have pertinence to the problem of interpretation.

It is not widely realised, particularly amongst the younger Samoans, that in ancient times a large part of the population had become accustomed to a life remote from the sea: many people were living in the relatively cool upland valleys of the interior. There is only fragmentary evidence of this period in Samoan history, and much of it can be read by plant ecologists and pedologists. The forest cover of Samoa with its peculiar pattern of local dominants, with large unexplained changes in forest composition and the widespread persistence of species properly belonging to second-growth seral communities, gives some hint of the extent of the inland settlements in ancient times. In the soils, partly buried beneath forest debris and obscured by soil movement more than a century old may be found convincing evidence of the former existence of extensive inland villages. It can be said that every place in the uplands endowed with a natural supply of permanent water, shows convincing evidence of at least one ancient village site somewhere in the vicinity — localities marked by a chequer-board pattern of stonework suggesting some arrangement of walls, of stone pathways, and by signs of past land use in the soils. These sites of ancient settlement were connected to one or more points on the coast by ancient tracks whose routes can still be traced. The ancient tracks seldom follow the easiest, most straight forward route, but were chosen to include natural obstacles presenting difficult climbing — short steep pitches — and where possible are routed so as to pass along knife-edged ridges. In short, the routing of the tracks implies a population preoccupied with defence, and suggests strongly that access to the coast was, at times, regarded as a mixed blessing. Furthermore these ancient inland settlements were not chosen with any great regard for the agricultural possibilities of the soil. It may be concluded that the ancient Samoans primarily sought permanent water in proximity to defensible hills, many of which still show signs of ancient earthworks and fortifications. . . .

The degree to which the occupants of these villages were preoccupied with the selection of defensible territory strongly suggests that they had been forced inland away from the more agreeable and bountiful coastal regions. There are exceedingly few places in Western Samoa where suitable defensive positions could have been constructed near the coast. . . It is also logical that in retreat they should go far inland, because on terrains formed from the volcanic rocks the only source of permanent water after leaving the region of fresh-water springs at the coast is that found high in the central ranges or in the crater lakes of the interior. . . (Wright 1963: 91).

It is probable that a general move towards reoccupation of the coastal lands had been initiated not long before the arrival of the first missionaries. Tonga and Fiji had been brought under mission influence in about 1860 and this may have led to a lessening of interest in overseas punitive and raiding expeditions. . . Records of early European settlers describe a pattern of land use very similar to that in existence around villages of today except that no mention is made of cropped-out land in the immediate vicinity of the villages. . . From early accounts it is apparent that farmers found little need to travel far from the village to reach soils capable of yielding good crop returns. . . The agricultural cycle of taro, *ta'amu* and other staple food crops involved about two years of crop production, followed by an 8-10 year bush fallow. . . If a century of European agricultural activity has made so little impress on the traditional pattern of island agriculture, it is safe to assume that a somewhat similar pattern was carried on before the Europeans came. It is likely that a rather different land-use pattern — modified to suit the different environmental conditions — was in use in the interior settlements of ancient Samoa (Wright 1963: 94).

The main objective in the two field trips was to determine as far as possible areas with signs of prehistoric occupation, to record them and to decide which would repay closer attention. For this reason the entire coastal part of the island was rapidly explored and sample areas inland were visited. Six small peaks were climbed and five of these were found to have signs of occupation. Altogether 25 areas around the island were recorded as having a total of 128 separate sites. In 14 of these areas nucleated or "village" settlements were found.

Sufficient was learnt to outline the general range of field monuments to be expected on Savai'i and to enable more concentrated surveys of promising areas to be undertaken in the future. None of the sites recorded or mentioned by Scott in his report on Savai'i is incorporated in this report, nor did I explore the southeast area of the island where he had been working. It should perhaps be mentioned that the large stone mound on the Letolo plantation at Palauli which he describes remains unique to this date.

Any exploration of Savai'i and interpretation of the archaeological field evidence is made enormously difficult by the Samoan's sense of time and distance. For most Samoans there is only one time — the immediate present. Apart from stories and legends of the past, of which a majority of the people seem to have some knowledge, there is no sense of history. Abandoned villages on plantations to which wide disused roads lead, may have no name or history of occupation; concentrations of house platforms in heavy bush are not known or recognised as villages of the past; adzes and large flakes or broken adzes lie around the rock platforms of present day houses, unrecognised as being *to'i ma'a* (stone adzes); features obviously of recent origin are said to be very old.

This is no criticism of Samoans, but an introductory explanation to the difficulties of interpretation of the field evidence. Apart from the general statements about the time of the Tongans, it is impossible from local knowledge to place any one feature in some sort of reliable time scale.

Another great difficulty is that the Samoan still lives today in very much the same way as he must have lived for centuries. There are obvious European introductions such as iron tools, tinned food, and a semblance of commerce in copra and banana production, but the existence of the villagers continues to depend very much on the growing and gathering of the foodstuffs, taro, *ta'amu* and breadfruit, upon which they have probably existed for centuries. Bonito fishing is still carried out with a lure and hook identical to those collected in the early European contact period. The houses are still built on platforms of stone, with surrounding courtyards of rough paving, much like old house sites found in heavy bush country. Indeed some houses are built on ancient platforms.

In fact, the immediate question raised by Savai'i was "Where does prehistory end and history begin".

For all these reasons my interpretation of these first findings is very circumspect. The report is essentially a factual one, presenting the records of field monuments as they were found. Any interpretation has been based on these findings alone, and no attempt has been made to incorporate historical records. I believe that the groundwork of any research is recording; this can be amplified by excavation and further amplified by a study of ethnohistory. Interdisciplinary consultation ultimately will provide indisputable interpretations which may be at variance with, or invalidate, prior individual interpretations.

Finally it is necessary to mention that all the ground, except in the bush, is covered with a thick growth of grass and a vine known locally as "mile-a-minute" (see Introduction p. 4). In this present reconnaissance survey only a minimum of clearing was undertaken in order to expose rock features for photography, while only very limited test excavations, principally for charcoal samples, were carried out.

LEGENDS

Story-telling is very much a part of Samoan life but no serious attempt was made to collect legends or local history. Nevertheless several stories were recorded when told by local guides during field trips. It was striking that most legends endeavoured to explain natural features of the landscape by some form of personification, or by associating a legendary ancestor or mythical figure with them. It was also striking that in the few stories recorded involving both Upolu and Savai'i, the legendary figures passed *from* Savai'i to Upolu. In contrast to the legends, it was a universally accepted *fact* that Tongans had once occupied the coast, but I heard only one explanation attributing a natural feature to forced labour of the subjugated Samoans: the coastal end of a volcanic lava flow at Samauga was alleged to be a rock-hill built at the order of the Tongans.

The following legends are recorded for the possible slender value they may have as pointers to long-forgotten facts of the past.

The only legend collected on the west coast related how the "fairy" Muso stepped from Samoa to Fiji during a trip across the Pacific. One footprint can still be seen beside the road near the coast at Falealupo, the other is said to be on the Fijian island Veti Levu. (Related by Foa Vesili, Asau.) The feature shown to me was a flat bottomed pit 6 inches deep and 9 feet by 3 feet with small blocks of lava lining the edge.

On the north coast near Safotu, two stories were collected. The one related to the lava flow at Samauga and the other to the partly submerged crater in the ridge above and east of Safotu. It is said that the original kava cutting in Samoa was planted on the ridge above Safotu and a second cutting was placed at Vailele on Upolu. The second cutting did not thrive and was brought to the place where the first one was growing: Lua'i (the first hole). When the trees grew, a chief named Mausautele pulled one out of the ground (leaving the crater) and flung it over his shoulder. The dirt from the root landed at Paia and became the earth mound (SS-Pi-1) at that village. Mausautele lived on the hill (SS-Pi-5) above the mound and he was the son of Tui Ali'i who lived in the high mountains. (Related by Feo Kamisi, Paia, and Cecilia Eteuati, Safotu.)

On the east coast at Tuasivi is a hill called Mauga Asi. The local story is that a mountain inland wanted to go to the sea to get some water for *palusami* (a cooked dish of taro leaves in coconut milk), but Asi stopped him by throwing a breadfruit in his face; the mark can still be seen today (crater). He got annoyed and went to Falese'ela on the south coast of Upolu. (Related by Fitu Ala'alatoa of Tuasivi.)

Also on the east coast it was related that Mauga Salelologa had a son who unfortunately grew so tall that he blocked his mother's view of the sea. His mother banished him to Upolu so that she might again enjoy the view. He travelled a long way, looking over his shoulder until he could no longer see his mother, and reached Falefa where he settled and became known as Mauga Fao. The place where he first lived in front of his mother is the small hill Salelavalu. (Related by Tupea Lave, Salelologa.)

ARCHAEOLOGICAL FEATURES

MIDDENS

The entire accessible coastline, with the exception of the southeast area, was searched, and showed, not surprisingly, evidence of former occupation in all parts. By far the most fruitful area for surface collection was the Safune coast in the north, around the village of Matavai which lies about the pool, Mata-'olealelo, Here, in addition to worked boulders, were a great number of adzes and flakes, both on the house platforms and in the surrounding gardens and enclosures. No distinct middens were discovered, but test excavations were not carried out. The fast flowing stream which emerges from a lava tube in the pool Mata-'olealelo is by far the most massive coastal source of water on the whole of the north, east and west coasts and it is likely that this source was an attraction in prehistoric times.

The common surface findings were adzes, broken adzes and flakes; midden shells were not so common. The most promising thick and stratified midden was at the east end of the south coast village of Sala'ilua, SS-Sa-1 (fig. 29); here a thick midden was clearly visible beside an old stream bed and exposed on the eroded beach front. Discreet clearing elsewhere along the Sala'ilua beach front showed similar midden to be present along the entire front, starting at a depth of 3 feet from the present surface. Unfortunately this midden was largely washed away in the hurricane of February 1966 (see Report 4, p. 73).

A scattered shell midden was also located at Asau on the northwest coast where recent excavations by the Public Works Department had exposed a section. A further scattered shell midden was found at Saipipi on the east coast near a coastal spring. This area was also a fruitful source of adzes and flakes. No sign of fishing activity was found in any midden, nor was any pottery found.

A count of the adze material collected on the surface indicates that only the Safune area in the north, the Fagamalo, Pu'apu'a, Saipipi, Iva, Salelologa, and Sala'ilua areas in the east and south coasts contained sufficient evidence of intensive prehistoric settlement to warrant further investigation. Most other areas of beaches revealed some evidence of occupation.

STONE MATERIAL

The adzes and adze fragments and flakes were easily hand-sorted into two colours of stone: a light grey and a darker grey, almost black. Dr. W. A. Watters, Geological Survey, Lower Hutt, reports (pers. comm.):—

> Both are very fine grained basaltic rocks. The slightly darker rock is a feldspar basalt, with a few tiny phenocrysts (larger crystals than the groundmass) of olivine and numerous lathy crystals of plagioclase feldspar set in a very fine-grained groundmass. The lighter coloured rock is also best described as a basalt, but it contains much less visible feldspar and more numerous small phenocrysts of olivine. In places the feldspar almost disappears and the rock may grade to another variety of basalt (limburgite or nephelinite).
>
> In both rocks the groundmass is extremely fine-grained and riddled with innumerable tiny grains of opaque mineral, either magnetite or iomentite. Both are obviously suited for making adzes, and I think would be inferior to few other rocks. I have looked at rather similar rock from the Chatham Islands which was widely used there for making adzes and other implements.

Both Upolu and Savai'i are made up largely of various suites of basaltic rocks, but the precise sources of these adze materials has not been identified. No quarries were either reported or seen during these field trips.

BOULDERS WITH WORKED SURFACES

On the second trip a number of beach boulders, of softer basaltic material than the adzes, were found. The first of these was discovered at Matavai on the edge of a stone wall lining a terrace (Buist 1967, plate 1). This had clearly been a hone for adzes *(foaga)*. A closer inspection of terraces and platforms led to the discovery of several more in other villages, as well as other types of worked boulders. These fell into three groups:—

HONES

Those with a groove much longer than it was wide, and not deeply cut. Some had a completely smooth plane surface as well. Several were worked on both sides. A typical smaller boulder worked on both sides, found at Avao village, is illustrated in plate 2.

CIRCULAR BOWLS

Those with groups of circular bowl-shaped scoops. These boulders were larger than the hones, and unlike them, could not be moved single-handed. The local explanation was that they were for the preparation of anointing oil and that the bowls were mortars to hold the seeds and roots used in the preparation. There was no suggestion that they were kava pounding stones — these usually being stones with a single shallow scoop. A boulder was excavated from the sand on the beach at Faletagaloa (Buist 1967: plate 7) and had been present there for as long as the oldest resident could remember (this man was the father of a man of 50 years). That in plate 4 was found in the foundation wall of a house platform at Faletagaloa. An unusual boulder (Buist 1967: plate 2) had been brought to Avao from the south coast and is associated with a legend about a "Princess" Lena and her two Fijian lovers who ultimately gave the names Itu-o-tane (north side) and Itu-o-fafine (south side) of the island of Savai'i. The boulder was brought from Samata by the present owner of the house where it rests, whilst he was employed in the construction of the coastal road in 1958.

Linear Hollows

Some boulders had long, narrow and deeply incised hollows. These were clearly for honing a sharp point. The two boulders from Faletagaloa described above had hollows in association with scoops, but other boulders had hollows alone.

"Phallic" Stones

Two upright stones were also found. One was actually mounted in concrete, and stood in front of the church at Faletagaloa. No explanation of its significance was obtained. The stone in plate 3 is set up in a rough paving near the brackish spring at Sasina. The story given was so obviously extemporary that it is not repeated here. There appears to be a complete loss of tradition for the function of these stones.

Field Monuments

The principal field monuments at Savai'i have been classified under the following headings:

1. Roadways and Walls,
2. Mounds,
3. House Platforms,
4. Terrace and Modified Hills,
5. Forts,
6. Caves,
7. Pits and Stone heaps.

Roadways and Walls

The most easily detected field monuments are roadways and walls. Motor roadways are recent, the road around the island being completed only ten years ago. This road is kerbed only in parts. Stone walls occur both in association with roadways, and in forest and clearings. Unfortunately it was not possible to apply Apple's (1965) typology for Hawaiian trails and roadways with any clarity to those in Savai'i, owing to the recent activity in motor transport which has inspired the rebuilding of many inland roads connecting plantations with the coastal circular road. Furthermore, the hurricane of February 1966 had obliterated many of the trails of Apple's Type A, and although one of these was followed up inland Sato'alepai to abandoned villages in forest clearings, the trail itself was seldom clearly defined. The easy obliteration by fallen trees and the rapid rate of second growth combine to obscure all but the most frequented trails. It is possible that the most useful trail was ultimately converted to a motor track (his Type D), as has happened in many valley trails followed during the survey. The only example of his Type Ae (stepping stones over lava) was discovered crossing the lava flow at inland Sato'alepai, and this trail is historical, since the lava flowed in 1905-11.

Most earlier roadways were of Apple's (1965) Types AB and B, that is, wide enough to allow horse traffic, or wide enough for two horses and possibly a cart. Those discovered were walled (kerbed) — in fact the presence of the kerb usually led to the discovery of the roadway. Recent motor road building in the valleys and on the ridges inland from the coast was found to terminate in earlier and narrower tracks, the kerbing of which had been simply widened to form the motor road.

A point of interest is that two roadways were found inland from the 1905 lava flow, both clearly being cut by the lava and both probably being continuations of existing roadways on the coastal side of the lava. Both were 12 feet wide and had eroded but substantial kerbing walls (Buist 1967b: plate 3). Flat clearings were associated with these roadways and large rock platforms occupied part of the clearings (fig. 21 and 22).

Stone walls are present in great numbers. These vary from one foot high rough heaps to 4 foot high neatly made structures. They present a problem of interpretation because they are so often difficult to trace out in full, and it is impossible to visualise the patterns they may form, owing to the dense undergrowth. The impression gained was that they nearly all represented a subdivision of the bush-cleared (or previously bush-cleared) land, while the more substantial ones probably were divisions between one village and the next. Walls were absent in the remoter of the inland prehistoric settlements, whilst the more recently abandoned villages often showed a sequence of wall-building, from low rambling walls to more substantial and straighter running structures. Ditches probably served the same purpose as walls, although they were not found as frequently. The bush clearing of one protohistoric village of inland Sapapali'i was traversed by a deep ditch which meandered among the house platforms as a continuation of the entrance pathway. A straight shallow ditch was found at another protohistoric village at Paia. This ran transversely across the ridge on which the village was situated, commencing at one end of the narrow roadway. As it did not completely cross the ridge and was placed in the middle of the village it was clearly not a defensive feature.

A stone wall was often used to form an enclosure. Again there was some difficulty in their functional interpretation and in placing them in a time scale. Most of those noted were said to be pig-pens, and indeed at least one enclosure lies not far from each coastal village — although they do not enclose the ubiquitous pig except by accident. The more remote enclosures were said to be *pa tonga:* that is, a place of walled refuge either for, or from, the Tongans. The smaller enclosures are approximately 100 feet square and the larger may enclose up to an acre of land. Because enclosures are such a regular feature of both present and past villages, there must be some reasonable explanation for them. In the light of observation, the suggestion is made that they enclosed areas in which sugar-cane or similar crops were grown and the purpose of the walls was to keep the pigs out rather than in. Wright suggests (1963: 92) that these enclosures were for agriculture rather than husbandry or defence against a raiding enemy.

Mounds

Two broad categories of mounds were discovered: stone mounds and soil mounds.

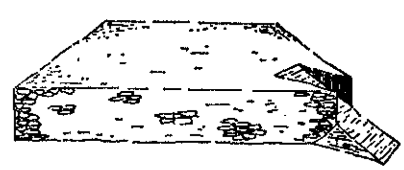
Stone Mounds: No such impressive mound as that of Pulemelei at Letolo was found, though it is possible that others exist. Mounds, large and small, were found in all areas investigated. They may be arbitrarily subdivided, for descriptive convenience, into: 1, *large,* 2, *small,* and 3, *star* mounds.

Large Mounds are either square or rectangular and have a flat platform with dimensions of 100 to 200 feet. The side scarps are not perpendicular and rise 8 to 10 feet, sloping and rough. The top is seldom smooth and no part of them appears to be paved with smaller stones or pebbles, though no clearing of weed was undertaken. It is of course possible that the original surface paving has become leached away over the centuries, leaving the larger boulders of the substructure exposed.

The majority of these large mounds are found on sloping ground, so that the downhill scarp is higher than the uphill and the top thus made level. They all have a regular form, and this together with the level top makes them a distinct field monument rather than just a heap of stones. All were found in bush-cleared land. Isolated and apparently large mounds were said to be present in uncleared bush in two areas, but it was not possible to visit either. Some are crossed by stone walls which were obviously built after the mounds. They usually occurred in groups of three or more.

Small Mounds are a category into which are placed those mounds in which the length of each side of the top platform is less than 100 feet. I also distinguished them from house platforms because they exhibited greater height than the majority of the low-lying house sites. They may, however, be simply a special type of house platform and the distinction may be artificial (see p. 53). Two circular small mounds were recorded.

The height from the level ground surrounding them is usually 6 to 10 feet, the sides are usually vertical (where not eroded) and the top is generally paved with small pebbles or with soil. A few are paved with the same rough lava boulders as the substance of the mound. In a few there is a well defined entrance stairway and in one case, two such stairways (fig. 13).



Mound SS-SI-9, Salelologa
(perspective sketch not to scale)

Fig. 13. Plan of mound SS-S1-9, Salelologa, Savai'i.

These mounds usually occurred in clusters, as did the large stone mounds, and were associated with them in the same general area.

Star Mounds are different from the other two in that the plan is not square or circular but is made up of projections (figs. 14, 15, and 16). They may have from five to nine projections and so form a "star", which

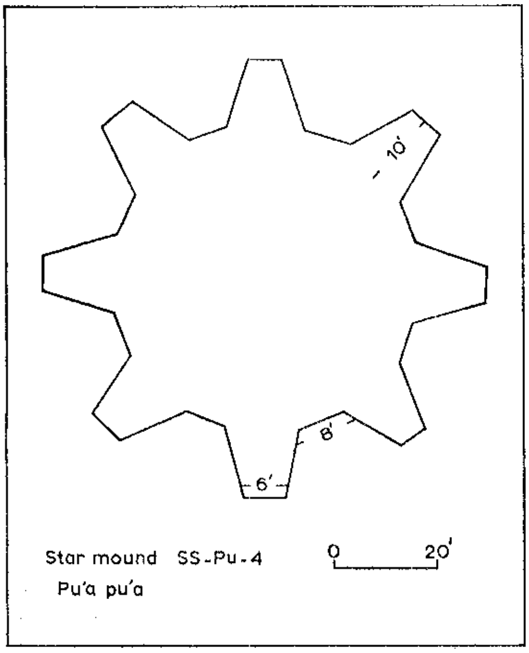


Fig. 14. Plan of star mound SS-Pu-4, Pu'apu'a, Savai'i.

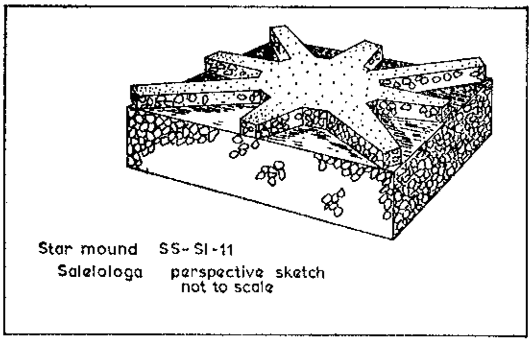


Fig. 15. Plan of star mound SS-S1-11, Salelogoga, Savai'i.

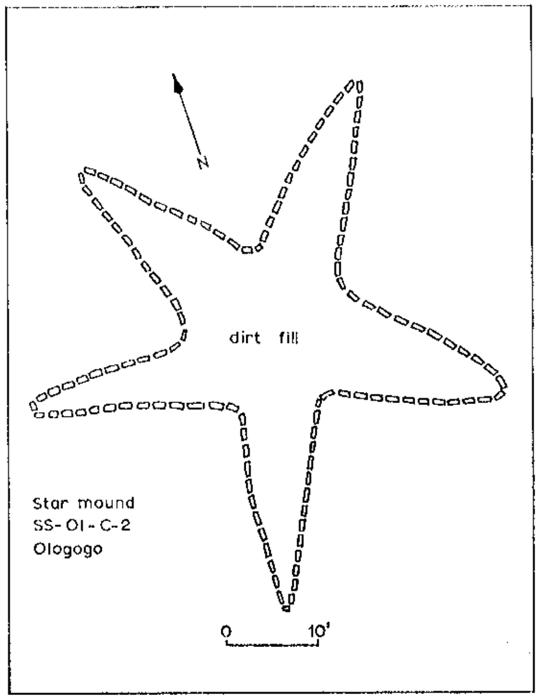


Fig. 16. Plan of star mound SS-O1-C-2, Ologogo, Savai'i.

seems to be the best descriptive term for this special type of mound. The sides are usually vertical and rise from 4 to 12 feet from the ground. The top is formed with the rough stone of the substance of the mound without much clear sign of paving. In one instance the star mound rises from an already substantial square foundation and the interstices of each point are smoothly paved. One five pointed star mound at Ologogo has a dirt fill (fig. 16).

Soil Mounds: Only one isolated and unequivocal soil mound was found. This mound, at Paia on the north coast, is associated with the kava legend noted above. The mound is almost as large as the mound of Laupule at Vailele on Upolu (Freeman 1944c and Report 6, p. 100), but its symmetry and outline are obscured by the presence of occupied houses on top and at the base (Buist 1967b: plate 4). The area around Paia is covered in heavy bush and overgrown coconut plantations, and it is possible that a cluster of earth mounds lies hidden and will be revealed only by an intensive search.

The purpose or function of many of the above mounds is by no means clear, and I have not interpreted any of them in description as "pigeon mounds" *(tia seu lupe)* although this term was used by a number of local informants and was also used by Golson (Report 1, p. 15, see also Report 4, p. 89).

House Platforms

Into this category I have placed the smaller, and lower, rock pavements. It was not always easy to decide, when confronted with a flat raised stone platform covered in the mile-a-minute vine whether the structure was a small mound, a house platform or a terrace. The choice was narrowed to house pavement when flat water worn pebbles were found as paving, especially if a kerb outline of large smooth pebbles could be determined. But some of the terraces mentioned in the next section may also have served as large house platforms — or at least have a house floor within them. Then too some of the mounds of the previous section may have been house platforms. Indeed a number of these carry small houses recently erected but these mounds were usually in small isolated clusters, whereas the lower house platforms and the terraces occurred in other larger clusters — this in fact is the main distinguishing feature between the one category and the other. House platforms in such a cluster comprise a nucleated settlement usually designated as a village.

House platforms may be rectangular (with both squared and rounded ends), square or oval. Only at Manase were round platforms present. The platforms were constructed by forming walls of large lava blocks, filling the enclosed space with large blocks and providing a smooth paving with water worn pebbles or with coral sand. Strictly speaking, the wall posts would be placed in the bare ground and the platform constructed after the house itself was completed; this at least is the present day practice. Plates 5 and 6 which are of platforms in present day villages more readily accessible to photography illustrate the variation in platform shapes.

Because house pavements with rounded and squared ends occurred in all settlements discovered (as well as in occupied coastal villages), the shape is not a diagnostic sign of sequence. However, platforms of some of these now abandoned settlements contained hearths or fireplaces near the assumed wall of the house structure. These consist of a rectangle of smooth boulders set on edge to enclose a space about 2 feet by 1 foot which is sometimes filled with charcoal. From ethnographic and historical accounts, as well as from the results of excavation, it can be assumed that they were hearths rather than cooking places. It may be proved that these hearths, rather than any other feature or shape, are one sign of 19th century or earlier occupation. A carbon date of 890 ± 70 years before 1950 from one of these at Village C at Ologogo (see p. 48) confirms their antiquity.

Terraces and Modified Hills

Terraces, in Savai'i usually stone-lined or made up entirely of stone, occur on gentle slopes and are usually associated with house platforms and pathways (fig. 17). They, therefore, are another indication of the presence of a village. Hills and small peaks are also modified by terracing, sometimes with stone-lined scarps, and by flattening of the top to form a platform. Terracing, whether on gentle ridge slopes or on hills, may indicate levelling either for living space or for agriculture, and there

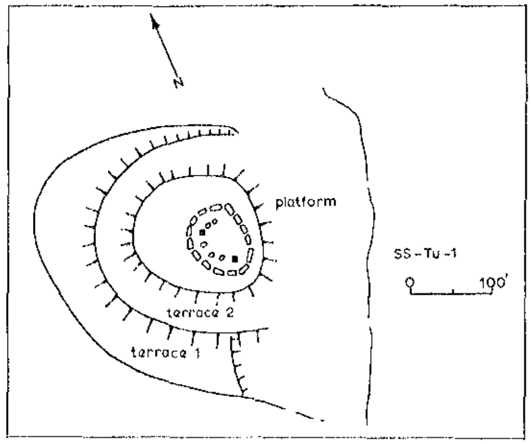


Fig. 17. Plan of terraced hill, SS-Tu-1, Tuasivi, Savai'i.

was no indication in the present survey which purpose was served. In none of the examples found could the terracing be said to have been designed primarily for defensive purposes.

Forts

Not a common feature of the Savai'i landscape, only four, possibly five, forts have been recorded. These all fall into the usual hill fort categories of headland, ridge and ridge peak forts. They are built from the soil by the formation of a ditch and bank, although the fifth and probably historic fort recorded by Scott (Report 4, p. 84) is surrounded by a stone wall. Isolated ditches and walls could not be regarded as defensive features as they were always open-ended; it is more likely that the few discovered were old boundaries.

Caves

Local people are attracted to the idea of caves and many stories are told of caves throughout Samoa.

Samoan caves are probably all lava tubes, or tunnels. Thomson (1921: 60-63) discusses these, quoting earlier reports from von Bülow on the cave at Paia. Investigations were later carried out by Freeman (1944a: 86-106) and Golson (Report 1, p. 19). Kear and Wood discuss the formation and subsequent life history of a lava tube (Kear and Wood 1959: 22) and make it quite clear that both Thomson and Freeman were mistaken in assuming that the ledge within the cave at Falemauga was the creation of the Samoans. This ledge is a natural feature of some caves and is present in the lava tube at Paia (fig. 18). Golson (Report 1, p. 19) was unable to confirm Freeman's evidence of intensive occupation of the Falemauga cave.

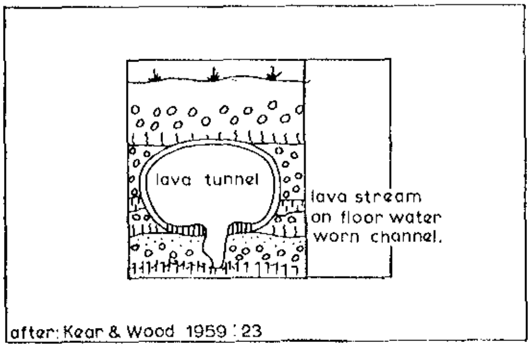


Fig. 18. Typical cross-section of a lava tube (after Kear and Wood, 1959).

Three lava tubes were explored in Savai'i during the present survey, but only one had signs of occupation which was, however, of recent origin. It is concluded that lava tubes were not used for prolonged occupation.

PITS AND STONE HEAPS

Surface pits occurring in association with house platforms and terraces are of two distinct types: circular pits with raised rim, and rectangular pits.

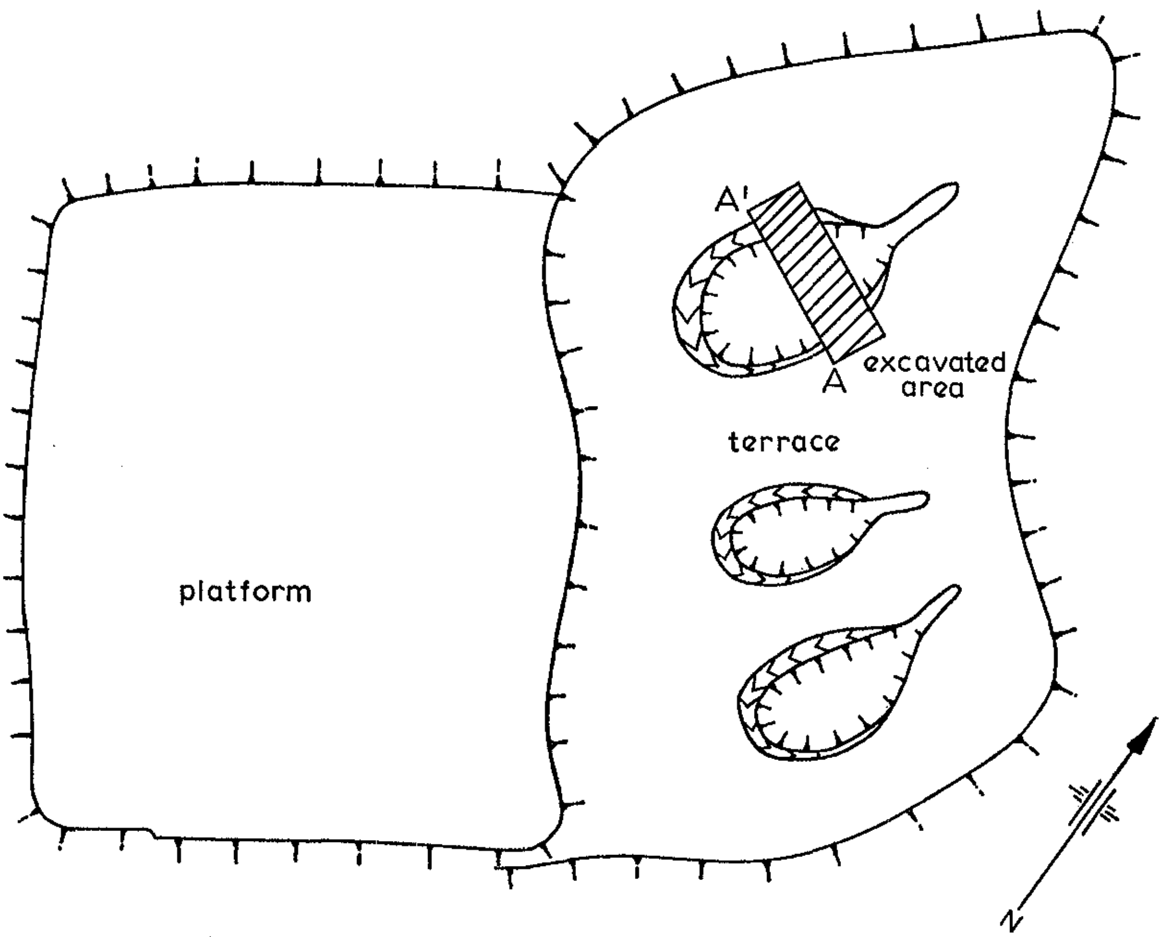
Circular Pits with raised rims were discovered by Golson (Report 1, p. 18) but he was unable to find any traditional explanation for this feature. Davidson (Green and Davidson 1964: 39) was informed that these were *umu ti* "ovens where men of old used to cook the *ti* root, which was then the staple food." She half-sectioned a pit at Vaigafa and it proved to be an oven; the term *umu ti* has been used since that time to designate these large rimmed ovens. On Savai'i the term is reserved for a pit which is 4 to 5 feet deep, circular with a 9 to 20 feet diameter and with a raised rim extending a further 6 to 10 feet; the rim has been formed by the spoil from the pit, whilst the pit itself is lined with stone blocks showing signs of fire. Charcoal is found in heavy deposit both on the sides and the bottom of the pit in the space between the stones.

An historic date had been obtained for an oven at Vaigafa in Upolu (Green and Davidson 1965: 64) which was a circular oven with a raised rim, or *umu ti*. On Savai'i they were found not only in the possibly historic village SS-Mt-2 at Matavai, but also in the protohistoric village SS-01-D at Ologogo and the prehistoric village SS-Sp-15 at inland Sapapali'i, as well as in other villages throughout the range of the occupation time-scale. One very large example was found near the ford at inland Sapapali'i and a somewhat smaller one at the village further inland. A carbon sample was taken from the latter and a date of 750 ± 80 years before 1950 was determined (GaK-1202). This places the *umu ti* as clearly prehistoric and with the historic Upolu example, makes it probable that this form of oven was used over a long period of time, finally falling into disuse in historic times.

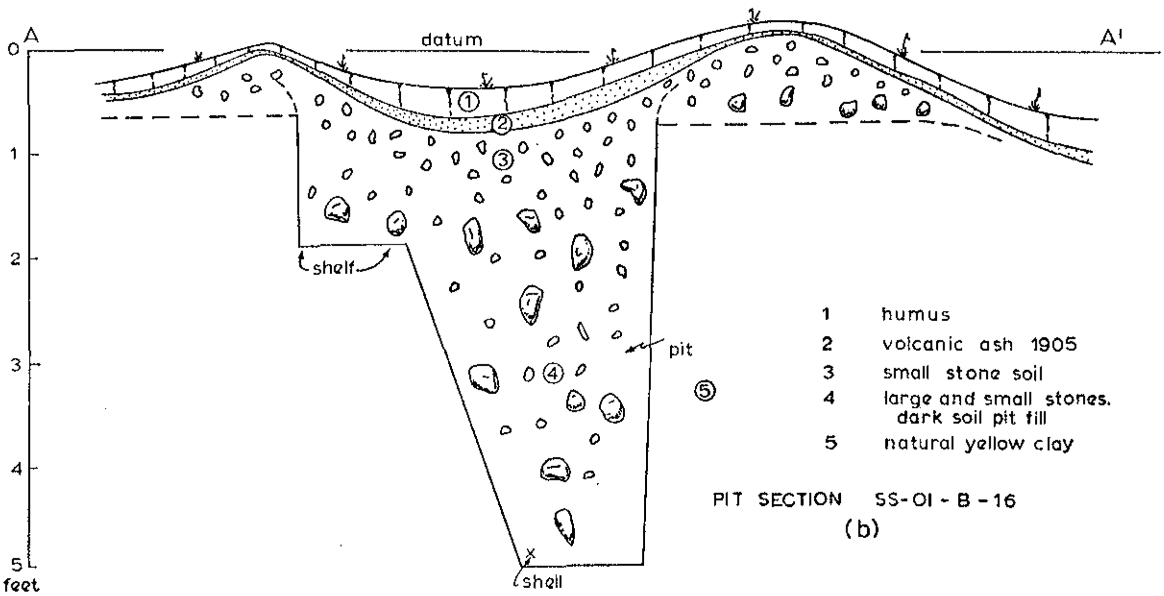
Rectangular Pits are a new type of feature first noted at Ologogo where the close-cropped pasture allowed easy recognition of surface features. It is possible they occur elsewhere but are invisible under the cover of mile-a-minute and scrub. This surface feature is an elongated depression up to 18 inches deep, 6 to 20 feet long and 6 to 12 feet wide. On one side of the depression is a heap of thrown out spoil and on one end or the other is a narrow entrance track. These pits are not to be confused with the depressions and root spoil from hurricane uprooted trees and are distinguished from these by: 1, the presence of a narrow entrance track, 2, the grouping of several pits (uprooted trees tended to occur singly) and 3, the frequent association with house platforms. Two pits were excavated. One revealed disturbance of soil to a floor on which lay a poorly preserved large *Tridacna* shell (fig. 19), but the other failed to produce any clear evidence of a floor apart from a smoothly worn entrance way. The impression gained was that these pits were rectangular collapsed subterranean pits with an end entrance, in which the roof had collapsed to form the surface depression. A radiocarbon date of 210 ± 100 years before 1950 was obtained for the excavated pit with the shell at Village B at Ologogo.

M. Hougaard (pers. comm.) observed irregular surface pits with entrances, near the river at Puleia and found that they were quarry pits for soil used in making dams for eel fishing. The absence of a lateral wall and their irregular shape distinguishes them from the collapsed subterranean pit.

Stone Heaps consist of fist-sized stones gathered into heaps varying from a barrow load to a lorry load in size. Golson (Report 1, p. 19) described similar heaps on Upolu and noted their association with other features. On Savai'i they were frequently associated with pits and often with house platforms, small heaps sometimes being enclosed within a walled enclosure adjacent to house platforms (fig. 23). They also occurred on flat clearings (areas in the lava-block strewn countryside which had been cleared of blocks) where a group of three to six heaps of small stones inexplicably occupied part of the otherwise clear ground. Two heaps were taken apart and were found to terminate at the natural



SKETCH PLAN OF PLATFORM WITH ASSOCIATED PITS.
SS-01-B-16 (a)



PIT SECTION SS-01-B-16
(b)

Fig. 19. Rectangular pits at Ologogo. a. location of pits in relation to earthen terrace. b. section through excavated pit.

surface and to lie on undisturbed ground, as Golson had found. The only explanation for these heaps is that they were "stock" for ovens or for pavements. The small stones had obviously been sorted during agricultural clearance and set aside from the larger blocks which were simply thrown to the periphery of the clearing. There was no sign of flaking or other stone manufacture near or on any of the heaps.

Villages

Sufficient ground was covered in the two trips to Savai'i to enable a start to be made on the elucidation of prehistoric and early historic settlement patterns. As confidence was gained in recognising clusters of house platforms, terraces and mounds, it became possible to designate these as villages. Experience also enabled an estimate of the relative age of some of these settlements, although the interpretation was generally based on the evidence of access tracks rather than the shape of house platforms. Thus those villages with access tracks wide enough for a horse and cart were judged to be historic, whilst those in which access was by foot-track (or in which tracks were no longer visible) were considered to be prehistoric. It must be emphasised that the heavy growth of the rain forests makes such interpretation difficult and it may in some instances stand in need of revision. However, the open land of the Ologogo Plantation, where the grass and weed is cropped close by stock, greatly simplified the elucidation of settlement patterns. In the light of the experience gained at Ologogo a number of other villages were reviewed and reassessed.

It must also be repeated that the prehistory of the coastal villages is difficult to clarify. Contrary to some statements, it is common to rebuild a house on an existing platform. The presence of quantities of worked stone in coastal areas indicates a prehistoric settlement of some intensity (which is not surprising on the coast). It is possible that many of the existing platforms have held generations of houses, and therefore extend back into prehistory.

The following list summarises the abandoned villages recorded, the names being those of the nearest occupied village.

North Coast: Asau, A'opo (2), Sasina, Faletagaloa, Matavai, Ologogo (5), Manase, Paia (2), Sato'alepai (5).
East Coast: Pu'apu'a, Sapapali'i (2), Salelologa (3), Vaipapa.
South Coast: Lata-i-uta.

It should also be noted that Wright (1963, map) has marked seven additional abandoned villages on the east coast and even more in the southeast coast covered by Scott.

Asau

The roadway, SS-As-1 and the terraces SS-As-2 (fig. 28) are parts of a settlement on the slopes above Asau which are now covered with heavy bush. The roadway is a narrow one and lined with high walls. The settlement is interpreted as prehistoric although the exploration was limited, so that the true pattern of settlement was not elucidated. It was hoped that the site could be visited again on the second trip, but the poor state of the road precluded this.

A'opo

Two settlements were visited, SS-Ao-3 and SS-Ao-4 (fig. 28). These lay on the same slopes as that of Asau, but further to the east. The present village of A'opo is known locally as the "village of a thousand parts" and it is likely that a great number of settlements lie in the heavy bush cover of the slopes above. A track was followed on the stereo aerial photographs past small volcanic peaks up on to the highlands, and Wright shows a track on his map. There was a traditional track across the island to the south coast at Sala'ilua. Ologogo lies at the eastern edge of the slope and the villages in the clearings behind Sato'alepai lie further east again. It seems possible that the whole area from Asau to inland Pu'apu'a was occupied.

Water supply over the A'opo area is very poor at the present time. There are two substantial stream beds showing signs of water flow on the worn lava base; however, neither of these has carried water in living memory, except during exceptional and heavy rains. The stereo aerial photographs show a track entering a volcanic cone east of the small 1902 outbreak above the present village; this track may have led to a source of water. At present water is collected from the infrequent rains or by carrying it long distances from rain pools in the stream beds. During a visit to A'opo, I accompanied a small boy with a long bamboo pole to a pool a mile from the village. We laboriously filled the bamboo with black water and heaved it home. The father of the boy had been away for two days searching for water in the hills above the village. It is difficult to reconcile this state of affairs with the evidence of extensive occupation, which must have required a greater water supply than the unpredictable rain. The extent to which water supplies in the area may have been affected by the A.D. 1760 lava is not discussed by Kear and Wood (1959).

SS-Ao-3 is a settlement a mile west of the present village along the road to Asau and on the edge of the 1760 lava flow. The area is in recently felled bush and taro gardens, and contains eroded rectangular platforms of large dimensions, but only 12 inches high. There were said to have been many more platforms in the vicinity but they were robbed during the formation of the road in recent years. A dry stream bed runs down hill on the eastern side of the area. The village appears to have been inundated in its western part by the 1760 lava flow. Large adzes have been collected during the preparation of the taro gardens, and one similar to those collected at the present village was inspected.

SS-Ao-4 is another settlement on the east side and inland of the present village. It has many large rectangular platforms and portions of a walled roadway 9 feet wide. The path followed on the exploration led through clearings and patches of bush and the evidence of occupation occurred in both bush and clearing. The number of platforms was greatest near the dry stream bed which was the object of the visit.

Sasina

This village lies by the sea on the eastern edge of the iron-bound part of the north coast (fig. 35). As well as evidence of occupation inland mentioned earlier, the part of the village nearest the 1760 lava flow edge appears to have some antiquity in the form of terraces although these are at present occupied by houses. Beyond these terraces and on the lava flow itself, lie many platforms and more terraces (plate 7) continuing into the bush. These have a different character from the terraces in the village itself and being built on the lava flow are probably historic as well as less impressive than those of the western part of the village.

SS-Sn-1 is a long and well preserved terrace on the coastal side of the spring at Sasina where the "phallic" stone described above occurs (plate 3). It is occupied in part by modern houses. A further terrace lies just inland from this and is similarly occupied by an impressive guest house as well as other houses.

Faletagaloa

A probably historic settlement lies approximately one and a half miles inland from the coastal village of Faletagaloa in an area known as Pu'e, on the west side of an old coconut plantation. It is designated *SS-Fg-5* (fig. 35) and consists of square and rectangular platforms all about 12 inches high and traces of a roadway 9 feet wide. On the far west side of the bush is a well 12 feet deep which was dry when visited, but is said to fill with heavy rain. It is a beautifully made thing cut 6 feet into natural rock with a build-up of lava slabs 6 feet high.

Matavai

This abandoned settlement, half a mile inland from the coastal village in the area known as Tilo, is designated *SS-Mt-2* (fig. 35). Over a considerable area of old coconut plantation are scattered a number of 50 feet to 100 feet square stone platforms, associated roadways and some enclosing stone walls. One large *umu ti* (large oven) was found towards the eastern slope which holds the terraces Mt-3. Under a boulder at the base of the steep slope a collection of friable and old human bones was found; these had obviously been disturbed.

Ologogo

This area, 6 miles from the coast, rises steeply from 1300 feet above sea level at the homestead to 2000 feet. It lies above the coastal villages of the Safune area and the inland village of Paia. The land is in partly cleared bush with some crops and large paddocks for cattle grazing. It is approximately one and a half miles wide and was explored one and a half miles inland from the homestead. The upper part is still in standing bush with a few ancient clearings. It lies immediately to the west of the volcano which first erupted in A.D. 1905. In fact the lower northeast corner of the original block is now covered with the lava flow from the volcano.

The ash shower from the outburst provides an easily recognised ground layer so that field monuments can be readily divided into those present prior to the shower (the majority) and those created after it inundated the area.

The Ologogo Block was first taken up by a German whose name has not been recorded, prior to 1900. It was then a small bush clearing which extended across the lower parts and around the present homestead. The original plan of the block (copied in Court Grant 987) reveals that the original clearing included the occupation at the terminations of the roadways recorded in this survey (01-B-1 and O1-B-2), although these features do not appear on the plan. The original owner left the block in a hurry during the eruption and the next owner (Wetzell) took up the block

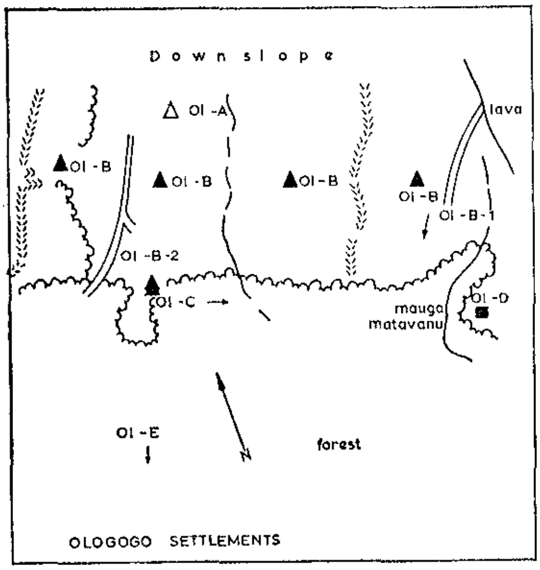


Fig. 20. Plan locating principal Ologogo settlements, Savai'i.

as a Crown Lease in the mid 1920s, but did little to develop it until the late 1940s when he planted kapok trees on the edges of large paddocks, setting out a cocoa plantation in two of these. The plantation, kapok trees and a small group of houses show on the aerial photo of 1954. The cocoa failed and the block passed to the present owners who started clearing the bush and raising cattle on the cleared land.

Wetzell built a stone wall, possibly from an existing one. There is a walled enclosure shown on the original plan, but this no longer exists: it probably enclosed a sugar plantation. In 1966 a heap of stone was taken from the paddock just southwest of the homestead in order to rebuild the butchery destroyed in the February hurricane. Apart from this, the present owner has not altered the land formation or the field monuments.

There are five areas of occupation which appear to be separate settlements (figs. 20 and 35).

SS-01-A is the post eruption village which lies just above, east and west of the present homestead. The low house platforms and coral floors are visible in the part shown to contain houses in the 1954 aerial photographs.

SS-01-B is the village just above this (see also detailed plan, fig. 21) extending both east and west in the area of the original bush clearing. The east part is noted on Wright's (1963) map as the abandoned village of Olo.

SS-01-C is a small settlement above B, on the edge of a natural terrace.

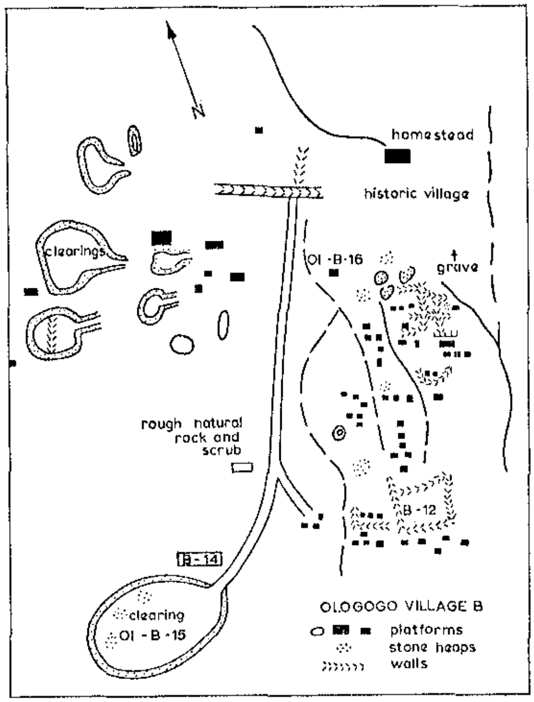


Fig. 21. Plan of Village B, Ologogo.

SS-01-D is a small cluster of platforms on a peak just west of the 1902 volcano.

SS-01-E consists of house platforms, pits and a stone mound in the bush of the upland part of Ologogo.

I have designated certain features of the villages A to E with numerals because they appeared to warrant separate detailed recording (see Appendix). The following is a record of the villages as a whole.

SS-01-B is the most extensive of the five settlements recorded at Ologogo and its most striking feature is the presence of the roadways entering it from the lower coastal end (figs. 21 and 22). These are described in Appendix and it has been shown that they were formed prior to 1900, possibly in the mid 19th century. This places at least part of the village in the historic period, and a carbon date for charcoal from the excavated pit (01-B-16) of 210 $\pm$ 100 years before 1950 (GaK-1201) confirms this suggestion.

The settlement extends from the lava edge in the east to the steep gully on the west boundary (fig. 21). The house sites lie on low ridges which run downhill from the south to the north and which are separated by numerous dry stream beds. As noted at A'opo, the rocks in these stream beds are water worn but no water has flowed in living memory although some are marked "streams" in the original

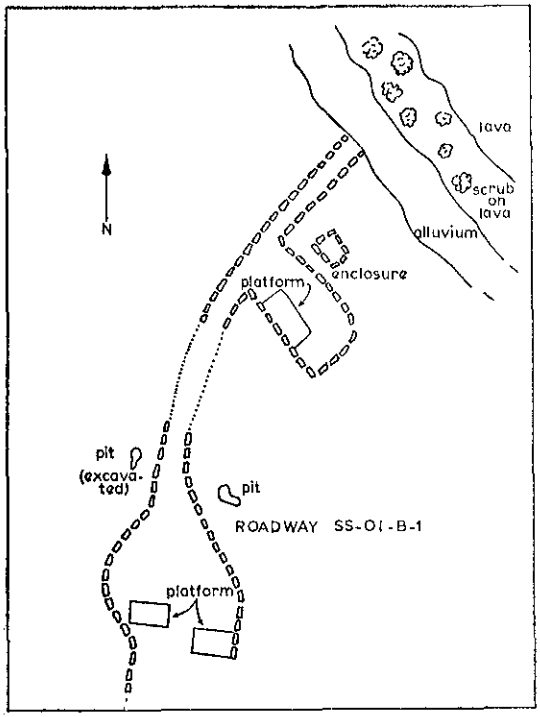


Fig. 22. Plan of roadway, SS-O1-B-1, Ologogo.

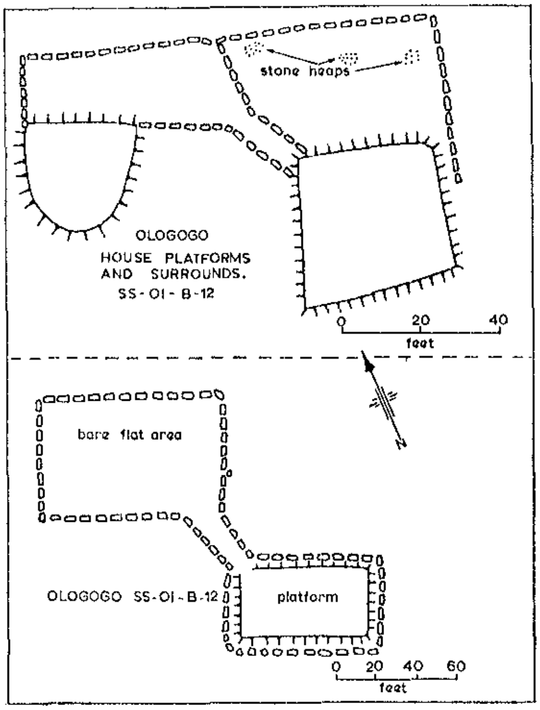


Fig. 23. Plan of stone house platforms, SS-O1-B-12, Ologogo.

block plan. The only running stream in the area is on the extreme eastern edge, and occupation extends up this stream to the flats below the peak with Village D.

The ground in its natural state is littered with lava blocks and these have been used to form terraces (probably for houses) as well as the house platforms which lie on the crest of the ridges (fig. 23, plate 8). Another feature which distinguishes Village B from the others is the use of low stone walls in association with the house sites. Thus the terrace or platform may be surrounded by a low stone wall or there may be a group of platforms surrounded by a stone wall, or the wall may extend to include a flattened and levelled area not obviously a house site; small heaps of small stones may lie within this enclosure. In addition there are longer, if not always higher, stone walls running transversely across the ridges in a meandering way (fig. 21 gives details for the central part of Village B). None of the other villages recorded has stone walls either in relationship with the house sites or associated with the village as a whole. It is suggested, then, that the stone walls are a late or protohistoric feature.

Another feature of Village B, present also in Village C, are the field clearings — areas up to a quarter of an acre in extent which have been cleared of surface lava blocks which have been heaped at the sides. These are probably the remains of gardens. The clearings occur most frequently in the west part of the village and the largest and neatest is at the termination of roadway SS-01-B-2. As noted, heaps of small stones lie within the clearings.

No count of terraces and platforms was made, but it is estimated that in Village B there are at least a hundred house sites. One *umu ti* was found.

SS-01-C lies uphill from Village B and is in recently cleared forest, on land with scattered trees and no undergrowth. It is separated from the lower village by an archaeologically featureless strip of land which rises steeply to a wide natural terrace along the edge of which lie the house sites. The west end of the terrace is still heavily bush covered and could not be explored, but the east part is more open and it was determined that the village is localised to the area immediately above the middle part of Village B, although there are isolated rectangular pits running east into the upper part of Village B.

The settlement consists of a group of six platforms associated with a star mound, isolated rectangular pits extending east and west from these, forest clearings which have been

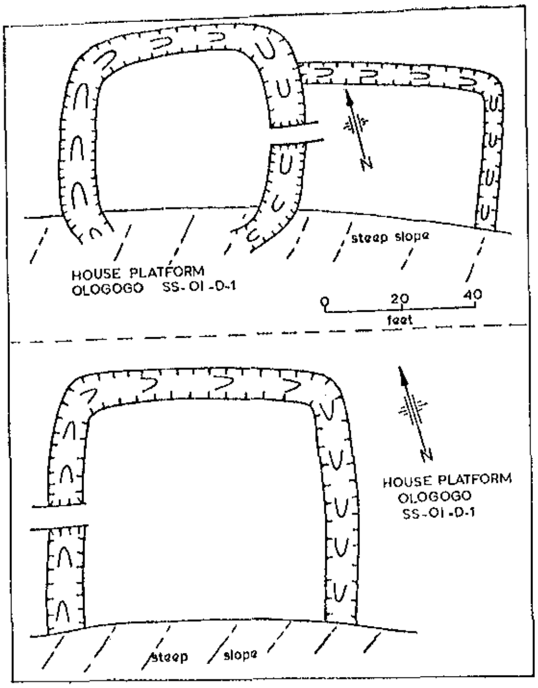


Fig. 24. Plan of earthen house platforms, SS-01-D-1, Village D, Ologogo.

levelled and cleared of lava blocks, and some isolated terraces on the east side.

The group of platforms consists of low eroded squares and rectangles built up to 12 inches above the surface and paved with soil and small stones. Irregular outlines of houses may be seen on some. The fireplace of one of these was excavated and a charcoal sample from it has been dated to 890 ± 70 years before 1950 (GaK-1200). The unique feature of this settlement is the star mound which is built out from the edge of the steep slope (fig. 16). This was the only star mound found in the locality.

Eight house sites remote from the first group were recorded, though the possibility of more in heavy forest to the west cannot be excluded.

SS-01-D lies on a small "dirt" peak of the Salani volcanic formation on the east side of Ologogo, immediately west of the Mauga Matavanu outbreak. There are only a few scattered lava rocks on the deep soil distinguishing it from more rocky soils developed on the Mulifanua formation, on which the previous villages are situated. The field monuments are, however, blanketed by the 1905 Matavanu ash and therefore are contemporary with, or earlier than, the features of Village B.

There are five platforms along the west edge of the peak and all of them have been formed from the spoil dug from a surrounding ditch. All are rectangular with sides from 30 feet to 60 feet long (fig. 24). On the east side of the clearing on the top of the peak are three rock scarped platforms formed from rocks presumably collected on the flats below the peak. In addition there are three circular pits with raised rims, each 15 feet in diameter and 2 feet deep — like small *umu ti* (large ovens). No excavations were undertaken in this unique group, unfortunately, and it can only be assumed that the cluster of features has a special significance. This, together with the unlocated stone mound, sets SS-01-E apart from the other four settlements.

Owing to the dense nature of the bush, and the small size of the clearing, no photographs were taken. It would be unrealistic to estimate the number of house sites in Village E but it must have covered an area half a mile square at least.

There are no rectangular pits in the area — a most unusual finding. There is, however, an *umu ti* (large oven) 30 feet in diameter associated with the perimeter platforms on the west edge. This was one of two found at Ologogo. A long terrace, levelled and scarped along the north side only, completes the settlement. An exploration of the steep sides of the peak and the ridges leading up to it failed to disclose any track or roadway into the area. It is possible that the original approach (and further settlement) was in the east which has now been partly obliterated by the lava field. The contemporary cattle-rustlers use this route, which is probably a traditional one, by way of inland Sato'alepai.

In the flat below, on the south side of the peak, there are a great number of rectangular pits, rather more in fact than platforms. Platforms do appear lower downhill on all the ridges which lead to the upper part of Village B. It is probable that these represent the upper part of Village B, rather than part of Village D, as the former extended upslope along the stream bed which flows around the base of the peak.

SS-01-E is in the uncleared, but cattle-grazed bush in the upland part of Ologogo at an elevation of approximately 2000 feet above sea level. The owner had discovered signs of occupation whilst clearing a new fence line and one of his workers had found a small adze when digging a post hole. The settlement is separated from the lower SS-01-C by an area approximately half a mile wide which lacks monuments.

In the bush are numerous small clearings and natural terraces on which lie rectangular platforms, associated stone heaps and rectangular pits. The majority of the platforms have been built up with lava blocks and are smoothly paved. The rectangular pits are both in close association with the platforms (being placed near the edge), and scattered throughout the area remote from platforms. Fourteen were counted on the trip down through the bush to the cleared land below. The stone heaps are, as in SS-01-B and C, associated closely with the platforms.

During an unsuccessful attempt to locate a 15 feet high rock mound which the owner noted in the bush whilst mustering cattle, a large clearing was discovered in which were two large rectangular platforms and associated rectangular pits and stone heaps (fig. 25). In the cleared space between these are three small platforms approximately 6 feet in diameter. One is ovoid and the others circular, all being built up with a stone scarp to 12 inches with a fill of earth and small stones.

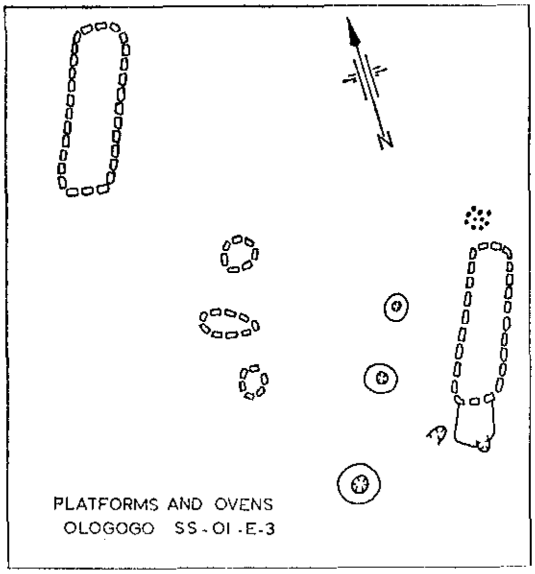


Fig. 25. Plan of platforms and ovens, SS-O1-E-3, Village E, Ologogo.

SUMMARY OF OLOGOGO SETTLEMENTS: In summary the settlements at Ologogo are more clearly differentiated into separate entities than are others recorded in Savai'i. Each has one or more unique features, and at least the first two can be placed in the historic or protohistoric period. It must be emphasised that the study of the settlements was enhanced immeasurably by the open nature of the greater part of the forest and the close cropping of the ground cover.

There is unfortunately no clearly perceived time differential between Villages C, D and E, unless the *umu ti* is assumed to be a feature of later villages, in which case Village D would come between B and C in time sequence. The star mound of Village C and the stone mound of Village E are also features unique to each, but there is no means of determining whether either feature, or indeed the *umu ti,* represents different periods of settlement rather than different aspects of the same occupation. If contemporaneity of any of these is assumed, however, a substantial population is implied.

The size and shape of platforms do not differ greatly from one settlement to the next, indicating a standard shape of house which does not differ greatly from contemporary coastal houses. Thus there are variations within each of these abandoned villages just as there are variations in size and shape in the occupied coastal villages. It is necessary, then, to rely on either the unique features, associated artifacts or on radiocarbon and geological dating in order to elucidate any time difference.

As already mentioned, the presence of hearths was noted in some house platforms and it may be confirmed that this feature is one useful means in separating prehistoric and protohistoric from more recent historic examples. Hearths were not found in SS-01-B but in both SS-01-C and E. Green (personal communication) has suggested that the use of hearths seems to end in the early historic period. Unfortunately no excavation was undertaken to clarify the position at Ologogo, but the conclusions already reached through consideration of other unique features were confirmed when attention was given to the hearth feature: Villages A and B are historic (although Village B may extend back into prehistory); Village C and Village E are prehistoric, and Village D probably protohistoric. The 11th century A.D. radiocarbon date for a hearth in SS-01-C appears to offer support for this suggested sequence.

PAIA

Two clusters of occupation occur inland from the present village of Paia (fig. 35).

SS-Pi-A is a cluster of platforms and terraces associated with the roadway Pi-2, 1.8 miles directly south of the present village and lying around the entrance to the cave called *'o le ana o le nu'u lē tau.* The roadway was in the process of being reformed when the survey was made, but it appeared to have been originally 6 feet to 9 feet wide with a wall on each side, traces of which were found in the bush above the reformed road. There are three round-ended and one square-ended platform

(Pi-3) built up to 12 inches above the ground with lava blocks, smoothly paved and containing hearths. The terraces (Pi-6) are stone scarped and extensive, running transversely across the ridge. One large *umu ti* (oven) was found at the bottom of a terrace scarp.

The thick nature of the forest precluded an accurate survey, and a projected trip up the remains of the roadway could not be undertaken in the time available. From the line of the roadway, and from its original design, it is presumed that it terminated in the similar roadway on the east side of Ologogo Village B and is, in fact, the downhill continuation of roadway SS-01-B-1. The lava flow obliterates both the upper end of the Paia roadway and the lower end of the Ologogo one. The hearths and the roadway suggest a protohistoric to early historic date for the settlement.

SS-Pi-B is east of Pi-A and two miles from Paia. Access to scattered platforms and walls was by way of a roadway east of Pi-2, running directly inland from Safotu. Some platforms are large (up to 100 feet square, 2 feet to 3 feet high, roughly paved) and others are oval, 20 feet by 10 feet. Further signs of occupation in the form of walls and terraces and a large stone terrace, lie half a mile or so further inland (Pi-8 and 9).

Manase

In the area between the Vaipouli hills and the buried volcano southeast from Safotu lies the inland Manase plateau in Fagaloa Volcanic formation (deep soils, steeply eroded). A settlement was revealed by recent felling of bush inland from the old German plantation of Schmidt (fig. 34). There is a strongly flowing stream in a deep gully on the east side of the area, flowing to the sea between the coastal villages of Manase and Salei'a. The soil is a rich red with very few smooth boulders most of which have been gathered to form the platforms.

The occupation forms two clusters: *Ma-1* consists of three large (80 feet by 40 feet) rectangular plots marked only by an outline of boulders with no sign of paving, while *Ma-2* is composed of circular platforms 30 feet in diameter, rising 2 feet to 4 feet. There are seven of these in the area along the west edge of the steep slope to the stream. The heavy weed and uncleared scrub probably cover more. Buck (1930: 66) describes one of these circular platforms in this area as 42 feet by 40 feet in diameter and 2 feet high and noted seven evenly spaced hollows around it from which the dirt had been scooped up. He also noted that "between the hollows, earth has been sloped upwards to form pathways to the platform." There are many "ditches" running here and there across the area also described by Buck but it is clear that these are natural features of a laharal area and not, as he suggests, for defence. These circular platforms were not found anywhere else on Savai'i, although circular mounds were recorded.

An exploration of the land on the east side of the stream was negative — doubly negative in that a recent house platform had been built up with soil. Experience elsewhere in Samoa suggests that any prehistoric platform is put to use rather than troubling to make a new one. Therefore it can be concluded that there certainly are no prehistoric ones in this area because the owner had just completed the laborious task of building one for himself.

Sato'alepai

A series of occupations extend from the coast to the high ridges inland 6 miles from the coastal village of Sato'alepai (fig. 34). The large plateau area in the vicinity of the Sato'alepai peak (St-1) lies on the seaward side of the 1905 lava flow, but the other four areas of occupation lie in clearings in the heavy bush inland from the flow.

A well formed roadway runs to the lava edge where it has obviously been interrupted by the flow. Traces of its possible continuation were found on the inland edge and in the first clearing. This is similar to assumptions made for the Paia-Ologogo road: the road was formed prior to the eruption, connecting villages now abandoned.

The settlements occupy clearings in the dense bush, but the heavy cover of mile-a-minute vines and grass obscure the patterns of the platforms so that intensive study becomes tiresome and unrewarding. Thus it is not possible, under present conditions, to elucidate the features in the manner of Ologogo, though the area would warrant similar examination were it first cleared.

SS-St-4 is a village on the flats below and inland from Sato'alepai peak (St-1) revealed by clearing of the scrub since the first visit in December 1965. There are extensive stone walls and round and oval platforms. The peak itself is terraced although there are no signs of platforms on the terraces. The subdivision of the flats into plots separated by stone walls is clearly visible on stereo pairs of the 1954 aerial photographs.

SS-St-5 is a settlement on the inland edge of the lava field in a large bush clearing. Stone walls are easily detected in the weed, but platforms are difficult to define. The majority are probably rounded or oval.

The roadway continues from here into St-6. There is also a foot-track, probably an ancient one, which travels east to Patamea.

SS-St-6 is another bush clearing further inland than St-5, connected to it by remnants of a 9 feet wide walled roadway. Just on the seaward end of the clearing is a group of *umu ti.* Several large stone heaps, not definite mounds, were recorded but no walls or platforms were clearly visible.

SS-St-7 is situated along a track inland and uphill from St-6. It is a large bush clearing in which are flats with eroded platforms around the perimeter.

SS-St-8 is still further inland and up the ridge from St-7 where the walking track, passing through heavy bush, leads to a further extensive clearing. This lies due east from the 1905 volcano. Large stone mounds are found in the seaward part of the clearing and in the flat swampy ground upland ceasing at the foot of the steep ridge on the inland side. As mentioned earlier, this walking track associated with the series of clearings is the one used by the contemporary cattle-rustlers, and is most probably a traditional route to the highlands beyond Ologogo.

PU'APU'A

Approximately half a mile inland from the coastal village of Pu'apu'a up the two- to three-year-old plantation road to a recent coconut plantation is a group of square platforms, 40 feet to 100 feet in size and 6 feet to 10 feet high. This is the start of an area of some 30 acres of recently felled bush, all of which has signs of earlier occupation (fig. 28). Again the area is covered with a thick growth of weeds and these together with the recently felled trees make a survey difficult. However, on the gently rising ground are found numerous small stone walls and platforms and these are crowned at the upland and highest part by the largest and best preserved star mound found in Savai'i (Pu-2) (fig. 14). The village name given was that of Paemanu'a.

It should be mentioned that inland from here in a northwesterly direction in heavy bush lie the five abandoned villages visited by Wright and plotted on his map. None of these abandoned settlements was visited on this trip. One was visited by Davidson and Green in the initial trip around Savai'i, but only the spring was found at the place called Fasasaia-pito-i-uta. On the coast they also visited the now abandoned village of Papalaulelei, where a wall lies at the back of the southern end of the village, while in it are house pavements with both round and rectangular house outlines and gravel fill in the interior.

SAPAPALI'I

The first village, given the name of Tuaula, lies in a bush clearing approximately two miles inland from the coast. Access is by way of the road north of the Williams Memorial on the coast. The features Sp-14 (roadway), Sp-16 (mound) and Sp-17 (wall) are parts of this village designated *Sp-A* (fig. 33). The clearing is some ten acres in extent and the locality is separated from lower occupational zones by a wall with a narrow entrance in the downland part. A well defined and narrow, walled walking track leads from this entrance to the clearing on which are weed covered platforms and a large *umu ti* from which a carbon sample was obtained. The large mound is set against the steep slope inland from the clearing.

The village was said to be a pre-contact one ("Before the Gospel") and was cited as the residence of the high chief Seiuli. The date of 750 $\pm$ 80 years before 1950 for the charcoal sample (GaK-1202) from the *umu ti* suggests that the village was occupied for a long period.

A very large rock mound (Sp-12) and an *umu ti* lie beside the roadway across the ford three quarters of a mile seaward from Village A. These appear to be isolated from any other features but prolonged exploration of the bush-cleared area in which they lie was not undertaken. The ford lies at the inland termination of coconut plantations which extend from the coast.

The second village of inland Sapapali'i, *Sp-B,* lies south of this in an area drained by one of the main branches of the Safua stream (fig. 33). Access to this area is the roadway from Betham's store. The village occupies an extensive part of a cleared plantation of recent origin and extends into the bush on the periphery. Features Sp-1 to 10 all lie within the village. No name could be determined for the area. The most striking feature of this village is the presence of numerous stone walls, both tall and low, which subdivide it into plots. The house sites are all scattered, rather than concentrated in clusters and the mounds appear in all areas. One eroded star mound was recorded.

This village is similar to the walled Village B at Ologogo, the Villages St-4 and 5, Paemanu'a at Pu'apu'a and Tuaula at Sapapali'i. It is suggested that they are all contemporary and, on the evidence of the extensive walls, were occupied up to the historic period.

SALELOLOGA

The land inland from the coastal village of Salelologa and surrounding the peak, even including the peak itself, was noted as having signs of extensive occupation (figs. 32 and 33).

The terraces S1-2 and 3, the walls S1-4, 5 and 7 and the roadway S1-6 indicate occupation over a large area, *S1-A,* although no clusters of house sites were found.

The group of mounds, *S1-B,* at Vaipapa (S1-8 to 11) indicates a further nucleated settlement of unique type. Two star mounds and two small rock mounds with paved tops and entrance ramps (a further possibly similar mound had been recently destroyed), form an unusual group. An extensive exploration seaward from this group failed to reveal any further features, and the only house platforms in the area are those at present occupied.

Terraces and platforms a half a mile further west (S1-12) indicate a small settlement.

It is possible that these three recorded areas represent separate parts of a large single occupation zone which extended from the east coast through to the south coast, associated with the original walking track. The extensive occupation in the vicinity of Palauli may be the centre of a very large prehistoric population concentration, associated with one of the two flowing rivers in Savai'i (see Report 4, p. 77).

LATA-I-UTA

The clearing of the Lata Plantation, started in the 1870s (Lewthwaite 1962: 145) shows extensive and successive occupations. The most recent occupant created impressive stone walls to enclose the coconut plantation. An earlier subdivision of the clearing is suggested by low eroded walls crossing in a more or less haphazard fashion, and an even earlier occupation by stone mounds and terraces which are crossed by the eroded walls. No clear pattern of house platforms could be determined in the heavy weed and scrub growth of the abandoned plantation (see also Report 4, p. 74).

In the clearing half a mile west of Lata-i-uta (La-4) a number of rectangular house platforms were located in a recent clearing and these extended into the unfelled bush.

Between the Lata Plantation and Palauli is an area drained by the Alia Tufu and Lata Rivers in which the evidence for settlement is discussed by Scott (Report 4, pp. 74, 75). Although I did not visit the area myself, an inspection of aerial photographs in stereo pairs indicates the presence of stone walls in clearings.

GENERAL SUMMARY AND CONCLUSIONS

The archaeological field survey of part of the north, east and south coasts indicates a substantial pre-contact occupation. Stone artifacts from local material were found in most coastal areas and in some inland sites. However it was more difficult to determine the age of most of the field monuments, because the style of the house platforms varies very little between the abandoned villages in the bush and the contemporary coastal villages. Plates 5 and 6 are included because these house sites, both occupied and abandoned, were more easily photographed than similarly shaped house sites in the weed covered bush country.

A sufficient number of roadways and high walls were recorded to permit their interpretation as a late (historical) introduction. The pattern of land use introduced by the increasing trade of the later half of the nineteenth century was clearly a revolutionary one, as both Wright (1963) and Lewthwaite (1962) have shown. The pre-contact village agriculture was extended to involve the active cultivation of the coconut. The ultimate aim in coconut cultivation is to create a stand of trees with a ground cover kept low by cattle grazing. This necessitates enclosing the area with a fence and the simplest fencing material is the ubiquitous lava boulder (latterly displaced by barbed wire). It is also possible that stone walls were built to protect small plots of sugar cane (used for thatching roofs) and vegetable plots, from marauding cattle and pigs. There is no evidence that these walls actually formed part of a defensive system although the contemporary explanation is that they were either *pa tonga* (forts of or against the Tongans), or district boundaries. District boundaries they may have been (in order to separate one village's stock from the next) but it is impossible to imagine that these crude walls served the purpose of Hadrian's Wall.

Roadways found were either wide enough to be bridle tracks or wheeled-vehicle tracks. Walking tracks other than those in constant use were not found because the conditions of rapid regrowth quickly obliterate tenuous tracks. Lewthwaite (1962: 153) quotes a German attempt to encourage the indolent population to increase copra production by presenting them with carts as a reward. This offer no doubt led to some increase in track widening, a labour which has recently been revived with the incentive of increasing use of motor trucks. Lewthwaite (1962: 153) places the original widening activities in the early twentieth century, but the archaeological and geological evidence suggests some took place prior to 1900.

Mounds present more of a problem for interpretation. Stone platforms for house structures from one foot high and 50 feet across the diagonal, to those from 50 to 70 feet square and many feet in height on which were built the houses of chiefs at marriage as well as houses of the gods, have been reported in early historical accounts (Poesch 1961: 162; Stair 1897: 111-2). But while the small low house platform category is often described, the sub-categories of large and small among the stone mounds are not as easy to verify from historical records. Specialised sites such as star mounds, which are not mentioned in the literature are probably prehistoric. Star mounds may have been built for the chiefly sport of pigeon snaring or may have formed part of the unrecorded pre-Christian religious life; judging by the present day propensity for village ceremony, the latter explanation is the more likely.

The larger mounds of heaped large boulders were found, for the most part, in areas of old clearings and coconut plantations. An unromantic explanation is that they are a feature of the early copra phase of Samoan culture. Coconut oil was originally extracted by allowing the copra to drain into old canoes, the oil being collected in barrels for export to the increasing European market. Lewthwaite (1962: 141) states that by 1870 the "copra revolution" was virtually complete and the old method of collecting oil was superseded by the preparation of copra whereby the flesh of the coconut was sun dried and exported whole (as it is today). The drying process involves setting the shelled copra out on large stone platforms, leaving the weather to do the work. (More recently artificially heated copra dryers were introduced.) It is possible that the majority of the large stone mounds were made either for this purpose or as plantation storage depots for prepared copra awaiting transport to barges and boats. However, the possibility that an originally paved surface has been leached away by the weather should be borne in mind; a ceremonial function can then be envisaged more readily. The reported discovery of skulls and artifacts within a mound during dismantling at inland Avao may perhaps lend greater antiquity to these large rock mounds than the present interpretation allows.

The previously unrecorded collapsed subterranean pit noted at Ologogo is difficult to interpret. In a climate which allows round the year cultivation of root crops, only the storage of the seasonal breadfruit as fermented paste may be suggested. Further excavations will be necessary before a proper assessment can be made, but the radiocarbon dating and its association with historic period settlements suggest a relatively late date for one point in the time span of this feature.

The principal form of settlement is that of clusters of house platforms and terraces. The two may occur in close association where the terrace is simply an extension of ground available for house platforms. Terraces have also been made remote from settlements, their purpose being presumably to provide flat agricultural land in steeply sloping ground of rich soil; single house platforms may be associated with these terraces in some areas.

One is on slightly firmer ground in reviewing the pattern of village settlements in Savai'i. It can be concluded, at the moment, that there is no unequivocal evidence that the earliest inhabitants lived high in the hills away from the vulnerable coast, returning to the coast by way of intermediate settlements under the influence of the Pacific peace of the mid-nineteenth century as some accounts of the traditional history suggest and as is indicated in the quotation from Wright cited at the beginning of this report. It is just as likely that the inland settlements represent different aspects of a culture which occupied both the coast and the forest, supporting a population as great or greater than the present rapidly increasing one.

There is no evidence that villages were fortified, as stated by Suggs (1960a: 94).

It can be assumed, on the evidence of the large stone walls, that the villages 01-B, St-4 and 5, Pu-1, Sp-A and B, and S1-A were abandoned in historic times. This is not to say that the villages were not originally prehistoric, but that the occupation of them continued through into the mid-nineteenth century. As mentioned in the discussion on the Ologogo villages, it is not possible to separate the various other settlements inland into different periods but only to grasp the strong assumption that they are all prehistoric. Certain unique features, such as the *umu ti,* star mound, or rock mound ultimately may be proved to be of primary importance in period differentiation.

Forts do not form a large part of Samoan culture compared, for instance, with the culture of the New Zealand Classic Maori. Only four, or possibly five, have been discovered in Savai'i. Those recorded both in Savai'i and Upolu are either ridge or headland forts, and suggest, by the presence of substantial inner banks, that they were used during the gun-fighting period. Unlike their New Zealand counterparts, they appear to have provided only temporary living quarters. The presence of the coastal headland fort at Safotu may give some substance to a tradition of Tongan dominance of the area, but there is no evidence within it of prolonged, or even substantial, occupation. It is just as likely that the Samoan forts represent late internecine strife of the nineteenth century. Davidson (1965: 63, 69) was unable to find any correlation between

Tongan and Samoan forts, so we must look elsewhere if we are to find evidence of the traditional Tongan occupation which some say pushed the Samoans into the refuge of open villages in the hills.

In conclusion, this report has emphasised the findings in the field in Savai'i. No attempt has been made to relate the findings on Savai'i to the accumulating information on Polynesian prehistory, or to the unpublished studies on settlement patterns in Upolu. A great amount of work is still necessary before the settlement patterns can be elucidated. Further work recording specific monuments is necessary before the antiquity and function of large rock mounds can be determined. Other field monuments require more detailed investigation than undertaken here. I can only hope that this brief introduction to Savai'i will be of help to future field workers.

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APPENDIX

A Check List of Sites Recorded on Savai'i

1. Roads and Walls

SS-Ao-4: Roadway west and inland of the present village of A'opo. It is 9 feet wide, kerbed in part and has causeways where it passes over steep cuts. The roadway is associated with an abandoned village.

SS-As-1: Roadway in heavy bush on the northern slopes of the northwestern part of Savai'i, inland and southeast of Asau. It is approached from Tufuga Fatu's plantation, up a ridge covered in heavy bush. The roadway appears to start suddenly and runs south up the slope until it meets a terrace wall running at right angles to it across the slope. The roadway continues in a westerly direction, but was not followed for more than a few hundred yards. Stone scarped terraces lie above it. It is on the average 6 feet wide with well made walls on each side, rising to a height of 4 feet.

SS-Fa-1: Stone wall running north-south, cut by main road, east of Fagasavai'i. The seaward side is eroded and peters out some 100 yards from the road. The inland side is well preserved and extends through the plantation clearing up to, but not into, the cleared bush. It is associated with mounds and terraces, Fa-3 to Fa-4. In plantation.

SS-Fa-2: Stone enclosures inland from road and on each side of Fa-1. These are low eroded walls enclosing only about 100 square feet. In cocoa-coconut plantation.

SS-Mt-1: Roadway inland from coastal village of Matavai. It has been reformed for motor traffic for half a mile and beyond this it becomes a walled track 9 feet wide. At least two junctions occur with similar walled roadways running transversely across the valley floor.

SS-01-A-2: Stone wall running north-south uphill east of owner's house. This wall is well preserved and is known to have been built (or reformed) by the previous owner of the farm prior to 1950. A further wall runs transversely from this in its mid part.

SS-01-B-1: Roadway on the east side of Village B, Ologogo and east of 01-A-2. It runs for approximately half a mile uphill from the ash edge of the 1905 lava flow (Buist 1967b: plate 3) and is 9 to 12 feet wide, with an eroded wall on each side. Near its present downhill termination is a flattened clearing, enclosed in walls, which has a large 12 inch high platform within it. At its uphill termination is a group of rectangular pits and three 2 to 3 feet high platforms. The roadway possibly continued uphill where there are traces of a wall, but the present farm track has disrupted and confused the former situation. A continuation of the road on the coastal side of the lava flow probably joins with the road from Paia (SS-Pi-2) to which it is similar in all respects, and with which it forms a line to the coast, interrupted only by the lava flow (fig. 22).

SS-01-B-2: Roadway on the west side of Village B, Ologogo and west of the present homestead. This roadway, 12 feet wide and enclosed with high eroded walls, runs uphill, the downhill end being difficult to determine owing to destruction by historic village. Uphill it is first crossed by the present paddock boundary track before narrowing and finally terminating at a large flat clearing in which are several small stone heaps and on the edge of which is a large platform — almost a mound. The roadway has a branch, 6 feet wide, running to the east to a group of small house platforms just uphill from the boundary crossing.

SS-01-B-3: Stone wall on the extreme west side of Ologogo. The wall is irregular and eroded, but is clearly visible on the 1954 aerial photograph although it is now overgrown with second growth scrub.

SS-01-B-6: Eroded stone wall continuing inland on the line of roadway 01-B-1.

SS-01-B-7: Stone wall running east-west from the clearing SS-01-B-5 at the termination of the roadway 01-B-1. The wall can be traced to the lava edge where it disappears under a cover of ash near the outbreak of the flow. The terraces of the eastern part of Village B are associated with this wall.

SS-Pi-2: Roadway on the mid-north part of Savai'i, above the village of Paia and inland from coastal Safotu. This roadway has recently (1965) been widened to allow motor traffic, but the upper part, 1½ miles from Paia, was still untouched when visited. It travels in a southerly direction up the ridge, and is about 6 feet wide and bordered by low eroded stone walls. From its line, it probably was the lower part of roadway SS-01-B-1.

SS-Pi-9: Stone walls running across a low hill inland of Paia just west of the stone terrace Pi-8. No local history of the area was obtained except that a well was located inland from here before the lava flow of 1905-11.

SS-Pu-2: Stone wall inland of Pu'apu'a coastal village. This wall, which is very wide (12 feet) and up to 5 feet high, runs northwest-southeast starting at village of Pu-3. It is said to extend inland for a long distance.

SS-Sf-1: Stone wall beyond the foot-track causeway on the inland side of Safa'i. It forms a large and well preserved enclosure 3 to 4 feet high in an area in which there are several lower stone walls and a large mound. A fresh water spring arises on the edge of an estuary near the mound and within the large wall.

SS-Si-2: Stone wall above and southeast of the church at Saipipi, running transversely across the ridge. Just up the ridge there is a large stone platform (Si-3). The wall, 4 feet high and in a good state of preservation, lies in an old clearing.

SS-S1-4: Several stone walls running transversely across the slope on the south side of Salelologa Peak. The best preserved example ends on the edge of a steep valley. All lie in a coconut plantation.

SS-S1-5: Stone walls run transversely across the slope in the coconut plantation on the east side of Salelologa Peak.

SS-S1-6: Roadway inland and west of Salelologa. The lower part near the present main road is wide, but further inland it becomes narrow and is lined by stone walls. The walls have probably been removed in the lower reaches to provide paving for the wider road. In coconut plantation.

SS-S1-7: Stone wall at upper part of roadway S1-6, inland of Salelologa. The eastern part is a massive wall up to 8 feet high, but it becomes lower in the upslope end to the west where it terminates at the edge of the bush. In cocoa-coconut plantation.

SS-Sn-4: Roadway at Sasina which is walled, and up to 15 feet wide in parts. It is said to be old, but was reconstructed two years ago for a distance of 1½ miles inland. The roadway continues as a narrow walking track (the Vaialia Track) alongside the dry Suianau stream. Many breadfruit trees were noted in the vicinity of the junction with the walking track to Letui, but no platforms could be discovered there.

SS-Sp-1: Large stone wall on Betham's plantation inland of Sapapali'i, at about 500 feet above sea level. The somewhat eroded wall up to 5 feet high and 10 feet wide, runs north-south starting on a low hill in the north and crossing the flats of the plantation.

SS-Sp-2: Stone walled enclosure with a stone mound inside to the south of Sp-1 and inland of Sapapali'i. The walls are 4 to 5 feet high, about 4 feet wide at the base and 2 feet wide at top. The enclosure is well preserved but has no locally known history, although it lies within a flat plantation area where many other stone features of a village occur.

SS-Sp-14: Roadway, continuing the line of the motor road inland from the middle of the coastal village of Sapapali'i. At first this roadway is 12 feet wide and can accommodate a truck, but beyond a ford and at the mound Sp-12 it narrows to 9 feet. Eventually the walking track follows it only in general way, the roadway itself being intermittently overgrown with second growth bush. The track and roadway lead to the area of Village Sp-15.

SS-Sp-17: Stone wall and associated narrow walking track at Village Sp-15, inland of Sapapali'i. This wall is probably an old boundary between villages and has a well preserved entrance or "gateway".

SS-St-2: Stone wall running east-west from south of Sato'alepai Peak towards Vaipouli. This wall is said to be part of a traditional boundary between villages and lies partly in plantation and partly in bush.

SS-St-3: Walled roadway and causeway across the estuary at Sato'alepai. The causeway was made into a motor road in 1959-60, but previously it had been a narrow foot causeway with the stone walled roadway beyond it. The walls continue, both lining the road and running off transversely to it for about half a mile inland.

2. Mounds

SS-Fa-3: Two rock mounds on each side of the stone wall Fa-1 in a neglected cocoa-coconut plantation inland from the road at Fagasavai'i. The west mound is larger, being approximately 100 feet by 200 feet with a 12 feet scarp on the seaward side. The smaller is also rectangular, but with steeper sides. They both have rough rock surfaces.

SS-Fg-1: Large rectangular rock mound behind a swamp which lies on the inland side of the coastal village of Faletagaloa and just west of the L.M.S. Church. The top is 160 feet by 100 feet and is smoothly paved with large stones. The sides have a sloping scarp 6 to 8 feet high which possibly has been eroded back from the perpendicular. Two oval house platforms have been built on the level top in recent times, although only their foundations remain. This mound lies in an archaeologically very productive locality around the spring of Mata'olealelo (see section on stone boulders).

SS-Fg-2: Large rectangular stone mound just east of Fg-1 and behind the church. It is at present occupied by several houses.

SS-Fg-3: Two large rock mounds, rough on top, half a mile inland from the main coastal road at Faletagaloa. Stone walls running transversely to the line of the present road built 1959-60 lie just seaward of the mounds. Each mound is 150 feet square and 5 to 7 feet high. The present road continues as a foot-track and was built from the track by widening it.

SS-Fg-4: Large stone mound only a foot high, in the bush on the east side of the road on the edge of an old coconut plantation. Eroded stone walls were also found in association with it. These features are quarter of a mile inland from Fg-3.

SS-La-1: Large stone mound in the Lata-i-uta Plantation 4 miles from Sala'ilua. It lies on the east side of the clearing, inland from the road and is approximately 200 feet square and 8 feet high. The main interest is that it is crossed by a low eroded stone wall.

SS-La-3: Stone mounds in the northwest part of Lata-i-uta Plantation. These mounds form a group, but are difficult to measure owing to the heavy growth of weed and scrub.

SS-Mt-4: Large rock mound with small platform on top on the flats inland of Matavai and high above Mt-2, in the direction of the road to Ologogo.

SS-01-B-4: Rock platform in a clearing that is part of the lower section of roadway 01-B-1 (fig. 22).

SS-01-B-5: Two rock platforms that are part of the upland section of roadway 01-B-1. The walls of the roadway broaden to enclose the mounds (fig. 22).

SS-01-B-14: Large mound, 40 feet by 40 feet on west side of termination of roadway 01-B-2, Ologogo. It has a rough top and is 6 feet high.

SS-01-C-2: Star mound in Village C, Ologogo (fig. 16). The mound is amongst a group of house platforms. It lies on the edge of a natural terrace and as a result the height of the upslope edge of the mound is less than the downslope side (18 inches and 4 feet 10 inches high). Each point of the star is 29 feet long and is squared at the tip. The rock scarps are well preserved in places. The centre of each point as well as the centre of the mound is filled with dirt, not rocks. This is the only five pointed star mound recorded in Savai'i.

SS-01-E-4: Large 12 feet high rock mound in bush above highest point of Village E, Ologogo.

SS-Pi-1: Large earth mound, north edge of Paia village. The base is square, but the flat top has been considerably modified by present day occupation including two sleeping houses and three small cook houses on the top, and a further sleeping house at the base at the southeast corner. The edge of the top is not clearly defined, but the base is 200 feet square, the slope 70 feet from the base to the top edge and the height 12 to 14 feet.

A large flat clearing in the present village is the obvious source of the earth for the mound, as the hill on the seaward side has not been robbed for soil (Buist 1967b: plate 4).

SS-Pu-1: Small 10 feet square rock mound in clearing just inland from the coastal village of Pu'apu'a. There are broken down stone walls radiating from each corner.

SS-Pu-4: Large eight pointed star mound measuring 84 feet across inland of Pu'apu'a and on the highest point of the Village Pu-3. Although covered with thick weed and rooted trees, the mound still has a very well preserved scarp 4 to 6 feet high. The ends of the points are clearly squared as in star mound 01-C-2, but in this example the interstices have also been squared (fig. 14).

SS-Sf-1: Large 100 feet square rock mound, 6 feet high, with well preserved scarps across the foot-track causeway on the inland side of the coastal village of Safa'i. At least one platform occupies the scrub-covered top as well as the small mound said to be the grave of a high chief called Maiava. A fresh water spring on the west side is enclosed within a stone wall in the manner of the present coastal springs.

SS-S1-8: One of four mounds grouped on each side of the main road west of Salelologa at Vaipapa. The two on the inland side of the road are star mounds, while a further mound in the area was removed some years ago for the wharf construction at Salelologa. No evidence for an old village could be found in the area, but several adze fragments were picked up during the exploration. S1-8, a round rock mound with well preserved walls, is 75 feet in diameter and 6 feet to 8 feet high. Two stepped ramps lead to the top, these being let into the mound. The top is paved in small stones and soil. The scarps have three or four enclaves in their outlines.

SS-S1-9: Rectangular rock mound on the coastal side of the road, quarter of a mile west of S1-8. This mound, like the others, is made with a lava block scarp and a soil fill. The scarp is somewhat eroded but stands perpendicular in a few places where it is still intact. The mound is 75 feet by 65 feet and probably stood 15 to 18 feet high. It has an entrance ramp let into the northwest corner. Small trees are growing on the top (fig. 13).

SS-S1-10: Star mound with six points inland from the road and north from S1-8. The mound is now somewhat eroded, but still clear enough for one to recognise its shape. It is 6 feet high, the arms are long and the central area small.

SS-S1-11: Eight pointed star mound about 300 yards west of S1-10. This mound is unique in that it has been built on a square rock platform 8 feet high, the star mound portion rising a further 2 feet above this. The centre area is 25 feet across and the points extend approximately 10 feet out from this. The intervening spaces between the points are 14 feet wide, narrowing to 18 inches at the apex. The floor of these spaces is paved with large flat blocks of lava out to the vertical drop of 8 feet to ground level (fig. 15).

SS-Sn-3: Large stone mound with crude house on top half a mile inland from the coastal village of Sasina. The mound is 100 feet by 40 feet in size and roughly paved. There are also many haphazard low stone walls in the vicinity which is an old coconut plantation.

SS-Sp-3: Stone mound within a stone enclosure (Sp-2) inland of Sapapali'i. It is 22 feet square and 3 feet high with well made sides and partly eroded. The surface is composed of large lava blocks and had no signs of paving on top.

SS-Sp-5: Large stone mound west of Sp-3. There are also several smaller ones in the vicinity. It is approximately 100 feet square and is built on a gentle slope so that the east side at 14 feet is higher than the west side. The surface is rough lava blocks with no sign of paving. A 3 feet high stone wall, in good condition, surrounds this mound.

SS-Sp-6: Stone mound quarter of a mile southwest of Sp-5. The mound is 40 feet square, 4 feet high and made of large lava blocks resulting in rough surfaces. It has a large tree growing on it.

SS-Sp-7: Large stone star mound quarter of a mile west of Sp-5 on top of a low flat-topped hill in old plantation clearing, near edge of bush. The mound has eight points, and stands 3 to 4 feet high.

SS-Sp-9: Large stone star mound at end of plantation road inland of Sapapali'i on which rests the foreman's house. The mound has eight points and is built on sloping ground so that the north edge is built up 4 feet and the south edge only 1 foot. It is paved with smooth pebbles, these being present when the foreman built his house on the mound. As his present house is built on piles 6 feet high, the paving appears to have been associated with an earlier structure.

SS-Sp-10: Large irregular stone heaps in bush clearing east side of Safua Stream opposite Sp-9.

SS-Sp-12: Large rock mound on north side of roadway just above the ford inland at Sapapali'i. Weed covered, and apparently very eroded and rough, possibly because it was robbed for road building. It is 80 feet by 36 feet in size and 11 feet high.

SS-Sp-16: Large rock mound on the inland edge of village Sp-15 (Tuaula). In size it is 140 feet by 100 feet.

SS-St-3: Large rock mound, partly dismantled recently to provide rock for rebuilding the Fagamalo School. A small platform has been formed on top at some stage. Very large boulders which it would take several men to shift, occur in the base of the mound. It lies just off the roadway, St-3, and not far west of mound Sf-1.

3. House Platforms

SS-Ao-3: A mile west of the village of A'opo along the road towards Asau, and on the eastern side of the 1760 lava flow, is a group of eroded large rectangular platforms about 1 foot high. There are said to have been many more but they were robbed during the formation of the present road in recent years. The group has been recorded as a village.

SS-Ao-4: East and inland from the village of A'opo is a scattered collection of rectangular platforms associated with a roadway and distributed over a distance of approximately a mile. They have been recorded as a village.

SS-La-2: Stone platforms in a group in the north part of the Lata-i-uta Plantation and midway between La-1 and La-3. It is possible that many more platforms are present, but this was difficult to determine owing to growth of weed and scrub.

SS-La-4: Group of stone platforms at east end of clearing half a mile west of Lata-i-uta Plantation. In this vicinity the bush has recently been felled, but the platforms extend into the unfelled bush as well as occurring in the open. They are recorded as a village.

SS-Ma-1: Recently felled bush on an inland plantation at Manase has exposed an 80 feet by 40 feet rectangle outlined by small and large water worn boulders. The enclosed area is in soil and lies on almost the same level as the surrounding ground level. No indication of its purpose was found, although its shape suggests that it is the outline of a large house.

SS-Ma-2: East of Ma-1 but clearly associated with it is a group of circular platforms, 30 feet in diameter rising to a height of 4 feet. These are built up with medium sized boulders and paved with small stones. They are recorded as a village.

SS-Ma-3: Large rectangular platforms built up from soil with a ditch on all sides, at inland Manase. There are no stones in the area and the ditch simply indicates the removal of soil to form the raised platform. They lie to the northwest in an area a mile from Ma-1 and 2, and on the edge of the steep slope east of Paia. Inspection of aerial photographs disclosed many stone walls in the surrounding clearings.

SS-Mt-2: Scattered platforms half a mile inland from Matavai, in an area recorded as a village which was given the name Tilo.

SS-01-A-1: House platforms immediately above the homestead at Ologogo. The houses present in the 1954 aerial photograph have since disappeared, but the platforms with their coral paving still remain. They have been recorded to save confusion in the future.

SS-01-B-6: Platform enclosed with stone wall which also continues downhill to enclose a bare flat area. This is one of several such combinations found in Village B.

SS-01-B-8: House platforms and terraces (which are probably house sites) on the ridge above and east of roadway 01-B-1.

SS-01-B-11: House platforms and terraces on ridges west and above the group of pits and stone heaps which lie just west of roadway 01-B-1.

SS-01-B-12: House platforms and terraces on ridges east of roadway 01-B-2. This designation also includes stone heaps, walls and clearings (fig. 23 and plate 8).

SS-01-B-13: House platforms, terraces and clearings on west side of roadway 01-B-2.

SS-01-C-1: House platforms in Village C, Ologogo. A hearth on one platform was excavated and a charcoal sample taken, giving a date of 890 ± 70 years before 1950 (GaK-1200).

SS-01-C-4: House platforms and terraces across gully east of 01-C-1.

SS-01-D-1: Group of five house platforms built up in soil in an area lacking in rocks on the edge of the peak west of Mauga Matavanu. The platforms are covered with the 1905 Matavanu ash mantle. Each is defined by a surrounding ditch, the spoil from which has been used to raise the platform above the general ground level. Each has an entrance causeway across the ditch, and one has a secondary platform. The ditches are all approximately 9 feet wide with a 3 feet scarp to the platform. One edge is formed by the steep slope of the peak (fig. 24).

SS-01-D-2: Three stone platforms on east side of a clearing about a quarter of a mile from 01-D-1. They are probably part of the same settlement.

SS-01-E-1: House platform in lower part of Village E, Ologogo, near fence line. This is a rectangular platform with a 4 feet scarp and associated collapsed rectangular pit. It is also the find spot of an adze collected at Ologogo.

SS-01-E-3: Two house platforms in bush clearing above 01-E-1. They are associated with features which make this spot unique: three circular pits and three small circular platforms as well as storage pits and stone heaps (fig. 25).

SS-Pi-3: A group of three round-ended and one square-ended house platforms around a cave entrance 1.8 miles up the road from Paia. They have been recorded as a village, because of associated terraces and other features.

SS-Pu-3: Group of square (40 feet to 100 feet) platforms 6 feet to 10 feet high about half a mile up the two to three year old road from the coastal village of Pu'apu'a. These platforms are in a recent coconut plantation and are probably the start of the village recorded as Paemanu'a.

SS-Si-3: House platform behind and east of Saipipi Church. The landowner's house was recently built on a small part of it, but originally the paved area was about 100 feet square.

SS-Sm-1: House platforms on the inland side of the road at Samalae'ulu. They are in a poor state of preservation as occupied houses in the area are built on them.

SS-Sn-2: A few scattered rectangular platforms and old terrace partly broken down by sea erosion, in the bush on the west side of Sasina on the edge of the 1790 lava flow.

SS-Sn-8: House platform east of star mound Sp-7, inland of Sapapali'i. It is 60 feet square and has a recent farm house built upon it. The platform is associated with walls, mounds and enclosures which have been recorded as a village.

SS-Sp-13: A group of three low house platforms and a large *umu ti* on the north side of the road beyond the large rock mound of Sp-12.

SS-Tu-3: Platform surrounded by an eroded stone wall, on the flattened top of Mauga Asi, Tuasivi (Tu-1). This was cleared of weed, measured and photographed (fig. 26). An area within the walls had been paved with flat stones and there remains the outline of a house within this. Part of the paving was still intact on the north edge; on the surface, six postholes were found. It is of interest to note that the owner of the hill stated that his father had built the stone wall of the platform to enclose a sugar-cane patch but that no house had ever been there. The intact paving excludes the possibility of a garden and the visible postholes still remaining indicate a house site.

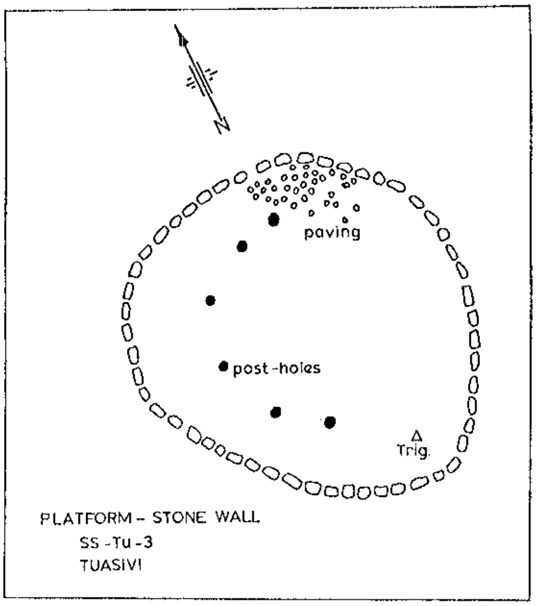

Fig. 26. Plan of stone-faced platform, SS-Tu-3, Tuasivi, Savai'i.

4. Terraces

SS-Ao-1: Two stone terraces above the present village of A'opo. Each is about 100 feet square with 3 feet high scarps downhill. Uphill between the first terrace and the second, are many stone walls, while a large wall encloses the entire area. The second terrace has recently been robbed for wall building around a taro patch.

SS-Ao-2: Large terrace and stone walls on the south side of A'opo village.

SS-As-2: Stone scarped terraces by roadway As-1, Asau, running east-west across the slope.

SS-Fa-4: Eight stone scarped terraces inland of the road and on a gently rising slope at Fagasavai'i. They are associated with a wall, stone enclosures and mounds.

SS-Mt-3: A terrace inland of Matavai on the steep slope of the ridge on the east side of the valley above the old village of Tilo. Small terraces which were probably house sites are also present. Two lava tubes in the area show no signs of occupation.

SS-Pi-6: Stone scarped terraces with associated house platforms (Pi-3), up the ridge from the village of Paia. One large *umu ti* was found at the base of one terrace.

SS-Pi-8: Large stone terrace on the side of a natural terrace east of Pi-6 and inland of Paia. It is smoothly paved and at present is in part occupied by a small copra dryer.

SS-Sl-2: This is the designation given to Salelologa Peak. The slopes on the south and west sides of the peak have been modified by large terraces with stone scarps. There are at least three of these on the east side and one on the south.

SS-Sl-3: Terraces of soil at the base of the north side of Salelologa Peak.

SS-Sl-12: Stone scarped terraces inland from the road and west of the group of mounds Sl-8 to 11, Salelologa. Possibly house platforms also occur in the weed covered area. The terraces are built on a slope to form level surfaces which are roughly paved with stones.

SS-Sn-1: Long and well preserved terrace on coastal side of the spring at Sasina. It is in part occupied by a present day house.

SS-Sp-4: Numerous stone terraces between Sp-1 and 3, inland of Sapapali'i. They are considered part of a village.

SS-St-1: Terraced hill, 2.8 miles inland from Sato'-alepai and northeast from peak behind Vaipouli School. The peak is also called Sato'alepai, and has three terraces on the south (inland) side, and a small one near the base; a wider and larger terrace, about 40 feet wide, runs some 200 to 300 feet around the south and east side; and a further small one occurs below the flattened top. The hill is steep and bush covered on all sides except the south which is gently sloping and cleared for a taro plantation.

SS-Tu-1: A terraced hill, Mauga Asi, on the coast south of Tuasivi. The south and west faces have been cleared for taro and pineapple plantations; the other faces are bush-covered with some coconut trees. There are two terraces and a platform on the top. The lower terrace, 50 feet wide and 500 feet long, merges with the upper terrace on the north side of the hill. Its southern portion terminates abruptly in a transverse stone scarp. The upper terrace, about six feet higher up the hill, has a disturbed stone-faced scarp. On the western end are a few recent graves. It is 450 feet long and 50 feet wide. The top, 150 feet by 170 feet, has been flattened and on it is built a platform, Tu-3 (figs. 17 and 26).

SS-Va-1: Terraced peak, Masa, on the north side of the Vaiola School compound. The peak has two terraces near the top, with their scarps on the south side formed by large blocks of lava. The top of the hill is a flat platform, 50 feet by 30 feet composed only of soil. The rest of the hill is steep and bush-covered.

5. Forts

SS-Ma-4: Fort on a headland on the coast east of Safotu above the bay called Vaiui. It consists of a transverse inner bank and outer ditch running between the cliffs of the coast. The inner bank is similar to the banks of later period Maori forts in New Zealand, which probably were constructed during the early phase of gun-fighting. The inner part of the fort is featureless, exhibiting no signs of prolonged occupation. Test excavations were made within the defences, on the bank, and beyond the defences and all soil profiles were found to be the same: a few inches of recent leaf-mould, then a charcoal flecked twelve inch layer of chocolate brown soil, and then a light yellow clay. It was concluded that the charcoal, being present in all areas both within and without the fort, was the result of early bush fires and would give no indication of the age of the fort, therefore no carbon samples were taken.

SS-Pi-5: A ring-ditched hill-top fort, north of the earth mound at Paia village. From the south, there is first a 20 feet wide terrace and then a steep scarp belonging to the outer bank of the 75 feet to 100 feet wide ring-ditch. The inner scarp to the top is steep, but readily climbed by a rough entrance path on the west side. The edge of the rim is breached in three places and is wide enough on the west side to allow room for a house platform (this being occupied within living memory). The inner edge of the rim falls sharply away to an inner flat area 200 feet in diameter, lying 6 to 10 feet below the edge. There are several exposed house platforms within this inner area. A small stone scarped terrace lies along the south side. It is difficult to determine whether the peak was an old volcanic cone with crater which has been considerably modified by occupation, or whether it was a round-ended ridge with a bank around the circumference of an inner occupation area.

6. Caves

Three lava tubes were examined in the present survey, one having a legend attached, and another showing signs of recent occupation.

SS-Pi-4: Lava tube located in the midst of the unnamed village up the ridge from the village of Paia. Thomson quotes von Bülow:— "This tunnel is known as *o le ana o le nuu lē tau* (the cave of the non-fighting tribe). During the war of the rest of the island with Safune *(Taua o le Faitasiga a Safune)*, about the end of the eighteenth century, the tunnel was used as a refuge, and taro and banana were stored there" (Thomson 1921: 61). I was given the same name for the cave by Fai Eliu of Paia, but he knew no history of occupation except by legendary dwarfs. These dwarfs had been seen by one man who thereafter was able to command food from them by simply wishing for it silently. When his wife became curious and questioned him on the miraculous appearance of the daily food, the unfortunate man told her the secret of the dwarfs and was struck dead. F. G. Calkins (1962) was able to confirm the presence of a dwarf footprint on the floor of the tunnel during her exploration in recent times.

The tunnel has a small entrance which slopes steeply to a large deep chamber. Only the first 200 feet were explored, but it failed to show any signs of occupation. The rock shelf, which has attracted the attention of the local population, is a natural feature explained by Kear and Wood (1959: 23).

SS-Fl-1: Lava tube located at Falealupo 200 to 300 yards inland behind the Convent in dense scrub. The tunnel is not deep, the entrance being just a few feet below ground level. The ceiling is circular with a maximum height of 7 feet, but the floor is level. The ceiling at the end opposite the entrance has collapsed. There are "made" rock benches along each side, formed from lava blocks plastered with soft mortar; the date "21-9-47" appears on this mortar. On the east side the bench is not continuous, but has a 10 foot gap in which is placed a crude rock "armchair". No artifacts or midden were discovered, but the soft sandy floor was not excavated (fig. 27).

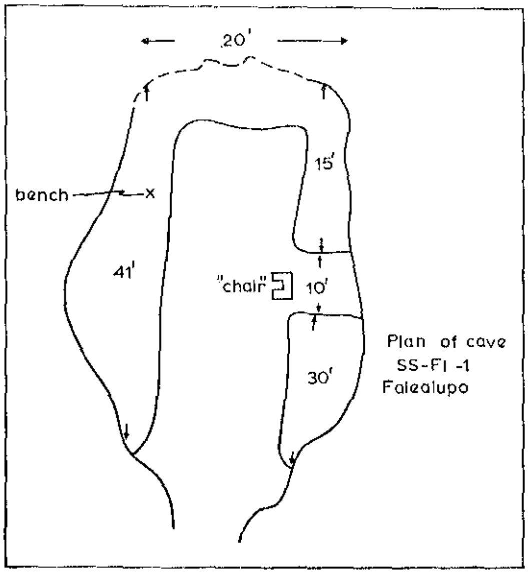

Fig. 27. Plan of lava tube, SS-F1-1, Falealupo, Savai'i.

A further lava tube was visited inland from Salelologa on the main road to the west. It lies in the vicinity of mounds Sl-8 to 11, but shows no signs of occupation and was not allotted a site number.

7. Rectangular Pits and Stone Heaps

These are all located at Ologo.

SS-01-B-9: A group of small and large pits on both sides of the road near the head of roadway 01-B-1. One pit of the group was excavated without positive results.

SS-01-B-10: A group of pits and stone heaps 200 yards west at the head of roadway 01-B-1, in a paddock being planted with coconut during the visit. One of the stone heaps was sectioned and found to rest on undisturbed ground level.

SS-01-B-15: A group of stone heaps in a large clearing at the termination of roadway 01-B-2. This group is associated with a large stone platform.

SS-01-B-16: Group of three pits just below the scarp of a house platform in the corner east of the lower end of roadway 01-B-2. One of these pits was excavated and an area 5 feet by 2 feet was opened and taken down to the floor at 4 feet 9 inches below the surface giving a section across the long axis of the depression (fig. 19). The cinder from the 1905 eruption was found 6 inches below the present surface. The fill of the pit was of large and small lava blocks (some burnt) and a dark chocolate soil, with charcoal bits scattered throughout. The natural soil also had large and small lava blocks, but in contrast to the fill there was a predominance of the smaller ones and a light yellow-brown colour to the soil. A large friable *Tridacna* shell was found on the floor. Charcoal collected for carbon dating gave a date of 210 ± 100 years before 1950 (GaK-1201).

SS-01-B-17: Clearings, pits and stone heaps on far west side of Village B.

SS-01-C-3: Pits, clearings and stone heaps west of the group of platforms 01-C-1 in Village C. These pits occur over a wide area.

SS-01-D-3: Pits, clearings, and stone heaps on flat below and south of base of hill of Village D. They too occur over a wide area. In addition further pits were noted in the bush below the uppermost Village E. Fourteen of these were also recorded on the track down to the lower clearings.

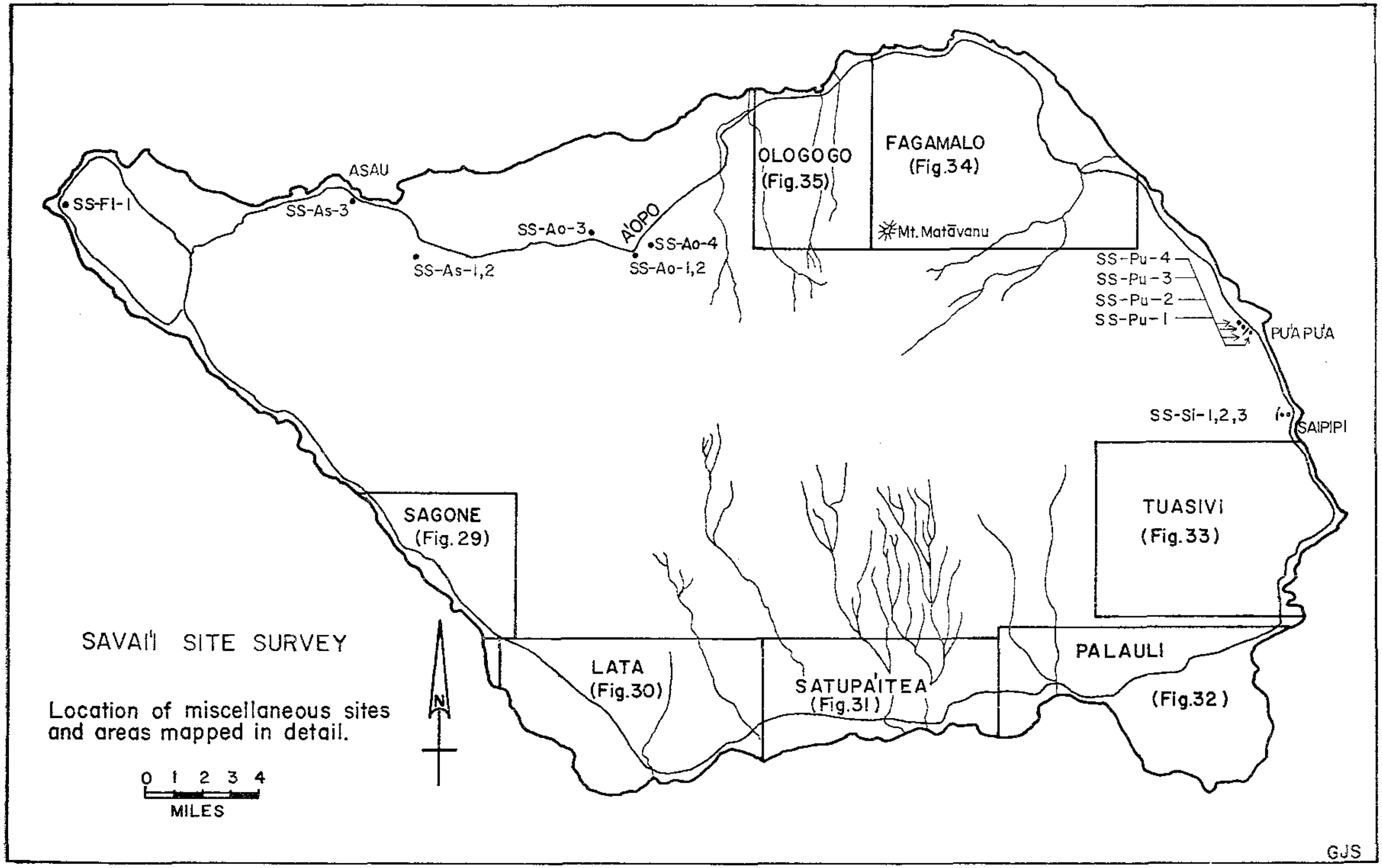

Fig. 28. Map of Savai'i showing reconnaissance survey areas and miscellaneous sites.

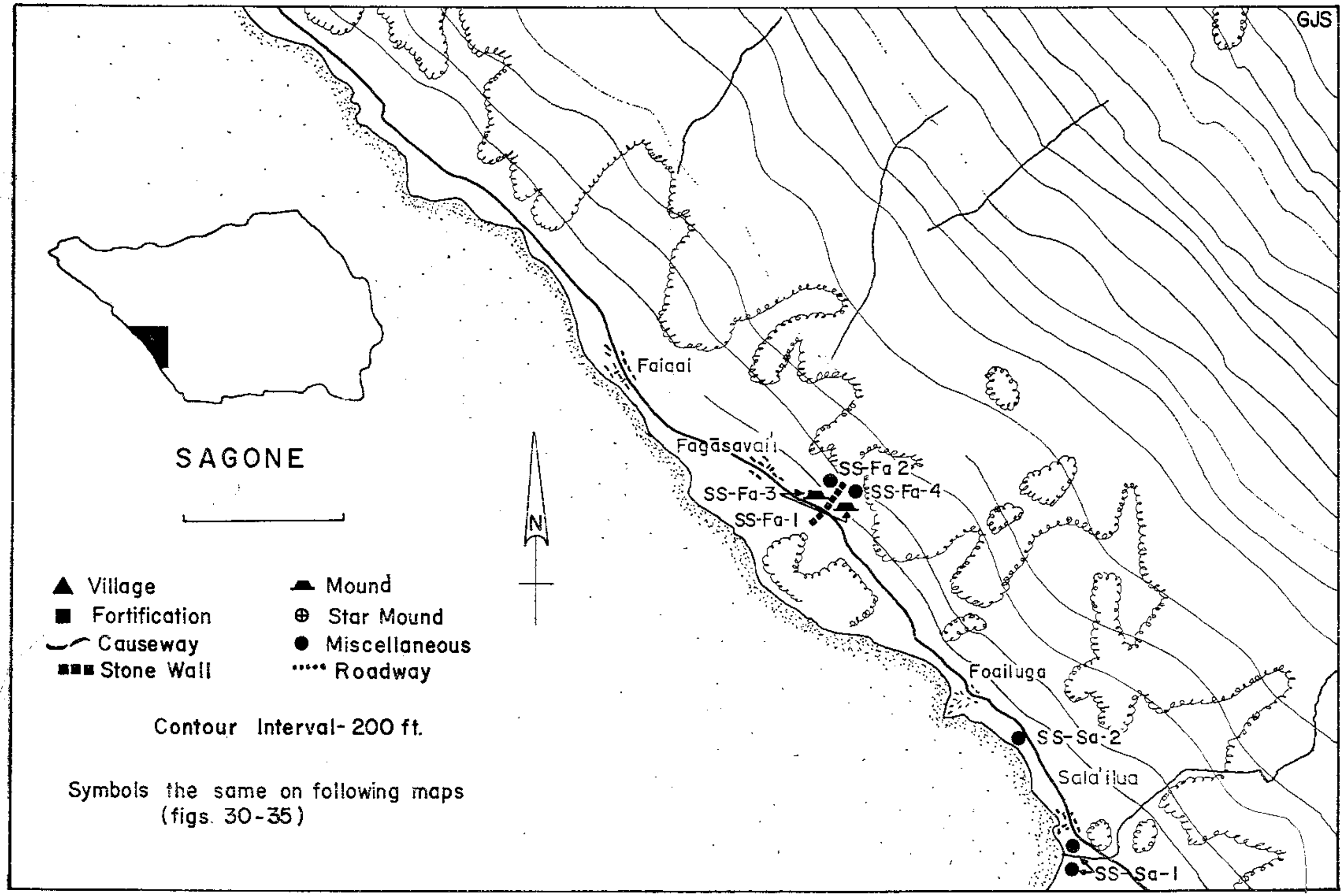

Fig. 29. Savai'i reconnaissance map: Sagone area, showing sites located.

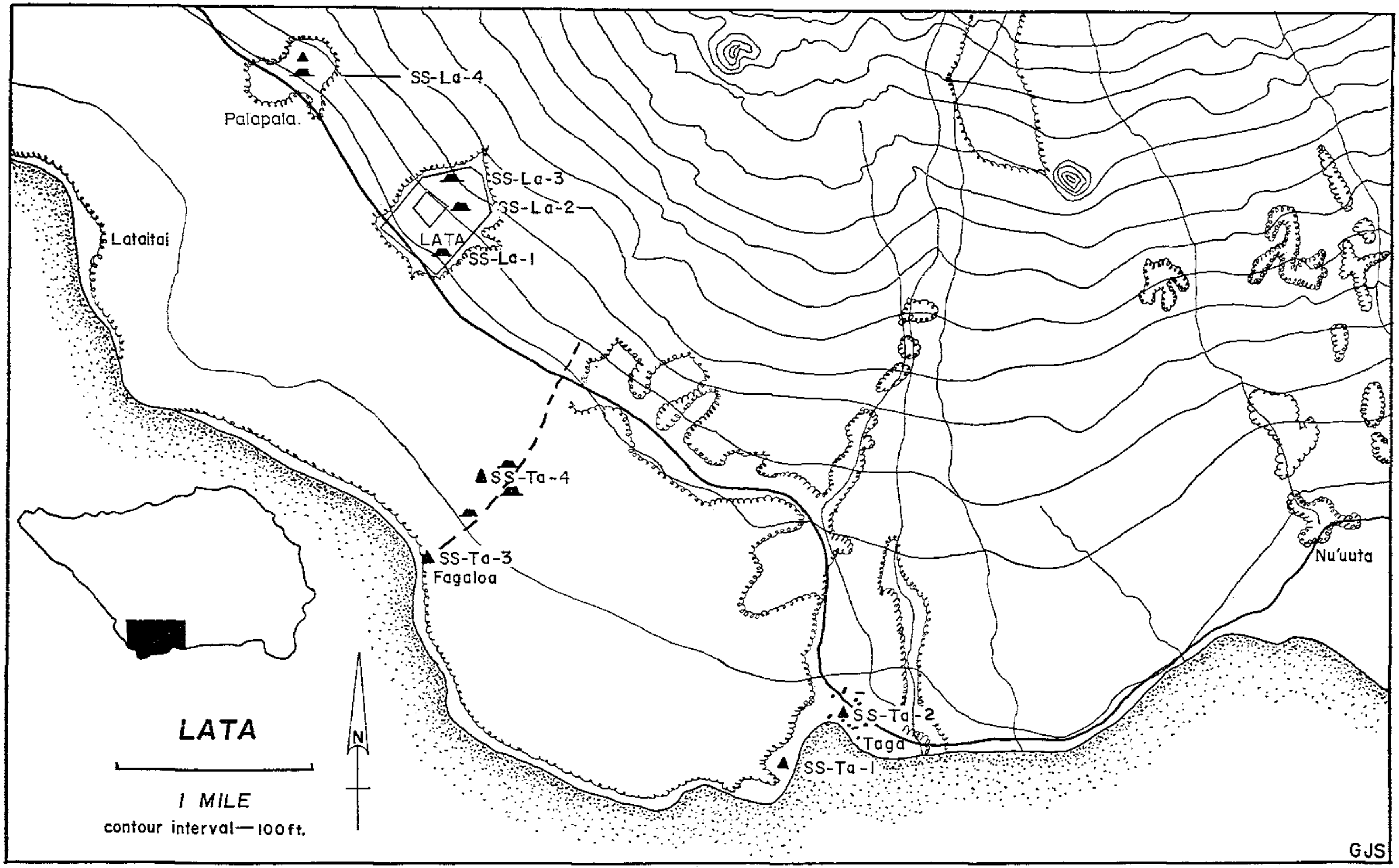

Fig. 30. Savai'i reconnaissance map: Lata area, showing sites located.

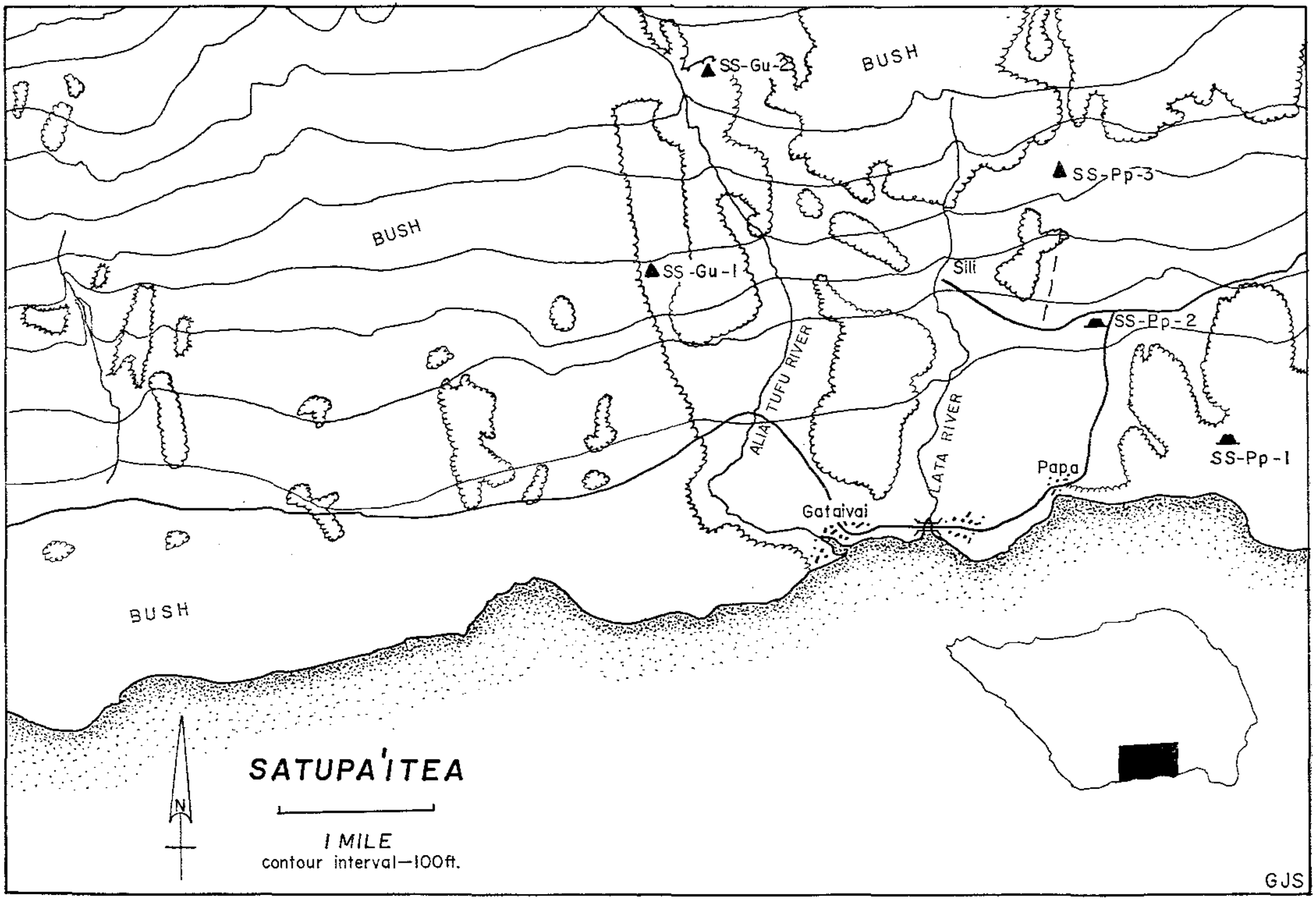

Fig. 31. Savai'i reconnaissance map: Satupa'itea area, showing sites located.

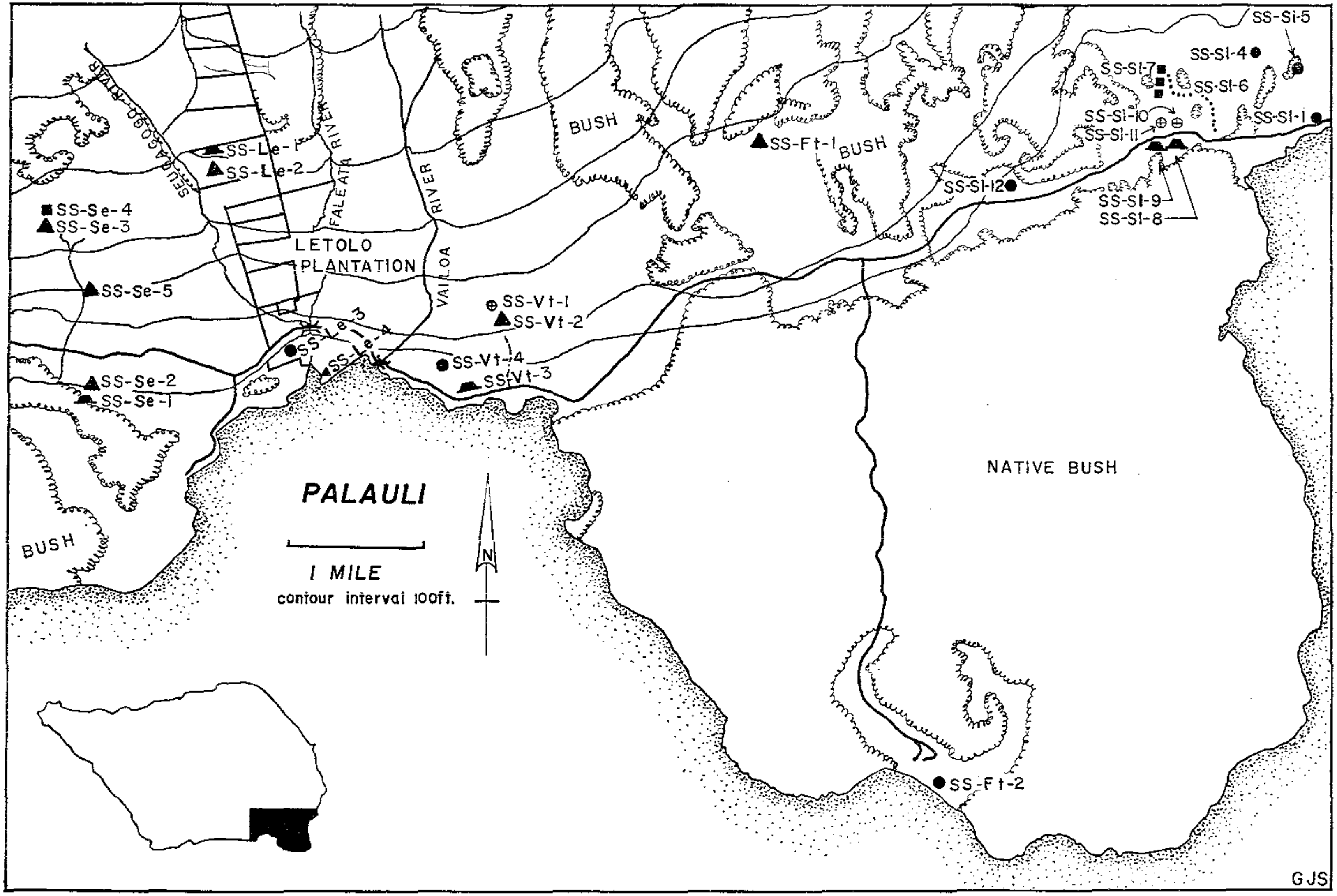

Fig. 32. Savai'i reconnaissance map: Palauli area, showing sites located.

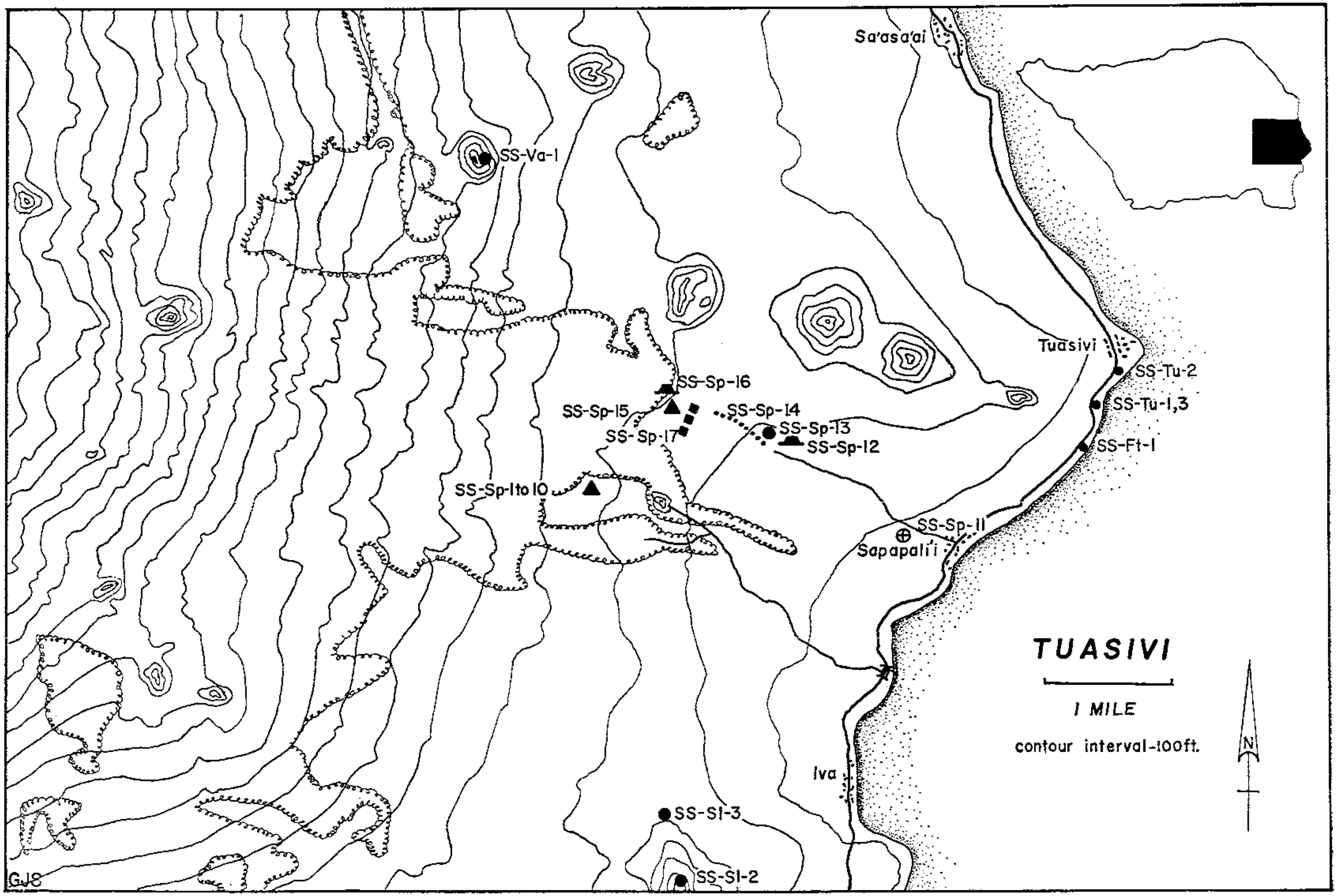

Fig. 33. Savai'i reconnaissance map: Tuasivi area, showing sites located.

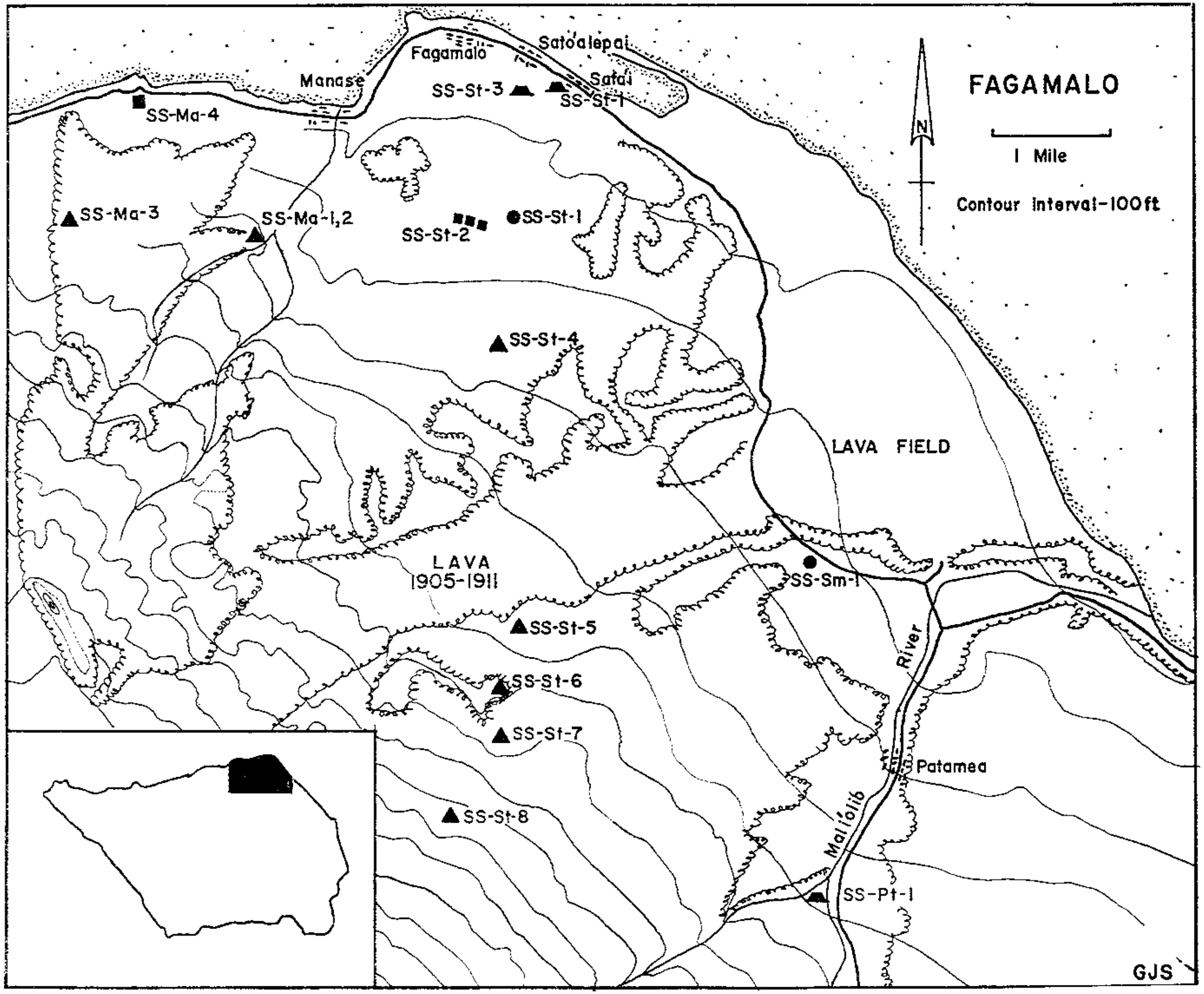

Fig. 34. Savai'i reconnaissance map: Fagamalo area, showing sites located.

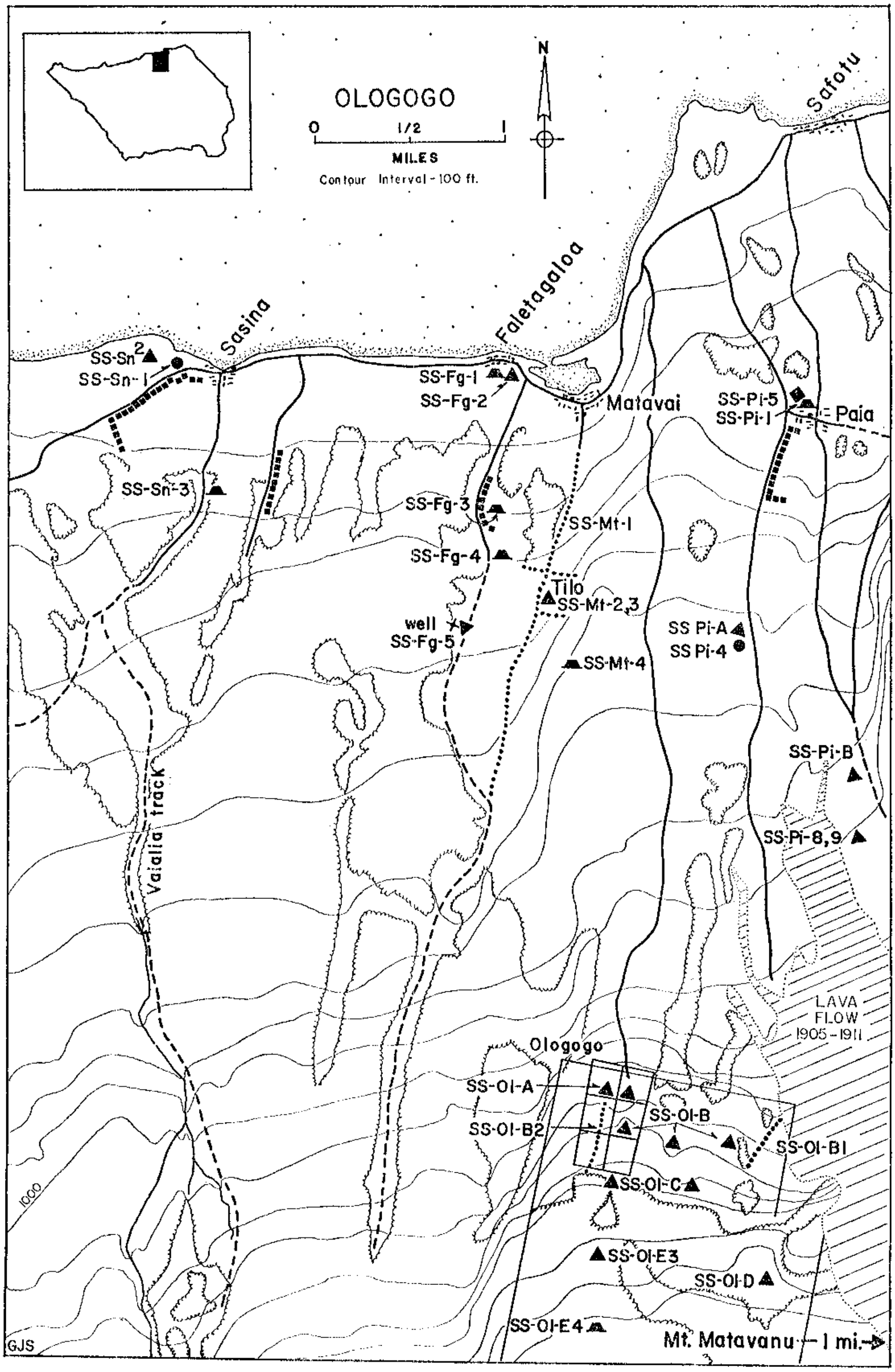

Fig. 35. Savai'i reconnaissance map: Ologogo area, showing sites located.

RECONNAISSANCE AND SOME DETAILED SITE PLANS OF MAJOR MONUMENTS OF SAVAI'I

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INTRODUCTION

Savai'i, westernmost of the Samoan Islands, compares unfavourably with its companion island Upolu in terms of soil fertility, industrial development, population distribution, etc., yet progress in the study of Samoan prehistory has shown extensive pre-European remains on both islands, a fact that transcends modern considerations of demography and geography. The following account draws data and conclusions from two field seasons of archaeological reconnaissance and mapping on the south coast of Savai'i.

THE AREA OF STUDY

The coastal lowlands on the south side of Savai'i present a uniform geomorphic aspect: a practically continuous sloping plain segmented by streams draining the heavily volcanic-mantled uplands. Archaeological sites observed on the south coast were found within 1000 feet elevation above sea level. The vegetation here falls into a broad association termed coastal and peripheral lowland forest (Cameron 1962: 63). Characterising the vegetation of this zone from sea level to 1000 feet and up to four miles inland, Cameron (1962: 64) notes that it, above all, has undergone the greatest change by human agency, to the extent that the native beach forest has disappeared in all but those areas that are now uninhabited. The vegetative difference is immediately apparent about midway along the rough track penetrating a large stand of native bush as it leads to the south tip of the Tafua Peninsula. Elsewhere the south coast of the island is covered by dense tropical vegetation of native forest trees, ferns, and the tall evergreen rain forest.

Throughout the reconnaissance area, three main geological formations are identified, the Mulifanua, Salani, and Puapua Volcanics, after the usage of Kear and Wood (1959). The first and most widespread, the Mulifanua formation, is one on which a moderate number of archaeological sites are distributed, although it is an area of little surface water. The Salani Volcanic formation has a smaller distribution on the south side of Savai'i, but is well drained. On the basis of direct observation and the reports of informants, the region of the Salani Volcanics with its deep soils and upland canyons, was more favourable for higher local population densities during pre-European times. Apart from sites observed and reported by the writer, there are several other old villages reported in the uplands of the south central coast. A third apron of basaltic rock is that of the Puapua Volcanic formation having a narrow coastal distribution.

Significant differences in land potential appear in relation to soil types. Volcanic eruptions in historic times have spread lava in a northerly direction from the central massif of Savai'i, making extensive areas unsuitable for agriculture. Although recent (historic) lava flows are restricted to the north coast, the entire south coastal plain is a flat region of disintegrated lava, one of the parent materials for the formation of well drained loamy and clayey soils that range from moderate to low natural fertility.

Zonation of the south coast of Savai'i whether by vegetation, soils, or vulcanology, is accompanied throughout by a long rainy season that can be relied on with great certainty. The mean annual rainfall is probably the least geographically variable among the physical features described here. As on the south coast of Upolu, the easterly and southerly winds bring a fairly regular distribution along the south coastal plain of Savai'i. This ranges from a mean annual rainfall of 100 to 130 inches in the southeast to 175 inches in a broad coastal band extending to the northwestern end of the island. Although it shows irregularities, the seasonal variability of rainfall is also small. Wright (1962: 85), characterises the south-east and east coast as a very weak dry season regime with one very dry and three moderately dry months. Westward along the south coast the "dry season" weakens even further with no very dry months and only one to two months that are moderately dry.

Temperature is another moderately constant climatic feature reflecting the tropical position of the island itself as well as the proximity of the lowlands to the coast. There is no doubt that elevation accounts for the most important variation in temperature. Curry (1962: 55) suggests that in addition, reduced cloudiness at night during the "winter" (June and July) accounts for most of the seasonal variation in mean temperatures, to which the writer would further add that temperature in the lowlands of the south coast is affected to a surprising extent during the day by the variations in cloud cover that accompany the onset of rains, particularly in combination with the southerly and southeasterly winds that are frequent throughout the year.

Other than physical features already reviewed, limitations to the amount and kind of land useful for settlement result from the configuration and structure of the shoreline along the south coast. The flat or undulating landscape of the Puapua formation terminates at water's edge in the form of rocky cliffs, 10 to 40 feet high, popularly termed the "iron-bound coast". This shoreline topography, with only brief interruptions, extends from the Tafua peninsula in the east, to the village of Si'utu, from which point westward the shoreline formations alternate between coastal strips of coral sand and high coastal cliffs of the Mulifanua formation, up to 200 feet above sea level. The collective effect is one of an inhospitable shoreline environment, that is even less desirable because of the thin, rocky soils on land that is difficult to clear for planting. It is not surprising that except for local population centres such as Taga and Gataivai, the south central portion of the island shares with other exposures of Puapua Volcanics and areas of historic flows, the lowest present-day population figures of Western Samoa.

The climatic complex of the south coast of Savai'i can be summarised as involving the chief features of constantly high temperature, little seasonal change, and abundant rainfall well spread throughout the year. Found here are conditions characteristic not only of Pacific islands but of the moist tropics in general, and one of the many absorbing problems in the archaeology of Western Samoa is to record and interpret the remnants of the prehistoric adaptations to the land and the life.

Research Methodology

From June through August during 1965 and 1966, the writer conducted archaeological reconnaissance studies of the south coast of Savai'i. Observations were made of every accessible monument, site, and settlement type for the purpose of providing a comprehensive account of the archaeological resources on the island. At each of the localities visited, inquiries were made through an interpreter about local knowledge of artifacts, information respecting location of archaeological sites, mounds, or other signs of early settlement. Frequently, with the services of a local guide, remains of settlements in the interior were found in much greater number than had been reported, often to the astonishment of the tenant. Through the generosity of the Samoan people, it was possible to move freely and effectively over Government, freehold and customary land.

Aerial photographs were studied for selected areas and the general reconnaissance was conducted with the aid of the Provisional Topographical Series map of Savai'i 1:200,000 and the Lands and Survey Department compilation sheets, 1:20,000. Figures 29 to 34, in sequence from west to east, are adaptations from the above mentioned sheets and cover the reconnaissance area with some overlap of regions surveyed by Buist (Report 3). Mobility between widely separated areas of the coast was possible with the use of the project vehicle except when rivers were swollen and impassable. The balance of the time allocated to the general survey was consumed on foot on cultivated land or in heavily forested regions. The shoreline was explored by boat along parts of the coast that could not be reached by truck or by foot.

The general objective was that the survey should obtain a descriptive record, maps, and photographs of the sites, and a surface collection of artifacts. Sites were numbered according to the site designation system employed throughout Western Samoa (see Introduction p. 10). With the intent of uncovering and mapping each of the major types of structural remains of Savai'i, a large proportion of time was alloted to the use of plane table and alidade, not only for the plans and profiles of individual structures, but also for a representation of the community pattern of one of the many settlements in the interior. From the plan views and elevations of individual structures, perspective drawings were produced. These are particularly valuable in view of the impracticability of photographing large examples of standing architecture under conditions encountered in the Samoan bush. Lack of formal mound arrangement in many sites and the dense cover of vegetation in others discouraged the making of maps for numerous sites. In other cases, the indistinctive nature of ancient mounds made any attempt to restore original orientation highly speculative; nevertheless, preservation was generally good and each of the illustrations is an accurate representation of the original structure shape. Only those archaeological sites actually visited by the writer have been placed on the map and no attempt has been made to locate numerous sites known by hearsay only. On each sector map of the south coast (figs. 29 to 34) bushlines are approximate as cultivated land area is subject to frequent changes. The location of archaeological sites on these maps was determined by taping from known points. Only in the case of the more remote sites under heavy cover are the locations approximate.

Artifacts, predominantly fragmentary adzes, were collected throughout the surveyed area, given field catalogue numbers, and their provenance recorded as part of the daily account of the archaeological survey. In addition to all of the above, limited excavations were carried out on several sites on the south coast.

As an important adjunct to the archaeological procedure described above, it was felt that a review of the 19th century literature on Samoa authored by various missionary, government, or private individuals might produce evidence for historically important cultural developments. Fundamental to over-all research on Savai'i was the hope and belief that knowledge of the archaeology, both of the coast and interior should, in this event, considerably aid historical interpretation of Samoan cultural development, at that time poorly understood. In the field an attempt was made to record local tradition relating to each area of interior settlement, particularly in the case of the notably large mound at Palauli.

Therefore, coupling a programme of limited ethnohistoric research with a surface survey, field work began on Savai'i in June, 1965. The detailed results are offered in the present report.

The Nature of Archaeological Sites

Several major types of architectural remains are currently recognised. First in order of frequency are mounds. Whether found in groupings or in relative isolation, these structures tend toward a single recognisable form, i.e., a pyramidal platform, having a roughly square or rectangular ground plan. The universal building materials for mounds throughout the south coastal lowlands are the moderate to large sized scoriaceous rocks that cover so much of the lowland surface. In his survey of Savai'i during 1965, Buist proposed a scheme classifying as small, those mounds with less than 100 square feet area on top, and as large, those having 100 to 200 square feet (Report 3, p. 39). An arbitrary division of mounds into small and large is convenient and useful for general descriptive purposes, and in the light of recent and extensive observations of structural remains on the south coast, it would seem that Buist's division holds true although variations found in size and distribution when added to original descriptions, make a model or typical example hard to define. One of the distinguishing structural attributes of the large mounds (those not recognisable as house mounds) is their greater height in proportion to the broad supporting base. Although construction consists of bouldery basalt rock, rough and dry-laid, the platform top and sloping or vertical sides are recurring recognisable and measurable features.

Several of the large mounds found in the uncleared bush were 20 feet high and in general proportions, they approached the dimensions of the largest platform mounds on the island, of which there are only several examples known. Our first judgements about the distribution of large mounds (8 to 20 feet above level ground) i.e., their appearance in groups of three or more must now be revised, as several were found on the south coast constructed in apparent isolation. In one case, the entire surrounding area was checked for associated architectural remains without success. More commonly, of course, other mounds could usually be found within 100 feet. Unlike the higher structures with their flat and regular but very roughly finished platform top, house mounds can unquestionably be identified as such by the smooth pebble paving representing the floor outline of the house.

Field monuments on Savai'i in terms of dimensions tend to group normally around an average size, but there were, in addition, several unusually large mounds, well outside the range of this cluster. In the largest of these, Pulemelei (figs. 39-41), certain distinctive features of mound construction, together with its imposing size, suggest a specialised function.

A second type of mound, numerically much smaller, is the star shaped or star mound, so named for the obvious reason that it somewhat resembles a star, as seen in the plan and perspective views (figs. 36, 37). All such star mounds observed by the writer conformed to this general description: usually rock mounds, having six to nine projections or points around the perimeter; sides usually vertical, and height may vary from 4 to 12 feet. The detailed accounts of those star mounds recorded by the writer will add other descriptive specifications to Buist's information (Report 3, pp. 39-40).

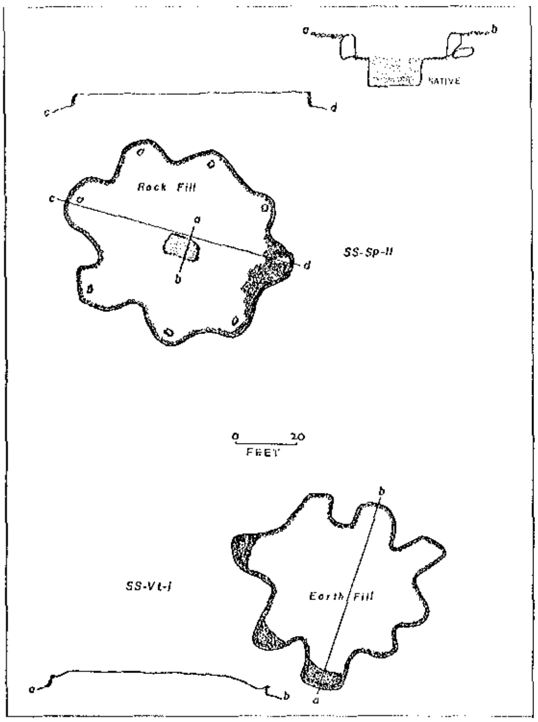

Fig. 36. Plan and sections, two star mounds, SS-Sp-11 and SS-Vt-1, Savai'i.

A second category of field monument I have tentatively called a *causeway,* following its ancient Roman and Middle American definition as a way of access, typically a raised road across marshland, water, or dry land. On Savai'i the larger category should perhaps include other evidences of tracks, roadways, footpaths, etc. The causeway itself, however, is easily distinguished by the raised roadbed, sometimes two feet above the surrounding ground level, the whole built of heavy stones filled between with smaller stones. The surface is smooth and varies from ten to fifteen feet in width.

A variation on this can be seen most clearly on the Letolo Plantation (fig. 38) where the roadway consists of an unpaved, ground-level track between two parallel rock walls. In the same area, low single rock walls are found in an extensive connective network among house mounds — a pattern that is repeated many times over on the south coast of Savai'i.

Terracing and earth mounds, described by Buist (Report 3, pp. 40, 41) are apparently to be found more commonly on the north and east coast of Savai'i where hills are closer to the coast as on Upolu. All of the above architectural remains are most commonly seen in groups and identified accordingly as settlements.

During three successive field seasons in Samoa, the general reconnaissance has revealed a number of elaborate fortifications. There seem, however, to be fewer such sites on Savai'i than Upolu. A fortified mountain spur is described for the area of the Mali'oli'o River in the northeast quarter of Savai'i and a second type of fortification with an encircling wall, found at Uliamoa, is perhaps the only one of its type in Samoa.

THE SURVEY

SAGONE

The area shown in figure 29, the Sagone sector of the southwest coast, was first visited during the short archaeological reconnaissance trip made around the island by R. C. Green and survey party in 1964. In December of 1965 the Sagone area was visited next by A. G. Buist as part of his general beach and inland surveys between the villages of Sala-'ilua and Fai'a'ai. The Sagone area was the last general area examined by the writer. It is a region of gradual rising slopes and good beach conditions alternating with rocky coastal cliffs. Wright (1963: 54-68) has described in detail soils of the lowlands and foothills differentiating the latosolic deposits into many varieties. Here, where the dry season is weak or absent, these basaltic woodland soils behind the beach formations are composed of clays, loams, and clay loams, and hill soils, each very stony and bouldery.

The Sagone coast, on the other hand, offers a higher proportion of features that would make this one of the more hospitable areas of the south coast. The favoured area at present, also probably reflecting a long-standing archaeological pattern, is the coast in the area of Sala'ilua. Here in a narrow coastal belt extending west for more than a mile and appearing elsewhere in scattered exposures are coral sands, termed the Fusi soils. At the eastern end of this strip, the calcareous sand is probably mixed somewhat with alluvial soils derived from the draining of the Sala'ilua spring located about three miles northeast. The coastal

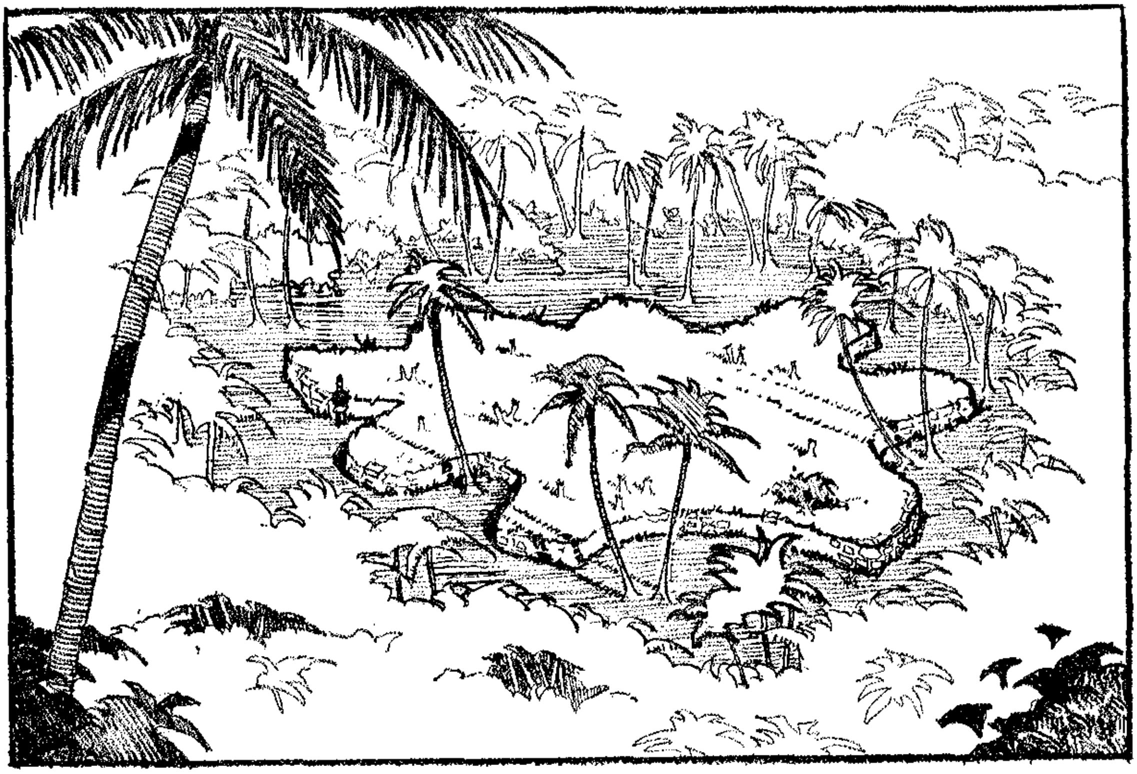

Fig. 37. Perspective sketch of star mound, SS-Vt-1, Vaito'omuli, Savai'i.

sands are well drained and characterised as an area of moderate fertility.

Evidence would indicate that the area formed by a slight embayment at Sala'ilua has been attractive to many people through time. Buist (Report 3, p. 37) first noted the presence of a thick and stratified midden, SS-Sa-1, at Si'utu at the east end of the village of Sala'ilua. Similar midden when first described, also appeared along the entire beach front. The site was visited twice by the writer near the end of the second and final field season. The principal midden site can be seen eroding from the face of the raised beach front, located on the east side of the intermittent stream that separates Sala'ilua from Si'utu. There is no evident mounding or surface formation to indicate occupation but refuse accumulation, on the other hand, is noticeably great. Buist collected over fifty adze fragments, predominantly from the stone house platforms of Sala'ilua where they undoubtedly had been transported from the beach. The second and final field season fell several months after the hurricane of January 1966. This general area of the southwestern coast of Savai'i sustained the greatest damage from the hurricane which devastated large areas throughout Western Samoa. Concrete at Sala'ilua and elsewhere on the coast was broken and scattered by the force of the wind and waves. Likewise, the effect of the hurricane on the midden area at Si'utu was severe. By all reports, including those of residents and one informant who had visited the site with Buist before the hurricane and with the writer after the hurricane, approximately 6 feet of the midden had been cut back and destroyed. The midden materials that appeared first at about a depth of 3 feet from the surface (Report 3, p. 37) appear to have been within the flood zone of the waters forced up by the heavy winds.

In spite of the heavy erosional damage to this site, the writer found the surviving midden intact. This, together with the fact that a large quantity of fragmentary adzes were again collected on the beach and in the adjacent village, should be taken as a sign of a large former settlement.

Elsewhere along this coastal strip from Sala'ilua in the east to approximately Samata-i-uta in the west, spot checks on cultivated lands at slightly higher elevation and general inquiries about ancient usage of this land met with no success. Buist reached the same conclusion in his search for middens. The beach midden at Si'utu is seemingly the most important site for this region as the coast elsewhere with its rockfall and poor beach conditions would discourage coastal settlements.

Twenty adze fragments were found scattered through the village of Si'utu and along the beach front.

LATA

This is the general name for the Cape Asuisui portion of Savai'i shown in figure 30 and bounded on the east by Nu'u-uta and Palapala in the west. Including the hinterland at highest interior elevations, it is an area that incorporates several exposures of Class I soils of high natural fertility but otherwise shares with the rest of the south coastal lowlands, only moderate to low natural fertility. A broad zone bordering the coast consists of the Togitogiga and Tafatafa loams. These are thin, rocky soils which shade toward the interior into other stony and bouldery soils that become exceedingly steep and rocky in the north central area shown in figure 30. Unlike the Sagone sector where the Mulifanua formation is part of a wide western Savai'i distribution, the Lata shoreline is composed largely of the sharp rocky cliffs of the Puapua volcanoes, bordered on the inside by an earlier flow of Mulifanua Volcanics. At Lata-i-tai is a small coastal strip of the Fusi sands.

In summarising hydrological conditions on Savai'i, Kear and Wood (1959: 75) note the absence of water in a wide area extending from Sala'ilua to Sili-Gataivai. Apart from the areas of historic lava flows, this part of the south coast is the region of lowest population density on Savai'i at present.

A good coastal spring at Taga accounts for the current local population density there, however, other sites of human settlement appear to be unrelated to permanent surface water supplies. Low mounds and walls in a small grouping can be seen north of the road at Palapala. These are almost certainly the same grouping of low stone platforms (SS-La-4) reported by Buist at the east end of a clearing one half mile west of the Lata-i-uta Plantation. Less than a mile southeast along the main road from Palapala other mound groupings were observed by Buist on the Lata Plantation. The most prominent of these were a large stone mound (SS-La-1) near the eastern boundary of the plantation land, a grouping of smaller mounds in the northwest part of the plantation (SS-La-3) and still others in the central part of the plantation (SS-La-2). Buist (1966: 22) disclaimed any further knowledge of the extent of these remains for the very acceptable reason that here as well as elsewhere, many small mounds undoubtedly have gone unnoticed under the heavy growth of mile-a-minute vines. It seems likely though that by their proximity to each other, these remains on the Lata Plantation should be considered a single population unit as Buist (Report 3, p. 52) has now done rather than three discontinuous sites. The large structure (SS-La-1) was first described as a large stone mound, approximately 200 feet square and crossed by a low eroded stone wall. This heavily overgrown mound is clearly visible from the main road and was re-examined by the writer during 1966. No added measurements were made at that time but in method of construction and general appearance, this mound was similar to others found on Savai'i.

Of the several reported areas of concentrated architectural remains in the Lata sector, those sites designated SS-Ta-3 and SS-Ta-4 are the most interesting from the standpoint of their location. Having made numerous inquiries about the region traversed by the main road north and northwest of Taga, and after numerous stops for spot checks, we were told at Sa'atala about the remains of an abandoned village on the coast. The land here is cultivated in a limited zone, near the main road, and in the bush beyond the area of cultivation, it is apparent that the track shown on the Lands and Survey Compilation Sheets 1:20,000 actually follows an old raised causeway leading southwest toward the coast. Fifty feet off the track on the north side and within one quarter mile from Sa'atala was a large mound, approximately 9 to 10 feet high, with generally rounded contours and over-all dimensions of 70 by 100 feet. Our guide, a hunter, reported there were no other mounds nearby and our explorations confirmed his statement.

Further along toward the coast, other mounds can be seen. These are scattered on either side of and close to the causeway. It is difficult to see the relationship of these mounds but by their number and general proximity, the area is designated a site, SS-Ta-4.

The causeway itself along its length of approximately one mile, has frequent but gentle turns. Its general condition is such that it was the best preserved among several examples seen. The general height of the roadbed varied but reached one metre above surrounding level ground in some locations. About midway along its length, between Sa'atala and the coast, in the area of SS-Ta-4, there were occasional remnants of balustrades or rock "railings". About 600 feet from the ocean are other better examples of the balustrade, well preserved to a height of 2 feet above the roadbed on each side. At the same approximate distance from the sea, a 5 foot high wall crosses the causeway at a right angle and continues northwest and due west to the sea. Although the causeway ends abruptly here as a raised structure, there is a further indication on the seaward side of the wall of a much inferior track leading to within 50 feet of the coast. A second concentration of mounds here is the abandoned coastal settlement of Fagaloa (SS-Ta-3). Although there is no church here and those who know this settlement by its name have no knowledge of its true age, it is an intuitive estimate that this is an historic period village. The settlement hugs the coast within a narrow belt of coconut trees. The house platforms of this coastal settlement are floored with beach coral typical of the modern houses. Within this settlement of Fagaloa is a small elliptical rock enclosure, 30 by 11 feet. The low surrounding rock wall is 18 inches high and the interior is loosely floored with moderate sized basalt rock. Such structures are usually explained by informants, no doubt correctly, as animal enclosures or the means to protect crops against animals.

The question of the age of the unnamed settlement SS-Ta-4, and its relationship to Fagaloa is difficult to answer, but that SS-Ta-4 is earlier than Fagaloa is a deduction drawn from several observations made during the brief visit there. First, the 5 foot wall noticed several hundred feet inland crosses the causeway at a right angle and curves toward the sea at each end thus forming a high enclosing wall. This wall enclosing the coastal settlement post-dates the causeway. Moreover, there is abundant evidence that rocks were taken from the road to construct the wall. Second, the causeway terminates abruptly, blocked by the wall. Third and finally, there seem to be important differences in mound construction. In Fagaloa, mounds are the typically low house platforms with small coral flooring. Those at SS-Ta-4, are noticeably larger on the whole, both in terms of architectural mass and general height. One mound was measured and found to be approximately 18 feet high. Altogether, there was a generally different character to these two settlement areas, suggesting to this observer at least two time periods, the one historic, and the other possibly pre-European.

The only other part in the Lata sector that was archaeologically rewarding was the area of volcanic sand and heavily shingled beach at Taga, where two sites are identified, SS-Ta-1, old Taga village and SS-Ta-2, in the area of the present Taga village. The old village of Taga is located on high land behind the beach along the western shore of the embayment. Several adze fragments were found within old Taga, which is hardly conclusive but might indicate an area of original prehistoric settlement. The abandonment of old Taga village in favour of its present location probably coincided with the construction of the original church near the coastal spring. It was in this area that other adze fragments were found in a fair quantity, scattered in the vicinity of the spring, hence the designation of SS-Ta-2, a miscellaneous site. Upstream from Taga, no sites were reported and nothing found in a short reconnaissance.

Fourteen fragmentary adzes were found on the coast at Taga, two from the old village, ten from the shingle area surrounding the coastal spring in the present village, and two complete adzes acquired by barter at Taga and said to have come from the same area.

SATUPA'ITEA

Many of the same physiographic features already described pertain to this sector of the south central coast of Savai'i. It is a region covered in the main by Class 4 soils of moderate to low natural fertility grading inland to the stony and bouldery loams of very low natural fertility. In land classification, however, there is an important difference here. From the standpoint of surface water, this is one of the best developed areas on Savai'i, particularly the high proportion of streams in the central uplands. The major drainage is the Lata River which divides the village of Sili a short distance north of the coast (fig. 31). Upstream from Sili in the bottomland of the main channel is a narrow expression of Wright's (1963: Map 1) recent soils from basic alluvium with a high natural fertility. A much higher proportion of these fertile riverine soils are distributed along the Alia Tufu River which heads near the geographic centre of Savai'i and empties on the coast at Gataivai. Much of the water carried in the upper reaches of the Alia Tufu probably runs underground as the stream flow of Gataivai is intermittent, the permanent water supply being a spring in that village. The modern village of Papa on the coast also has a spring.

The hydrology of this area has no doubt had a strong influence on the distribution of early settlements. The following eight abandoned settlements have been plotted in the upland regions of the south coast drained by the Lata and Alia Tufu Rivers and their numerous tributaries: Masania, Fale'a, Fetaia'a, Leolo, Maugoniu'ula, Malaga, Asolelei, and Mutia. These settlements, plotted by Wright and shown on the geological and soil classification maps (Kear and Wood 1959; Wright 1963) would indicate that in former times this was one of the most heavily favoured regions of the island's south side. In the course of exploration of the Alia Tufu, an aggregation of mounds on the east side of the river was visited. Located on figure 31 as SS-Gu-2, this is either Fale'a or Fetaia'a. There is a great abundance of undistinguished mounds and walls in this immediate area. On the opposite side of the Alia Tufu is another settlement, to my knowledge not previously recorded. Pula (SS-Gu-1) is in most respects indistinguishable from other sites already described, but some general remarks may be useful for later interpretation of the settlements in this area. The first tangible indication of anything of archaeological interest in the area was the gift of two adzes from the manager of the Bartley store at Vailoa. These had been discovered only several days previously while cleaning a well on the Bartley Plantation north and slightly west of Gataivai.

A few hundred yards north of the main residence on this plantation is a *fale* housing a Samoan family who tend the surrounding taro and cocoa crops. A fragment of a grinding stone found here and the accidental discovery of adzes in the excavation of a well would suggest an earlier settlement here, even without the presence of mounds which appeared in numbers northwest of the main residence. One of the best preserved was a mound 5 feet high, 50 by 70 feet with the customary rough stone surface. A stone wall 6 feet high appeared to be an integral part of the settlement, with mounds scattered randomly on either side of it. Other smaller amorphous rock piles were noticed throughout the area, and there is a large number of the common low stone walls connecting various mounds. Among the large number of mounds of the conventional form, an unusual type was seen here. From its standard rectangular platform, 4 feet high and measuring 35 by 50 feet, an ascending ramp leads from a corner of the mound to a smaller platform raised 10 feet above the ground. This is a well formed and well preserved structure and no others of its type were observed. At Pula mounds extend into the bush. At least two dozen mounds are visible and the original settlement area is likely to have been much larger than that explored.

Under heavy bush in the southeast corner of the Satupa'itea sector, a mound, SS-Pp-1, was added to the site inventory through information from local informants. It is a large, flat-topped rock platform mound, 44 by 53 feet, and 13 feet high. The walls of this platform are nearly vertical except for areas of collapse. Another noticeable feature is an irregular zone of soil about six inches deep, having no pattern but clearly delineated from other rocky areas on the platform top. More interesting and revealing is the position of this mound on a terrain of loose scoria with no other mounds or associated architectural remains in the area. Whatever the function of such mounds were, here is clear evidence of the incidence of a platform mound in isolation with no apparent associated structures.

About 100 yards south of the junction of the main island road and the Sili road is a large mound SS-Pp-2. In its general dimension, this mound is very sizable — about 100 feet long, 75 feet wide and 15 feet high. Although a probable pre-European construction and now heavily overgrown, it has been used more recently for a house platform. Two cement grave markers can be seen in front of a house outline at its west end.

Northeast of the present village of Sili, an old roadway leads inland approximately one mile to SS-Pp-3. Although this site is effectively covered either by mile-a-minute or by heavy bush on the west side, each of the expected components of an abandoned inland settlement are present, including small and large mounds and numerous stone walls.

Following the practice of local inquiry and spot checks, the area west to Nu'u-uta was surveyed and found to be one of those relatively arid inland areas, unproductive of archaeological materials, and probably unattractive to early human settlement as it is today.

The river mouth areas at Gataivai and Puleia were searched as part of an intensive survey of that entire presently-inhabited coast, east to beyond Papa. The occasional finding of an adze fragment throws this part of the coast into sharp contrast with Sala'ilua and other coastal settlement areas that apparently were larger and socially more important in early times.

Two adze fragments were picked up in the yard of a modern *fale* near the east end of the village of Papa and a third from the shingle beach at Gataivai. Finally from Pula village on Gataivai village land were the two adzes recovered during the excavation of a well.

PALAULI

The area indicated for this division on the map (fig. 32) actually encompasses a portion of the Fa'asaleleaga district in the east. It is in the western half, however, on land behind the large embayment of the sea coast, that much of the work was concentrated during both field seasons. A full range of architectural remains are found here.

Viewing physiographic aspects of the region as a whole, there is a relatively large proportion of moderately fertile soils. Fronting most of the central part of the coastal embayment and extending to the north and east is a zone of stony and bouldery clay loam and clay soils of moderate natural fertility (Wright 1963: Map 1). In a much more restricted strip along the west central and west coast of the embayment is a complex ranging from mineral soils of moderate and low natural fertility to the calcareous beach sands, found only rarely on the south coast of Savai'i. More important than soil fertility however is the fact that in contrast to the exposed rock-bound coastline elsewhere, the low ground at shoreline was easily accessible for canoes and was further protected from heavy ground swell surf by a barrier reef. The lagoon has undoubtedly afforded valuable seafood throughout the history of settlement in this region.

The iron-bound rocky cliffs make up the balance of the coastline of the Palauli sector and the broad band of bouldery Togitogiga and Etemuli loams is continuous through the upland portions of Savai'i (Wright 1963: Map 1). Extending southeastward from Palauli is a broad area of Puapua lava, the Tafua peninsula, having a heavily forested interior. Near the seaward end of the flow are located a large hill and village (Tafua).

The hydrology of Palauli is an important constituent in the cultural-environmental complex. Palauli is one of the best watered areas on Savai'i. Rainfall is comparatively heavy, there are several subterranean sources of water and there are three surface water drainage systems, the Faleata, Seugagogo, and Vailoa Rivers.

The short archaeological reconnaissance trip made around the island of Savai'i by Green and survey party in 1964 suggested a number of possibilities for future research on that island. Mounds, both large and small, observed on the Letolo Plantation, Palauli District, being easily accessible, were selected as a major focus of research interest during the 1965 field season. Subsequent clearing, study and recording on the Letolo Plantation during 1966 was directed toward the elucidation of community patterning among the many mounds visible on the plantation.

The Nelson Plantation (Letolo), located just west of the village of Vailoa, extends from the coast inland approximately 2.5 miles. It is bounded on the east by the Faleata River and on the west by the Seugagogo River (fig. 38). The land rises gently to an elevation of about 800 feet above sea level at the highest part of the plantation. In several places the land is cut by intermittent streams feeding the Seugagogo watercourse. The plantation land is broken up into a series of paddocks shown as numbered blocks with boundary lines represented by stone walls or barbed wire. Blocks 1 and 2 are at the southern end of the plantation between the main road and the coast. The Letolo plantation is extensively cultivated in coconut and cattle grazing helps to keep the vegetation down. It is not difficult therefore, to see the remains of at least one earlier settlement of this area, primarily in the form of low mounds. One prominent landmark, well known to local inhabitants, is a probable early historic period grave in Block 2, SS-Le-3, visible from the main road. The density of house platforms seems to be greatest at the higher elevations inland. Travelling north on the main plantation access road, the first outstanding indication of the extent of the earlier occupation is a large mound of basalt rock in the upper part of Block 8 north of the access road. The mound probably stood 6.06 metres high originally, but there is little to be said concerning its original configuration since it was badly damaged during the collecting of rock by the Public Works Department for road building in the 1950s. To the northeast, also in Block 8, can be seen a large stone wall.

Although numerous platforms, stone pavements, amorphous piles of stone, and low stone walls can be seen in Blocks 9 and 10 and continuing north, the large stone mound described and drawn by Green (Green and Davidson 1964, fig. 8) is by far the most spectacular. The plane table mapping of this structure including site plan and profiles (figs. 39, 40) plus a larger scaled area map for future settlement pattern studies were the main objectives of research on the Nelson Plantation. Two sets of aerial photographs made available by the Department of Lands and Survey, Western Samoa, Series 215507 and Series CAA512 made in 1954 and 1962, were useful, in that during the interval of eight years, a large part of the upper plantation land was cleared exposing features not apparent in the first series of photographs. Among these features is a high stone wall reported by Green (Green and Davidson 1964). Study of the aerial photographs shows that this large stone wall lies in an approximately straight east-west line. At the western end, it terminates at the bank of a main tributary (unnamed) of the Seugagogo stream in Block 15. The wall is continuous to the east as far as the west bank of the Faleata River and more than half of the wall in this direction is under heavy forest. The wall has an approximate average height of 2.44 metres and was approximately 1.83

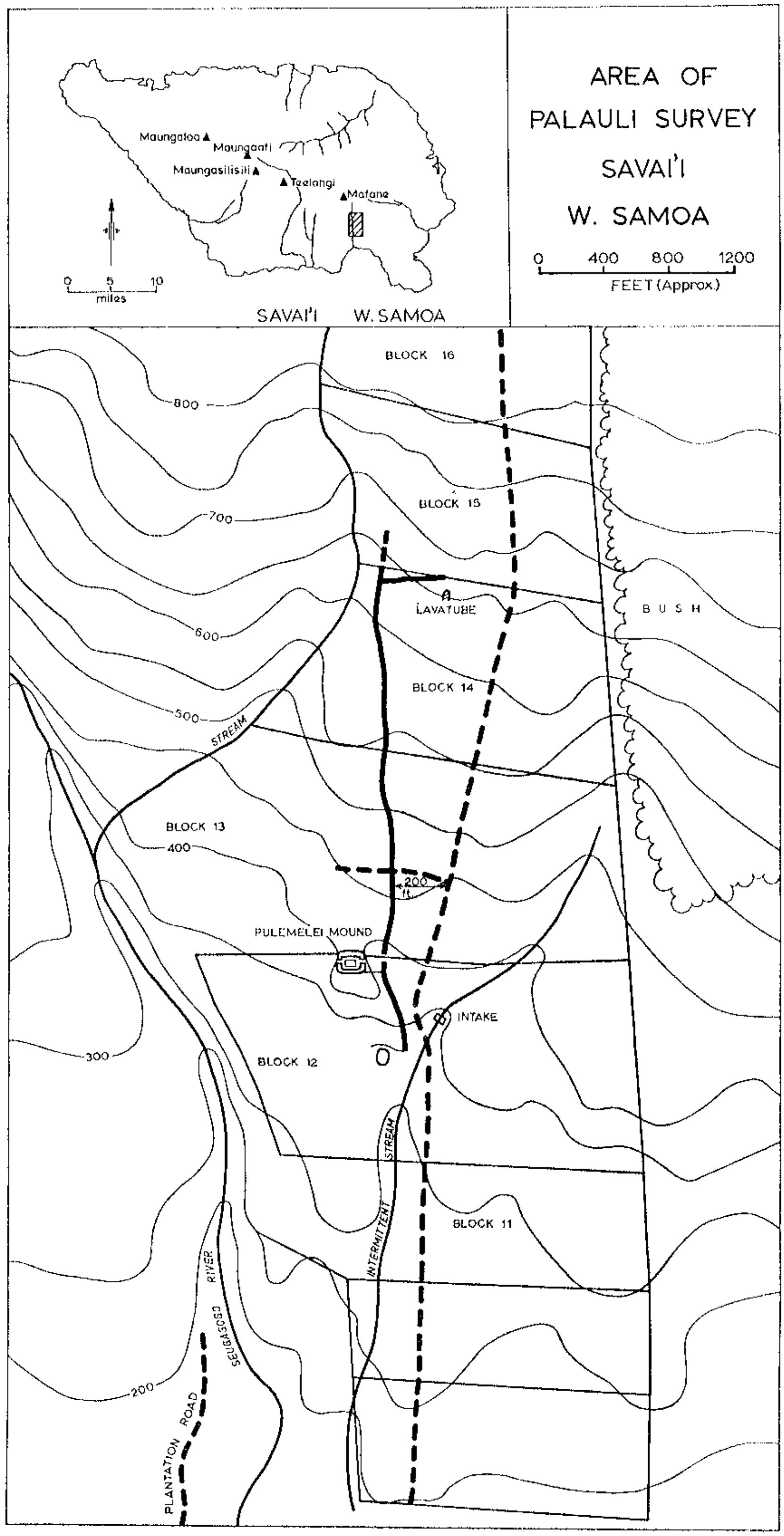

Fig. 38. Map of intensive survey area associated with Pulemelei mound, Letolo plantation, Palauli, Savai'i.

metres wide at the base. Its size and its situation between two main watercourses strongly suggests defence as the purpose of its creation.

Many stone platforms can be seen on both the inland and coastal sides of the wall. All such structures on the Nelson Plantation including the large stone mound are constructed of the locally abundant basaltic rock of the Salani Volcanics which forms much of the eastern half of Savai'i. Prominent topographic features of the land include a lava tube, the entrance to which can be seen in the upper central portion of Block 14, a short distance west of the plantation access road (fig. 38). It appears to be typical of Samoan lava tunnels following the description offered by Kear and Wood (1959: 22; see Report 3, p. 41, fig. 18). The entrance is a 4.57 metre vertical shaft which then slopes at 45 degrees into the tunnel itself. The tunnel, 4.57 metres to 6.10 metres in diameter, was explored with artificial light for a distance of 61 metres, at which point it turns from south to a slightly southeasterly direction and continues for an unknown distance. Unlike some other Samoan lava tubes, said to have been occupied during local wars, there was no evidence of human occupation in that just described. Other lava tunnels are said to exist on the plantation land.

Through only a superficial examination of the terrain adjacent to the large stone mound, Green and party observed and recorded an early roadway which subsequently was shown to have extended further than previously thought. Reference to figure 38 shows the roadway with its basically north-south alignment extending from Block 12 to Block 15. The most distinctive feature of the roadway is the two parallel rock walls which were constructed 3.66 to 4.57 metres apart and which border the roadbed throughout its entire length. Judging from the small quantity of collapsed rock, it does not seem likely that either of these two walls had been built more than 1.22 metres high originally.

The construction of the modern rock fence line between Blocks 12 and 13 involved the reuse of stone from the older roadway, giving the initial impression that the road had been built only to conduct traffic between the large stone mound and its smaller satellite house mounds downslope. This roadway does lead downslope from the outer edge of the main platform of the large stone mound and thus appears architecturally to be a subordinate but important element in the composition of the whole. However, clearing of the heavy cover of mile-a-minute in Block 13 revealed the road continuing north. About midway through Block 13 where the land rises gently, the roadbed is stepped and the remnants of several treads and risers can still be seen in the form of large slabs of basalt rock.

Regrettably, the roadway terminates in such a way that it is difficult to guess what the original construction plan had been. It appears to end as if unfinished at a point near the stream in the northwest corner of Block 14. The only break in the otherwise continuous walls of this roadway is seen just below the fence line separating Blocks 14 and 15. Here, a smaller, parallel-walled roadway turns east. It follows a meandering but generally easterly direction. Within 91.5 metres, one of the two walls disappears and the other continues in a low, poorly preserved condition to the area of the mouth of the lava tube, described earlier. Although there is no evidence for the occupation of the tunnel itself, there are numerous platform mounds in the vicinity and within 6.06 metres of the tunnel entrance at its southeast corner is a small rounded mound of the size and type usually identified by Samoans as a grave. Much more clearing of the mile-a-minute would be necessary to assess the nature of associations in this area.

The southernmost extension of the roadway in Block 12 lies at the foot of a large natural terrace on top of which the large stone mound was built. At its southern terminus, the east wall of the road ends abruptly and the west wall turns sharply to the west and becomes part of an extensive network of low and rather wide, single rock walls which interconnect many of the house mounds in Block 12. These walls can be seen in Block 13 also and in other areas of the Letolo plantation land as well. By traditional evidence and by personal observation, these walls can be explained as raised footpaths, convenient within a settled area where the volcanic soil is extremely slick when wet and where rainfall is abundant. Davidson (personal communication) has remarked on the same feature observed in the area of Sauniatu, Upolu.

In terms of size and rarity, the most notable field monument yet found on Savai'i lies on a slight promontory in the upper central portion of Block 12. SS-Le-1, *Pulemelei* as it is called by the Samoans today, is remarkable for its imposing size, suggesting an edifice of great former importance (plate 9).

At the time that it first came to the attention of archaeologists in 1964, the mound was densely covered by trees and bush and had to be cleared of this vegetation by a large labour force of men and women. Young women of the village of Vailoa were particularly proficient in the fine cleaning of the upper terrace or mound top which undoubtedly is a most

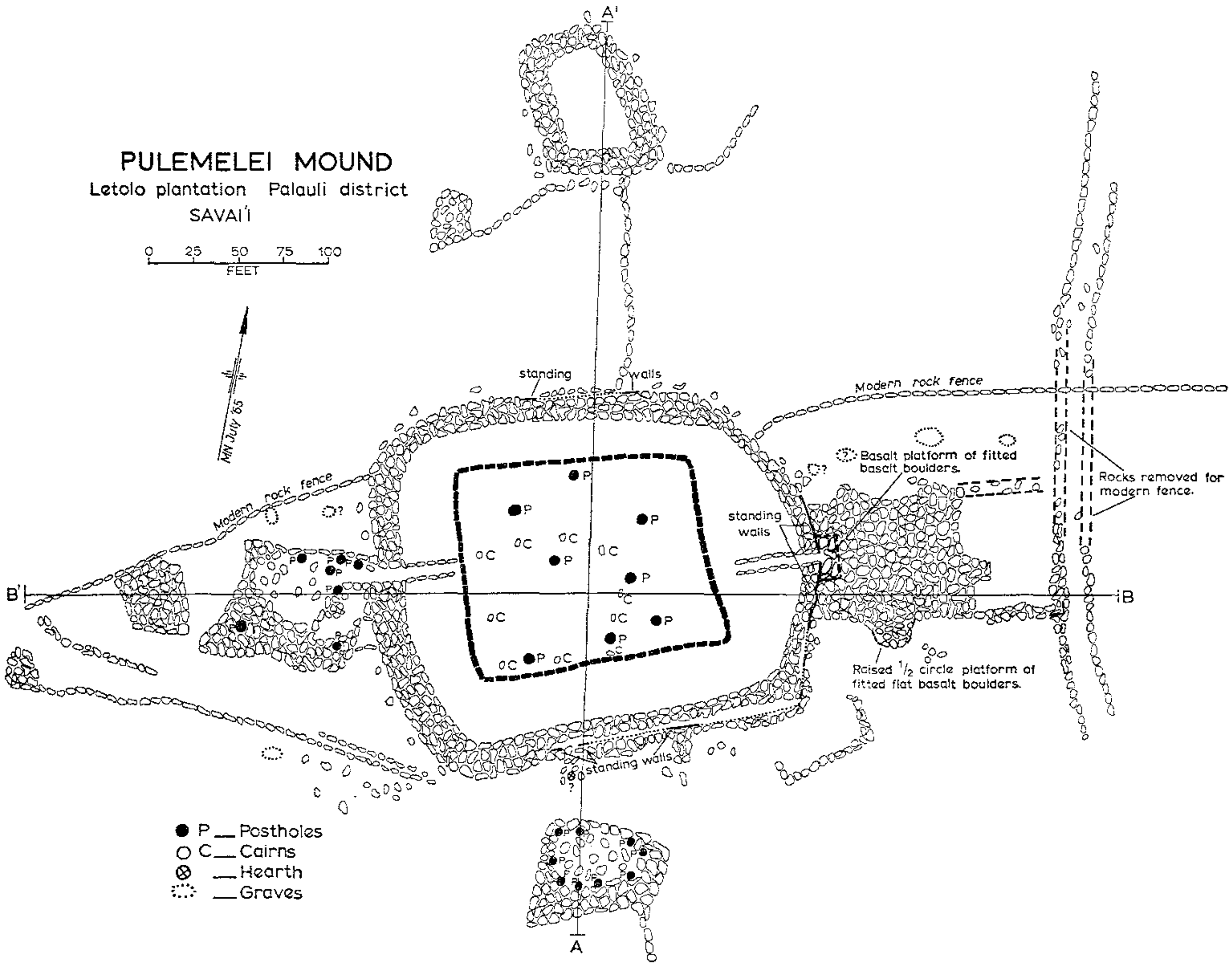

Fig. 39. Plan of Pulemelei mound SS-Le-1, Palauli, Savai'i.

critical part in the study of the function and importance of this mound. Owing to the composition of the mound of medium and large basalt rock, and to its imposing size, no major excavation was attempted; however, many details were noted in the process of clearing and mapping.

Either by plan or by chance, the orientation of this basically rectangular complex is such that we can conveniently describe its architectural features by reference to the cardinal points of the compass. Thus, the mound at its base, is 61 by 50.32 metres, measured along the east-west longitudinal axis and along the transverse axis, north-south. It rises in two tiers making a total height of nearly 12.20 metres. The principal approaches to the top are two central ascending ramps, one each at the west and east ends of the mound. These do not appear to have been stepped and were constructed as depressions or cavities in the substructure, probably less than a metre deep and approximately one metre wide. In addition to the rampways which are the same at each end, both end zones include large raised pavements or "courts". At least three factors, however, suggest that the east end was the principal approach to the mound. Here the pavement is larger and more carefully executed. The plan view shows its association architecturally with the west wall of the roadway. Finally, on the east side only, there is a raised basal platform of large fitted tabular basalt boulders placed at the foot of the rampway. Relative to the problem of which is the "front" or principal approach, it is interesting to note that on the east side only there is a notable absence of smaller mounds for a distance of at least 122 metres.

Although the east and west end zones are nearly replicas of each other, the plan view shows obvious dissimilarities on the north and south sides of the mound. The detached rock pavement on the seaward or south side does not appear to be structurally part of the main mound. It is extremely low but it bears possible evidence of postholes, some of which appear to outline an area relatively free of stone (fig. 39). Evidence of the same nature can be seen in the pavement at the west end of the main mound. Elsewhere in the vicinity, however, an indisputable example of postholes around the perimeter of a small house was mapped. With time enough for clearing, many more could undoubtedly be found in this area.

North of the main mound and connected to it by a raised rock walkway is a somewhat higher-than-usual platform or terrace, which in turn is connected to several other smaller platforms to the east and west. The question of its size and the fact that it is structurally part of the large mound, leads to interesting speculation about its importance. It does not appear to have been finished as carefully on top as would be necessary for a living surface. No evidence for either a stepped or ramped approach to the top of the large mound could be found on the north or south sides; however, near the southeast corner is an abutment, perhaps more accurately described as an indistinct agglomeration of rock piled to a height of approximately 4 metres. The purpose of this is unknown.

Leaving aside the question of multiple phases in the history of this site, which would only be apparent through excavation, the plan, profile and perspective drawings illustrate the essentially unaltered condition of this structure (figs. 39, 40, 41). There is no evidence for more than a slight amount of collapse which can be accounted for by the root action of fast growing trees. Looking at the floor

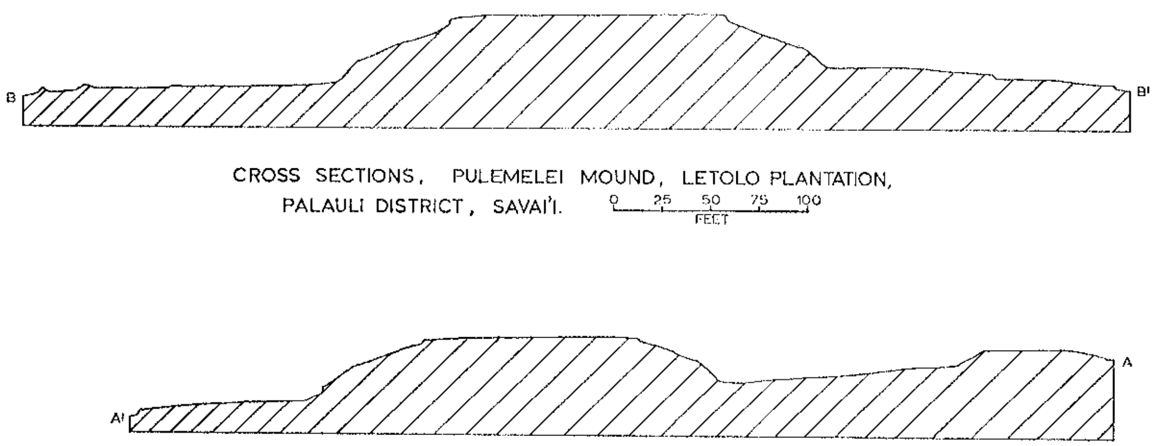

Fig. 40. Main profile cross-sections, Pulemelei mound.

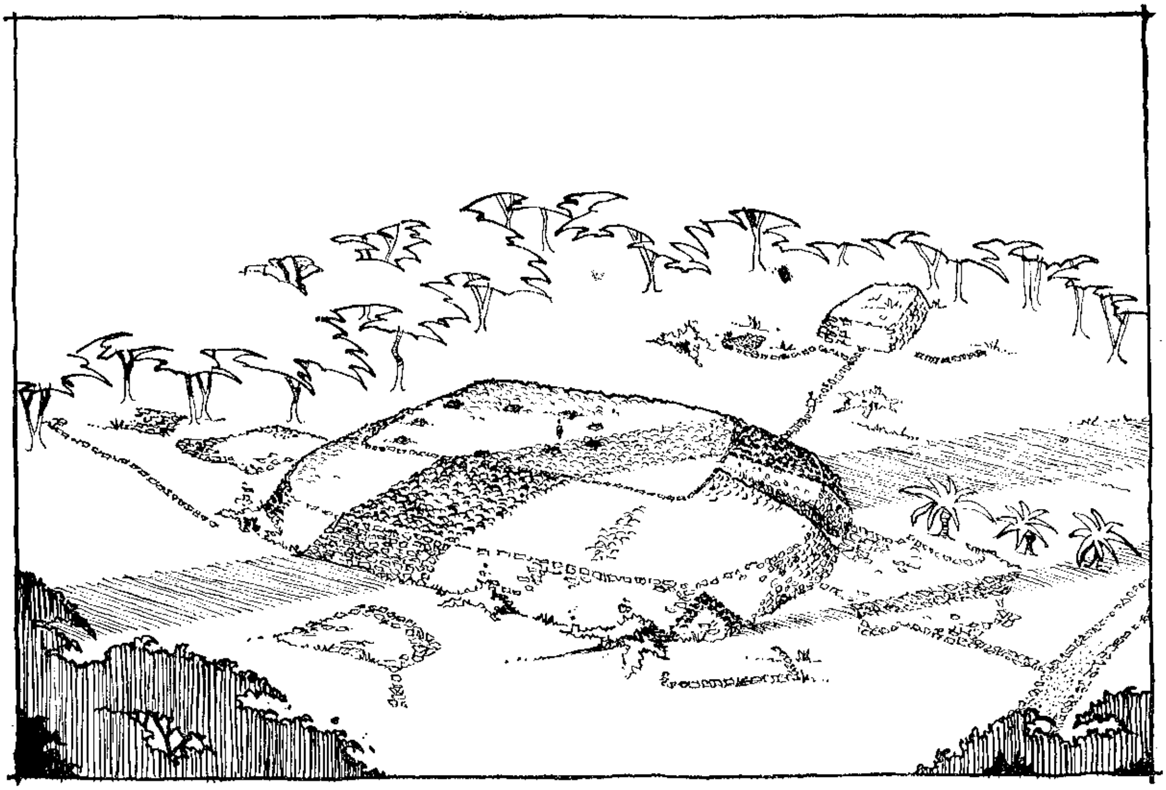

Fig. 41. Perspective view, Pulemelei mound.

plan and profile of the top terrace, we see that it had been carefully "squared" and levelled. As the mound has probably been effectively covered by vegetation since its abandonment, observations made by the survey party during a short visit in 1964 could be tentative at best. For example, the informant's suggestion that a house had stood at the eastern end of the terrace could not be verified because a very detailed and minute cleaning of the entire top terrace revealed a common use of small, water rounded stones for the flooring of nearly the entire surface of the terrace.

Areas of disturbed rock are numerous. These are single isolated instances of the exposure of the heavier sub-floor building material. From their individual appearance, they might be interpreted as postholes, but they seem to be randomly distributed and might better be explained as the result of many treasure seeking expeditions.

Another feature of particular interest on top of the mound is a series of cairns or small columns of tabular rock, each 45 cm. to 53 cm. high and approximately 30.5 cm. by 45 cm. wide. Three of these flat slab cairns at the edge of the platform were noted by Green. These three, plus seven others found subsequently, together have an oval or roughly circular distribution (fig. 39). Therefore, earlier information about these cairns, i.e., their distribution in pairs, is wrong. Possibly wrong also is the original informant's suggestion that these were receptacles or pedestals for large shell trumpets *(foafoa)*. Although one such shell was found elsewhere on the top platform, the function of the cairns as seats is the interpretation offered consistently by local Samoan informants.

A final aspect in connection with the large stone mound is the excavation of a presumed grave, the middle in a series of three shown in plan at the northeast corner of the large stone mound complex. Others in a similar linear arrangement were observed at the northwest corner, and all are small artificial tumuli of the type described for Block 14. The excavation was carried to a depth of 1.52 metres with essentially negative results, pointing to a nonfunerary function. Not conclusive but highly suggestive evidence for this comes from the fact that the subsoil appeared to have never been disturbed. Other tumuli should also be tested.

At the end of the 1965 field season, among extended problems for future work was a strong recommendation for additional settlement studies at Letolo and environs. A specific aim, therefore, was a limited but intensive mapping of the community pattern to show how and where the numerous platform mounds were distributed, types of groupings, if any, and relationship, if any, to the large Pulemelei mound. The detailed mapping of a small area has admitted limitations, but it is believed that an accurate distributional and quantitative study of the type shown in figure 42, together with over-all characterisation and perspective of the settlement situation on Savai'i, should precede and complement a more intensive survey. In the area shown, two examples of parallel rock roadways are part of a wider network of low stone walls. On the basis of a restricted area shown, it can probably only be said: a) there is an apparent random distribution of mounds, b) low stone walls, rather than directly connecting mounds, appear to have been erected in the space between mounds. Judging by the height and condition of these walls, it does not seem that the walls were formed by a careless placement of rocks in a process of clearing for cultivation. One interpretation of this pattern of mounds and walls would be the possibility of multiple phases of occupation. More conclusive answers and better perspective would emerge from more extensive mapping but unfortunately, this will be time consuming and expensive even on this easily accessible Letolo Plantation.

West of Letolo is the abandoned settlement of Uliamoa (SS-Se-3) known to have been occupied in historic times (Watters 1958: 4). It is reached by a track that parallels the Tafega stream on the west side, and was first visited during the 1965 field season. The track to Uliamoa passes the abandoned settlement of

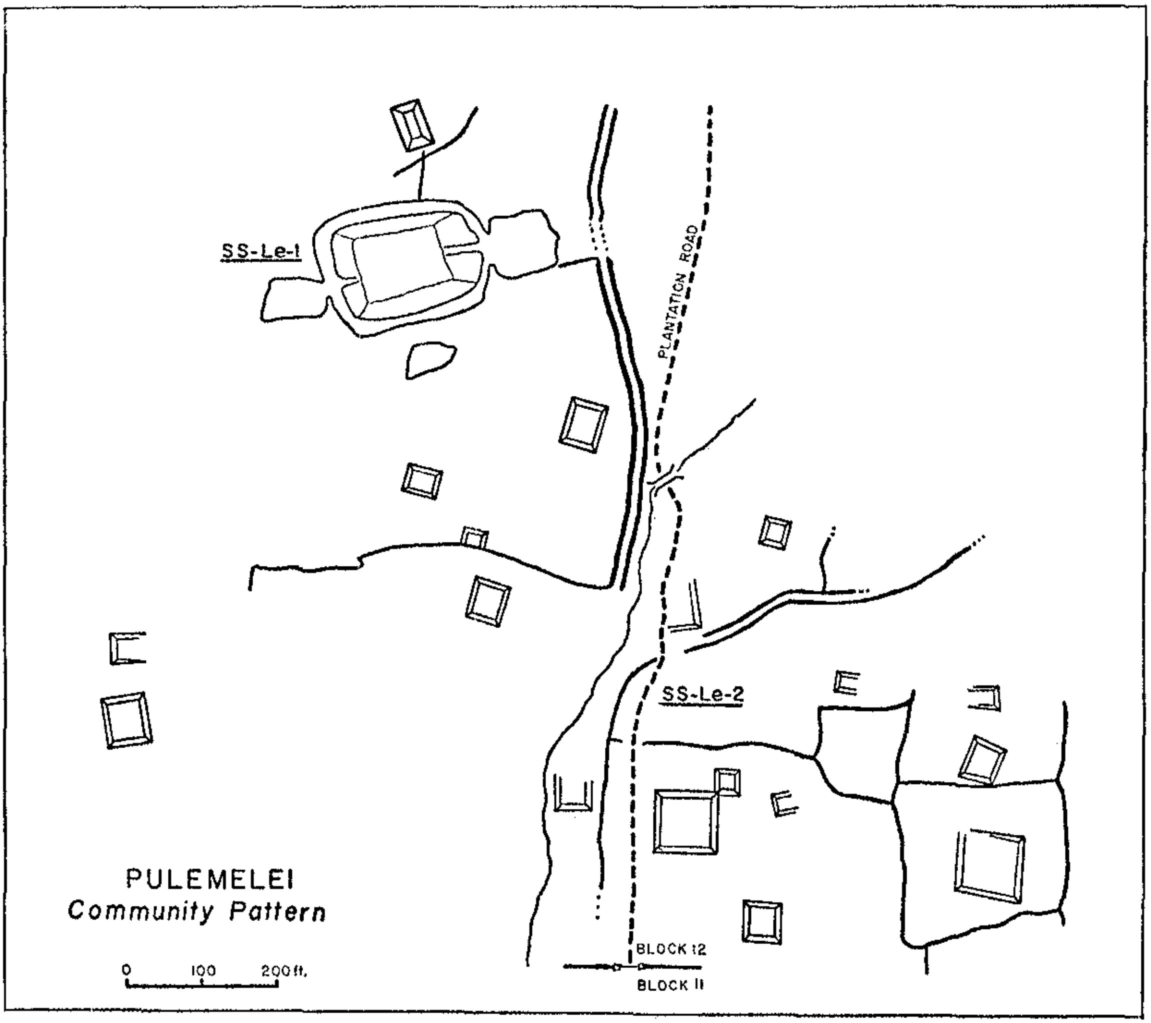

Fig. 42. Location of smaller structures in relationship to Pulemelei mound, Palauli.

Lalofau, SS-Se-5, situated on the east bank of the Tafega stream. At this point, an east-west wall must be crossed. The wall is said to divide the land historically into the Lalofau and Uliamoa districts. Uliamoa is situated on high land on the west bank of a spur of the Tafega stream. Lalofau and Uliamoa were visited during 1965 and 1966 and both seem to be not unlike other settlements of the same age in Samoa. The general area of Uliamoa was judged to be worthy of a large proportion of the second field season because of the presence of a large fortified enclosure, SS-Se-4, located a few hundred feet north of the main settlement area. At the time it was first visited briefly during 1965, several of its most prominent architectural features were noted: its circular form; approximate dimensions, and above all, the fact that this fortification did not resemble others then known in Samoa. During the following field season, the Uliamoa fort was cleared with a labour force from Satupa'itea and an accurate plan drawing made (fig. 43). A perspective view of the same structure can be seen in figure 44. The fortification consists of an impressive stone wall, 6 to 9 feet high, forming a closed circuit but interrupted by a series of large and elaborate fortified entrances. The entire fortification is

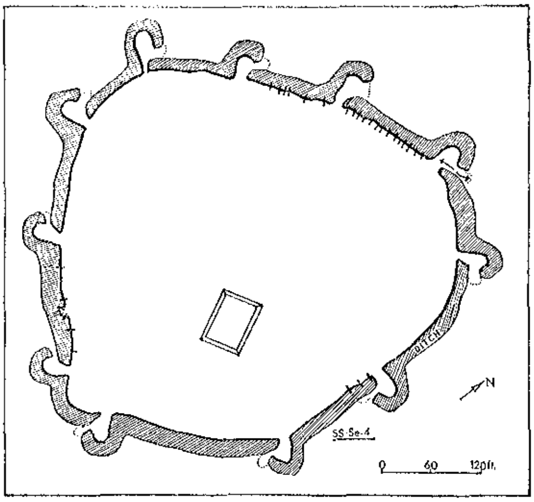

Fig. 43. Plan of fortification, SS-Se-4, Uliamoa, Savai'i.

ringed by a ditch, the excavated earth forming the outer embankment for the wall. Entrance or exit from this fortification was via a narrow bridged passageway flanked on either side by the ditch. A cut away in figure 44 illustrates a hypothetical cross-section showing ditch,

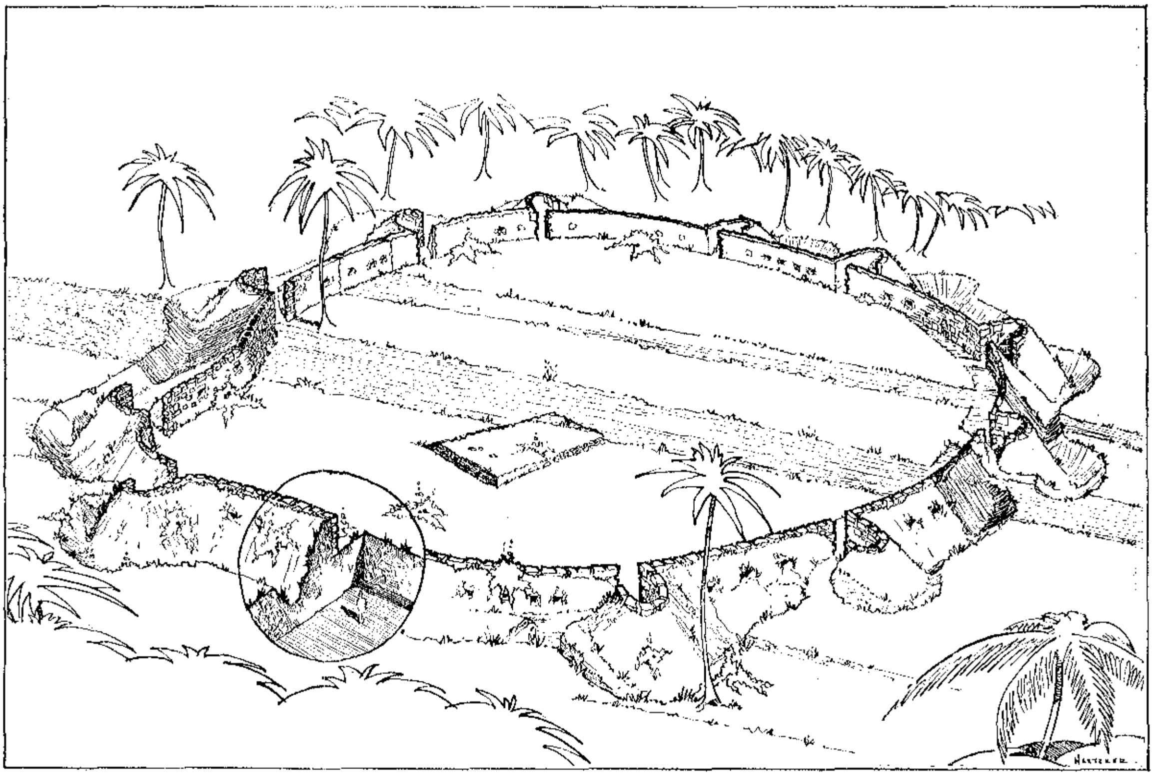

Fig. 44. Perspective view of fortification, Uliamoa.

embankment, and interior rock facing of the fortified wall.

Many small openings through the wall were found at irregular intervals. The position of these along the circuit of the wall is shown by the small dark lines. It seems likely they had been distributed throughout the entire circumference and they appear to be missing only in areas of a slight displacement of rock, destroying the hole itself. On the other hand, most of these holes were carefully constructed with capstones and still provide a continuous line of sight once the vegetation is cleared away. Their vertical position in the wall tends to be low — from 2 to 4 feet above ground level. If designed as ports for line of sight for gunfire, they would only be effective for attackers in the ditch as the line of sight through most of these ports falls below the outside ground level.

A platform mound just off centre toward the southeast was the only structure within the defensible area. No surface features or distinguishing characteristics were found.

The exploration of several foot trails used every day by natives of Satupa'itea on their way to and from village plantations, led to the discovery of an unusually large mound SS-Se-1, which may have a partly natural foundation. It is unusually long (150 feet) and has gently sloping sides so that measurements are inexact. There are a number of smaller platform mounds in the area designated SS-Se-2.

There are rock features on the east bank just below the confluence of the Seugagogo and Faleata Rivers, confirming local tradition that places the old village of Vailoa, SS-Le-4, there.

Some unusual mounds occur. One such mound, SS-Vt-3, along the main island road at Vaito'omuli has a footing of very large well-fitted smooth boulders. It is well built and has a triangular upper platform. which is atypical of Samoan mounds.

On the grounds of the District School at Vaito'omuli was a site, SS-Vt-4, productive only of adzes, found abundantly over a period of years.

Less than a mile north of the main road at Vaito'omuli are two additional inland sites, SS-Vt-2, an abandoned settlement known as A'ega, similar in all observed respects to others already described, and a star mound, SS-Vt-1 located a few hundred feet to the north. This eight-pointed structure illustrated in figure 36 has an earth fill and rock retaining wall, with three of its eight projections rock-filled. No surface features were noted.

At Laufa'i on Fa'ala village land, an abandoned inland settlement, SS-Ft-1, was found and explored. Although no large mound of the Pulemelei type was seen here, the Laufa'i settlement is impressive for its geographic extent. Mounds here under mile-a-minute and unfelled bush are seen only with difficulty but this would appear to have been as densely settled as the Letolo plantation area. There are several large stone walls and two causeways that parallel each other about 75 feet apart leading north and south. One veers toward the other but terminates in the area between as if unfinished.

A short visit was made to see the village of Tafua at the tip of the Tafua Peninsula. The road to Tafua is in very poor condition and impassable to all but a high frame vehicle. The beach in front of the village is typical in lacking a stratified midden, but a mound, SS-Ft-2, near the coast on the Salelologa side of the village, beyond the modern graveyard, is known traditionally as a place from which fishing was done in ancient times. The rock mound, higher than the usual house platform, was seen, but nothing else was found to suggest this as an important former settlement. There was no knowledge of the former occupation of the slopes of the cone behind the village.

A total of twelve stone artifacts, mostly adzes, and one shell artifact were found by the writer or collected by others at Palauli during the 1965 field season. Of these, one adze, given by Mr. Darcy Oliver, was found at the old Vailoa village, now abandoned, on the east bank just below the confluence of the Seugagogo and Faleata Rivers.

Five other artifacts, adzes and miscellaneous stone, also given by Mr. Oliver, were excavated in the playground area of the District School, Vaito'omuli.

At Pulemelei, one Type I adze and one apparent imitation of an adze in vesicular basalt were found by the writer, both near the southeast corner of the large stone mound.

Just beneath the gate on the fence line between Blocks 6 and 8, another adze was picked up, with no associated context.

On the top of the large stone mound, close to the junction of the east rampway and the lip of the platform, an unusual stone object was found. Probably used in an upright position, its shape is palmate, that is with a gently flaring upper portion. One imaginative suggestion is that the stone served as a base for burning candlenut which could be seen over a long distance at night.

Two adzes of unknown provenance were brought in by Samoan labourers from the villages of Vailoa and Satupa'itea.

Again, from Pulemelei, came a fragmentary *Cassis* shell trumpet cached beneath several rocks at floor level on the upper platform. One informant remembers seeing four such shells seventeen years ago, one at each of the four corners of the platform. All had been drilled to form a mouthpiece so the shell could be sounded as a horn. The one remaining example is broken at the place where the hole would have been drilled.

The spire of a *Triton* shell trumpet with opening on one side was later found on the surface of the low stone mound lying to the north of the main structure of Pulemelei and connected to it by a raised walkway.

During 1966, additional artifacts were found at various locations in Palauli. From the yard of the Headmaster's house at the District School, Vaito'omuli, came one additional broken adze. Others were found both in the area of the Catholic pastor's house in Fa'ala and from the Toto'omea area of Fa'ala. Still others were picked up in roadfill, and around house platforms in the general area between Fa'ala and Vaito'omuli, from the Fa'afualoa area of Vailoa and from the track to Uliamoa.

Finally, less than a mile north from Fa'ala along the village plantation lands access road, is the abandoned settlement of Fogatia. Here can be seen low walls and house platforms of the type commonly found elsewhere on Savai'i. Two features observed here are worthy of mention. A star mound was discovered within 100 feet east of the plantation road. It had only two discernible points with a rock seat on one as at Sapapali'i, and in size and height was comparable to other rock-surfaced star mounds already described. Also on the west side of the road was a large stone wall badly collapsed, but with unmistakable holes at irregular intervals through the wall, exactly as described for the Uliamoa fortification. At Fogatia, however, there was no indication of a ditch and bank, or that the wall had formed a closed circuit.

Tuasivi and Fagamalo

Although the chief focus of attention was on the south coast, other areas throughout Savai'i were visited a) for the need for familiarisation with other sites on the island and b) owing to alternating field seasons of project personnel and periods of no field activity, sites reported during intervening periods were examined irrespective of their location. Several such sites on the east and north coast visited by the writer during 1966 are described here to supplement the fuller treatment of north-east Savai'i by Buist (Report 3).

The star mound SS-Sp-11, the plan and profile of which appear in figure 36, occupies flat land on the south side of the inland road about 1000 feet from the main island road at Sapapali'i. In plan and general dimensions, SS-Sp-11 is similar to star mound SS-Vt-1 at Vaito'omuli with several minor structural exceptions. During the clearing and mapping of this structure, eight cairns, identical to those interpreted as seats on top of the large Pulemelei mound were found, one on each of the eight projections. In addition, the same mound had a central rectangular depression floored with a fine gravel. A test excavation here revealed a brown-black soil fill beneath the pebble floor and above the native yellow clay loam.

Two of the more recently discovered sites recorded by the writer are reached through the village of Patamea. Following the Maliolio River on foot, the track leads through Patamea village land. The steep sided valley narrows as the track moves upstream. The Maliolio River divides and a large flat-topped rock mound, SS-Pt-1, is situated on the triangle of land formed by the two streams and a high stone wall protecting the south approach to the mound (fig. 34). Following the river channel east of the main watercourse, the track continues upstream in a southerly direction. One sees examples of probable terracing in poor condition and small rock walls scattered in this area which is partially cleared but not cultivated. What has now become a hunting track turns and climbs the south wall of the valley along a spur of the hill which has been terraced in several places. The object of this exploration, a fort, SS-Pt-2 lies an additional two hours distance on foot from the point where the hunting track leaves the valley. The defensive system of this fortification is closely paralleled by others found on Upolu. The main wall of earth, approximately east-west, was approached from the north and was found to have no defensive ditch on that side. The wall has a surprisingly gradual slope on the north side and dips abruptly on the south side. Here there are pits of the type seen at the fort SU-Lu-41 at Luatuanu'u on Upolu (Report 13) but much larger. Three large depressions on the south side of the wall are halved by the remains of a ramp access across the middle of each one. The walls of these pits are faced with rock. Noteworthy are the impressive dimensions of this site. The pits are approximately 15 feet deep and from the crest of the wall to the deepest excavation is approximately 40 feet. There is a secondary wall several hundred feet to the south and undoubtedly other undiscovered features here. Hurricane damage during 1966 was extensive in this forest and large fallen trees tend to obscure even the most prominent features.

Another site visited during the same inspection of the northeast coast area, SS-Ma-3, is located on high land, east of the valley behind Safotu (fig. 34). This is a very flat tableland cultivated in coconut. It can clearly be seen that this was not at any time a densely settled area, but there is a sizable earth platform, 50 feet square and several more of the same approximate size a short distance to the south.

Special attention was drawn to a very broad shallow depression, about 150 feet square. It has the appearance of an agricultural plot that is surrounded by a ditch, one foot deep and a raised "lip" and embankment, less than a foot above ground. There are no features in the area enclosed by the ditch and although local planters claim no knowledge of its origin or function, it would seem to be a relatively recent construction.

Another fortification is situated at Manase Point between Manase and Safotu on the easternmost of two high bluffs 150 feet above the sea. This small defence complex, SS-Ma-4, consists of a 400 foot earthwork wall, and a shallow outer ditch.

Three adze fragments were found among the foundation stones surrounding the Memorial Monument to Malietoa Vai'inupo at Sapapali'i. From the vicinity of the modern *fale* northwest of the star mound, SS-Sp-11, two stone anchors and two adzes had been collected by the owner.

Other

During the mobile phase of the work on Savai'i, several areas and sites not shown on the accompanying maps were observed and are reported on here for the value they might have for future research.

Approximately four miles east of Falelima, at Matenga, a platform mound was noted on the sloping land on the ocean side of the main island road. It is a rock mound steeply constructed on the three downhill sides and continuous with ground level on the uphill side. This stretch of the coast road can be recognized by the planted row of *Pomuli* trees, beyond which on the north side of the road several other small mounds can be seen.

At the inland edge of the beach at Falelima is a very large rectangular platform mound, over 100 feet in length and supporting several houses. Its footing is composed of massive stonework.

Informants at Fatutuia report house mounds in a direct line to the village of Papa on the northwest coast of Savai'i. The presence of these mounds was verified on a short inspection of the area northwest of Fatutuia. However, the small cove occupied by the coastal village of Papa revealed nothing of archaeological interest.

DISCUSSION AND CONCLUSION

These concluding remarks, a summary of our archaeological knowledge of the south coast of Savai'i, are subject to the revision and additions that will result from comparative analysis of related studies on the north side of Savai'i, on Upolu, and in American Samoa.

Archaeology, like history, is a science in which knowledge rests equally on the uniqueness of events and their temporal relations. In actual practice, the extent to which it is possible to draw historical conclusions concerning spatial and temporal relations of the prehistoric populations is limited by the archaeologist's resources, i.e., the quality and quantity of the archaeological record. On Savai'i, despite a central interest in the total content of Polynesian cultural development, it has been necessary to emphasise a structural-functional analysis of architectural remains. Other cultural residue and good chronological control are not convincingly represented. Furthermore, the question of what constitutes an archaeological site is a methodological problem that Savai'i shares with other areas of the world in which the luxuriant vegetation acts as an effective barrier to archaeological surveying. But even though the physical definition of an archaeological site is sometimes difficult in the Samoan bush, many individual structures have been recorded and described, and in the case of plantation lands that have been cultivated in coconut or taro, etc., we can begin to see the apparent relationship of various structures to each other, and view them in terms of pattern and configuration.

Nineteenth century government, missionary, and private documents contain numerous references to the "ancient" stone walls, villages, roadways. The following excerpt from Sterndale (1874: 8) is typical:

> The Island of Upolu, like Savai'i, is only inhabited upon the sea coast. This was not the case formerly, as the whole interior exhibits evidence of ancient prosperous settlement. It consists of sloping ridges and wide elevated plateaux, rising one behind the other up to the crown of the central range, very much of which displays vast areas of rich table-land covered with luxuriant forests, in whose silent depths are to be seen the ruins of ancient villages and buildings of strange form, composed of massive stone work. One easily recognizes the fact that all the available land in those localities has been at one time industriously cultivated, from the remains of

boundary walls, causeways, reservoirs and ditches for purposes of irrigation, and similar works, affording proof that in some early unknown time the population was much more dense as well as more energetic and industrious than at present.

Our knowledge of the distribution, relative density, and types of pre-European remains on the coastal lowlands of Savai'i has been greatly extended, but the problems of interpretation of Samoan prehistory from a study of settlement or community pattern and architecture must be seen in relation to both the physical and cultural environments.

Savai'i is a heavily forested island with steep inland hills and much of its surface covered with lava flows and black scoria rocks. On the relatively young basalts, yellow-brown clay loams in combination with the hot and humid climate produce a luxuriant plant growth. In addition, tides, currents, reef development, surf, winds, rainfall, temperature, soil quality may all have been environmental factors limiting and controlling the placement and development of habitation sites; but among these physiographic features, it seems probable that the amount of arable land, water supply, and coastal formations were possibly the most important. Although there were no doubt social or political conditions to account for the inland settlement in Samoa, the nature of the south coast of Savai'i with its large proportion of sheer cliffs has forced the population to the interior. The midden at Sala'ilua indicates, however, that at some time in the past, that region held an attraction for a large settlement under native cultural conditions. No doubt the site was placed to take advantage of the coral sand formation with its all weather beaching ability and the general embayment at the mouth of a fresh water supply.

Interesting though it is to consider prehistoric Samoan man's relation to nature, the questions that arise out of it will probably only be answered after an analytical scrutiny of the micro and macro environments, and until then, in the study of the interrelationship of culture and environment, there may be danger in over-emphasising the latter. Moreover, at this point, other questions seem to have priority e.g., how are the primary archaeological units for Savai'i described, what is their apparent relationship to each other? What might be said about their relative age and distribution? Conclusions cannot be well reasoned in the sense of having broad and deep knowledge of Savai'i prehistory, nevertheless, broad descriptive answers to these questions are possible.

Types of archaeological sites and their forms have been observed on Savai'i and a brief attempt was made to detect mound orientation or other signs of internal patterned arrangement of an interior settlement (fig. 42). In the absence of any evident mound arrangement, it may well be, according to the conditions discussed by Watters (1958: 14) that inland settlements take a random form for a variety of reasons. Speaking of interior settlements in 1840, Watters (1958: 14) comments as follows:

The social and economic independence of the households expressed itself in the wide spacing of dwellings. The apparently haphazard spacing of houses gave no clue that the family chiefs in the village council discussed the siting of houses. Knowledge of local siting factors, land-ownership boundaries, and human whim seem largely to have determined the pattern.

Two types of fortifications have been described, each architecturally distinct in ground plan and method of construction. The contrasts between these two are particularly interesting. The well preserved condition and the wall ports of the Uliamoa fort suggest its construction and use following the introduction of firearms which if true, would place it in the latter part of Samoan history in contrast to the more numerous ditch and bank earthwork defences found elsewhere in Samoa.

Among factors often cited for settlement of the interior are statements to the effect that local populace was exposed to constantly shifting foreign influences (Report 13, p. 208) and inter-district disputes so that settlements were obliged to be near a fortified *'olo* or place of refuge. Wright (1963: 91-94) adds:

The degree to which the occupants of these villages were pre-occupied with the selection of defensible territory strongly suggests that they had been forced inland away from the more agreeable and bountiful coastal regions.

Survey data from the south coast of Savai'i is relevant to this problem. A large proportion of the population lived on the not-easily-defended level or gently sloping land, and in many cases, there is no architectural evidence of the need for defence. Not only was the Uliamoa fort the only example from the south coast but extensive exploration and many general inquiries brought emphatically negative results. What generalisation might be possible about fortifications in Samoa would not appear to apply on the south coast of Savai'i.

The question naturally arises of the contemporaneity versus sequential occupation of the many archaeological sites. In a further statement characterising Samoa of 1840, Watters notes that only four per cent of the population and 14 per cent of settlement sites were more than one mile inland. Again survey data and general impressions from field observations would indicate far more than four per cent inland population at some time in the past, which only serves to illustrate the need for chronological control. Even later age estimates can be uncertain, for example, pre-1830 or "pre-Gospel" coastal villages cannot be distinguished by the lack of European style churches, as all churches in 1840 appear to have been large native houses built in the elliptical form (Watters 1958: 15).

Historical sources, often and properly combined with archaeological investigations, were consulted to supplement direct observations in the attempt to interpret architectural remains on Savai'i. A brief initial inspection was made of major sources of the history of Samoa, i.e., nineteenth century government, missionary, and private documents. The materials vary in thoroughness. Some are weakest on religion and political organisation, strongest on material culture and vice versa. Others are highly romanticised, containing hypothetical reconstructions of the peopling of Samoa.

Among published accounts which contain data on old Samoa are those of Krämer (1902), von Bülow (1897), Stair (1895, 1896, 1897), Pritchard (1866), Turner (1861, 1884), H. B. Sterndale (1874), R. A. Sterndale (1890), Pratt (1890) and Churchward (1887). There are of course similar sources by the same and other writers, some of which remain unpublished. Far from a thorough review of all documentary sources, specific items in the published literature were consulted for their interest and applicability to archaeology on Savai'i. In areas of Samoan religion and ceremony, social organisation, mythology and historical traditions, much has been written but is largely inferential in terms of its application to archaeology, for example, among names in the genealogy of the Samoan kings is "Paepaetele" meaning a large platform of stones (Pratt 1890). And again, a conch shell cached in the Pulemelei mound is suggestive of Turner's description of the use of the conch shell as a trumpet, and of one Samoan war god whose emblem this shell is said to have been. The same legend refers briefly to the temple of the war god where the shell was kept when it was not being carried to battle. In the light of other features at Pulemelei, it may be of some interest to quote a paragraph from Williamson (1937: 70):

I now pass to the subject of what I may call the family seats in the marae. There are a few more references, besides those by de Bovis, Baessler, and Ari'i Taimai already quoted, to the specific stone seats. Cuzent speaks of stones called *niho* (teeth) in a Tahitian marae, which he says represented the places of the different members of the family to whom the enclosure belonged, the stone in the centre being the seat of the eldest son, who, I may point out, would be the holder of the title. Baessler describes a *marae* in the island of Eimeo, containing a pyramid, an altar, and nine large stones, the seats of the chiefs and nobles of the land, round the altar.

Williamson is speaking here of ancestral stone seats in the *marae* of the Society Islands which he considered comparable to ancestral wooden posts in Samoa. However, he could have further cited the Pulemelei mound with its apparent circle of stone seats, had there been general knowledge of that structure.

John B. Stair, missionary and resident of Samoa from 1838 to 1845 collected data and memoranda bearing on Samoan customs as they prevailed before Christianity and European society were able to exert their influence. Among the things described by Stair is a direct reference to the "Pulemelei" type of platform mound, or perhaps to the Pulemelei mound itself, if one may judge from the following (1897: 111-12):

Upon the marriage of a chief with a lady of rank, the site selected on which to build their house was formed into a *fanua-tanu*, or paved ground, by the united labour of the inhabitants of the entire settlement or district, as the case might be, according to the influence of the parties. By this means a raised terrace of stone was formed from fifty to seventy feet square and often many feet in height, on which the house was built. This widespread custom prevailed throughout the whole group, not only in the case of dwelling houses, but also in sacred edifices or buildings, *fale-aitu*, houses of the gods. These were also built on *fanua-tanu* by the people of the district or settlement. In some remarkable instances these raised stone terraces or platforms were of very massive construction, which seem to have been the work of an earlier but now extinct race of men.

Further allusion to a similar mound structure is made by Turner (1884: 23) in the following excerpt concerning the *aitu langi*, or gods of heaven:

These gods were supposed to have fallen from the heavens at the call of a blind man to protect his son from a cannibal chief. They were scattered over several villages, but did not move about in the bodies of mortals. A large temple was erected to one of them in which there were ten seats on which sat the principal chiefs. A large shell was the only visible representation of the god, and in the time of war it was carefully consulted.

Pigeon-catching or snaring was a cherished sport in old Samoa and by some descriptions, was of ceremonial importance in addition to its practice as an amusement. One is tempted to see in the detailed accounts of the great annual pigeon catching festivals, the answer to the question of star mounds and their purpose, but although detailed accounts of this activity are offered by Krämer, von Bülow, and others, no direct historical evidence for the use of such mounds can be seen.

The consultation of historical source materials although not a very promising line of inquiry to explain archaeological remains, does help to establish a very general and relative age estimate. Mid-nineteenth century writers on Samoa speak of the remains of walls, roadways, and fortifications which were at that time overgrown, and objects of great curiosity. Other remains, particularly fortifications, may date from the destructive wars of the early 1800s or earlier, during the often-cited Tongan war period. Samoa has a history of over one hundred major wars, potentially an important chronological framework for the interpretation of Samoan fortifications.

The possibility that surviving native Polynesian beliefs might help to account for archaeological findings was explored through interviews with the oldest and/or most knowledgeable informants at various localities on Savai'i. From this it could clearly be seen how effective was the substitution of Christian theology for Samoan religion. The Samoans are fervent communicants of the Christian religion and informants' attempts to explain archaeological phenomena were often flavoured with elements of biblical interpretation and otherwise reflected a basic lack of knowledge about pre-Christian Samoan religion. It is also true, though, that the vitality of old Samoan religion was not expressed through objects of the spirit world. On his arrival in Savai'i in 1830, Williams found no evidence of idols, temples, or human sacrifice. Steinberger (1874) adds: "Mythology and reverence constituted the sum of their religion". A host of deities, totemism, and superstitious observances can be added to the characterisation of native Samoan religion, most of which do not seem to lead to correspondences in the archaeological record. In view of the absence in Samoa of a class of priests or chiefs who possessed a vested interest in the old religion, and the segregation between material and spiritual worlds (Watters 1959) it seems unlikely that buildings can be identified with mythological or historical personages as in Middle America. Perhaps we need to look no further than internal structuring within the community to explain such large mounds as Pulemelei. Watters (1958: 16) comments as follows on the individuality of certain villages in Samoa in 1840:

> Certain villages were the recognized capitals of districts and sub-districts, bearing the titles of *Laumua* and *Tumua*, denoting their primacy. Such places would have *malaes* and *fale-teles* of the highest prestige and there the paramount chiefs and orators would play leading parts in the elaborate discussions of district or sub-district assemblies.

Whatever the exact associations may be with Samoan and Polynesian culture, monument building on Savai'i is associated with social and political organisation and it is hoped that derivations from the accompanying data on settlement and construction will effectively add to the gradually increasing body of integrated knowledge of Samoan prehistory.

ACKNOWLEDGEMENT

The writer would like to express his gratitude to Mr E. Annandale of Apia, and Mr Slade of Letolo, for providing hospitality and services on the Nelson Plantation, to Siaosi Tini, for his invaluable assistance during fieldwork, and to many others on Upolu and Savai'i who contributed in various ways to the success of the work.

He would particularly like to express his appreciation to Mr Julian Naetzker, architect, of Jamestown, N.Y., who prepared the perspective drawings for this report and for Report 13.

Mr Gordon Schmahl drew the site location maps.

SURFACE ARTIFACTS FROM SAVAI'I

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ADZES

The most numerous of the three surface collections of adzes is that from Savai'i, numbering 195, of which 3 are unique, and 192 are classifiable. There is also a large number of small fragments, which cannot be classified, and are therefore not discussed here.

The adzes are classified according to the typology outlined in Report 2, and their distribution according to type and locality is set forth in table 2. Most of the finds come from modern coastal villages, with a small number from each of the present inland villages of A'opo and Paia, and a smaller collection from the plantation area of Letolo and the mound Pulemelei, described in Report 4. The localities in table 2 from which collections were made are arranged in approximately clockwise order beginning at the northernmost settlement on the east coast, and continuing to the extreme east of the north coast. They are also grouped into the broader divisions of north, south, east and west coasts, with the locality of Falealupo placed in a separate division designated as the northwestern tip, and into corresponding inland divisions where relevant. The localities are by no means of comparable size and status in local organisation, some being merely village sections, while others have sub-district status. For example, Safune embraces the areas of Sasina, Faletagaloa and Fagae'e in local political organisation.

Little apparent pattern emerges from the breakdown of types according to locality, which is not unexpected given the small numbers from any one locality. The most numerous type, I, is well distributed around the coast and in inland areas, being present in 21 of 32 localities in which collections were made. The next most numerous type, II, is also fairly evenly distributed among 18 localities on the east, south and west sides of the island, with a concentration in a small area of the north coast. Type III is scattered around the north and west coasts and rare or absent on the south or west sides, with a cluster of examples only from the inland village of A'opo on the north coast. Type VI is most common on the north coast, with a major cluster at the northern end of the east coast. It is rare elsewhere. Type IX occurs in smaller numbers than is common in surface collections, its numbers being considerably boosted by 6 examples from Matavai, on the north coast, and 5 from Sala'ilua on the west coast. Otherwise its distribution in ten other localities is sporadic around the coast, while it is the only one of the types usually found in surface collections not represented from the few inland localities.

The small collection from the south coast does not include any examples of the four uncommon types, which are represented by sporadic occurrences from the other three coasts. Nor is any pattern, or clustering of supposedly older types in given localities in evidence.

In general, the larger the collection from a locality the greater the range of types. Thus a collection of 22 adzes from Faletagaloa includes 9 types, 18 adzes from Saipipi and 17 from Sala'ilua each include 8 types, while 21 adzes from Matavai cover 6 types. There is thus a considerable range of types from individual localities on each of three coasts, only the south coast, with its smaller collections, having a smaller range.

It is interesting to note that the inland village of A'opo has a noticeably higher proportion of Types III and VI than most locali-

TABLE 2

DISTRIBUTION OF SURFACE ADZES FROM SAVAI'I

		I		II		III		IVa		IVb/V		Va		Vb		VIa		VIb		VII		VIIIa		VIIIb		IX		X		unique		total
EAST COAST	Pu'apu'a	2	2	1							1			1	1		3										1					12
	Saipipi	2	4	1			2					2					4								1		1	1				18
	Sa'asa'ai	1	1			1																										3
	Tuasivi						1																									1
	Fatausi	1																														1
	Iva	1	1		1																								1	1		5
	Sapapali'i			1	1																1											3
	Vaipapa		2			1																										3
	Salelologa				1									1									1				1					4
SOUTH COAST	Fa'ala				1											1											1		1			7
	Vaito'omuli	2	1																													
	Vaiioa	2			1												1															4
	Satupa'itea			1																												1
	Papa																										2					2
	Gataivai				1																											1
SOUTH INLAND	Pulemelei	1																														1
	Letolo	1			1	1										1																4
WEST COAST	Taga	3	2	1			1								1												3					11
	Si'utu				1																					1						2
	Sala'ilua		4	1				1									2								1		5	1	1	1		17
N.W.	Falealupo	1																														1
NORTH COAST	Safune																1								1							2
	Sasina		3														1										1		2			7
	Faletagaloa	2	6	5		2					1				1	1					1				1		1		1			22
	Fagae'e	1		2													1															4
	Matavai	5	4	3				1									1			1						1	5					21
	Avao	1				1																				2						4
	Safotu					1	1				1										1								1			5
	Sato'alepai	2				1											1															4
	Letui					1																										1
NORTH INLAND	A'opo	1	2	1		4										1	1	1														11
	Paia		3	3							1						1								1					1		10
UNLOCALISED			3																													3
																																195

N.B. Complete specimens at left of each column, fragments at right.

ties, raising the possibility that these types may, for some reason connected with their function, be commoner in inland situations.

Unique Specimens

The large Savai'i collection has only three unique specimens, of which two are kinds encountered in the other collections as well. A 15/10 from Sala'ilua is a small edge ground flake (fig. 45a), while A 16/67, from Paia, is a broken adze which has been reground to form a tool which is narrowest at its cutting edge (fig. 45b). It is similar in this respect to another unique specimen from Upolu.

A 16/144, from Iva, has an almost diamond-shaped cross-section, with a distinctly "beaked" cutting edge, the only such specimen in the entire collection. It is ground on all surfaces (fig. 45c).

Other Artifacts

Other artifacts from Savai'i are more numerous than those from Upolu and Luatuanu'u, although the collection is still an extremely small one. Once again, by far the greatest part consists of grinding and polishing tools, as is only to be expected in view of the large number of stone adzes recovered. Slightly greater success was experienced in the search for fishing gear and worked pearl shell, but the amount recovered is still ludicrously small compared with many Eastern Polynesian groups.

Grinding and Polishing Tools

Five fragments of grindstones worn on two opposing sides were collected on Savai'i. G 16/1, from land named Pula, on Gataivai village lands, is probably part of a fairly large shallow grindstone. G 16/2, from Sapapali'i, near the memorial to Malietoa Vai'inupo, is a fragment from the side of a grindstone with only small portions of the two opposing ground surfaces. G 16/5 and G 16/6a are from site SS-Sa-1, Sala'ilua. G 16/5 is a fragment ground on two opposite sides whose total size cannot be estimated. G 16/6a, however, also ground on two sides, appears to be almost complete, with a maximum length of 116 mm. G 16/7, from Saipipi, is a small fragment ground on two sides to the point where the stone appears to have been worn right through and to have broken. G 16/8, from Fatausi, is a further small fragment, from the edge of one ground surface of what was probably a fairly large grinding stone. One further fragment, G 16/6b, from Pu'apu'a, shows signs of abrasive wear. It lacks the flat or hollow ground surface of the grindstone fragments, and appears to have been used as a file.

An item from the playground area of the District School, Vaito'omuli, appears to be a very weathered fragment of a large adze of Type I or II, one surface of which has been more recently used as a polishing tool. From the same location is G 13/1, an unusual flat thin rectangular piece of fine-grained stone, carefully shaped, which would appear to be a file of some kind (fig. 46c).

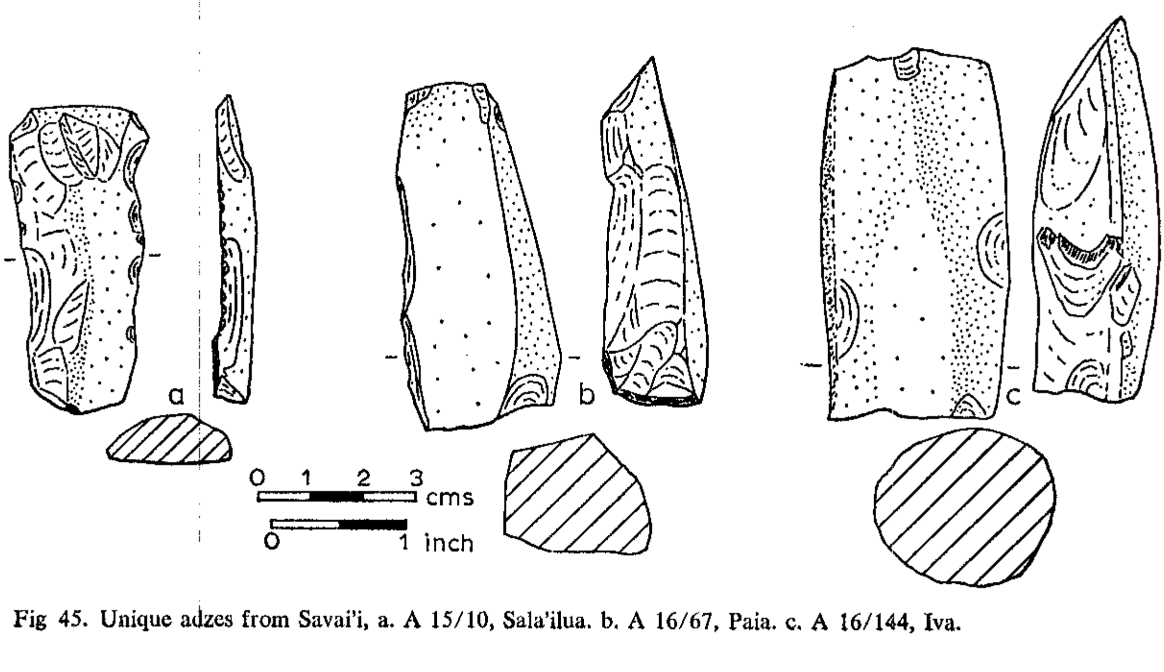

Fig 45. Unique adzes from Savai'i, a. A 15/10, Sala'ilua. b. A 16/67, Paia. c. A 16/144, Iva.

Anchor Stones

Two anchor stones were recovered from a house site area near the star-shaped mound SS-Sp-11, Sapapali'i. G 16/3 is shaped like a large square bell, with rounded rectangular section and flat base, with a rounded top. It has a hole for suspension with a groove on the upper outer surface. This form of line attachment is identical to that on the anchor G 10/713 recovered from excavations at SU-Va-1 (Report 7b, p. 135, fig. 57). G 16/4 has a similar groove and hole for suspension but is not otherwise shaped. Rather it is a natural stone which has been drilled for suspension. G 16/3 weighs 5.21 kilos and G 16/4 weighs 7.3 kilos.

Scrapers

An arca shell scraper, G 11/6, was recovered from a small cave known as Ana-ulu-po'o at A'opo. Signs of wear are clearly visible on the outer edges (fig. 46a). A flake of brown glass, G 11/5, was recovered from the village area at Sa'asa'ai. It has signs of use on the two long edges (fig. 46e).

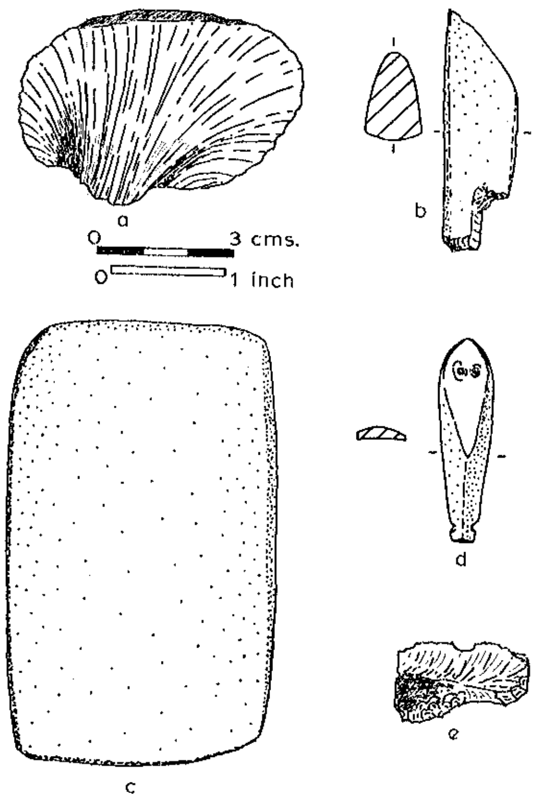

Fig. 46. Other artifacts from Savai'i. a. scraper, G 11/6, A'opo. b. broken lure shank, F 11/1, Safune. c. polishing stone, G 13/1, Vaito'omuli. d. modern lure shank, F 11/2, Neiafu. e. glass flake, G 11/5, Sa'asa'ai.

Fishing Gear

A fragment of a large lure shank, F 11/1, probably made from the columella of a *Cassis* shell was found on the surface at Safune village. It has a pointed proximal tip, and is considerably thicker than it is wide. Both dorsal and ventral surfaces are flat. There is no perforation for line attachment, and it is probable that the shank broke before completion (fig. 46b).

During our search for artifacts in the modern villages, a pearl shell lure shank, F 11/2, was donated by a girl in Neiafu village. In size it is intermediate between the largest of the *pa laiti* and the smallest of the *paala* figured by Demandt (1913: plates III, IV). The proximal end is rounded, with two dorso-ventral perforations. There is a single pair of notches at the distal end for point lashing. The dorsal surface is flat transversely, and concave longitudinally, while the ventral surface is convex longitudinally with three slight facets giving a low subtriangular section transversely (fig. 46d).

Worked Pearl Shell

Small quantities of cut pearl shell were found in four coastal villages, two pieces from Si'ufaga, three from Sa'asa'ai, one from Safune, and one from Papa. Most of these have the appearance of being fairly fresh, and of having been cut with metal tools. It is quite evident that here, as on Upolu, pearl shell is a rare and prized commodity which is never wasted.

Summary

Savai'i, like Upolu, is extremely poor in artifacts other than adzes and adze fragments. The only other artifacts which are at all numerous are grinding and polishing stones, and fragments of these. As on Upolu, a number of large boulders showing signs of working were encountered during site surveys. Only small fragments were collected and included in the surface collection.

The two anchor stones are of particular interest, being carefully worked, and comparable to one recovered from excavations at Vailele.

Items of fishing gear once again proved to be rare to non-existent. The one specimen recovered from the surface is made from material other than pearl shell, while the modern specimen that was donated is in pearl shell.

Although more fragments of worked pearl shell were found on Savai'i than on Upolu, they are still extremely rare. It appears that pearl shell is very uncommon among midden shells on the surface of coastal deposits and those pieces which are found show signs of being worked with modern tools.

Conclusions

Although the surface collection of artifacts from Savai'i is the most numerous of those from Western Samoa, its main value is in substantiating our conclusions concerning the frequency of occurrence of the various adze types, and in supporting our negative findings on the occurrence of fishing gear, particularly that in pearl shell. The adze collection, although numerous, is dispersed over 32 localities, with only small numbers of adzes coming from all but a few of these localities. Types of adzes appear to be widely distributed around coastal Savai'i, with no unusual concentrations in any particular locality. In general the range of types in a locality increases as the collection grows larger. The few adzes from inland locations do not differ from the coastal pattern, although Types III and VI are more prominent than usual at A'opo.

The rare artifacts other than adzes support conclusions drawn below from the Upolu collections concerning the paucity of archaeologically recoverable material culture in Western Samoa, and in particular the universal lack of items of fishing gear and the waste materials associated with their manufacture.

IV. INTENSIVE RESEARCH AT VAILELE, UPOLU

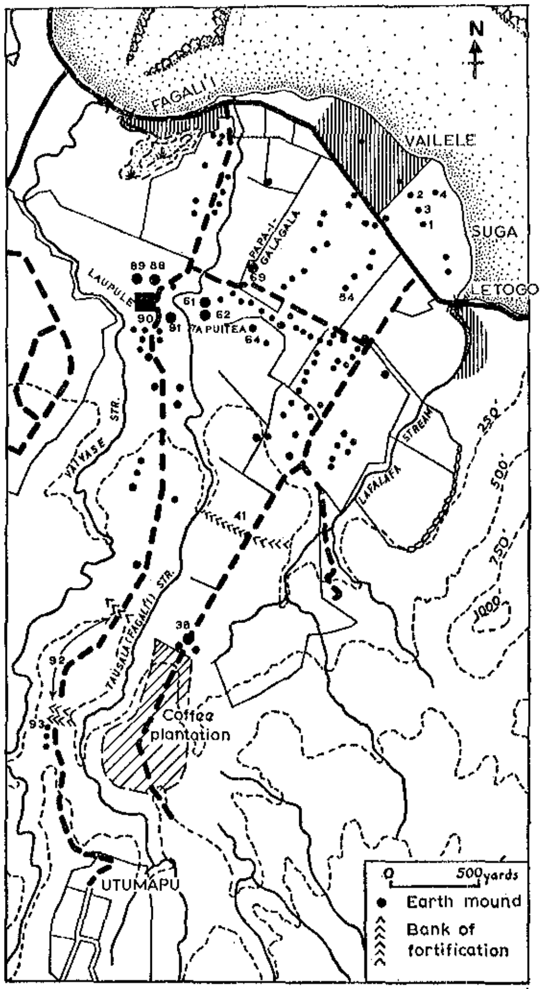

Fig. 47. Map showing distribution of mounds in the Vailele survey area, Upolu. (Only sites mentioned in text are numbered, those for other sites are on file at Auckland Museum).

INTRODUCTION TO THE VAILELE PROJECT

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The Vailele project has been essentially a continuation and development of a reconnaissance survey and one test excavation made in that area by Golson in October 1957 (Report 1, p. 19). Vailele village today lies some 2½ to 3 miles east of Apia, along the north coast of Upolu, and is surrounded on the east and inland sides by the Vailele Plantation of the Western Samoa Trust Estates Corporation. Nearly all our work has been carried out within the Plantation properties, except for part of one day spent surveying on land belonging to the village. For permission to carry out this research on WSTEC land and for the innumerable services rendered us at Vailele and elsewhere, we wish to thank Mr. P. W. H. Kelly and members of the local plantation staff.

Earthen mounds of all sizes are plentiful over the Plantation properties and an attempt has been made to record their distribution by systematic survey (fig. 47). The reasons for this are obvious. It was necessary to determine the relationship between the group of earthen mounds at the locality known as Suga (where excavations were conducted) and those other mounds for which descriptions and some traditional accounts were available. One of the largest mounds in the Vailele area was initially described by Thompson in 1927, and eight of the larger ones were accurately mapped and described in detail by Freeman in 1944. Moreover, Freeman (1944c) recorded traditional accounts which were said to be associated with the last stage in the building of some of the larger and better known mounds which he described, providing one means for assigning a date to them. In 1957 Golson received some similar information about the Suga mounds in which he excavated and other information is available in Krämer (1902). Thus it has been possible to "date" traditional occupation at some of the mounds by means of genealogies as well as to relate them spatially by field survey, and in the case of the mounds at Suga in which we have excavated, to check on these dates archaeologically.

THE SURVEY

The reconnaissance survey carried out by myself in the Vailele area was accomplished on foot over the course of two and a half days. It consisted of recording the type and location of each visible surface monument by systematically working through the plantation, fenced block by fenced block. The ground cover is largely grass and sensitive plant which serve as pasture between the coconut palms on the plantations, and is ideal for locating sites. Also, as most of the property has been in plantation since 1867, few more recent remains of Samoan house structures are to be found.

The nature of the survey was influenced by the type of field monuments available for recording, and the objective of the survey, which was distribution. Most field monuments not already recorded consisted of small and medium sized mounds, which for the most part warranted only superficial description as to general size, shape, and height (and even for these characteristics it is impossible to be precise without excavation), so that location on a map and notes on the above characteristics are all that was recorded. At some sites additional features were in evidence, which were, of course, noted. All sites were marked by pin holes on a blue-print copy of a base map of the area, the number being written around the hole on the white surface of the back of the map, and the information recorded in a note book. The map strip used was one of a number from which the official topographical maps of Western Samoa (1:20,000) have been produced. The maps covering the Vailele area, not then available, have been consulted in making the map used here (fig. 47). For copies of these strips in advance of publication of the maps, and for permission to use them, and aerial photographs, I am indebted to Mr. A. J. Hunter of the Western Samoa Department of Lands and Survey.

The survey covered roughly the same area as Golson's study. The eastern boundary was the Lafalafa stream, and all the land on the elongated, rising and narrowing strip between it and the Tausala (Fagali'i) stream was surveyed inland to the coffee plantation. Later, Hougaard carried out a further detailed survey in this area (Report 11). In addition, most of the mounds and other sites on the strip of higher ground behind Fagali'i village and especially those along the western bank of the Tausala stream, were included in the reconnaissance, which extended inland along this ridge only to the point where it narrowed and had been fortified.

Freeman recorded four large rectangular mounds on the western bank of the Tausala stream under the name Laupule, but the name specifically refers to the largest mound, the base dimensions of which are 346 by 314 feet, and upper surface dimensions 190 by 143 feet (Freeman 1944c: 145-147). In the present survey it is SU-Va-90, while the mound he noted to the southeast is Va-91, and his two to the north toward the sea are Va-88 and Va-89. Directly to the east across the stream valley on the other bank are two more rectangular mounds mapped by Freeman, the larger of which I recorded as Va-62, and the smaller as Va-61. Off to the southeast occurs a third rectangular mound which he also recorded and which in my survey is Va-64. These three mounds come under one name, Tapuitea (Freeman 1944c: 147). I also recorded a number of other smaller mounds not noted by Freeman in this area. Finally, on a prominent natural rise on the eastern bank of Tausala stream and below the Tapuitea mounds towards the sea, Freeman (1944c: 151) described a low conical mound called Papa-i-Galagala, which was said to function as a sanctuary or place of refuge to which anyone could flee, and, if he reached it unscathed, be safe from the wrath of even the most powerful chief. I recorded this site, SU-Va-69, as a natural hill with at least two terraces on the north (seaward) face, and a 5 foot high platform at the top which has rounded corners and is some 25 paces across. My pace is consistently about a yard, so that these measurements accord well with Freeman's description of the site as 73 feet in diameter and 4 feet high, and his location of it on a marked prominence about 120 feet above sea level. The one difference, not unexpected in such matters, is his description of it as a truncated conical mound which conforms closely to the usual type of *paepae* found in Samoa (Freeman 1944c: 151). We both recorded the small platform constructed entirely of stone to the rear of the mound, though my description reads simply "rock outcropping and terraced rock platform."

One hundred and ten sites were recorded in the survey. The main result is some idea of the distribution of the mounds in relationship to their size and shape. This is revealed in figure 47. Little additional comment is necessary, except to say that smaller low mounds may also exist, which I have not recorded because they could not be identified with certainty except through excavation. As a consequence this survey represents mounds varying from half the size of those excavated at Suga to those equal to or slightly larger than them, with a few ranging on up to the size of those recorded by Freeman. Except for two mounds, Va-38 and 39, located in the flat just below the coffee plantation, only about five other larger mounds were recorded which approach anything like the size of the smaller ones described by Freeman.

The mounds recorded by Freeman are part of a main concentration of mounds situated from half to three-quarters of a mile inland from the coast, in which the mounds become larger in size as one moves from east to west, ending with the largest known mound, Laupule, on the western side of the Tausala stream. This cluster is spatially distinct from the cluster of mounds with interconnecting sunken ways at Suga. The Suga mounds, by comparison, are only a few hundred yards from the coast, number only seven or eight, are somewhat more uniform in size than those further inland, and seem to be separated from the main concentration further inland by an area in which I could distinguish only a few low mounds, some of which must be excavated before they can be identified with certainty.

A few mounds had stones and traces of river gravel pavements on their surfaces or in disturbed sections cut into them, and some had distinct ditches around one, two, or three sides. Only one, Va-54, was completely encircled by a distinct ditch.

An impressive negative aspect of this survey was the absence in this area of prehistoric and protohistoric stone house pavements and platforms so common in other parts of Samoa. One reason is the lack of plentiful building stones near the sites, but as stones were obviously brought into the area in some cases from the adjacent stream valleys and nearby higher ground, this is not a complete explanation. The stone foundations of the older houses in the present Vailele village are further witness that stone can be used in this area. One must consider the possibility that in the Vailele area the prehistoric and protohistoric populations were living on mounds, but that at or shortly after the time of European contact this practice was abandoned. More extensive work than we have done would be needed, however, to confirm this impression.

The fortification designated SU-Va-41 stretches between the Tausala and Lafalafa Rivers. Golson, as noted below, obtained a tradition which implies it was built by Mata'afa during the early 1890s. The bank is inland of the ditch, defending the area inland from attackers coming up the slope. The ditch varies from 10 to 20 feet in width, and the scarp of the ditch and inner bank rise 10 to 12 feet, with the bank itself built up 4 to 6 feet above the ground surface.

The other fortification recorded in the area consists of ditch and bank systems at two narrow points on the ridge west of the Tausala stream. A number of mounds are enclosed between these two defences, but whether they are contemporary with them has not been determined. They are certainly more numerous within the fortification than below it. The whole site was numbered SU-Va-92. The outer ditch at the inland end is 10 to 15 feet deep. On its inner side is a low bank, and an inner ditch about 10 feet deep. Then there is an inner bank on the eastern side where there is a flat terrace partially outlined in stone. All the features in this locality have been much disturbed by recent plantation roading. The other ditch at the seaward end is shallow and approximately 12 feet across, with some traces of an outer bank. The inner scarp of the ditch is up to 10 feet high, but the area behind is flat with no signs of an inner bank. Just beyond the double ditches at the inland end of the fortification is a very high mound, approximately 20 feet high, which was numbered Va-93.

The Excavations

Excavations in this project area were confined almost entirely to the mounds at Suga. The mound in which Golson carried out his test excavation was designated SU-Va-1, and the other three in which we excavated were numbered in sequence as we worked on them Va-2, 3, and 4. The one test excavation not at Suga was done by Hougaard at Va-38, the large mound already sectioned by the plantation road just before the coffee plantation at Utumapu. The excavations were not designed to open up large areas of the mounds, a task beyond our resources if we were to carry out any other work in Samoa, and also impossible in the case of Va-1 and Va-2 where prior bulldozing had rendered such an operation no longer feasible. However this and subsequent bulldozing of our own has made the recovery of long sections through these mounds possible. These sections and the limited area excavations have revealed the major stages in mound construction and a great deal about the functions of the mounds.

Because of disturbances, both ancient and modern, in many of the mounds, I do not think that excavation of an entire or even half or a quarter of a mound would yield much additional information on structures, although such excavation is obviously a task which now must be performed at some stage. It certainly would recover an endless array of postholes, pits and other features, and some portions of stone curbing and platforms from former structures. Our experience suggests, however, that it will be very difficult to assign features to the surface from which they were cut, because of the spreading of the water worn river gravels of the floor pavements, following the rotting or removal of posts, especially if these river gravel deposits are superimposed without thick intervening sterile fills.

For these reasons then the initial excavations at Vailele concentrated on recovery of sequence data, the processes which went into the construction of mounds, and the general functions which they served. We also attempted to explore over a wider area the earlier deposits where they were found preserved more or less intact under the mounds, as these are probably less disturbed than those of open sites in the same area, could they be found. In fact, although a great deal of our time, energy, and resources went into the task of excavating in four of these mounds, these efforts together would not have been sufficient to accomplish the full excavation of any one of them. As for the larger mounds, it is obvious that they would require a large scale operation planned solely for that purpose.

The Vailele Mounds And Traditions

The use of traditional and genealogical materials may occasion some derision among New Zealand and other Polynesian archaeologists who tend to doubt their utility, especially with respect to genealogical dating (Suggs 1960b: 772). To some extent I share these views, but I feel that well documented materials from Samoa and elsewhere reporting events for the last 300 to 400 years, and recorded in the nineteenth century, are probably no less accurate than are radiocarbon determinations, for instance, and they certainly may often help in interpreting the materials recovered by the archaeologist. An examination of this evidence therefore, seems reasonable and necessary (Suggs 1960b: 771-772). At the same time I would have no hesitation in stating that materials gathered today in the islands by archaeologists who do not speak the language or possess a full understanding of the social context in which the information is given, are likely to be very inadequate. As a consequence, we have not pressed this line of investigation initiated by Golson in Samoa.

Vailele village has shifted at least once in the historic period from a settlement along the beach, where old house platforms and an abandoned church are still to be found, to the present location which is more convenient to the main road. In the old beach location, one specimen of a two-holed shell lure with a flat rectangular section, a type well known in ethnographic collections, was found, and a shaped coral file. This is one of the few instances where an item of fishing gear has been recovered from such a context, despite extensive searching by all of us in the numerous coastal middens associated with most villages.

The present village of Vailele, and Fagali'i in the next bay to the west and closer to Apia, although now separate villages, derive from a single community known as Saleupolu, which according to information given to Freeman (1944c: 149-150) "was a very large one and consisted, so it is said, of 100 *fuaiala* or village sections. These *fuaiala* were situated inland on either side of the Tausala stream; and here it was that Tupuivao the despot, decided to build the great earthmound which came to be known as Laupule." This tradition obviously relates principally to the larger cluster of mounds inland. While it is possible that the mounds at Suga could have belonged to one of the *fuaiala* or village sections of Saleupolu, they are not a part of the main mound complex around which Saleupolu was centred, and with which most of the traditions are concerned.

The seven large rectangular mounds of Tapuitea and Laupule "belong to the same period; they were all constructed during the era of and at the bidding of Tupuivao, a famous figure in Samoan history" (Freeman 1944c: 148). Freeman places Tupuivao's death genealogically as approximately 250 years or ten generations ago. A study of the relevant genealogies convinces me that Tupuivao was born somewhere between 1590 and 1620 A.D. While still a young man (*taule'ale'a*) he lost his rights to his mother's titles of Tui Atua and Tui A'ana by refusing to come to her when she was dying, preferring instead to continue with his attempts to catch pigeons near Safata (Henry 1958: 97). As a result of this behaviour, he was forced to go to war with his cousin, Faumuina, and his supporters, for his mother had named the cousin her successor, and Tupuivao refused to recognise his mother's decision. Tupuivao and his supporters were eventually defeated, though Freeman records that "for many years his power was absolute"; when defeated he went into exile on the island of Tutuila. In my estimates based on the genealogies, his mounds were probably built between A.D. 1615 and 1640 while he was at the height of his power, as it certainly seems unlikely that he built them when he was a boy and his mother held the titles, or when he was forced into exile. During this period he became widely known as a cruel despot. The largest of the seven mounds is said to have been used solely as a platform for his house and symbol of his power, while the others were for his various retainers. All were in his father's village of Saleupolu.

A dating for these events is laid out in table 3, where I have used both Krämer's estimates of 30 years to a generation and the more usual 25 years to a generation to arrive at dates for persons who occur some eight to ten generations previous to certain historically known figures in the same line. One of the best known of the historical figures is Malietoa Vai'inupo who was approximately 65 when he met John Williams in A.D. 1830 (Williams 1838: 287). He died in A.D. 1841. Malietoa Vai'inupo is said by Krämer (1902, I: 212) to have been between 20 and 30 years of age when he was selected by I'amafana to succeed him as *tupu*

Table 3

GENEALOGIES CONNECTED WITH TRADITIONS USED FOR ESTIMATING AGE OF SALEUPOLU VILLAGE AND ITS MOUNDS

Estimate of Age at Birth	*Generation*	*Genealogy*		
1500 — 1550 A.D.	21	[1]*Salima-i-Papa Fagali'i* =		
1530 — 1575 A.D.	22	[1]*Fuailelagi* = *Le Aumoana*		
1560 — 1600 A.D.	23	[1]*Tauiliili-i-Papa* = *Taufau*		*Sina* =
1590 — 1625 A.D.	24	[1]*Tupuivao* =		*Faumuina* =
1620 — 1650 A.D.	25	*Luamanuvae* =		*Fonoti* =
1650 — 1675 A.D.	26	*Falanaipupu* =		*Muagututi'a* =
1680 — 1700 A.D.	27	*Togafau* =		= *Tupua* =
1710 — 1725 A.D.	28	*Ilimatogafau* =	= *Luafalemana*	*Galumalemana* =
1740 — 1750 A.D.	29	*Tuimavave* = *Salaina'aloa*		*I'amafana* (born 1750-1760 died 1800-1810) succeeded as Tui Atua by:
1770 — 1775 A.D.	30	*Fa'asuamaleaui* =		*Malietoa Vai'inupo* (born circa 1765-1700 A.D. approx. age 65 in 1830 A.D. died in 1841 A.D.)
1800 A.D.	31	*Mata'afa Filisounu'u* (born circa 1800 A.D. killed in fight against Malietoa in 1829 A.D.)		

[1]Lived in the village of Saleupolu according to traditional accounts.

or "king" of Samoa. He was installed as Malietoa at about age 35 on his father's death (Henry 1958: 117), and for the next thirty years waged a continual fight to gain eventually the position of *tupu* (Stair 1897: 253-58). Krämer (1902, I: 212) places I'amafana's death between A.D. 1800 and 1810, while Henry (1958: 115) says it was in A.D. 1802. These facts together would seem to indicate that Vai'inupo was born between A.D. 1765 and 1770. Because the period during which I'amafana was Tui Atua and Tupu of Samoa is said to have been a long and peaceful one, and he did not die a young man, I would place his birth before A.D. 1760. His son, who was a small boy upon his father's death, died at about age 50 in A.D. 1850 (Krämer 1902, I: 173; Henry 1958: 113). I'amafana was the son of Galumalemana by a fifth and favourite wife and was not born himself until after Galumalemana's death, so that an estimate for I'amafana's birth actually provides a fairly late date for that generation. Galumalemana also lived to be an old man, so that his birth must have occurred during the first few decades of the 18th century. Another historical figure in the genealogy of table 3 is Mata'afa Filisounu'u who was killed in 1829 in a battle against the forces of Malietoa Vai'inupo (Krämer 1902, I: 212). This implies that he was probably born around A.D. 1800 as were most others of that generation, and his father during the same period as Malietoa Vai'inupo. From these historically known people then, one line can be traced back six and nine generations respectively to Tupuivao and Salima-i-Papa Fagali'i. It can be checked against another line leading back to Sina, a sister of Tupuivao's mother, Taufau. In these accounts the people from Tupuivao back to Salima have an association with Saleupolu, and in particular Salima can be associated with site Va-69 and the Malae 'o le Vavau below it (Freeman 1944c: 151). From the earlier published accounts it would seem, therefore, that in authentic Samoan tradition, these mounds were in use as part of the settlement of Saleupolu during the entire 16th and part of the 17th centuries A.D., with the largest of the mounds taking their final form before the mid-17th century.

Another historical account tells of an event that was supposed to have been acted out in the portion of the Vailele area with which we are directly concerned (Krämer 1902, I: 266). This story relates to Salima-Galemai and his unfaithful young wife, Tuitogama'atoe, who left him and went off with a young boy, Lemafaitu'uga (see table 4). The full story need not concern us, but it does contain certain other important information. The first item is that Salima-Galemai's father, Tuisuga, is indicated as living at Suga about the time of generation 19 or circa the last half of the 15th century. Salima-Galemai is, in a footnote accompanying this story, said to have lived at the inland village of Utumapu (the present name for the upper Vailele plantation area).

Genealogically, the placement of people appearing in this story can be set out as in table 4 and their positions supported by other relevant genealogies (Krämer 1902, I: 169, 243, 244, 266). The position of Salima-Galemai is contradicted in one place, however, where in gen-

TABLE 4

GENEALOGIES CONNECTED WITH TRADITIONS ABOUT MOUNDS AT SUGA, VAILELE

Generation	*Genealogy*		
19	*Tuisamoa Falelili* =	[1]*Tuisuga* = *Tapuutuutumai*	
20	*Tavatele* = *Matu'u*	[2]*Salima-galemai* = (Tuitogama'atoe)	*Tui A'ana Tamalelagi* =
21	*Lemafaitu'uga* = *Tuitogama'atoe*		
22	*Malietoa Taulapapa*		

[1]Lived in Suga, a division of Vailele (Krämer 1902, 266, fn. 8).
[2]Is said to have lived in Utumapu, which at this time was an inland village behind Vailele (Krämer 1902, 266, fn. 9), (see also Churchward 1887: 280).

eration 17, Mamaoga, identified as a daughter of the Salima-Galemai married to Tuitogama'a-toe, is seemingly several generations too early. In one genealogy (Krämer 1902, I: 248) this Salima is identified as Salima-Galemai-i-Suga, this being the Suga by Vailele. What is at issue here is, I believe, a distinct possibility that there were two Salimas, one Salima-i-Papa-Fagali'i belonging to generation 21 and the powerful chief of Saleupolu, and the other a Salima-Galemai of generation 20 who probably lived both at the coastal village of Suga (Krämer 1902, I: 231) where his father, Tui-suga lived and in the inland village of Utu-mapu. If so, tradition would indicate an even earlier initial occupation for the mounds at Suga than has been anticipated by Golson (Report 1, p. 19), a finding not incompatible with the archaeological evidence. Tradition also leaves an impression, supported by the archaeological evidence, that some occupations of the mounds at Suga where we were excavating were contemporary with the occupation of the larger mounds of Tupuivao in the community of Saleupolu found on both sides of the Tausala stream, so that in this sense the settlement at Suga could easily be one section of this large "village" as the survey would suggest.

Results of two 1957 interviews by Golson [MS] with the chief and talking chief of Vailele, one conducted in the village of Vailele itself and one carried out in the field while travelling over the area of the most detailed reconnaissance with the same informants, may be compared with the information from Freeman and Krämer presented above. The area traversed with the informants was that between the Tausala stream on the west and Lafalafa stream on the east inland to the coffee plantation of Upper Vailele. Golson also obtained a certain amount of information relevant to Vailele from a third interview with the chief of Moata'a on the subject of the origins and descent of the Asi title. The interpreter on the first two occasions was the informant on the third, when a Samoan school teacher trained in New Zealand served as interpreter.

Certain weaknesses of the interviewing procedure are recognised by Golson, in particular his failure to have available maps and aerial photos and other means to tie the traditional nomenclature to geography, and as well his inexperience in interviewing and the shortage of time which resulted in a failure to check back. I would add that Golson's material was being gathered one generation after Freeman and two to three after Krämer, and that the interviews were dependent on an interpreter who held a title in another village.

Reading through Golson's notes I have been struck by a certain range of items which parallel closely those recounted above, and an equal number of others about the authenticity of which I have serious doubts. In the first category are:

1. Attribution to *a* Salima in both interviews of the mounds where the excavations took place;
2. Association of Salima with Malae 'o le Vavau and with his mound on the ridge behind it on the east side of the Tausala stream;
3. Placement of Tupuivao as a descendant of Salima at three generations distance (interview 2);
4. Location of Tupuivao's house mound and *malae* at Laupule on the west side of the Tausala stream;
5. Tausala named for Tupuivao's mother Taufau (interview 2);
6. Salima named as main chief of Saleupolu line (interview 3);
7. Salima placed genealogically as being a little more than ten generations before the coming of the missionaries (interview 1); and
8. Salima's sway described as extending from Letogo to Fagali'i.

In the second category are:

1. The village of Salima stretched on both sides of today's main road and back to beneath a long flat tongue-like ridge of land by the east bank of the Tausala, called Malae 'o le Vavau (if so it would not be a village associated with the main concentration of mounds, which are differently distributed);
2. Salima's village also stretched from beneath the end of Malae 'o le Vavau to the Tausala thus including mounds described by Freeman on the east bank of that river (but Freeman's three mounds of Tapuitea are inland of Papa-i-Galagala and Malae 'o le Vavau and were attributed to Tupuivao or his retainers);
3. Genealogical dating of Salima to a time little more than three generations before the coming of the missionaries (interview 2);
4. Salima was beaten in a war (Taua o Salima) by Malietoa, who gave all the honours and dignities to the people of Faleata, who helped him when he was attacked by Vailele. The Faleata leader was Tafa'igata [Krämer (1902, I: 241) puts him in generation 10 of the 30 to 33

he has recorded, and this Malietoa six generations later]. The people of Vailele were driven out and dispersed;

5. Salima went to war with Malietoa Uitualangi [Krämer (1902, I: 243) puts him in generation 16] and was beaten, his people dispersed, the Saleupolu name coming to an end (interview in Moata'a);
6. The people were said to have come back to the area at the time of Tupuivao;
7. The Tausala was named for Tupuivao's sister, Taufau (interview 1);
8. Tupuivao became a Christian and moved to live just west of the road to Berking's plantation at back of the narrow coastal strip in the present village of Fagali'i where Golson was shown a house mound that had been cut into (the section showed two different *paepae* levels);
9. The people followed Tupuivao down to the coast and the modern villages of Fagali'i and Vailele are descended from them;
10. Letogo was said to be a new creation of the Fijians who were given permission to settle by Tupuivao and who intermarried with the local Samoans.

In his concern for inland settlement Golson learned a great deal in particular about that area in the coffee plantation and in the bush beyond, between the Tausala and Lafalafa Rivers. This included the following points:

1. The ditch and bank defence located in both his and our survey below the coffee plantation and extending across the ridge from one stream bank to the other was built by Mata'afa during the troubles of the 1890s. Europeans supported Malietoa, but were pushed back to Fagali'i by Mata'afa and some Europeans killed, so the British bombarded Apia [Masterman (1958: 37) confirms the historical statements, but it is interesting that by this time both the lands of Vailele in 1867 and Utumapu, inland of Vailele, in 1878 had already been taken over for plantations by the German firm of Godeffroy and Sons (Lewthwaite 1962: 142)].
2. During interview 2 (in the field) the coffee area was said to be Suavaga, and its chief, Polutele, was said to have lived to the east across the river where his dwelling place was called Tiaono. He was placed as five generations before Salima. In interview 1, the coffee area was identified as an old site of Vailele village called Maugautu. In interview 2, Maugautu was placed some distance up through the coffee and to the east of the plantation road. In interview 2 Maugautu was not placed in time, but in interview 1 the sequence of settlements was said to be: Maugautu, Tiaono, Asomau (another site on east side of river in interview 1) and finally Saleupolu. Before any of these was placed Mataletoelau (interview 1) or Matalivelao (interview 2) whose chief was named Fa'aluaseu (interview 2). In interview 1 its location was placed east of Maugautu and immediately preceding that settlement in time. Finally both interviews yielded statements that the first site of habitation for Vailele people, Mataiau, lay in the bush behind the coffee part of the plantation where the terrace earthworks are visible. In interview 1 these people were said to have come from Manu'a.

Geographically, Golson concludes, the moves of settlement reflected in the above discussion are from inland (Mataiau) towards the sea (Salima's village). No explanation for these moves was forthcoming, however, except in the face of direct questioning, when warfare was cited in interview 1 as a cause for leaving Maugautu.

Clearly Golson's results, when compared with Krämer and Freeman, are unsatisfactory in a variety of ways, as he recognises, and for this there are good reasons. They are valuable, however, as an indication of the kind of traditional materials with which an archaeologist is presented when he works in Samoa. In this case it would appear that the older and more consistent materials which appear to have more authenticity, are those presented by Krämer and Freeman, but that these traditions are now being lost, or abbreviated and confused.

Krämer's data also adds another village, Utumapu, as one being inland of Vailele, though it is not named in the list assembled by Golson. Hougaard's survey work and a test excavation in one of the larger mounds just below the coffee area serve to characterise the nature of the field monuments in this locality and to demonstrate that one of the mounds again has a successive series of occupations, suggesting some continuity in the population living there over the last 1500 years. Thus, the archaeological evidence can hardly be used to provide strong support for any interpretation of the traditions which suggests movement from the most inland village to the coast. Rather it provides some evidence for continuity in occupation in both areas since the 5th century A.D. or before, up to a point fairly close to the historic period. The abandonment of the area as a result of European contact, missionary activity, and the development of the German plantations in the locality after 1867, with movement into the modern villages of Vailele, Fagali'i and Letogo, must be seriously considered, therefore, as an alternative explanation for the present concentration of population in large villages directly on the coast.

SUMMARY

From the traditional materials associated with field monuments in the Vailele Project Area and from a survey of the obvious field monuments, something of the nature of prehistoric occupation in this area may be presented as a background to the excavations themselves. This background reveals chiefly that our excavations at Suga all belong to one section of a well known community, Saleupolu, important in Samoan traditions of the late 15th, 16th, and early 17th century A.D. It also reveals that these sites form a distinct cluster away from the main one in that settlement, and one that may have had as its chief a Salima different from the Salima so often associated with Saleupolu. In this context it is believed the five reports which follow can be better understood.

EXCAVATIONS AT SU-VA-1

a. FURTHER DETAILS ON EXCAVATIONS AT Va-1 IN 1957

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INTRODUCTION

The mound, subsequently labelled Va-1 in the survey of sites in the Vailele area, had been cut into by a bulldozer to obtain spoil for levelling the yard of an abattoir to the east. This resulted in the removal of a swathe about 18 feet wide, the floor of which penetrated the natural to a depth of just over 2 feet in the direction of the abattoir and then rose gradually to the west reaching the surface about three-quarters of the way along the long axis of the mound. A number of circumstances on the first visit encouraged further investigation. A complete triangular-sectioned adze was found pushed down in natural subsoil at the east end of the bulldozer cut; inspection of the rough sections exposed by the bulldozer revealed a number of stages in the build-up of the mound; and pottery came to light, one piece *in situ* in the blackish layer underlying the mound, the rest from cleaning up along the foot of the south face of the cut.

An excavation, which lasted in all about eight days, was therefore carried out in a trench 20 feet by 5 feet aligned along the south side of the bulldozer cut. The trench was divided into four equal squares, labelled from west to east, A, B, C and D. A point was chosen where a completely undisturbed profile was present to the west but where the top had been removed by the bulldozer to the east. The intent was to save labour in reaching the bottom pottery-bearing deposit. Because the trench was extended to the edge of the bulldozer cut, slight variations occurred in its width.

STRATIGRAPHY

The stratigraphy encountered was only briefly outlined in the preliminary Report 1, which appears above, and will be detailed here in relation to the south wall of the trench (fig. 48).

Layer 1 is the topsoil. This was stripped off to expose:

Layer 2a, a thin pebble and small stone spread, interpreted as a house floor. The pebbles, of water worn volcanics, averaged 1-1½ inches in diameter and constituted the bulk of the material used in forming a distinct surface. Though thin, the resulting pavement was solid and well made. It was picked up further west along the south side of the bulldozer cut where part of the topsoil had been removed. The pavement rested on:

Layer 2b, a deep and well compacted yellowish-brown earth containing some weathered stone and in places a greyish clay. This is interpreted as the latest stage in the build-up of the house mound, the material apparently being derived from the local deposits natural to the area.

In a portion of the bulldozer section, cleaned down, drawn and described before excavation commenced, note was made of (i) a concentration of smallish stones in the bottom of the layer 6 to 8 feet east of the west end of the trench subsequently excavated and (ii) a core of larger stones west of the trench. A number of postholes were visible in the top of layer 2b which were excavated and plotted in plan. Their distribution is confined, of course, to the western end of the trench where layer 2b was still intact. It is probable that all of them interrupted the pebble surface, 2a, but this could not be firmly established during excavation of the pavement, probably owing to the "spreading" of pebbles after abandonment of the site.

Layer 3, markedly differentiated from layer 2b, is a composite zone of pebble pavements and

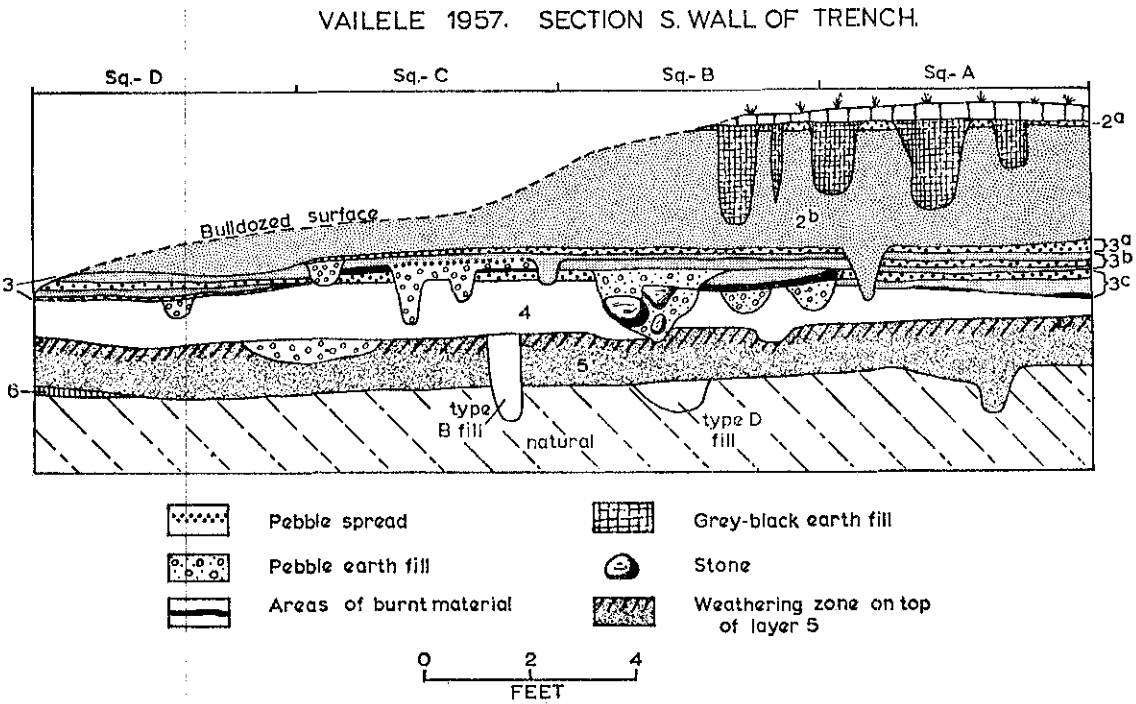


Fig. 48. South face of cutting II, SU-Va-1, Vailele, Upolu, excavated by Golson in 1957.

intervening fills. It is interpreted as representing a number of house floors and their local repairs and renewals. The pebbles are not particularly well water worn and, in comparison with the 2a pavement, are small, ¼ to ½ inches in average diameter.

Two main pavement levels seem to be represented, 3a and 3c. The upper, 3a, lies immediately below the contact with layer 2b and is well laid and level. Possible postholes associated with this level were seen but proved impossible to define and excavate. Near the east end of the trench and running across it, was a discontinuous line of stone which may have constituted the eastern margin of a house (plate 12). Beyond this line the pebble pavements found did not undeniably belong to floor 3a. Indeed excavation, when continued eastward of the stone alignment and 3a pebble spread, relied on the differentiation of a downward-sloping dark coloured horizon, with some small stones, beneath browner earth, not on a pavement as such. The 3a layer varied in thickness from 2½ to 3 inches at the west end of the trench to 1 to 1½ inches toward the east. While charcoal in small quantities was collected from the top of 3a, it has not been processed for dating.

The lower pavement, 3c, seems definitely to run in a level and even fashion fairly continuously over the excavation area. It is interrupted in square B by an area of charcoal and pebble fill penetrating into the top of layer 4. Because of the complex nature of the material between 3a and 3c, no success was achieved in discovering postholes belonging to layer 3c. Charcoal samples collected from the surface of 3c and from a hearth-like area sealed in by 3c and resting directly on layer 4 (fig. 48) have not been dated.

The complex zone between the two major pebble pavements is 3b. At the western end of the trench this formed a clear and simple separation between the pavements in the form of a thin hard-packed and deliberately laid yellow clay, visible in the face of the original bulldozer cut. However in the south half of the trench at the west end, this clay gave way to a thinner skin of dirtier clay with some charcoal. Against the south face itself it was replaced by a pebble layer. Toward the eastern end of the trench, 3b was represented by a thin and patchy seal, with a pebble layer at the same level in some places, while at the eastern end another area of yellow clay appeared. It was penetrated by a disturbance containing charcoal sealed in by 3a and from this a sample for possible dating was collected.

Layer 4 is somewhat like layer 2 but exhibits a more complex structure. In the main it is a

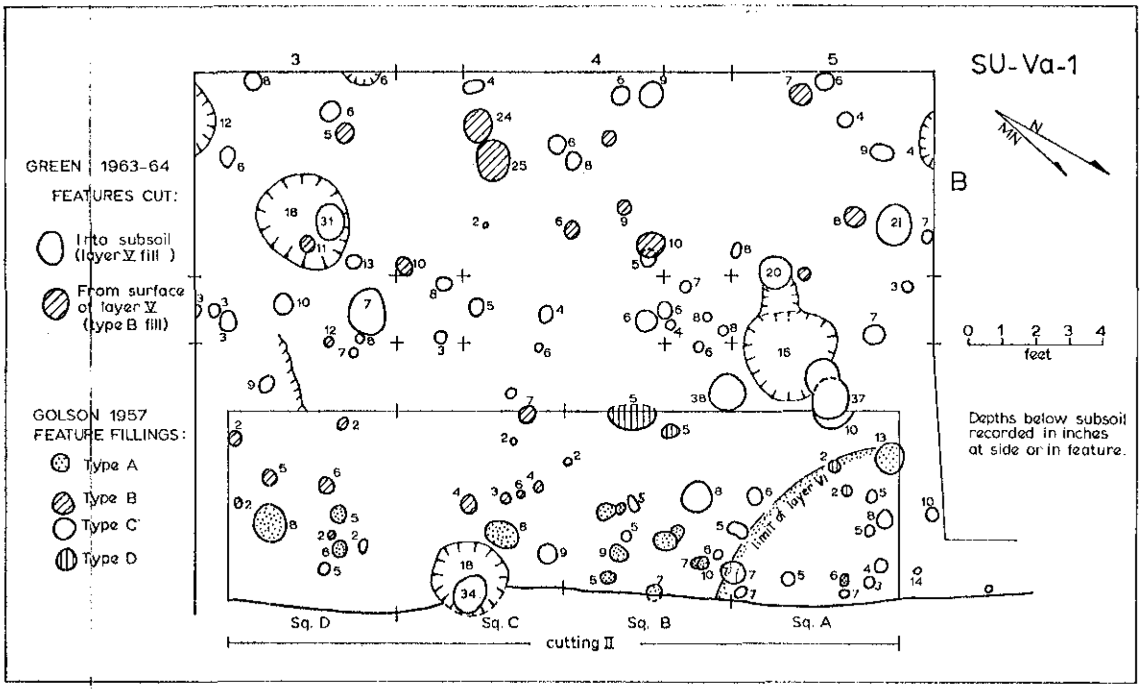


Fig. 49. Plan of features cut into subsoil at the base of cutting II and squares B-3 to B-5, SU-Va-1.

layer of greyish earth, but in places it approaches the yellow colour of layer 2, while in others it is very pebbly. Postholes and other disturbances from the layer above are everywhere cut into it. The material suggests interpretation as an earthen fill derived from natural around the site to make the low mound on which were placed the house floors of layer 3.

Layer 5, a dark coloured soil, in the main resting on the natural and filling pits and postholes dug into the natural, is separated from layer 4 by a weathering horizon represented by a slightly greyish surface to the layer. This is the layer from which pottery, broken adzes and fire-cracked rocks were recovered. It has been interpreted as an occupation horizon unconnected with the house platforms overlying it.

Layer 6, a yellow-brown earth under layer 5, was identified only at the two ends of the trench, in particular the western end where the exposed segment had the form of a quarter circle. It contained some pottery and charcoal.

The exposed surface of the subsoil now registered the presence of a considerable number of postholes and other disturbances. In view of the fact that excavation had proved unable to define precisely all the disturbances penetrating the subsoil from above layer 5, an attempt was made to differentiate the features by the nature of their infilling. The result is shown in figure 49 where the fillings have been classed as follows:

Class A — pebbles and earth similar to layer 3

Class B — an earth fill which in one case filled a hole on other evidence early

Class C — the dark fill of layer 5 which definitely assigns these features to a time before the layer itself

Class D — a clay fill like layer 6

However, too much faith should not be placed in these results for the categories were not as clear as could have been wished and the area of excavation was too small to allow any patterns to emerge.

Portable Artifacts
(By R. C. Green)

Two incomplete adzes, an unclassifiable fragment of another, a stone flake, and 370 sherds of pottery were recovered from secure contexts in layers 5 and 6 of mound Va-1. In discussion of the two adzes (fig. 50b, c) Golson (1959: 19) wrote:

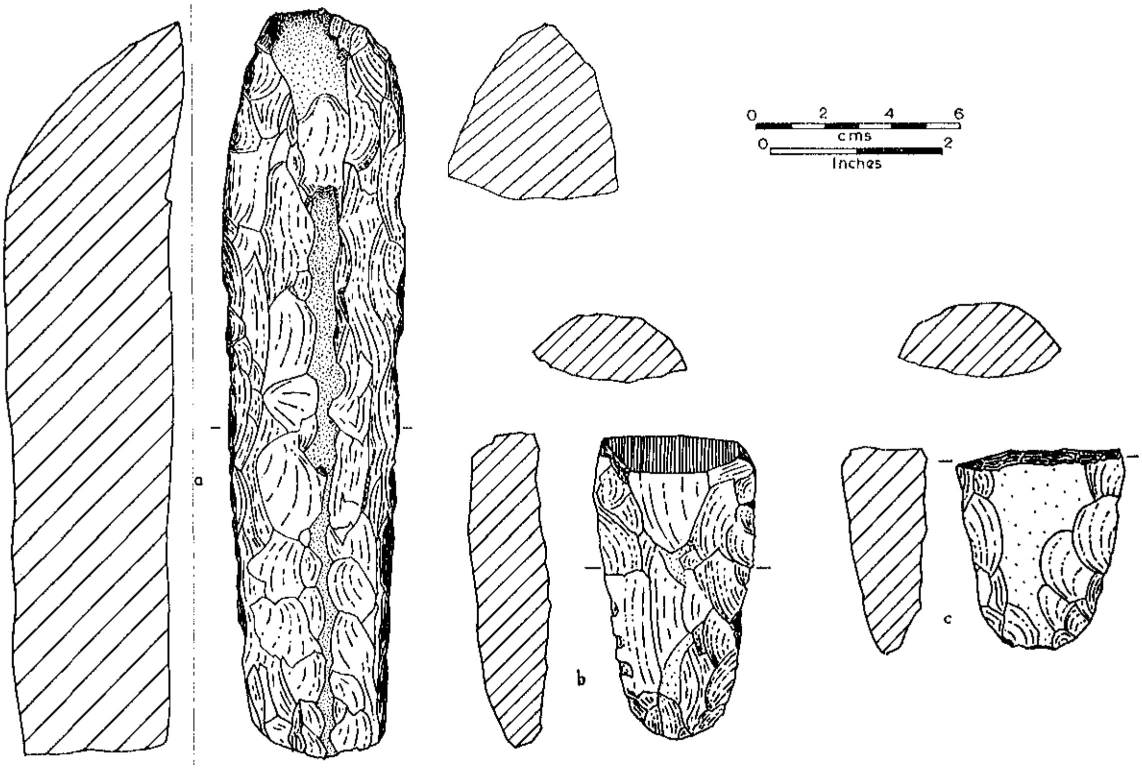


Fig. 50. Adzes recovered by Golson from SU-Va-1 in 1957. a. Type VI, WS1/1. b. Type Va, WS1/262. c. Type Va, WS1/221.

Some evidence comes from Western Polynesia itself, where we have been able to demonstrate the great antiquity of the Western quadrangular type. Two incomplete examples have been recovered in 1957 within a Samoan habitation layer radiocarbon dated to the 1st century A.D. [Translation from the French].

Subsequent additions to our knowledge of early adze forms in Samoa, from Va-1 itself and SU-Sa-3 in the upper Falefa valley, and in the South Pacific at large, Fiji, Tonga, Tahiti and the Marquesas, show Golson's attribution (1962: 175) of his two incomplete specimens to Duff type 2C, typical of West Polynesia, to be in error. They belong to a new type whose importance was not recognised in previous Polynesian adze classifications and their classification as 2C has been withdrawn by Golson.

The group of related adze types to which these two belong approximates to one Duff (1956: 182; 1959: 137) calls 4C, which he describes as a flat backed gouge, without grip, known from large gouges in the Marquesas and Pitcairn and from small ones in Hawaii, Pitcairn, and the South, North, and Chatham Islands in New Zealand. He describes them as follows:

The cross-section, though rounded, is approximately triangular, base downwards. There is no distinct front, and the planes of sides and front coalesce to form an arch. The back is straight longitudinally, and the plane of the front comes down to meet it, the bevel is shallow, and the cutting edge is broad. (Duff 1956: 182).

In his classification of Samoan adzes Buck (1930: 346-47) labelled these as type V and illustrated one in particular from Savai'i (Buck 1930, fig. 193) that is very close to one of the two forms found in early contexts in Samoa. The type was, however, an uncommon form in collections.

The class received renewed attention when forms of these adzes were excavated in early period contexts in the Marquesas, and Suggs (1961: 110-111) set them up as new types apart from the Duff system of classification, and stressed their parallels with other examples from Melanesia. One type was called the Hatiheu, which was defined as possessing an oval to circular cross-section, though the illustrated example (Suggs 1961: fig. 31f) clearly does not, and instead has a cross-section with a slightly curved back and a more deeply rounded arc on the front and sides, the back being essentially straight longitudinally. The other type, called Ha'e'eka, was defined as having a plano-convex cross-section, though it differs from those with which we are concerned in narrowing toward the cutting edge as well as the poll. Sinoto and Kellum (1965: 21) in describing similar adzes from other early contexts in the Marquesas, place them in group 1 as a form closely approximating to the Hatiheu type of Suggs and characterised by being untanged, flat-oval in cross-section, with a rounded cutting edge. In the Society Islands in the early burial site of Maupiti, Emory and Sinoto (1964: 156) place almost identical adzes in their group 5 and in a footnote call attention to their relationship with adzes from Va-1 that had just been uncovered in our 1963-64 excavations. Their definition of the class was "semi-circular in cross-section, the base flat, face and cutting edge curved, giving the adze a hoof-shaped appearance" (Emory and Sinoto 1964: 156).

In our Samoan collections there appear to be two contemporary forms of this Buck Type V adze, one of which we have called the Vailele variety and the other the Sasoa'a variety (Report 2, p. 25). The Vailele variety is wider, particularly at the cutting edge, the back is flat, and the arc of the cross-section is also low and flatter so that it is more like the Hatiheu and Maupiti forms of this adze. In Samoa the front lies in one plane rather than curving, while the cutting edge is very rounded giving it a quite different appearance from the 2C adze. In the Sasoa'a variety the adze is narrower throughout, the cross-section making a high rounded arc above a flat back, while the front sometimes curves slightly toward the rounded cutting edge. It is more like archaeological examples in stone from Tonga and Fiji and museum examples from Fiji and the Trobriand Islands as well as those made in giant *Tridacna* shell from many island groups in Melanesia, Micronesia, and even early Neolithic burials in the Philippines (Green 1968: 103). Neither type can in my view be placed in or related to those other adzes in Duff's type 4 (adzes with triangular sections, apex to the front) although in Samoa a case can be made that these types and not the quadrangular adze are the form from which the later and common Duff type 2C adzes evolve, thus replacing this earlier form. At any rate the occurrence of the Vailele variety as one of the more common forms in layer 5 of Va-1 has been confirmed by our subsequent excavations at this site and is discussed below.

The sherds of pottery associated with these adzes Golson (1959: 19) described as coarse, thick, of local manufacture, and employing a high proportion of basaltic grit. He continued:

> As only sherds of pottery have been found in Samoa, it is impossible to reconstruct whole vessels. The variety of styles is extremely restrained. The main type is in the form of a very simple bowl; the rim is incurved, and its upper surface, its lip, is flat. This type is found within almost all the layers of the principal Tongan sites, but the rim forms of Tongan pottery are more varied . . . Samoan pottery is not decorated (1959: 29).

Further analysis of the sherds has revealed no reason to amend this general description, so it remains only to present some additional details.

The figures on frequency (table 5) show that rims form about 12% of the collection, a figure only a few percentage points greater than what we obtained (see p. 128). The figures on distribution (table 5) reveal no significant trends from square to square, although a general rate of recovery of 3.5 sherds per square foot and one of over 4 per square foot for square B indicates a greater concentration of sherds in this area than in any excavated by us. Data for arbitrary levels within layer 5 show no difference in distribution among features on the pottery, but do suggest that twice as much was present in the upper half of the layer as in the bottom half. A study of rim sizes shows no difference in thickness between those in the upper and lower portions of layer 5. Rather a range between 6 and 15 mm. is revealed for thickness at the rim, with sherds of 9 and 11 mm. thickness being most common, and 10 mm. being an average thickness in a population with a normal distribution. Many body sherds, however, are much thicker than any rim examples, a range of between 4 mm. and 22 mm. being representative of a sample of 100 sherds, with an average thickness being 10 mm. Data resulting from the analysis of the temper in three of these sherds are presented in Report 19.

TABLE 5

DISTRIBUTION OF POTTERY SHERDS RECOVERED IN 1957 EXCAVATIONS

		Square A		Square B		Square C		Square D		Sq. C-Pit		Postholes		Totals		%
		Rim	Body	Rim	Body	Rim	Body	Rim	Body	Rim	Body	Rim	Body	Rim	Body	
LAYER FIVE	Top	5	25	12	76	1	21	5	71	—	—	—	—	23	193	61
	Bottom	8	40	2	26	6	16	1	12	—	—	—	—	17	94	31
	Very Base	3	16	—	—	—	—	—	—	0	7	0	3	3	26	8
	Totals	16	81	14	102	7	37	6	83	0	7	0	3	43	313	
	Percentages:													12%	88%	100

LAYER SIX	Square A		Unassigned	
	Rim	Body	Rim	Body
	0	8	1	5

b. EXCAVATIONS AT Va-1, 1963-64

R. C. GREEN
BERNICE P. BISHOP MUSEUM

FIELD PROCEDURES

In the interval between the test excavations conducted by Golson in 1957 and our arrival in December 1963, the remaining portion of the mound at Va-1 suffered damage as it continued to serve as a source for fill for the nearby holding pens and by the natural processes of erosion. In particular there was slumping along the vertical faces of the various cuttings. Thus when the site was cleared, it was difficult, in the absence of a plan map, to identify the precise position of Golson's excavations or other disturbances without first clearing away displaced debris and straightening up the various cutting faces in a series of shelf-like excavations. The aims of the initial operations, which constitute the first stage of the excavations were: 1) to obtain fresh stratigraphic faces along the entire southern side of the bulldozer cutting, making possible a better appreciation of the mound's over-all stratigraphy and its relationship to that described by Golson, 2) to delineate on a plan map (fig. 51) the precise position of the cuttings made by the bulldozer, by Golson and by other agencies as a means of establishing a reference system for the excavated areas on the site, and 3) to clear and dress the faces of the bulldozer cutting along the western and northern sides so that an adequate basis would exist for assessing which areas could be most profitably excavated in order to define the extent of the pottery-bearing layer at the base of the mound and its relationship to the other layers which formed the mound itself.

By this means it was hoped that new excavations would permit an adequate sampling of the pottery-bearing layer and make it possible to define more fully the adze types and other items of material culture which were to be associated with this horizon. As well it was hoped that this approach would not only permit the specification of the main occupation layers, but also indicate something of their extent and composition, and the types of features associated with each from which their function as structures might be inferred. Another expectation was the recovery from the most recent layers of sufficient structural and technological items of late pre-contact and early post-contact age to provide an indication of some of the continuities and changes that had taken place over the two thousand years spanned by the sequence of the mound. Finally the record of events at this mound, in concert with those from the excavations at the other mounds in the locality, were intended as the basis for a local stratigraphic sequence, with major events common to more than one mound serving as one means for tying the individual sequences together.

During the first stage of operations the cutting made by Golson was expanded to a size of 22 feet by 7 feet which permitted the identification of the undisturbed corners of his excavation under the slump from the upper layers. This also exposed a fresh stratigraphic section in which all the layers described in his preliminary report (p. 19) could be identified (plate 10). His trench was labelled cutting II. Although in the grid used elsewhere, it would correspond to squares A-3, 4, and 5, these designations were in fact not used. Golson divided it into squares A to D (see Report 7a). A second indentation to the south of cutting II, probably created by a front-end loader, was also cleared and its face cut back to align it with the grid. It was labelled cutting I. Two six foot squares with intervening baulks two feet wide were laid out between cuttings I and II and designated as grid squares A-1 and 2. After these were excavated and the sections drawn, the intervening baulks were removed. At the same time the original face of the now badly eroded bulldozer cutting to the west of cutting II was straightened and excavated (plate 11). The completion of these operations

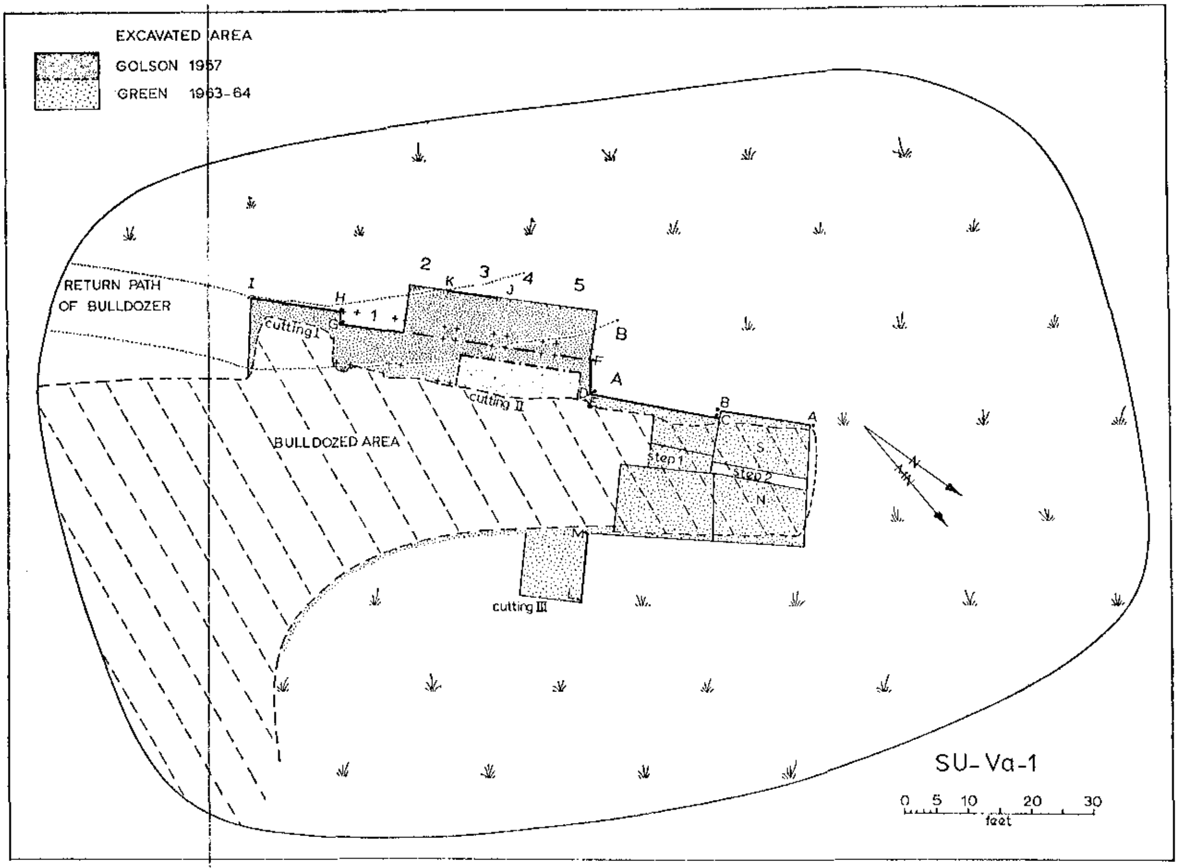


Fig. 51. Plan of mound SU-Va-1, Vailele, Upolu, showing disturbances and areas excavated.

resulted in a series of stratigraphic sections totalling some 95 feet in length (fig. 52) which paralleled the southern face of the original bulldozer cutting. In a similar fashion a stratigraphic section about 80 feet in length was exposed along the northern face of the same cutting (plate 13, see also Davidson 1965: plates VI and VII).

With this information it was possible to specify the approximate area which might be covered by the pottery-bearing layer and to identify most of the major stratigraphic problems presented by the sequence of layers. This suggested that the greatest and most easily accessible area with the pottery layer still undisturbed lay directly behind cutting II, in the area gridded for squares B-2 to B-5. The stratigraphic excavation of these squares by layers, followed by the same process of removal for the baulks and columns, constituted the second stage of our operations.

One part of the third stage of excavations consisted of the investigation of the western end of the bulldozer cutting. Here the bulldozer had removed only some of the upper layers along a sloping plane, leading to the employment of a system of steps in the excavation of each layer, and the designation of the rectangles as steps 1 and 2, either north or south of the principal baulk. At the same time a ten by eleven foot rectangle on the northern side of the mound in row 5 and the baulk and part of row 6 were opened. This excavation, labelled cutting III, was intended to define the extent of the pottery layer on that side of the mound, to expose a remnant of a pavement associated with the layer above, and to relate both to the most recent event on the site, the cutting of a grave (fig. 53b). At the end of the excavations some shallow trenches were extended out from cutting III (see fig. 55) to define the extent of a stone platform in that cutting and to pick up the position of one of the upper layers (II) which was used to form the latest stage of the mound.

In the above manner approximately 1,300 square feet of additional deposits were excavated beyond the initial 100 square feet sampled by Golson. For this reason we are able to expand on his basic sequence, augment the pottery sample and expand the knowledge of portable and structural artifacts associated with the various deposits, in particular that of the pottery-bearing layer. It should be noted, however, that in at least half of the 1,300 square feet, one or more of the upper deposits had been disturbed and displaced by bulldozing and/or erosion.

The first stage of operations was conducted largely by myself with assistance at various points from Dr Scott and Mr Boraman. It consumed some 29 working days in which a crew of four workmen on the average assisted during some 24 days, and my wife and I spent the others in drawing up the principal sections. The second stage of operations was supervised by Miss Davidson, Miss Crosby and myself and covered a period of 14 working days during which four to five workmen assisted in the various tasks. The final stage of operations was supervised largely by Miss Crosby with my assistance, and took 17½ days to complete. Despite these efforts, which encompassed nearly the entire first season of our Samoan programme, many problems remain in the interpretation of the results.

While additional excavations might have solved some of these problems, others result from a combination of circumstances that are no longer capable of resolution. Among these circumstances were a large number of disturbances from the time of habitation that required detailed excavation procedures to handle and which even then could not always be completely controlled. As well, there was the complete destruction without record by the initial bulldozing of what in effect proved to be the core of the mound. To these circumstances must be added the fact that it was not until after the end of the programme that the detailed results of the excavations in cutting II were available and that for all of the archaeologists involved, this was their first experience in excavating a site of this type under the conditions encountered in Samoa. Among these conditions were the use of an untrained labour force to carry out much of the excavation, so that on occasion useful information went unnoticed or unrecorded, even under close supervision. Another difficulty was the use of four archaeologists at various points during the course of this excavation as recorders, so that a uniformity of observations was not always achieved in recording what was often very fine and complex local stratigraphy. As a result, insufficiently detailed records often exist bearing on a particular problem. It appeared unwarranted to assume, therefore, that further excavation would resolve such problems, and unlikely that it would bring to light new evidence which would justify the expenditure of time and effort. As a result the interpretation of the existing data has focused on outlining the major events definitely in evidence at this mound, rather than attempting a close interpretation of a mass of individual constructional features and local deposits for which the materials are too often ambiguous.

Stratigraphic Sequence

One of the problems continually faced during the excavation was that of differentiating local lenses from widespread deposits, and grouping some sets of deposits into major structural units, while separating others according to significant breaks in the sequence of occupation. In this we were constrained by Golson's existing division of the sequence into five major layers, and attempted to fit our results into the same framework. As excavation proceeded, however, it became increasingly difficult to do this in every case because former lenses of seemingly local significance sometimes took on the characteristics of widespread beds while new deposits continued to appear. Examples of these difficulties are layer IVb, not noted by Golson, which became prominent to the west of his cutting (fig. 52, 53b, and 54) or the palaeosol horizon at the top of layer V, not mentioned in his preliminary report, which we initially grouped with layer IV and labelled IVc, but which is now placed with layer V.

When the second stage in excavation at this mound was nearly complete, a new face with fairly uniform layers, which had been exposed along the south wall of the squares in the B row, was selected as the most suitable for description as a standard sequence (fig. 53a). In describing this typical sequence in detail, the individual deposits are listed as beds starting from the base, as in geological sections, although during the excavations and in identifying the stratigraphic contexts of features or items, the main layer designations of Golson, followed by lettered subdivisions for individual deposits, are used throughout the report. Thus the major divisions recognised by Golson are still preserved, though the description of the over-all sequence in strictly geological terms has been greatly expanded.

Underlying subsoil, or natural surface deposit: The Vailele plantation area is underlain by the Salani Volcanics (Kear and Wood 1959: Map 2). The latosolic soils developed on these basalts are classed by Wright (1963: 57, table 14) as the Moamoa soils of group 3, type c. In

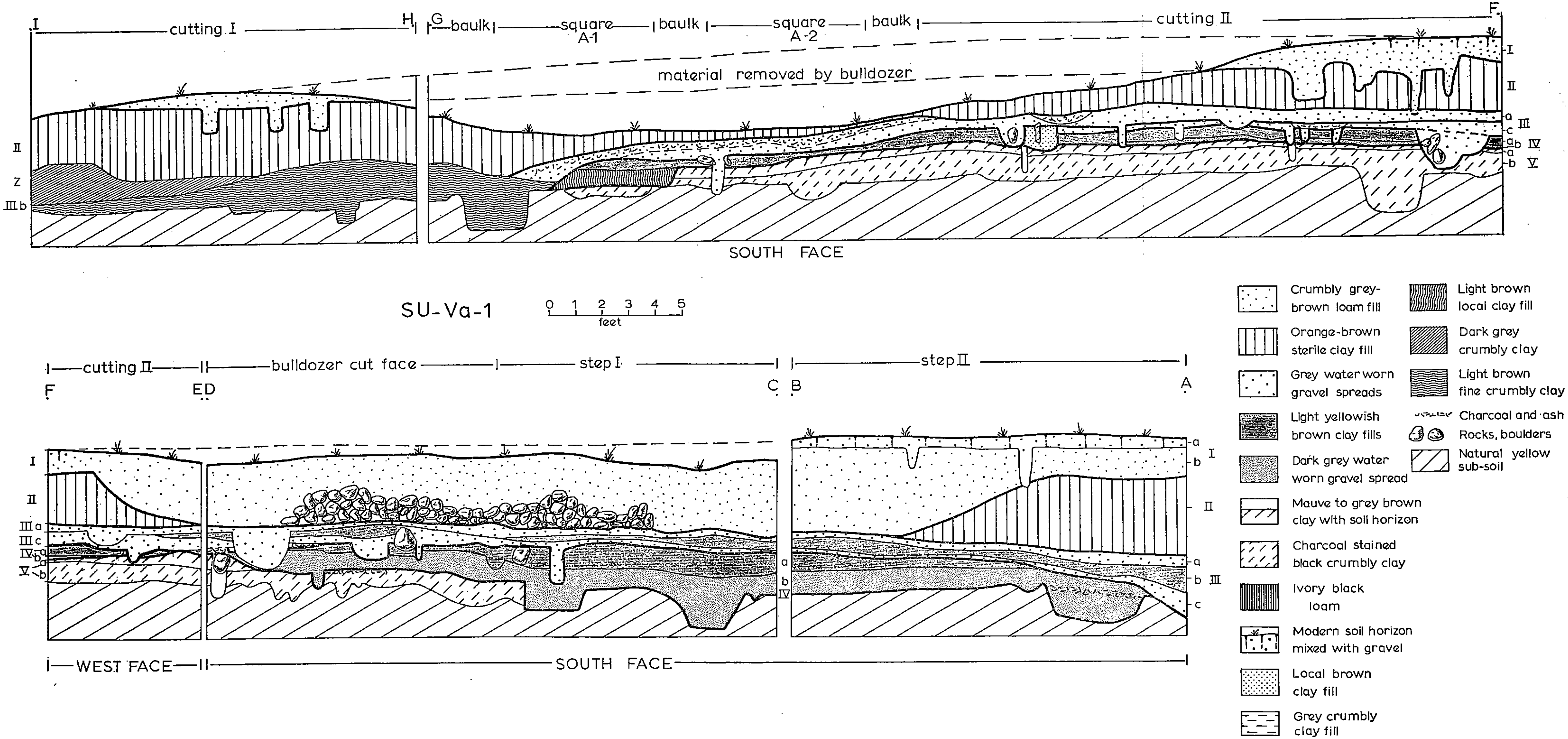


Fig. 52. Cross-sections along south face of bulldozer cutting, SU-Va-1.

this group they represent the older soils of the drier districts and have only low to moderate fertility. The subsoil here, as under the other mounds in this locality (Reports 8, 9, 10, and 11) consists of a very compact light yellow-brown clay in which are numerous small reddish inclusions of decomposing vesicular basalt, and occasional large boulders of the same material.

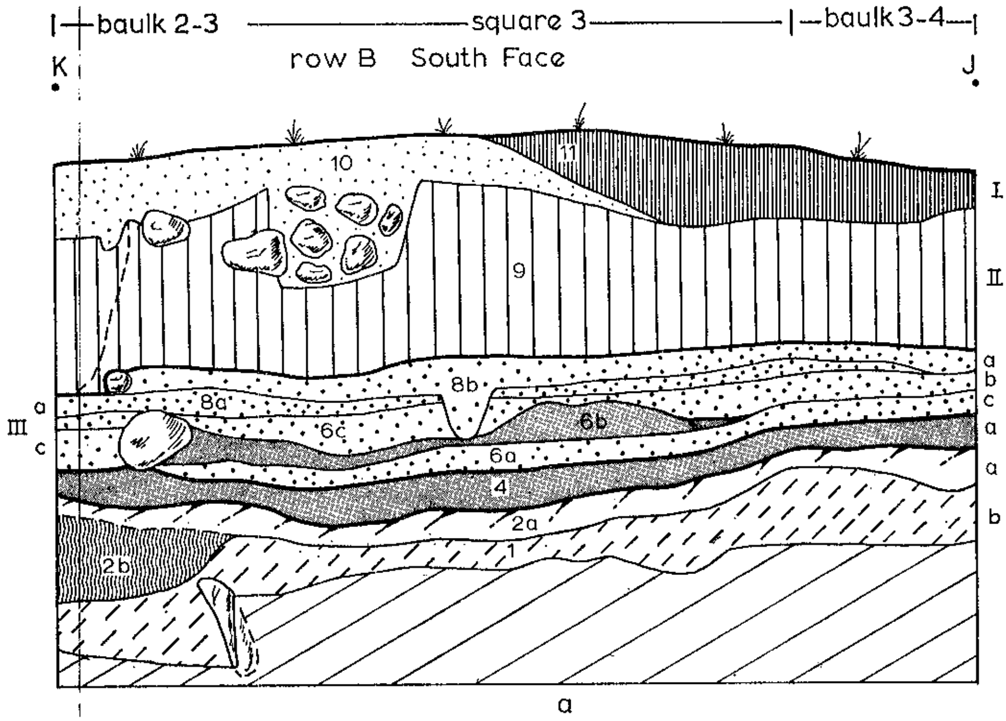
One excavation for a sewer for the new soap factory nearby exposed a vertical section extending down some 15 feet below the surface. In this section a culturally disturbed deposit of gravel and silt 3 to 4 feet thick could be identified at the top through which finely divided charcoal was scattered. In this zone several postholes 8 inches in diameter and 16 to 20 inches deep were noted, the tops being cut from very close to the surface. As well, two firepits lying some 16 to 20 inches below the surface were observed. Underlying this uppermost deposit was a very hard layer of scoria rock, below which occurred multi-coloured layers of fine ash with occasional pieces of pumice as inclusions. At the base some decomposed lumps of coral also occur (M. Hougaard, P. W. H. Kelly, personal communications). In another test square excavated to a depth of 4 feet at a point some 30 yards south of SU-Va-4, a similarly disturbed but otherwise undifferentiated cultural deposit with bits of finely divided charcoal throughout extended down to a surface at a depth of 61 inches. Again a large posthole 8 inches in diameter and 20 inches deep was noted in one wall. These results indicate that while the natural surface deposits under the mounds are of much the same composition as those encountered at greater depth elsewhere in the surrounding flat, the mound has protected an old natural surface close in elevation to that of the present surface, and one which has been disturbed or destroyed by subsequent activities out in the flat.

Layer VI: As a result of the above situation, a great number of features cut into this old subsoil surface have been preserved under the mound. While some reflect features cut from the surface of one of the later deposits (see Report 7a, p. 110), many are filled by layer V, and so definitely precede any of the later occupations. These earliest features were referred to Occupation 1 in our preliminary report (Green and Davidson 1964: 21) but are here associated with layer VI, a discontinuous yellow-brown earth identified by Golson, but not by us, at the base of the mound (Golson, Report 7a and fig. 49). This layer, although not mentioned by Golson in his preliminary report, contained some pottery and charcoal, and is in my view probably to be associated with the occupation which gave rise to the various features definitely sealed in by layer V. Layer VI then probably represents the remnants of the soil horizon on which the initial occupation took place, but a zone which was nearly everywhere either truncated or removed by human activities during this first period, as it is not now generally in evidence. For this reason it does not appear as a bed in the standard sequence.

Layer V: is composed of two beds. Bed 1 is a black crumbly clay stained by charcoal and containing some river gravel, a moderate number of portable artifacts, and traces of former midden debris. While this bed seals in a number of underlying features, it has only a few features, principally shallow postholes cut from its surface or that of the bed above. Bed 2 above was initially labelled layer IVc and is a mauve to grey-brown gravelly clay lacking the heavy charcoal stain of bed 1. It produced a few portable artifacts including some pottery. This bed was not recognised everywhere on the site and its assignment to layer IV has already been questioned by us (Green and Davidson 1965: 65) on the basis of radiocarbon dating and its restriction to the same general area as was covered by layer V. In that article we noted that we were investigating the possibility that this bed represented the leached zone of a palaeosol. Charles Wright, who was to have done this work, was not able to do so through circumstances beyond his control. He wrote to me on April 26th, 1965 as follows:

> I am therefore quite unable to answer your letter and the most interesting points you raise. As I imperfectly recall the sequence, it is probable that bed 2 in Va-1 (layer IVc) is a buried soil. I made a few rough sketches from the area when I visited it in August and referring to these I note that I had noted the possible presence of a buried soil at about this point in the sequence. However, . . . at the time I had no idea of your layer numeration. I have a note 'query buried soil' in just about the position you need it. The light colour of this layer is to be expected, since the natural organic matter would not be a permanent characteristic in a well-drained tropical soil containing these kinds of clay (mainly kaolinitic, with some halloysite); whereas the darker layers below and above are black by the virtue of the man-made carbon which does not disappear readily with time. I think you would be safe to call layer IVc of Va-1 a buried soil; at least until such time as you can get a competent pedologist to visit the area.

It is unfortunate that we were never able to do so, but because there is little possibility for a buried soil elsewhere in the sequence, other than where he and I have queried one, I believe we are talking about the same layer. For-



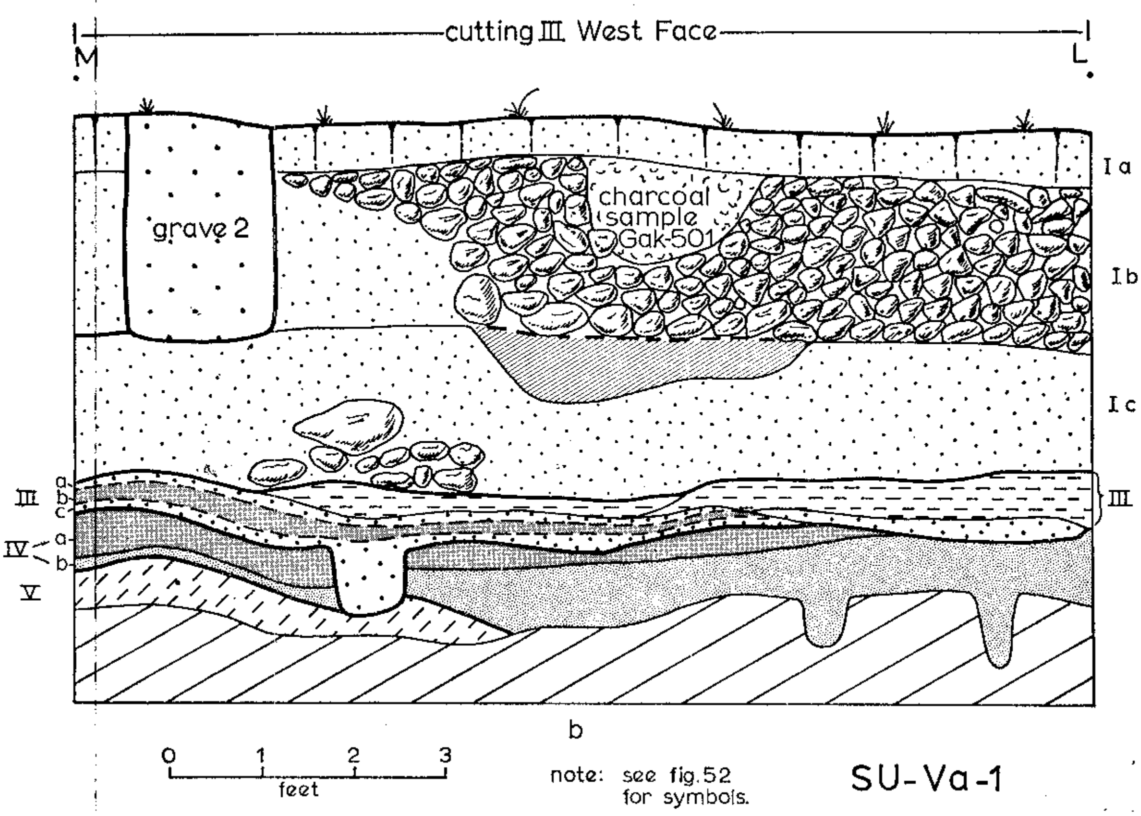


Fig. 53. Cross-sections, SU-Va-1. a. south face, square B-3 and adjacent baulks. b. west face, cutting III.

tunately in Golson's more detailed report and section he also describes independently a weathering horizon on layer V represented by a slightly greyish surface. Given the support the radiocarbon dates furnish for a break in the sequence at this point, (Green and Davidson 1965: 65-66), it appears that bed 2 should now be labelled layer Va and identified as a soil horizon developed on layer Vb or bed 1.

Layer IV: The layer designated as IV by Golson exhibited marked variation in his section, in the main being made up of greyish earth, with portions approaching a yellow colour and other portions having a very pebbly composition. Golson compared most of it to his layer IIb, which is a natural earth fill from the surrounding area. We began with his distinction, but found at the western end of cutting II that a thin pebbly lens could be identified at its base, which we labelled layer IVb. Traced to the west this lens proved to expand into a dark grey water worn gravel spread, of considerable thickness and extent (fig. 52). It was labelled bed 3, though it did not appear in the section used for the standard sequence (fig. 53a). Layer IVa, or bed 4, therefore corresponds most closely to what Golson identified as his layer IV and is a light yellowish clay fill flecked with small pieces of decomposed basalt. It is generally sterile of cultural material or other signs of occupation and presumably is a fill which derives from the subsoil in the surrounding area and was used to form a low earthen mound.

Layer III: In Golson's grouping of the beds, layer III proved to be the most complex, consisting of an upper and lower gravel spread, and a complex bed of varying composition in between. We have had the same experience with it and encountered an even greater complexity. Layer IIIc, consisting principally of bed 6a, is a thin water worn gravel spread with occasional large stones, and is the principal deposit infilling features that are presumably cut from its surface but which can only be identified in layer IV. It appears to represent the first house floor to be built on the low earthen mound created by bed 4, an interpretation consistent with its dark grey to brown colour and the fireplaces on its surface. Lens 6b is an orange-brown clay fill similar to the surrounding subsoil and lacking in cultural material. It is localised in the area of square B-3. Bed 6c toward the western end of the B row of squares is primarily a water worn gravel spread, but towards the eastern end the frequency of pebbles decreases and fines increase. Its colour varies from dark grey-brown as a gravel to more yellowish-brown elsewhere. After some debate, it was assigned to layer IIIb, rather than IIIc, along with bed 7, which again did not appear in the standard sequence but does occur in adjacent squares to the west. Bed 7 is a very thin band of light yellow-brown clay flecked with pieces of decomposed basalt. Presumably bed 6c is a localised renewal of a house floor and 7 a renewal or rebuilding of the mound to receive the next major house floor of layer IIIa. Lens 8a is a dark grey-brown water worn gravel spread, which infills most of the features thought to have been cut into the underlying beds from its surface or that of the bed above. Lens 8b is a darker black water worn gravel spread with numerous fire hearths on its surface. These two lenses, which form bed 8 or layer IIIa appear to reflect the final house floor of layer III, one which was renewed at least once. We found, as Golson did, that this well laid floor seemed to terminate along a stone alignment located in the baulk between squares B-2 and 3 (fig. 55). It should also be noted that beds 6 and 8 became less complex in the area of square B-5 and were represented there only as 6a and 8a, separated by bed 7.

Two beds of local extent lie to the east in cutting I and square A-1. They are probably stratigraphically equivalent to layer IIIb or c, and seem to be stratigraphically later than layer IV. They would appear to represent two small low earthen mounds built to the east of the main earthen mound before the formation of the present mound. One bed is labelled IIIb because it is definitely stratigraphically earlier than IIIa. This deposit is a fine light brown crumbly clay. The other, labelled "z", is more difficult to place precisely in time, but consisted of a dark grey crumbly clay. Traces of similar deposits probably belonging to these mounds appeared at the eastern end of the section exposed by cleaning the northern face of the bulldozer cutting, so they may have been of fair extent.

Layer II: Bed 9 is a thick orange-brown sterile clay fill with local lenses of finer crumbly grey clay and large blocks of decomposed vesicular basalt. This fill, which appears to derive from the surrounding subsoil, was heaped to depths of up to 3 feet on top of the already existing mound and considerably beyond to form an earthen mound of rounded rectangular form, in size about 120 by 170 feet and standing about 6 feet high. A large basin-shaped depression was left in the centre of the mound, however, in which occur a series of loam fills and a succession of stone platforms.

Layer I: The depression in the centre of the mound, not reflected in the standard sequence, was filled with a series of very crumbly loams flecked with charcoal. They probably represent separate beds which should be distinguished from layer I, but this has not proved possible in every instance. In cutting III it proved possible, however, to subdivide layer I into three beds: a largely earthen fill, Ic, at the base, with numerous postholes on its surface, an intermediate layer of stones, Ib, forming a platform, and an upper gravelly loam, Ia, belonging to the last occupation (fig. 53b). In the standard sequence only the last of these beds is represented. This is bed 10, a crumbly dark grey-brown soil horizon developed during the last hundred years and superimposed on what was a very thin layer of river gravel belonging to the last house occupation. Golson (Report 7a, p. 108) assigns the gravel as a distinct spread to the surface of layer II, but our evidence suggests that a number of the features in layer II are sealed by this layer. Also within the area of the depression are a number of beds and structures which are better associated with layer II, and these are followed by a final phase in which the entire surface of the mound served again as a house platform represented by the pebble band in layer I. Significant here is Golson's comment that the pebble spread was picked up further west along the south side of the bulldozer cut where part of the topsoil had been removed. This would be over the area of the rock platform and depression in the precise position where it was not recorded in our section (fig. 52) because it had been scraped away, though it was picked up again further to the west. Thus this pebble spread rested not only on top of layer II as he indicates but as well extended across the top of stratigraphically later beds of quite different composition. To end the description of the sequence, mention must be made of bed 11, a loose ivory black soil of localised extent which is a recent infilling in the return track of the bulldozer. Mention should also be made of the ancient coconut trees, said to be those from the original German planting of the last century, and a recent grave dating to after 1880 A.D. which end the sequence.

In summary the stratigraphic sequence of Va-1 covers a long series of events, with one major interruption. During this period the nature of the occupations in the mound area changed several times, so that no single functional interpretation of these beds, the mound or its contained occupations is possible. Rather it is necessary to interpret each layer individually.

Occupational Sequence

The translation of the general stratigraphy revealed by the sections of Va-1 into a more meaningful sequence of occupations is dependent primarily on the association of each deposit with various portable artifacts and structural features, and the composition, form and distribution of the deposit itself. Given the limited extent of the excavations in relationship to the total size of the mound, and the destruction of the mound's core by bulldozing, any such assessments must of necessity be partially inferential and somewhat restricted in scope. Still evidence exists for a number of reasonably well supported inferences about the form and function of some of the layers. Such inferences, however, are usually also dependent on analogous structures known ethnohistorically or archaeologically, and here again only certain deposits appear to reflect situations for which we have adequate parallels, while for others we do not.

The earliest occupation of the site is that associated with layer VI, a deposit of limited occurrence and unknown duration. Similarly the extent of the features associated with it are unknown. The reason for this is the fact that only where features were sealed in by layer V was it possible to assign them securely to this occupation and not to some later one. For instance beyond the perimeters of the area covered by layer 5 are other features of the same type which are sealed in by layers IV and III. They could also be of this age. However, most are probably not, because they are filled by these deposits rather than containing different fills reflecting an earlier period of occupation. As such they present a significant contrast to the situation encountered in the rectangle of step 1, north side, where a number of features cut into the subsoil did contain a dark fill with occasional pieces of pottery. This made it possible to assign them to the initial occupation despite the fact that layer V had been removed from this area by bulldozing. In this way early features in this rectangle could be differentiated from the other features of a later date in which fills were of a composition similar to deposits of layers IV and III. This approach is similar to that followed by Golson for the features at the base of cutting II (Report 7a, p. 110; and fig. 49).

In the system usually employed in our excavations, only those features filled by layer V deposits were recorded for the base of that layer, the other features having been defined and excavated at an earlier stage. Still it is possible to relate our results to those of Golson by equating his features with type C fills with those recorded by us as cut into the subsoil and filled with layer V. When plotted, the map (fig. 49) reveals three principal types of features: a small number of large deep postholes, a small number of shallow rounded pits and a large number of small postholes. The same situation obtained elsewhere on the site. It appears significant that in nearly every case, the shallow pits seem to be stratigraphically earlier than the large deep postholes, and would appear to represent some of the earliest features from this occupation.

The pits may have served a variety of functions, but one of the more obvious is as stores for fermented breadfruit. This is based on analogy with descriptions of such pits in the ethnographic and historical sources, a continuity of occurrence of pits of this type throughout the Samoan sequence, and their wide distribution in both early and late archaeological contexts throughout tropical Polynesia. The fact that they appear to be the first features on the site, suggests use of the area for food storage before construction of any large structures requiring sizable uprights.

Because fireplaces, ovens or stone alignments are lacking for this occupation and the postholes themselves exhibit no clear patterning, at least in the areas excavated, it is not possible to deduce the particular type of structure that might be reflected or infer its main function. Nor are the associated portable artifacts of much help, for only a limited amount of pottery was present which can be assigned to this horizon. This occupation has its closest parallels structurally with that of the F-lb layer at the base of SU-Va-4 where similar pits and postholes occur on the original surface in as early or an even earlier context (Report 10, p. 164).

Of the various deposits encountered in this sequence, the extent of that belonging to layer V is most securely known. This is no accident as the excavations, as noted above, were designed to provide this information. From the sections along both sides of the bulldozer cutting and the excavations conducted in squares A-1 and along the shelf to the west of cutting II, four points could be established on either side of the cutting beyond which layer V did not extend. On the north side of the mound, the excavation of cutting III provided confirming evidence that only a small portion of layer V remained. In square B-2 the ephemeral nature of layer V except in features filled with the deposit, and the low incidence of pottery recovered from the layer, confirmed that again we were on the perimeter of the deposit. It should be noted that along this edge layer V had often been cut away and is sometimes replaced by a local lens of lighter brown clay. As a result it is often difficult to draw its perimeter exactly, but it is possible to say that beyond the line indicated, evidence for its existence, or former existence is lacking. Given the termination of this layer by a trench in the area of step 1, south, and its inferred existence over approximately half of step 1, north side, on the basis of its presence in the underlying features noted above, it then becomes possible to define its extent and project the approximate area over which layer V is to be anticipated in the area of grid squares A and B, 6 and 7, and C-3, 4, 5 and 6.

Based on this projection the approximate area covered by layer V may be estimated and percentages of the areas destroyed by bulldozing, sampled by excavation, and still intact calculated. What is obvious on inspection is that the bulldozing cut away a major portion of the northern half of the area covered by layer 5, and that Golson chose the best remaining portion of the southern half from which to obtain his sample. It should occasion no surprise then that he recovered pottery in greater relative abundance from his excavations than we did from ours.

My calculations indicate that layer V probably covered only some 1950 square feet of area in the centre of the mound. Of this some 900 square feet or over 46.1 per cent was destroyed by bulldozing, while another 380 square feet or 19.5 per cent remains intact. Thus the 34.4 per cent of the deposit which has been sampled by excavation represents a much larger proportion of the total than one might suspect from the observation that only some 670 square feet of layer V has been excavated, especially where the comparative reference is to the total area covered by the mound without consideration of the stratigraphy, or the process by which the mound itself was formed. In actual fact, however, our sampling of this important basal deposit is probably better than that for any later deposit.

Despite this fact, a fully satisfactory interpretation of layer V as a structural entity is not possible. The deposit itself was probably of an irregular oval shape, and rose some 12 to 15 inches above the surrounding surface. Although no stone curbing demarcated its perimeter, it terminated abruptly in a shallow ditch in the area of the rectangle on the south side of step 1, and appeared to have been cut away along part of the eastern margin in squares A-1 and B-2. Elsewhere it wedged out, in one case terminating as a partial infilling sloping down into an existing feature. On its surface, particularly that portion belonging to bed 2, a few features, nearly all of them small postholes (fig. 49), have been identified. However, no pavements, stone alignments, firepits, ovens, or gravel spreads indicative of house floors or living surfaces were in evidence. Again, while the associated artifacts in the deposits were fairly abundant, they do not suggest an accumulation of items built up by continuous occupation. For instance, nearly all the adzes are broken fragments and only a very few of the pieces of pottery can be joined, so that evidence for breakage of once larger sherds *in situ* is minimal. Moreover their distribution and that of the charcoal was not in concentrated pockets, but well scattered throughout the deposit.

In the preliminary report I suggested, as one possible interpretation of this situation, that the layer represented refuse collected from elsewhere and spread out in this area, though for what reason I was unable to say. I am still inclined to this view, rather than favouring the attribution by Golson that it is an occupation layer. However, it seems unlikely that it would have such a uniform thickness and regular shape were the layer deposited entirely without purpose, and the ditch around part of one edge, and the postholes on its surface, are strong evidence that it did serve as a low earthen mound for a structure or structures of unknown use.

Such an interpretation of the deposit, of course, raises the possibility that the occupation associated with this layer may be of quite different date from the materials contained in the deposit, including the charcoal upon which the present dating of the deposit rests. Thus while Golson's three radiocarbon determinations of the 1st to 2nd century A.D. for the charcoal and associated items in the deposit are quite adequate to date these materials (Green and Davidson 1965:65), they only furnish a date before which deposition of layer V on this site could not have occurred.The use of the date as one for the deposition of layer V as well, therefore, requires an assessment of additional evidence bearing on this point.

Given the evidence of a soil horizon developed on the surface of layer V, indicating an interruption in the sequence of occupation, and the fact that an oven at the base of layer IVb dates some 1100 to 1200 years later, a substantial interval of time could have passed between the primary deposition of layer V elsewhere and its transfer to the present site. That this did not occur, is in my view supported by Golson's finding of remnants of a layer VI with pottery, as well as his identification of some features with fills like the layer VI deposit. This makes unlikely, though not impossible, an interpretation which suggests that the initial occupation is actually younger than the deposit which covers it. Of more importance is the fact that the only soil horizon appears on top of layer V, while none is in evidence under it. Rather the underlying features were still well defined and open when they were purposefully filled with layer V, implying that a gap occurred only following its deposition, and not before it.

In the interpretation presented here, an interval of 1100 or more years then passed, in which pottery and certain types of adzes were dropped from the Samoan assemblage. By the time the locality was again occupied people were making houses on earthen platforms capped by water worn gravel spreads. Before this occurred at Va-1, an oven was excavated and used in the area of the step 1 rectangle, north side. This oven has been dated to 680 ± 80 years before 1950 (GaK-500; fig. 54; Green and Davidson 1965: 64-65) and marks the beginning of an almost continuous series of events at Va-1 which extends up to the 19th century A.D.

In a structural and functional sense layers IV and III may be classed together as representing a single component at the site belonging to one period during which occupations of a like nature are several times repeated. As a unit they provide a significant contrast structurally and functionally not only with the two earlier occupations but to the layer II occupation which follows. Structurally the type of occupation is one commonly encountered in Samoan sites in which a low earthen platform is erected using fill from the surrounding area and then is covered to a depth of several inches with a paving of water worn gravel called by the Samoans *'ili'ili.* On the surface of this paving occur stone pavements, stone alignments and shallow fireplaces, while in the underlying deposit is usually evidence for a number of associated large and small postholes and a few shallow pits. Owing to the spreading effect of the gravels, however, it is usually difficult to demonstrate stratigraphically that these latter features actually derive from the surface of the gravel paving itself, though this is usually assumed to have been the case.

The functional interpretation of these deposits and their associated features as platforms which supported dwelling houses is attested to by both the archaeological and historical records, although historically the platforms are usually of stone and the pebble spread is often confined within a stone curbing to the area of the structure itself. But earthen terraces and mounds with most of the features noted above, including oval house structures outlined by stone curbings, are known from archaeological contexts in both the Luatuanu'u survey area and from the upper Falefa valley (Reports 12 and 14, and Ishizuki 1968). Thus, unlike the two previous occupations or that which follows, where analogies adequate for fuller interpretation are lacking, the deposits of layers III and IV possess a reasonable structural and analogical basis for interpretation as platforms and pavings which once carried domestic dwellings. However, as is common, their associated portable artifact content is negligible.

With the above as a general basis for the interpretation of these two layers, the individual deposits may be considered more closely. Layer IVb has a water worn gravel as its major constituent which suggests it served as a paving. This is consistent with the fact that over the area of squares B-4-5 and in the southern half of cutting III, it was represented by only a very thin band of gravel (fig. 52). However, to the west of cutting II and in the northern part of cutting III, especially after layer V terminates, it expands into a deposit 10 to 15 inches in thickness (figs. 52, 53b). Here it would seem to represent a fill as well. But the extent of layer IVb (fig. 54) is not certain because it was not distinguished by Golson in cutting II, where it would have been nothing more than a thin lens at the base of layer IV, and because its termination was able to be fixed at only two other points, each extending over only a very short lineal distance. In general then, layer IVb functions both as an addition to the northwestern side of an existing platform created by layer V without a significant increase in height, and as a paving which probably covered an area larger than layer V, yet one which lay off centre from it to the northwest. Although not many postholes are recorded as cut from its surface, the composition of the deposit makes this determination difficult and it is perhaps significant that a number of postholes and large pits, especially in the step area, were filled with this deposit and may well have been cut initially from its surface. One feature definitely associated with the sur-

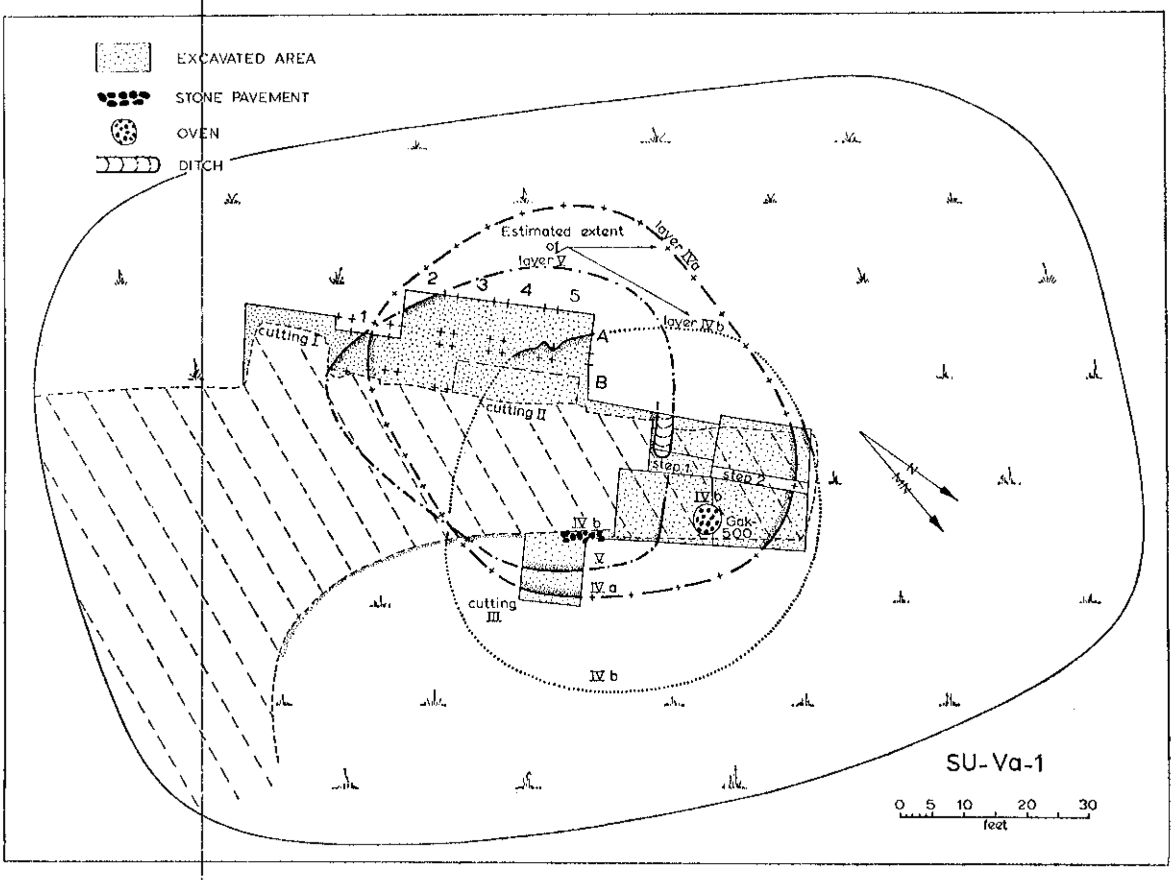


Fig. 54. Plan showing estimated extent of layers IV and V, SU-Va-1.

face of this layer was a small remnant of a stone pavement initially seen on the shelf excavated along the face of the bulldozer cutting in front of cutting III and extending back into that cutting in an additional row of stones (fig. 54; plate 13). A small firepit was also found on its surface in cutting III.

The general area covered by layer IVa, like that for V, may be projected fairly accurately on the basis of established reference points (fig. 54). It is also clear from the deposit itself that its function was as an earthen capping which sealed in the existing deposits and increased the height of the mound by 6 to 8 inches before the paving of its surface with a new gravel spread, represented by layer IIIc, began. A large number of features are recorded as cut into the layer IVa deposit, but most of these probably derive from features that belong to one or more of the paving layers above. However, a burned area was noted on its surface by Golson at one point.

A number of postholes and a few shallow pits are probably to be associated with the occupation represented by the layer IIIc paving. As well a number of very shallow firepits were encountered on its surface. Its extent seems generally to be closely related to that established for layer IVa, which is logical.

Some not well understood events associated with the renewal and relaying of the gravel spreads in localised areas followed, after which bed 7 of layer IIIb was deposited over a good portion of the existing mound's western end. At this point or slightly earlier some low mounds were also formed along the eastern margin, but neither their purpose nor their shape is known.

The final occupation of this period is that represented by layer IIIa. Sealed as it was directly under the layer II fill and being the last in the series, it is the best preserved. Again a large number of postholes and a few pits are probably to be associated with this occupation, but as usual their precise assignment has proved difficult. More rewarding has been the evidence, recovered by both Golson and ourselves, that the main part of layer IIIa seemed to terminate against a stone alignment near the eastern end of cutting II (plate 12) and in the baulk of B-2-3. Golson (Report 7a, p. 109) on limited evidence considered the possibility that it might be the margin of a house; on the broader evidence available to us I would consider the margin of the house pavement a more likely interpretation. The house itself was probably not very distant, however, as a shallow fireplace partially outlined in stone lies not far away in the baulk between cutting II and square B-5 (fig. 55).

The precise extent of layer IIIa is difficult to establish, partly because its subdivisions were not recorded for part of cutting III or along the adjacent part of the northern face of the bulldozer cutting and partly because more of it may lie in the unexcavated area to the southwest than was the case with some of the previous layers. In this context it is probably well to remark that some of the local deposits which belong with layers IIIb and IIIa are of greater extent than has been indicated, but the problems surrounding their distribution have not been resolved on the basis of the existing evidence. At the end of the period of occupations reflected by the deposits of layers III and IV, a low but sizable mound, probably with other mounds adjacent, had been formed in the central area of the Va-1 site. They would be incorporated into the core of the main mound to be constructed during the next occupation.

The way in which layer II seals in the previous deposits suggests that there was little pause between the end of the layer IIIa occupation and the next stage in construction. The structural evidence from layer II, however, reflects an occupation of a quite different character, and one which is at present difficult to interpret in functional terms.

The deposit of layer II is a deep fill, largely devoid of cultural evidence, with a composition suggesting its derivation from excavations into natural in the surrounding area. Based on the evidence from the principal sections, the excavations, and a long trench to the north of cutting III (cf. fig. 52, and 55), the distribution and thickness of the layer II deposit indicates it was at this time that the mound at Va-1 took on the general dimensions in size and height which it possesses today. The initial shape of the interior of mound, however, presented a quite different appearance, for in that area the layer II fill is lacking and instead a series of charcoal flecked loam fills and remnants of stone platforms are in evidence.

Using the existing data, it is difficult to project any other form for the area not covered by layer II than a large oval-shaped depression in the centre of the mound. It should be noted that Golson did not pick up this depression in cutting II where it was to be anticipated. This may be explained, however, by the fact that in that corner of his cutting where it should have been, he was working back from a disturbed and slumped face, as the pictures from his excavation testify, and it may be that much of the loose loam fill in the depression had come away there leaving only the abruptly rising surface of layer II to excavate. Still this does not explain why he did not pick it up in the west

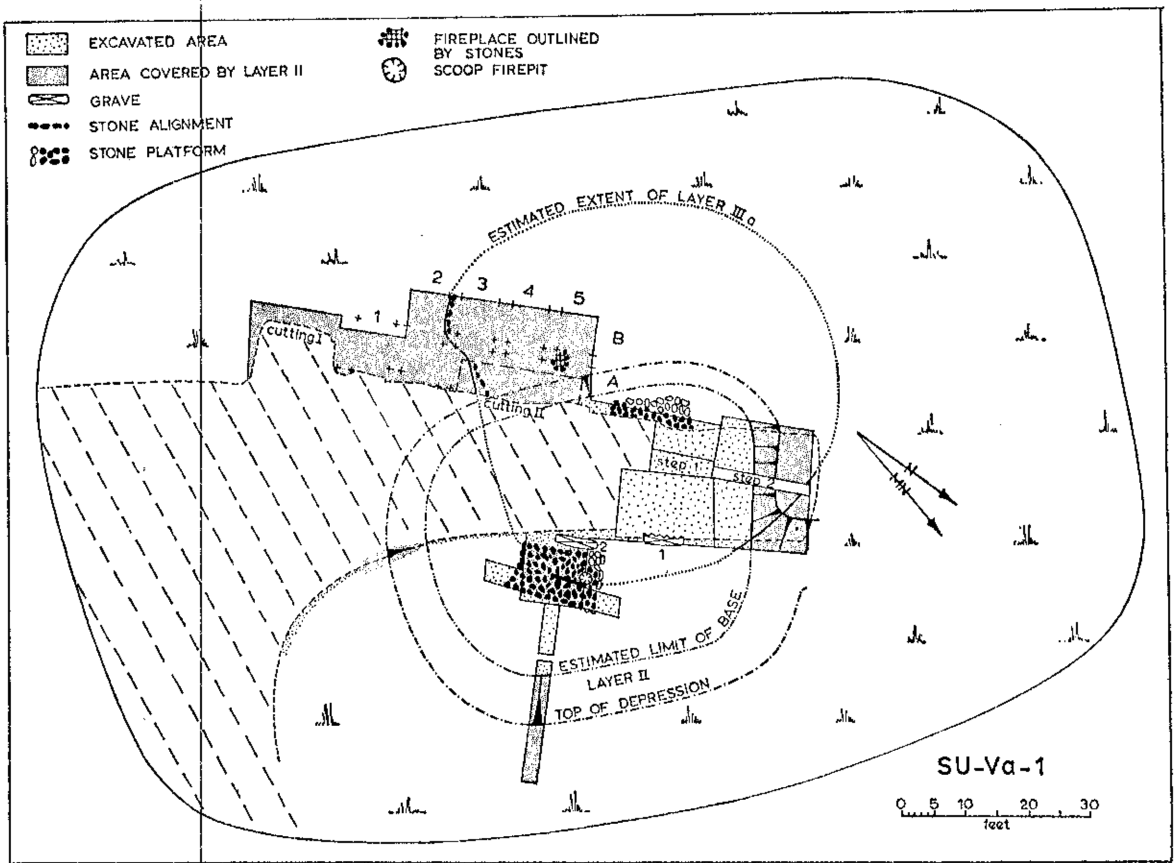


Fig. 55. Plan showing estimated extent of layer IIIa, and features associated with layers I, II, and IIIa, SU-Va-1.

end wall of cutting II, as I did when re-establishing that face. I am unable to see it in the existing black and white photographs of his sections, but this is hardly surprising, as I can only just pick it out on my own, largely because I know where it is. The sloping sides of layer II were unambiguous and clearly demarcated in the step 2 area, however, and they were equally well marked in the section at the eastern end of the northern side of the bulldozer cutting. The slope was less well defined in the trench to the north of cutting III, partly because time did not permit adequate exploration of all the details in that trench. Finally in the rectangle on the north side of step 2, the base of the deposit continued as a thin band into the northern face, but the top and slope turned to the west, indicating that either the depression was not closed or not as regular as has been projected (fig. 55).

Over much of the area excavated by Golson and myself, the level upper surface of layer II was no longer intact, but where it was, a substantial number of postholes, many of them large and deep, were recorded as cut from this surface. As well, a number of fairly large deep pits were encountered, particularly in the area of the step 2 rectangles. One shallow oval pit in the centre of the baulk between cutting II and square B-5 was 3 feet 3 inches long, 22 inches wide and 8 inches deep. It was thought possibly to be a grave, but in this interpretation I am no longer confident. Its importance lies in the fact that two postholes from layer I cut into the base of it, indicating an occupation following that of layer II. Also a pit in the area of step 2 was filled with clam shells and sea urchin spines, one of the few instances in which food refuse was recovered from this mound. Thus, as will be discussed below, I am reasonably certain from our records that the pebble spread at the end point of the mound sequence is not to be associated with the surface of layer II, but that many of the features recorded as cut from the layer II surface are to be so associated.

The other features and deposits which I believe are to be associated with layer II all lie within the central depression, where the paving of layer IIIa initially served as the floor. On this floor along the south side of the depression a rock platform had been erected, as is indicated in the section (fig. 52). That it extended out into the bulldozer cutting beyond the point where we were able to record it, is revealed by the initial photos taken of the bulldozer cutting in 1957 before Golson's excavations began. In these it is clearly in evidence. How far it extended in this direction is, of course, now impossible to determine. Some might argue that this stone platform belongs to the final occupation of layer IIIa, an interpretation which is possible stratigraphically. However, it lies on top of the layer IIIa paving which is not what I would have expected if this were so, and at present the finding of a stone platform of this type on top of an earthen platform and paving would constitute an unusual circumstance in Samoan archaeology. Finally the construction of another platform of similar size and shape in the area of cutting III which can be associated with the layer II occupation, but not III, suggests that the earlier one should also be assigned to this same occupation.

Another remnant of a stone platform some 3 to 4 feet long was noted in section resting on the layer IIIa surface directly under grave 1. It is conceivable that this could be the northwest corner of the same platform as that described above, but it cannot be demonstrated now. A small cluster of rocks also appeared at this level in cutting III (fig. 53b). These three stone remnants, it seems, mark the original structures in the depression. They were all covered over by one or more loose loam fills, probably from some of the surrounding garden soils. The depths of these infillings, labelled layers Ib and Ic were not everywhere noted, particularly in the face along the southern side of the bulldozer cutting. But they were clearly marked in the northern section face in the area of step 2 and in cutting III. In cutting III, moreover, a large number of postholes were recorded on the layer Ic surface. In the step 2 area the section shows that the layer Ic surface sloped down to meet with the upsloping layer II surface, rather than meeting the sides of the depression as a level fill. This suggests that the layer Ic infilling may have taken the form of a low earthen mound within the depression rather than a simple fill raising the level of the floor. It may even be that the mound did not extend to the south so that the deposit was not there to be recorded, being represented instead by the platform.

After this another fill was added in the area of the depression, which was recorded on both sides of the bulldozer cutting as well as in cutting III. At the same time a deep roughly rectangular rock pavement with a firepit on its surface was constructed in the area of cutting III (plate 14). That the fill and pavement were contemporary and formed a level surface, rather than the rock fill forming a raised platform is made clear by the fact that the sides of the pavement wedge out upwards where they are sectioned (fig. 53b) rather than the reverse.

In this interpretation, then, layers Ic and Ib and the accompanying rock platforms or pavements, are to be associated with the layer II occupation, whereas the layer Ia occupation is a separate one which follows. The Ib stage of this occupation has been dated to 220 ± 70 years before 1950 on the basis of a radiocarbon date (GaK-501) for the firepit on the surface of the stone pavement (Green and Davidson 1965:65, 67).

What then is the functional interpretation of the layer II occupation and the associated features in the depression? It is difficult to know as good archaeological or ethnological analogies are lacking. The Samoans who viewed the results in the field could only suggest a pigeon mound, but they are inclined to interpret many mounds as pigeon mounds. In this case, however, the suggestion may have some merit, for while in Samoa pigeon netting platforms were in general simple affairs (Buck 1930: 321-22, 535), in Tonga (McKern 1929: 19) one type did have a small central depression "averaging 20 feet in diameter, as deep as the artificial mound was high." The depression in this mound is, of course, more than twice the Tongan average but the form is still suggestive, especially as blinds might serve as an interpretation of the structures within the depression. One might even interpret the break on one side as part of an internal access ramp (cf. Golson, Report 1, p. 15). But until more intact structures of a like nature are identified archaeologically, this occupation must remain a partial enigma.

The occupation which follows is contained in layer I, although the layer is now a soil horizon. Golson restricted his definition of layer I to the topsoil, and designated as layer IIa the thin gravel spread at its base. I included both in layer I, the occupation, of course, being defined from the pebble and small stone paving which lay just under the surface in many areas of the mound. Whereas in the area of cutting II Golson was able to observe the relationship of this paving to that of layer II over a very limited area, we were able to observe it over a much greater area. However, the clearest case for separating the two deposits into two occupations occurs in the step 2 area (cf. fig. 52) where it can be shown that features cut from the layer Ia surface lie well above layer II and often have layer Ib in between. These features not only include the usual small postholes, but one very large one from the layer Ia surface which extends down through both layer Ib and Ic, into the layer III deposit. As well, as noted above, evidence was found in the baulks and squares behind cutting II that some features belonged to layer II, but others to layer Ia above. Finally, as was noted in the discussion of the stratigraphy (p. 120), layer Ia apparently extended across the area of the depression and its paving was observed there by Golson. On this basis I have interpreted this paving as a separate occupation in which the function of the mound changes back to that of a platform for a dwelling. As such it parallels in function the last stage of prehistoric use to which the other mounds investigated in this locality were also put (Reports 8, 9, 10).

Following this final Samoan occupation, the locality came into German possession and became a plantation. The coconut trees on its surface, as noted above, are said to date from this period. Of more use for dating is the fact that the mounds then served as a place of burial, probably for plantation labour. Two such graves were recorded in Va-1.

Grave 1 was some 2 feet 5 inches deep and badly disturbed by the bulldozer. Hence all of the associated bottles and jugs which marked it were broken and the whole left side of the skeleton missing. The person seemed to have been placed on the right side, and lay almost face down. The right arm and leg bones as well as the upper portion of the vertebral column were present. The skull was crushed and only a portion of the jaw remained intact. The individual was judged to be fully adult, but not of advanced age, on the basis of the condition of the teeth, the fact that all the molars had erupted, and all the symphyses on the long bones had closed. Sex was impossible to judge, but the light degree of mastoid development and the size of sciatic notch make an assignment of female plausible. This would fit the evidence of the pin and locket. Race is impossible to determine, but Polynesian need not be excluded as the individual possessed a so-called "rocker jaw". Items associated with the burial include the remains of a coffin around the body, from which we recovered wire nails, and portions of a hinge. As well, as is not uncommon with burials, schnapps jugs and wine bottles in about equal numbers were used to outline the grave, though none was found in position. The schnapps bottles have a label which shows a lion in the middle of a circle and SEITZER in the band around the trademark. On the base HERZOGTHUM-NASSAU is stamped. Finally at the neck of the skeleton a metal locket with a floral design was encountered, while over the thoracic vertebrae a pin was recovered. I would estimate the burial to be relatively recent, probably the beginning of the 20th century, but no memory of this event now survives locally.

Grave 2 was also some 2 feet 5 inches in depth but was a less formal affair. The individual lay extended on his back and it was evident from their position that the large flat headed nails found had been used as pins and driven into what was once a board to hold the arms and legs in position. There was no evidence of a coffin. Two clay pipes, both entire, lay next to the skull and fine coloured beads which once must have formed an arm band lay next to the right arm at the wrist. The skeleton was disturbed and some of the bones removed by the local Samoans during my absence; it was judged to be the remains of an adult male of fairly light build. They were sure it was a plantation labourer of Solomon Island origin. One of the clay pipes has a monarchy style design and reads "Advance Australia," the other features the Exhibition Hall in Melbourne, Australia and reads Melbourne Exhibition, of which there were two, the first dating to 1880 A.D., the second eight years later. The burial probably dates to the 1890s, the first Melanesians having begun to arrive in Samoa as plantation labour around 1883 (Lewthwaite 1962: 143). Thus, as at Va-2, the final use of the mound at Va-1 was as a burial place for plantation personnel around the turn of this century.

Portable Artifacts

One of the aims in continuing Golson's excavations at Va-1 was to obtain a more adequate sample of the portable artifacts from layer V as the most certain means of acquiring a useful comparative assemblage of an early date. While the area excavated was more than five times greater than that excavated by Golson, we recovered only some 31 more potsherds than he did, or a total of 401 potsherds to his 370. As noted above, however, he sampled the most central remaining portion of this layer; we were in general confined to the less productive margins, at least with respect to pottery. Nonetheless the total sample of potsherds from Va-1 is now sufficiently large and the two subsamples sufficiently alike to be sure they accurately reflect Samoan pottery of this period. In the realm of associated artifacts, Golson's results were meagre, two partial adzes being the principal items recovered (Report 7a, p. 111). In this realm we were far more fortunate and as a result are able to document a fair range of stone implements associated with the pottery, permitting the fuller definition desired for an early assemblage of Samoan portable artifacts. In the acid conditions of the deposits, however, bone and shell did not survive, so this component of the assemblage is unfortunately still lacking.

POTTERY

The pottery recovered by us is in all respects identical to that obtained by Golson, with the result that the general statements made previously (Report 7a, p. 112) apply here as well. Possible exceptions are two sherds with thin walls, well finished surfaces, and fairly fine temper. They may reflect a survival of an earlier Samoan ware (Report 10, p. 170) into this period, or they may simply be there because this ware was earlier in time and by chance some sherds from it came to be incorporated in these deposits. In this respect it is significant to view the distribution of potsherds above layer V (table 6). Some might interpret the decreasing occurrence of these sherds as an indication of a declining pottery tradition, persisting over several hundred years of time; I interpret them, however, as a result of upward movement of a few sherds by means of later disturbances which penetrated into the underlying deposits, and believe this explains why numbers taper off rapidly as one moves to the higher deposits because disturbances less often penetrated to the pottery-bearing layer. It should also be noted that the 15 sherds from step 1, north side, here assigned to layer IVb, may in fact equally well belong to layer V, and should be removed from consideration in the above context. In this rectangle, as explained above, all that remained to be excavated was the fill in features cut into natural and a surface deposit much disturbed by the bulldozing during which most of layer V and subsequent layers in this area had been removed. Had I known as much about the probable distribution of layer V then, as I did later, doubtless we would have assigned most of these potsherds to a layer V context instead. The numerous pits cut into natural in the step area, probably account for the presence of the remainder of the sherds in layer IVb.

The figures for the distribution of potsherds in layer V (table 6) are not particularly revealing. Where excavations appear to approach the margins of the layer, as in cutting III and in the squares and baulks of B-5, B-2 and A-1, the number of sherds drops markedly. For instance, only four of the twenty-six sherds found in B-2 were in the square itself which is on the margin, the rest being in the baulks. Also, despite the small area involved, the largest number of sherds was collected from the clean up around the edges of cutting II made by Golson, so that the higher yield is consistent with his results. Again percentages of rim sherds in proportion to body sherds are entirely comparable with the sample obtained by Golson (Report 7a, p. 112) as are the figures obtained for the thicknesses of rim lips (table 7) and for the body pieces (Report 7a, p. 112).

The only additional data derived from these potsherds then is that resulting from a closer study of the rims, and from some general observations made on features which reflected techniques of manufacture. The rim types have been classified according to whether the upper surface of the lip is flat or rounded and whether the inner and outer vessel walls remain parallel, expand, or bulge at the rim. An attempt was also made to judge whether, when the flat lip is in the horizontal position, the resulting vessel wall at the rim would have remained straight, or curved inward to some degree. As well, the presence of flat facets or of rounding on the inner or outer edges of the lip have been noted. The results are summarised in table 7 and the main variations are illustrated from actual examples (fig. 59). Despite a somewhat elaborate appearing classification, the outcome is principally confined to two general results: one is that there is no significant difference in the number of rims with parallel sides over those with expanded sides because both occur in about equal numbers, and the other is that a similar situation applies to straight versus incurved rims. In short two kinds of low open bowls of shallow depth, and fair size, much like the pottery kava bowl of Fiji known as the *dari,* are what seem to be reflected. In my view the rounding of the inner lip edge, or the creation of a slight flat facet on it, are best interpreted as a manufacturing stage in the production of the rim, where the potter in beating out the flat lip often causes a slight ledge of clay to protrude. She removes this either by using the thumb to scrape a facet along this edge which is not completely obliterated by additional beating, or she obliterates it by drawing the thumb and finger in a closed position along the edge smoothing it out. I have observed both practices in the manufacture of flat rims on modern Fijian bowls of similar shape.

TABLE 6

DISTRIBUTION OF POTSHERDS IN SITE SU-VA-1

A. *Contexts other than layer V*			*Total*
1. No Context	— square A-2:	1 body sherd	
	— loose fill at base of cutting face:	1 body sherd	2
2. Layer I	step 1, north side:	1 body sherd, badly eroded	1
3. Layer IIIa	— baulk B-2-3:	1 body sherd	
	— baulk B-3-4:	1 body sherd	2
4. Layer IVa	— step 1, north side:	1 body sherd	
	— square B-2:	1 body sherd	
	— baulk B-4-5:	2 body sherds	
	— baulk A-1-cutting I:	1 body sherd	5
5. Layer IVb	— step 1, south side:	1 body sherd	
	— step 1, north side:	4 rim and 11 body sherds	
	— step 1, centre:	3 body sherds	
	— step 2, south side:	4 body sherds	26
	— step 2, north side:	2 rim and 1 body sherd	
		Sub-total	36

B. *Layer V contexts only*

	Clean up around cut II	Clean up of N & S sides bulldoz. cut	Square A-1 & baulk A-1-2	Square A-2 & baulk A-2-cut II	Square B-2 & baulks B-2-3 & B-2 cut II	Square B-3 & baulks B-3-4 & B-3-cut II	Square B-4 & baulks B-4-5 & B-4-cut II	Square B-5 & baulk B-5-cut II	Cutting III	
Body Sherds										
Thick ware	87	25	8	44	24	56	45	9	29	327
Thin ware	—	—	—	—	1	1	—	—	—	2
Rim Sherds										
Thick ware	7	1	2	2	1	7	11	1	4	36
									Sub-total	365
									Total	401

C. *Numbers and Percentages of Potsherds*

1. Other contexts:	Number	Percentage
Thick rim sherds	6	16.6
Thick body sherds	30	83.4

2. Layer V:	Number	Percentage
Thick rim sherds	36	9.9
Thick body sherds	327	89.6
Thin body sherds	2	0.5

3. Total:	Number	Percentage
Rim sherds	42	10.5
Body sherds	359	89.5

TABLE 7

RIM TYPES AND THICKNESS OF LIP

A. *Rim types*	Other	Layer V	Total
1. Flat and parallel sides:			
Straight orientation —	—	8	
Incurved orientation —	3	9	
Incurved orientation, with facet on inner edge of lip	—	1	
Incurved orientation, with inner edge of lip rounded	—	1	22
2. Flat lip with expanded sides:			
Straight orientation	1	3	
Straight orientation, with facet on inner edge of lip	—	3	
Straight orientation, with inner edge of lip rounded	1	1	
Incurved orientation	—	4	
Incurved orientation, with facet on inner edge of lip	—	4	
Incurved orientation, with inner edge of lip rounded	—	1	18
3. Edges of flat lip rounded, sides expanded:			
Straight orientation	—	1	1
4. Round lip, with expanded bulge on inner side:			
Straight orientation	1	—	1
Total	6	36	42

5. Orientation summary

	Parallel	Expanded	Flat rounded	Rounded with bulge	Total
Straight —	8	9	1	1	19
Incurved —	14	9	—	—	23

B. *Rim lip thickness*

Thickness in mm. —	8	9	10	11	12	13	14	15
Number of sherds —	7	7	8	6	5	5	—	4

The other notes on manufacturing techniques encountered on these sherds refer to the following repeated observations: fine striations, like wiping marks from some fabric, on both the inner and outer surfaces of sherds; orange colouring as a result of oxidation of the iron in the clay on the outside of sherds whose interior surfaces are a dark grey from the reduction of the iron particles; white incrustations on some inner surfaces; and occasional depressions on interior surfaces of the larger sherds resulting from anvil marks and suggesting the use of the paddle and anvil method of manufacture. On this last point, however, it should be noted that any paddle marks, if such ever existed, have been obliterated by subsequent wiping of the surfaces, a finishing technique which is abundantly in evidence. Thus how the vessels were initially formed is not known, and only once was note made of a possible instance of coil bonding along a rim sherd (Cat. no. P 10/172).

ADZES

In the adze assemblage from Va-1 only five of the eighteen specimens are complete, so that the types in many cases have had to be inferred from partial examples. Fortunately this has proved possible because the types themselves can be established on the basis of complete adzes in the surface collections. Recent excavation of pottery-bearing layers in the SU-Sa-3 site of Sasoa'a in the Falefa valley has provided a collection of comparable age in which the number of adzes is greater and more of the specimens are entire. Analysis of this collection supports a claim that the adze types of Va-1 are typical of those associated with the pottery horizon.

Fifteen adzes were recovered during the 1963-64 excavations at Va-1, of which only one had no stratigraphic context (table 8). In addition Golson found two adzes in layer V (Report 7a, p. 110) and one out of context in the bulldozer cutting (Report 1, p. 19). I would guess that the adze in the bulldozer cutting, because it has a fresh unweathered surface and is entire, came from a later layer than V. The other adze without stratigraphic provenance was found in the debris of cutting I. Because of its weathered surface and because it is of a type generally considered early, I would place it as derived from layer V.

In definite layer IV contexts are two adzes, one of an unclassified type, the other of Type I. The unclassified specimen may well have served as an unhafted chisel, given the battered condition of the end of the poll. This would be consistent with the fact that oval sections in Polynesia are often found on adze-like tools that are judged functionally to have been utilised as chisels. The other adze is of a kind related to our typical Type I specimens in that the front and back faces are parallel, with the front face more ground than the back. Also along the top edge the sides slope in, while in cross-section, the adze is relatively thin in relationship to its width, as is reflected by a shoulder index of 38. It would present a low quadrangular cross-section with the front narrower than the back, therefore, were it not for the fact that the lower edge along each side has been flaked from the rear, leaving a medial ridge instead down the sides. Also the adze is of small size, falling at the bottom end of the size range for adzes of type I. Thus, while the specimen may be classed as Type I, it is not typical of that type (fig. 56c).

The main collection of adzes is from layer V, twelve of the specimens being recovered by us and two by Golson. Two small thin adzes of Type I, but again with medial ridges down each side, form a part of the assemblage (fig. 56f, h). They serve to establish the presence in this pottery horizon of an adze of a type related to that we have defined as Type I. It should be noted, however, that the more typical adzes of Type I generally found in later contexts, are not present in this assemblage, and it may be that these small adzes and those of Type III are ancestral to them. An adze with a similar section, but of larger size, was recovered from the Maupiti burial site in the Society Islands (Emory and Sinoto 1964: plate 3b), so this form of Type I adze is found elsewhere in Polynesia in early contexts.

The occurrence of the Type II adze in this assemblage is important in relation to the origin of Polynesian adzes with inverted triangular cross-sections. In our preliminary report (Green and Davidson 1964) for instance, this adze was classed as a Duff (1959) type 3 G, an untanged adze with triangular cross-section, apex to the back, a reflection of the dominant "keeled" back and inverted triangular cross-section which it possesses. However, the front edges along the side also slope in as a result of moderate flaking along that edge. As such the specimen fits perfectly the Buck definition of adzes of Type II employed by us (fig. 56b). Adzes of Type VIII with true inverted triangular cross-sections are not yet known from early contexts in Fiji, Tonga and Samoa and are not common in later assemblages from West Polynesia or in the earliest ones from East Polynesia, appearing in abundance only in later contexts in East Polynesia. This raises the question of whether the Poly-

TABLE 8

DISTRIBUTION AND CLASSIFICATION OF SAMOAN ADZES AT SU-VA-1

1. *No context*

Type V, Vailele variety, butt end only: cutting I, in debris of clean up, the heavy patina suggesting derivation from layer V. Cat. no. A 10/1.

2. *Layer IVb*

Type I, with medial ridge along sides, almost entire adze, 74 mm. long and 37 mm. wide by 14 mm. thick at centre: step I, north side. Cat. no. A 10/140.

Unclassified type, battered poll section of adze with thick oval section: step 2, north side. Cat. no. A 10/142.

3. *Layer IV — Layer Va interface*

Type V, Vailele variety, blade end and cutting edge of adze: baulk between cutting I-square A-1. Cat. no. A 10/22.

4. *Layer V*

Type I, with medial ridge along sides —
partial adze broken longitudinally, with one side intact: square B-3. Cat. no. A 10/29.
entire adze made on flake — 52 mm. long and 33 wide by 7 mm. thick at centre: column between square B-2-3-cutting II. Cat. no. A 10/138.

Type II, entire adze—87 mm. long and 44 mm. wide by 24 mm. thick at centre: cutting III, in pit. Cat. no. A 10/141.

Type III, blade end and cutting edge: baulk B-2-3. Cat. no. A 10/41.

Type IVa, entire adze made on flake with medial ridge on front that is unobliterated flake scar—33 mm. long and 12 mm. wide by 10 mm. thick at centre: baulk between B-3 and cutting II. Cat. no. A 10/31.

Type V, Vailele variety —
butt end: square A-2. Cat. no. A 10/26.
blade and cutting edge: baulk B-3-4. Cat. no. A 10/32.
Sasoa'a variety —
butt end; square A-2. Cat. no. A 10/18.

Type VIa, blade end: baulk A-2 cutting II. Cat. no. A 10/27.

Type VII, tip of blade and bevel: baulk A-1-2. Cat. no. A 10/28.

Type X, bevel and cutting edge: ledge against bulldozer face to east beyond cutting III. Cat. no. A 10/23.

5. *Summary — 1957 and 1963-64 collections*

Types:	I	II	III	IVa	V	VI	VII	X	unclass	Tot.
Number with										
No context	–	–	–	–	1	1	–	–	–	2
Layer IV	1	–	–	–	–	–	–	–	1	2
Layer V	2	1	1	1	6	1	1	1	–	14
										18

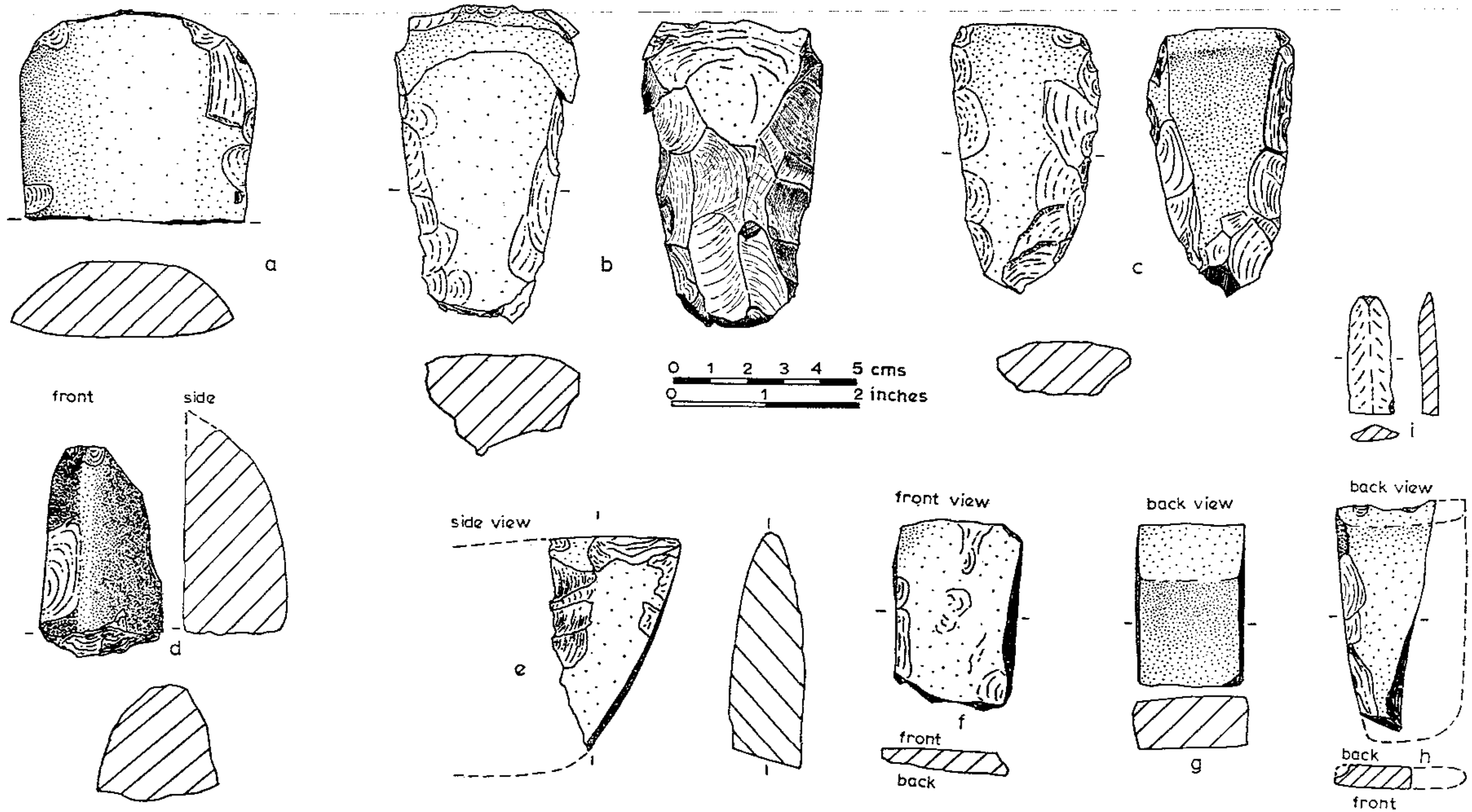


Fig. 56. Adzes from layers IV and V, SU-Va-1. a. Type Va, A 10/22. b. Type II, A 10/141. c. Type I variant, A 10/140. d. Type VI, A 10/27. e. Type VII, A 10/28. f. Type I variant, A 10/138, g. Type III, A 10/41. h. Type I variant, A 10/29. i. Type IVa variant, A 10/31.

nesians evolved the inverted triangular adze from those of Type II or IV, independently of similar adzes in Island Southeast Asia, or derived them indirectly from that area. Thus, how one views this question and whether one uses the classification of Duff or Buck for this adze becomes of some importance.

A portion of the blade end of a quadrangular adze, nicely ground on all surfaces, is almost certainly of Type III and attests to the early presence of the quadrangular form in Samoa (fig. 56g). The bevel on the cutting edge of this specimen exhibits a small facet from resharpening.

An adze of Type IVa solely by virtue of its cross-section in reality probably functioned as a very small chisel made on a flake (fig. 56i). The front still bears a median ridge which is the intersection of two flake scars, while the sides slope in to the rear as a result of fine chipping along these two edges. The bevel alone is ground.

The dominant type of adze from layer V is Type V, a type generally rare in Samoan surface collections. Of the two varieties of this type, the more common one in this site, with its wider cutting edge and low plano-convex cross-section, has been designated the Vailele variety. Five specimens of this variety were recovered, three by us, and two by Golson. Four are in secure layer V contexts, the other lay at the interface between layer V and IV, and was initially assigned to layer V (fig. 56a). Later when drawing the section of the adjacent baulk, I vacillated and decided in favour of a layer equivalent to IV, but now have returned to the initial decision on the basis of the over-all stratigraphy and the adze's possession of a heavily weathered surface. The sixth example of Type V is a butt end, probably from an adze of the Sasoa'a variety.

The blade end of a Type VIa specimen possesses nicely ground sides and exhibits a rounding of the triangular apex (fig. 56d). In other respects it is typical. This and the tip of the blade and bevel of a Type VII adze serve to establish the triangular cross-section, apex to the front, as part of the early adze assemblage in Samoa. Were it not for complete surface examples of Type VII adzes, however, it would be difficult to convince people that this fragment represented an adze of that type. With such specimens, however, it is difficult to conceive that the fragment can be from an adze of any other type, despite its fragmentary nature (fig. 56e).

Finally a fragment of a bevel and cutting edge almost as limited in extent has been judged as belonging to Type X. The section is that of an adze with high insloping sides, and the back, bevel, sides, and front are all highly ground as in whole adzes of this type. If the fragment is not of Type X, it is almost certainly of Type IX.

As an assemblage these adzes from layer V establish the certain presence of adze Types II, III, V, VI and VII in the pottery-bearing horizon of Samoa, dating to the 1st or 2nd century A.D. As well, an adze related in type to I and another, probably of Type X, or perhaps IX, may be assigned to this period. Finally a flake chisel, which in type would be assigned to IVa, belongs in this assemblage. The most common type, however, constituting approximately 43 per cent of the adzes from this small but significant assemblage, is V. This serves, as noted in the full discussion of this type in Report 7a, (p. 111) to support a growing body of evidence that it is one of the most important early Polynesian adze forms.

Core

Large cores of the type of homogeneous fine-grained basalt normally used in the manufacture of adzes and other stone tools (Report 3 p. 37) are not often encountered in excavations. However, a beautiful example of such a core, about 19 by 18 by 12 cm. in size was found in square B-5 in the fill of a large post-hole belonging to layer I. Three small patches of natural surface still remain on the boulder, but the major surfaces carry thirteen large flake scars and several minor ones.

Adze Fragments And Polished Flakes

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. Since this was our first excavation in Samoa, a larger number of these spalls than usual was collected by the archaeologists and workmen alike and many will have to be discarded after close examination. However, items on which no doubt existed during cataloguing were listed in the adze series of catalogue items rather than the general series and will be described here. Four of these flakes possess a polished surface on one face indicating derivation as a chip flaked from a ground adze. All were found in the excavation of layer V on the south side of the bulldozer cutting. The largest of these flakes, some 58 mm. long, has fine flaking along its edges from what is probably use wear; the other three flakes exhibit no signs of retouch or later use. Three other waste flakes, all lacking polished faces, two from layer V and the other from the clean-up of debris in cutting II, were also found. Also one spall of a natural pebble, recovered from layer IVb in the central baulk of step 1, possesses a surface that appears to have been covered with red pigment, probably from a local rock rich in iron oxide still used as a dye by Samoans.

Pebble Chopping Tools

Pebble tools with one or more roughly flaked edges are not commonly reported as a part of Polynesian tool assemblages, although they are often present. Suggs (1961: 125) describes them as rare but present for all periods of Marquesan prehistory. They have also been recovered in excavations from Hawaii (Emory and Sinoto 1961: 65) and New Zealand (Trotter 1961: 31) and are of far wider distribution than published reports would indicate. Doubtless they are a surviving element from the ancient Southeast Asian chopper-chopping tool tradition that is widespread in time and space throughout the Pacific.

Several such implements were encountered at Va-1 and others have continued to turn up in subsequent excavations in Samoa. Two of those from Va-1 derive from layer V, square B-4, and are made on water worn pebbles of convenient hand size, 9.1 by 9.8 cm. and 12.5 by 16 cm. being their greatest dimensions. Both are pebbles naturally flattened on two sides, one being 6.6 cm. and the other 5.7 cm. thick, with one end modified by flaking from both sides to produce a single, though irregular, chopping edge. The third specimen from layer V is made on a more elongated pebble, 15 cm. long, 7.4 cm. wide, and 4.4 cm. thick. It has been modified along part of one side, rather than the end, and the modified edge has later been blunted by bruising. A better example of a pebble chopper comes from a later context, layer IIIa, square B-5. The pebble on which it was fashioned is of circular shape with a diameter before modification of 12.2 cm. and a thickness of 5.2 cm. A sinuous edge some 9.9 cm. long was created at one point on the perimeter by extensive flaking from both sides, transforming the pebble into a suitable hand chopping tool (fig. 58a).

Hammerstones

Water worn stones of more cylindrical shape than those used for choppers were employed as hammers. These can usually be identified from signs of bruising and pitting on one or more of the ends. Other than this they are unmodified. The three larger examples all exhibit pitted areas on one end only of stones for which greatest dimensions of 10.8 by 7.5 cm. and 13.5 by 10.5 cm. are typical. Two are from layer V, squares A-2 and B-4, and one is from layer IIIa, square B-5. A smaller cylindrical stone pebble, slightly pointed at either end, 4.7 cm. long, and 1.8 cm. in diameter, probably belongs in this category as an example of another form of stone hammer.

Discoidal Anvil Stone

A broken implement fashioned in a very fine-grained basalt with a texture something like that of sandstone was recovered from layer V in the clean-up at the east end of cutting II. It was of a discoidal form with central depressions on either side (fig. 58b). Both the outer edges and the central depressions possessed evidence for modification by bruising. Its function was not immediately apparent.

Very similar artifacts from a wide area in the Pacific have recently been described (Tugby and Tugby 1966: 166-170; Birks and Birks [MS]), while those from Hawaii have long been known (Emory 1924: 78). One from the paddle-impressed pottery horizon in Fiji in association with a radiocarbon date of 2000 years ago and another from the Mangaia mound in Tonga associated with a pottery horizon belonging to the later part of the Tongan sequence (Birks and Birks [MS]), when taken in conjunction with similar specimens from various periods in the Marquesan sequence (Sinoto, personal communication) and those from Hawaii, indicate that the Samoan specimen belongs to the Polynesian part of this tool tradition. The Samoan and Fijian examples serve to document the tool's position as a component of early assemblages in Polynesia and adjacent Melanesia.

The functions that have been suggested for these implements are several. They vary from the unlikely interpretation as stone bait mortars provided by Buck (1957: 354-55) to that of multipurpose implements such as hammers, anvils for crushing nuts, and crushing and grinding stones suggested by the Tugbys (1966: 169-170). In Polynesia Emory's (1924: 78) designation of them as specialised rubbing stones or their interpretation as anvils for crushing nuts favoured by the Birks ([MS]) seem more likely functions.

Octopus Lure Sinker

The recovery from layer V of two stone sinkers for the octopus lure, one in the clean up of cutting II and the other in square A-2, places them as part of the early assemblage in Samoa. No octopus lure sinkers have yet been found in archaeological contexts in Tonga, however (Poulsen 1968: 87). The conical octopus lure sinker, shaped much like a spinning top, is only known ethnographically for Tonga; the same applies in Samoa, where none of these sinkers have turned up in archaeological excavations, although again they have been recorded ethnographically by Buck (1930: 434-36) and ourselves.

The early sinkers from Samoa are of a type which I propose to call cowrie-shaped sinkers, because their form approximates that of the complete cowrie shell that is usually employed in whole or in part in making the lure portion of these objects. Stone sinkers of this type have a flattened base with the body at one end being broader and rising more steeply than at the other end (fig. 58c, d). In addition the more steeply rising end is often partially flattened. Some may even have traces of a groove on the upper surface along the centre line of the sinker. Octopus lure sinkers of this type are known from these early Samoan examples and from those of the Settlement and Developmental periods in the Marquesas (Sinoto 1966: 299). They appear to be the ancestral form from which the coffee-bean and bread-loaf shaped sinkers, best known from Hawaii (Emory, Bonk and Sinoto 1959: 28-29), are to be derived. Given the marked contrast between the later forms of octopus lure sinkers of East and West Polynesia, the identity of the early forms from the Marquesas and Samoa is of some importance.

Of the two specimens from Samoa, one is flattened only on the base and lacks any sign of a groove (fig. 58c), while the other is flattened both on the base and at one end, the upper surface of which bears the faint trace of a groove (fig. 58d).

Net Sinker

A crude cylindrical sinker made in vesicular basalt was found in layer V of baulk B-4-5. The dimensions are 11.5 by 8.5 by 6.3 cm. A central groove for a cord encircles the stone in the two lesser dimensions, and served to attach the sinker to one of the smaller nets used in fishing (Buck 1930: 474). This and the octopus lure are the only two items of fishing gear recovered from the Vailele locality; both belong to the early pottery horizon.

Anchors

Anchor stones of two types, either with a perforated hole at one end, or with a constricted neck and encircling groove for the attachment of the anchor rope, derive from the later occupations. That with the hole (fig. 57) was from layer IVb in the rectangle on the north side of step 2. That with the constricted neck was from debris that had slumped into cutting II in such a way that the anchor could only belong to the layer II or a later occupation. The perforated hole on the one anchor was bored from both sides and was linked with a groove running over the top (fig. 57). This anchor weighed 6 pounds 2½ ounces. The other anchor, of similar size, was broken on one side and weighed 5 pounds 14 ounces.

Shaped Stone File

A portion of a stone file or saw with one sharp edge was encountered in layer V at the base of column B-3-4 cutting II (fig. 58e). The object is made in a very hard fine-grained basalt with a composition similar to sandstone, the

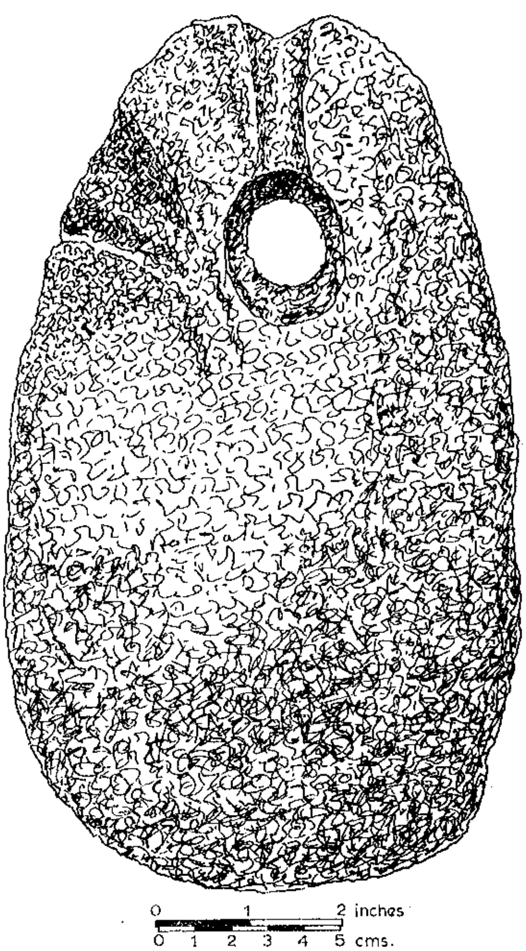


Fig. 57. Anchor stone, G 10/713, SU-Va-1.

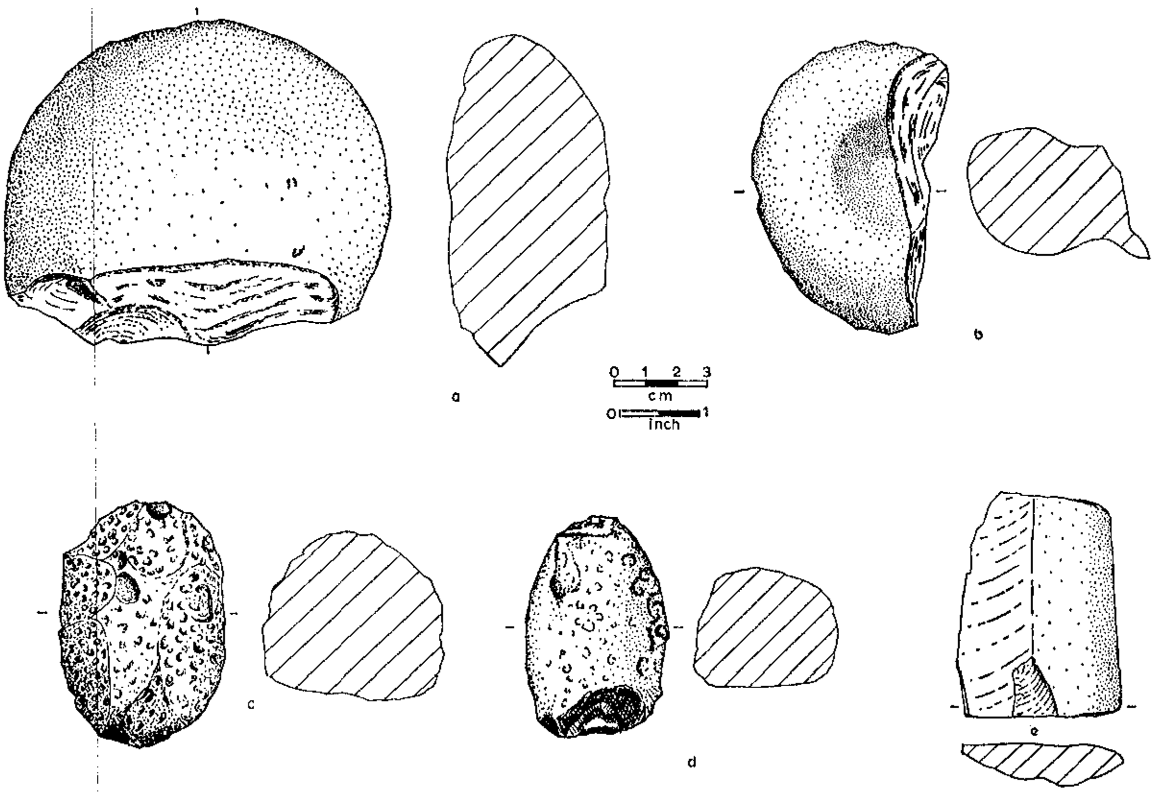


Fig. 58. Other artifacts, SU-Va-1. a. chopping tool, G 10/268. b. anvil stone (?), G 10/1. c. octopus lure sinker, ungrooved, G 10/46. d. octopus lure sinker, slightly grooved, G 10/3. e. stone file, A 10/43.

sharp edge, which is highly polished, presumably being used to saw grooves in stone or bone.

Grindstone

A piece of a large flat rectangular shaped grindstone, broken along one edge, was found in layer V of baulk A-2 cutting II. Its dimensions are 22 by 19 cm. with a thickness of from 6.3 to 8.4 cm. One surface is concave and highly polished from grinding.

Miscellaneous

Four objects which are probably artifacts of unknown use were collected. One is a smooth pebble with a concave surface that may in part be due to grinding. It is 9.4 by 8.3 by 3.7 cm. in size and comes from the rectangle on the south side of step 2, layer IVb. Another is a stone hemisphere with a diameter of 4.2 cm. and a height of 3.4 cm. It was found in layer V at the base of baulk B-4 cutting II and may have functioned either as a pottery anvil stone, or more likely as a mat weight, similar to natural stones still in use for this purpose in Samoan homes today. Another piece of very fine-grained white material, thought possibly to be of zeolitic origin, was found in layer V of the baulk B-3 cutting II. It is 3.3 by 2.3 by 2.1 cm. in size and has one ground face, as if it had been used as an abrading tool. The fourth item is a small piece of pumice 4 by 2 cm. in size from the clean up of cutting II, layer V. Modification of its upper surface and a slight groove on one side indicate it may have been used as an abrader in smoothing objects of wood or bone.

In summary the portable artifacts from Va-1 derive largely from layer V. Principal among them are the potsherds and adzes, the latter permitting the first definition of an early adze assemblage to be associated with this pottery. But significant additions to this assemblage are pebble chopping tools, hammerstones, a discoidal anvil stone, the cowrie shaped octopus lure sinker, a net sinker, a shaped stone file and a grindstone. Taken as a collection, this assemblage forms a list of adze and other stone tool types that are typical of Polynesian culture and places them in association with a distinctive type of pottery that is so far uniquely

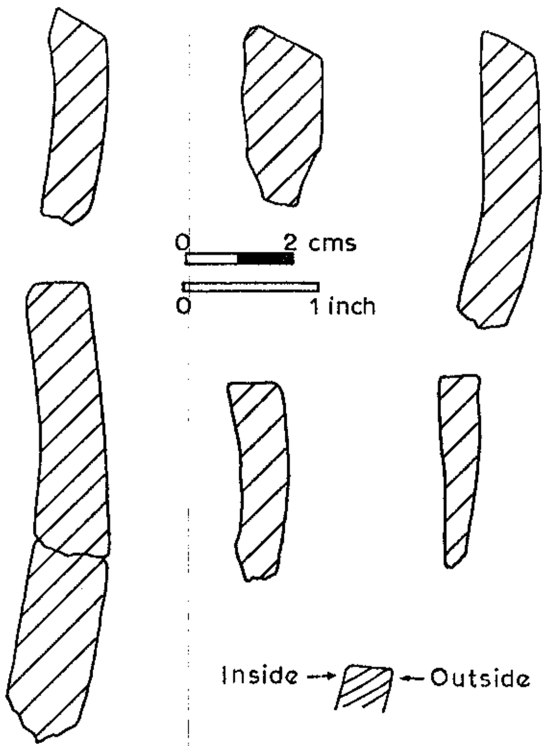


Fig. 59. Pottery rim forms, SU-Va-1.

Samoan, though it has some general relationships to contemporary pottery traditions in Fiji and Eastern Melanesia.

Summary

The excavations at SU-Va-1 from December 1963 to May 1964 achieved most of the purposes for which they were conducted. These include a more complete examination of a stratigraphic sequence spanning the last 2000 years with only one major interruption, fuller definition of an occupation sequence in which the site served different functions during the various periods represented, and collection of an adequate sample from the principle pottery-bearing horizon at the base of the mound providing a portable artifact assemblage useful for comparative purposes. The one aim not fulfilled was that of the recovery of a sufficient portable artifact assemblage of later date with which to compare the earlier one.

The stratigraphic sequence, while it refines and expands on that described by Golson, confirms the general validity of a six layer sequence as applicable to the entire site, even though his description was based on a limited excavation record. The larger area exposed by the 1963-64 excavations has made possible a fuller interpretation of the main occupations reflected by the stratigraphic sequence, however. The occupations follow this sequence:

1. Use of the original surface for an occupation of unknown extent involving storage pits and structures which are associated with a few sherds of pottery;
2. An occupation of uncertain function reflected by layer V in which a deposit containing much cultural refuse was spread over an area which is now towards the centre of the mound;
3. A series of occupations reflecting use of the site for domestic dwellings that are built on low earthen platforms represented by the deposits of layers III and IV;
4. An occupation in which the mound was increased to its present size and height, except for a large central depression in which a series of stone pavements and structures were erected, the function of these features still remaining conjectural;
5. An occupation in which the filling of the central depression and the addition of a gravel spread permitted the conversion of the mound back into use as an earthen platform for a domestic dwelling;
6. The final use of the mound as a place of burial during the early European plantation period.

For this occupational sequence, the portable artifact assemblages of layer V and of the plantation period graves are sufficient to be useful for comparative purposes. In particular this is true of the layer V assemblage of the 1st to 2nd century A.D. in which the pottery and stone tools of that date provide significant contrasts and parallels with the early Tongan materials on the one hand and with the early Marquesan materials on the other (Green 1968).

EXCAVATIONS AT SU-VA-2

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In September 1960 I spent a week in Western Samoa in order to assess its archaeological potential at first hand. During this week one day was devoted to clearing the northern face and recording the stratigraphy of a cutting recently bulldozed through the mound at Vailele now designated as site SU-Va-2. At this time a charcoal sample (not submitted for dating) was collected from the base deposit although no pottery was encountered in that layer. A brief account of the mound, which described its stratigraphy, was written and accompanied by a sketch giving basic measurements for a section through it. This investigation showed that an opportunity existed for obtaining extensive and reliable stratigraphic records for various other mounds at Vailele to compare with those being obtained by continuing with Golson's excavations at Va-1.

The existence of the bulldozer cutting completely through the mound at Va-2 offered a means of obtaining such data with a minimal expenditure of effort and without greatly increasing existing damage to the site. Moreover, I knew from my initial investigation, that the stratigraphic record presented by this section through the mound was complex and implied several stages of construction and occupation, just as Golson's section from Va-1 had done. I also knew, however, that to obtain a really reliable section through the mound would involve far more effort than the one day previously given to it. In fact our endeavours at this site consumed some 54 working days from the initial clearing of the northern face of the cutting directed by Dr. Scott, to the final recording of the stratigraphy carried out by Kaye Green and myself. The excavations, employing on the average four workmen were directed by Mr Boraman and were carried out, with my assistance at crucial points, between February 22, and April 3, 1964.

Our operations were largely directed toward obtaining a complete stratigraphic cross-section through the mound rather than attempting to recover what would have been, from the viewpoint of time, manpower, and previous disturbance of an important part of the central portion of the mound, a necessarily incomplete record of any large scale structural features or other aspects of occupation associated with any particular layer. Two tasks were undertaken with the objective of a complete cross-section in mind. The first was to clear and dress both sides of the bulldozer cutting through the mound, so as to record the stratigraphy in detail. The second was to carry out a series of small scale excavations at selected points along one section which would help in the interpretation of some of the problems presented by the stratigraphy as well as assist in inferring the types of occupation reflected by each of the principal layers encountered.

INITIAL INVESTIGATIONS

The mound was initially recorded in 1960 as approximately 140 by 180 feet in size, the bulldozer cut that passed at a slight angle through the mound being 174 feet in length. The subsequent plane table survey which provided the plan in fig. 60 has confirmed the length of the bulldozer cutting and that of the mound, but revealed that its width is only about 125 feet. Thus in plan the mound is of a rounded rectangular rather than circular form and resembles the other mounds at this locality, at least in their final stages of construction.

Total thickness toward the centre of the deposits forming the mound was originally measured as 8 feet 3 inches and the later more complete sections for this portion of the mound show that in general the deposits vary between 7½ and 8 feet in thickness (figs. 61a, b). Five principal layers were reported as forming the deposits at the centre of the mound in the initial account.

Bed 1, a uniform bed at the base of the mound, extended from one side of the mound to the other and varied in thickness from 1 foot 3 inches to 1 foot 5 inches. The deposit consisted of a medium to dark brown clay containing a few highly weathered boulders of vesicular basalt. Numerous flecks of charcoal appeared near the surface, while toward the base the layer faded into a compact underlying deposit of the same general composition as and similar to the subsoil deposits natural to the area. The bed was interpreted as a palaeosol reflecting the original ground surface before construction of the mound itself, an interpretation that has remained unchanged.

Beds 2 and 3, totalling some 3 feet 9 inches in thickness, were grouped together as the fill and surface of a sub-mound prior to the present one. Bed 2 consisted of a light yellow-brown and fairly compact clay fill with many pieces of highly weathered basalt included in it. It was capped by bed 3, a deposit of similar composition but of fairly pure light yellow-brown clay free from boulders, which had been used to face the surface of the sub-mound. On the available evidence, the original sub-mound was judged to lie off centre towards the western portion of the present mound, its base on the eastern side beginning some 54 feet in from the eastern end of the cutting and extending at least 102 feet to the west. While these initial observations have proved to be substantially correct, the clearing of the full section soon showed the sub-mound's history to be far more complex, involving several extensions to the east. Beds 2 and 3 were surprisingly free from charcoal and other signs of occupation.

What was thought to be an extension of the bed 3 facing material appeared to rise above the surface of the sub-mound to form what was interpreted as the surface of a still higher sub-mound into the top of which a large pit had been cut. This interpretation, however, was clearly in error, and the fuller section indicates that I was misled by identifying as bed 3 what is stratigraphically a much later lens of similar composition.

Bed 4 was identified as a loose and poorly compacted medium brown clay with numerous small pebbles and flecks of charcoal piled to a depth of up to 8 feet on the eastern side extending the mound some 60 or 70 feet in that direction, and to a depth of some 3 feet over the sub-mound on the western side. The result was the present mound. As noted above, the earlier extension of the sub-mound itself to the east, dividing the otherwise similar fills in two, had not been perceived.

Bed 5, a loose dark brown zone, described as the present soil horizon developed under the grass cover on the plantation, was the last layer recorded. It varied between 6 and 10 inches in thickness. Not noted in these initial observations was the fact that it masked a river gravel pavement spread across the surface of the mound.

Subsequent Investigations

The clearing of the entire northern face of the bulldozer cutting revealed most of the errors in the above interpretation. It also revealed that the sequence of sub-mound construction was far more complex than had originally been thought. It was therefore decided, after photographing the existing section, (plate 15) to employ a bulldozer to clear all spoil from the cutting, re-exposing the southern face as well, so that both walls could be dressed down, drawn and compared. At the same time excavations were conducted in squares B-10, 8 and 6 (fig. 60) in an attempt to resolve certain problems presented by the stratigraphic section of the northern face. In squares B-10 and 6 these excavations were taken down to the undisturbed deposits under the mound, and in each case they provided information pertinent to the interpretation of some of the stratigraphic features of mound and sub-mound construction. In the case of square B-8, excavation was carried down only to the floor of the sub-mound, so that a careful search could be made for features on its surface; again it provided the intended information although this was largely of a negative character.

Other excavations had different objectives. A trench was excavated at an angle to the bulldozer cutting (fig. 60) which ran along the surface of the sub-mound down and across the ditch-like depression which was particularly prominent on the south and east sides of the mound. Here the concern was not only to relate the adjacent ditch stratigraphically to one or more of the phases of mound construction, but also to open a section across the ditch which would provide information on its original form. Again this operation was successful in its objective. To complete the cross-section along the northern face of the bulldozer cutting, it was necessary to make a cut back to the

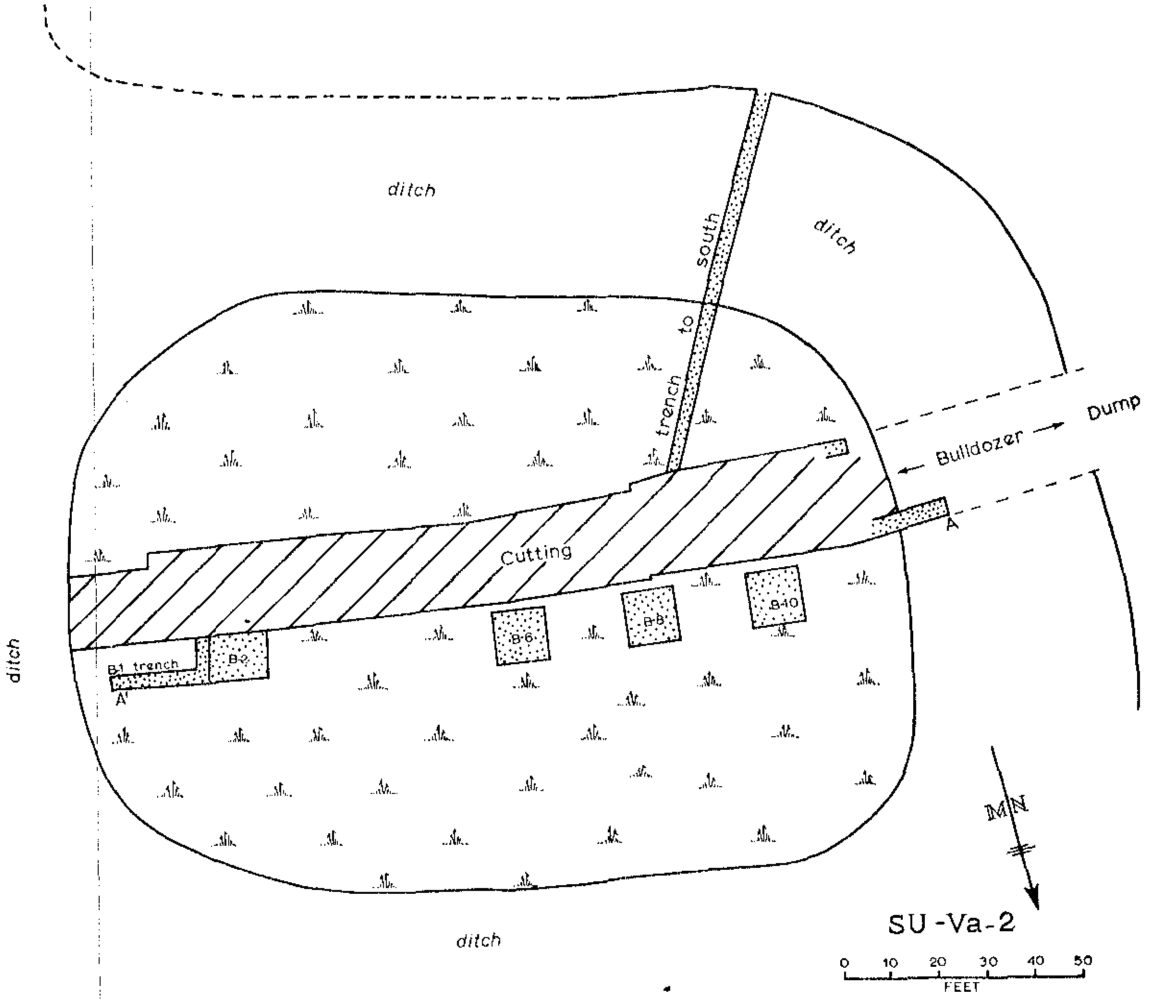

Fig. 60. Plan map of mound SU-Va-2, Vailele, Upolu, showing disturbed and excavated areas.

depth of the sub-mound floor in the area of B-2, because the upper part of the face had been badly damaged by the initial bulldozing, and by subsequent erosion. After this it was necessary to cut a trench from the area of square B-1 to the edge of the mound in order to complete the section. These last two investigations were also useful in revealing the presence at various levels, of a number of pits not previously observed.

With all these objectives accomplished, however, difficulties still remain in the interpretation of the occupational sequence presented by the long stratigraphic section through the mound. These difficulties could probably only be resolved by extensive additional excavations. They relate largely to the over-all form of the sub-mound at any point in the series of constructional stages that characterised its development and to its function during any one of these stages. Whereas the final form of the mound was rounded rectangular in common with many other mounds in the locality, and its function at this time was as a platform supporting one or more structures associated with a pebble pavement, ovens, pits, and adzes that are the usual signs of domestic activity, this may not always have been the case with the sub-mound. This uncertainty with regard to the sub-mound must be kept in mind in reading the following account of the stratigraphy and its interpretation.

Stratigraphic Sequence

The two principal stratigraphic sections through the mound along the northern and southern faces of the bulldozer cutting, together with those for squares B-6 and 10, and that for the trench through the ditch to the south, provided some 500 feet of often complex section which is impossible to illustrate in its entirety. Even the publication of the principal section along the northern face of the bulldozer cutting has presented problems because of its complexity and length. It is published here as the most informative of the sections, but it has had to be presented in separate parts (fig. 61). For this reason another version of the same section at a much reduced scale, employing simplification of features occurring in each layer is also illustrated (fig. 62). This generalised section illustrates graphically major stages in the stratigraphic sequence consisting of: (a) a uniform layer representing a palaeosol underlying the actual mound sequence, (b) a small low sub-mound of rounded (?) shape to the west which was increased in size by several additions to its eastern margin until it was almost as long as the present mound, and (c) the present mound of rounded rectangular form created by covering the entire sub-mound with a deep fill and covering the surface with river gravel pavement, the mound being used as a platform for habitation. These three stages have been labelled Periods I, II, and III and the stratigraphy is interpreted in terms of these three periods. First, however, the sequence of beds in the illustrated section (fig. 61) of the north face of the bulldozer cutting will be described in order of deposition.

Sequence of Beds

Bed 1: the basal deposit of undetermined depth composed of very compact light yellow-brown clay in which numerous large and small pieces of decomposing vesicular basalt occur as inclusions. The bed is lacking in organic material or charcoal and corresponds well to the undisturbed subsoil deposits natural to this locality on which a polygenic soil horizon is normally developed.

Bed 2: a medium to dark brown clay loam flecked with small grains of reddish basalt and lumps of charcoal. The latter occur particularly toward the surface where the soil possesses an imbricating structure, the deposit then becoming less structured and more compact where it joins bed 1. It contains few large boulders or other stones.

Bed 2a: a compacted medium brown loam fill within a large pit cut from the surface of bed 2.

Bed 2b: a loose medium brown loam fill at the base of an oven pit.

Bed 2c: a lens of dark grey to black colour burned bright red at its base from fire, the deposit itself still containing many large pieces of charcoal.

Bed 3: a compact yellow-brown clay with few rocks as inclusions, very similar to the clay deposits used elsewhere in "facing" or "capping" a mound surface.

Bed 4: a light brown, fairly compact clay fill with numerous large boulders.

Bed 5: a very dark brown loosely compacted loam-like fill, very similar to bed 13.

Bed 6: a light yellow brown loosely compacted clay fill with an extensive concentration of rock occurring on its western margin.

Bed 7: a compacted and very pure deposit of light brown clay used as a "capping" on the surface of the softer fill of bed 5.

Bed 8: a lightly compacted clay, primarily dark brown in colour, but mixed with occasional patches of light yellow brown clay and containing pockets of large rock.

Bed 9: a fairly compacted deposit even more mixed in colour than bed 8, the colour ranging from light yellow to dark brown. The deposit possesses numerous small pebbles. Also, whereas the transition from bed 8 to bed 9 is not clearly demarcated, the surface of bed 9 is well defined and seems definitely to represent the side of a former mound.

Bed 10a: a dark brown to greyish clay loam fill flecked with pieces of charcoal, which lies on the western margin of the mound. At its surface are stones that are part of a pavement which may be of later origin judging from its stratigraphic relationship to the sub-mound surface uncovered in square B-10.

Bed 10b: a deposit of fairly good sized rocks, some of boulder size, on the eastern margin of the mound. At their base is a clay lens which extends to the east sealing the underlying oven.

Bed 11: a medium to dark brown clay and loam fill containing flecks of charcoal and exhibiting only occasional pockets of large rock.

Bed 12: a small lens of mixed light and dark brown compact clay.

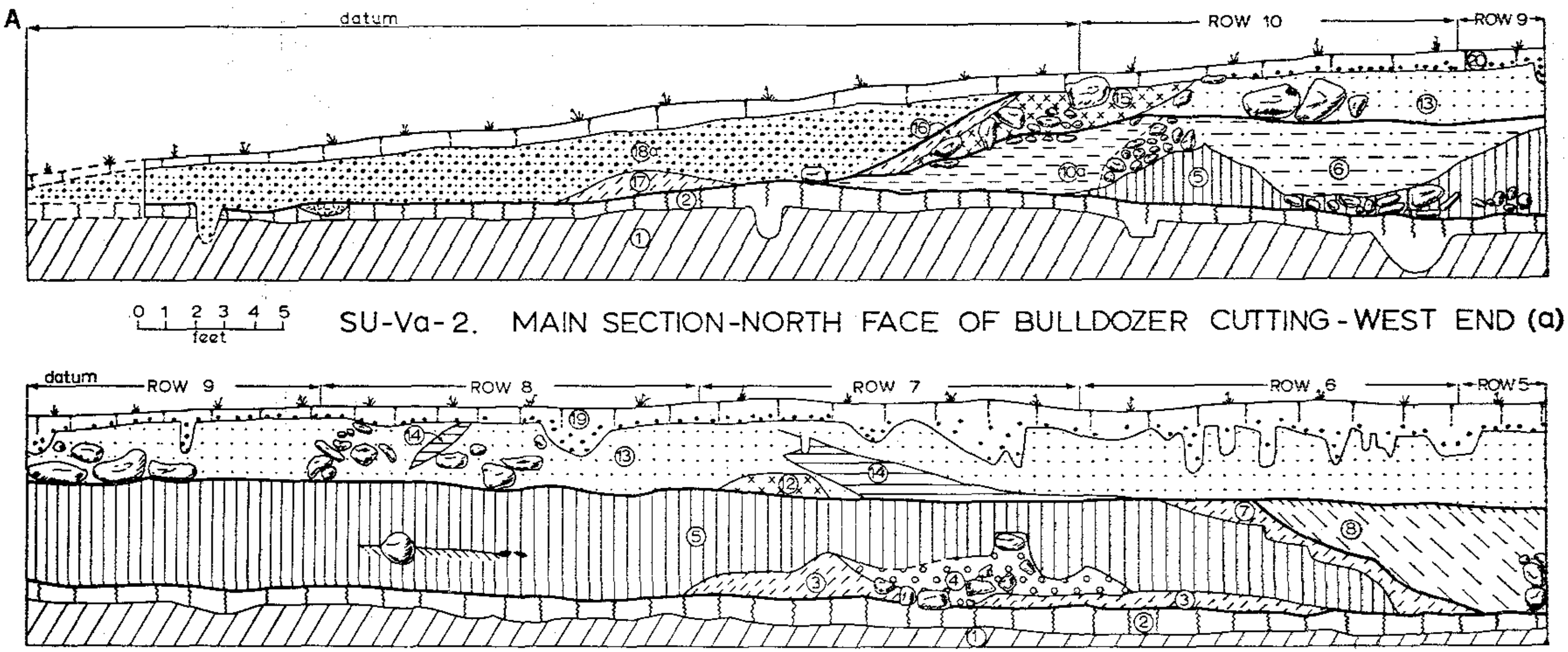

Fig. 61a. Western portion of cross-section along north face of bulldozer cutting, SU-Va-2.

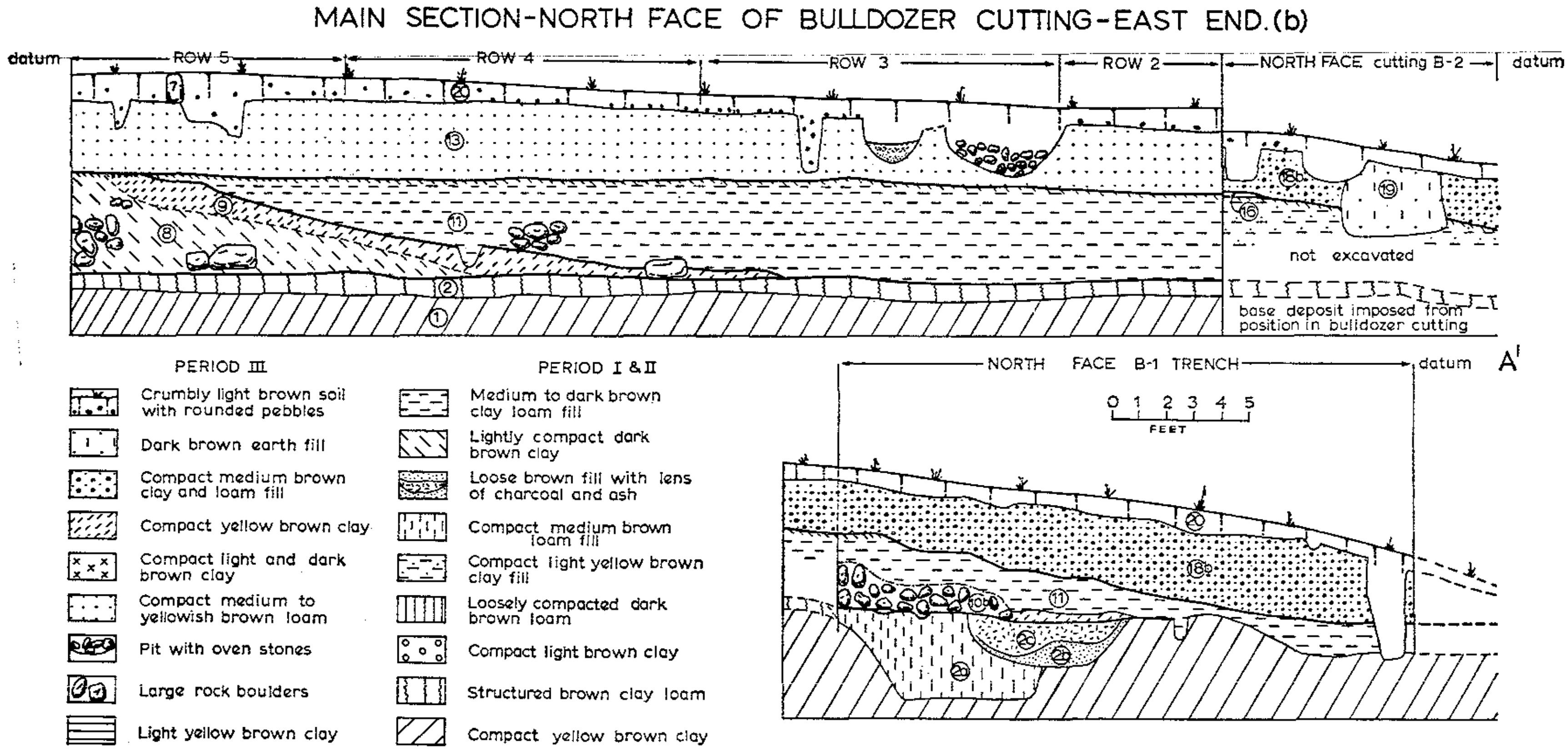

Fig. 61b. Eastern portion of cross-section along north face of bulldozer cutting, SU-Va-2, with key to layers.

Bed 13: a deep fill of fairly compact medium to yellowish brown loam flecked with scattered bits of charcoal and containing few or no large rocks.

Bed 14: a light yellow brown clay lens which appears at two points within bed 13 and seemed initially, because of its similarity to materials used for facing other surfaces, to be part of another mound.

Bed 15: a compact clay ranging from light to dark reddish brown in colour.

Bed 16: an even more compact clay of yellow brown colour used as a facing layer for this margin of the mound.

Bed 17: another small lens of the compact yellow brown clay similar in composition to that used in the facing layers.

Bed 18a: a medium brown fill of somewhat compacted clay and loam which is very similar to bed 18b.

Bed 18b: a medium brown compacted clay and loam fill flecked with scattered bits of charcoal and containing few or no large rocks.

Bed 19: a very dark brown and loose textured earth fill within a deep pit.

Bed 20: a crumbly light brown deposit on which is developed a fairly well structured soil horizon, which tends to mask the occurrence in this layer of a river gravel pavement across the top of the mound, but not on the sloping margins. While not easy to see in section, the paving is well attested by the water rounded pebbles which composed it at the base of the bed. The various postholes and pits which are cut from this level have the same loose earth fill which constitutes the deposit itself.

INTERPRETATION

Human occupation of the locality in Vailele called Suga before the construction of the mounds is attested at all four excavated sites. In two cases, Va-1 and 4, the building of the mounds has protected from later disturbance a basal layer containing evidence of occupation by a people initially using pottery, while in the case of Va-4 this was followed by an early aceramic occupation as well. In Va-2 and 3 the mounds have preserved a basal layer which is associated with only a few ephemeral indications of occupation dating to the 12th century A.D. or before. At Va-3 a low flat pavement follows the initial evidence of occupation and is prior to the construction of the mound. However, at Va-2 the sequence of mound construction directly overlies this basal horizon.

Deposition of bed 1, the natural subsoil deposit common to this locality, is, on geological grounds, prior to any human occupation, and it is reasonable to assume that a soil horizon was already established on its surface which was then disturbed by man. Bed 2, a fossil soil horizon, provides evidence in support of this interpretation in the form of flecks of charcoal scattered through the deposit, but particularly toward its surface, and in the form of a limited number of stratigraphically associated features.

These features constitute Period I to which bed 2, and other minor lenses like 2a, b, and c may be assigned. The features consist of scattered hearths and pits, one possible oven and some postholes. All six of the possible postholes were identified in the sections, but only three of them are certain. A pit, with a stone slab set on edge along one side and rocks within, was also identified in section along the southern face of the bulldozer cutting; other pits may be noted in the northern face. A fire hearth on the surface of bed 2 was sectioned at the west end of the northern face (fig. 61) and another was discovered out in the cutting itself at the same end. A thin lens of charcoal and ash was found on the surface of bed 2 above the pit with slab noted above, and a similar lens of organic material with charcoal was encountered on the same surface in the southeast (not southwest as previously reported) corner of square B-6 (Green and Davidson 1965: 64). The charcoal sample, GaK-502, yielded a result of 850 ± 70 years before 1950, an indication that bed 2 precedes the 12th century A.D. in time and that the mound sequence postdates it.

A pit 1 foot 11 inches deep, cut from the surface of bed 2, was encountered in the northwest corner of square B-6 and several intercutting pits and one oven were uncovered towards the eastern end of the mound in the area of square B-1, especially where the excavations were extended as a trench to the east. Here a deep pit refilled with earth (bed 2a) was cut into by a later pit which was partially refilled (bed 2b) before it was in turn used as an oven (bed 2c).

Only a single sherd of pottery and a few flakes were recovered from bed 2, again suggesting that human occupation in the area was not intense prior to the 12th century A.D. Rather from all the evidence, including the structure of the soil horizon itself, one might most reasonably infer some type of horticultural activity in the area of the site during this period.

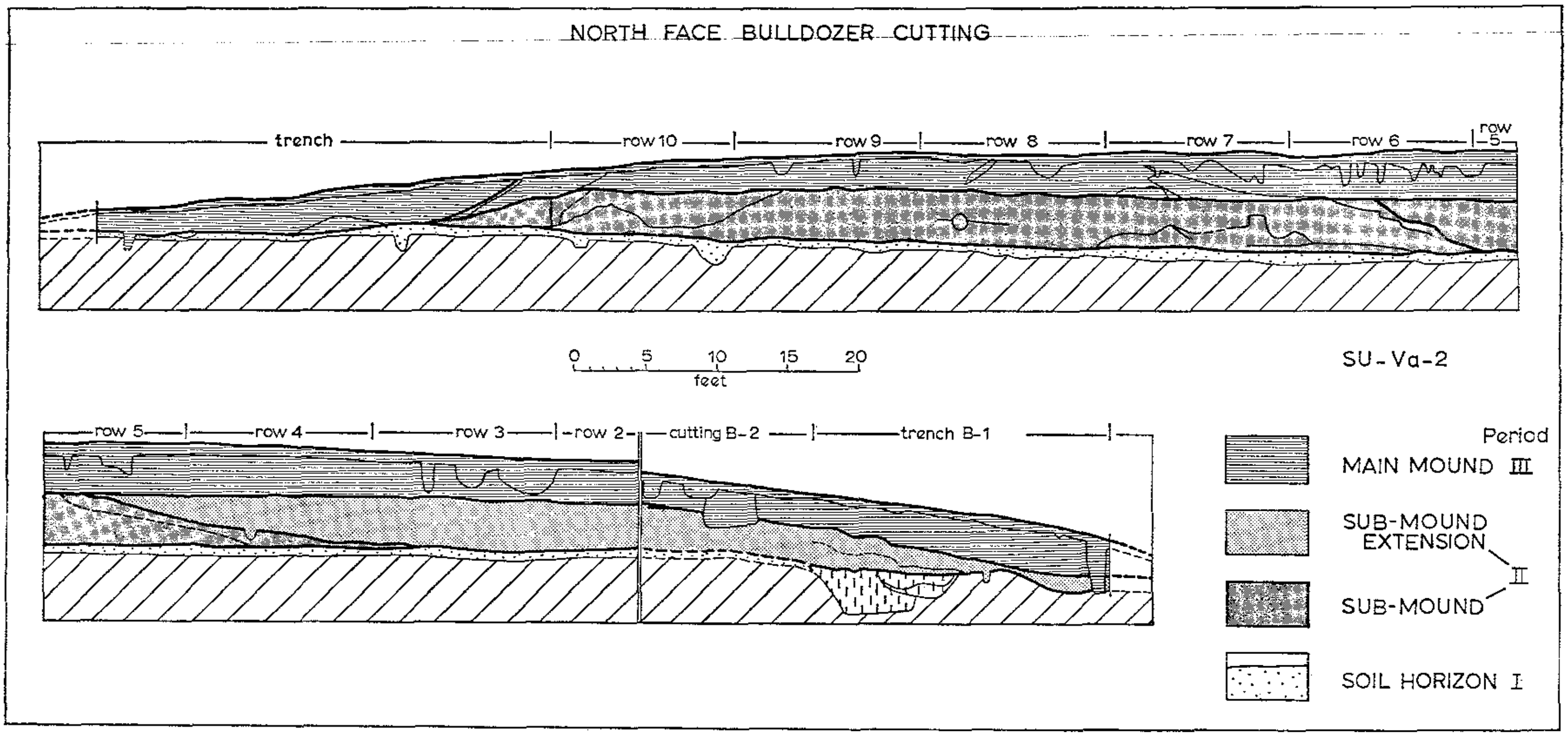

Fig. 62. Interpretative section, north face of bulldozer cutting, SU-Va-2.

Period II begins with the construction of a small low mound. It is fairly clear that this mound consisted of at least beds 3 to 7. Its form at this stage cannot be identified. Only with the addition of beds 8 and 9 along the eastern edge and 10 on the western edge is the evidence sufficient to predict a mound of rounded rectangular shape. The difficulties of interpretation, not apparent from the illustrated section alone, arise when one attempts to correlate the sub-mound beds appearing in the northern face with those in the southern face. Many are found to have no obvious correlates. Thus what appears as an early side to a sub-mound, bed 7, was identified in the northern section and its trend traced in plan across square B-6, yet it has no obvious correlate in the southern face and was not noted in my initial observations on the northern face. At present it must be left as a puzzling edge possibly reflecting some earlier stage in mound construction. Beds 3, 4, and 6 also appear to be local and have no obvious equivalents in the southern face.

Even more difficult to interpret is the appearance in the southern face of a continuous layer with a clearly defined surface underlying that of the main sub-mound floor. This again could be evidence of an earlier sub-mound, but only the slightest hint of a corresponding surface appears in row 8 of the grid, within bed 5, and nowhere else in the section for the northern face (see fig. 61).

Reasons for thinking that this surface does not represent an earlier sub-mound are several. The first is that just cited, the lack of a corresponding surface in the northern face of the bulldozer cutting. Another is the fact that the bed in the southern face which forms this surface is only some 12 to 18 inches thick and difficult, if not at times impossible, to separate from bed 2 which underlies it, this being the only portion of any section where this contact was not clearly demarcated. Still another is that except for its surface, the bed is difficult to distinguish from that overlying it and is very similar in compositon to bed 5, the principal bed forming the sub-mound in the northern section. Thus the existence of two distinct beds in the southern section may simply reflect intervals in building the initial sub-mound, with the lower bed derived from the soil scraped from the surrounding surface and the upper bed a fill quarried from below that surface.

Another problem was a concentration of rock forming a crude wall at the western end of bed 6 at the point where the flat surface of the sub-mound begins to slope down along the surface of bed 10 to join with bed 2. In square B-10 the sub-mound surface could be traced and again it sloped down on the surface of this bed in the same fashion. Concentrations of rock also appeared under it, but careful excavation revealed no evidence that they formed any sort of crudely laid dry stone masonry wall. A concentration of stone also appears at this point in the section in the southern face, occurring at the base of a similar bed whose surface again slopes from the sub-mound floor down to the top of bed 2. All this suggests that while the form of the sub-mound along its western edge was dependent on the addition of the deposit labelled bed 10 or its equivalent, this was preceded by dumping a quantity of rocks along this margin to form a crude edge faced in stone prior to finishing the side slopes with a more compact clay layer (fig. 63).

Bed 9 in the northern face of the cutting (fig. 61) is a "facing" layer which forms the first definitely identifiable side for the eastern margin of the sub-mound. Its correlation with a corresponding layer of similar slope and composition in the southern face is fairly straight forward and seems reasonably secure. Its position is also consistent with my initial identification and description of a sub-mound beginning at this point and extending 102 feet to the west. In fact by using the observations from the section along the trench to the south in conjunction with those just discussed for the eastern and western margins of this first sub-mound, a small rounded mound with a flat upper surface of between 70 and 75 feet in diameter and a base diameter of about 100 feet may be inferred as a likely form (fig. 63), although other forms, such as a star mound, are also possible.

The sub-mound, however, did not long remain at this size but was considerably expanded by an addition to the eastern side and probably to the northern margin as well. In the illustrated section (fig. 61) this event is represented by bed 11, a bed which also appears in the same position in the southern face of the bulldozer cutting. It was this extension which went unobserved during the original observations made on the mound's stratigraphy. If our inferences are now correct, these additions would result in a sub-mound whose size was over twice that of the original (fig. 63).

Whatever the shape of these two sub-mounds, or any earlier one, it appears that they did not serve as a platform for structures used regularly for habitation. First the rock or pebble pavement that usually accompanies such a structure was lacking from all the sub-mound surfaces examined both in section and in the

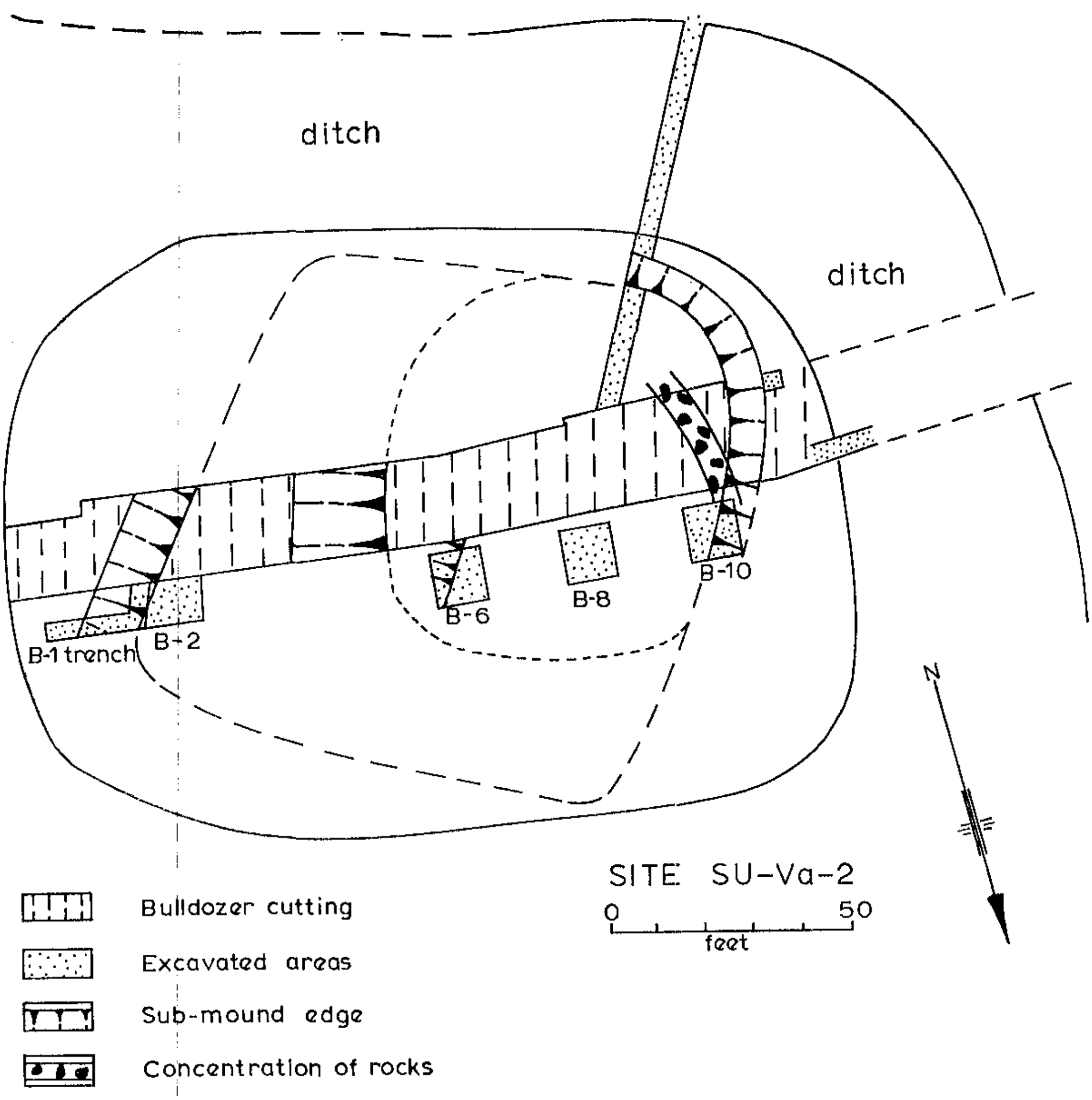

Fig. 63. Plan showing estimated extent of sub-mounds, SU-Va-2.

excavated squares and trenches. Also bits of charcoal, artifacts, and other debris normally associated with habitation, were absent from this surface. Finally, only a few features have been identified that derive from the sub-mound surfaces examined. Those found consist of three possible postholes along the upper margin of the sub-mound in square B-10 which may represent some form of fencing along the perimeter, and five small stake holes, none more than 6 inches in diameter, encountered as an irregular north-south alignment in the centre of square B-8. Other than these the sub-mound floor presented a very hard and relatively smooth clay surface unbroken by features of any sort. This situation is sufficiently unlike that encountered in the other mounds, where the clay surfaces are neither as compact nor as well formed and where they are commonly penetrated by pits and postholes and invariably overlain by a pebble spread representing a pavement, to claim for the sub-mound a significant difference in function during its various stages in growth, even without knowledge of its exact form.

The trench to the south through the surrounding ditch-like depression revealed that the soil horizon labelled bed 2 had been entirely cut away from the margin of the sub-mound to the southern end of the trench. Also up to 15 inches of subsoil deposits from bed 1 have been removed, creating a flat shallow ditch-like depression. A similar feature appears on the eastern end of the illustrated section in the area marked B-1 trench (fig. 61). Here the surface of the sub-mound slopes down from the area of square B-2 until it reaches a point where bed 11 is only some 6 inches thick and resting directly on bed 1, bed 2 having been entirely cut away. After this point it is evident that nearly 2 feet of bed 1 has also been removed, presumably to form one side of what was probably a shallow flat ditch. While this ditch is now filled with bed 11, it is likely that the filling was the result of later erosion from the surface of bed 11 and that initially a shallow flat "ditch" created by the borrowing of spoil, entirely surrounded the sub-mound.

The filling of the shallow ditch-like feature with deposits eroded from the sub-mound is attested both at the eastern margin of the mound as discussed above and in the trench to the south, though in the latter instance, it appears that some of these deposits were partially removed again when the present mound was constructed. This period of sub-mound erosion suggests there was an interruption in the use of the site before the construction of the present mound.

Period III is constituted by those beds which belong with the construction and habitation of the mound in its present form. This begins with the creation of a mound platform whose size is approximately equal to that of the last stage of the sub-mound but twice as high. It is followed by the enlargement of this mound to its present size and shape by significant additions on the margins.

Two lens-like beds, 12 and 14, and one continuous deep fill, bed 13, which cover the entire sub-mound to a depth of not quite 3 feet form the first step in this process. Bed 12 would seem to be only a very localised deposit, while the two lenses of bed 14 were those which initially led me to believe that a higher sub-mound with a large depression in its centre had been erected at this point over the earlier sub-mound. The excavations in square B-8 and a careful study of the section face has shown that this interpretation is incorrect and that bed 14 is nothing more than a localised lens which is part of the general mound fill.

Of more interest are the results from the excavations in square B-10 which assist in the interpretation of beds 15 and 16 in the illustrated section (fig. 61). In square B-10 the remains of a stone pavement occur at the base of bed 15 forming a facing layer on the side of the mound. The lower portion of the pavement rests on the surface of bed 10 or is embedded in it; the upper portion rests on the surface of bed 13 (plate 16). Although the extent of this paving is not known, it appears to have been restricted because it does not appear in equivalent situations on the southwestern margin of the mound either in the bulldozer cutting or the trench to the south, or on the eastern margin of the mound in square B-2 or in either face of the bulldozer cutting. The stratigraphic position of the pavement in square B-10 made it quite evident that it followed the sub-mound in time — a point not clear in the bulldozer cutting section — and was thus to be associated with the earliest step in the construction of the present mound platform.

Whatever its purpose, the pavement did not long endure before being covered by bed 15. Many large boulders were included in the deposition of this bed along the side of the mound, and when completed its surface was secured by facing it with a layer of clay (bed 16). A clay facing layer of similar composition occurs in equivalent stratigraphic contexts on the eastern margin of the mound. Thus in the southern face of the bulldozer cutting, it lies directly on the sub-mound surface at the lower end, but rests on a bed that is the correlate of 13 at the upper end. In the *western* face of square B-2, bed 13 is terminated by a similar clay capping layer that slopes off to the north from the upper surface of bed 13 down to the flat surface of the sub-mound floor. Only the tip of this bed appears on the surface of the sub-mound floor (bed 16) in the north face of the illustrated section at the western end of square B-2 (fig. 61). This furnishes further evidence that the margins of the sub-mound and the present mound originally coincided, and also helps to pinpoint the approximate position of the sub-mound margin along the northeastern side. Still it would appear from all the sections examined that such facing layers were localised and not general, for they do not appear on the southwest margin of the mound in either the bulldozer cutting sections or those of the trench to the south. I am inclined, therefore, to treat all these facings, including the pavement, as either construction stages or local repairs to the margins of the mound while it was in use as a house platform.

Bed 17 is presumably nothing more than a local lens of clay material similar to that used for facing the mound's margin which was dumped at this spot at some time prior to the final additions to the margin of the mound.

Bed 18 is divided into sub-beds "a" and

"b" because it is only from similarity in composition and position in the stratigraphic sequence that I am able to infer that they are the same deposit. A bed which is probably their equivalent also appears in the southern face at the eastern end of the bulldozer cutting, but not on the western end. Thus around some sides of the mound, but particularly on the southeastern and northwestern margins (fig. 63), it would have been necessary to add a fairly extensive fill to enlarge the mound to its present size and shape, and sub-beds 18a and b reflect this activity.

To summarise, in Period III, a mound double the height of the sub-mound in its final stage, but essentially the same size and shape, was created by the addition of beds 12 to 16. It was then made into a mound of rounded rectangular shape, with a slightly different orientation, by the addition of beds 18a and b. Actual occupation of the mound as a house platform may therefore have spanned more than one period of habitation. Extended habitation is reflected in the multiple features: pits, postholes, ovens cut into the surface of beds 13 and 18, not only in the illustrated section, but in all other sections as well. Some of the pits were intercutting and two even contained some bone and shell refuse. The pits and ovens were most numerous along the eastern side of the mound, while the postholes were more frequent in the centre portion, particularly in the excavated squares. The limited nature of the excavations, of course, made it impossible to infer any structural forms from the distribution of the postholes, but the appearance of a very large deep posthole at the eastern margin of the mound in the illustrated section (fig. 61) and one in a similar position in the southern face of the bulldozer cutting suggests that a substantial wooden fence may have been present around this edge of the mound.

Bed 20 is the present soil horizon formed on the surface of the mound. Contained within it on the flat upper surface of the mound are rounded water worn pebbles and remnants of a gravel spread which once formed a living surface. This horizon, however, is no longer distinguishable as a separate deposit from bed 20.

The final occupation of the mound is almost certainly prior to the late 19th century use of the locality as a plantation. This inference is supported by the fact that only pre-contact portable artifacts were recovered from bed 20. It is also consistent with the fact that one end of a shallow rectangular grave pit, 11 to 12 inches deep and 23 to 24 inches wide, cut from the present surface through this pavement was encountered in the southeast corner of square B-6. Parts of the two femurs remained in a very decomposed state at this end of the grave, suggesting burial in an extended position. The burial is probably that of a 19th century plantation labourer similar to those encountered at Va-1 (Report 7, p. 127).

From the section along the trench to the south, it appeared that an earlier fill of the flat ditch surrounding the mound had been removed from the last 30 feet of the trench beginning with a sharp vertical face just beyond what was judged from surface evidence to be the present margin of the mound. If so the mound's margin on this side may be slightly beyond that indicated on the plan (fig. 63). It would also suggest that the ditch, although at present filled wih deposits eroded from bed 13, was still functioning on this side during the Period III occupation of the mound.

Portable Artifacts

Few artifacts were recovered from this site despite disturbance of a large area and actual excavation of more than 600 square feet of deposits. Among the artifacts only the two adzes from bed 20, Period III, assume any importance. The two adzes are of Types III and IX. The Type III adze is a complete specimen (fig. 64c) and was recovered from bed 20 at the east end of the baulk between square B-6 and the bulldozer cutting when this baulk was carefully removed to the depth of the sub-mound floor. The adze is 91 mm. long and measures 40 mm. wide by 14 mm. thick on a section taken at the middle of the adze. It is polished all over, except for the poll, as is diagnostic for adzes of this type. A slight additional facet appears on the left hand edge of the front of the adze. The other adze, of Type IX, is represented only by the butt portion, and was found in bed 20 of square B-2. Both of these adze types are common forms in the later periods of Samoan prehistory.

A third adze, an unfinished example of Type I, has a cutting edge 59 mm. wide, or more than twice the 23 mm. which is the width of its poll. All surfaces are flaked and even the bevel portion is not ground. The shape of the adze suggests it was made on a large thick flake in which the poll was the initial striking platform, the flat surface of the flake becoming the back, and part of the hinge fracture at the end of the flake surface becoming the bevel. The adze now carries a well developed patina characteristic of items from the basal layers of the other mounds which develops as a result of prolonged burial in the acid soil. It was

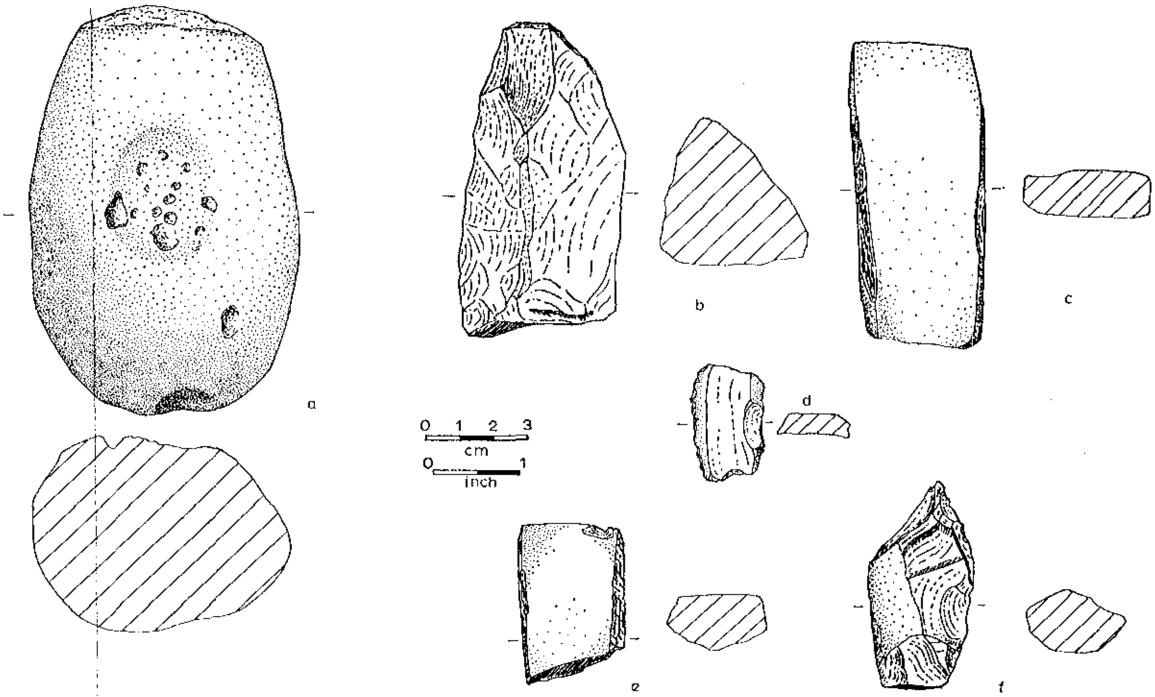

Fig. 64. Artifacts from SU-Va-2 (c), and SU-Va-3 (a-b, d-f). a. pounding stone, G 10/570. b. broken adze, Type VI, A 10/143. c. adze, Type III, A 10/206. d. retouched adze flake, A 10/147. e. broken adze, Type III, A 10/151. f. auger made on broken adze, A 10/168.

found some 50 feet in from the eastern end of the bulldozer cutting next to the north face during the cleaning up of that face. It is likely that it derives from layer 2 though it was removed from its context before this could be verified.

Other materials from secure layer 2 contexts include one body sherd of thick coarse pottery, an unutilised but probably man-made stone flake; and a large hand-sized pebble, one edge of which has had flakes struck off from two directions, leaving a sinuous cutting edge. All came from square B-6. The pebble with flaked cutting edge would appear to qualify as a chopping tool similar to those found in Va-1 (Report 7, p. 134). The piece of pottery is the only sherd from the basal layer. Square B-10 produced no artifacts from its basal layer and none was recovered in cleaning up the bulldozer cutting sections for drawing.

Both of the other pieces of thick coarse pottery found came from sub-mound contexts, one in square B-6 and the other in the southern face of the bulldozer section opposite row 9. Their present position is interpreted as secondary, a result of being brought in with the fills which make up the sub-mound.

In addition to the two adzes described above, a fragment of an unfinished adze, a large grinding stone, a stone flake and a reddened polishing pebble were recovered from bed 20, Period III. The fragment of the unfinished adze, which has edges bruised from attempts at flaking, was found in square B-2. The grinding stone, made on a large boulder, possessed a single hollow grinding surface. It was found discarded in the most eastern of a series of pits cut from bed 20 into the underlying fill of bed 18b in the area of square B-2. The pebble with a reddish polish on one side that looks as if it resulted from burnishing some red surface was also found in square B-2. The large unused stone flake, which carried a heavy patina, came from bed 20 of square B-8. It may well be in secondary position. Another flake from square B-8 also has a heavy patina; it was recovered from the top of bed 13 where its position is again probably secondary.

This account of the portable artifacts indicates they were uncommon anywhere except for that part of bed 20 which lay on the eastern margin of the mound, the same area where an increase in pits and ovens and the only midden refuse were encountered.

SUMMARY

Investigations at Va-2 were directed almost entirely at recovering reliable sections through the mound from which an outline of its stratigraphy could be produced, the ultimate objective being the reconstruction of a sequence of events which could be compared to others in the Vailele area. While this aim was in large part achieved, the interpretation of the stratigraphy, particularly that of the sub-mound, was found to be more difficult than had been anticipated even with information from the limited excavations conducted to assist in this process. However the main outlines of a three period sequence are clear.

Evidence for utilisation of the area of the site in Period 1, prior to the 12th century A.D., is slight and probably represents some form of clearing and horticultural activity. This is consistent with the fact that no signs of the nearby occupations belonging to the earlier ceramic periods were encountered. In Period II a sub-mound, probably of square or rounded form, was built in at least two stages. Whatever its shape, this sub-mound was clearly not used for habitation, though its function could not be determined from the limited evidence recovered. A shallow flat ditch surrounded the sub-mound during its final stage and probably was the source for some of the fill.

Subsequently this ditch was filled by erosion from the surface of the sub-mound, after which a new period in mound construction, Period III, began. In this period a new mound of the same size and shape as the existing sub-mound, but twice as high, was constructed and used as a house platform. The mound was then enlarged by additions to the northwestern and south-eastern margins to take on its present rounded rectangular form. Associated with the occupation of Period III were pits, ovens, postholes, a pavement, a little midden refuse and a few portable artifacts, all signs of domestic habitation prior to European contact.

With the German development of Vailele as a plantation in the last half of the 19th century, occupation by Samoans ceased. The mound, however, served at least once as a burying place, probably for a plantation worker.

EXCAVATIONS AT SU-VA-3

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Excavations at Va-1 and 2 having been brought to a close, in the few weeks remaining, a not as well defined but otherwise similar mound lying between Va-1 and 2 was selected for test excavation. The main objectives were to determine the general outlines of the stratigraphy and to recover materials along with datable charcoal samples from any earlier occupations preserved under the main mound deposits. For this purpose the approximate centre of the mound was determined by measurement and base lines laid out from it along magnetic north-south and east-west directions, so as to define quarter sections on the mound. Two ten foot squares, C-5 and 6, separated by an intervening baulk of 2 feet, extending from the centre point along the east-west base line in the northwest quarter of the mound, were initially selected for excavation (fig. 65a). In these squares excavation by layers proceeded until the undisturbed sub-surface clay common to the area underlying the various mound deposits was reached. Operations in these two squares fulfilled the main objectives. A relatively straightforward stratigraphic sequence emerged and an excellent charcoal sample was recovered from one of a series of firepits in the bottommost layer.

Two other squares, C-7 in the row already begun, and D-5 to the north of C-5 (fig. 65a), were also opened, but were excavated only to the top of layer 3. The same was done with the three intervening baulks. In this instance the object was to test further the feasibility of defining postholes and obtaining patterns that might reflect the nature of former structures on the mound itself.

In all, 15½ working days were spent in clearing the grass, laying out the squares, excavating them and recording the finds and features from this site. Each day between five and seven men, most with prior experience on one of the other mounds, were employed in these tasks under the supervision of Crosby and myself.

STRATIGRAPHY

Four principal layers deposited by man and two deposited by nature were encountered in the excavations (fig. 65c).

Layer 1: Today the uppermost layer exhibits a brownish soil profile developed under grass on what was once a pavement composed of larger than usual water worn pebbles and gravel from a local stream. Removal of the turf with spades left the gravel portion of the layer exposed, and this was excavated by trowel in order to define various features cut into underlying deposits and filled with this material. As is usual, no features could be defined on the pavement surface itself, even when it was trowelled down. Nevertheless it is probable that many and perhaps most of these features actually originate from the pavement surface of layer 1.

Layer 2: a greyish-brown clay mixed with smaller water worn pebbles and some river gravels. It could be distinguished from the layer 1 deposits, which are otherwise similar, both by colour and size of pebbles everywhere except in square D-5. There, particularly in the southeast corner, disturbance by the roots of a coconut tree made this distinction impossible. Like layer 1, it is interpreted as a pavement commonly associated with Samoan dwellings and other structures. This layer was also

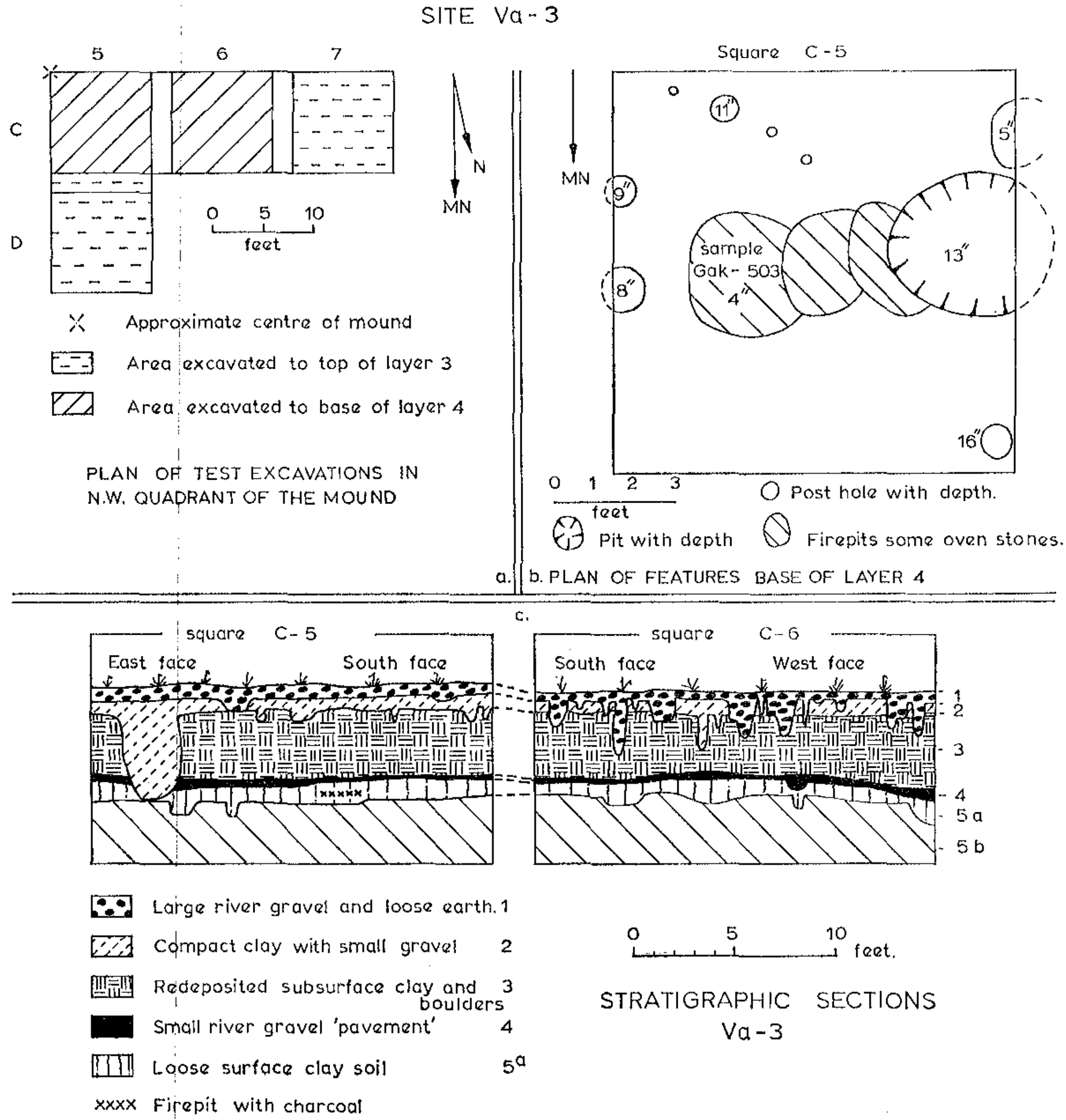

Fig. 65. Plan and cross-sections, SU-Va-3, Vailele, Upolu. a. plan of excavations. b. plan of features at base of layer 4. c. cross-sections for east, south, and west faces of squares C-5 and C-6.

removed by trowel, revealing an underlying hard clay surface into which numerous features filled with this material were cut. These were defined by excavation and plotted. Some pieces of branch coral and occasional shell were recovered in this layer in squares C-5 and 6.

Layer 3: Removal of the top of the next layer revealed that a light brown to reddish-orange coloured clay, 3a, though not always continuous over the entire surface, had usually been applied to the top of a deep earthen fill, presumably to supply a firm base on which the overlying pavements rested. Locally this "puddled" clay lens was up to 3 inches thick, and even lined some of the features. Under it was the main fill, 3b, of redeposited clay and rocks derived from borrowing in the surrounding area, in particular from the depression and possible sunken way to the south of the mound.

The main fill, yellowish-brown in colour with many boulders of decomposed vesicular basalt, was between 3 feet and 3 feet 6 inches thick, and as it was lacking in internal features, was removed by shovel.

Layer 4: in composition consists of a fine crushed stone and small pebble spread in which occur occasional large water worn pebbles and thicker local concentrations of river gravel. Otherwise it formed a very thin deposit, 3 to 6 inches thick, on the surface of which no obvious features could be determined. Its removal by trowel revealed numerous features, however, particularly firepits on the surface of or cut into the underlying naturally deposited layers.

Layer 5a: a grey to yellow-brown friable soil of the same general composition as the underlying undisturbed deposits. While it was usually possible to define firepits both on its surface, and within it, in general, other features could only be identified where they had been cut into the underlying natural. It is interpreted by myself as the original soil zone, much disturbed by subsequent human activities including the building of fires, and digging of several large shallow pits at a time *before* the deposition of layer 4 took place.

Layer 5b: the compact yellowish-brown local clay with many large blocks of very reddish decomposed vesicular basalt encountered at the base of all excavations in the area.

Occupation Sequence

Initial human occupation at this site is represented by firepits or small ovens in or on the surface of layer 5a, and occasional shallow pits and possible postholes cut into the underlying natural (fig. 65b). This evidence is thus very similar to that obtained from the basal layer of Va-2, and in my view is best interpreted as being associated with local horticultural activity. It ceased at this site with the deposition by man of a gravel pavement on the surface of layer 5, designated layer 4. This was unlike other such gravel spreads in that in these two squares it did not fill a host of underlying features cut into the deposits below. The portion encountered in excavation probably represents the margin of one of these pavements, rather than the central area where features belonging to one or more structures might be expected. It is also necessary to note the lack of any artificial infilling under the pavement. which places it in a class often recorded in Samoa. In this class the pavements surrounding structures are nearly flush with the ground level, with a single row of natural boulders used as curbs to define the perimeter, and the interior "paved" with small stones, water worn pebbles, and gravel from the local stream.

The first of a series of firepits at the base of layer 5a[1] in square C-5 yielded a satisfactory charcoal sample (GaK-503) which has been radiocarbon dated as 865 ± 70 years before 1950 (fig. 65b; Green and Davidson 1965: 64). This places initial human activity at this spot in the 10th or 11th century A.D. followed shortly thereafter by the first sign of more deliberate occupation.

Sometime afterwards the construction of the earthen mound followed in which the central surface was capped by a puddled clay "skin", presumably to provide a more solid and stable surface. This practice was also noted for the surface and sides of the sub-mound at Va-2. The earthen mound was, on the present evidence, used primarily to support a number of structures whose precise form was difficult to discover from the surviving postholes.

The evidence for the use of the mound to support structures, probably dwellings, is of three kinds. First are the typical pebble pavements associated with such structures, second are the numerous postholes and pits filled with these deposits, and third is a small group of portable artifacts found in these deposits and not in the other layers. Given the relatively simple stratigraphic sequence, it seems most likely that the earthen mound took its present form in one operation, very much as did mound Va-4, and that thereafter two main prehistoric occupations followed. The final use of the mound has been by Europeans in the historic period, although this was only minor in contrast to the substantial European occupation of Va-4.

Features were identified in large numbers on the surface of layer 3 and again on the surface of layer 2. Most were postholes, others were stake holes, and a few were shallow pits. No firepits, portions of stone curbing, or ovens were found. Features on the surface of layer 3 and filled with layer 2, all appeared to arise from that surface. But our experience of these "pebble spreads", usually known as *'ili'ili*, has taught us, as noted several times previously, that these appearances may be quite misleading, so that many if not all these features may derive from the surface of the layer 2 pavement.

Man-made and natural disturbances of the upper surface of layer 3 were very numerous,

[1]Layer 4b has here been redesignated as 5a, so that the sample's context is still the same as that previously reported.

though not difficult to define, and most disturbances terminated within the first foot and a half of the mound fill. They appear to occur in equal concentrations in all four of the squares and the three intervening baulks, and the man-made features, because of their great number, do not form any easily distinguished structural patterns. The postholes range in size from a large one, 3 feet deep with a surface diameter of 2½ feet (fig. 65c), to a number between 12 and 20 inches deep and a great many between 6 and 10 inches in depth. A fair number of stake holes, 3 to 4 inches in diameter and 4 to 6 inches deep were also in evidence. Thus in a ten foot square anything between 15 and 20 postholes and 6 or 8 stake holes, plus one or two small pits may occur. This does not include a number of other holes that had to be marked as uncertain. When coupled with other disturbances by roots and burrowing animals the results lead us to conclude that the opening of a larger area in order to define possible structures would be of limited use. What this evidence does reflect is continued reuse of the pebble pavement by rebuilding a number of structures, before the entire mound surface was renewed with the addition of layer 1.

Discrimination of features on the surface of layer 2, filled with layer 1, was more difficult than for layer 3, and again determination of which features belonged with the surface of layer 1, and which arose from the surface of layer 2 was not possible. It is likely that many are to be associated with the layer 1 pavement. The features on the layer 2 surface were as numerous and exhibited the same range of variations as those on the surface of layer 3. As a consequence no patterning could be assigned to them which would allow the certain inference of a particular form of structure. Rather one must conclude that a number of structures of undetermined form are to be associated with both pavements.

From the available data it is possible to support an interpretation which suggests that occupation also occurred directly on the "puddled" 3a surface of the earthen mound, so that three rather than two occupations could be inferred. However in view of the usual Samoan practice of placing stone paving around structures, this interpretation is not accepted, although as a possibility it cannot be excluded on the present evidence. One reason for raising this possibility is that this clay capping lens is not always encountered at the surface of earth mound fills, and where it is, as at Va-2, it has sometimes formed an occupation surface. This and the occasional lining of some of the postholes with this clay, would lend some support to such an interpretation.

Portable Artifacts

A small collection of artifacts was discovered, primarily in layers 1 and 2. It includes broken adze heads, adze heads too fragmentary to classify, flakes with polished surfaces broken from finished adzes, some of which have been reused, numerous other flakes, a portion of a grinding stone, a pounding stone, an auger or piercing tool, pieces of pottery, and a piece of metal.

Adzes

Four broken adzes assignable to Type I were obtained, one from layer 1 and one from layer 2 in squares C-5 and 2 from layer 1 of square C-7. They represent two mid-section portions from C-5 and a water rolled blade end and a portion of a poll from C-7. All are from small versions of the most common Samoan adze types. An unfinished adze with all surfaces flaked but otherwise conforming to Type II was recovered from layer 1 in square C-6. Another portion of an adze with flaked surfaces and probably a broken roughout of either Type II or VIII was found in layer 2 of square D-5. Two butt portions of Type VIa adzes derive from layer 1 contexts, the water rolled example being from square C-6 and the other from C-5 (fig. 64b). The last adze, an entire blade portion of Type III, some 47 mm. long and ground on all sides (fig. 64c), came from the top 3 inches of layer 3 in square C-6. Discounting the two rolled examples, which could have been intruded with deposition of the river pebbles, and the one adze not definitely typed, the prehistoric occupations on the surface of the mound yielded six partial adzes of Types I, II, III, and VIa, which constitute a typical late assemblage.

Adze Fragments And Polished Flakes

Most unclassified adze fragments and flakes with one or more polished surfaces which derive from the breaking of finished adzes, were in large part recovered from layer 1. One fragment from square C-6 was possibly from a Type I adze, but the other two from the baulk between C-6 and C-7 were unclassifiable. The remaining items from this layer were small to medium sized flakes (up to 46 mm. in longest dimension) of which there were 2 from C-5, 4 from C-6, 7 from C-7, 3 from D-5, 2 from the baulk between C-6 and 7, and 1 from that between C-5 and 6, making 17 flakes with polish in all. Besides these there was a small (22 mm. by 32 mm.) thick flake polished on one face from square C-5, the polished side of which forms a crescent-shaped edge with the flaked surface, and along this edge is fine flaking either as a result of use or retouch (fig. 64d).

In layer 2 there was a large thick flake, 94 mm. by 64 mm. by 24 mm. in size, which is from D-5 and is probably an adze roughout. From square C-5 in this layer came a medium sized flake polished on three surfaces, an indication that it is probably the corner from a cutting edge of either a Type I or III polished adze. In the same context was a small (21 mm. by 34 mm.) rectangular shaped flake with polish on two surfaces, one polished face of which, where it intersects with the base of the flake, has retouch flaking along its entire length, making a steep scraper edge. Another flake with polish on one small surface came from the baulk between C-6 and 7. Finally a single small flake with one polished surface was recovered from layer 4 in square C-5.

Flakes

Other flakes have been classified according to whether they appear to have secondary flake scars along an edge as a result of use or minimal retouch, or whether they appear to be simply waste flakes. As at Va-1, a great many more flakes than are reported here have actually been saved and are in the collections, but upon close examination most appear to be spalls with cortex surfaces on them that suggest they are not the result of purposeful flaking. Other flakes have a heavy patina and rolled appearance suggesting they have been introduced with the deposition of the gravel pavements and this has also been noted. Still I find it difficult in this context, as at Va-1, to draw a really sharp line between those flakes which are definitely struck as a result of human activity and those which result from other causes. In general we encouraged all to save even the most doubtful materials while excavating, and in reporting on them now, I have not only removed many of these items from consideration, but in doing so have been influenced as well by the materials in which they are made. Thus I have tended to retain flakes in materials known to be used or suitable for use in stone tools but rejected those which yield hackly or poor quality fractures and have little or no developed bulbs of percussion.

After applying the above criteria to the Va-3 collection, the following flakes have been retained for description. Those from layer 1 consist of 34 waste flakes and 7 considered to have been utilised. One of the utilised pieces has only a small notch showing signs of use; the remaining flakes having small fractures along one or more of the sharp edges. Among the waste flakes 11 have a patina more characteristic of long buried materials from this locality and may have been brought in with the deposits used in paving the surface. Several flakes from this layer were found in every square and in two of the three baulks, the main concentration being 15 in square D-5, where it was not possible to separate layers 1 and 2.

In layer 2 the number of flakes retained falls to 9, 8 classified as waste and one with a patina as utilised. Another with patina is among the eight waste flakes. Again they are distributed among all squares and in one of the baulks, though of course the frequency in each is reduced to one or two examples.

Three waste flakes and one large and apparently utilised one from layer 4 all show a well developed patina, while one unweathered waste flake was also found in layer 5a, though it may have fallen into the square from one of the gravel layers in the walls above.

Auger

A piercing tool or auger (fig. 64f) made on an adze is heavily water rolled and probably derived from the imported river gravels. Nevertheless it is a tool not often encountered and warrants description. It is made on the butt portion of an adze, probably of Type II, which where it broke had, at the end toward the cutting edge, been reduced by extensive flaking on all sides to form an auger-like point. Rolling, however, has obliterated any obvious signs of wear around the point, while from its size and shape it presumably functioned as a hand tool.

Grinding Stone And Pounder

A typical block from what once was a larger grinding stone, now 67 mm. by 56 mm. in size, had one well used concave surface, so that the stone varies in thickness from 36 mm. on one side to 24 mm. on the other. It came from layer 1 in square C-5. In layer 2 of the same square a small somewhat elongated but otherwise water rounded vesicular basalt boulder about 12 cm. in length was encountered which shows definite signs of having been modified to make a simple stone pounder. Two indentations have been pecked into the opposing broader sides at about the centre of the stone, presumably to facilitate gripping with the fingers, while the broader end has been flattened and shows the pitted effects of pounding (fig. 64a).

Pottery

No pottery was encountered in layer 1, or sub-mound contexts, but 10 pieces were found in layer 2 and 1 in layer 3.[1] Four pieces were in square C-5, 5 in D-5 and 1 in the baulk between, while that in layer 3 was also in square C-5. One of the sherds from layer 2 is a thick flat rim with a slight facet on the inner lip edge. The flat surface when oriented horizontally forms an angle with the body surface that suggests that the top of the vessel, while open, was curved in slightly. The remaining sherds are all from the body of simple bowl forms and all ten sherds are of the thick type of pottery with coarse temper that is best compared to that from layer V in Va-1. Two pieces show the fine striations across the outer surface that indicate a wiping motion with either a rough cloth or fibre object as the means of finishing the surface. The body sherd from layer 3, on the other hand, is thin, with finer temper and is closer to sherds from Va-4.

How this pottery came to be in this context is uncertain. I possess no certain evidence that the manufacture of pottery survived into this portion of the Samoan sequence and am inclined to the view that it is intrusive, though in this case I would have anticipated its primary occurrence in the mound fill of layer 3. However, it does not occur there in quantity and does not occur in sub-mound contexts. My suggestion therefore is that the more earthy nature of the layer 2 deposit with its lower concentration of pebble materials plus the restricted occurrence of this pottery in only one area of that excavated, is an indication that some of this deposit was taken not from a local stream or shingle beach, but rather borrowed from an earlier pavement nearby, associated with a time when pottery was still being made. Such a practice is, of course, known today, and presumably has gone on in the past.

[1]The 12th piece of pottery originally reported from this site has proved to be only a lump of unfired clay.

European Artifact

A tiny and very thin piece of sheet metal, probably of copper, was recovered from layer 1 in square C-7. As this was the only European material recovered in any layer, its presence is probably the result of intrusion from the surface.

Summary

The excavations at Va-3 provided a useful stratigraphic sequence for comparison with that of other mounds, Va-1, Va-2, Va-4, and Va-38, excavated in the Vailele project area. The principal result is the finding that occupation in this part of the Suga locality did not begin until the 10th or 11th century A.D., well after pottery had ceased to be used in that locality. This is comparable to the situation at the adjacent mound of Va-2. The construction of the mound in a single stage, however, followed by multiple periods of occupation on its surface, corresponds to the pattern at Va-4, and not that of Va-2, with its sub-mounds, or Va-1 and Va-38 with their multiple periods of build-up.

EXCAVATIONS AT SU-VA-4

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INTRODUCTION

Excavation on mound Va-4 at Vailele Plantation took place at three different times and involved, at one time or another, many of the archaeologists who have worked in Western Samoa in recent years. The first phase of research was in 1964 when the initial test squares were dug by Miss E. Crosby. The second phase was in 1965 when the author conducted the most extensive excavations undertaken on the mound. The final phase was one of short excavations for a total of about four weeks during 1966/1967 which were conducted by several individuals in order to gain supplementary information on the ceramic horizon below the mound itself.

The principal work described in this report was carried out by the author in November and December of 1965. As will be described at greater length below, the objectives of the excavations in 1965 were strictly limited. With the exception of the occasional assistance of Dr A. Buist, after his arrival on November 26th to conduct an archaeological survey of the island of Savai'i, and the brief initial assistance of Dr R. Green, all the work was done by the author with the help of six to eight Samoan plantation labourers hired from the Western Samoan Trust Estates Corporation (WSTEC), owners of the Vailele Plantation. The work was not easy: the author especially missed the aid of another individual trained in archaeology and involved in the same problems of excavation and interpretation. While the circumstances then were not entirely ideal for understandable reasons, the author feels that the excavations, nevertheless, largely achieved what they set out to do.

The supplementary work in 1966-1967 was done by Mrs M. Hougaard, Dr Green, and others at the author's suggestion because it became apparent toward the conclusion of the work in 1965 that understanding of the significance and formation of the ceramic level below the mound demanded more intense study than could be carried out at that time. The author especially wishes to thank Mrs Hougaard for the information she obtained.

PREVIOUS RESEARCH IN THE LOCALITY

During excavations in four mounds at Vailele in 1963-1964, 449 pottery sherds were recovered, with most (403) from mound Va-1 (Green and Davidson 1964: 23). Green was able to identify two principal types of pottery, both undecorated: (a) a thick ware with feldspathic basalt tempering, and (b) a less frequent ware which was thinner and which had finer tempering. The rest of the assemblage from Va-1 consisted of adzes, chisels, octopus lure sinkers, net sinkers, and other artifacts. The excavations on the other mounds did not recover as many Samoan artifacts as the work on Va-1. Indeed, the sherds found in Va-2 (3 sherds) and Va-3 (11 sherds) appeared to be in secondary position.

Below mound Va-4, however, was a level which seemed more comparable to Va-1. In the one and a half test squares excavated by Miss E. Crosby of the University of Auckland, 32 sherds were found in a layer which Green (Green and Davidson 1964: 26) interpreted as "a deposit formed when pottery was still being produced." Found with these sherds were small flakes of obsidian: the first time in Samoa volcanic glass had been discovered in an archaeological context. Moreover, the upper layer at the surface of the mound itself produced a quantity of European finds. These may be related to the occupation associated with concrete foundations of a European house on the eastern end of the mound. This house is ascribed by Mr P. W. H. Kelly, General Manager of the Western Samoa Trust Estates Corporation which now owns the Vailele Plantation, to the German establishment of the original plantation on these lands after 1867 A.D.

In sum, it was clear from the test excavations that further work ought to be done on Va-4.

Objectives Of The Excavations In 1965

The principal objective of the research in 1965 was to retrieve a larger sample of the artifacts from beneath the mound to compare with the assemblage from Va-1. In addition, by opening up a more extensive area on the mound, further information was sought on the structural history to enable more substantial comparison with the stratigraphic histories from the major excavations on Va-1 and Va-2. Finally, it was thought a larger sample of the European materials might permit one to date that occupation more precisely.

In addition, Green thought it likely that the ceramic level below Va-4 might represent an occupation of the locality later than the 1st century occupation in the vicinity of Va-1, but at a time, in his words noted above, "when pottery was still being produced." The reasoning behind this hypothesis developed out of the work in 1964. Radiocarbon dates for Va-2 and Va-3 indicated that the mounds at Vailele, best interpreted on structural evidence as "house mounds", might have been first constructed after the 10th or 11th century A.D. and perhaps even after the 13th century (Green and Davidson 1965: 66). In other words, as evidence stood, there was a hiatus of some 900-1000 years between the ceramic period and the non-ceramic occupations under Va-2 and Va-3. Green, therefore, considered it possible that the Va-4 ceramic horizon might date from a time during that hiatus. Further excavation in the mound, hopefully then, might be able to reduce the gap in the prehistoric record at Vailele Plantation.

The Excavation Of Mound Va-4 In 1965

Strategy Of The Excavation

It was in 1964 that Miss Crosby excavated the one and a half test squares on the mound which were remarked on above (these squares have been designated here as S-1 and N-1: fig. 66). In 1965 the sections of these squares were re-examined after they had been cleaned out. Then the remaining half of the partially dug square was excavated and slightly enlarged to compensate for erosion (fig. 66: square N-1 extension). In addition, two new squares, 3 metres by 3 metres, were opened at the margins of the mound approximately along the axis, or datum line, of the old squares (fig. 66: squares S-2 and N-2); these squares were designed to extend knowledge of the stratigraphy of the mound across the short axis from edge to edge.

The information gained from all four test squares gave a reasonable picture of the stratigraphic details of the mound. Utilising this knowledge, a bulldozer was hired from WSTEC and, following the suggestion of Green, a cut was made through the mound parallel to the datum line of the test squares (fig. 66: bulldozer cut). This procedure was admittedly a drastic one but did permit an examination of the total stratigraphy of the mound from one side all the way to the other, and, more to the point, it exposed a large area of the ceramic-bearing sub-mound horizon. In this way, the largely sterile fill of the mound was removed in a short period, and time was left for additional sampling of the ceramic level: the principal objective of the research.

The Excavation Of The Test Squares

Because there were no experienced workmen on the excavations and time was too short to struggle against linguistic barriers in order to train individuals in the techniques and objectives of stratigraphic excavation, the author utilised an exploratory technique which involved the discovery of major stratigraphic units by repeated excavation of a small test area in a corner of each square (at times, all four corners). Each level found in this way was then excavated by trowelling in arbitrary levels of 5 to 25 cm., depending on the specific demands of each case. The predominantly sterile fill of the mound, however, was removed with shovels. The use of this technique allowed the author to rotate the work crews between the three squares while he did more critical excavation in one of them.

Square N-1 Extension: The completion of the excavation of the southern half of the square was complicated by the erosion since 1964. The southern half was slightly enlarged to 4.70 metres by 2 metres, but even then little of the occupation levels above the mound fill was exposed. Very few of the features which were found in these top layers could safely be interpreted as post holes, an observation which holds for the other test squares. Some of the "features" appeared to be root-holes; others were deep, narrow tunnels going down through the fill often as far as the

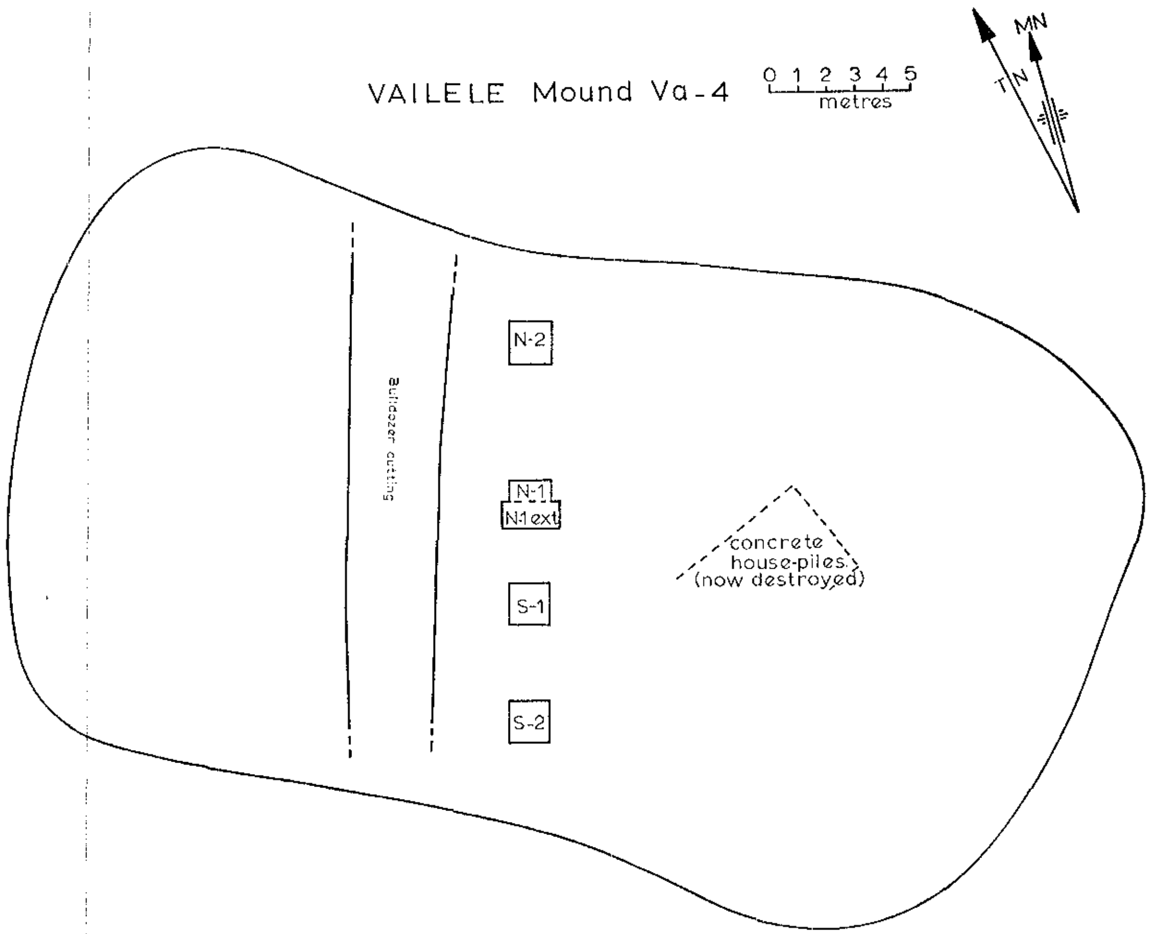

Fig. 66. Plan of mound SU-Va-4, Vailele, Upolu, showing areas excavated.

sub-mound level which were sometimes empty and at other times filled with the soils of the mound levels. Comparative evidence observed in Samoa by the author suggests that these common features were made by burrowing land crabs. The implication is obvious: cultural materials from late times were recovered *in situ* from the prehistoric ceramic horizon *below* the mound.

The stratigraphy in N-1 extension serves well as a typical example of the entire mound. The following layers were discriminated:

Layer A: granular, "humic brown" clay topsoil with small pebbles as inclusions. (European artifacts.)

Layer B: disturbed zone developed at the top of layer C. Yellow-brown, granular, weathered clay soil similar to layer A, but lighter in colour and not as friable.

Layer C: yellow-tan clay in some areas quite compact, but in others more friable.

Layer C/Layer E: a thin layer of small, water worn pebbles separating layer C from layer E. This zone appeared to be only well represented in the area of N-1 extension. Only after the author knew what to expect could he identify the possible occurrence of this zone in the recleaned sections of square S-1 and, vaguely, in square S-2. It was not found in square N-2.

Layer E: the general letter designation for the brown clay fill of the mound. The texture varied from very compact to weathered. (Layer D was a fill discriminated only in square S-2.)

Layer F: sub-mound greenish-grey clay soil which could be subdivided into two zones:

Layer F-1: granular greenish-grey clay with a brown-to-red/orange cast.

Layer F-2: greenish-grey clay, very compact and sticky.

Layer F was excavated to a depth of 50 cm. without discovering further subdivisions.

Interpretation: Layer A is clearly associated with the European occupation of the mound on the basis of the recovered artifacts. Layer B possibly represents the last native use of the mound; European artifacts recovered from this level are probably intrusive, although the technique of excavation was not precise enough during the work in 1965 to prove this interpretation. Layer C appears to be a secondary stage in the construction of the mound. The "pebble layer", layer C/E, seemed to be a spread of *fale* (house) floor paving stones over the main fill of the mound: this point of view was supported by the workmen and such a practice is extant today. Layer E represents the main construction of the mound. Taken together, this sequence of events in the history of the mound is similar to that of mound Va-2 (Green and Davidson 1964: 25), but there the secondary mantle of fill was roughly 4 feet thick and had been built up in several stages. Thus, while there is similarity between the stratigraphic histories of Va-4 and Va-2 there is also sufficient difference to conclude only that there was a practice of mound rebuilding. The precise timing and purposes of such rebuilding may not have been identical; no common "phase" in the history of the Suga mounds can be safely deduced from this evidence alone. Indeed, one of the characteristics of modern Samoan villages is their "time-transgressive" nature ; some house sites in the same village have been abandoned, others rebuilt, and others are newly built.

Interpretation of layer F is difficult. Crosby also recognised two subdivisions, but Green (Green and Davidson 1964: 26) has referred to "river gravel deposits" at this level and has suggested tentatively that it "seems to represent a low house mound platform rising only a foot or so above the sterile subsoil." The work in 1965 showed this interpretation to be unnecessary for several reasons: (a) the contact between the two subdivisions was most irregular; (b) the texture of the deposits and the seemingly random occurrence of finds within them strongly suggested they were natural formations; (c) even if the pit-like features, which were found in the bulldozer-cut in the surface of layer F-2 and were filled with the materials of layer F-1, were cultural features, as they appeared to be, such an interpretation did not preclude the view that layer F-1 was a natural formation; and (d) in fact, the closest similar deposits were the various soil layers which had developed on the surface of the mound. In other words, it seemed very likely that at least layer F-1 was a buried soil. Professor W. Dickinson of the Department of Geology at Stanford University examined the deposits while he was in Samoa during the excavations in 1965; he also was inclined to view the subdivisions of layer F as "soils" of uncertain depositional formation, an interpretation which Green now also agrees is the most likely one. Samples of both layer F-1 and F-2 were taken under controlled conditions and sent to Dickinson in the United States. Microscopic examination has failed to find any evidence contrary to the field interpretation (W. Dickinson, personal communication). Further discussion of this layer appears below during the description of the supplementary work in 1966-1967.

Square S-2: The excavation of square S-2 confirmed the general stratigraphic sequence found in square N-1 extension; the actual stratification of the layers and features, however, was incredibly complex. There were several large pits of varied form and uncertain significance which had been cut from the upper levels. A shallow, elongated feature cut from just below the present turf (layer A) in the northwest corner of the square contained badly decayed, disarticulated fragments of bone of uncertain genus; none could be preserved.

Square N-2: As in square S-2, the lower portion of the mound fill (layer E) contained many large blocks of stone, but in this square the blocks directly at the bottom rested on, and partially in, a horizontal bed of charcoal, ash and cooking stones. The initial impression was that this "Hearth Horizon", which extended over the entire square, might be contemporaneous with the ceramic horizon. Careful stratigraphic excavation soon showed that no sherds were clearly associated with it, and convinced the author that the charcoal deposit was unconsolidated and exposed at the time when the mound fill was loaded on top of it. It was thought at the time of excavation that radiocarbon analysis of samples from this level might be able to date the primary phase of mound construction. Whether or not such an interpretation is now likely will be discussed at greater length below when the radiocarbon dates which have been obtained are described. The Hearth Horizon could be subdivided into two lenses:

Upper lens: concentrated deposit of charcoal and ash with blackened water worn pebbles. Definitely hearth residue.

Lower lens: more compact ash and charcoal with fewer stones. Several hearth basins were found which had been cut from this lens into the underlying deposit. This lens rested directly on the firm clay of layer F-2. No trace of layer F-1 could be identified.

Excavation Of The Bulldozer Trench

The use of a bulldozer to cut a trench through the mound parallel to the test squares turned out to be only partially successful. The original plan was to come down as close to the surface of the sub-mound level as possible without disturbing it: in a trench over 27 metres long, the closer the bulldozer could come to the basal layer, the less manual labour would have to be expended on cleaning out the remaining fill. In the first cut through the mound luck ran against the work. As the bulldozer dug deeper, the author tried to affirm its progress by excavating a small test area near the centre of the exposed west section (fig. 67). The spot selected proved later to lie over a pit feature in layer F-1; the significance of this position will be appreciated when it is realised that the distinction between the brown clay of the mound fill and the greenish-grey brown clay of layer F-1 was visually obvious only under extremely favourable light conditions. It was really the layer F-1/layer F-2 contact which was the warning level. As it turned out, the slightly tilted blade of the bulldozer cut too deeply toward the middle of the mound. Unless the project were to be abandoned altogether, the only choice was to make another cut next to the first one. The decision to do so was nervously made with one difference: this time rather than risk repeated failure, the cut was taken down only to 25 to 35 cm. (10 to 15 cm. at the centre of the mound) above the surface of layer F-1. It took a week to remove the remaining mound fill.

Once the bulldozer-cut had been cleaned up and the sections planed down, a grid of 3 metre squares (without baulks) was set out in the cut (fig. 67). While the workmen excavated layer F-1 in several of these squares, the author excavated an area next to the east section wall to confirm the presence of a hearth horizon similar to, and certainly coterminous with, the hearth horizon found in square N-2. A hearth and small pits were uncovered. More important, the section along the east wall (fig. 68) supported the earlier impression that layer F-1 had been removed in antiquity to prepare the area for the cooking pits. The hearth level lensed out toward the south; layer F-1 eventually appeared in the section beneath the charcoal spread and finally replaced it stratigraphically.

Both sections in the bulldozer-cut were drawn and photographed. No subdivisions could be seen in the fill of the primary mound along this short axis of Va-4. The pebble spread separating the primary mound from the secondary mantle of clay (layer C) could be followed in both sections as far as the edges of the mound, but it disappeared before it actually reached them. In other words, the sections confirmed the absence of this spread in square N-2 and its virtual absence in square S-2.

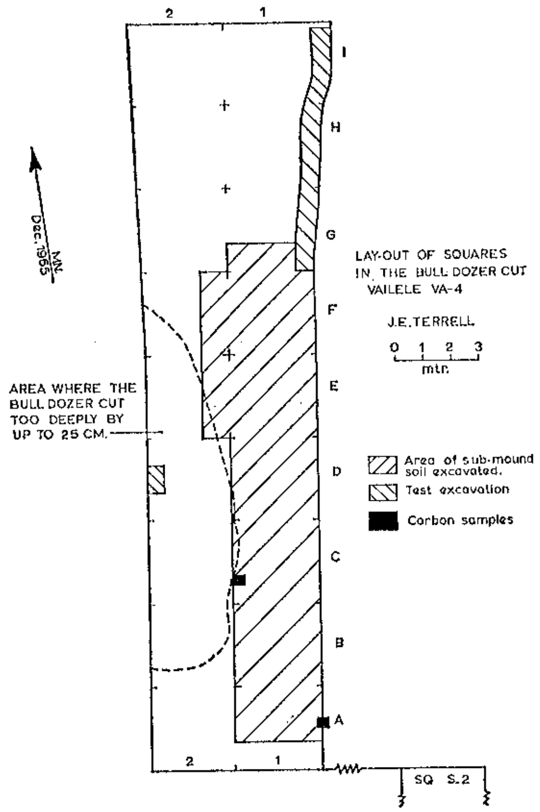

Fig. 67. Plan of bulldozer cut and grid, SU-Va-4.

Supplementary Excavations In 1966-1967

The supplementary excavations carried out for short periods in 1966 and 1967 by Mrs M. Hougaard, Dr Green and others were undertaken at the author's suggestion in order to clarify interpretation of the sub-mound layers. On the whole the excavations achieved their purpose, although it is not possible even now to describe with complete assurance the precise origins of the "F" layers. The areas excavated are shown in figure 67.

As one might expect, there has been some difficulty in correlating the results of the later work with those obtained in 1965. The controlled stratigraphic excavations undertaken over a total period of almost 4 weeks were able to discriminate further subdivisions in both layer F-1 and layer F-2. After detailed

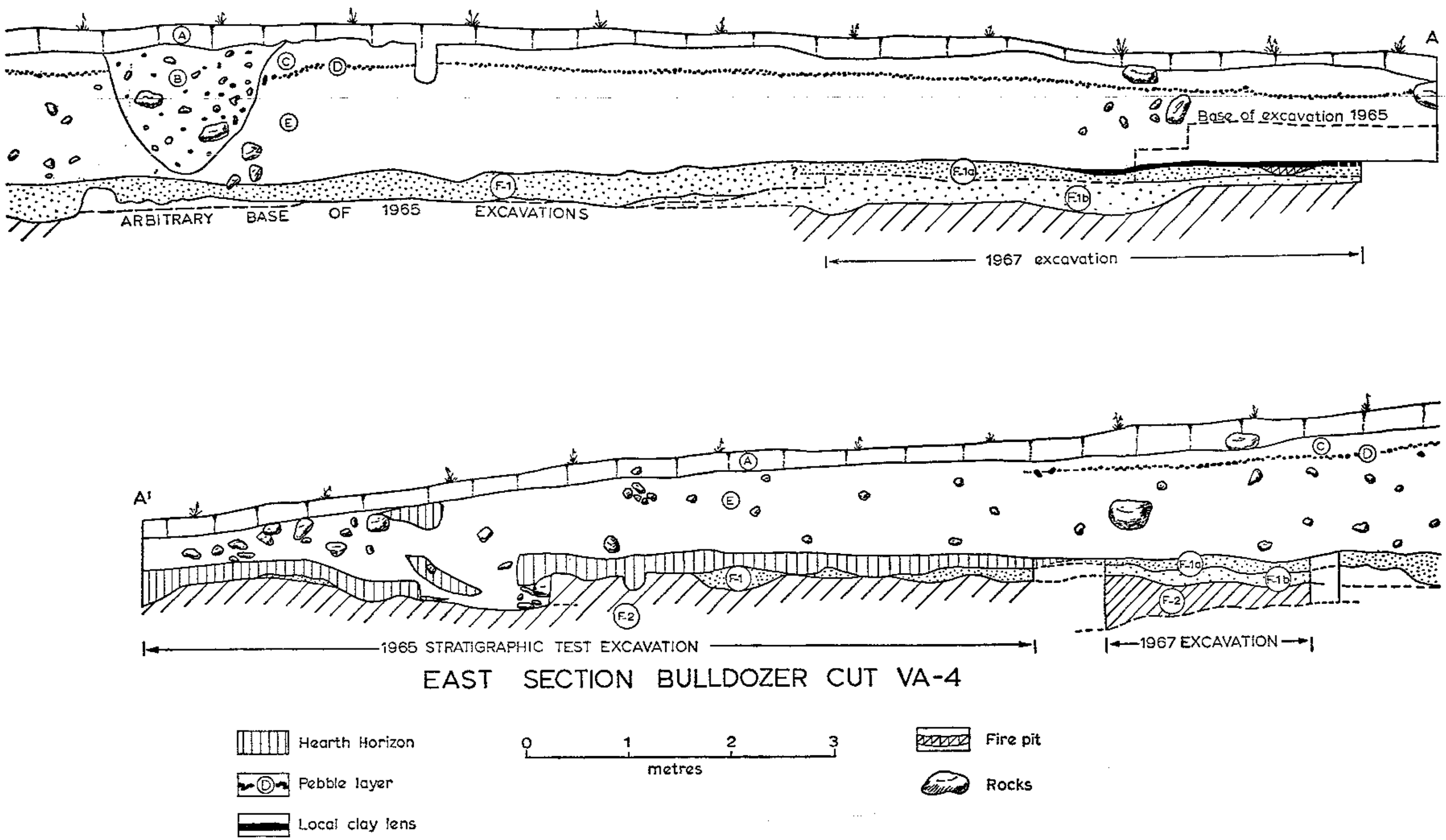

Fig. 68. Cross-section of east face of bulldozer cut, SU-Va-4.

study of the field notes and sections, however, it has been possible to arrive at a reasonably certain understanding of the relationships between the observations made during each phase of work (fig. 68).

In brief, the stratigraphy below the mound fill is now defined as:

Layer F-1a and the Hearth Horizon: Under favourable conditions of light and moisture, it was possible to discriminate a dark brown zone at the top of layer F-1 which was approximately 5 to 15 cm. thick. While a few sherds, obsidian flakes and flake blades were found at this level, the majority of the artifacts recovered in 1966-1967 came from the lower zone (layer F-1b). One large pit feature, a firepit, several postholes and two charcoal scatters were found at the base of this zone. The postholes discovered in square F-1 of the bulldozer-cut appear to form a round or round-ended post structure. Stratigraphically, this upper zone lies at the same level as the Hearth Horizon in the northern area of the bulldozer-cut. It is likely then that these various features date to the general period of that horizon, although they may not be precisely contemporary because the concentrated zone of charcoal marking the Hearth Horizon appeared to lens out at the surface of layer F-1a a short distance in from the northern edge of square F-1. Moreover, the large pit is stratigraphically earlier than the other features.

Layer F-1b: The lower zone of layer F-1 could be seen under favourable conditions as a distinct horizon. As already noted, the majority of the finds were recovered from this level, which was approximately 5 to 40 cm. in thickness and quite variable in depth. A few postholes and one pit, similar to those uncovered in 1965, were found at the base of the zone. No carbon samples were obtainable from a context clearly associated with this "ceramic horizon".

Layer F-2: In square F-1 of the bulldozer-cut Mrs Hougaard was able to identify at least one subdivision in the clay and rocks of layer F-2 which appears to mark a pedological variation in the "natural" subsoil.

Interpretation: Without detailed study by a qualified pedologist it is impossible to explain fully the origins of layer F, but the work in 1966-1967 generally confirms the earlier impression that the recognised subdivisions are the result principally of soil development and that layer F-1 is the weathered surface of a palaeosol. Occupation in the vicinity later covered by mound Va-4 appears to have been relatively slight during the ceramic period (layer F-1b). The only evidence of intensive habitation of the old field under the mound occurs during the general time of the Hearth Horizon, which, on the evidence available, is post-ceramic in date.

A detailed discussion of the stratigraphy below the mound has been prepared which describes the correlations made between the results of all the phases of work in the bulldozer-cut. The report is on file with the original field notes, plans and sections.

Radiocarbon Dates

Carbon samples for radiocarbon dating were obtained from the Hearth Horizon and layer F-1a in square N-2 and the bulldozer-cut. Unfortunately, no samples were found in clear association with the ceramic horizon (layer F-1b). Further, no samples could be obtained for the occupations on either the primary or the secondary mound fills. One sample, however, was collected from a cooking pit at the base of the mound fill (layer E) just above the buried field. At the present time, two determinations have been run on samples from the Hearth Horizon and one on a sample of uncertain association from the base of layer F-1. These dates are (half-life of 5570 years):

GaK-1194 — 2150 ± 100 B.P.
200 B.C.

Carbon Sample No. 1 (35 gm.) from a concentrated lens within the Hearth Horizon in square N-2.

GaK-1198 — 1660 ± 80 B.P.
A.D. 290

Carbon Sample No. 6 (15 gm.) from a thin concentrated lens of carbon and fire-burned pebbles at the base of layer F-1 and on the top of layer F-2 on the west section of the bulldozer-cut. Not an obvious cultural feature with clear associations, but only a lens of "scattered" material.

GaK-1199 — 1680 ± 80 B.P.
A.D. 270

Carbon Sample No. 7 from a stone-lined cooking pit at the base of the Hearth Horizon in the stratigraphic test trench in the northern limit of the bulldozer-cut along the east section.

Interpretation

In the interpretation of radiocarbon dates the author agrees with the position recently taken by Polach and Golson (1966): (a) because of the inaccuracies of the method, a minimal standard deviation of plus/minus 100

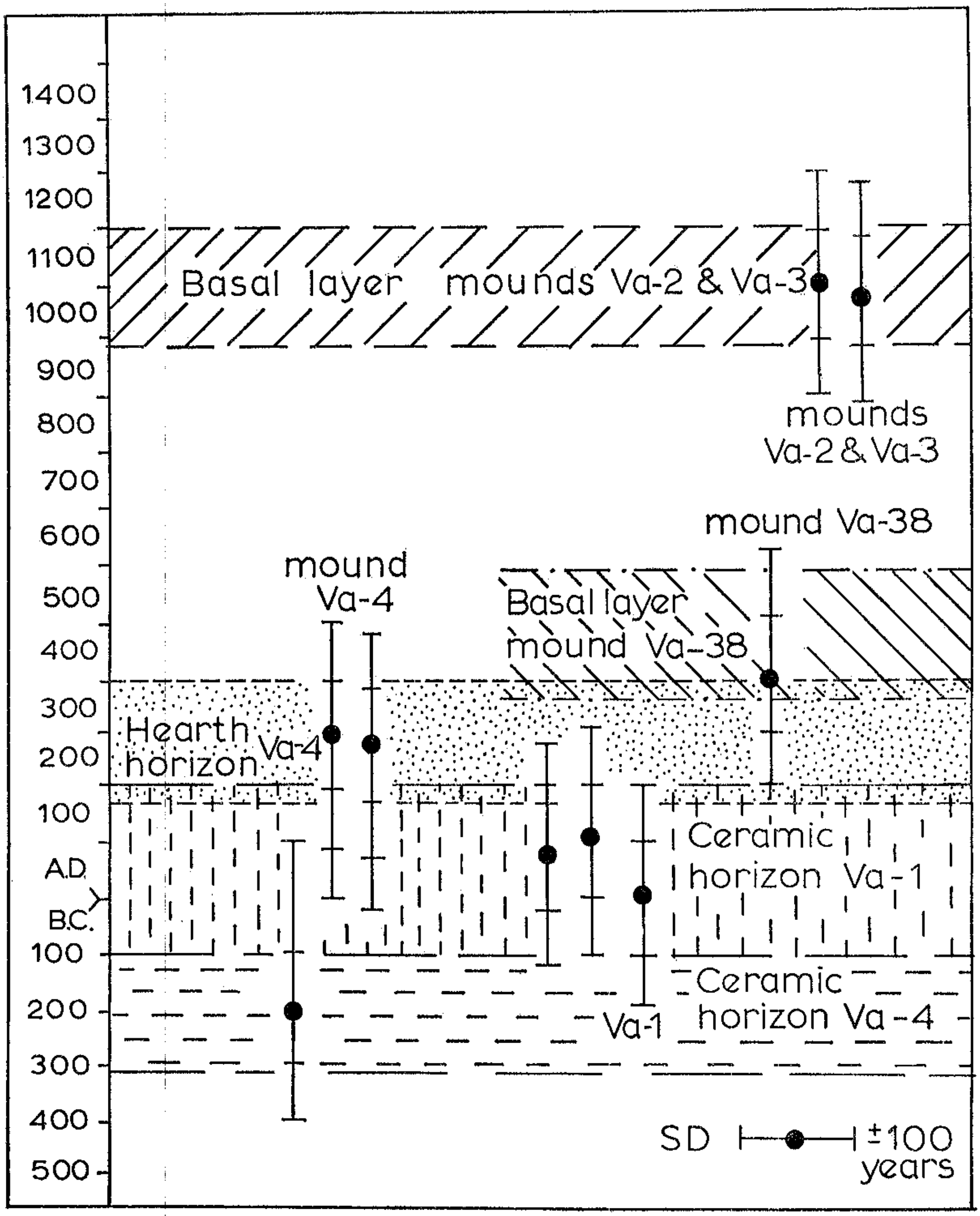

Fig. 69. Chart of early radiocarbon dates for Vailele excavations in relation to those from SU-Va-4.

years is advisable, and (b) when radiocarbon dates alone are considered, it is statistically unwise to deal with a probability less than that afforded by two standard deviations. Moreover, in evaluating the Vailele dates, further uncertainty also arises from the very fact that the cultural parameters are extremely vague: with the exception of the dates for the ceramic level below mound Va-1 (fig. 69), the cultural traits associated with the samples are quite general. Lacking truly diagnostic assemblages, it is difficult to draw close temporal and cultural connections between the various stratigraphic events observed in the Vailele mounds, a limitation which is by no means restricted to Vailele, or, for that matter, Samoa (cf. Terrell 1965, 1967). With these cautions in mind, it is possible to use the dates obtained for Va-4 and other mounds at Vailele to set up a broad chronology for the locality (fig. 69).

The three dates for Va-4 at first examination seem contradictory. The two dates clearly associated with the Hearth Horizon (GaK-1194 and GaK-1199) appear to be 400-500 years apart, while the date vaguely related with layer F-1 (GaK-1198) is approximately the same as the later date for the Hearth Horizon. Admittedly, the Hearth Horizon in the bulldozer-cut was not demonstrated to be coterminous with the horizon in square N-2, but so similar were the deposits that their identical stratigraphic positions strongly favour such an interpretation. The sample from layer F-1 may mean either that there was relatively little time between the ceramic horizon and the Hearth Horizon, or which seems more likely, the charcoal-and-pebble lens should be associated with the later horizon. Therefore, the least ambiguous position is one which uses all three dates to "bracket" the general time of the Hearth Horizon to the 1st-5th centuries A.D., with the oldest date (GaK-1194) suggesting occupation toward the earlier limit.

This time range for the Hearth Horizon is far earlier than that originally anticipated on stratigraphic inference alone. As mentioned above, the characteristics of the contact between the primary mound fill and the Hearth Horizon suggested that construction of the mound followed soon after that horizon had been deposited, which by inference from the dates for the basal layers under mound Va-2 (GaK-502) and Va-3 (GaK-503) implied a date between the 10th and the 13th century A.D. for the Hearth Horizon. It now seems that the layer was formed relatively soon after the ceramic occupation under mound Va-1 which has been dated (N.Z. 361-363) to a time between the 2nd century B.C. and the 3rd century A.D. Therefore, just when it was that mound Va-4 was first built is a moot question which cannot be answered until analysis of the sample from the cooking pit at the base of layer E (this pit is *not* shown on figure 68) is completed.

A major difficulty remains: no carbon samples have been recovered from a definite ceramic context below Va-4. In the view adopted here, the ceramic horizon is earlier than the hearth area, but how much earlier cannot be said. However, study of the artifacts suggests they are earlier, not later as Green once believed, than the ceramic occupation below Va-1.

Portable Artifacts

(By R. C. Green)

The portable artifacts from Va-4 fall into two discrete groups: those of European manufacture found concentrated in layer A and those of local manufacture found largely in layer F-1. It should be noted, however, that because of recent disturbances, a few items of European origin were encountered intruded into the prehistoric mound and sub-mound contexts. It should also be noted that a few items of local Samoan origin may be assigned to the occupation of the upper layers of the mound itself prior to the erection of European dwellings on its surface.

Terrell discusses above (p. 159) the basis on which the occupation associated with the European goods may be ascribed to the late 19th century German establishment of a plantation on these lands, an event dating to after 1867 A.D. This assessment is supported not only by the structural evidence for concrete pylons supporting a European style building on one side of the mound, but also by the assemblage of portable objects of European origin. These include a large sample of items in the following categories: both green and clear bottle glass; clear window glass; several varieties of china-ware potsherds from both plates and saucers; crockery-ware potsherds including a number from schnapps jugs; wire nails; metal washers; an iron hinge; and a few pieces from clay pipes. This assemblage conforms, especially in its metal objects and potsherds, to what one would expect from a late 19th to early 20th century A.D. occupation level in Samoa, and may be compared to a dump of similar age in Lotofaga (Report 15, p. 250). It may be contrasted with those items of European origin — pieces of clay pipes, gun and striking flints, a restricted range of coloured bottle glass, slates, trade beads — found in sites dating to earlier periods of contact.

It is not my intention to analyse further the European artifact collection from layer A in this report; rather it will be described in greater detail in later reports, where it can be compared with an assemblage of European origin from an earlier contact settlement in the Falefa valley. Intrusive European items in the sub-mound contexts, however, will be listed.

Two items of local origin predominate among those recovered from prehistoric contexts. One item is pottery, sherds of which derive almost entirely from the F-1 layer; the other is obsidian cores and flakes, which were encountered only in the F-1 layer. In quantity and range, objects other than these are extremely restricted. This is disappointing, for other objects in stone might have been expected in the sub-mound contexts in association with the pottery and obsidian, which would have been useful for comparison with those in layer V of Va-1, where pottery was also found.

Adzes

The middle portion of an adze, probably of Type VIa, was recovered from layer A in square S-1. Portions of two unclassifiable adzes and the blade section of a Type I adze came from layer C in square N-1. These are the only adzes from secure mound contexts. However, in reopening square S-1 (before proceeding with his own excavations), Terrell recovered two adzes from the materials that had slumped into the base of that square in the interval between Crosby's excavations and his own. It is thus presumed that these adzes derive from a mound context, probably layers A to C, an interpretation which is supported by their lack of the soft patina characteristic of the stone materials found in the sub-mound contexts. One is the undifferentiated butt portion of a Type VIa adze; the other is the blade portion of a medium sized Type I adze. Thus Types I and VIa are encountered in the later pre-European occupations associated with this mound, just as they are common types in the occupation layers on the other mounds in this locality.

The unmodified butt section of a Type I adze was found in the Hearth Horizon of square N-2, which is useful in providing a relatively firm 3rd to 4th century A.D. date for the earlier end of the time span covered by adzes of this type. In contrast is the blade portion of a Type V adze, Sasoa'a variety, found while cleaning up the bulldozer cutting. Unlike the above adzes, it has the typical soft patina of the stone objects from sub-mound contexts. This type is the most common of the adze forms found in early pottery-bearing assemblages and this example may, therefore, be assigned to this horizon with reasonable security.

Only a single classifiable adze was recovered in a secure sub-mound context. This was one found by Crosby in her layer IVb (in this case considered equivalent to Terrell's layer F-1b) in square S-1. The adze is not easy to classify in our typology, but conforms most closely to those of Type I. Other unclassifiable adzes in the sub-mound contexts include a roughout carrying a heavy patina but definitely of a type of banded basalt often used in the manufacture of adzes. It was found in the upper 15 cm. of the F-1 layer in square B-1. Another unclassifiable portion of an adze was encountered in the F-1b layer of square F-1.

Basalt Flakes

Flakes of the fine-grained basalt normally used in the manufacture of adzes (Report 3, p. 37) were encountered in both mound and sub-mound contexts. Most of these probably derive from the utilisation of stone adzes in the vicinity rather than from either local activities associated with the manufacture of adzes or attempts to produce flakes for use as tools (cf. discussion by Davidson, Report 15, pp. 248-250).

In the layers belonging to the mound, flakes are known only from the excavations in squares N-1 (N½) and S-1 conducted by Crosby. Their recovery was general throughout the sub-mound contexts. But this difference may reflect only the methods and strategies employed in excavation of layers forming the mound (see Terrell above p. 159).

What may be a more significant difference is that polished adze chips were not recovered in the sub-mound layers, but only in those of the mound. These flakes, thought to be chips from the polished portions of a finished adze, were found in layer A, two in square N-1 and eleven in square S-1. None show signs of re-use or retouch. The twelfth flake with polish from S-1, however, does have some secondary flaking along one edge which may be indicative of subsequent use.

Eleven other plain flakes, ranging between 20 and 49 mm. in length, were found in layer A of square S-1. One carries a heavy patina, suggesting it is in secondary position. A small water worn pebble with a large flake removed from one side, and finer secondary flaking along the edge created by removal of this initial flake, was recovered from this same context. It may have functioned as a crude chopping tool.

Stone flakes in others layers belonging to the mound were less frequent. Layer C produced five plain flakes between 24 and 42 mm. in length, two from square N-1 and three from square S-1. None exhibit signs of retouch or use. In the main mound fill, layer C, two large pebble flakes were encountered towards the base of the layer in square N-1. Both pebbles have been flaked, though each retained some of the original water worn cortex. One was 90 mm. in its longest dimension and 87 mm. wide; the other was of similar size but with more extensive flaking. In this example, after a single flake had been struck off one end on one side, the other side had most of its cortex removed by striking off flakes from the perimeter of the first side. The resulting tool resembles a crude chopper.

A total of 56 flakes was recorded from various contexts in the F-1 layer. Their size and distribution are given in table 9. In overall distribution these flakes appear to be about equally concentrated in the upper and lower levels of layer F-1, but where the control is by natural stratigraphy within the F-1 layer, a tendency toward greater frequency in the F-1b layer may be noted. This result is consistent with that for the distribution of potsherds (p. 172 below) and implies that such occupation as occurred belongs mainly with this part of the F-1 layer.

Table 9

Distribution and Size Range of Basalt Flakes in F-1 layer, SU-Va-4

A. Distribution by:

1. Two principal arbitrary levels

Square:	B-1	C-1	D-1	E-1	S-2	Total
0-15 cm.	4	0	5	1	4	14
15-30 cm.	5	2	1	0	0	8

2. Other arbitrary levels

Square:	N-1 (Ext.)
10-20 cm.	4
40-50 cm.	1

3. Statigraphic divisions

Square:	F-1	E-2	F-2	N-1 (N½)	S-1	Total
F-1a layer	4	2	2	0	1	9
F-1b layer	6	1	1	6	6	20

B. Total number of flakes: 56.

C. Size distribution of flakes by 15 mm. classes

	Number of flakes
15-30 mm.	19
30-45 mm.	18
45-60 mm.	14
60-75 mm.	5

Actual size range — 17-73 mm.

In this collection of flakes, those with one or more polished surfaces (interpreted as chips off completed adzes) are lacking. Rather, many of these flakes carry a deep but soft patina as a result of long induration and chemical weathering. Only one of the smaller of these flakes has any sign of retouch; in this case there is some fine retouch along one sharp edge. The rest exhibit no clear traces of secondary working or use fracture, although their weathered condition makes this difficult to judge. An analysis of the size distribution of the longest dimension of each flake, grouped by 15 mm. classes, shows there is fairly regular distribution between 17 and 60 mm., with only a few flakes being over that size. One pebble found in the top 15 cm. of the F-1 layer in square E-1 has some fairly rudimentary flaking suggesting that it may possibly have served as a core. Other than this, the only explanations that may be offered for the presence of the flakes in this layer are either derivation only from the unpolished portions of adzes (which seems unlikely) or from a further stage in the manufacture of adzes from roughouts, examples of which do occur in this layer.

Obsidian Pieces

Before the excavations at this mound, the prehistoric use of obsidian in Samoa was not anticipated. Since then its occurrence has been confirmed at a number of sites, although any occurrence in abundance seems restricted to the early contexts which also contain pottery. Thus while obsidian in sites dating after the 2nd century A.D. is minimal, it has been found in secure contexts dating after 1200 A.D. (Report 15, p. 250).

Another aspect of this use of obsidian which occasioned surprise was the extremely small size of all pieces. One explanation, of course, is that all large obsidian cores and flakes were rigorously selected against by cultural preferences, and so never occur in archaeological sites, which seems unlikely. Another explanation is that the small size of the pieces which formed the source or sources dictated the small size of the artifacts, a solution supported by the size of the pebble-like cores from which the flakes were struck. Thus in size, the industry of cores and flakes is more like that recovered from some Hawaiian sites (Emory and Sinoto 1961:42), where all pieces are again uniformly small, than those from New Zealand or Easter Island, where size covers a much wider range in most of the assemblages, and where the average size of individual pieces is also much larger.

From my observations, all these Polynesian obsidian industries are best seen as belonging to a single tradition in which 93 to 95 per cent or more of the flakes have not been modified toward any formal shapes and bear no retouch purposefully directed toward such an end. As a result they are not amenable to analysis by the usual typological classifications, although assemblages do vary as to size, presence and nature of retouch, and other properties (Smart and Green 1962:252; Shawcross 1964:14-22). This Samoan industry may therefore be viewed as one of those in this tradition, but one which tends toward small flake size.

Here it should be noted that the use of obsidian or pitchstone as a component of the Polynesian struck-flake-tool tradition is not as restricted as has often been assumed, for the material is now attested archaeologically from New Zealand, Easter Island, Pitcairn, the Society Islands, the Marquesas, Samoa, and Tonga, although only in New Zealand, Easter, Hawaii and Samoa do obsidian flakes so far occur in numbers (Green 1964b: 134-142; Evans 1965:469-481; Carter 1967:28, 36; Emory and Sinoto 1961:42; Green *et al.* 1967:199; Suggs 1961:174; Poulsen 1967: 286).

Table 10 shows that 74 pieces of obsidian were encountered in the F-1 layer of this site, while none came from the later mound layers. Where the division of the F-1 layer was by two arbitrary levels a tendency for the greater number of pieces to occur in the upper 15 cm. level is evident. The results from square N-1, using both natural (N ½) and arbitrary (Ext.) divisions, however, suggest that the majority may derive mainly from the contact between layer F-1a and F-1b and from F-1b just as the stone flakes and pottery do. Thus, because the contact between F-1a and F-1b generally lies between 5-15 cm. below the surface of the F-1 layer, if the first level is 15 cm., items from the F-1a-F-1b contact and below are included in the upper division, although they lie stratigraphically in the lower one.

The obsidian generally exhibits a dull black lustre, except on freshly fractured surfaces, which are glassy. A few pieces have reddish streaks, as in some New Zealand obsidians. The source of obsidian in Samoa is not at present known and is not referred to in the standard reference on Samoan geology (Kear and Wood 1959). Occasional tiny natural pebbles of obsidian in the alluvium of the Falefa valley, a report (unverified) by a local resident of possible obsidian in a road cutting leading out of that valley into Fagaloa Bay, and its occurrence in the pottery-bearing layers of the Sa-3 site and other later sites in that valley, all suggest that its source is in the Fagaloa Volcanics surrounding that valley. This, however, remains to be demonstrated.

In this initial study of these obsidian objects one piece was designated as a pebble because no flakes had been removed from its surface. The remaining pebbles had one or more flakes removed, and have been designated as "cores." The remainder were classified as flakes. Only half as many cores occur as flakes, but in their longest dimension the cores exceed the flakes both in size range and in average size. It should be noted, however, that most cores measured between 10 and 16 mm. in their longest dimension, with only three, measuring between 20 and 23 mm., falling outside this range.

Measurements on the longest dimension for the fifty flakes reveal a size range between 5 and 17 mm., with the greatest number being fairly evenly distributed between 8 and 13 mm., and 10 mm. being an average size as in some obsidian flakes from Hawaiian sites (Emory and Sinoto 1961:42).

On only one flake could I find any obvious retouch; this example possessed fine secondary flaking at one end of a 12 mm. long flake. Therefore, the precise use of these small flakes remains enigmatic, although some sort of sharp, fine cutting tool is implied. In this respect, their presence would seem to derive from an activity different from that which

Table 10

Distribution, Type, and Size Range of Obsidian Pieces in F-1 layer, SU-Va-4.

A. Distribution by:

1. Two principal arbitrary levels

Square:	B-1	C-1	D-1	S-2	Total
0-15 cm.	0	4	2	9	15
15-30 cm.	1	0	4	0	5

2. Several arbitrary levels

Square:	N-1 (Ext.)
0-10 cm.	3
10-20 cm.	25
20-30 cm.	5
30-40 cm.	4
Total	37

3. Stratigraphic divisions

Square:	N-1 (N½)	S-1	A-1	Total
F-1a layer	0	0	0	0
F-1b layer	9	7	1	17

B. Types of pieces:

Pebbles—1 Cores—23 Flakes—50 Total—74

C. Size range of pieces:

Cores — Range 10-23 mm., Average size 15 mm.
Flakes — Range 5-17 mm., Average size 10 mm.

accounts for the pottery, for more than half of the obsidian pieces were recovered from square N-1, whereas the pottery was concentrated around square B-1 (see below).

Other Items In Stone

In square S-1, layer F-1b, a thin ground slab of white travertine rock, 17 by 22 mm. in size and only 3 mm. thick, was found. Its shape is irregular and its function unknown. In layer A of the same square two homogeneous fine-grained basalt blocks from broken grinding stones were found. One is ground on both surfaces, the other on one. Two other pieces from grinding stones were encountered in the F-1 layer, one in square C-1 and the other in square F-1. Both of these exhibit grinding on one surface only. All four are small fragments of larger blocks, 56, 41, 89, and 68 mm. respectively being their greatest dimension.

An unshaped pounding stone from a level 37 cm. below the surface in layer E of square N-1 (Ext.) completes the tool assemblage. It is an elongated spheroidal-shaped pebble of vesicular basalt 78 by 63 mm. along its two greatest dimensions. Two shallow pecked depressions occur mid-way on each of the two wider faces of the pebble opposite each other, while a third depression, resulting from some slight pecking, lies between them on one of the smaller faces. The broader end of the stone is bruised, as if from pounding.

In square A-1 a row of stones resting on the surface of layer F-1 ran diagonally across the square from southeast to northwest and contained several large coral slabs among the stones which formed the alignment. Small fragments of unmodified coral occurred sporadically in or on top of the F-1 layer. These fragments were from the upper 15 cm. division of squares D-1, F-1, and N-1 (Ext.) as well as between 15 and 25 cm. depth in the F-1 layer of square S-2.

Shell And Bone

Shell and bone were uncommon in these deposits, partly because of the acid nature of the soil, but also because the deposits were not refuse dumps. Only an unworked tip from a *Tridacna* shell was encountered in the top 5 cm. of the F-1 layer in square N-1 (Ext.). More numerous were shells from one of the large pits cut from the upper levels of the mound in square S-2 down into the underlying F-1 layer. At the depth of the F-1 layer this feature yielded some 27 specimens of *Nerita plicata,* the common sea snail, and a couple of specimens of *Tectus* sp. belonging to the *Trochidae* family. The pit features also yielded an unidentifiable fish bone and a vertebra as yet unidentified. The only bone definitely from the F-1 layer was a calcined piece burned in a fire found in the top 5 cm. of square N-1 (Ext.) that has not yet been identified.

Intrusive European Materials

Terrell recovered a number of items of European manufacture in the F-1 layer of several of his squares, citing evidence for fairly recent disturbance to explain their presence (see p. 160 above). These items include: two pieces of green bottle glass in square D-1; a piece of crockery from a schnapps jug in an intrusive pit feature in square E-1; a piece of field tile, ten pieces of crockery (eight from schnapps jugs) and 2 pieces of bottle glass from square N-1 (Ext.); and two pieces of bottle glass, a square and a wire nail, and a metal washer of the split type from square S-2. They accord well with the assemblage of European items listed above for layer A.

Pottery

The most informative portable artifact from Va-4 has turned out to be the pottery recovered from the F-1 layer. While the initial sample of 32 sherds from Va-4 was not sufficient to do more than to suggest a difference between the pottery found in layer V of Va-1 and that from this site, the impression was that most of the Va-4 sherds belonged to a thinner-walled ware with finer tempering. With the recovery of 237 sherds from all excavations, covering a total area of 140.85 square metres, and the study of sherd temper from the pottery in several Samoan sites (Report 19, p. 271) it has been possible to refine and confirm this impression. Not only are the great majority of the sherds from a thinner-walled, finer-tempered ware, but these sherds possess a different temper from that in the thicker-walled, coarse-tempered pottery (table 11, see also Dickinson, Report 19).

Initially it was thought that this pottery from Va-4 might reflect a later stage in the ceramic tradition. This has proved not to be the case; rather it appears to represent an earlier stage. Not only is this conclusion suggested by the early radiocarbon dates from the Hearth Horizon which seals in this ceramic horizon, but it is also supported by the occurrence of both types of pottery stratigraphically one above the other in layers 5 and 4 of the Sa-3 site at Sasoa'a in the Falefa valley, which is dated to the same general 1st to 2nd cen-

TABLE 11

DISTRIBUTION OF POTSHERDS FOUND AT SITE SU-VA-4

I. Layer A — Square S-1: 1 body sherd of thin fine-tempered ware.

II. Layer E—Square N-1: 1 body sherd of thick coarse-tempered ware from base of layer.

III. Layer F-1—

A. Surface Finds: 1. Surface of bulldozer cut: 1 body sherd of thin fine-tempered ware.
2. Spoil from square A-1: 2 sherds of thin fine-tempered ware, one body, one rim.
3. Spoil from square F-1: 3 body sherds, two thin fine-tempered ware and one thick coarse ware.

B. Excavated from F-1 layer in individual squares

Square	N-2	N-1 (N½)	N-1 (Ext.)	S-1	S-2	Totals
Thick Coarse	1	0	2	0	0	3
Thin Fine	0	16	21	13	5	55
Total	1	16	23	13	5	58
Approx. Area in Square Metres	9	4.65	9.4	9.3	9	41.35

C. Excavated from F-1 layer in squares within bulldozer cut

Square	A-1	B-1	C-1	D-1	E-1	F-1	G-1	Trench	D-2	E-2	F-2	Totals
Thick Coarse	3	16	3	1	0	5	0	0	0	0	0	28
Thin Fine	34	65	19	13	4	6	0	0	1	1	0	143
Total	37	81	22	14	4	11	0	0	1	1	0	171
Approx. Area in Square Meters	5.7	9	9	9	9	8.6	1.4	7.2	.1	2.1	2.4	

IV. Distribution Totals

	Individual Squares	Squares in Bulldozer cut	Other Contexts	Total	Percentage
Thick Coarse	3	28	2	33	13.8
Thin Fine	55	143	6	204	86.2
Total	58	171	8	237	100
Approx. Area in square metres	41.35	63.5	—	104.85	—

tury A.D. time depth (Davidson *et al.* 1967: 227). Here the pottery of layer 4 is identical to that of layer V at Va-1, while the pottery of layer 5 is closest to that in the F-1 layer of Va-4. Hence the difference in pottery, the early age of the non-ceramic Hearth Horizon, and the stratigraphic relationship of the two pottery wares at the Sasoa'a site support the contention that the F-1 layer, or at least its pottery-bearing lower portion, is either contemporary with or antecedent to the ceramic horizon at Va-1, the latter being the more likely case. At the same time the following non-ceramic Hearth Horizon of the 3rd to 4th century A.D. on the one hand and additional excavation evidence from Va-38 (Report 11, p. 181) and other sites on the other hand, not only push the non-ceramic sequence back to the 4th or 5th centuries A.D., but make the gap between the basal layer at Va-1 and other sites no longer loom so large, especially when the sequences from sites all over Upolu are taken into account.

The principal features of the assemblage of potsherds from Va-4 are summarised in three tables, the first indicating the over-all frequency of the sherds and the numbers of thick coarse and thin fine wares, the second showing the internal distribution of potsherds within the F-1 layer, and the last providing the occurrence and typology of rim sherds. From the data provided in table 11, it is obvious that the thick coarse sherds constitute only a small proportion, 13.8 per cent of the collection, and that nearly half of them derive from a single square, B-1. I have tried various calculations to see if it could be demonstrated that this thick coarse pottery occurs more often in the top of the F-1 horizon or layer F-1a. While results from some squares would seem to indicate such a tendency, it is not a consistent pattern. While this inconsistency might be explained away by the use of arbitrary levels in some squares, even this explanation will not do away with a significant number of thick coarse sherds in what is definitely the F-1b layer. The intermixture of thick and thin ware sherds in this deposit must therefore be accepted as genuine on the present evidence.

The thin fine ware, as well as the thick coarse ware, was most frequent in square B-1 and in the two adjacent squares, A-1 and C-1. A slightly lower concentration was encountered in square N-1. Thin fine ware is distributed throughout the F-1 layer as the predominant type and occurs in both F-1a and F-1b contexts.

The average concentration of sherds is 2.2 pieces per square metre if computed in relation to the entire excavated area. This is a very low rate of recovery. However, the figures in table 11 indicate that potsherds are not uniformly distributed over this area, and few or none occur in the F-1 layer to the north and west of square F-1 in the bulldozer cutting or in N-2 of the individual squares. This is the same general area in which the non-ceramic Hearth Horizon is found that often replaces the F-1 horizon. But even if this area is removed from consideration, only in square B-1 do potsherds occur in a concentration which even begins to approach that at other sites with a ceramic horizon. All this suggests we are dealing with an occupation of either a brief interval in time, or one of low intensity in a restricted area, or a combination of both these factors. As test squares excavated in the open to the north and south of this mound do not reveal either this layer or occupation, it is probable that it is preserved only under the mound, and even then restricted to only a portion of the area so preserved.

A more useful analysis bearing on this problem is that for divisions within the F-1 layer shown in table 12. The results reveal that the greater proportion of the sherds are derived from layer F-1b. This is quite clear in the sherds grouped under Category A, where natural layers were employed. Where even finer depth control was practised within these layers, as in square A-1, the results suggest that most of the sherds either lie on or near the interface of F-1a and F-1b or near the base of F-1b. It is also clear from this analysis that sherds do occur in F-1a and as Terrell concludes (see below), it is therefore probable that these sherds are in secondary position and may well derive from the F-1b part of the layer.

TABLE 12

DISTRIBUTION OF POTSHERDS IN THE F-1 LAYER OF SU-VA-4

Category A — in which potsherds may be assigned to natural division of F-1 layer.

1. Distribution by natural layers

Square:	A-1	E-2	D-2	Total	Percentage
Layer F-1a	8	0	1	9	23
Layer F-1b	29	1	0	30	77

2. Arbitrary contexts within natural layers of square A-1

Layer F-1a—2 on or near surface, 1 in fireplace, 4 at base of layer or on surface of underlying layer, 1 unlocated.
Layer F-1b—10 on or near surface, 7 in middle and 12 near base of layer.

3. Natural layers according to Crosby's designation in which her layer IV equals **F-1.**

Square:	N-1 (N½)	S-1
Layer IVa	0	0
Layer IVb	16	11
Layer IVc	—	2

Category B — in which potsherds may be assigned to one of two principal levels in F-1 layer.

Square	B-1	C-1	D-1	E-1	N-2	S-2	Total	Percent.
0-15 cm.	31	11	4	0	1	4	51	40.2
15-30 cm.	50	11	10	4	0	1	76	59.8

Category C — in which potsherds may be assigned to several levels in F-1 layer.

Square:	F-1*	N-1 (Ext.)	Total	Percentage
0-10 cm.	1	3	4	11.7
10-20 cm.	2	12	14	41.2
20-30 cm.	8	4	12	35.3
30 + cm.	—	4	4	11.7

*Hougaard places all these sherds in a layer equal to Terrell's F-1b.

TABLE 13

OCCURRENCE OF RIM SHERDS IN SU-VA-4

A. Distribution of Rim sherds:

Thin Fine — 1 sherd on surface of F layer in bulldozer cut.

Square:	A-1	B-1	F-1	N-1 (N½)	N-1 (Ext)	S-1	Total
Thick coarse—	0	2	0	0	0	0	2
Thin fine—	1	12	1	1	5	3	23

B. Frequency of Rim sherds:

	All Squares Thick Coarse	All Squares Thin Fine	All Contexts
No. of Rims —	2	23	26
Total no. sherds —	33	204	237
% of Rim sherds —	6.1	11.3	11.0

C. Frequency of Rim Types:

Flat thick lip — coarse ware — 1
Rounded lip — coarse temper — incision decoration on top surface of lip 1
Flat lips — fine ware
  straight sides — 2
  expanded sides — 9
  one side thickened — 2
  outcurved sides — 1
Rounded lips — fine ware
  straight sides — 3
  outcurved sides — 2
Lip ending in point and very outcurved — 5

In the sherds grouped under Category B, where the division in the F-1 layer was between the upper 15 cm. and the remaining lower portion, the tendency for the sherds to occur most frequently in the lower division is not so marked. This is understandable for the F-1a layer was normally about 10 cm. or less in thickness, so that the lower 5 cm. of the first 15 cm. level would normally have included some of the F-1b layer and the interface between it and F-1a, where sherds were common, thus raising the frequency in the upper division and lowering it for the lower division. The same situation would seem to be true of the 10 cm. level distribution results grouped together under Category C. In this case it should be stressed that all the sherds from square F-1 are thought to derive from what here is called the F-1b layer. This distribution of sherds, with the greater numbers, perhaps 75 per cent or more, in the F-1b layer seems consistent with and furnishes additional support for the stratigraphic interpretations below. It also appears consistent with the interpretation of a palaeosol horizon developed on the surface of the F-1 layer, while the majority of the structural or other artifact evidence for occupation appears to be associated with the F-1a—F-1b interface or the F-1b layer, but not the F-1a layer. Again it calls attention to the restricted nature of the evidence for the earliest utilisation of this location.

While the distinction between the two types of pottery may be made on the basis of the body sherds, it is the contrast in rim types that provides the soundest criteria for differentiating between the two wares. A simple flat rim from a bowl is the almost exclusive rim form found on sherds of coarse thick ware; rims made from thin fine ware are more varied in form and suggest the presence of several vessel shapes (see fig. 70). Still the commonest rim form on the thin fine ware is a flat and usually slightly expanded rim set at a slight angle to the exterior surface, which suggests a large open bowl shape (fig. 70). Thus there is a basic similarity between the thin fine ware and the thick coarse ware as far as a rim form and vessel shape is concerned. This similarity is supported by the occurrence of some quite thick-walled body sherds that are otherwise of the thin fine-tempered ware (Dickinson, Report 19, p. 271) and have been classified with this fine ware. Clearly wall thickness does vary on vessels, as it must, according to the part of the vessel from which a sherd comes. What is indicated by the average wall thicknesses between the two wares is the same as is indicated by the rims, namely a larger range of vessel shapes with thinner walls in the fine ware category.

Therefore, while a continuity in the ceramic tradition between the earlier and later wares is clearly indicated in rim form and vessel shape as well as in the basic techniques of pottery manufacture, a number of additional rim forms in thin fine ware furnish a clear contrast. Among these forms are the flat-lipped variety with one side slightly thickened, the flat-lipped variety with outcurved sides and all of the rounded lip forms (fig. 70). In this last group the outcurved rims in particular suggest some sort of open mouthed jar form. Indeed, the very outcurved rims ending in a pointed lip are not only unique so far in Samoa, but because two of them could be fitted to four paddle-impressed body sherds (plate 17), it is possible to reconstruct such a shape for this vessel (fig. 71). Temper analysis, moreover, has demonstrated that this pot, like the others, is of local Samoan manufacture (Dickinson, Report 19, p. 272).

Only one of the usual thick flat rim forms occurs on the coarse ware sherds. An exception is a sherd in the same ware, but with a rounded lip form that carries fine incised notches at right angles to the lip. Similar decoration on fine ware lips from layer 5 of the Sa-3 site in the Falefa valley are also known. Such rims were not recovered from layer V of Va-1. This would again seem to indicate that the thick coarse ware may be part of this earlier ceramic tradition, which then comes to predominate in a restricted form in the later contexts.

The frequency of rim sherds in relation to body sherds is similar to the results from Va-1. The 11 per cent rims among all potsherds from Va-4 compare favourably with the 12 per cent obtained by Golson and the 9 per cent obtained by myself at Va-1. Thus, small though the pottery sample at Va-4 is, it does stand in clear contrast to that from layer V of Va-1.

In conclusion, it should be noted that many of the sherds have surface finishes which indicate that they were wiped or scraped by some implement which left fine parallel lines, particularly on the inner surface. Also a few sherds bear distinct depressions normally interpreted as anvil marks. However, only five decorated body sherds which belong to the partially reconstructed pot suggest that a carved paddle was ever employed in the manufacture of Samoan pottery. Otherwise such paddle marks, if they existed, seem to have been obliterated by subsequent smoothing. As a result the impression is strengthened, as expressed on initial examination of Samoan ceramics from Va-1, that they as well as this earlier part of the ceramic tradition are far removed from the Lapita

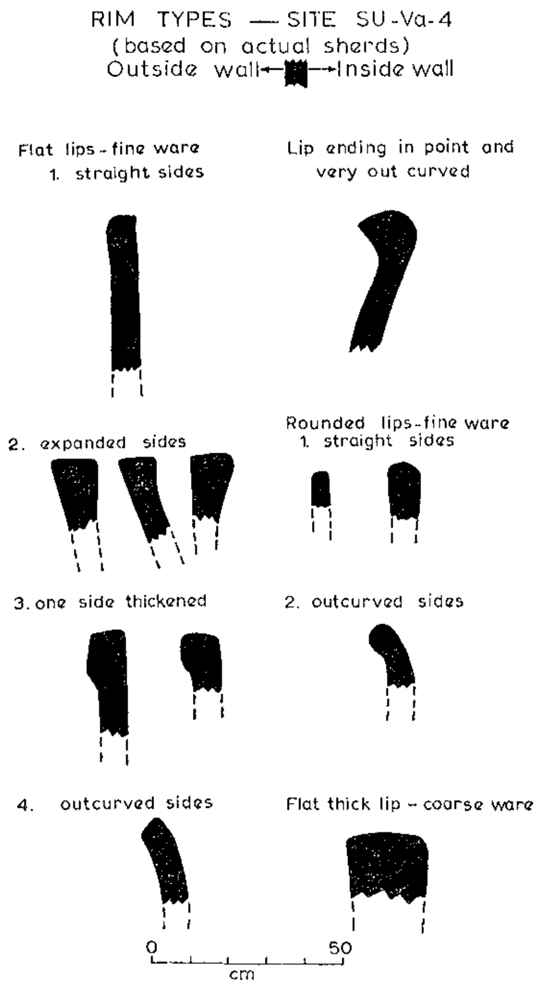

Fig. 70. Principal pottery rim forms from SU-Va-4.

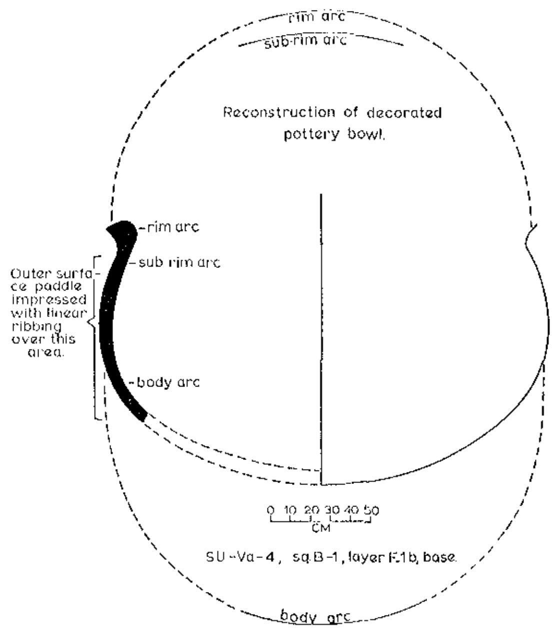

Fig. 71. Reconstruction of form of decorated pot from SU-Va-4.

ceramic tradition of the same date in Tonga and do not seem to be related. Rather this Va-4 pottery assemblage appears to take us back a step closer to the impressed ware tradition of Fiji, except that it lacks many of the rim forms and vessel shapes common to that tradition and possesses only one of the less common among the carved paddle decorative motifs known to characterise that tradition after 100 B.C. Therefore, if these early 1st to 2nd century A.D. Samoan and Fijian pottery horizons are related, it would appear that it is through some common ancestral tradition, rather than by the derivation of one tradition from the other.

Summary Of Stratigraphic Events (By John Terrell)

The sequence of events discovered by the excavations on mound Va-4 can be summarised as follows:

1. Ceramic Horizon (prior to 100 A.D.?)

The first event noted in the history of mound Va-4 is an occupation of the old field now buried beneath the mound by a people who knew the art of pottery making. The evidence uncovered is relatively sparse: the function of the "pit features" at the base of layer F-1b is unknown, and the random occurrence of artifacts within that layer suggests that the area of intensive habitation, if such existed and still survives, has not yet been found.

2. Hearth Horizon (ca. 1st to 5th Century A.D.)

On the evidence available, the occupation marked by the Hearth Horizon was aceramic and occurred relatively soon after the ceramic occupation in the vicinity now covered by mound Va-1. The cultural associations of this horizon are unknown. Much of the area covered by the hearths and other features seems to have been prepared in antiquity by the removal of layer F-1, perhaps to make a firm, dry surface for the cooking area. The occupation marked by layer F-1a has been interpreted in this report as dating to the same general time as the Hearth Horizon, although it may be somewhat earlier. This is not the only interpretation possible, however, for the stratigraphy is somewhat ambiguous and artifacts were recovered from layer F-1a. While none of the 11 sherds found by Hougaard in square F-1 came from this level, sherds were found on and near the surface of layer F-1 in 1965 and Green (above) has outlined results which confirm this earlier observation. This information consists of data on both layer of origin and the spatial co-ordinates for each of 36 sherds from square A-1. Graphic analysis has shown quite clearly that 7 of the sherds, or 20 per cent, were found scattered in layer F-1a, 2 of which were at the surface below the mound superstructure. The conclusion believed to be most probable, however, is that such finds are in secondary position and are derived from layer F-1b. Considering the shallowness of layer F-1a and the presence of features cut from it into the main pottery-bearing layer, it is thought to be not too surprising that artifacts were found throughout the soil horizon of layer F-1.

3. Hiatus Of Unknown Duration

Until the radiocarbon date for the cooking pit at the base of layer E is available, the length of time between the deposition of the Hearth Horizon and the first construction of the mound superstructure remains unknown.

4. Primary Phase Of Mound Construction And Occupation

5. Rebuilding Of The Mound By The Addition Of A Secondary Mantle Of Clay And Further Use Of The Mound

6. European Occupation

Final Observations

Now that the major results have been described in some detail, it is proper to step back from the evidence gained and look over what has been accomplished. In general it can be said that the excavations have, indeed, achieved the limited objectives they were designed to meet: (1) a far larger assemblage from the ceramic horizon below the mound has been obtained which has proved to be even more important for an understanding of early Samoan prehistory than anyone would have predicted at the start; (2) the unexpected discovery of a Hearth Horizon at the base of the mound has made it possible to reduce somewhat the temporal hiatus in the prehistoric record at Vailele; (3) the stratigraphic history of the mound itself is now much better known; and (4) a broad assemblage from the European occupation has been gathered from the excavations and about the foundations of the house on the eastern end of the mound. In sum, there is now a richer knowledge of time and events at Vailele. But it would not do to be too complacent. Prehistory is made of much more than time itself and finicky (albeit necessary) stratigraphic details. There is much which is unknown about the culture of the people or peoples who lived at Vailele: only if and when better understanding of the cultural content of prehistoric life at Vailele has been achieved will archaeologists be able to say they know its past.

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INVESTIGATIONS AT INLAND VAILELE

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In September 1966, further work was carried out in the Vailele area. An extensive area of earthen terraces in the coffee plantation, not included in Green's survey (Report 6), was mapped, and a small excavation was carried out in the large mound Va-38, recorded by Green, which had already been bisected by the plantation road. These investigations, though limited, served to throw further light on the sequence of occupation in this most inland portion of the Vailele survey area.

THE SURVEY

The area surveyed is a continuation of Green's survey, and is indicated by shading on the Vailele survey map (fig. 47). Mapping was done by a combination of compass and plane table survey. There are no earthen mounds in the coffee plantation, in contrast to the rest of the Vailele survey area, and the archaeological remains consist of earthen terraces, and trenches. The area is the southern part of an extensive system of fortifications, which is bounded in the north by the transverse trench Va-41, and appears similar to other ridge fortification systems such as those described by Scott (Report 13), and Davidson (Report 12). Although the excavated mound Va-38, and its two adjacent mounds lie within the area of the fortifications, there is no way of determining whether they are in any way related to them.

No stone structural remains were found in the coffee plantation. This is consistent with the general lack of stone in the Vailele area discussed by Green (Report 6).

THE EXCAVATION

Mound Va-38 is the northernmost of a group of three mounds at the boundary of the coffee and coconut plantations (fig. 72). It had already been bisected by a plantation road to a maximum depth of approximately 1½ metres. The side of the road cutting formed a slope of about 45 degrees.

A cut was made into the slope, at approximately the middle of the mound, on the western side of the road (fig. 73). The nature of the road cutting meant that the highest layers in the excavation could be defined only to a very limited extent. The excavation was carried out in a series of steps so that at no stage was more than about 1 square metre of any one layer uncovered. The excavation was 1½ metres wide and about 4 metres long, extending from the edge of the actual road itself to within 50 cm. of the fence line.

A topsoil of about 8 cm. had formed over the cut, otherwise disturbance was minimal, consisting mainly of concentrations of ant nests in some areas.

The stratigraphy encountered in the excavation, and the features uncovered, are described below. The stratigraphy is illustrated in fig. 74.

Layer 1: topsoil. A very disturbed layer. The top of the excavated section does not quite reach the top of the mound, so there was no indication in the excavation of the nature of the final occupation of the mound, except for the presence of one possible stake hole.

Layer 2: loose brown rubble and small water worn pebbles. A major fill layer in the construction of the mound. Towards the base of this layer three compacted surfaces were identified as floors I to III. Layer 2 material loosely filled four postholes which were apparently dug from the level of floor II. These were: feature a-1, 60 cm. in diameter, 90 cm. deep; feature a-2, 20 cm. by 10 cm. at the surface, and 35cm. deep; feature a-3, 12 cm. in dia-

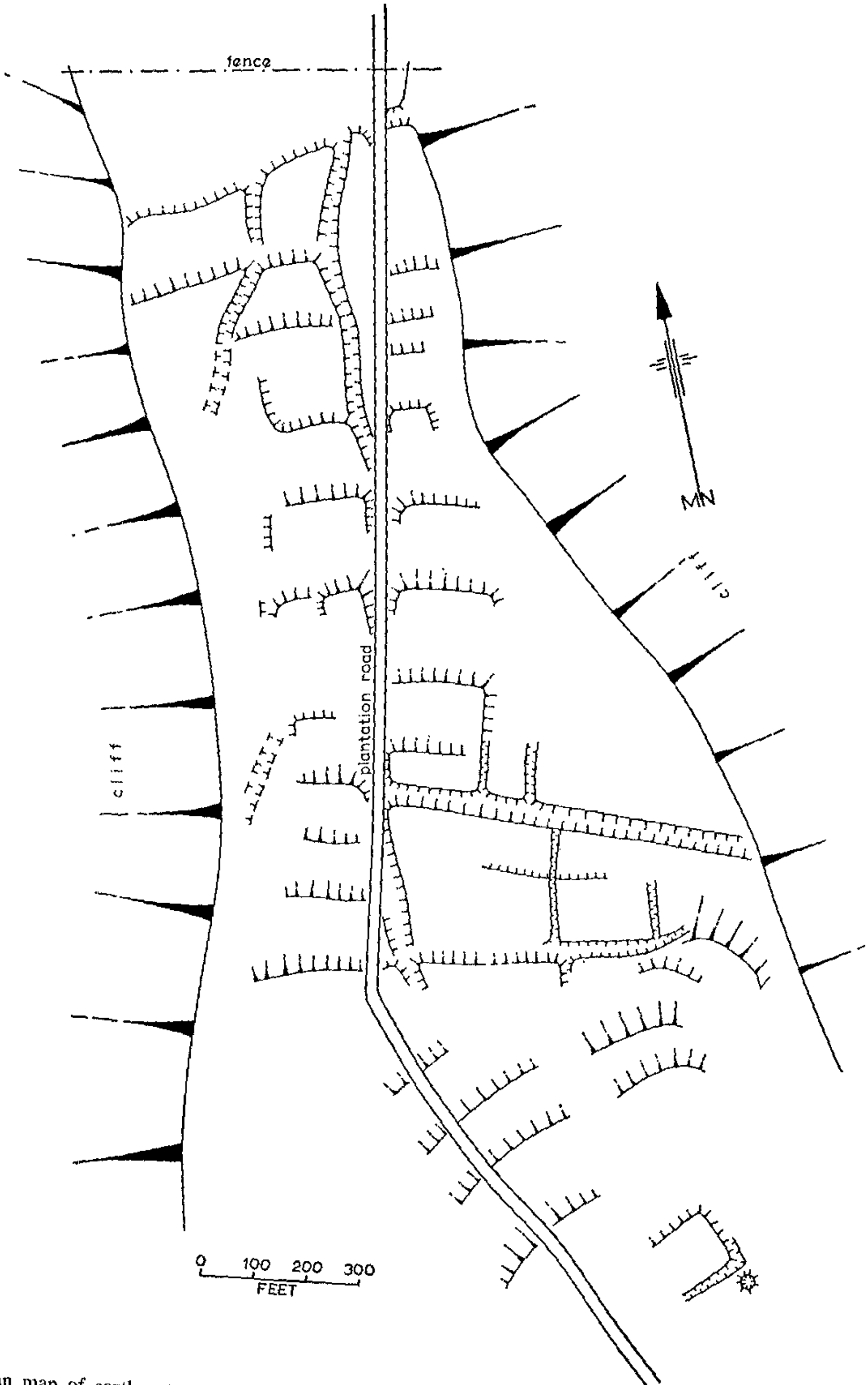

Fig. 72. Plan map of earthen terraces inland from SU-Va-38, Vailele, Upolu.

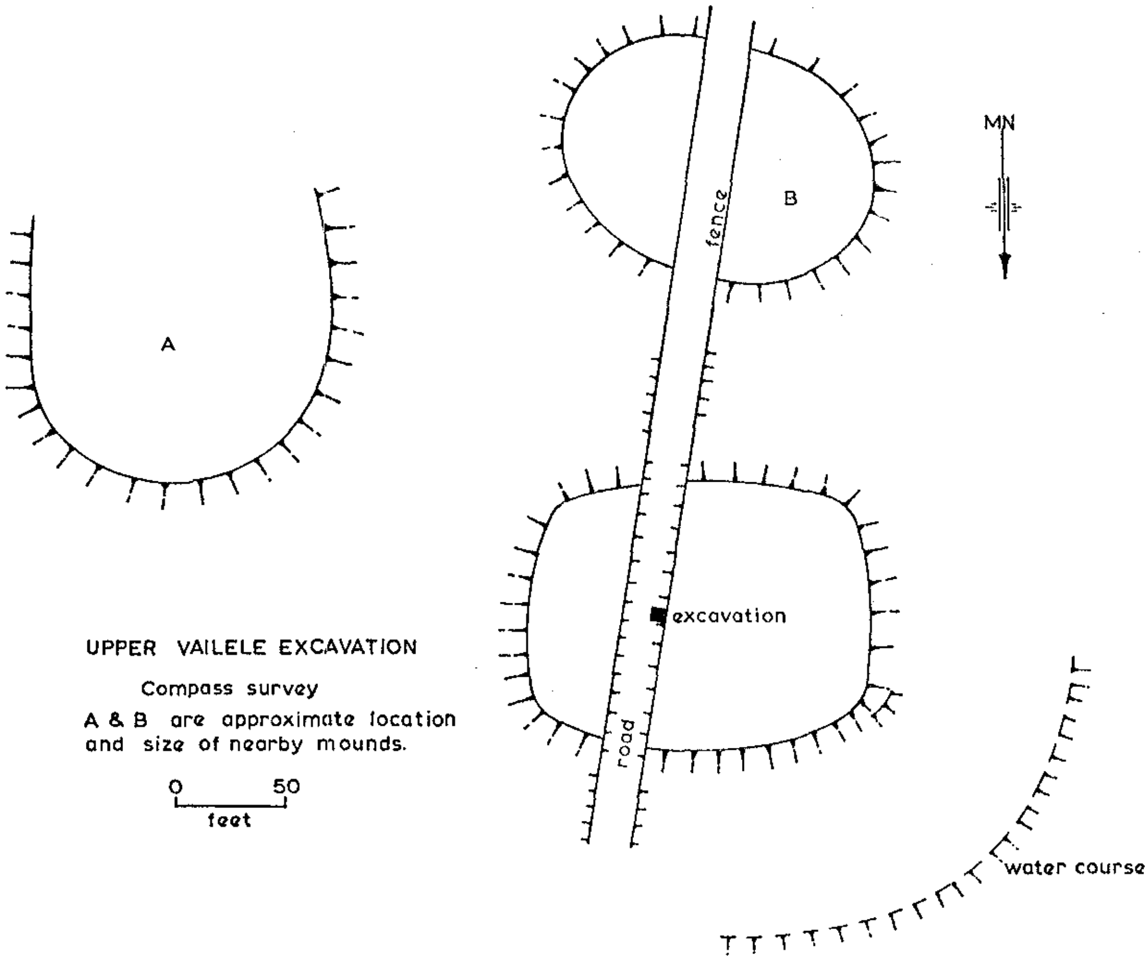

Fig. 73. Plan map of SU-Va-38 and adjacent mounds, Vailele, Upolu.

meter, 15 cm. deep, and feature a-4, 8 cm. diameter, 30 cm. deep.

Floor I: a compacted surface confined to a small area and much disturbed by ants. It appears to have been compacted from layer 2 fill, and overlies more of the same fill. It is tentatively identified as a floor because of its similarity to later discovered, well identified floors.

Floor II: a clearly identifiable compacted surface from which the postholes a-1 to a-4 were dug. The surface consists of compacted layer 2 fill and one or two large stones.

Floor III: identical in content to floor II but not compacted. Probably the initial occupation level on the surface of layer 3 to which floor II was a later addition. Associated with this floor was a large shallow depression, b-1, 60 cm. in diameter and 30 cm. deep, seemingly associated with the two postholes a-3 and a-4, which cut through its edges.

Layer 3: loose brown fill with water worn pebbles. No features.

Layer 4: light brown fill with large stones. No features.

Layer 5 (Floor IV): a hard compacted floor, extending over the whole of the excavation, and very easily identified. A hollow "drain-like" feature ran north-south on this floor, with the floor about 15 cm. higher on the east side of the feature. When this higher part of layer 5 was removed it was found to overlie a second layer, 5a, of very loose brown soil, which was confined to the east side of the drain-like feature, and filled a second much larger feature, c-3, parallel to the first (fig. 74). These two features appeared to be definitely part of the same structure, and appeared more like

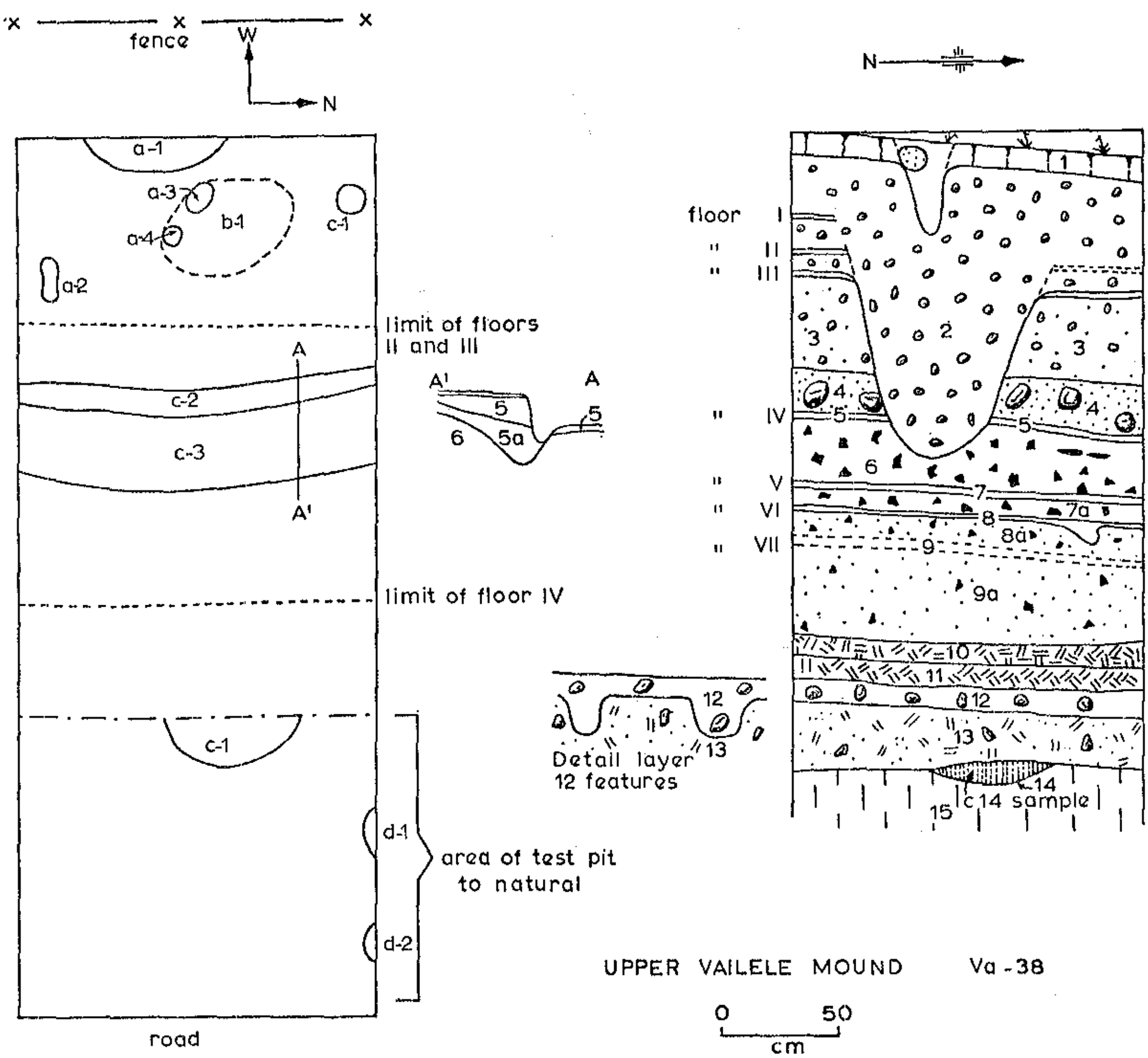

Fig. 74. Plan and cross-section of excavations in SU-Va-38.

an edging of some sort, with the upper feature c-2 possibly containing a log or other organic material, than like drains. The features did have a definite downhill slope, but this was in conformity with the general stratigraphy, which also sloped. One posthole, c-1, 12 cm. in diameter and 10 cm. deep was also filled with layer 5.

Layer 6: a loose brown rubble in which one adze roughout was found.

Layers 7, 8, 9, (Floors V, VI, VII): compacted surfaces developed on layers 7a, 8a and 9a respectively. They are dark coloured layers. 7 and 8 are almost certainly floors. The status of 9 as a floor is less certain, but in cross-section it appeared similar in nature to 7 and 8. Both 8 and 9 were identified only in cross-section, after the excavation, following extremely heavy rain, and in a favourable light. Layer 7 was identified as a floor during excavation. Layer 8 appeared to fill a small feature, possibly a drain or a stake hole, cut into layer 8a.

Layers 7a, 8a, 9a: homogeneous brown fill with some stones, on which the compacted surfaces 7, 8, and 9, apparently developed.

Layers 10 and 11: harder more homogeneous light brown layers incorporating a mixture of charcoal which was apparently deposited as part of the fill. During excavation they were identified as two separate layers because of a difference in compactness, but no difference could be seen between them in cross-section. Two carbon samples were taken from these layers. Because of the diffused and fragmentary nature of the charcoal the samples are not regarded as satisfactory for radiocarbon analysis.

Layer 12: a sterile layer of what appeared to be water worn shingle, which filled two features cut into layer 13. Feature d-1 was 16 cm. in diameter and 16 cm. deep, and feature d-2 was 26 cm. in diameter and 18 cm. deep.

Layer 13: a hard brown layer with few stones, some flecks of charcoal.

Layer 14: the fill of a firepit, dug directly on the natural subsoil underlying the mound. The firepit contained burned stones and clay, and considerable charcoal. Carbon sample GaK-1439 from this firepit has given a determination of 1550 ± 80 years before 1950.

N

Layer 15: natural undisturbed subsoil beneath the mound.

In every case where layers have been described as "floors" they show a characteristic darkening of the soil, at the top of a lighter layer. The conjunction between the darkened layer and the layer immediately beneath was in every case rather gradual, while there was a sharp division between each "floor" and the succeeding layer. This suggests that the floors are buried soils, which developed on the various successive surfaces of the mound. Floors III and IV had also well defined features cut from their surfaces, indicating that they were living surfaces at some time.

The construction of the mound appears to have involved a number of stages. The earliest evidence of occupation is the firepit at the base of the excavation. This was sealed and covered by layer 13, with layer 12 a possible floor. Several more fill layers were capped by the floors V, VI, and VII, which are here grouped together because of the similarity of their underlying fills. A further layer of fill (layer 6) is capped by the floor IV (layers 5 and 5a) which represents a separate occupation. Floors I, II, and III, form another occupation series, are probably fairly close in time and may all have been laid down while a single post occupied the feature a-1. The final surface occupation of the mound could not be identified in this excavation.

There thus appears to be a minimum of six occupations represented in the section, of which one (layer 14) antedates the mound, while five represent structural additions to the mound, until it reached its present form. Two of these (layer 12 and floor IV) have single floors, and two involve three successive floors, while the nature and complexity of the final occupation is not known. At the maximum, there have been 9 occasions (including the gravel layer 12 and the present surface) when an additional fill layer or layers have been added to the mound and the surface left open long enough for the characteristic darkening and compacting to occur.

Stone flakes were found in all layers from layer 5 upwards. Only a sample of these was retained. Layers 7 downwards were sterile. No pottery was found in the excavation.

The adze, A 17/1, from layer 6, is very weathered, and has no ground surfaces. It is roughly quadrangular in section, and measures 8 cm. in length, and 3½ cm. in width.

No other artifacts were found.

CONCLUSIONS

The small excavation in mound Va-38 demonstrated quite clearly that the mound reached its present size through a series of structural additions, rather than in one massive building period. There is evidence of at least six successive occupations of the mound site, two of which were sufficiently extensive to involve repeated additions to the floor surface at the time. The radiocarbon date for the first occupation provides an indication of the length of time involved.

It is apparent that the occupation of the inland Vailele area was not a single exceptional occupation, but one which was repeated over many years.

The extensive remains revealed by the survey, moreover, suggest that at various times a considerable range of countryside, from the coast itself, at least as far inland as the coffee plantation, was occupied, and modified, by man.

V. INTENSIVE RESEARCH AT LUATUANU'U, UPOLU

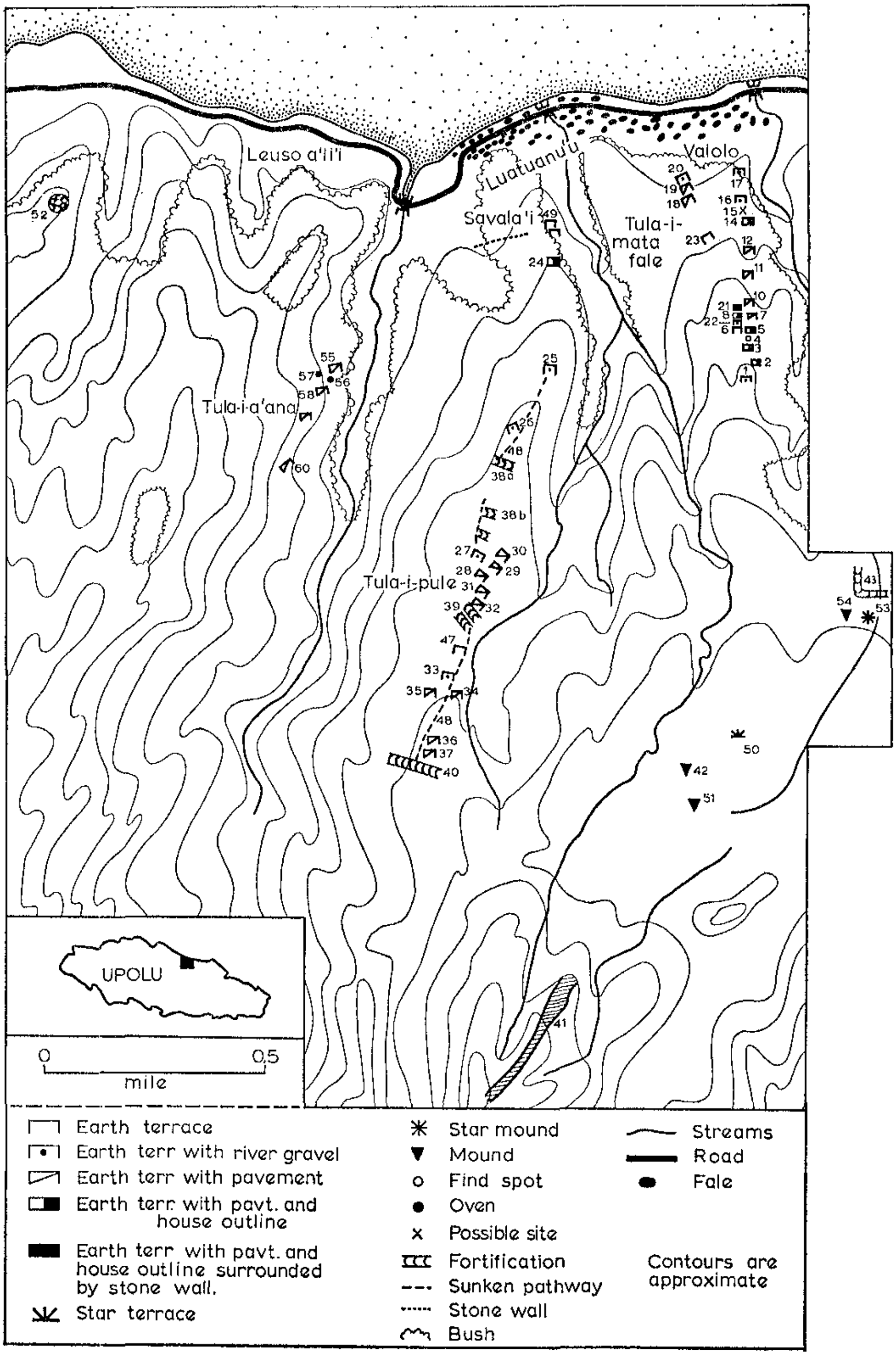

Fig. 75. Map showing distribution of sites in Luatuanu'u survey area, Upolu.

SURVEY OF SITES AND ANALYSIS OF ASSOCIATED ARTIFACTS, LUATUANU'U

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INTRODUCTION

The Luatuanu'u project began with the detailed survey of the large inland fortification, Site Lu-41, described in Report 13. This site was first brought to our attention by Mr J. W. Hart, then of Apia. During the course of the initial investigations there, it became apparent that the land between Lu-41 and the present day coastal village of Luatuanu'u was covered in archaeological sites. In order to understand the relationship of the fortification to these other sites a survey was conducted to cover two open fern-covered ridges intensively, and a somewhat wider area in a more general, less intensive fashion.

A variety of methods was employed in recording the sites. No attempt was made to clear those sites which were covered in heavy bush, but where dry fern covered sites on the open ridges it was cut or burned off, quickly revealing the sites. The best preserved and most interesting sites were mapped by plane table survey. Others were recorded by compass and tape, tape alone, or, occasionally, by pacing.

Concurrently with the mapping of sites, a surface collection of artifacts, mainly stone adzes and fragments, was made. Many fragments came from the stone pavements and house floors which make up a considerable number of the sites, and the exact location from which such fragments came is recorded. Thus there are small assemblages of adzes from some of the sites recorded, as well as from the modern village area. It was hoped that these would provide further evidence, particularly about the age of the sites.

The present village of Luatuanu'u consists of two independent sections, Luatuanu'u and Leusoali'i, separated by the Ma'epu stream, each occupying a flat coastal strip backed by high ridges ending in steep bluffs. Settlement in these two sections is of the extended ribbon type, and there are only a few plantation houses for temporary occupation inland. Immediately behind the sandy coastal strip a series of narrow infertile fern-covered ridges, divided by steep gullies with flowing streams, extends back towards the bush (fig. 75). Eventually the ridges come together into a few major bush-covered ridges rising towards the central mountain ridge of Upolu.

There are three main types of vegetation in the survey area. The tops of ridges for some distance inland are covered with staghorn fern. Further inland on the ridges, in the Ma'epu Stream valley, and to the east of the village are the present village plantations with a heavy cover of mile-a-minute, and other weeds, which makes location of sites very difficult. Furthest inland, and in the steep gullies, there is bush. There are also patches of bush on the open ridges, and both bush and open fern-covered clearings occur in the plantations.

Trails run up the various ridges today, and progress along any one ridge is relatively easy, but crossing from one to another is difficult, making each ridge a separate unit for purposes of settlement or cultivation, and also making defence of any individual ridge a comparatively simple matter.

Very little traditional information on the area could be obtained under the conditions in which we operated as archaeologists. What we obtained was fragmentary, probably because of the increasing loss of traditions by modern Samoans. They themselves were of this opinion. It is also probable that our informants belonged to a family who found little advantage to themselves in knowing traditions which perhaps may be retained by other family groups in the village. We did not possess the proper means to pursue possible sources of traditional information any further.

Hawaiian: kula = slope

The general name for the patches of open fern-covered ridge is *tula,* or bald. The three open ridge areas on which sites were recorded were said to be named Tula-i-Matafale, Tula-i-Pu'e, and Tula-i-A'ana (fig. 75), but informants were inconsistent as to whether these names only referred to the land as it is named at the present time, or were actually names of the settlements formerly existing on the ridges.

There is a general tradition that the present coastal settlement is a rather recent phenomenon. According to this tradition settlements were formerly located in various areas inland of the present village, which was established only when the coastal flat arose in what was formerly a lagoon, and was found to be habitable.

Mercer and Scott, in a study of the village agriculture in Luatuanu'u, identified the *tula* areas as old clearings, which, they felt, might have been the scene of intensive cropping during periods of temporary but acute population pressure, when settlements were located inland. They found the soils in the fernlands low in phosphate and potash (in which they differed little from surrounding areas) and noticeably poorer than other areas in exchangeable calcium (Mercer and Scott 1958:355). It would appear then that the inland areas have been intensively used in the past, and this is borne out by the archaeological evidence.

SITE SURVEY

The survey area within which the sites were given the designation Lu- is bounded in the east by the Namo River dividing Luatuanu'u from Solosolo, and in the west by the stream which divides Leusoali'i from Lauli'i. Sites east of this area on Solosolo lands are prefixed So- while the nearest recorded sites to the west are those of the Vailele survey area, numbered Va-1 etc.

Although some sites were recorded in all parts of the survey area, the intensive survey was confined to the two major fern-covered ridges behind the village of Luatuanu'u, on either side of the Saipule Stream. These two ridges were intensively explored, and it is likely that all sites occurring within the areas to be described in more detail below, have been located and recorded. A third ridge, between two branches of the Saipule stream, in a rather inaccessible situation, has not been explored.

A few sites were recorded to the west of the main survey area, behind Leusoali'i. These include a group of sites on an open ridge known as the Tula-i-A'ana, and an unusual fortification.

To the east, a large fortification was recorded on the 1150 foot peak between Luatuanu'u and Solosolo. Between this peak and the coast, in village plantations, sites are known to exist, but the vegetation cover was not conducive to their discovery and mapping. Isolated sites were recorded on the ridge between the upper end of the Tula-i-Matafale and Site Lu-41 along the trail to this latter site, and on the western side of the Namo River. Coverage in these areas was by no means complete. The majority of sites are shown in fig. 75, only those in the extreme east being omitted.

THE FIELD EVIDENCE

The commonest forms of field evidence in the Luatuanu'u area are earthen terraces, often with stone paving and house outlines, and fortifications. Other types of evidence that occur are sunken paths, walls (other than defensive walls), ovens, and specialised mounds. The various forms of evidence will be briefly described, and then their distribution discussed. Further descriptions of individual sites are provided in the appendix.

The topography of the area is important in a consideration of the nature of the sites. There is little stone occurring naturally on the ridges, and what does occur is in the form of boulder erratics, unsuitable for building in most cases. Abundant water worn stones of all sizes occur in the stream beds. These have been extensively used for paving and outlining houses and pavements. Foundations for these structures, however, have been made of earth, rather than of stone. Similarly, there is a lack of stone walls and stone paths, which are so common in some areas.

The topography has largely conditioned the distribution of sites in linear arrangement along ridges. This situation is particularly suited to transverse earthworks at narrow points along the ridges as a means of fortification, although other kinds of fortifications also occur. It is quite evident that the various ridges have been intensively and extensively occupied in the past.

FORTIFICATIONS

All major forms of fortification so far encountered in Samoa are represented at Luatuanu'u. Most common, however, is the transverse ditch with scarp or inner bank, cutting across a ridge from edge to edge. As noted above, this type of fortification is well suited to the terrain. The most impressive example is Lu-41, fully described in Report 13.

Fortifications on the ridge known as the Tula-i-Pu'e also belong to this category. The various defensive works on this ridge have been assigned to three separate sites, which divide the other sites on the open part of the ridge into three separate clusters.

Lu-38, the most coastal of the three fortifications, consists of three short transverse ditches without banks at a narrow point on the ridge (fig. 76). The first and deepest ditch is undoubtedly designed to defend the interior part of the ridge from attackers from the coast. The other two ditches could be defended from either side. It seems likely, however, that they also were designed to defend the interior, and particularly the area of sites Lu-27 to Lu-32 from attack from the coast. Lu-39, which occupies a natural saddle in the ridge, is a complex of discontinuous ditches, banks, and scarps, but still serves to cut off the ridge and prevent access of attackers, in this case either from the coast or from inland (fig. 77). Finally, Lu-40, furthest inland along the ridge, is typical of the larger more massive transverse ditches with outer bank, steep inner scarp, and low inner bank which abound in Samoa. Stretching across the ridge for some 170 yards, it is again built against attack from the coast (fig. 78).

Of quite different nature is the hilltop fort, Lu-44, on the prominent peak overlooking the coast between Luatuanu'u and Solosolo. The peak is sculptured all around with broad terraces and high steep scarps, so that it closely resembles some terraced hill top fortifications in New Zealand, just as Lu-38, for instance, resembles ridge type of fortifications in New Zealand. There are discontinuous ditches on some of the outer edges of Lu-44, but most of the hillside is so steep that the scarps and the natural slopes are sufficiently effective defences.

Different again is Lu-43, in which a fairly gently sloping area, just beyond a major branch in the ridge, is enclosed on three sides by a ditch, while on the fourth, upslope side, the ditch continues only a short distance to a point where the hillside steepens. On this side the crest of the ridge has a series of four earthen terraces. A similar type of defence may be involved in the area designated Lu-45, recorded as an area of terraces and a ditch, under heavy second growth, which was not further explored.

Finally, yet another kind of fortification, Lu-52, on the bluffs above Leusoali'i, was reported and surveyed by Atonio and Kusini towards the close of the 1966-67 field work period. While this was not visited by any members of the party, the description and sketch plan provided by Atonio reveal that it has a complicated series of enclosing ditches among which are some trenches with flanking angles which could only have been designed for fairly sophisticated gun fighting.

The ridge fort of Lu-41 and the hilltop peak of Lu-44 are examples of two major kinds of fortification which occur in Samoa, utilising different types of terrain. Lu-43 and Lu-52 are more unusual forms. The number of fortifications in this area suggests that it was one of conflict for some time. One explanation for

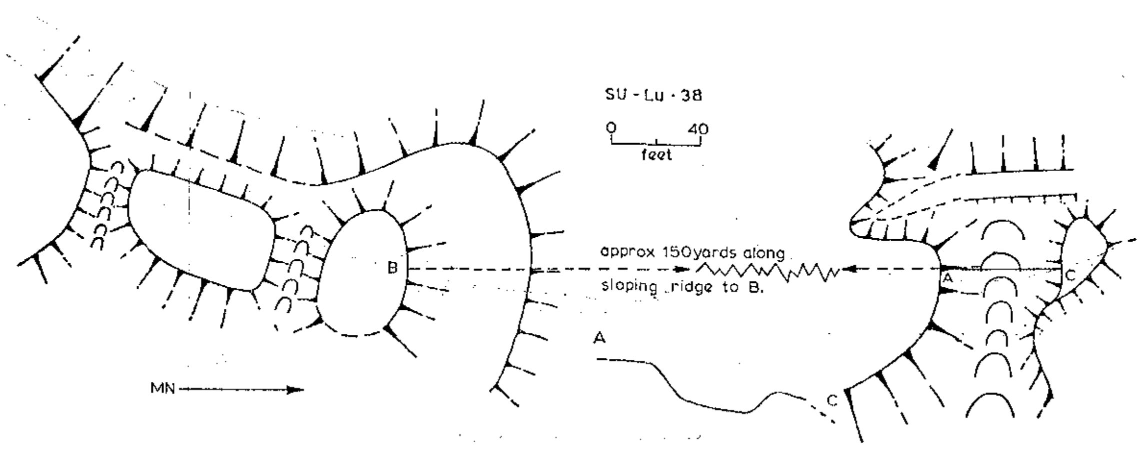

Fig. 76. Plan of fortifications at SU-Lu-38, Upolu.

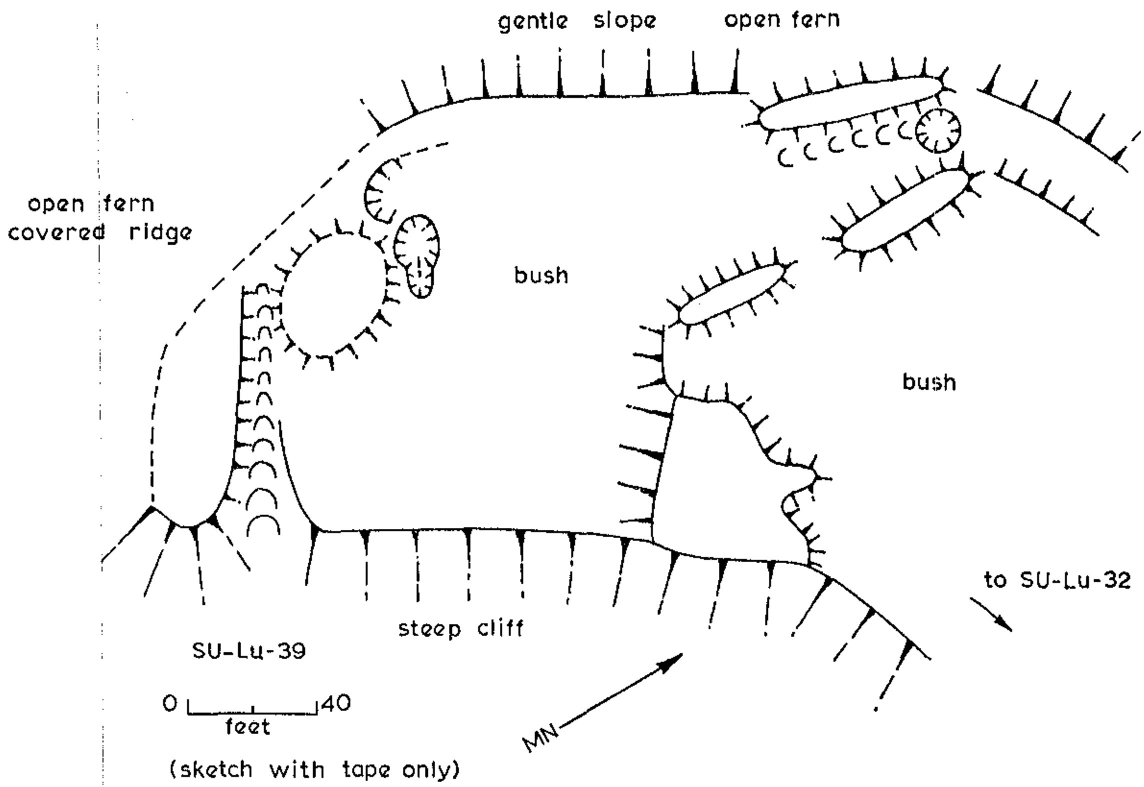

Fig. 77. Plan of fortifications at SU-Lu-39, Upolu.

this may be the fact that for a long time the shifting boundary between Atua and Tuamasaga districts was located in this area. That it was also the scene of fighting in the civil wars of the late 19th century is well known. Unfortunately it is no longer remembered which of the fortifications we recorded were actually involved at that time.

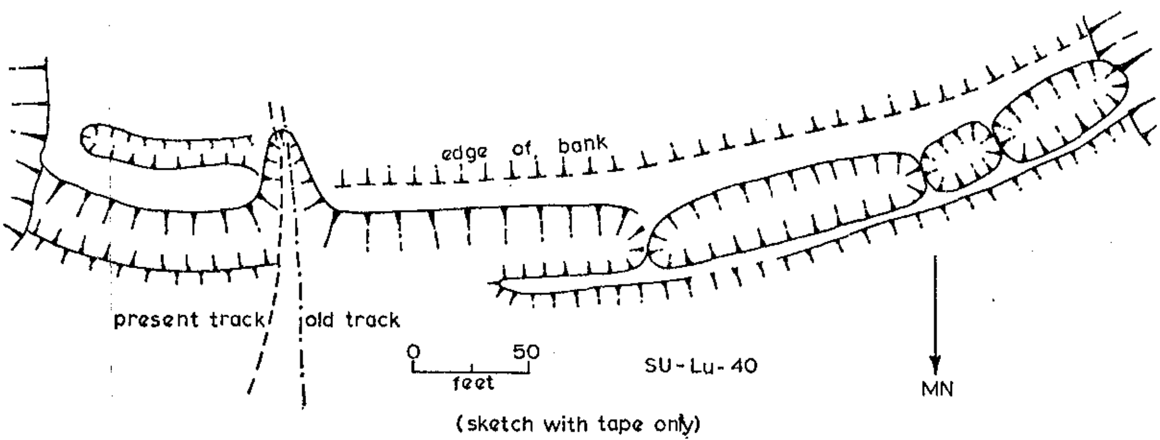

Fig. 78. Plan of fortifications at SU-Lu-40, Upolu.

EARTH TERRACES

The earth terrace is the commonest form of field evidence in the Luatuanu'u area (plate 18). It is usually formed by cutting back into the ridge and depositing the resulting spoil in front to make a level platform which may or may not carry an associated stone structure. Almost all the terraces are roughly rectangular in shape, although one rather rounded example was recorded on the Tula-i-Pu'e. Some terraces are quite massive, with considerable scarps both downslope at the front of the terrace, and upslope at the rear. Dimensions are given in the appendix. Some terraces, particularly on the Tula-i-Pu'e, where the slope of the ridge is more gentle, are very slight, merely levelled areas on almost flat land.

Only four of the twenty-eight earth terraces recorded lacked any trace of stone structures on them, apart from those terraces incorporated in the complex sites Lu-41, Lu-45 and Lu-46. The majority of terraces carried some form of structure, although in some cases only traces of it remained. Nine were in this latter category, with scattered pebbles and stones on the surface, but no definite outlines of pavements or houses.

Fifteen sites had clearly defined pavements, outlined on one or more sides by stone curbs, and with fills varying from quite large water worn stones to small river pebbles. Only seven had clearly defined outlines of houses as well as pavements.

STONE STRUCTURES

Twenty-two sites included reasonably clearly defined stone structures, while a further nine had apparently had some kind of structure, which was now no longer recognisable owing to such factors as erosion and robbing of stones. Terraces with no structure at all were found to be the exception rather than the rule. The majority of structures took the form of pavements clearly outlined by a single course of large smooth stones set end to end around the edges, while the fills variously consisted of small and large river stones. Most pavements of this kind were approximately rectangular, although very few were completely so. Many now lack clearly defined edges on one or more sides, and it is impossible to tell whether they were always like this, or whether stones have been robbed from them since they were last in use.

Clearly outlined houses are much rarer than pavements. Houses completely outlined by a single set of curbs are absent. Even the most clearly defined houses such as those of Lu-3 (fig. 79) and Lu-5 (fig. 80) lack curbs around one portion, and at sites such as Lu-21, multiple lines of curbs suggest a number of successive houses on the same spot (fig. 81 and plate 20). The interior of those houses that are outlined by curbs always consists exclusively of small pebbles known as *'ili'ili* in contrast to the surrounding pavements which often include both large stones and small pebbles. This suggests that several other structures, which lack

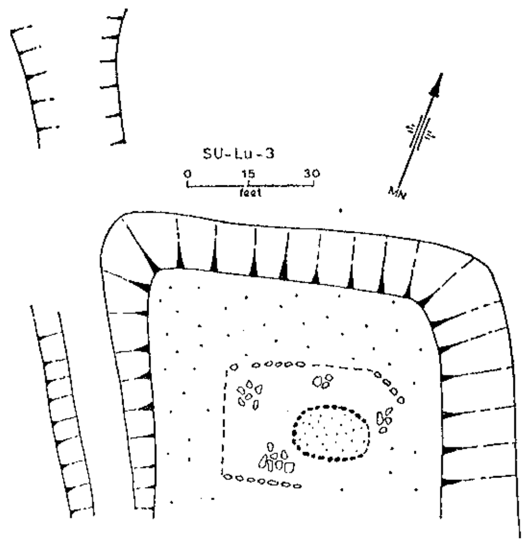

Fig. 79. Plan of earthen terraces and structure, SU-Lu-3, Upolu.

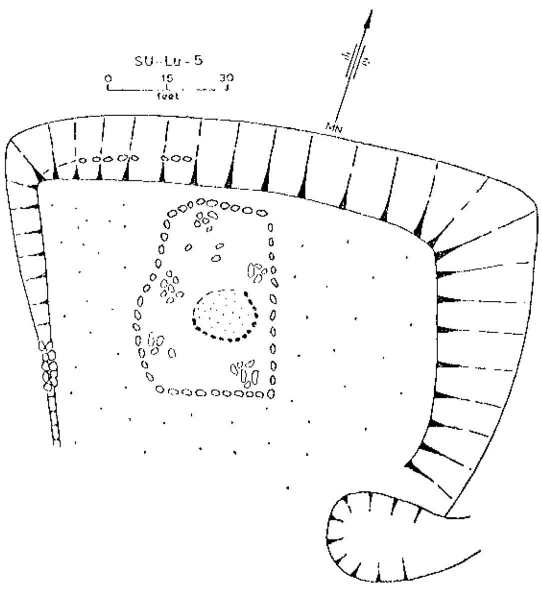

Fig. 80. Plan of earthen terrace and structure, SU-Lu-5, Upolu.

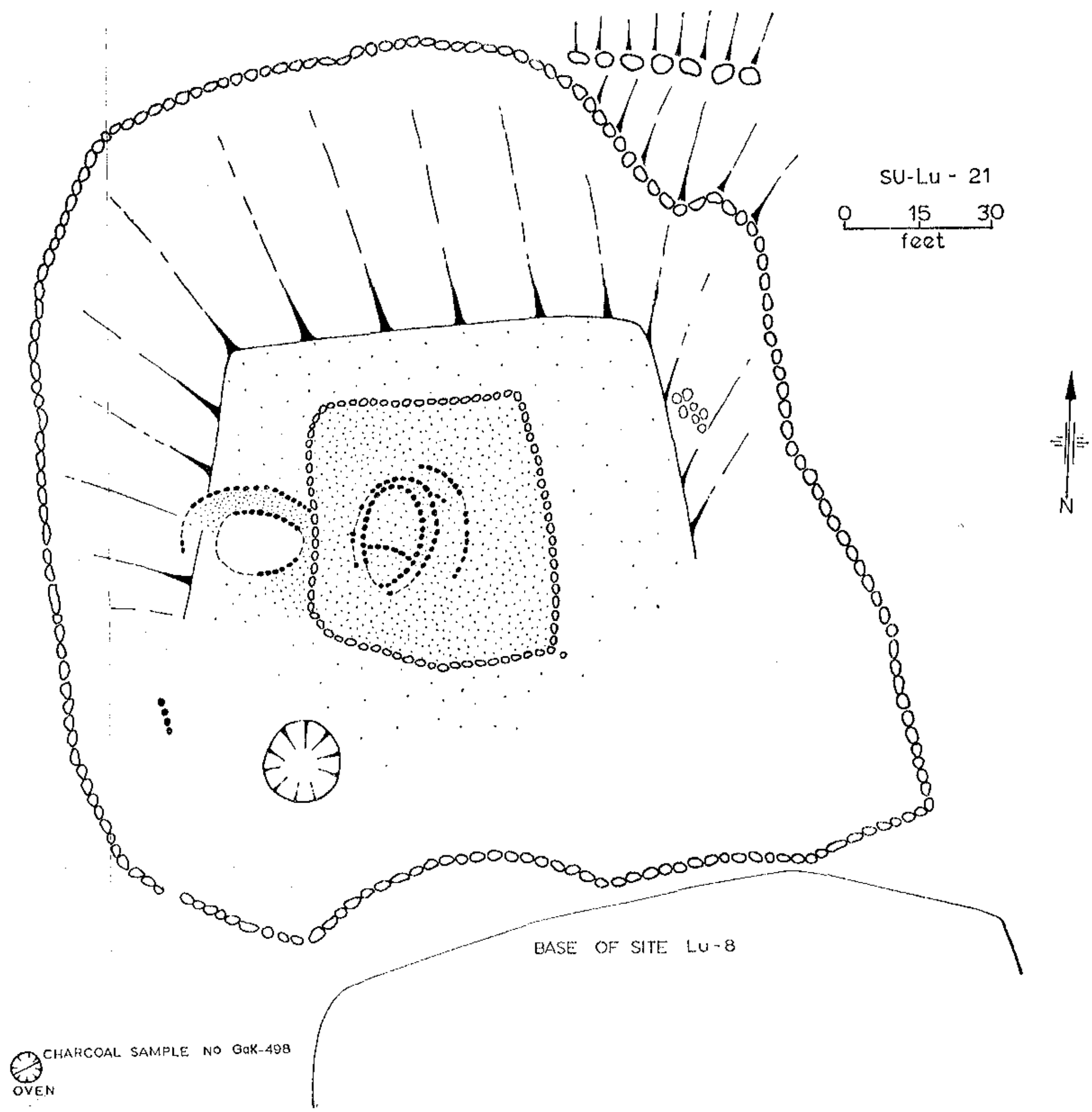

Fig. 81. Plan of earthen terrace and structure, SU-Lu-21, Upolu.

house curbs, but where there is a preponderance of *'ili'ili* in one area, were also almost certainly house sites. Some structures, however, particularly those on the Tula-i-A'ana, of which Lu-60 is a particularly impressive example, are large rectangular structures outlined by large curbs and completely filled with *'ili'ili*. It is presumed that these were also house structures, in which the house floor was not differentiated from the surrounding pavement, because it seems unlikely that Lu-60, for instance, supported a house with the same dimensions, 87 by 45 feet, as the pavement.

Pavements are variously located on terrace structures. In some instances the structures occupy the entire area of the terrace, as in sites Lu-27 to Lu-29 for example. In other instances the structure is much smaller than the terrace surface and may be located in the centre, as in sites Lu-2 (fig. 79), Lu-7 and Lu-21 (fig. 81), towards the front, as at Lu-5 (fig. 80) and Lu-12, or to one corner, as at Lu-8 (fig. 82) and Lu-10 (fig. 83). Generally, both pavements and houses are aligned with their longest dimension running east-west. Exceptions are the pavement of Lu-5 (fig. 80),

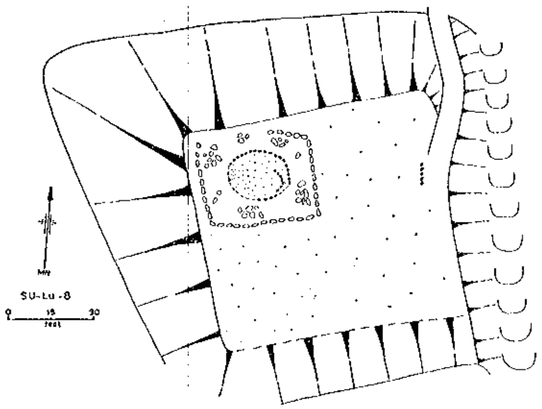

Fig. 82. Plan of earthen terrace and structure, SU-Lu-8, Upolu.

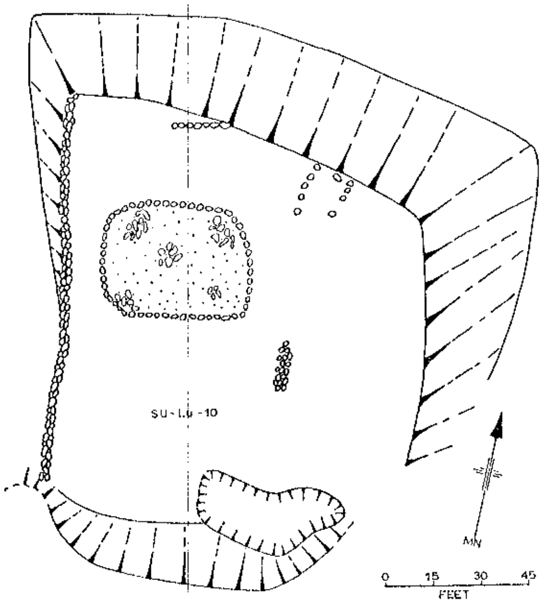

Fig. 83. Plan of eathern terrace and structure, SU-Lu-10, Upolu.

and the house outlines inside the pavement of Lu-21 (fig. 81).

All house outlines visible are oval, while all pavements tend towards rectangular, with the exception of the structure on Lu-7, which is approximately oval, but probably too large to represent a house outline only.

Mounds

Several sites differ from the normal terraced sites in being either completely free standing mounds, or specialised sites of the" star-shaped" type. These are here considered separately. Lu-42 is a small but high mound beside the path leading to the fort Lu-41. It is considerably further inland than any of the sites on the Tula-i-Matafale ridge, but the terrain is so similar that a decision to make a relatively small high mound, rather than a broader lower terrace, would not have been conditioned by factors of topography. The land surrounding this site is covered in dense second growth, in which other, smaller sites, may be concealed. Interpretation of this site should therefore be reserved, while its existence, and its differences from other sites, are noted. Local belief considers it a pigeon snaring mound.

Lu-51 is a much lower oval mound, built of earth with stone facing. It stands alone, on gently sloping ground, close to the edge of the ridge — a situation said to be ideal for pigeon snaring.

Lu-53 is a star-shaped earthen mound with stone facing. It is fully described in Report 14. Like many of the stone structures it is actually situated on an earthen terrace. Lu-54 is an earth mound close by.

Lu-50 is strictly an earthen terrace, but it is of a specialised kind differing from the regular terraces described above. It resembles half a star-shaped mound. Four arms protrude on the downslope side, while on the upslope side, the site merges into the natural slope.

Interpretation Of Terraces And Mounds

Actual house structures are identifiable on only a few of the earthen terraces. Yet it is difficult to imagine what function the earthen terraces could serve, other than as foundations for houses. The presence of at least vestigial remains of structures on most terraces tends to support this interpretation. The rectangular terraces, on the open ridges, with and without structural remains of identifiable form, are here regarded as house foundations. That many of them may be the end products of repeated occupations will be evident from Report 14. If the sequence at site Lu-53 is at all typical, many other sites in the area will also have been occupied repeatedly over a long period of time. This means that the structures which are now visible on the terraces may be the last of several on the same terrace, while the terrace itself may have been added to and altered over many years. It is probable that over the years, stones, which would be at a premium in this area, may have been shifted from one site to another, and used in many successive structures, and this would include adze fragments incorporated into pavements.

The specialised mounds, and star-shaped forms, do not appear to be house sites, at least not ordinary dwelling sites. Other possibilities are religious sites, burial places, and pigeon catching mounds. The problem of interpreting specialised sites in Samoa, and of identifying in the field, sites of the types listed above, will be further considered in future reports. At this stage, it should merely be stated that the specialised sites in this survey area are believed not to be ordinary dwelling sites, but that no more precise interpretation is feasible at present.

Stone Walls And Alignments

These features are rare in the survey area, perhaps because of the relative shortage of stone. Only one stone structure is surrounded by a stone wall, in contrast to the Falevao project area where many house sites and earthen terraces are surrounded by stone walls. Lu-21 (fig. 81 and plate 19) is completely surrounded by a low meandering stone wall which runs around the base of the scarp on three sides, and across the rear of the terrace immediately below the base of the scarp of adjacent Lu-8. This feature makes Lu-21 unique among earthen terraces with and without structures in this project area.

A free standing stone wall was encountered at the base of the Tula-i-Pu'e in the area known as Savala'i. It resembles the modern pig wall at the rear of the present village, but is said to be older than the memory of present inhabitants.

Two stone alignments were recorded as Lu-15. They occur on sloping ground where there is no terrace, or visible structure, and their purpose is uncertain.

Sunken Paths

Sunken paths occur on both the Tula-i-Pu'e and the Tula-i-Matafale. The path on the former has been assigned a site number, Lu-48, as it can be traced for some distance. It is a shallow rounded trench some 3 to 4 feet wide and 18 inches to 2 feet deep, which winds up the ridge between terrace sites. It is particularly noticeable passing along the west side of the group of fortifications that compose Lu-38 and on the open ridge between Lu-39 and Lu-40, where it does not correspond to a modern and little used trail through the fern, and was revealed only when the fern was burned off.

On the Tula-i-Matafale a sunken path is visible between sites Lu-5 and Lu-6 and between Lu-7 and Lu-8, with a subsidiary track actually leading up on to site Lu-8. Elsewhere on the ridge the track is absent, or very faint, and has not been assigned a site number. These sunken paths are similar to modern trails leading to plantations both in this area and in other parts of eastern Upolu, where constant passage of many people, particularly in wet weather, has worn a noticeable depression along the trail. The paths recorded here are regarded as older because they are not at present used, and because they are closely associated with terrace sites.

Ovens And Large Holes

Relatively few ovens were recognised in the survey area. On the Tula-i-Matafale, one oven was identified near site Lu-21, situated outside the enclosing stone wall to the southwest of the site. It is about 5 feet in diameter. This oven was half sectioned, and a charcoal sample taken from it yielded a date of 230 ± 70 years before 1950 (Green and Davidson 1965:64). The only other feature in the entire area which can confidently be identified as an oven is Lu-56, a large raised rim pit of the type which modern Samoans identify as an *umu ti*. This site was not excavated, but is identical with features tested in other project areas and found to be ovens. No ovens were located on the Tula-i-Pu'e.

Several circular pits with straight sides were found close to terrace sites. These differed from the shallower ovens, and from the more irregular and more numerous borrow pits which surround certain sites, particularly Lu-51 and Lu-53. At the southwest corner of site Lu-21, inside the enclosing wall, is a larger circular depression approximately 15 feet in diameter and 3 feet deep (fig. 81). To the southeast of Lu-12 are three smaller holes, 5 feet in diameter, and 1½, 2, and 3½ feet deep. These three holes, which appear to be rather recent, are said to hold water after rain, leading to a suggestion by informants that they are water holes. A proper well, stone lined and at least 3 feet deep, was found some 38 metres to the southwest of the end of a drain belonging to site Lu-53 (Report 14, p. 210).

A similar hole, 10 feet in diameter and 3 feet deep was noted on the Tula-i-Pu'e, east of site Lu-36, while yet another, 9 feet in diameter and considerably more than 3 feet deep, on the Tula-i-A'ana, was recorded as a separate site, Lu-57.

Distribution of Sites

Two areas, the Tula-i-Pu'e and the Tula-i-Matafale, were recorded in sufficient detail to be discussed as settlements, or as parts of settlements. It should be clearly understood that the remaining areas were not exhaustively surveyed, the sites recorded being those close to the path and of an unusual or easily noticeable nature. The Tula-i-Pu'e and the Tula-i-Matafale, however, are typical of the long narrow ridges occurring in this part of Upolu, and the distribution of sites on them may be regarded as representative of this type of terrain.

TULA-I-MATAFALE

The area known as the Tula-i-Matafale is an expanse of open ridge which begins immediately behind the village, at a height of about 250 feet above sea level, and extends inland for about half a mile from the coast to a height of 550 feet above sea level (plate 18). It is the eastern of two main branches of the ridge system between the two streams which flow to the sea at either end of the main section of Luatuanu'u village. The narrower western branch is also open but is apparently devoid of sites. Shortly above the Tula-i-Matafale the two branches of the ridge merge and continue inland for a further half mile to join with the major ridge between the two main forts Lu-41 and Lu-44. This inner portion of the ridge is mainly village plantation land in which sites are present, but difficult to recognise. It would thus be wrong to assert that the inland edge of the *tula* marks the end of archaeological sites. Nonetheless, the *tula* probably corresponds to a zone of intensive use in the past, and as such may be regarded as a unit of settlement.

There are nineteen earth terraces on the Tula-i-Matafale including those on a small offshoot at its lower western end (fig. 75). One particularly large terrace (Lu-14) bears traces of two structures, making a possible total of 20 sites altogether. As shown on figure 75 there are two terraces with no trace of stone at all, five with scattered stones but no defined structure, seven with fairly clearly defined pavements and a further six in which house outlines are recognisable. Sixteen of these sites are aligned along one ridge with a second line leading through sites Lu-23, and Lu-18 to Lu-20. In the first alignment is a cluster of seven sites arranged in parallel sets of three and four sites on either side of the trail. With the exception of Lu-21, houses where they are identifiable are aligned with their long axes at right angles to the path.

The varying state of preservation of the structures on the terraces may be interpreted in several ways. The terraces might not all have been occupied at the same time in the later stages of occupation of the area, or some may have been robbed since occupation terminated, or some terraces may have supported houses which lacked pavements and outlining curbs. But given the reluctance of Samoans today to build a new house foundation when a disused one is available near by, it is probable that at some time almost all the terraces were in use contemporaneously, giving a fair indication of the distribution of a settlement at the peak of utilisation of this area.

Unfortunately, with few actual structures and house outlines fully preserved, it is difficult to generalise about sizes of houses. Among the six house outlines for which there are measurements (see appendix), a range between 12 by 16 feet and 19 by 25 feet is indicated. In general it would appear that there was little variety in size of platform or structure, but considerable individual variation regarding the exact lay-out of pavement and house on the platform. The only site which can be clearly differentiated from all the others on the basis of a unique feature is Lu-21 with its surrounding wall (plate 19). It is possible that this was a chief's house, or even a *fale aitu* (cf. Stair 1897: 226-227). The presence near by of the only recognisable oven, the large depression, a possible second house attached to the first and the fact that the site is in the only cluster of sites on the ridge, further suggest that it may have had some particular significance in the settlement which other sites lacked.

The date from the oven near site Lu-21 gives some idea of the period when the area was in use. The full range of time could be estimated only from detailed excavations on the ridge, but in view of the early date obtained from Lu-53 (Report 14, p. 216) and the exhausted nature of the soil on the *tula* areas, it is likely that a considerable range of time is involved, and that the present form of the sites represents a fairly late stage, probably around the time indicated by the date from Lu-21.

TULA-I-PU'E

The Tula-i-Pu'e is a single long ridge between the Saipule and Ma'epu Streams. The open part begins nearly half a mile from the sea at a height of about 350 feet above sea level, after a more gradual ascent than that leading to the Tula-i-Matafale, and continues for rather more than three quarters of a mile, reaching a height of about 850 feet above sea level, before the open ridge is replaced by bush and scattered plantation clearings. Fifteen terrace sites have been identified on the Tula-i-Pu'e, to which may be added a further two or three on the land known as Savala'i between the open *tula* and the coastal flat. Sites on this *tula* are also strung out in a more or less linear arrangement; unlike those on the Tula-i-Matafale they are interspersed with fortifications, which occur at naturally constricted places on the ridge, dividing it into three sections, which for ease in localising artifactual finds were named Tula-i-Pu'e nos. 1, 2, and 3.

There are only three recognisable terrace sites, two of which are rather eroded, on the lowest part of the Tula-i-Pu'e (no. 1). The lowest of these, Lu-24, is very similar to sites on the Tula-i-Matafale, having a fairly clearly defined pavement and house on a rectangular well defined terrace. The other two sites are more eroded terraces with scattered stones. It would appear that this part of the ridge may have been intensively used for agriculture in the later prehistoric period to reduce it to its present barren state. The sites at Savala'i were not properly surveyed, but appeared to be terraces with remains of pavements similar to Lu-24, but not as clearly defined.

The next group of sites, Lu-27 to Lu-32, comprising the second part of the Tula-i-Pu'e, is separated from group no. 1. by the fortifications of Lu-38, and from group no. 3 by the fortifications of Lu-39. These sites form a distinct group and are rather different from the majority of sites on the Tula-i-Matafale. In all of these sites except Lu-30, the stone structure occupies the whole surface of the terrace or platform, and in each case the structure consists of a pavement with no indication of a distinct house floor within. Three structures are outlined by curbs, and three are not, but in every case the pavement is well laid and apparently complete. Only two sites, Lu-29 and Lu-30, which are on more steeply sloping ground, occupy terraces with steep scarps, the remaining sites are only barely noticeable platforms, or levelled areas. There are a number of slight small earth terraces in the area which have not been assigned numbers. No walls or ovens were noted in this area. There is considerable size range in the structures, Lu-29 being significantly larger than the others.

Whether these sites lack house outlines because they are of a different age than those on Tula-i-Matafale, or whether their rather different character reflects merely a different preference on the part of a different section of the community, or a separate community, cannot at this stage be determined. Similarly the relationship of these and other Tula-i-Pu'e sites to the fortifications Lu-38 and Lu-39 is obscure. It is possible to consider the Tula-i-Pu'e no. 2 as the interior of a single fortification, bounded by Lu-38 on one side and Lu-39 on the other. Alternatively, the two sets of fortifications could be two separate manifestations, independent of each other and of the house sites. The house sites themselves are too carefully made and elaborate to fit in with the type of "bush refuge" described by nineteenth century observers. On the other hand, patterns of warfare may have differed in earlier times, when, according to the archaeological evidence for house sites, a sizable population was at least semi-permanently resident on the *tula* ridges. Two points should be made about the fortifications Lu-38 and Lu-39 in this connection. Neither would be at all suitable for gun warfare, and it is unlikely therefore that these are nineteenth century sites, whereas Lu-40, 41, and particularly Lu-52, could easily be interpreted as post-European constructions. Secondly, both fortifications occur in patches of bush, rather than in fern, and at places naturally suitable for fortification, which may mean that they had been set aside for fortifications for some time, and so escaped the intensive use to which the remainder of the ridge was put.

It could be argued then, that these two fortifications are pre-European, and may have been used at times of crisis by a population residing fairly continuously on the ridge.

The seven house sites on the third part of the ridge are more strung out than those on no. 2, but are otherwise very similar to them, and it is quite possible that all these sites form a settlement to which the fortification Lu-39 is not related at all. Lu-47 has no structure on it. Lu-36 has a small irregular paving which is near the centre of the terrace, but the remaining sites have large though not always well defined pavements covering the surface of the terraces.

The most inland fortification, Lu-40, is apparently not directly related to the terrace sites below it, as it is designed to be held against attack from the direction of the coast. Its massive construction, and inner bank, suggest that it could be a post-European site, though not necessarily so. No sites were observed in the bush above this fortification, but some could exist unrecorded in the overgrown village plantations which are scattered through the bush. A further fern-covered area further inland also suggests that utilisation of the inland area did not cease at Lu-40.

In general, the sites on the Tula-i-Pu'e closely resemble those of the Tula-i-Matafale in distribution, being spaced out in a linear arrangement, partly but not totally determined by the topography. Like those on Tula-i-Matafale, these sites appear to be oriented at right angles to the path which winds up through them, rather than parallel to it, as is usually the case in modern linear villages. No sites appeared particularly large or unusual, and no ovens or stone walls were found.

Tula-i-A'ana

Recording of sites on this ridge was too elementary to warrant detailed analysis. Once again, a linear arrangement of structures on an open ridge was found. As the ridge was not cleared of fern, details of sites, and less obvious features such as sunken paths, were not observed. The sites recorded, however, are sufficient to show that the type of settlement pattern described for the other two *tula* also occurs on the ridges behind Leusoali'i. Principal interesting features of this ridge are the large raised rim oven, the only one of its type recorded in this survey area, and the exceptional site, Lu-60, which in its size, and more particularly in its neatness, with exceptional care being taken to select the pebbles for the paving, stands out from all other sites in the area. Historic descriptions of sites of this kind are lacking, but it would appear that this structure either belonged to a person of unusual importance, or served some specialised purpose such as that of a meeting place, guest house, or religious structure.

Other Sites

The other principal area in which sites were recorded is the ridge inland of the Tula-i-Matafale, along the trail leading to Lu-41. Little can be said about the actual distribution of sites in this area, as only the most obvious were recorded. There is evidence, however, that a number of sites exist much further inland than those described above, but still following the linear arrangement along the ridge top. A former settlement, named Vaomanogi, probably of fairly recent age, was said to exist inland of Lu-51, although we did not locate it. Certainly there is abundant evidence for occupation in this area, and the results of excavations at Lu-53 (Report 14) indicate that this occupation extended over a long period of time.

The three fortifications on this ridge are further evidence of the amount of warfare in the area. Lu-43, which is eminently unsuited to gun warfare, may be presumed to be pre-European. Lu-46, a small promontory between two branches of the Namo River defended by a shallow ditch, and overlooked by opposing river banks, also appears unsuitable for gun fighting. It more closely resembles the concept of a bush refuge. It is rather out of the Luatuanu'u area, however, and although it is on the west of the Namo River, it is geographically much closer to Solosolo sites.

Finally, it is certain that numerous sites exist in the plantation lands inland of Cape Utumau'u, east of Luatuanu'u. These, however, await future investigation.

Discussion

The survey revealed abundant evidence of sites away from the coastal strip on which the population is now concentrated. The archaeological sites far exceed the present plantation houses that now exist inland. Because of the nature of the terrain, the terraced sites with structures, which are interpreted as house sites, follow a linear arrangement. Apart from the cluster of sites which includes Lu-6 to Lu-10, Lu-21 and Lu-22 on the Tula-i-Matafale, and that of Lu-27 to Lu-33 on Tula-i-Pu'e, however, sites are more spaced out than in modern villages. While the sites are regarded as house sites, it is important to remember that houses, according to nineteenth century ethnographic descriptions, included dwellings of ordinary people and chiefs, community houses, and religious structures. Of the sites recorded on the three *tula*, only Lu-21 and Lu-60 were sufficiently different from other sites to justify any interpretation as specialised sites. It should also be noted that no area could be identified as a *malae*. While a *malae* for these settlements could have existed on the coast, or further inland, or on an open expanse of ridge, such an open area has now no identifying marks.

The occurrence of warfare is attested by the numerous fortifications. While fighting is known to have occurred in the area during the nineteenth century, some of the fortifications recorded are regarded as unsuitable for gun fighting and belonging to an earlier period. The exact relationship between the fortifications and the house sites is not known, but there is no evidence to suggest they were not in some cases associated.

Further inland several specialised sites occur which are not present on the ridges that were surveyed in detail. These include two star-shaped structures, and several free standing mounds. As the distribution of house sites, less easily recognisable in the denser vegetation of this area, is not known, these sites cannot yet be adequately interpreted.

Table 14

Distribution of Adzes According to Site or Locality, Luatuanu'u

		I	II	III	IV		IVb/Va	V		VIa	VII	VIII		IX	X	unique	frag-	total
					a	b		a	b			a	b				ment*	
Tula-i-Matafale	Lu-2						1											1
	Lu-3																	1
	Lu-4	1																1
	Lu-5									1					1		1	3
	Lu-7			1													1	2
	Lu-8														1			1
	Lu-10																4	4
	Lu-11			1													2	3
	Lu-12	2								2		1					4	9
	Lu-14												1				6	7
	Lu-15	1		2										1				4
	Lu-16									1							2	3
	Lu-17	1 1						1									4	7
	Lu-18		1 1							1							1	4
	Lu-19			1						1								2
	Lu-20	1						1									1	3
	Lu-21			2	1			1		1				1			8	14
	Lu-22																5	5
	Lu-16 to -17	1 1		1													2	5
	Lu-18 to -20														1			1
	other														1		2	3
Tula-i-Pu'e	Lu-24	1 1						1									4	7
	Lu-27		2	1	1					1							11	16
	Lu-28						1								1		1	3
	Lu-29		1											1				2
	Lu-30																1	1
	No. 1	1				1					1	1					5	9
	No. 2						1								1			2
	No. 3		1							3					1		2	7
	Other							1			2							3
Other Inland	Lu-51	1	1															2
	Other								1	3				1 2			2	9
Intermediate	Vaiolo	6	1 2											1 2		1	4	17
	Savala'i													1			1	2
Luatuanu'u Village		5 9	1 6				1				1	1	2	2 2			4	34

* Fragments whose type cannot be identified.

N.B. Complete specimens are listed at left of columns, fragments at right.

The time span involved in the utilisation of this region, and the complexity of individual sites, is described in two following Reports, 13 and 14.

ARTIFACTS

During the course of the research in Western Samoa extensive surface collections were made, but probably the largest localised collection was made by Atonio Maiava, who spent some months in 1964 building up the surface collections in his home area of Luatuanu'u.

Adzes

The distribution of adzes and fragments according to type and locality in the Luatuanu'u survey area is given in table 14. Artifacts were recovered from eighteen of the sites on the Tula-i-Matafale, although in some cases these consisted only of unidentifiable fragments. A further six are localised to small areas of the ridge, and a further three are known to be from the Tula-i-Matafale, although their exact locality is unknown.

The adzes from the Tula-i-Pu'e are not so exactly localised, because in the main, they were collected after the survey was completed, by Atonio, who did not at that time have access to the site numbers. Here adzes are localised to five sites. A number of others are localised to the section of the ridge on which they were found. These sections, Tula-i-Pu'e nos. 1, 2 and 3, are those defined above (p. 194). Three other adzes are known to come from the ridge.

Only one other inland site, Lu-51, produced any adzes for the surface collection. The remainder of the inland adzes are made up by a small number of items whose exact locality is not known.

Two small areas, which are not at present inhabited, have been termed intermediate. These are small flat or gently sloping areas on the way up to the two *tula*. Vaiolo is a small gully between two branches of the Tula-i-Matafale ridge. The path up to the Tula-i-Matafale passes across the mouth of this gully, and a number of finds were made there. Savala'i, Lu-49, on the way up to the Tula-i-Pu'e has been described in the section on site survey (p. 194). In terms of horizontal distance, Savala'i is further from the sea than the lowest sites on the Tula-i-Matafale. For present purposes, however, "inland" which is always a relative term to the Samoan, is regarded as beginning with the beginning of each open ridge.

Quite a number of adzes come from the coastal flat on which the modern village is situated. The exact position of some of these is known, but is not regarded as useful in the present context.

The collection from the village, and from the intermediate zone (principally Vaiolo) stands out from the inland collection in having a much more restricted range of types. This is demonstrated in table 15. Types I and II are predominant in the village, followed by Types IX and VIII, with one example of Type VII and one fragment which may be either IVb or V. From Vaiolo, there are only Types I, IX, and II in descending order of frequency. On the other hand, all types and varieties except the Lotofaga variety of Type VI are represented in the inland collection. Type VI is more numerous than Type I and Type III is more numerous than Type II, while Type X is equal in number to Type II, followed by slightly lesser numbers of Types V and IX. Small numbers of Types IV, IVb or V, VII, and VIII complete the other end of the scale.

Table 15

Comparison of Adze Types from Coastal, Intermediate and Inland Zones, Luatuanu'u

	I	II	III	IV		IVb/	V		VI		VII	VIII		IX	X
				a	b	V	a	b	a	b		a	b		
Tula-i-Matafale	9	2	8	1	–	1	3	–	7	–	–	1	1	2	4
Tula-i-Pu'e	3	4	1	1	1	2	2	2	4	–	3	–	1	1	3
Total Inland	13	7	9	2	1	3	5	1	14	–	3	1	2	5	7
Intermediate	6	3	–	–	–	–	–	–	–	–	–	–	–	4	–
Village	14	7	–	–	–	1	–	–	–	–	1	1	2	4	–
Total Coastal	20	10	–	–	–	1	–	–	–	–	1	1	2	8	–

Two factors should be considered here. One is the relative age of settlement on the *tula*, and on the coastal flat. The other is differential functions, which might cause some types to be found more frequently in bush or plantation areas than around settlements. In this connection, it should be noted that most of the examples of Types III, VI, and X, totally lacking from the village, come from actual house sites, suggesting that their absence from the village is perhaps to be explained by their age, rather than by their function.

Traditionally, the present village of Luatuanu'u is a comparatively recent settlement. Moreover, it is to be expected that surface finds from a presently inhabited village would mostly belong to the closing stages of the prehistoric period. It would therefore appear that the predominant types at that time were Types I, II, and IX.

We know that inland situations were in use as much as 2000 years ago (Davidson *et al.* 1967:225-228 and Report 14), and that the Tula-i-Matafale was still occupied around about the 17th century (Green and Davidson 1965: 64, 66-67). We might expect to find, therefore, a few adzes representing early stages, and a number representing the later stages of inland occupation. It would appear possible that Types III, VI and X, together with I and II formed the majority of the adzes at this time, and that the three former types decreased considerably in popularity in the latest part of the sequence, which is represented by the village collection. In the inland collections, also, the rarer Types IV, V, and VII, are quite well represented, although they are absent or only minimally represented in the village collection. The equally rare Type VIII presents no contrast, as it is represented by equal numbers from the village and from inland sites.

The contrast between the inland and coastal assemblages is the most striking. There appears to be little significant difference between the two *tula* collections. Proportions differ, but except for the lack of the Type VII from the Tula-i-Matafale, all types are present on both ridges. Again, the samples from individual sites are too small for any striking differences in assemblages to be apparent. Most sites have yielded only one or two types, a few have yielded three, one yielded four and one five. As would be expected, the last two sites also yielded the largest collections. These are sites Lu-21 and Lu-27. The former produced examples of Types III, IV, V, VI, and IX, as well as 8 unidentifiable fragments, and the latter, Types II, III, IV, and VI, together with 11 unidentifiable fragments. The presence of so many artifacts on Lu-21 may argue against its use as a specialised site, but it should be noted that they are all fragments, and could have been obtained from neighbouring sites as part of the pavement of Lu-21, rather than actually used on the site.

Unclassifiable Specimen: Only one unique item was recovered in the Luatuanu'u area. It is a small artifact A 14/24 from Vaiolo, in the intermediate zone. In section, this item belongs to Type IV, as it is wider on the front than on the back. Unlike all known examples of Type IV, however, it is narrowest at the cutting edge, where it measures 12 mm., widening to 23 mm. at the other end (fig. 84). In size of cutting edge it is close to other unique examples from Vaivase, and Paia on Savai'i. Both of these latter, however, appear to be reutilised fragments of larger tools, while A 14/24 is finished on all surfaces. These three items are all adzes, in that they are bevelled on one side only. If any items from Samoa are to warrant the designation of chisels, however, given our lack of knowledge concerning hafting and function of all stone tools, these three, which narrow to the cutting edge, are the most likely to deserve such a designation.

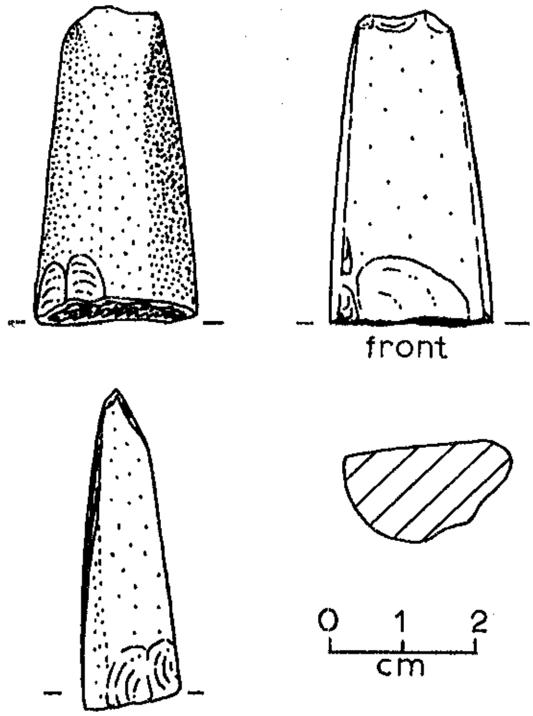

Fig. 84. Unique adze, A 14/24, from Luatuanu'u.

Other Artifacts

Very few artifacts other than adzes were recovered during the Luatuanu'u Survey. Three fragments of grinding or polishing tools were recovered from inland areas. G10/395 is a fairly coarse-grained stone, broken, with signs of abrasion on one surface. It was found just below site Lu-17, on the Tula-i-Matafale. G14/8, from the open area below Lu-51 is the corner of a larger grindstone. It is similar looking rock to G10/395, slightly finer, with one surface used for grinding. G10/394, from the Tula-i-Pu'e no. 2, is a small stone with four facets which have been used for polishing. Only the ends are not used. This specimen has a very smooth surface suggesting its use for polishing rather than grinding.

One other item was recovered from the inland area. G10/393 from site Lu-19, is a thick flake which could have been suitable for use as a coconut grater (fig. 85b).

A very smooth round stone, G14/7, approximately 64 mm. in diameter, was found in the village (fig. 85a). It is probably a natural stone, but informants pointed out that such stones were sought after and used as weights during the making of *'ie toga*, fine mats.

These few items comprise the entire surface collection of artifacts other than adzes and adze fragments, suggesting that recoverable material culture in Samoa is extremely limited. Under such conditions it is fortunate that stone adzes and recognisable structural remains are as numerous, and as useful, as they have proved to be.

Discussion

A clear distinction is apparent between the range of adze types present in the coastal and inland collections. The restricted range of types in the coastal collection tends to support the view that this coastal settlement is relatively modern, and conversely, reinforces the view that the normal adze kit at the close of the prehistoric period was restricted to Types I, II and IX.

Two radiocarbon dates from inland sites have indicated the extent of time during which inland sites were occupied. It is therefore not surprising that the full range of known adze types has been recovered from the inland sites. But the relatively small number of items from individual sites, and the fact that the presence of an adze on a house platform in Samoa does not date the site to the time when the adze was in use, but merely provides a *terminus post quem*, make it rather difficult to make any precise statements about the exact ages of individual house sites.

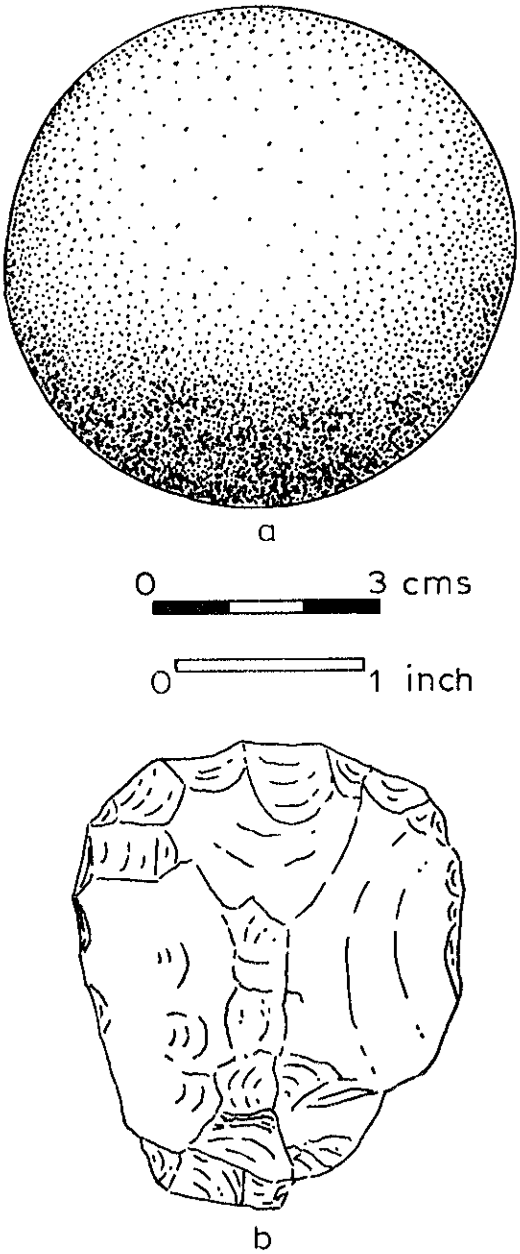

Fig. 85. Other surface artifacts from Luatuanu'u. a. smooth round stone, possibly a mat weight, G 14/7, b. thick flake coconut grater, G 10/393.

The presence of a stone adze in the paving of a modern house does not date the house to the prehistoric period. Similarly, even if the exact date of the disappearance of Type V adzes from use were known, the indestructible nature of Type V adzes would mean that some would still occur in house pavings long after they were actually dropped from use. On the other hand, probably a majority of adzes on a given site belong to a time not too far removed from the time the pavement was built.

These arguments merely support the view that the inland ridges were occupied from a time when all known types were in use, and that occupation probably ceased before a time when Types I, II and IX predominated to the exclusion of all others. On the other hand the closing stages of occupation of the ridges would appear to have coincided with a stage when the adze Types II and VI were at least as popular as Types I and II.

Artifacts other than adzes were so rare as to be of no diagnostic value.

SUMMARY AND CONCLUSIONS

In the Luatuanu'u area there was formerly considerable settlement on the ridges running inland behind the village. Because of the sparse nature of the vegetation, it has been possible to examine this setttlement rather more fully than is usual under normal Samoan conditions. It is apparent that settlement was to a certain extent conditioned by the topography, leading to a linear form of distribution of sites on ridges, but a considerable element of choice also prevailed. Sites mostly consist of earthen terraces, which do not vary much in size and form, on the surface of which are structures. These vary considerably in form and position, but there is little variation in over-all size or skill in construction which could lead to identification of specialised sites.

In addition to house sites, the other major feature of the survey area is the number and diversity of fortifications. The documentation of these two major types of site, and their distribution, is believed to provide a reasonable sample and description of occupation in this topographically rather atypical area of Upolu. The survey data gain a new dimension from the two detailed reports of individual sites which follow.

The analysis of adzes from individual sites and sections of the survey area provides a striking contrast between the modern coastal settlement and the inland areas, supporting the view that the former is largely recent, while the latter have been occupied for a considerable period of time. Our knowledge of the sequence of adze types is not sufficient, however, for relative ages of inland sites to be precisely determined on the basis of artifact types, and it is doubtful whether such a procedure would be practicable, the presence of older forms being indicative of a depth of occupation in the immediate area, rather than the antiquity of a given site in its present form.

Nonetheless, the collection of an adequate sample of adzes from known sites within a survey area, is a valuable addition to the data obtained from the survey alone. Our experience in Luatuanu'u, however, suggests that adzes are the only artifacts which are sufficiently numerous for analysis of this kind in Samoa.

ACKNOWLEDGEMENTS

All those who took part in the Luatuanu'u Project are much indebted to Atonio Maiava and his family, especially his parents, Maiava and Fa'alili, and those members of his family living inland on the family plantation lands. Atonio worked with us throughout the research programme and his assistance was invaluable. His family in Luatuanu'u provided generous hospitality at all times during the Luatuanu'u Project.

APPENDIX

CHECKLIST OF SITES RECORDED AT LUATUANU'U

SU-Lu-1. On Tula-i-Matafale. Situated on edge of bush at upper end of ridge. Earthen terrace with river gravel scattered over surface. Size approximately 66 feet east-west by 42 feet. Terrace scarp at northeast corner approximately 3 feet high, sloping in towards the centre of the ridge at west of site.

SU-Lu-2. On Tula-i-Matafale. Situated near top of open ridge. Square earthen terrace with line of stone curbs at base of scarp on east and west sides. Terrace 85 feet east-west by 80 feet. Surface covered with scattered small stones. House 25 feet by 18 feet, not clearly defined, in centre, with associated pavement. Pavement clearly bounded on east and north, paving stones most numerous in west. Pavement absent on southeast side. Scarp on north side of site 4 feet 2 inches high.

SU-Lu-3. (fig. 79). On Tula-i-Matafale. Earthen terrace built out on north side. Scarp at northeast corner 5 feet 5 inches high, at northwest corner 4 feet 6 inches. No scarp at south of site, only very slight depression where surface gravel on site ceases. Terrace surface 69 feet east-west by 45 feet. Oval house 18 feet by 12 feet outlined in centre, surrounded by pavement on north and west sides. Sunken path runs along west side of terrace.

SU-Lu-4. On Tula-i-Matafale. Find spot. Not artificially flattened. Slight scarp on west side a continuation of path from Lu-3. Scattered cooking stones on east part of site.

SU-Lu-5. (fig. 80.). On Tula-i-Matafale. Earthen terrace with high scarp on north, 9 feet 6 inches at northeast corner, and 4 feet 6 inches at northwest corner. Scarp becomes lower on east side and is absent on south. On west side, site is separated from Lu-6 by a small trench, or sunken path. Small area of stone retaining wall and pavement at southwest corner of terrace. Line of stones midway down north scarp. Terrace approximately 100 feet east-west by 65 feet. Large pavement, 48 feet by 35 feet, aligned with longest dimension in north-south direction, reaches to front edge of terrace. Straight edged on three sides, irregular on west side. Oval house, not clearly defined, approximately 16 feet by 12 feet is situated in centre of pavement with longest dimension east-west.

SU-Lu-6. On Tula-i-Matafale. Earthen terrace built up mainly on west side, out from centre of ridge. Scarp on northwest corner, 9 feet high. Bounded on east by trench and track dividing site from Lu-5. Site measures approximately 60 feet east-west by 54 feet. No structure visible.

SU-Lu-7. On Tula-i-Matafale. Square earthen terrace bounded by steep scarp on north and east, and by ditch separating it from Lu-8 on west. On south side also a steep ditch with gentle slope up to northern scarp of Lu-5. Scarp of Lu-7 measures 9 feet 6 inches at northwest corner, and 18 feet 6 inches at northeast corner. At southeast corner is a small terrace half way down main scarp, bounded by semi-circular line of curbs, with scattered small stones and coral on surface. Surface of main terrace 96 feet east-west by 60 feet. In centre there is an irregular oval structure with large paving stones towards the outside and small pebbles in the centre but no curbs outlining a house. Transverse ditch on south side has 6 foot scarp on north and 12 foot scarp on south side. Longitudinal ditch on west, at its centre, has 4 foot 6 inch scarp on east side, and 6 foot scarp on west.

SU-Lu-8. (fig. 82). On Tula-i-Matafale. Earthen terrace with high scarp on north side, 18 feet 6 inches at northwest corner, 15 feet at northeast. South side of the site is base of scarp of Lu-22, and at base of north scarp is south wall of enclosure of Lu-21. Longitudinal trench on east side separates site from Lu-7. Tracks run up through the northeast corner of the scarp, on to the terrace. Terrace measures approximately 90 feet east-west by 77 feet. In northwest corner of the terrace is the pavement, 40 feet by 33 feet, with house, not clearly defined, and with two sets of curbs on east, 21 feet by 18 feet.

SU-Lu-9. On Tula-i-Matafale. Not a man-made site, originally assigned a number in error.

SU-Lu-10. (fig. 83). On Tula-i-Matafale. Large earthen terrace with high scarp on north side, fading to nothing in southeast corner, and giving way half way along west side to steep scarp up to southeast corner of Lu-21. On south side of site there is a steep scarp upslope with a slight depression at its base. There is a stone wall along west side of terrace, and a few curbs along the north side at top of scarp. Terrace 110 feet east-west by 130 feet is unusual in being longest from north to south. Structure, located towards west of terrace, is rectangular with rounded edges, 46 feet east-west by 35 feet. It is outlined by large curbs, and includes both large paving stones, and smaller pebbles. No house outline visible. Isolated groups of stones occur on east part of terrace. Scarp at northwest corner 11 feet 6 inches, at northeast corner 19 feet 6 inches. Southern scarp 14 feet 6 inches at centre.

SU-Lu-11. On Tula-i-Matafale. Situated mainly in bush. East side, on open ridge, approximately 120 feet long. Stone structure, rectangular with rounded ends, approximately 30 feet by 30 feet is some 90 feet from east side and 35 feet from north side. 10 feet west of structure begins a series of small round pits which are numerous on north and west sides.

SU-Lu-12. On Tula-i-Matafale. Earthen terrace, with scarp on north side, and parts of east and west sides, 5 feet 6 inches at northwest corner, 10 feet 6 inches at northeast corner. Low upslope scarp on south of site is not parallel to front of terrace. There is an extensive flat area at southeast of site, on which actual corner of site is not clear. Here, apparently off edge of site, are three straight sided circular pits, said to hold water after rain. Area of terrace approximately 100 feet by 85 feet. Irregular structure towards front of terrace is not clearly defined. Incompletely outlined by curbs, with small stones inside.

SU-Lu-13 On Tula-i-Matafale between Lu-12 and Lu-14. Not a true site. Sloping ground with vesicular basalt boulders standing as erratics, and scattered patches of river gravel.

SU-Lu-14. On Tula-i-Matafale. Very long east-west oriented terrace. Length 205 feet, width 135 feet. Divided 143 feet from east end by shallow ditch depression running from back to front. East part of terrace artificially built out, scarp 22 feet 6 inches at northeast corner. Smaller western part of terrace appears to be levelled area of ridge, scarp at northwest corner 8 feet 6 inches. Uphill scarp at rear more than 140 feet long and 15 feet high in central section. Numerous small boulders at base of downhill scarp appear to be remains of paved strip 10 feet to 15 feet wide at base of north and east scarp. Surface of entire pavement is very level, and covered with river gravel. Remains of a pavement on western part of terrace, 25 feet by 20 feet and defined on west, north, and part of east side with pebbles, and a few curb stones, suggesting an oval house in the centre. Six foot line of stones, and pebble concentration near centre of eastern part of terrace, may be a further structure.

Su-Lu-15. On Tula-i-Matafale. Area of open ridge with no artificial terrace. Numerous vesicular basalt erratics on surface. Two alignments of small boulders. One, 126 feet long, climbs up slope from northeast to southwest on east side of ridge. The other, 33 feet long, is near top of this area of ridge on west side.

SU-Lu-16. On Tula-i-Matafale. Small earthen terrace. Many boulder erratics on north and east sides. Built up two to three feet above natural surface on north, east, and west sides, cut back slightly into ridge on south side leaving 1 foot scarp. River gravel covers an area approximately 24 feet by 25 feet, beginning about 24 feet back from north edge of terrace. Begins about 10 feet from east side of terrace, and extends to west edge of terrace.

SU-Lu-17. On Tula-i-Matafale. Large low earthen terrace, scarps only 1 to 2 feet high. Dimensions approximately 84 feet north side, 160 feet west side, 170 feet east side, 64 feet south side. One concentration of river gravel about 40 feet square, 36 feet from south side of terrace. About 40 feet north is another gravel concentration, near the north edge of the terrace, which measures 42 feet by 45 feet. Considerable shell on north and west of this area. 50 feet east of this terrace a small slight terrace, 150 feet long and 10 feet to 12 feet wide, along which modern path runs.

SU-Lu-18. On subsidiary ridge west of main Tula-i-Matafale. Well defined earthen terrace with marked scarp at rear, 8 feet high. Terrace measures 105 feet north side, 70 feet west side. Height of scarp at northwest corner 8 feet, at northeast corner 9 feet. Scarp slopes gently down towards rear scarp of Lu-19. Structure is situated 34 feet from west side, 24 feet from south side of terrace. Rectangular with rounded corners, 29 feet east-west by 17 feet. Outlined in coarse curbs filled with heavy river gravel.

SU-Lu-19. On subsidiary ridge west of main Tula-i-Matafale. Well defined earthen terrace with steep scarp at rear, 4 feet 6 inches high. Terrace measures 70 feet by 50 feet, height of scarp at north-west corner 2 feet 6 inches, and northeast corner 5 feet 6 inches. Ill defined structure 6 feet to 8 feet from west edge of terrace and 12 feet from south edge, extends to north edge. Estimated size of structure 47 feet by 38 feet. Curbs on west and north sides only, river gravel fill.

SU-Lu-20. On subsidiary ridge west of main Tula-i-Matafale. Flattened area at base of slope with very slight scarp (less than 1 foot) at rear. Concentration of river gravel measures 42 feet north-south by 36 feet.

SU-Lu-21. (fig. 81 and plates 19, 20). On Tula-i-Matafale. Extensive earth terrace slightly more than 100 feet square. Height of scarp at northwest corner, 14 feet, at northeast corner 13 feet. Entirely surrounded by somewhat irregular stone wall at base of scarp on north and west sides. Near centre of terrace a large pavement approximately 50 feet east-west by 55 feet, outlined with curbs, and filled with large and small stones. In centre of this pavement outlines of several house structures aligned in north-south direction. At west edge of terrace signs of another house, lying east-west, with traces of pavement on north side. At the rear of the terrace is a large circular depression in the southwest corner. Outside the site, to the southwest, is an oven. Patches of stones occur all over the site, especially on the northern scarp.

SU-Lu-22. On Tula-i-Matafale. Rectangular earthen terrace, approximately 60 feet north-south by 55 feet. Narrow side terrace on the east side. Surface not very flat, has scatter of river gravel, but no structure.

SU-Lu-23. On subsidiary ridge west of main Tula-i-Matafale. One and perhaps two earthen terraces Lower terrace fairly well defined. Only 12 feet to 16 feet from front to back. Scarp at rear suggests that there is a second terrace above. No river gravel or structure visible.

SU-Lu-24. On Tula-i-Pu'e, slightly above patch of bush behind village. Earthen terrace, roughly rectangular, rounded off at northeast and northwest corners. Measures 57 feet east-west by 51 feet. South scarp is steep, approximately 5 feet high, north scarp gentler and not as high. Structure occupies most of terrace, beginning at north end, and extending 39 feet to south, outlined by curbs on east and south sides and paved with medium sized stones. House is oval, approximately 25 feet east-west by 19 feet, not clearly outlined. Situated in southeast part of structure and filled with small stones.

SU-Lu-25. On Tula-i-Pu'e. Flattened knoll with area of scattered small stones, 54 feet by 39 feet, no outlining curbs. May not be a site. A short distance north, a small area of stones about 8 feet by 3 feet.

SU-Lu-26. On Tula-i-Pu'e, on spur west of main path. Earthen terrace cut back into ridge on south and east, and built out on north, and mainly on west. Terrace distinctly circular in appearance, rather than rectangular, measures 60 feet from east to west. Northern part covered with river gravel for about 40 feet from northern edge, no structure clearly outlined. Total distance from edge of north scarp to base of south scarp (where there is slight depression) 81 feet. Scarp at northwest corner about 5 feet high, fading to nothing at northeast. South scarp also about 5 feet high.

SU-Lu-27. On Tula-i-Pu'e. Artificially flattened area, with very slight scarp on north and west, natural slope on east, and level ground to south. One small narrow terrace below main area to west and north, and possibly more to west. On top of platform an area 54 feet east-west by 32 feet is covered in river gravel. There are no outlining curbs, and no house outline is visible.

SU-Lu-28. On Tula-i-Pu'e. Artificially flattened area, with very slight scarp. Rectangular structure, outlined by curbs and filled with gravel and scattered larger stones, measures 40 feet east-west by 29 feet and occupies entire flattened area. No house outline visible.

SU-Lu-29. On Tula-i-Pu'e. Earthen terrace approximately 90 feet by 70 feet. Surrounded by steep scarp on all sides. Downhill scarp on north, east and west sides measures 10 feet in height at northwest corner, 6 feet at northeast. Uphill scarp on the south is steep and well preserved and measures 7 feet high at southwest corner. Entire surface of terrace covered with large and small paving, no house outline visible. (Note: several small faint earth terraces with no structures, between this site and Lu-28, have not been numbered).

SU-Lu-30. On Tula-i-Pu'e. Narrow earthen terrace 80 feet east-west by 27 feet. In the centre is an area of river stones, approximately 31 by 23 feet. No house outline is visible.

SU-Lu-31. On Tula-i-Pu'e. Rectangular structure on flat land. Southeast corner hidden by heavy bush. North and east sides are completely defined by curbs, and measure 50 feet and 51 feet. South and west sides partially obscured. Interior paved with medium sized stones. No house outline visible.

SU-Lu-32 On Tula-i-Pu'e. In thick bush. Rectangular structure incompletely outlined by curbs, measuring approximately 39 feet east-west by 42 feet Interior partly disturbed, partly paved. No house structure observed. A low stone wall, 10 feet beyond west edge of terrace, apparently marks edge of site.

SU-Lu-33. On Tula-i-Pu'e. Earthen terrace, trapezoidal in shape. Gentle scarp on north, east, and west sides, appears to have been paved. Measures 88 feet across north side, 65 feet across the back or south side, and 59 feet from front to back. Surface paved with large and small stones, house outlined towards rear. Towards one corner of the pavement, not in the house structure, two small circles of curb stones, 2 feet in diameter, 3 feet apart.

SU-Lu-34. On Tula-i-Pu'e. Structure on naturally flat area, not artificial terrace. Curbs outline an area 42 feet by 27 feet with heavy gravel fill inside.

SU-Lu-35. On Tula-i-Pu'e. Almost level with Lu-34 but on west side of ridge. Artificially flattened area 34 feet by 29 feet, covered with pebbles and a few larger stones. No house outline in centre, several small incomplete sets of curbs at rear and side.

SU-Lu-36. On Tula-i-Pu'e. Earthen terrace cut back steeply on south side to form a steep scarp, about 6 feet high at southeast corner. Approximately 50 feet wide east-west with uneven sides of 33 feet and 25 feet. Irregular and incomplete area of paving in centre. Off the terrace to the right is a circular hole, 10 feet in diameter and 3 feet deep.

SU-Lu-37. On Tula-i-Pu'e. In heavy bush. Stone structure on terrace immediately above Lu-36. Northern scarp of this site is southern scarp of Lu-36. No scarp at rear.

SU-Lu-38. (fig. 76). On Tula-i-Pu'e. Three transverse ditches, grouped together as one site. First feature is an outer bank, ditch and steep inner scarp. Bank is in the form of a mound, 20 feet by 10 feet on top, with a height of 10 feet from bottom of the ditch, which extends across the ridge immediately south of the ditch. Ditch is clearly defined on east, widening to broad flat area between mound and scarp. A broad path, about 10 feet wide, runs across the west side of the defences, by-passing the outer bank, and continuing up an artificial access way cut into the steep inner scarp. Inner scarp is about 16 feet high. No inner bank. There is then a bare patch of ridge for about 150 yards up a gentle slope strewn with numerous erratics. No artificial features. Next feature a broad flat terrace, with very steep scarp behind it. Then narrow flat area of ridge cut by two steep transverse ditches each about 40 feet long. Trace of path along west side. Ridge then widens again towards area of sites Lu-27 to Lu-32.

SU-Lu-39. (fig. 77). On Tula-i-Pu'e. In bush-covered natural saddle on ridge. Consists of two lines of defensive works, curving around in north and northeasterly direction. First group consists of two successive banks aligned north-south, with steep scarps on west, and a large irregular mound with steep scarp on southwest side. Second group, close to northernmost bank consists of trench, with banks on western side, and a further trench also with uphill bank, parallel to, but some distance from the edge of the mound. Between the two ends of the second line of defences are several small pits and banks.

SU-Lu-40. (fig. 78). On Tula-i-Pu'e. In bush. Ditch and scarp running across the ridge from cliff to cliff for about 500 feet. Ditch and outer bank with 20 foot inner scarp extends from eastern cliff about 100 feet to main access way through the defence. For a further 100 feet there is no ditch, only the steep 20 foot scarp, but the ditch and outer bank which is partially stone faced reappear and continue to western edge of ridge. Ditch on this side consists of four units of various lengths. There is a shallow inner ditch to the east of the access way, but only a trace of this, in the form of a depression behind the slight inner bank, on the western side.

SU-Lu-41. On main ridge far inland behind the Tula-i-Matafale. Described in Report 13.

SU-Lu-42. On main ridge leading to Lu-41. Small but high mound, covered in second growth, beside path to Lu-41. Differs from other sites in survey area in being a free standing mound, rather than earth terrace. Height approximately 8 feet.

SU-Lu-43. On junction of Tula-i-Matafale with main ridge leading between the major fortifications Lu-41 and Lu-44. Main ridge runs north-south, climbing gently to the north. Ditch extends along west, south and southeast sides, running into steep natural scarp on east. There is a short continuation of the west ditch on the north side, which gives way to a series of four transverse terraces, three with 10 foot scarps, and one with 15 foot scarp.

SU-Lu-44. On high peak between Luatuanu'u and Solosolo. Very complex series of broad terraces and high steep scarps, encircling hilltop.

SU-Lu-45. Between Lu-44, Cape Utumau'u, and Luatuanu'u village. An area of earthen terraces and one ditch. Noted in plantation lands, but not thoroughly explored.

SU-Lu-46. On southwest bank of Namo River between Luatuanu'u and Solosolo, some distance inland. Situated near a major branching of the river, on a promontory formed by the main western branch of the river and a small tributary. A number of low earth terraces, and a shallow transverse ditch. Land known as Tolu.

SU-Lu-47. On Tula-i-Pu'e. Earthen terrace measuring 72 feet north-south by 64 feet. Gentle scarp, no structure visible. Old track passes up east side.

SU-Lu-48. On Tula-i-Pu'e. Sunken path. A rounded ditch about 3 feet to 4 feet wide, and 18 inches to 2 feet deep which winds up the ridge between sites. Most noticeable between Lu-39 and Lu-40, though it does appear below Lu-39.

SU-Lu-49. On slope between main part of Tula-i-Pu'e and present village. Land known as Savala'i. Two earthen terraces, in scrub, from which several adze fragments were recovered. To the west is a stone wall.

SU-Lu-50. On main ridge leading to fort Lu-41. Earthen terrace, shaped like half star. Measures 63 feet from side to side. North edge is not straight, but has four "arms" protruding. Beneath them is a shallow trench or borrow pit. Traces of stone facing.

SU-Lu-51. In open clearing on main ridge leading to fort Lu-41. Low circular earthen mound with stone facing, measures 80 feet by 63 feet. Situated close to edge of cliff. Surrounded by about 9 irregular pits, from 45 feet to 100 feet from edge of mound.

SU-Lu-52. On hill above western end of Leusoali'i. Extremely complex series of continuous and discontinuous ditches and pits. Unlike any other fortifications in the area. Area known as Pito Ti.

SU-Lu-53. On main ridge to fort Lu-41, just above junction with Tula-i-Matafale. Star-shaped earthen mound, described in Report 14.

SU-Lu-54. On main ridge to fort, adjacent to Lu-53. Earthen mound.

SU-Lu-55. On Tula-i-A'ana. Artificially flattened area with structure outlined by curbs. Covered in fern.

SU-Lu-56. On Tula-i-A'ana. Large raised rim oven. Diameter 30 feet from outer edge of rim, 15 feet interior.

SU-Lu-57. On Tula-i-A'ana. Depression 9 feet wide and 6 feet deep, filled with fern.

SU-Lu-58. On Tula-i-A'ana. Artificially flattened area with structure outlined by curbs. Covered in fern.

SU-Lu-59. On Tula-i-A'ana. Artificially flattened area with structure outlined by curbs. Covered in fern.

SU-Lu-60. On Tula-i-A'ana. Artificially levelled area with very fine stone structure on it. Well placed curbs outline an area 87 feet by 45 feet which is filled with a large quantity of very smooth uniform sized river pebbles which must have been carefully selected.

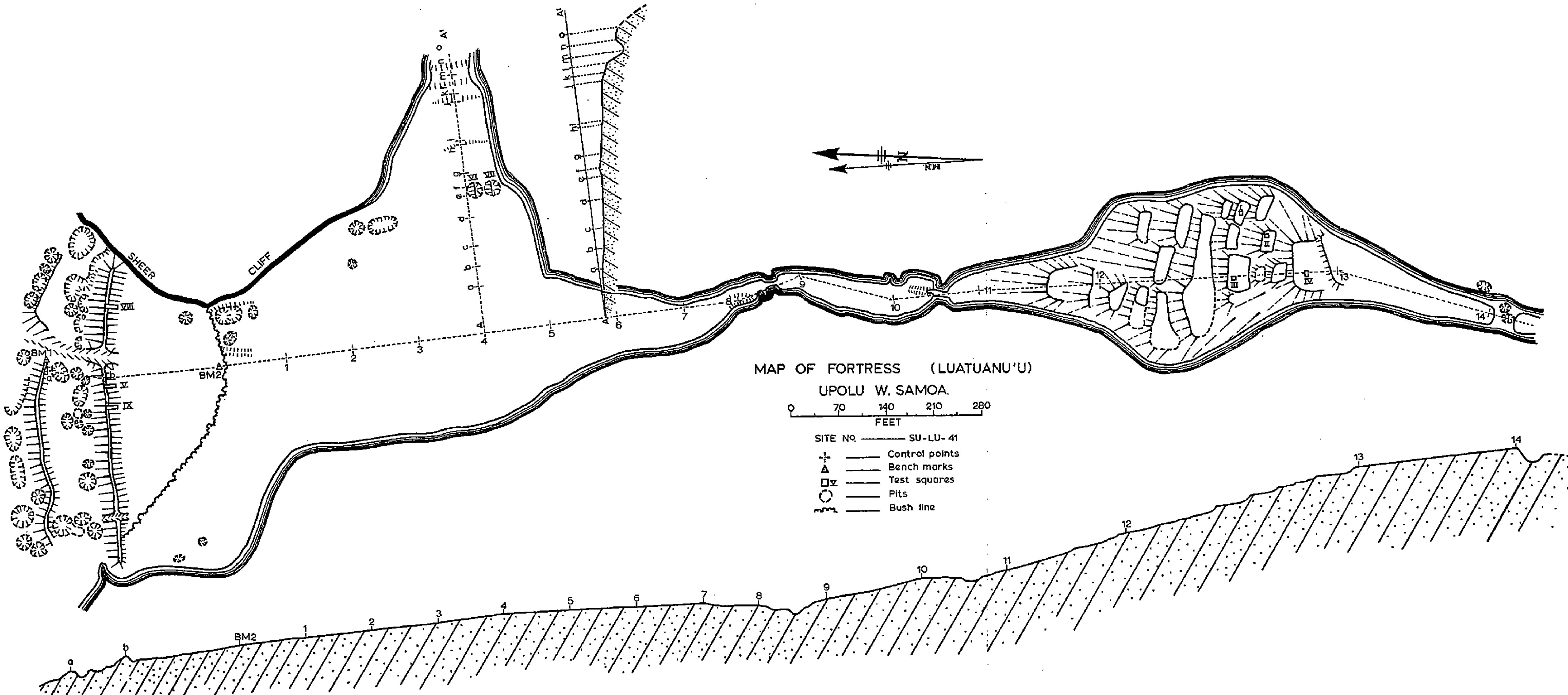

Fig. 86. Plan and profiles of fortification Su-Lu-41, Luatuanu'u, Upolu.

INVESTIGATION OF SU-LU-41, A LARGE INLAND FORTIFICATION

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SURVEY OF SITE

Various sites in the Luatuanu'u area were selected for more intensive study, among them the large fortification of Lu-41 located some two and a half miles inland. It is situated at the apex of the ridge systems in the project area, at a point where the lower ridges coalesce into a single ridge between two major stream valleys. Thus the fort is in a position to overlook the entire area. Mr William Hart, then science instructor at the Latter Day Saints Church College at Pesega, first brought to our attention the existence of this fortified complex that extends along the crest of the main ridge for nearly a half mile. Most of the area within the defensive perimeter is now under heavy forest cover, but at the main approach from the north, the land has been cleared of heavy timber for cultivation and the general earthwork contours there are easily visible. The same is true for a second area in the upper, southern end of this fortification where at some time in the recent past, a large area of land was cleared by fire revealing other construction features. After additional clearing in areas of main construction features, a plane table map was made of the entire fortified ridge (fig. 86). From this a perspective sketch of the fortification has been prepared (fig. 87).

In common with other fortifications of the same type on Upolu and Savai'i, the dominant feature is a large earth embankment that protects the main approach along the ridge from the coast. The bank spans the entire width of the ridge terminating at each end at the point where the ridge drops abruptly over 100 feet to the stream beds below on each side. The main entrance, a simple direct cut through the bank, is offset to the east. Other defensive earth embankments examined by the writers on Upolu and Savai'i had their main entrance-exit feature consistently off centre in the same manner. A smaller cut in the bank near its western end was presumably a secondary access to and from the defended area. The embankment itself at present stands about six feet above ground level. Although gently rounded on top by extensive root action and erosion, the top of the bank was probably level and wide enough for a multiple palisade.

Seen in figure 86 on the north or downhill side of the main bank, is a series of pits roughly circular and ranging from 2 to 5 feet deep. Dug into weathered basaltic soils, these are borrow pits, clearly the source of earth for construction of the main bank, and served also as an outer defence (plate 21). A small natural escarpment on the east side of the main approach appears to have been enlarged to form a small outer bank (figs. 86 and 87). The spacing and distribution of pits on the outside of the bank points clearly to their design as an initial obstacle in any frontal attack on the fortress.

Other pits inside the fortified area cannot be easily explained the same way. Their distribution along the east edge of the ridge is not evidently strategic as the area near the southeast corner of the main wall is the least vulnerable in the entire fortified area. Several of these pits have been constructed in pairs, i.e., two circular pits together, divided by a narrow base-rock partition, giving a "double" effect (fig. 86). Two small depressions along the western edge were less than 2 feet deep and probably do not represent an important construction feature. In areas cleared for recent cultivation, the pits

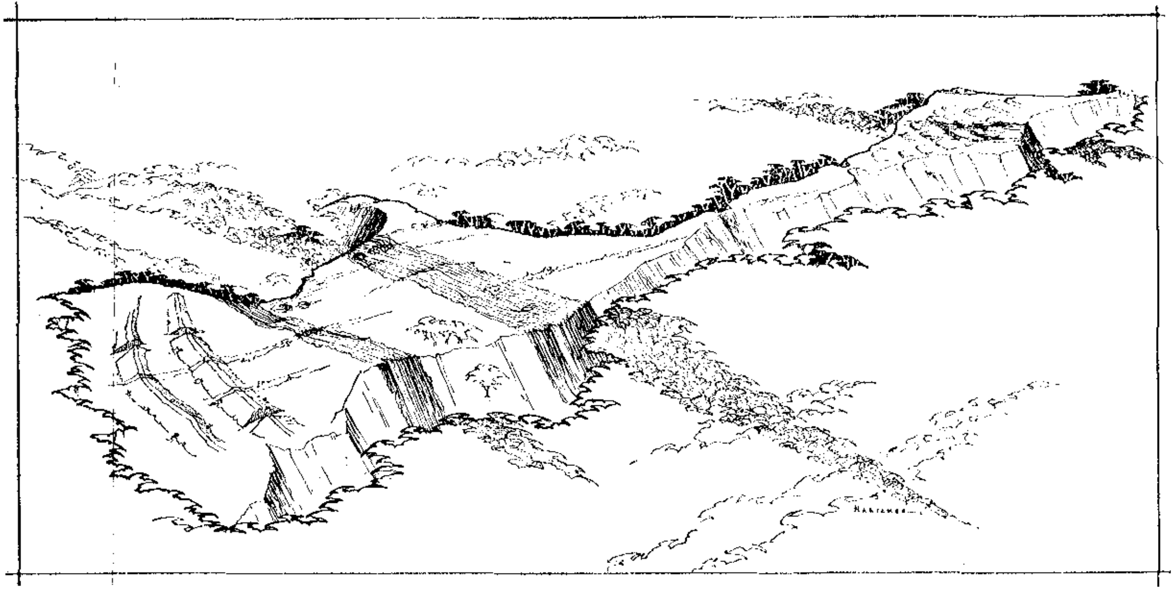

Fig. 87. Perspective view of fortification, SU-Lu-41.

have not retained their dimension and form as well as those in areas which have not been cleared.

Test Excavations

One pair of the double pits inside the fort was half sectioned (fig. 86, VI and VII, and fig. 88). The results indicated that in plan these pits had a slightly more rectangular form than their surface outlines would suggest. It also revealed that they were cut down into the soft underlying and highly decomposed basalts of the Fagaloa Volcanic Formation (Kear and Wood, 1959:36-39). The pits lacked traces of any internal features and exhibit no evidence of features such as postholes to indicate they were roofed. The fill of the pits belongs to a single and seemingly recent phase of continuous deposition since the site was abandoned. The only Samoan explanation for these pits elicited by Green was for the storage of fermented breadfruit, *masi,* for a whole community rather than a household. Samoans questioned by Scott said the pits were too large even for community *masi* pits, although their size did not seem to concern those Samoans questioned by Green. At present a food storage function would seem to be an acceptable explanation but one that is still subject to verification.

Natural protection is afforded by the steep gradient of the flanks that drop abruptly down to the stream beds on the east and west. This is true throughout except for a less steep, broad slope about midway along the east side. Here a double ditch and bank were added by the builders across the crest of this small flanking ridge.

From this point south along the main ridge, the valleys on each side become narrow and progressively more shallow as they approach their source in the central massif. Where the crest of the main ridge also narrows to little more than a neck of land, two deep ditches have been cut across the ridge. The fortification complex continues to the south where the land widens and slopes upward more abruptly. This area, exposed by recent burning, revealed an extensively terraced slope along the ridge to the top. Some additional clearing along the sides, preparatory to mapping the area, revealed over a dozen carefully levelled earth terraces, seemingly representing a habitation area within the defensible boundaries of this fortification. Several test pits, four feet square, were dug at various terrace levels (fig. 86, I, II, III, IV). The initial test near the east side produced a loose soil in a fine root network to a depth of 8 inches, underlaid by a brown clayey soil with soft weathered basalt occurring irregularly. Test squares II and III were dug to a depth of 30 inches with the same results — some fragmented weathered basalt scattered through a homogeneous brown clayey soil. Native earth matched that examined around the outer basal slope of the terrace. With the exception of a slight soil colour change in one test from yellow-brown to grey, in terms of surface features or visible stratigraphy, there was nothing to suggest any domiciliary occupation of these terraces.

The last of these sampling tests was a rectangular pit, 2 by 5 feet in the second highest terrace level. Although again there was no apparent stratigraphy, several small irregular

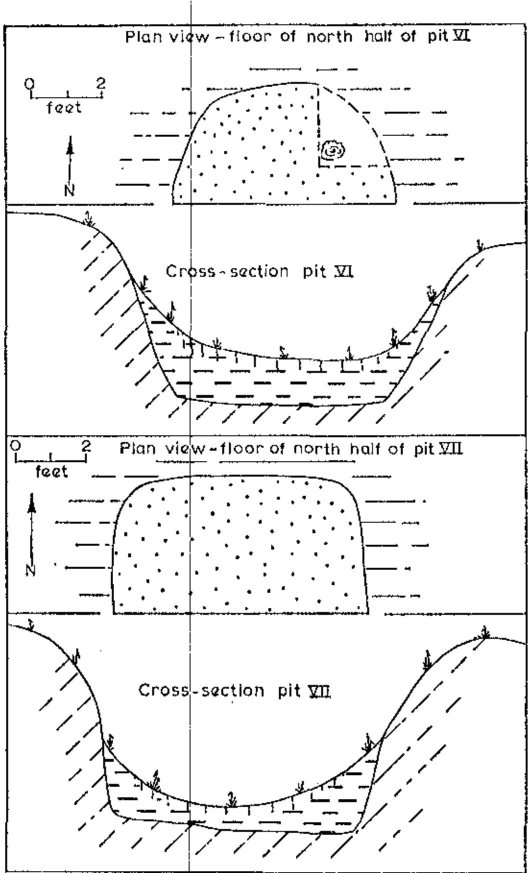

Fig. 88. Floor plan and cross-sections of pits VI and VII, SU-Lu-41.

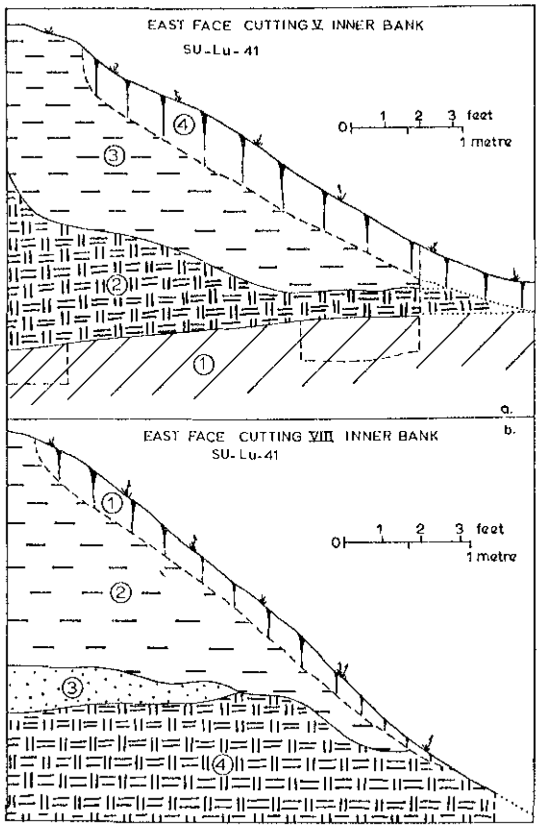

Fig. 89. East faces of cutting V and cutting VIII, through the inner defensive bank of the fortification Su-Lu-41.

fragments of a fine-grained basalt were found here, both on and below the surface, within a depth of 8 inches. Within that depth, what might provisionally be termed a cache appeared in the form of five small nearly circular stones of throwing size, each approximately 3 inches in diameter and found together approximately 8 inches below the surface. At that depth, no change in the soil colour or composition could be seen to indicate the intrusion of a depository, although the stones were clearly foreign to the surrounding rubbly basaltic deposits of the Fagaloa Volcanic Formation.

The high narrow ridge extending further to the south is flanked at its south end by three additional pits (fig. 86). Although other evidences of minor scarping were later discovered on higher land further in the interior, the area shown in figure 86 appears to embrace all of the main construction features in connection with the defence of this mountain ridge.

Several excavations were made into the main wall during two successive field seasons. In 1964, Green sectioned the inner wall of the main embankment west of the main entrance (fig. 86, V, and fig. 89a) and found a basic sequence of two principal upthrown deposits, the earlier consisting of highly weathered basalt boulders in an abundant matrix of yellow brown clayey material, overlaid by a sequent layer of highly weathered basalt boulders, closely packed but with a loose brown soil, not a clay, as a matrix.

In a second excavation carried out east of the main entrance during 1965 by Scott (fig. 86, VIII, and fig. 89b), the cross-section showed only minor variations from the stratification described by Green. Aside from details on the upper erosional surface, and a basal layer not recognised in the second cut, the sequence of a red-brown loose soil with basaltic debris overlying a yellow-brown clayey horizon was repeated. One possible interpretation of these results is that the initial bank of an earlier fortification at this spot was a low one, and that much more recent modifications have resulted in the present deep pits and other alterations.

Dating

Although six charcoal samples were collected from various layers, only some were judged to be suitable for dating. The charcoal usually appeared as flecks and generally in insufficient quantity for radiocarbon analysis. Among those of adequate sample size, several were stratigraphically late and may possibly derive from processes of natural erosion and recent burning.

Two samples from the earlier construction layer, 4, in Scott's cutting (fig. 89b) which corresponds to Green's layer 2 (fig. 89a) were submitted for analysis. The single sample selected, GaK-799, yielded an age of 1500 ± 80 years before 1950 or a date of approximately the 5th century A.D. Under the best of circumstances, a solitary radiocarbon date is strongly suppositious until it is supported by other dates. In this respect the Luatuanu'u date receives support from a number of others which also indicate settlement well inland in Samoa including the Luatuanu'u area (Report 14, p. 216) by this date and before. In this case the difficulty of interpreting the date as an age estimate of the construction is complicated, however, by the difficulty of association, i.e., a positive association between the event (construction of the bank) and the non-artifactual sample (the charcoal included in it) cannot be shown. Instead the charcoal may have already been present in the upthrown deposit before it was excavated to make the bank. Still an age for ridge fortification in Samoa of this order is not unlikely in view of what is now known about fortifications, their distribution and probable age in the rest of Polynesia and Fiji (Green 1967). Subsequent radiocarbon analysis of additional samples from this and other fortifications would thus help to assess the significance of the present result and would greatly advance the study of this class of Samoan structures.

Interpretation

The question of fortifications is something that came to the attention of various Europeans who visited or lived in Samoa in the 19th century. According to Holmes (1967:78) the Rev. John Williams, in his unpublished journals of the early 1830s, describes "these forts as being constructed of coconut logs, eighteen or twenty feet in length, standing on end, buried six feet deep in the ground. Their location was most often on a high mountain, so that access to them would be more difficult. Wives, children and property were placed inside the fort and living accommodations were temporary coconut leaf houses." Williams first arrived in Samoa in 1830 A.D. just at the end of one of the most bloody wars, fought so far as one can tell, mainly with traditional weapons. But by 1832 he reports that many of the weapons formerly used were being replaced by muskets, blubber knives, bayonets attached to a pole nine or ten feet long, and steel axes attached to a handle four to five feet long (Holmes 1967:77). Thus by the time the first resident European missionaries arrived in 1836 some changes had already taken place in Samoan intertribal warfare. Such warfare continued, however, in a long series of outbreaks to the end of the 19th century.

Still Wilkes and others in the United States Exploring Expedition, who were in Samoa in 1839, were in large part recounting from the missionaries stories of the war of 1830 and the resulting devastation of the A'ana district and its population, because no significant outbreak of war had taken place in the interim. In his published account Wilkes (1844, II: 159) briefly describes a fort on a high ridge on the western boundary of the bay of Faleletai which was involved in this war. But in his unpublished journal (November 2, 1839) he also notes that "the island [of Upolu] affords much picturesque scenery and in the mountain ridges many remains of old forts or fortifications." He found the accounts given of the fortifications differed materially, some Samoans imputing them to internal wars amongst themselves, whilst others said they were erected by a foreign foe that attempted to get possession of the island some 70 years before. The foreign foe in this passage is identified as a cruel and savage race coming from the South in large war canoes; in the published account Wilkes (1844, II : 99), in connection with the discussion of the possible builders of some earthen mounds on a ridge in the centre of the island, identified a similar foe as "warriors of Vavao who invaded Upolu," practised predatory warfare along the coast, then occupied this commanding position. Trees growing on the earth mounds in 1839 were two feet in diameter, while the missionaries had inferred from their inquiries among the Samoans about the foes that the invasion referred to had occurred seventy or eighty years previously. Hale (1846 VI : 180), also mentions the extensive walls in the interior bearing marks of great antiquity and says "the traditional account which the natives gave of them was that they were fortifications erected during a war between their ancestors and the Tonga people." Today what is probably a version of this same tradition is the oft repeated identification of these fortifications with the traditional period of Tongan domination of the 10th to 13th century A.D., any more recent Tongan invasions having been forgotten. Indeed a version of the present tradition was given to us as an explanation for the construction of Lu-41 as well as for many other such sites.

Other writers describe Samoan fortifications, both ancient and contemporary, over the course of the next sixty years (Brown 1908: 42-49; Churchward 1887 : 45-56, 109-110, 173; Erskine 1853 : 75; Krämer 1902, II : 337; *Samoan Reporter,* no. 4, 1846, no. 9, 1849; Steinberger 1874:16, Turner 1861:191). From these accounts for the 1840s to the 1890s one can identify various changes in the fortifications as a result of continued introduction of weapons including cannon and breech loading rifles and from increasing contact with European methods of warfare. None of these changes need concern us here, but they do explain the final form of many of the present fortifications encountered in our surveys in Samoa. The important point the earliest accounts establish is that these changes were imposed on an already existing pattern of prehistoric fortification which was a noticeable part of the landscape, a pattern based on traditional Samoan warfare before the advent of European weapons.

The Rev. John B. Stair, who was in Samoa between 1838 and 1845, furnishes us with an important account of one of these traditional fortifications as it was in 1845.

> We started from Apia in good time, full of eager curiosity. Several miles inland we reached a point of interest, as the track led directly through the great fortress or *Olo,* of *O le Vaemaunga,* deserted at that time, but which had played an important part in many a struggle of the past. We found the *Olo* of considerable extent, and protected by the steep sides of a precipice or deep ditch, and an embankment of earth. In time of war, the gap through which the road passed was closed by a strong stockade, and defended by a large body of troops. (Stair 1894:241).

The same fortress observed by Stair was reported to us by Mr William Hart of Pesega during 1965. The first earth bank, of the type described for the Luatuanu'u fort, is approximately 4 miles south of the coast at Apia at the end of the Magiagi road. (See *olo* marked on map in Freeman 1944b : fig. 2). This bank is a smaller version of that at Luatuanu'u with certain differences apparent at first glance. For example, there are no large deep pits visible either on the outside or inside of the wall. Instead there are several mounds within 183 metres on the downhill side of the bank. The vertical drop on the outside of the bank is as great as at Luatuanu'u, but there is not nearly as much depth behind it. Rather the ground level inside is nearly equal to the maximum height of the bank. Several hundred feet south is a double ditch and bank, and other single earth embankments can be seen concealed in the bush down the slope toward Magiagi. As at Luatuanu'u, the entranceways tend to be offset on the east side.

Considering only the two fortifications under discussion, the main distinguishing feature of the Magiagi or 0 le Vaemauga fortress is the system of low multiple banks (five altogether) each of which spans the width of the ridge overlooking the Vaisigano drainage from its east side. At Luatuanu'u there is the high single earth bank with pits in front. All of this suggests that in its last stage, the Luatuanu'u fortification Lu-41 may have been modified for early 19th century gun warfare. The report of an ancient track connecting these two fortifications by an inland route is confirmed by several Samoan informants. The track is known to have been used during the period of *Mau* political uprising in the 1920s.

EXCAVATION OF A STAR MOUND AND EARTHEN TERRACE AT SU-LU-53

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With the observation of various mounds by Davidson, Buist and Scott in Upolu and Savai'i, which were star-shaped and consequently named "star mounds", it was felt that one of these mounds should be excavated in the final three months of the programme.

In general on Upolu, mounds are constructed of earth, although in some areas where volcanic rock was readily available, they are, as in Savai'i, made of stone.

The reasons for selecting this site were threefold:

(i) it was situated in an area which had been extensively surveyed by Davidson and Green and Scott (Reports 12 and 13), and results could thus be compared with the work previously done by them;

(ii) it was partially an earthen mound and amenable to excavation;

(iii) it was in reach of Apia and on the route to the projects in the Falefa area.

The Setting

The site, SU-Lu-53, is located approximately 1½ miles inland from the present village of Luatuanu'u on the main ridge which runs approximately in a north-south direction between site SU-Lu-44, a hilltop fort, and SU-Lu-41, a ridge fort above the junction with Tula-i-Matafale (fig. 75). The general locality has abundant evidence of extensive occupation in the past. There are numerous house-platforms, stone pavements, artificially flattened areas and terraces, and a former settlement named Vaomanogi was said to have existed in this area. (Report 12, p. 195).

I will describe only the area immediately surrounding SU-Lu-53. The site, which has been built on an earthen terrace on the eastern slope of the ridge, is adjacent to the present-day track from the Luatuanu'u village to the ridge fort SU-Lu-41 (fig. 90). This track runs on the west side of the terrace, between the edge of an artificially flattened area with an earthen mound and a low bank built on the east side of the track.

Towards the north, about 70 metres from the terrace, are four big terraces with a ditch running across and on either side of the ridge (site SU-Lu 43). About 38 metres towards the south is a stone-lined well, now in disuse.

The star mound itself is not as regular in shape as some of the mounds found by Buist (Report 3, p. 40) on Savai'i, but is comparable to those recorded by Scott (Report 4, p. 72). Although clearly belonging to the same category as the rock mounds found by Buist and Scott on Savai'i, it differs from them by being built from soil with the arms partially of rock and soil and a rock facing all around. In this respect it is most like those described by Scott for Savai'i (Report 4, p. 72) and Davidson (pers. comm.) for some other areas of Upolu.

The mound has eight arms, varying in shape and size, with seven pits surrounding it. Of these pits, three were dug on the terrace area, while four others lie outside the terrace line. They also vary in shape and size, the biggest being 11 by 5 metres and the smallest 4.5 by 2.5 metres (fig. 90).

The Investigations

Investigations were conducted over a period of seven weeks from December 8th until January 31st, 1967. The mound and surrounding

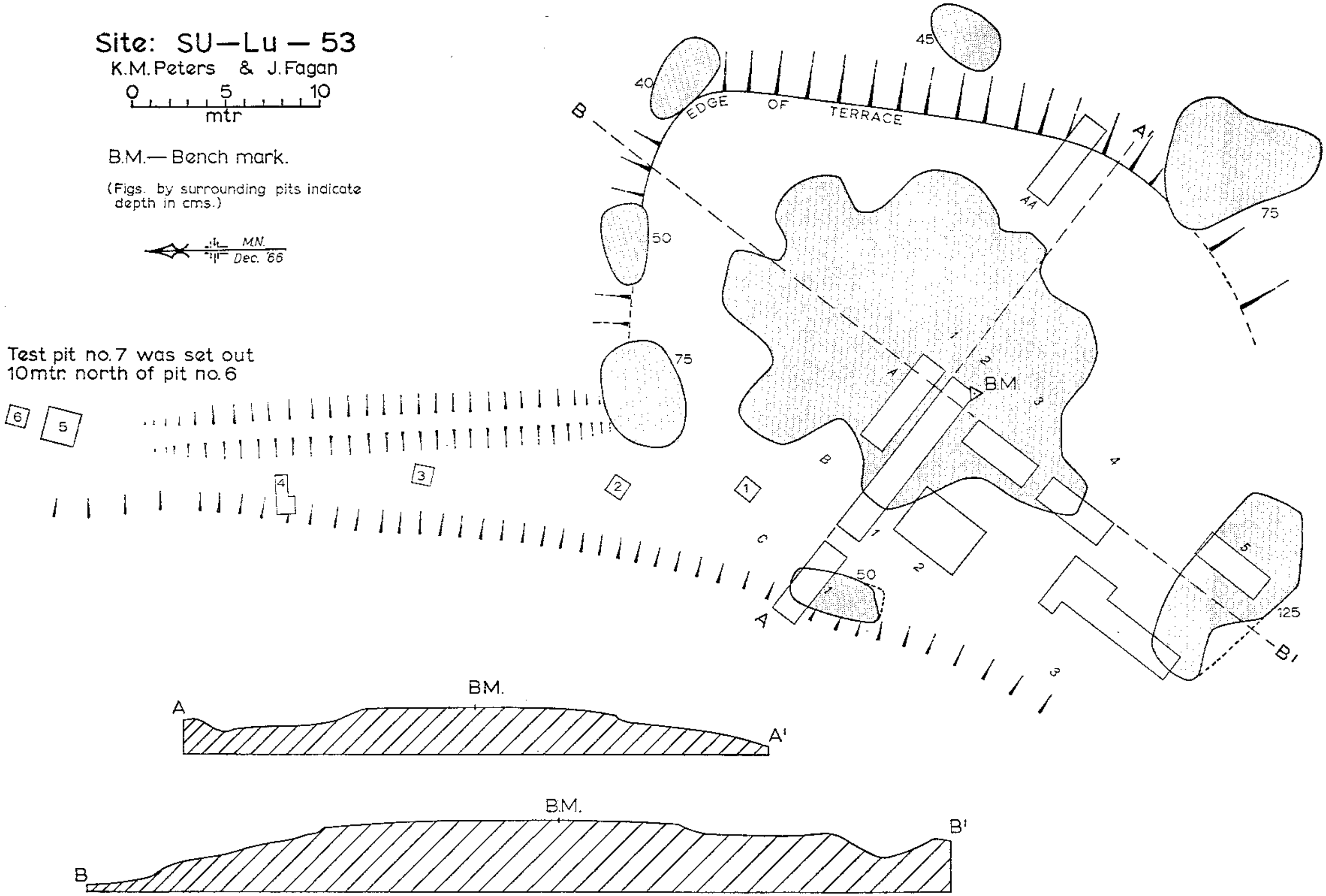


Fig. 90. Plan and profiles, SU-Lu-53, Luatuanu'u, showing areas excavated.

pits were cleared of vegetation and then mapped with a plane table and telescopic alidade. When the excavations were finished two cross-sections were taken along the main lines of the excavated rectangles (fig. 90). During the excavations it was observed that the star mound could have been built on a terrace, and in order to investigate this, the area between the pits on the northern and western side was cleared and the edge of the terrace was discovered. In clarification it must be said that surface evidence is almost impossible to detect where it has been covered by vegetation, in particular a creeper, the name of which speaks almost for itself — "Mile-a-minute".

On December 12th excavations began. Initially a rectangular grid was set out from a point approximately in the middle of the mound, so that it covered one quadrant of the mound. The main lines of the rectangles ran through two arms into the pits opposite, so that their association with the mound could be investigated. During the excavation when structural evidence discovered needed further investigation, additional rectangles were opened up within and outside the quadrant. Rectangle AA was set out on the edge of the terrace. The series of small test pits 1 -7 and B-2 and 3 were opened up to investigate a drain system. Rectangle A-5 was positioned 1.25 metres off the main line because of obstruction by trees. The rectangles were 1.50 metres wide and 4 metres long, with one metre baulks between them. During the excavation rectangle A-2 was extended 1.50 metres to the east, and rectangle C-1 one metre to the west. Between A-2 and B-1 the baulk was subsequently removed. In the last stages of the excavation rectangle A-1 was set out and excavated.

A total area of approximately 90 square metres was excavated by a crew of five and in the closing stages six Samoan workmen for most of the excavation, supervised by Miss J. L. Fagan, then a student from the Anthropology Department of the University of Auckland, under my direction.

The object of excavating this site was to obtain additional information on its construction, to identify any possible features associated with it which might shed light on the functions of star mounds and to place the star mound form within a stratigraphic sequence.

The natural strata were sufficiently clear to be followed entirely, although the thicker layers were excavated in arbitrary levels of about 15 cm. Among our workmen we had two experienced excavators who had been working with members of previous archaeological expeditions of the Samoan programme, and the other workmen did not take long to develop into competent stratigraphical excavators who, with some supervision, worked extremely well.

Because of this a larger area was excavated than was originally planned.

Stratigraphy

The excavation revealed a stratigraphic sequence which may be divided into five major units. As the stratigraphy is very consistent over the area excavated, I will use only the main north section of the rectangles A-2, B-1 and C-1 and the east sections of A-1, A-2, A-3, A-4 and A-5 (fig. 91) in outlining the stratigraphic sequence. The stratigraphy in rectangle AA on the edge of the terrace will be treated separately.

The numbers in parentheses with each layer are the colour indications from the Munsell soil colour chart (Fujihira 1965). The layers are numbered from the bottom up.

Layer 1: (10 YR 3.4) A yellow soil of volcanic origin from the underlying volcanic rock in which occurred pockets of very concentrated charcoal.

Layer 2: (7.5 YR 3.3) Loose grey soil with fine and well distributed charcoal.

Layer 3: (7.5 YR 3.4) A grey-brown soil with loose well distributed fine charcoal.

Layer 4: (7.5 YR 3.4) Yellow-brown soil matrix in which occurred scattered lumps of charcoal.

Layer 5: (7.5 YR 3.3) A yellow-brown mixture of loose soil, clay and some pebbles.

Layer 6: (10 YR. 3.4) A very compact yellow hard clay.

Layer 7: (7.5 YR 3.3) Fine greyish concentrated soil with some pebbles in big posthole.

Layer 8: (10 YR 3.3) Yellow clay mixed with charcoal.

Layer 9: (7.5 YR 3.4) A very compact yellow-brown clay.

Layer 10: A volcanic rock (10 YR 3.1) mixed with yellowish volcanic soil. (YR. 3.4).

Layer 11: (10 YR 3.3) Dark brown soil with some pebbles.

Layer 12: (10 YR. 3.4). A pebble spread (*'ili'ili*).

Layer 13: (10 YR 3.4) Mixed brown soil with yellow clay and stones.

Layer 14: (5 YR 3.2) Mixed brown-grey loose soil.

Layer 15: (10 YR 4.6) Lens of yellow clay.

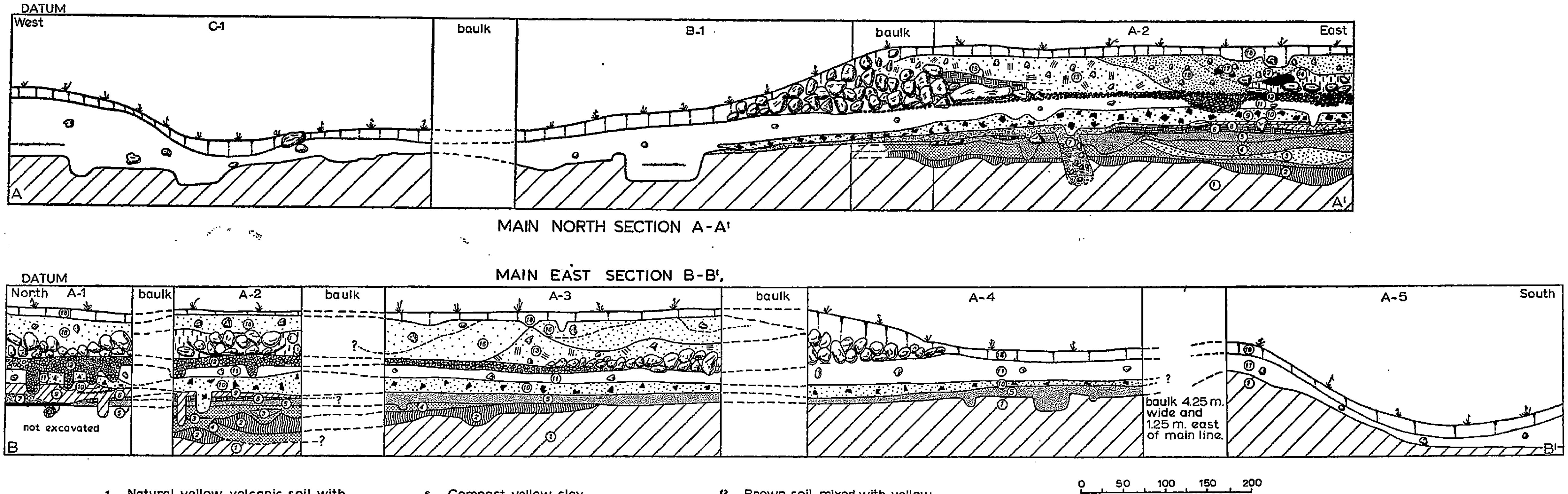
Layer 16: (7.5 YR 3.3) Dark brown soil mixed with some stones.

Layer 17: (2.5 YR 3.6) Red burned soil.

Layer 18: (7.5 YR 3.3) Humus layer.

Structural Evidence

The major structure discovered was undoubtedly the drain system on the west side of the



1 Natural yellow volcanic soil with pockets of charcoal.
2 Loose grey soil with fine, evenly distributed charcoal.
3 Loose grey soil with fine, thickly distributed charcoal.
4 Yellow-brown matrix with scattered big lumps of charcoal.
5 Yellow-brown loose mixture of clay and soil with some pebbles.
6 Compact yellow clay
7 Fine grey concentrated soil.
8 Yellow clay mixed with charcoal.
9 Compact yellow-brown clay.
10 Volcanic rock mixed with yellow volcanic soil
11 Dark brown soil with some stones.
12 Pebble spread.
13 Brown soil mixed with yellow clay and some stones
14 Loose mixed grey-brown soil
15 Lens of yellow clay
16 Dark brown soil with some stones
17 Red burned soil
18 Humus layer

MAIN NORTH AND EAST SECTIONS OF EARTHEN TERRACE WITH STARMOUND. SU-Lu-53

Fig. 91. Principal cross-sections, SU-Lu-53.

mound. A full description will be given further on in the report. The clay living floors associated with the double alignment of stones may also be regarded as a main feature. The postholes and firepits did not form any significant pattern except for layer 12, the pebble spread, where in rectangles A-1 and A-2 was found a set of postholes which formed a near circle with a firepit in the middle. The depth of these postholes suggests that they belong to a temporary structure such as a cooking shed rather than anything more substantial like a house (fig. 92). Most postholes were of the same depth, 10 to 15 cm., much too shallow to support a house, which needs postholes of at least 25 cm. or deeper, as was observed in various other excavations in Samoa. The structural evidence encountered can thus be dealt with by units of several layers rather than by individual layers.

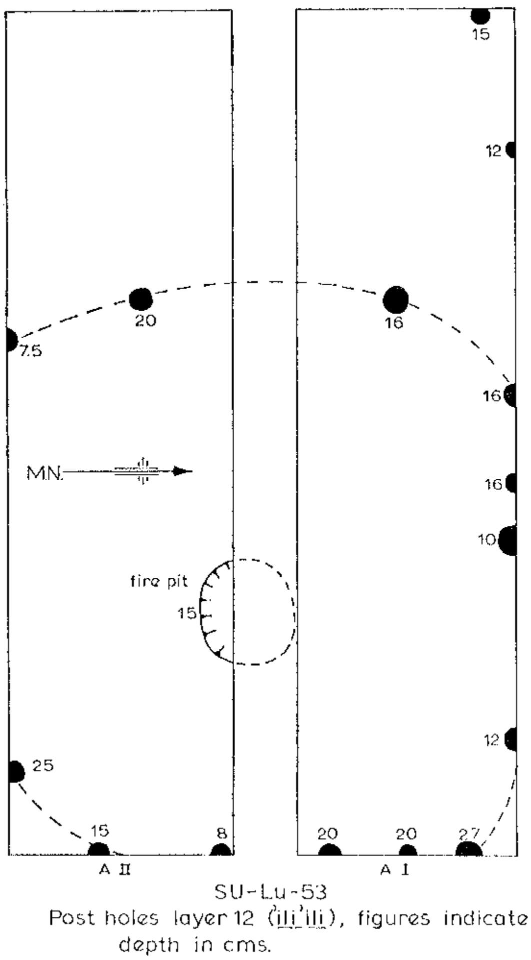


Fig. 92. Plan of postholes and other features in association with layer 12, SU-Lu-53.

Unit 6 comprises layers 13-18 and represents the period when the mound was built and used. Associated with this period were:

(1) the pits dug surrounding the mound;

(2) a firepit and rake-outs from it in one part of the mound. No postholes were discovered that belong to this unit.

Stratigraphic evidence shows that the surrounding pits were dug in the terrace as well as in the outlying areas, and therefore they are clearly later than the terrace occupation. This is supported by the stratigraphic evidence which was encountered in rectangles C-1 and A-5. Here, under the topsoil, was found layer 11, which overlies the earlier occupation layers of the terrace and the natural volcanic yellow soil. The material found in the fill of the mound coincides with that which would have been derived from these pits dug into the volcanic soil. Also, if the earth which forms the mound without the arms is calculated (approximately 100 cubic metres), and then the amount of earth which could have been derived from the pits (111.50 cubic metres), it will be seen that the figures come to approximately the same amount. So beyond any doubt one can say that they were dug in order to provide earth for building the main body of the mound.

Surface and excavation evidence show that the outside of the mound has a rock facing with the arms partially or almost entirely constructed from rocks, while in the interior of the mound were discovered, in the east section of rectangle A-2, two firepits cut into each other at a depth of 63 cm. The diameter, which is only approximate because they were not fully excavated, was 130 cm., with a depth of 25 cm. Charcoal samples were taken from these pits.

Unit 5 consisted of layer 12 only, the pebble spread which covered most of the terrace. Postholes and a firepit mentioned before were associated with this layer (fig. 92).

Unit 4 could be described as a period without occupation, consisting of layer 11, and was formed when the terrace was abandoned for a period of time. Thus it constitutes a major break in the occupation sequence. No structure was found associated with this horizon, although the area may have been used in gardening. Some artifacts, 3 broken adzes and 1 possible one belonging to Types VI, VIb and I (Report 2) were discovered, together with stone flakes, suggesting that some human activities were going on when this horizon was formed.

Unit 3, represented by layer 10, had the appearance of a pavement formed by volcanic rock, wherever it was encountered in the excavation. Only 1 possible and 3 definite post-

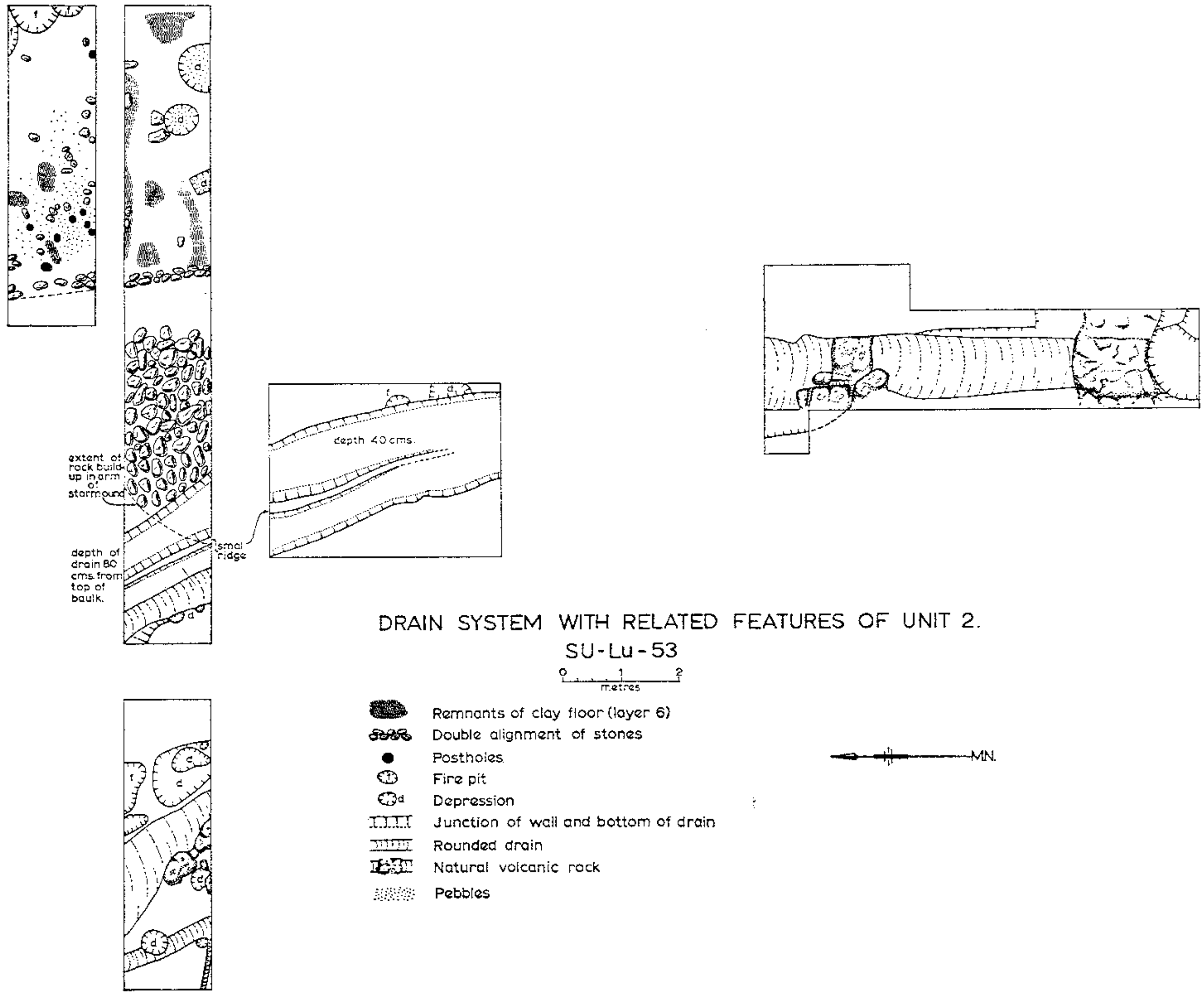


Fig. 93. Plan of drainage system and other features of Unit 2, SU-Lu-53.

holes were excavated in this layer, so that interpretation beyond a pavement is not possible. The postholes were of the shallow type, measuring 10, 14, 13 and 15 cms. in depth.

Unit 2 includes layers 5, 6, 7, 8 and 9. The evidence of these layers clearly indicates that this unit represents extensive occupation of the terrace. The layers 7, 8 and 9 were hard clay floors associated with postholes, firepit, a pebble spread, and a double alignment of stones, which could suggest a possible house structure. Also associated with this unit were big rocks, which could have been part of a rock pavement, and a "drain system" (fig. 93).

The layers are very disturbed in the rectangle A-2 by root action, but could be followed up to the double alignment of stones to which they are definitely related. This alignment of stones ran in an approximately north-south direction and was evident in rectangles A-1 and A-2.

The drain system was a major feature of this part of the terrace sequence (fig. 93). It ran in a north-south direction on the west side of the terrace. There is a major drain and three minor ones in rectangles B-1, B-2 and C-1. The major drain was traced by a series of seven small test pits for a distance of about 50 metres to the north, where it terminated at the foot of a large surface rock. Two test pits on the other side of the rock did not reveal any signs of continuations of the drain. The main surface of this rock slopes towards the ground so that the run-off from rain would enter the drain, which was 25 cms. wide and as deep at this point (fig. 94).

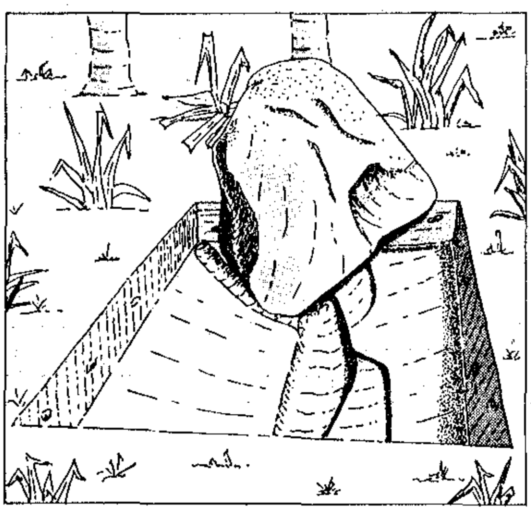


Fig. 94. Sketch of test pit 5, SU-Lu-53, showing drain blocked by a large boulder.

On the west side of the rock was a small drain which ran towards the main drain in the centre, making use of a sloping man-made surface along the west side of the centre drain. This sloping surface measured 75 cm. in width from the centre of the middle drain. The corresponding surface on the east side was not excavated but it was estimated to be between 75 cms. and 100 cms. in width as it was on an approximately similar plane to that on the west side. At its southern end the drain extended about 15 metres from rectangle B-1, where it was blocked by sub-surface volcanic rock, a part of the underlying natural into which the drain was cut. While signs of an attempt to hack away the rock in order to continue the drain were evident, the effort had not been effective in breaking through the bedrock. Nevertheless, the drain resumed beyond the rock and continued on for approximately another 3.5 metres, where rock similar to the first also blocked it. Again, it was clear that the bedrock had been hacked away on either side in an unsuccessful attempt to make a continuous channel. On the other side of this rock the drain seemed to continue, but the investigation ceased at this point through lack of time. It could well be that the drain continued to the stone-lined well which was about 38 metres further to the south in the same direction. If so, the blocked portions indicate it never reached the finished stage.

Two additional shallow drains were encountered in B-1 although these were not as deep as the major drain. Here the major drain measured a depth of 80 cm. and was approximately 75 cm. wide, separated by a low earth ridge 15 cms. wide and 15 cms. high from the second drain, which measured 30 cms. in width and 50 cms. in depth, followed by a third one which was 50 cms. wide and 50 cms. deep (fig. 93). All depth measurements were taken from a point on the top of the baulk opposite the drains.

In C-1, one definite drain and a possible one were excavated. Both ran in the same direction as those described above. Additional excavations to the north and south to investigate them further were not undertaken because of lack of time (fig. 93).

In B-2, the two minor drains converged into one, which in turn merged into the main drain, initially suggesting some sort of irrigation system (fig. 93). This idea had to be abandoned as the excavation progressed and it was found that the drain terminated against the large surface rock at the north end and was blocked in two places at its southern end. Moreover, level measurements taken show that there was a drop of 35 cm. towards the centre of rectangle B-1 from either end.

Unit 1, a unit of four layers, 1, 2, 3 and 4 consisted mainly of grey loose soils with thickly distributed charcoal throughout on top of the natural volcanic soil (layer 1). This basal layer had a very uneven surface in which all depressions were filled with pockets of charcoal, suggesting that a burn-off might have taken place as the initial event in the first phase of the occupation sequence, followed by the use of the area before the construction of the terrace.

The Terrace

One rectangle, AA, was set out and excavated at the front edge of the terrace. Three layers which were present in the two main sections along the A to A-1 and B to B-1 cross-sections were also discovered in this area. These were Layer 12, the pebble spread, layer 11, the almost sterile layer, and at the bottom, layer 1. Between layer 1 and layer 11 in this area were layers of fill forming the terrace itself. The only structures found here were two small firepits, one big firepit measuring approximately 1.75 metres in diameter, covering the whole of the west section, and one small posthole in the bottom layer (fig. 95). Charcoal samples were taken from this firepit, one of which, GaK-1339, gave a result of 2170 ± 90 before 1950 A.D. The construction of the terrace must thus have occurred in the period between the deposition of layer 1 and layer 11, as layers 2-10 in the main excavation are not present in rectangle AA. As shown above, layer 11 marks a major break in the occupation of the site. It seems that big boulders had been rolled or placed on the edge of the terrace in order to contain the fill for terrace build-up. The terrace itself is a good example of inverted stratigraphy, in which the yellow clay was dumped first, to be followed by the volcanic rock and stones (fig. 95).

Interpretation

When people moved on to this site they presumably burned off the vegetation on the upper surface of layer 1. They made cooking fires, which are present under the edge of the terrace; the layers 2, 3 and 4 are soil accumulations mixed with charcoal from the burn-off. These soils may have been used for agricultural activities, as the charcoal was very evenly distributed. The terrace was then built, possibly as a platform for a house. This must have occurred between the period of layer 1 and layer 11. The features of unit 2, the double alignment of stones, scattered large stones, postholes and patches of pebble spread *('ili'ili)* probably represent a house or houses on the terrace. The compacted clay floors, layers 7 8 and 9, suggest that this occupation covered a considerable period of time.

The drain system must be associated with this period as it is filled by the sterile layer 11, while the occupation of layer 10 fades out near the edge of the drains. They were probably dug in the time between the formation of layers 1 and 7, and were still open and probably in use up till the occupation of layer 10, the volcanic rock pavement, which is also the last period of occupation before the major break in the terrace sequence, layer 11. The very small amount of occupational evidence associated with layer 11 suggests it must have been formed when the site was abandoned for a period of time though its use for gardening is quite possible. When people returned to the terrace a pebble spread *('ili'ili)* was laid down on the sterile surface and in rectangle A-1 evidence was found of a rock pavement in place of the pebble spread. Although no signs of a house were encountered, it would appear that a house was present at this level, as living structures in Samoa are normally associated with pebble spreads and rock pavements.

The star mound itself was built after this last occupation of the terrace. Quite probably the rocks from the pavement, mentioned above, were used for the arms and facing of the mound, which surface is now in use as a plantation.

Portable Artifacts

The number of portable artifacts discovered in this excavation is, apart from the stone flakes, small. They consist principally of 12 certain adze fragments, another possible one, a smoothing or polishing stone, two partial grinding stones (one of which was taken away by local Samoans during the night) and a more complete grindstone identified as one used in preparing kava. The adze types follow the classification used throughout this volume (Report 2). Among the 12 adze fragments, four were unclassifiable while two others could not be classified with certainty, leaving six adzes distributed among three types.

The possible adze was ground on one side and made from the type of basaltic material normally used in manufacturing adzes but it is highly weathered and no definite decision could be reached on its function. Another fragment thought not to be an adze was concave on both sides and was probably used for polishing or smoothing stone tools.

Four of the classifiable fragments are of Type I and two of Type VI. The other two are probably of Type VI and X.

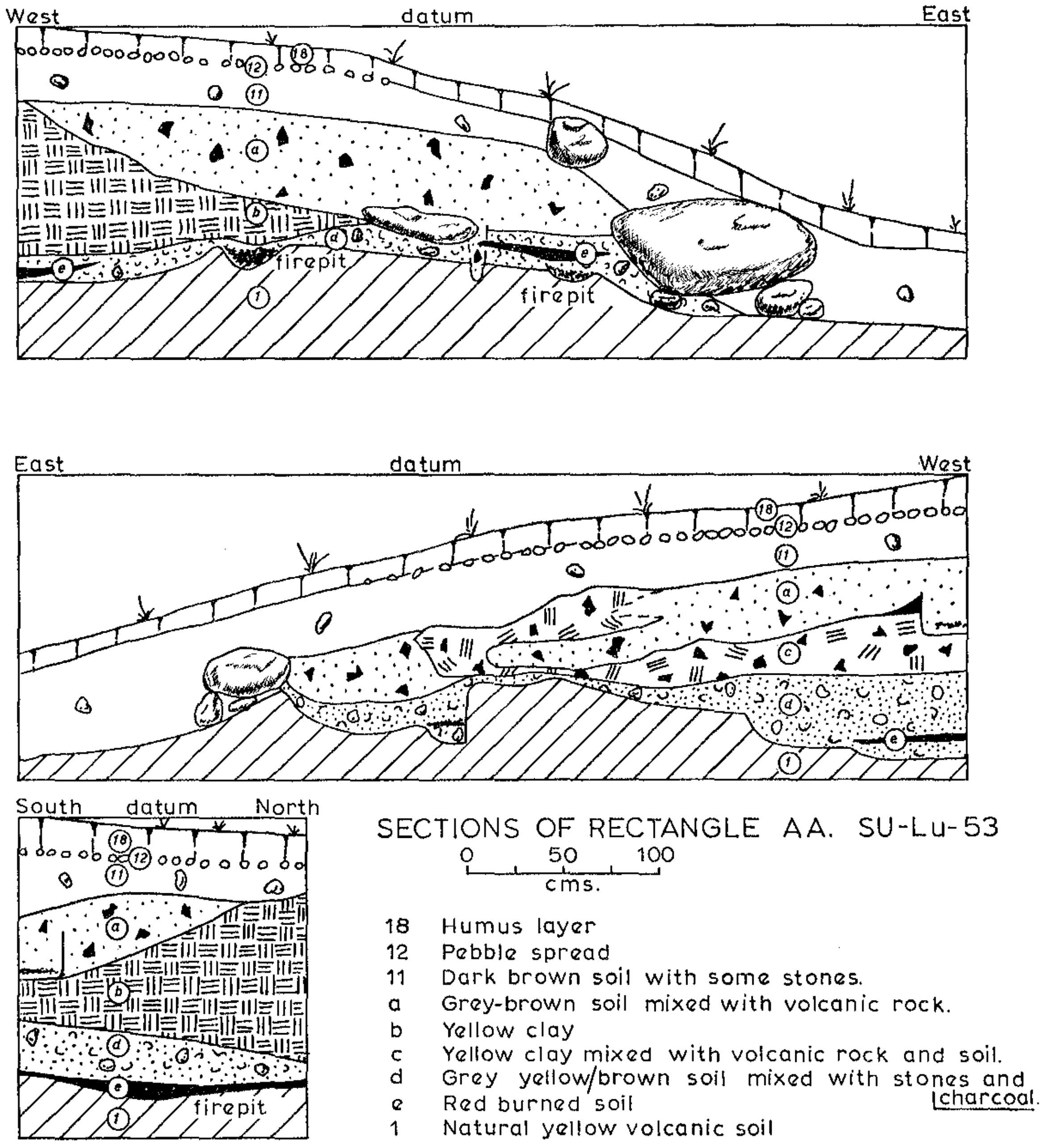


Fig. 95. Cross-sections of north, south, and west faces of rectangle AA, SU-Lu-53.

Of the four fragments of Type I, two were found in layer 11, one in layer 12 and one in layer 1.

The three Type VI fragments were discovered in layer 11 while the fragment probably belonging to Type X was also found in layer 1.

In sum most fragments were found in the upper layers of the terrace sequence, the one fragment of Type X being the only one discovered on the natural subsoil. This agrees with other findings (Report 2, p. 32) which show that this type probably belongs to the early portion of the Samoan archaeological sequence. About the other adzes one can only say, that like many of the stone artifacts they were probably brought in from elsewhere among the stone gravels of the *'ili'ili* pavements as most of them lack sharp edges and appear to have been rolled and waterworn.

The recovery of Types I and VI in the respective layers of the terrace sequence conforms with the results from the other terrace sites in the Luatuanu'u area (Report 12, p. 197).

Stone Flakes

The total industry of 273 flakes in all is divided into four separate assemblages according to the stratigraphy described above. The remaining flakes were too few to be treated as separate assemblages. The flakes, which are predominantly of basalt, are very weathered, owing to the very acid content in the soil. This often made examination of the flakes very difficult.

In order to obtain as complete an analysis as possible, the flakes were measured in length along the axis of the flakes, and breadth parallel to the striking platform. With these measurements diagrams were prepared from which the proportions and frequency of the flakes can be examined. Thickness and angle of striking platforms were also measured and expressed in diagrams.

The frequency of proportions is demonstrated in fig. 96, which shows the entire industry and the assemblages of the layers 11, 10, 4 and 2.

From the diagrams it can be observed that there is a very even pattern in proportion with a peak in the master diagram (the entire industry), as well as in the four separate diagrams, representing the assemblages. This suggests that there was little or no specialisation in form by size as all percentages seem to cluster around 3 cm. in length and width. The length peaks in each assemblage may be explained by the fact that elongated blades were being selected, this is not certain, however, as small flakes are absent in this industry.

By looking at diagrams of the thickness of platforms (fig. 97) one can see that three peaks stand out at 9 mm., in the master diagram and the diagrams of assemblages from layers 11 and 4. It may be that those peaks indicate a manufacturing of rougher flakes or tools, or that they belong to an early stage of adze manufacturing, e.g. roughouts.

Discussion: On present evidence it appears that in Polynesia no specialised industry has been discovered which produced cores, burins, knives etc. with the notable exception of the Waitaki River Mouth industry in the South Island of New Zealand discussed by Shawcross (1964). The SU-Lu-53 industry discussed here produced very little evidence of worked flakes. One small flake has a definite polished edge and could have been used as a small chisel (tattooing?). Another flake may have had a polished edge but interference, probably by the Samoan workmen who always would like to find an adze, made it doubtful. Those were the only flakes which had secondary working on them. This together with the total absence of small flakes and cores strongly suggests that the flakes were accidentally deposited on the site, rather than that it was a workshop where they were manufactured. This is supported by the fact that Samoans do bring in pebbles and other stone material for their *'ili'ili* pavements, taking the deposit from former sites now abandoned. There are no real differences apparent between the assemblages themselves in proportions and dimensions.

The graphs for thickness and angle of the platforms are based on very small samples so that differences that appear may be simply the result of chance variation.

Grinding Stones

Three grinding stones were recovered in the excavations. One, from the middle levels of fill in rectangle AA on the terrace, was removed by local inhabitants before it could be recorded.

The second example, G 17/704, is a broken portion of a formerly very large grindstone. It measures 30.2 cm. by 34 cm. and is 18.2 cm. thick. It has three shallow hollows on it, two of which appear to have been well used for sharpening tools. The grindstone may have been discarded as no longer useful, as it was part of the stone pavement encountered in layer 12.

The third grindstone, G 17/530, has a large deep linear hollow on one side, and was immediately identified by the workmen as a stone used for preparing kava. It had been discarded, for it was recovered from the rock build-up of the arm of the star mound between rectangles A-2 and B-1. Its dimensions are 42.4 cm. by 28.1 cm. and 12.4 cm. thick.

Conclusions

It has often been assumed from historical sources (Pirie 1964, Watters 1958) that permanent settlements inland were few in numbers in prehistoric times. However, evidence from archaeological field surveys and excavations by Davidson, Green, Ishizuki and Scott, has proved beyond reasonable doubt that extensive inland settlement did exist formerly. This report substantiates their result with stratigraphic and structural evidence. The stratigraphic evidence encountered in this excavation has shown that settlement in the Luatuanu'u area, 1½ miles in-

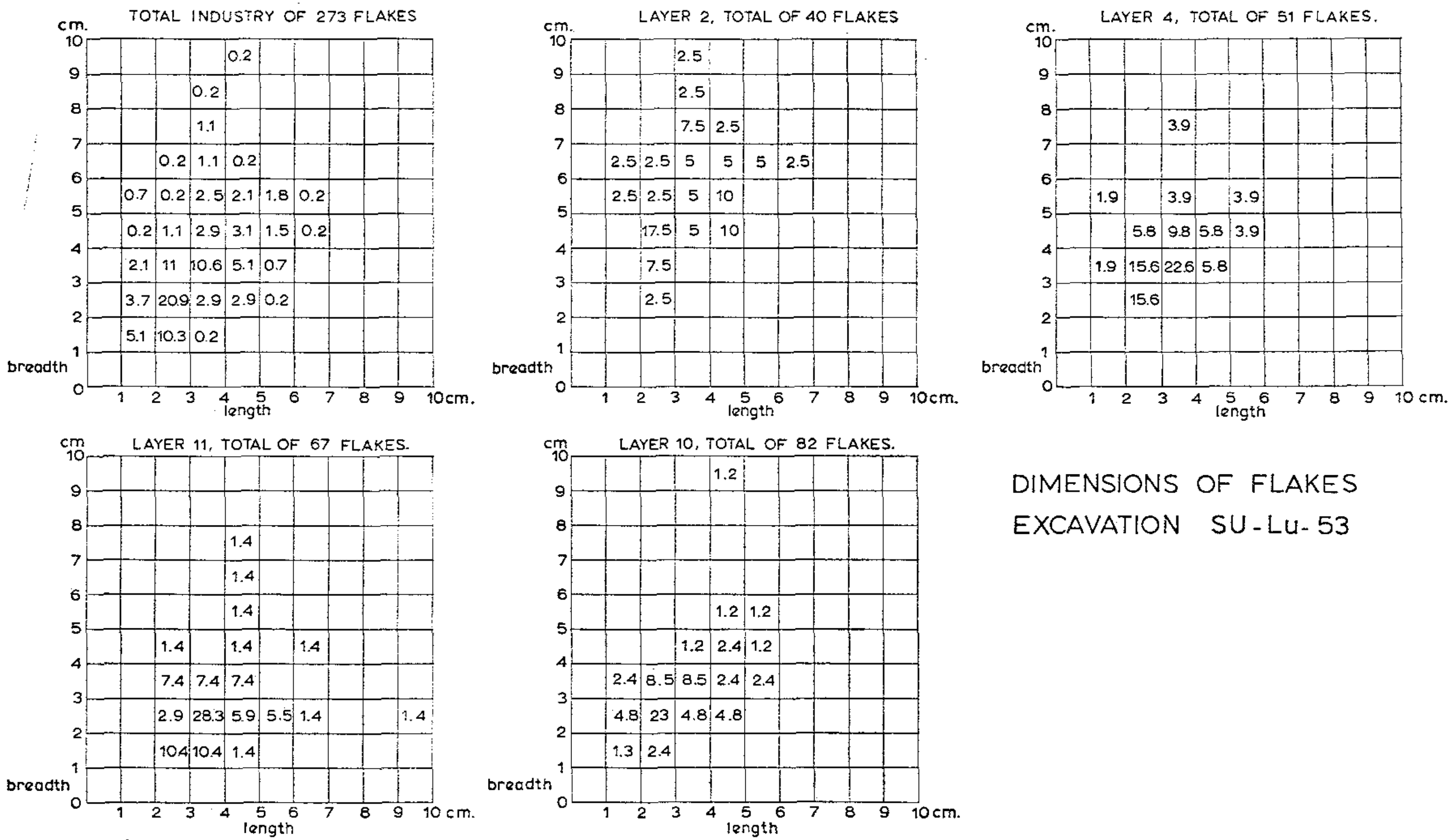


Fig. 96. Diagram of flake dimensions, SU-Lu-53.

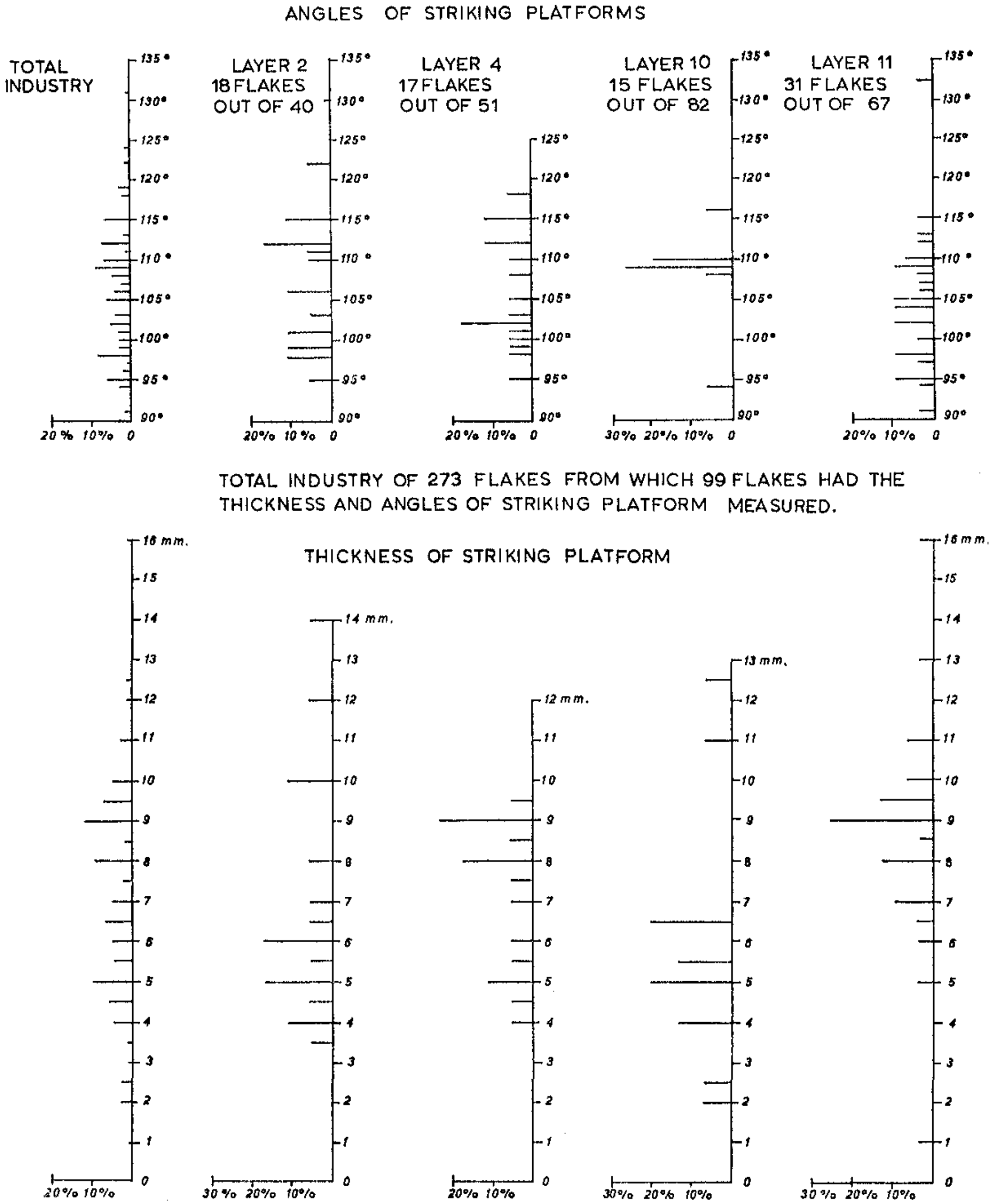


Fig. 97. Diagram of angles and thicknesses of striking platforms in flakes from SU-Lu-53.

land, had several occupation periods. The structural evidence indicates that except for the final period of the star mound, it was largely domestic occupation.

The time span encompassed by the stratigraphic sequence is indicated by a radiocarbon date obtained from this site. The sample, GaK-1339 from the oven sealed by the bottom layer at the terrace yielded a date of 2170 ± 90 years before 1950, or approximately the 2nd century B.C. (Peters in Davidson *et al.* 1967). This is comparable to the 5th century A.D. date from the Luatuanu'u fort, SU-Lu-41, one mile further inland (Report 13, p. 208). Although a solitary radiocarbon date cannot be trusted, the dates from the two sites together do indicate that the antiquity of settlement inland in the Luatuanu'u area is comparable to that encountered in other inland areas of Upolu.

On this evidence the terrace form has therefore some considerable antiquity and may be placed early in the Samoan archaeological sequence. It was used for domestic habitations and when not in use, for agricultural activities. Associated with this terrace was an elaborate drain system, a feature not previously encountered in Samoa. The importance and function of the drains was not immediately apparent and has yet to be satisfactorily established. That it had some importance to the early inhabitants of the terrace is certain, because too much work had been done for it to be considered simply a temporary feature, and statigraphic evidence shows that it was in use for some considerable length of time. One end of the drain was blocked twice by bedrock, although the drain might continue towards the well, while the other end began at the foot of a large surface rock. The only interpretation that can be suggested at the moment is for collecting surface water.

The star mound form is undoubtedly late in the archaeological sequence.

Additional evidence on the function of these star mounds was not forthcoming from these excavations. There was no evidence of any structures on the surface of the mound or in those layers composing it and although the local Samoans told us it was a pigeon mound, this information has to be treated with caution. In this excavation no pottery was found and the only faunal remains discovered were those from a dog which was buried in the humus layer in rectangle A-5 and is very recent.

ACKNOWLEDGEMENTS

First I would like to thank Dr R. C. Green who gave me the opportunity to undertake this excavation and assisted me in every way in preparing this report.

Also I wish to thank Miss J. L. Fagan, who under sometimes tiring conditions showed much skill and enthusiasm and through the discussions we had, contributed much to this project.

My thanks should also go to my crew of Atonio, Kasini, Viko, Vito and Manua who showed skill and interest in the excavation and made the project a pleasant one. Thanks are also due to Vito's wife who gave us great hospitality.

Lastly I would like to thank Miss J. M. Davidson, Mr F. W. Shawcross, and Mr L. M. Groube with whom I discussed this report and who helped in its writing.

VI. INTENSIVE RESEARCH AT LOTOFAGA, UPOLU

EXCAVATION OF A COASTAL MIDDEN DEPOSIT, SU-LO-1

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INTRODUCTION

At the beginning of the 1963-1964 field-work season in Western Samoa, a number of aims were formulated (Green and Davidson 1964: 14-15, and Introduction above, p. 5). Two of these could be achieved only through excavation in a coastal site or sites, and more particularly in beach midden sites. These aims were: (1) to develop suitable techniques for excavating the non-concentrated beach middens encountered in many parts of tropical Polynesia so as to recover information on that part of the pre-European economy which concerned exploitation of the coastal environment, and (2) to develop an archaeological definition of the nature of Samoan fishing gear, especially that to be found in earlier sites.

Previous archaeological research in Samoa had made no contribution in either of these fields. Golson's single coastal excavation, a small test pit at Ti'avea, revealed no artifacts, and no attempt was made to sample non-artifactual remains, if any, in the deposits (Report 1, p. 18). Golson remarked on the general absence of beach exposures and shell middens. Consequently it was with an awareness of the likely absence of obvious sites that a search was carried out in 1963-1964 for coastal middens that were potential excavation sites.

In 1964, also, archaeological definition of Samoan fishing gear was lacking for all periods of Samoan prehistory. Ethnological descriptions (e.g. Buck 1930, Demandt 1913, Krämer 1902) suggest that a wide range of fishing gear was made in shell other than pearl shell, and Buck had put forward the hypothesis that this was because of a lack of pearl shell in Samoa in pre-European times (1930: 498). The lack of pearl shell in coastal occupation sites required archaeological verification, while the apparent absence in Western Polynesia of one-piece hooks, in contrast to their abundance in Eastern Polynesia, required investigation.

At the time the investigation was undertaken, systematic study of midden deposits and their non-artifactual content was relatively undeveloped in the Pacific, although some techniques had been introduced by Gifford in Fiji, New Caledonia, and Yap (Gifford 1951, Gifford and Shutler 1956, Gifford and Gifford 1959) and by Bishop Museum archaeologists in Hawaii (Emory and Sinoto 1961).

A summary of the limited midden investigations indicated the need for a more systematic approach to the problem (Green 1961 b). Only in New Zealand had serious attempts been made to classify the many different types of midden and define techniques suitable for the analysis of each (Green 1963a, Davidson 1964a). It was already apparent, however, that tropical beach middens presented new and unique problems, and that a fresh start must be made in developing techniques for their analysis. A starting point was the description of archaeological excavations in a number of beach middens on coastal Mo'orea (Green *et al.* 1967: 177-183).

During the first weeks of the field-work season, various areas of coastal Upolu were explored by Green and Scott, in the search for a suitable midden site, at intervals between initiating work on other projects. At Aleipata the only exposed section found was that at Ti'avea, already tested by Golson, while the offshore islands at both extremities of Upolu and certain suitable strips and sandspits, notably that at Vaie'e, proved equally disappointing. It now seems probable that many modern coastal villages rest on prehistoric midden deposits, but this could be proved only by a detailed programme of test excavation, and in 1963-1964, the search was directed towards a site in which an exposed section revealed definite evidence of cultural deposits.

The most promising area located during this initial survey was at Lotofaga village, at the point where the road from Apia to Aleipata reaches the South Coast. The known existence of old village sites inland of this village (Golson, Report 1, p. 14) further suggested that a survey of these remains could be carried out in conjunction with the detailed coastal investigations.

Much of the modern village of Lotofaga is situated on high ground well above the sea, but an important section, including the principal *malae,* from which the village takes its name, and the traditionally important area of Mulifusi, is located on the low-lying sandy area (plate 22). This is terminated by low cliffs on the inland side and at either end, with the parts near the cliffs often being extremely swampy.

At the eastern end of this low-lying area, the artificial widening of an entrance channel through the reef several years previously had started a process of erosion, with the result that in early 1964, stratified cultural deposits were visible for a considerable distance. Beyond the eastern extremity of this sandy area, and separated from it by a protrusion of higher ground, is a small rock-bound cove, which now serves as a garbage dump for the Etemuli section of the village. Here even deeper stratified deposits were exposed, with a more earthy matrix. Several artifacts were recovered from the exposed section at this point, suggesting that this would be a profitable place to excavate.

Three areas at Lotofaga were tested by excavation. In the earthen deposits below Etemuli, an 8 foot by 8 foot square was excavated, and designated area A. In the most promising part of the sandy deposits, designated area B, a more extensive excavation was carried out. Two 6 foot by 6 foot squares, B-2 and B-3, separated by a 2 foot baulk, were laid out some 8 feet from the beach edge. Subsequently the intervening baulk was removed, and the seaward side of B-2 was extended 2 feet, so that the total excavated area covered 96 square feet. The third excavation, C, midway between A and B, but still on the raised sandy area, was undertaken to see whether the stratigraphy encountered in area B was general in the beach area, or localised, and to determine whether any recognisable relationship existed between the stratigraphy of A and B. A single 6 foot by 6 foot square was excavated at this point.

THE EXCAVATIONS

INTRODUCTION

A crew of five young men and one girl was employed throughout the excavations. Except for surface layers which were shovelled out, all material was excavated by hand trowel and then sieved through a screen with a quarter inch mesh. A screen with an eighth inch mesh was tested on the baulk between B-2 and B-3 and found to be impractical. All material retained by the sieve was sorted in the field. Unworked volcanic stone and pieces of coral, which were abundant throughout the deposits, were weighed in the field and discarded. Bone, charcoal, shell, and artifactual material were sorted and bagged for further analysis in the laboratory.

Excavation procedure varied somewhat according to the presence or absence of natural stratigraphy. In areas B and C the procedure adopted involved a combination of natural layers and arbitrary levels. Natural layers thicker than 6 inches were excavated in arbitrary 6 inch subdivisions. Natural layers less than 6 inches in depth were excavated in their entirety as layers. A constant watch was maintained for features, which were excavated separately as they occurred.

Two major problems were encountered in excavation, one concerning the nature of the deposits, and the other concerning the setting in which the excavation was taking place. Neither of these problems was entirely solved, and for this reason the stratigraphic contexts of the material recovered were not as exact as they should have been.

Natural stratigraphy was present in all three deposits but it was often not clearly defined. The deposits were not compacted, but very loose, and there were no clear discontinuities so that material from the base of one layer was easily confused with material from the surface of the next. As the excavators were, at least initially, unskilled, a certain amount of mixing took place. However, the apparent absence of major time breaks means that the mixing did not involve material widely separated in time. In addition to the difficulties encountered in distinguishing and following layers and lenses in the deposit, considerable difficulty was experienced in locating and satisfactorily excavating postholes and other features, whose fills were very similar in nature to the surrounding materials. Probably mistakes were also made here, and again provided some mixture between different natural layers.

There appears to be no alternative to slow and careful excavation in natural layers when dealing with such deposits. Arbitrary levels ignore the fundamental nature of the deposits, and while they may make neat and easily comparable units for midden analysis they are meaningless, so that analyses based on them are also meaningless.

The second major problem encountered was the disturbance of the deposits by the very numerous spectators who surrounded the excavation at all times, and by the children and dogs who played around the excavation in the evenings. People were constantly shuffling around the edge of the square, sitting on spoil heaps, and inadvertently kicking into the excavations small fragments of European material culture which abound in loose sand or earth on the surface of the deposits. Particularly in excavation A was this a problem, where the material surrounding the edge of the excavation and constituting its upper walls was a soft loose layer containing large quantities of glass and metal fragments which were constantly falling into the square. Despite our care, some of these pieces became mixed with sieved material, and in one instance the same item was removed from the excavation several times. It seems reasonable, therefore, to interpret the very small quantities of small modern European items which occurred in the sieved material from lower layers as intrusions due to the intensive human activity in the vicinity of the excavation.

It must be admitted, therefore, that despite efforts to maintain the strictest control, a certain amount of mixing of material from the base of one layer and the top of the next, or from the fill of a feature and the surrounding deposit, took place, and secondly that in many cases, material collected included both material excavated from a layer, and items accidentally introduced into the excavation while that layer was being excavated. In the first instance, mixing would not involve pieces widely separated in time. The only answer would appear to be extremely slow and careful excavating with as many trained people, rather than unskilled labourers, as possible.

The second instance seems to concern mainly European items being intruded into pre-European deposits. Pre-European material was sparse in the deposits, and all items encountered were immediately bagged. On the other hand small items of European manufacture were very numerous in and around the excavation, and those excavated from the uppermost deposits were discarded. There would be every opportunity for these to fall into the excavation, and minimal opportunity for intrusion of earlier items.

A third problem sometimes encountered in tropical midden deposits, the mixing of material by burrowing land crabs (Green *et al.* 1967: 201, Terrell, Report 10, p. 160, Palmer 1965: 27, 29) was not encountered at Lotofaga, where to all appearances the deposits were undisturbed until excavation was begun.

EXCAVATION A

A number of natural layers were visible in the eroding section in this area. It was evident from the start that excavation must be by natural layers, and not by arbitrary level. Initially an 8 feet square was set out at this locality. At a depth of 6 feet the excavation was reduced to an area 5 feet by 8 feet. Layers were numbered from the top down. Those which were deeper than 6 inches were arbitrarily subdivided. Material from layers 3 to 8 was sieved but this became increasingly difficult as the clay content of the deposit increased. Material from layer 9 down was washed through sieves in the lagoon. This meant that charcoal from these layers was largely lost. On the other hand sorting of other constituents was greatly facilitated.

STRATIGRAPHY

The stratigraphy was as follows (fig. 98a):

Layer 1: dark grey soil with large quantities of very recent midden including coconut shells, cans, bottle glass and nails.

Layer 2: lighter grey soil with similar content to layer 1.

Layer 3: greasy black soil with considerable charcoal.

Layer 4: orange clay with large quantities of coral, containing European midden material.

Layer 5: reddish yellow clay with sparse European material.

Layer 6: grey clay with more coral and shell than layer 5, and charcoal scatter at base.

Layer 7: yellow clay with sparse midden.

Layer 8: similar to layer 7, but separated from it by lens of white sand in southwest corner of square.

Layer 9: deep deposit of sandy soil with sparse midden material.

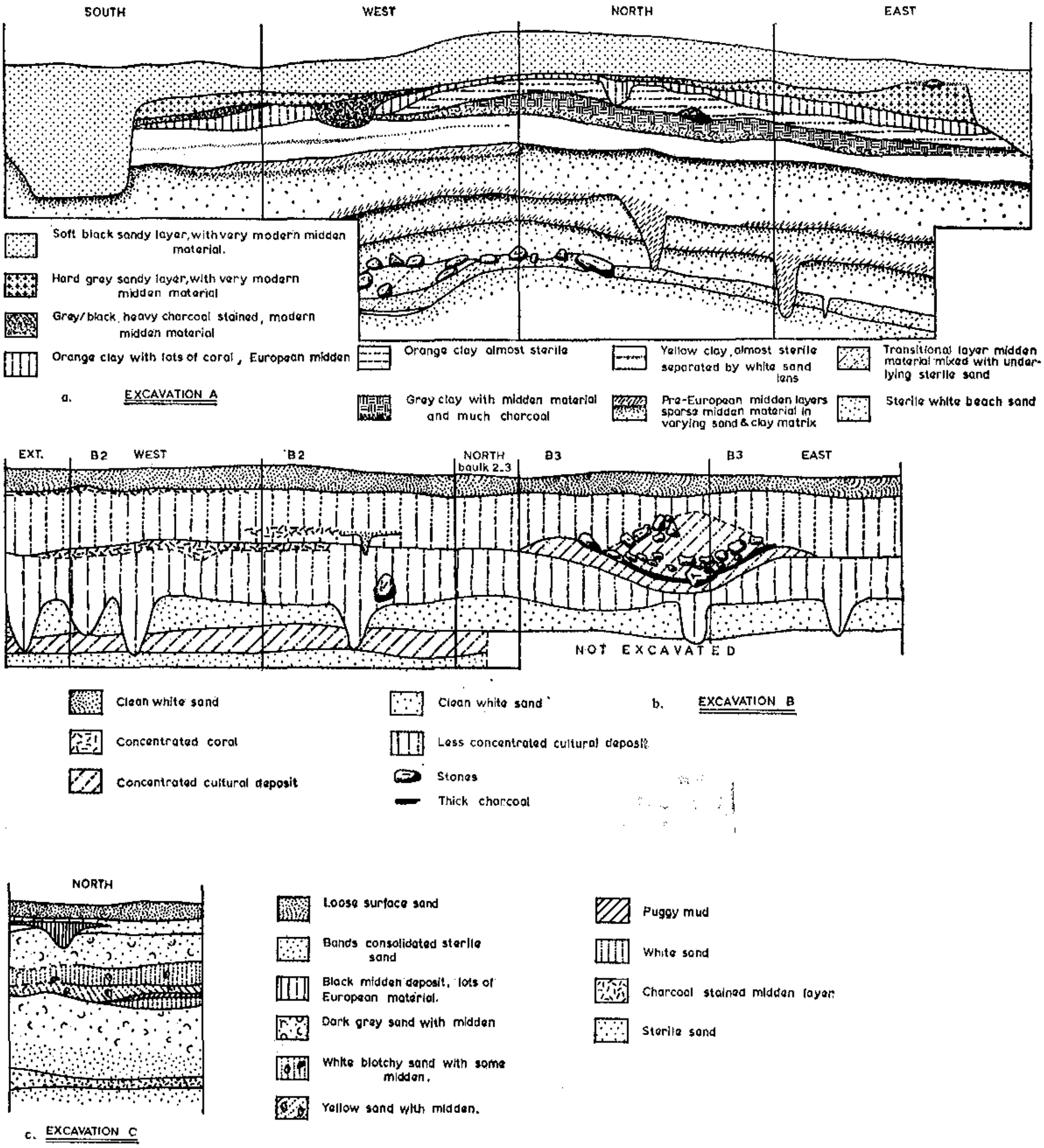

Fig. 98. Cross-section of excavations at Lo-1, Lotofaga, Upolu. a. all faces, excavation A. b. north, east and west faces, excavation B. c. north face, excavation C.

Layer 10: more clay-like deposit with less sand but similar midden content to layer 9.

Layer 11: variable deposit, very sandy towards the sea but with more earth towards the cliff. Sparse midden.

Layer 12: zone of mixed material from layers 11 and 13.

Layer 13: sterile white beach sand.

All layers were highest in the northwest corner of the square and sloped down to the south and east. Layers 1 to 8 were easily distinguished in section, though not always as clear to follow during excavation. Layers 9 to 11 were difficult to distinguish at all times, with the result that the excavated layers only approximate to the actual strata.

Features

A large modern pit was encountered near the south wall of the excavation. It was dug from near the surface and extended into layer 9. Its fill contained very recent debris. At the present day this area is occasionally used to make lime for building purposes, particularly churches, by a process introduced by the missionaries. This pit, and a larger one which could be observed in the exposed section, were said to be associated with this process.

Several postholes were found. In the upper layers only an isolated posthole with layer 6 fill was encountered. It was about 10 inches deep. A number of post and stake holes were found in layers 9 to 11. Some of these appear in the illustrated section (fig. 98a). The excavated area was not large enough for the nature of any structures to be defined from the distribution of the postholes.

Concentrations of coral gravel, possibly indicating house floors, occurred at several points in the deposit, particularly at the top and bottom of layer 9, and at the base of layer 10. Postholes were associated with the two latter.

A number of large stones in the northwest corner of the square at the base of the deposit could be the disturbed remains of a house platform. They may, however, have been merely rocks scattered on the edge of the beach. No stone paving, platform, or alignment was encountered in the excavation, though small unworked stones were very numerous.

In 1965 the site was revisited. Erosion had then destroyed the actual site of the excavation, and the exposed section stood immediately behind where the excavation had been. A stone house floor, consisting of two courses of fist sized pebbles, was visible in a position corresponding to layer 8 of the excavation.

Interpretation

The small cove where this excavation took place would appear to have consisted at one time of a sandy beach reaching back toward the cliff. This is represented by the basal layer of clean beach sand. Initial human activity in the area probably involved both occupation of the cove, represented by the deliberately laid coral floors, the midden and artifactual material, and the post and stake holes of the lowest layers, and activity above and near the cliff, resulting in increased erosion, and deposition of spoil from above. Layers 9 to 11 probably represent a long slow process of accumulation, with no apparent breaks in the sequence. There are points of concentration, where cultural material is more plentiful, and where there is some evidence for structures, in the form of postholes, but no large sterile bands occur, nor are soil horizons in evidence.

Layers 4 to 8 represent an increase in erosion from the cliff behind, with resulting deposition of more earth and less sand. Layers 4 and 6 are best interpreted as midden layers, which appear to represent occupations of the site, but layers 5, 7, and 8 are mainly clay with little cultural material and may be natural accumulations or imported fills. Both 4 and 8 were associated with floors, one of stone, the other of coral gravel. Layer 3 apparently also represents occupation, though it may result from very temporary occupation associated with lime making. The top two layers, however, are the result of the still continuing process in which the people of Etemuli throw their rubbish over the edge of the cliff, where it is constantly churned over and rooted through by scavenging pigs.

There is no clear break between European and pre-European material. Layers 9 to 11, interpreted as pre-European (despite the occurrence of occasional intrusive European items by the means described above) reflect a similar process of deposition throughout. This probably reflects a relatively unchanging occupation pattern and land use in the vicinity over a considerable period of time. Layers 5 to 8 indicate an increase in activity in the surrounding area apparently associated with European material culture. No items relating to post-European 19th century occupation however, were recovered. The European material is all recent in type and it is probable that all of it belongs to the period since the shift of Etemuli to its present position in about 1925. The virtually sterile layers 7 and 8, could then belong to the 19th and early 20th centuries which are not represented by diagnostic artifacts in the deposits.

Artifacts

Layers 1 to 4 contained large quantities of European material of very recent type, particularly metal and glass, but also including slate, china, and beads. Layer 5 yielded a much smaller amount of European material. Layers 6 to 8 contained small amounts of European material, and a few pieces of cut bone and shell, but no stone artifacts.

Very small amounts of material were recovered from all earlier layers. Because the material is so sparse it is listed in its entirety, omitting only European items which are believed to be intrusive. Other items were as follows:

Layer 9a:	1 stone flake.
Layer 9b:	2 stone flakes, 1 flake from polished adze.
Layer 9c:	4 stone flakes, 4 flakes from polished adzes.
Layer 10a:	3 flakes from polished adzes, 1 stone coconut grater head.
Layer 10b:	3 stone flakes, 2 flakes from polished adzes.
Layer 10c:	4 stone flakes, 5 flakes from polished adzes.
Layer 10d:	3 stone flakes, 1 water worn stone flake, 1 used sea urchin spine.
Layer 10e:	3 stone flakes, 3 flakes from polished adzes, 1 fragment of *Turbo* shell one-piece hook, 1 fragment of rubbing stone.
Layer 10f:	1 stone flake, 2 flakes from polished adzes, 1 cut piece of *Turbo* shell.
Layer 11a:	2 flakes from polished adzes.

This material was disappointingly sparse, given the promising finds of two adze fragments, a stone drill point, and a shell scraper from the lower layer of the exposed section prior to the excavation.

Midden

The non-artifactual remains from this and other excavations are discussed in a following section.

Excavation B

Excavation was commenced in both squares B-2 and B-3 which were separated by a 2 foot baulk. However, it proved more satisfactory to work on one square at a time, and B-2 was completed first.

Stratigraphy

The stratigraphy, which was uniform throughout the site, was as follows (fig. 98b):

Layer I: 0 - 8 inches. A series of thin bands of compacted white sand, apparently sterile.

Layer II: 8 - 30 inches. A thick layer of whitish sand in which coral, stone, bone, shell, and artifacts appeared in small quantities. A concentration of coral gravel at the top of this layer suggested a floor of some type. Small local concentrations of coral occurred at various depths, and some features were recorded.

Layer III: 30 - 54 inches. A darker midden layer with more stone and charcoal, but no significant increase in other constituents. In the southeast corner of square B-2 a burial was encountered in a very shallow pit near the surface of this layer (see below). The layer was excavated in four arbitrary 6 inch levels. The deepest of these included small amounts of layer IV as the transition from layer III to layer IV was gradual and irregular. There were several features in the layer.

Layer IV: 54 - 60 inches. Sterile white sand.

Layer V: 60 - 69 inches. A compact black layer with abundant charcoal and a small oven.

Layer VI: below 69 inches. Sterile white sand.

When a burial was first encountered, in the extreme corner of the square, it was left unexcavated until a larger area could be cleared down and the entire burial exposed. Interference with the visible portion by curious villagers, however, meant that excavation of the burial became urgent. Consequently, all material above it in the B-2 extension, and the remaining unexcavated 10 inches of layer II material in the B-2/B-3 baulk was shovelled directly into the sieves and not excavated by hand or by arbitrary level.

After removal of the burial, the entire area, comprising B-2, B-3, the intervening baulk, and the 12 square foot extension on the south side of B-2 was excavated to the base of layer III. During the excavation of the numerous features dug from near the base of layer III, the underlying cultural layer, V, was discovered. The sterile layer IV was then removed throughout the excavation in order to expose layer V. During the course of excavation of layer V the sides of the B-3 excavation began to collapse under the weight of spectators. In view of the lack of artifacts from the excavated portion of layer V, it was resolved to abandon the excavation at this point. Only half of the total exposed area of layer V was excavated, therefore, covering B-2, B-2 extension, and half of the B-2/B-3 baulk.

Features

Postholes are generally difficult to locate in this type of sand and coral midden deposit, because the deposit is loose and uncompacted, and the fill tends to be very similar to the surrounding material. Two small postholes were found dug into the surface of layer III and filled with coral gravel. It is possible that they were dug from the middle of layer II like one appearing in the north face of B-2 (fig. 98b) but not noticed until they penetrated layer III. Several large postholes dug from near the base of layer III and penetrating layer IV, and in some cases layer V, were located in both squares. There were at least four in B-3, of which two appear in section, four in B-2, of which three appear in section, and one in the B-2 extension. They do not form a meaningful pattern. There was also a shallow circular pit or depression about 4 feet in diameter in the southwest corner of the excavation. It was dug into layer IV and contained layer III material.

Two large ovens were encountered in B-3. Oven A in the northeast corner appears in section in fig. 98b. It is a layer II feature. Oven B was dug from a depth of approximately 36 inches below the surface in layer III. It was 30 inches in diameter and about 1 foot deep. A small oven was encountered in layer V in square B-2. It contained a portion of a human tibia.

A cluster of large stones was found in the northeast corner of square B-2 between 14 inches and 20 inches below surface in layer II. They may have been derived from an oven or pavement to the north of the excavation.

Burial

The burial was placed in an extremely shallow pit, only a few inches deep. The body was lying in a supine extended position with arms parallel to the sides of the body. Two large circular coral slabs covered most of it, one centred over the head and upper chest, the other centred over the pelvis. The lower legs extended beyond the coral slabs and were covered with sand. The body was oriented with the head to the west. To the south of the body was an alignment of stone curbs which may or may not have been associated with the burial. They could also have marked the edge of a house.

Because of local feeling in the village, it was necessary to reinter the skeletal material as soon as possible. When the burial was exposed it measured 5 feet 3 inches from heel to top of skull. The bones were small and light, and in a fragile condition. The skull was crushed, apparently by the weight of the coral slab. All thirty-two teeth were present and in good condition.

At the time the burial was exposed, the pastor stated that over the years a number of burials had been exposed by erosion and that in some cases the people had been buried together with their "precious things". There was no evidence of grave goods in this instance, and no substantiating evidence or detail was brought forward concerning the "precious things" exposed with previous burials. In 1965, a severe storm caused considerably more erosion at Lotofaga, and exposed a number of human bones at various points along the beach, but no associated artifacts were found. All the evidence suggests that burials are quite numerous in the area, but that grave goods, if they occur, are rare.

Radiocarbon date

A single charcoal sample from this site was submitted for radiocarbon dating. It came from the layer V oven in square B-2 and yielded a determination of 735 years $\pm$ 85 before 1950 A.D. This provides an indication of the time when occupation on the low-lying beach area may have begun.

Interpretation

The approximate time when the beach area was first occupied is indicated by the radiocarbon date. This initial occupation was apparently largely a cooking occupation, with an oven and numerous oven stones in the deposit. A period of abandonment apparently followed, represented by a further accumulation of sterile beach sand. Occupation resumed, and the deposits accumulated gradually, with evidence of structures, and of cooking activity, at various levels. There is a definite difference in colour between layers II and III which constitute the bulk of the deposit, but little difference in their content. There were two major concentrations of coral gravel in the deposit, which are interpreted as living surfaces in or near house sites. A greater quantity of artifactual material was recovered from these than from other portions of the deposits. One concentration occurred in layer II between 20 inches and 26 inches below the ground surface, and the other at the top of layer III. This latter was associated with the burial and with the large oven A. A further coral concentration was located in the southwest corner of the excavation at the top of layer II. These two layers represent a long period of slow accumulation with living and cooking structures sometimes actually in the area of the excavation, sometimes nearby. The top layer, of compacted sterile sand, belongs to the modern period when the area has served as a vehicular roadway, and houses have been located to the inland of it. The total lack of modern European items, in contrast to the upper layers of excavation A, serves to emphasise the nature of the latter as a garbage dump. In the area of excavation B, garbage is dumped right on the present beach where the sea slowly disposes of it.

Artifacts

Artifactual material from this excavation also was disappointing in quantity. Layer I was not sieved and no artifacts were obtained from it. Artifactual material from remaining layers was as follows:

Layer II: 8-14 inches: 2 stone flakes, 6 flakes from polished adzes, 1 cut piece of shell, 1 used sea urchin spine.
14-20 inches: 4 stone flakes, 1 flake from polished adze, 1 stone core, 1 lure shank fragment, 1 shell scraper.
20-26 inches: 3 stone flakes, 23 flakes from polished adzes, 1 piece of cut cowrie shell, 1 shell scraper, 1 used sea urchin spine.
26-30 inches: 3 stone flakes, 5 flakes from polished adzes, 1 small stone adze.

From Layer II above the burial in B-2 extension were recovered:
6 stone flakes, 1 flake from a polished adze, 1 stone core, 1 *Turbo* shell scraper, 1 used sea urchin spine.

Layer III: 30-36 inches: 15 stone flakes, 9 flakes from polished adzes, 3 stone cores, 2 grindstone fragments, 1 shell chisel fragment, 2 used sea urchin spines.
36-42 inches: 8 stone flakes, 13 flakes from polished adzes, 1 broken adze, 1 stone core, 1 shell scraper.
42-48 inches: 3 stone flakes, 3 flakes from polished adzes, 2 grindstones.
features: 1 flake from polished adze.
48-54 inches: 1 stone flake, 1 stone core.

From Layer III beneath the burial in the southwest corner of B-2:
1 stone flake, 1 stone core, 2 flakes from polished adzes.

Layer V: 1 piece of cut bone.

There were no artifacts from layers IV and VI.

Excavation C

A single 6 foot square was excavated at this locality. The excavation was conducted partly by natural layers, partly by arbitrary levels.

Stratigraphy

The stratigraphy was as follows (fig. 98c):

Layer 1: loose surface sand.

Layer 2: black midden layer with concentrated European material. In northwest corner only.

Layer 3: bands of consolidated white sand.

Layer 4: grey sand with sparse midden material. Excavated in three arbitrary levels 4a - 4c.

Layer 5: white sand with sparse midden material.

Layer 6: yellow sand with sparse midden material.

Layer 7: dumped material. (a) puggy yellow mud, (b) clean white sand.

Layer 8: dark grey sand with midden material. Excavated in four arbitrary levels 8a - 8d.

Layer 9: largely sterile white sand with intruding patches of layer 8. Excavated in two arbitrary levels, 9a and 9b.

Layer 10: black greasy charcoal stained deposit.

Layer 11: sterile white beach sand.

Features

Isolated postholes were defined at various levels. A single posthole 9 inches in diameter was dug from some point in layer 4, and intruded 7 inches into layer 5. A posthole 9 inches in diameter and 9 inches deep in the surface of layer 8 was filled with layer 7. Two postholes were dug from the lower portion of layer 8, and were discovered in the surface of level 8d. One of these was 16 inches deep. The other bisected a small hearth or oven at the very base of layer 8, and cut into layer 9. The hearth was 2 feet in diameter and was sectioned by the east wall of the excavation.

There were no concentrations of coral indicative of house floors in this excavation, and no pavement or platform remains. Neither were any ovens discovered other than the hearth already mentioned.

Interpretation

The earliest occupation at this locality was, as at excavation B, mainly a cooking occupation. It took place on sterile beach sand and was probably of fairly short duration. Following it the area was abandoned for a period of unknown duration represented by layer 12. When occupation again resumed in the vicinity, the deposits accumulated in a very similar manner to those of excavation B. Layer 4, 5 and 8 are all sparse midden layers differing from each other only in colour. Layer 6 could represent a soil horizon marking a period when the surface of the deposit was more stable than usual. The curious mud and sand lenses of layer 7 localised to one half of the square are difficult to interpret, but probably represent some brief dumping activity in a localised area.

Unlike excavation B this area did contain an identifiable post-European midden layer, although a very shallow and localised one. Layer 2 represents the type of material to be expected in a post-European occupation layer in this part of the village, contrasting again with the "dump" deposits of excavation A. Layers 1 and 3, however, are typical of the general surface deposits in the village area where houses have not recently existed.

Artifacts

The following artifacts were recovered:

Layer 2: metal and glass.
Layer 3: metal and glass, 1 stone flake, 1 clay pipe stem, 2 flakes from polished adzes.
Layer 4a: small amounts of metal and glass.
4b: 1 flake from polished adze.
4c: —
Layer 5: two pieces of cut shell.
Layer 6: 1 stone flake, 2 flakes from polished adzes.
Layer 7: 1 stone flake, 1 flake from polished adze.
Layer 8a: 3 stone flakes, 1 stone core, 1 flake from polished adze, 1 broken adze, 1 used sea urchin spine.
8b: 1 stone flake, 2 flakes from polished adzes.
8c: 2 flakes from polished adzes, 1 used sea urchin spine.
8d: 2 stone flakes.
Layer 9a: 1 *Turbo* scraper, 4 pieces of cut *Turbo*, 1 used sea urchin spine.
9b: —
Layer 10: 7 pieces of *Turbo* shell, possibly worked.
Layer 11: 1 flake from a polished adze.

This artifact collection was as disappointing in quantity as those from the other excavations. The European material from layers 2 and 3 was definitely associated with those layers. That from layer 4 is thought to be intrusive. Also intrusive must be a fresh sea urchin spine from layer 8.

Discussion

The actual cultural remains in the deposits, midden material and artifacts, will be discussed in following sections. In this section the nature of the deposits themselves, and their accumulation, is discussed.

Geological History

The coastal strip at Lotofaga is very similar to other coral sand deposits around the coast, described by Kear and Wood (1959: 29-30, 47) as Tafagamanu Sand, although they do not record the existence of any such coastal deposits at Lotofaga. Tafagamanu Sand deposits are said to be raised beaches or raised beach ridges, attaining a height of 5 or more feet above sea level. Investigation of the deposits at Lotofaga, however, showed them to be largely cultural, and quite distinct from the underlying coral sand deposit on which they rest. This observation has also held true for exposed sections of Tafagamanu sand examined by us elsewhere on Upolu and Savai'i. Moreover, a radiocarbon date for charcoal from an oven at a depth of slightly over 5 feet in excavation B, shows that the cultural deposits have an age no greater than 820 years before 1950, at least in the vicinity of excavation B.

There is evidence at Lotofaga for a former lagoon in the area now occupied by the coastal strip. At the edge of the present beach, exposed at low tide, is an old coral reef. The area between this reef and the base of the cliff, which is now occupied by the cultural deposits under consideration, must at one time have been part of a lagoon. It seems that change in the land/sea level caused this reef to become "raised" and sand to accumulate behind it, forming the surface on which the cultural deposits later accumulated. There is no evidence for the dating of this geological event.

Kear and Wood obtained a radiocarbon date of 1180 $\pm$ 55 years before 1950 for a sample of coral sand at the base of a 5 foot sand bank at Tafagamanu, Upolu (Grant-Taylor and Rafter 1963). If the situation at Tafagamanu were the same as that at Lotofaga, the overlying sand bank would be composed of sparse cultural deposits, while the radiocarbon date would provide a good indication of the date when natural accumulation of coral sand reached a sufficient height for occupation to begin.

It is possible that many of the so-called "raised beaches" in Samoa are actually cultural deposits, at least in their upper levels. But it would appear that at Lotofaga, at least, the appearance of a smaller raised beach, some time within the period of human occupation of Samoa, provided a surface on which the 5 feet or more of cultural deposits gradually accumulated.

Traditional History

There are three important places in Lotofaga according to the local traditions. Two of these are on the low-lying coastal strip. Lotofaga, the *malae* from which the village is named, is on the eastern side of the stream, west of the excavated area, and is associated with the important title Fiame. Mulifusi, referring to the stream itself and its western bank, is associated with two of the most famous women in Samoan traditional history, Levalasi and Salamasina. According to one account the latter is buried at Mulifusi.

The third important area is the *malae* Tanumaleo, which is located on the higher ground to the east of the village. This *malae* is associated with the first settlement in the area of the founder of the title Tupuola. The earliest events recorded in the village traditions took place on the high ground at Tanumaleo, rather than on the coastal strip.

The name Lotofaga itself is sometimes said to refer to a story that the low-lying coastal strip, which had previously been under water, was raised and became habitable. One version of the story relates that the land was deliberately reclaimed by Samoans carrying thousands of tons of sand in baskets under the domination of Tongan conquerors. In either case, the event apparently took place after the beginnings of settlement in the area. Once the low-lying strip was occupied, however, it became a focus for certain events associated with important traditional persons.

The traditional and geological evidence both seem to support a view that some raising of a shallow lagoon area took place, probably either at the same time as the raising of the Tafagamanu sand deposit somewhat over 1,000 years ago, or immediately prior to the beginnings of occupation dated to between 650 and 820 years ago. In either case, this event would have taken place after the beginnings of human occupation in the general area. While no date is available for the beginning of occupation at area A, it is reasonable to assume that occupation there would have begun at about the same time as in area B.

Correlation of Deposits

At the present time two processes are continuing which are relevant to our understanding of how deposits of this kind accumulate and their nature. Children bring fresh coral and sand almost every day to scatter around houses and make their surroundings clean and pleasant. At the same time, rubbish is meticulously collected from the houses and yards and taken away, usually to be dumped on the beach. These two processes combine to produce a relatively deep cultural deposit which, however, is not highly productive of either artifactual or midden material. Its main constituents are coral gravel, and small volcanic stones, both of which are usually deliberately introduced, and neither of which is removed as organic rubbish is.

In excavation A it was noted that there was an increase in the soil in contrast to the sand content of the matrix in the landward side of the square. Nonetheless, because of the much greater amount of soil it was assumed that area A was fundamentally different from B and C. However, the aforementioned storm in 1965 resulted in the cutting of a stream channel through the sandy strip close to excavation C, from near the cliff to the edge of the beach. In the exposed side of this channel deposits were visible in which there was a gradual and complete change from a sandy matrix in the vicinity of excavation C to an earth matrix quite comparable to excavation A near the base of the cliff. The deposits appeared to contain equal amounts of cultural material, evenly distributed, the change being only in the nature of the matrix.

It was thus apparent that there was in fact no fundamental difference between the lower deposits of excavation A and those of excavation B and C, the same processes being responsible for both. There seemed to be no marked parallel, however, between the stratigraphy of A on one hand and B and C on the other. Layers 1 to 8 at A appear to represent a modern accumulation for which there is no parallel in the other two areas, while layers 9 to 13, which are presumed to correspond in time with the deposits of the other two sites, show no stratigraphic resemblance to them.

On the other hand B and C have marked similarities to each other, suggesting that the stratigraphy on the sandy area may be the same over a wide area. Both B and C have a basal cultural deposit of charcoal stained sand, ovens, and cooking stones, which is overlaid by sterile sand. This appears to represent an extensive but rather brief initial occupation, followed by a period of abandonment. At each area there is then a steady accumulation of cultural deposit with a stratigraphic break approximately at the centre. In area B this break between the two major layers was seen merely as a living level at that particular location, but in excavation C there was some evidence for a time lapse when the normal process of accumulation was interrupted, and the surface stabilised. Both areas also share an upper layer of hard compacted sand, thought to be a result of the vehicular road way, although at C, near the end of the road, it is overlain by a recent occupation layer, and loose surface sand.

Nature of Occupation

The excavations suggest that a fairly wide range of activities was carried out on the coastal strip. Structures were present at various levels, sometimes with coral gravel floors. These would appear to have been living or sleeping houses, although no traces of the substantial stone platforms which now support houses in the area were uncovered in the excavations. Ovens, and cooking debris in the form of oven stones and quantities of charcoal, also occur. Thirdly, burials were evidently common and were placed in shallow pits in or near houses.

The artifact collection, described below, is not particularly informative, but tends to support a view that people were living in the area, rather than using it as a workshop, for example. The bulk of the collection consists of stone flakes, almost half of which show polish on at least one surface, suggesting that tools were being used in the area, but not made there. Other artifacts are few, and appear to be merely small items which escaped the notice of those detailed to keep the surroundings of houses free of debris. Even today, only a minute fraction of the durable European material culture used and discarded in the area finds its way into the deposits of areas B and C. Only the upper layers of area A reflect a deliberate dumping activity, which is apparently modern, the pre-European layers at area A conforming to the pattern of habitation and cooking rather than to that of dumping in the area.

The excavated area is so small a fraction of the total midden area that it is not possible to make any meaningful estimates of the total occupation pattern of the coastal strip at any one point in time. It can only be suggested that the results of the excavations imply for the excavated areas at least, a form of occupation very similar to that at present occurring in the vicinity of B and C, in which cooking and sleeping take place in the area, and burials are occasionally made near houses, while the area is kept meticulously clean, and garbage deposited on the beach below high water mark. Thus the present form of occupation would appear to extend some distance into the past in all three areas, and still continues today near B and C. The modern form of dumping at area A, which is no doubt related to the existence on the hill above the excavation of a large modern settlement, and the absence of settlement at area A itself, appear to be a relatively modern phenomenon, with no prehistoric precedent.

Importance of Coastal Settlement

The extent to which occupation of prehistoric Samoa extended beyond the coastal strip to more inland situations will be discussed fully elsewhere. It should be noted here, however, that extensive remains of settlement in the form of stone walls, platforms, and pavments of all sizes, are found stretching inland almost continuously from Lotofaga to the central mountain ridge of the island. Moreover a large number of present day residents of Lotofaga are descended from people known to have lived inland probably as recently as 130 years ago (Green and Davidson 1965: 67-68). It is probable that there is a greater concentration of population in the village of Lotofaga now than there was in pre-European times. On the other hand, the excavations show that there was continued occupation over a long period of time on the coastal flat, suggesting that a not inconsiderable portion of the area's total population was occupying the coastal strip on at least a semi-permanent basis.

MIDDEN ANALYSIS

Methodology

One of the principal aims of the excavation was to define suitable techniques for analysing Samoan midden deposits. New Zealand middens had been divided into three main categories, according to the concentration of cultural material in the deposit in relation to the amount of matrix. These categories were: (1) concentrated deposits, for which the only practical techniques were sampling techniques, (2) non-concentrated deposits, for which a combination of total collections and small samples would be required, and (3) sparse deposits for which total collection of all items excavated was the only adequate method (Davidson 1964a: 83-88). These categories could be further subdivided according to the number and relationship of major constituents, i.e. whether the midden was composed largely of one constituent such as shell, alone, or of a combination of several constituents.

The Lotofaga midden was found to fall into a new category, with two groups of constituents, one concentrated, and one non-concentrated, or sparse. The former included unworked volcanic stone, and coral fragments, while the latter included shell, bone, charcoal, and artifactual material.

In commencing work on a strange midden deposit it is better to collect too much, rather than too little. Procedures can easily be revised to involve collection of less material, but once material has been discarded, it cannot be recovered. For this reason excavation was begun with the intention of collecting the total content of the midden other than sand and earth. It was proposed to take small samples of various size for comparison with the total collection.

In order to separate small pieces of cultural material from the matrix in a midden such as this a sieve must be used. A question immediately arises as to what sized sieve is most suitable. At Lotogafa we used a quarter inch mesh. An eighth inch screen was tried on the baulk between B-2 and B-3, but its use slowed down the work to such an extent that it was felt to be impractical. It was beyond the ability of the excavators to sort accurately all material retained by such a screen. On the other hand no attempt was made to experiment with a larger screen, for it was soon obvious that an important part of the sparse but culturally important constituents of bone and stone flakes was of very small size, and would be lost through a larger screen. The quarter inch screen was thus found to be the smallest size which could practically be used, and its use was deemed necessary because of the fragmentary nature of some important items.

It was soon apparent that total quantities of stone and coral gravel could not be saved, because both constituents were concentrated in the deposits. In order to maintain some record of their occurrence in the midden they were weighed before being discarded. This procedure enabled local concentrations which were noted during excavation, and visible in section, to be expressed in quantitative terms.

Throughout the excavations all other constituents were collected in full. Few attempts were made to experiment with method, or to introduce sampling techniques. It was immediately evident that small samples (such as column samples) would not yield adequate amounts of bone, shell, and charcoal, while the quantities of unworked stone and coral could be gauged as easily, and more accurately, by weighing the total from each layer than by sampling.

In only one instance was an attempt made to compare small samples with the collection from a total square. In excavation C, all major levels and layers were excavated in two parts, first a single quadrant (the northeast quadrant) and then the remaining three. This procedure was not followed in the case of layers 2 and 7, which were not present in the whole square. The procedure provided in effect a large column, whose content may be compared with that of the total square (table 18). It is apparent that in most cases it is not possible to predict accurately the composition of the total square at a given layer, on the basis of the composition of that layer in the quadrant. This suggests that material is not uniformly and evenly distributed in the midden. In particular the bone constituent in the square is very inaccurately represented in the column. Moreover, if shell were divided into the many species present in the sample, rather than viewed as a single constituent, the sample would be equally unrepresentative of the whole.

Just as the column is not an accurate sample of the square, so the square is almost certainly not an accurate sample of the several acres which the actual midden encompasses. It would appear almost impossible to reconstruct the total composition of a large and diffused midden of this type, without very extensive excavations indeed. One of the ultimate objects of many midden investigations is, of course, to estimate the total amount of various constituents present, in order to draw conclusions about diet, population size, and so forth. This could not be attempted at Lotofaga on the basis of the limited excavations described. Our aims therefore, were limited to getting the maximum amount of information from the excavations undertaken. This can best be done by analysing everything which occurs in the excavation, rather than concentrating on a sample of a sample, especially where that sample is not even representative of the total area excavated, let alone of the total universe, which in this case is this coastal midden.

It was concluded therefore, that in a non-concentrated midden such as this, total collection of the sparser constituents such as bone, charcoal and shell in the excavation, is the most satisfactory way to get the maximum information about these constituents. This leaves the bulky concentrated constituents coral and stone for consideration. It could be argued that a precise measure of their content is not necessary, but on the other hand they do provide a good indication of the concentration of particular activities in a given layer, because their very bulk means that variations will be more meaningful and less open to chance than variations in the minute quantities of constituents such as bone. As the final sorting of coral and stone and their weighing requires little more work than the initial separation of smaller constituents from them, the decision to extend the analysis of the total content of the square to them also seems reasonable.

Any conclusion that implies that the various constituents are not evenly distributed in the midden raises a further point. To understand fully the structure of such a midden, a methodology should be employed in which each layer is excavated in a number of small units that may be compared with each other and with their sum. In this way concentrations within a layer may be recorded, where the total number of items is so vast that recording of individual stones and bone fragments is out of the question. This was not done at Lotofaga, except in the crude manner described above for excavation C, but if it had been done, our knowledge of the structure and content of the areas excavated would have been enhanced.

Before discussing the individual constituents in the midden it is appropriate to make some concluding remarks about the excavation of a midden such as this. Firstly it must be emphasised that there may be as great a range in tropical beach middens as there is in those of New Zealand. Experience so far suggests that each midden should therefore be regarded initially as a new and unique problem, rather than with the assumption that methods found suitable elsewhere will automatically be found to be right for this site also.

On the other hand, observations repeated over the course of the fieldwork suggest that in fact a number of middens in Samoa will be found which do resemble the Lotofaga midden fairly closely. In such sites, sampling, whether by quadrant or by column, will not provide an accurate picture of the total excavation and leaves as the necessary and only feasible alternative, total collection in the area to be excavated of the constituents that are to be analysed. Thus our experience at Lotofaga suggests that future work on middens of this type should disregard sampling *per se,* and concentrate on refining excavation techniques, and devising smaller units for total analysis, which will enable the total distribution of constituents within a layer or level to be better understood.

It is probably fair to say that one can begin excavation of any midden in Samoa with the assumption that the deposit will not consist of a number of level parallel layers undisturbed by features of any kind, nor will it consist of an undifferentiated mass of deposit. Rather it will consist of uneven layers and lenses, with postholes, ovens, burials, and other disturbances which will make analysis by large cubic units of comparable size impossible.

Content of the Midden

Total Content

The total weight in grams of the various constituents for each layer of each excavation is given in tables 16 to 18. It is apparent that no percentage analysis of the constituents of a layer should be given, when some constituents, such as bone and charcoal are counted in single grams, while others, such as coral and stone are measured in large numbers of kilos. Accordingly the amount of each constituent in each layer or portion of a layer, in each site is shown in figures 99 to 101. Thus in figure 99a the varying quantities of coral and stone in excavation A are shown on a scale measured in 50 kilo spaces, in figure 99b amounts of shell are shown on a scale measured in single kilo spaces, and in figure 99c, bone and charcoal are shown on a scale measured in 5 gram spaces. Similarly in figure 100a to c constituents in the two squares B-2 and B-3 are shown, and in figure 101a to c, constituents in excavation C.

It must be pointed out that some layers were thicker than others, and excavations B and C were smaller in area than the upper part of excavation A, so that cubic units of identical size are not being compared. None

Table 16

Analysis of Constituents by Weight in Kilos, Excavation A

Layer	Stone	Coral	Shell	Bone	Charcoal
2	108.182	215.529			
3			1.713	.013	.130
4	296.364	21.824			
5			1.198	.001	.148
6, 7	256.364	101.173	1.962	.009	.319
8	266.818	21.633	2.056	.012	.021
9a	61.591	59.836	1.968	.005	.006
9b	74.773*	122.285*	2.968	.016	.005
9c	46.818	113.884	2.568	.022	.001
10a	56.918*	164.369	2.854	.018	.001
10b	50.909	161.389	2.921	.013	.001
10c	100.000	199.419	5.125	.023	.001
10d	137.045*	99.632	2.226	.025	.001
10e	97.727	118.271	2.817	.037	.003
10f	38.864	74.566	1.770	.014	.001
11a	24.545	24.562	.833	.001	.001
11b	37.500	34.102	.437	.001	.001

* Large pieces of coral or stone included.

the less, the variations in content of layers within sites are to some extent demonstrable.

The content of the baulk between the two squares, and the extension to square B-2, in excavation B, are not shown, because their hasty excavation in the face of disturbance to the burial did not permit full analysis of all layers.

A number of points may be made about the composition of individual layers as reflected in the diagrams. Some layers in all three sites have low amounts of all constituents, presumably because they reflect periods when the excavated area was not the centre of any cultural activity. Concentrations of coral appear to reflect house floors, while concentrations of stone are in most cases evidence of more intense cooking activity, the exception being the extremely high stone content of layer 8 in excavation A, which is probably due to the edge of the stone house floor which later became visible in the eroding section. A lack of close correlation between stone and charcoal constituents probably reflects inadequate charcoal collection rather than invalidating the interpretation of large amounts of stone as cooking debris.

The diagrams also demonstrate the cultural origin of the coral constituent in so far as it was deliberately rather than naturally deposited. The highest concentrations of coral occur in layers which contain relatively large quantities of cultural material, while layers described as predominantly sterile beach sand have much lower coral content.

TABLE 17

ANALYSIS OF CONSTITUENTS BY WEIGHT IN KILOS, EXCAVATION B

			Stone	Coral	Shell	Bone	Charcoal
B-2	layer II	8-14"	3.636	49.628	1.297	.075	
		14-20"	6.878	76.700	2.634	.058	
		20-26"	11.136	158.358	2.580	.064	
		26-30"	5.454	52.511	.709		
	layer III	30-36"	21.363	269.760	2.382	.002	
		36-42"	29.545	124.464	2.836	.069	
		42-48"	28.636	32.841	1.227	.022	.011
		48-54"	11.818	13.421	.541	.006	.005
		54" and features	11.363	5.470	.177	.005	
		pit	2.954	3.182	.155	.001	.001
	layer IV		4.773	11.372	.310	.007	.010
	layer V		33.182	42.974	1.115	0.11	.048
B-3	layer II	8-14"	6.818	54.884	1.315	.080	
		14-20"	8.182	72.532	1.295	.026	
		20-30"	18.182*	117.961	2.588	.057	
	layer III	30-36"	31.591	189.218	4.572	.060	.009
		36-42"	51.818*	56.423	2.195	.024	.023
		42-48"	10.909	15.513	.828	.001	.016
		features	10.000	19.118	.279	.022	
		48-54"	2.727	3.639	.226	.001	.008
		oven B	4.545	4.554	.211	.002	.001
B-2 Extn.	layer II	8-30"	25.000	192.390	2.747	.045	.011
	layer III	30-36"	6.136	53.208	.649	.001	.002
		36-42"	10.227	35.692	1.066	.006	.002
		42-48"	11.364	8.636	.498	.003	.003
		48-54"	5.454	7.727	.287	.001	.002
B-2	layer II	under burial	7.273	47.273	.387	.016	.002
Baulk B-2/B-3	layer II	8-14"	2.954	56.684	.741	.023	
		14-20"	1.364	29.351	.637	.001	.003
		20-30"	5.454	41.825	.332	.003	.003
	layer III	30-33"	2.727	25.454		.002	.001
		33-36"	3.182	22.500		.001	
		36-42"	3.182	16.828	.416	.012	.002
		42-48"	6.364	15.025	.479	.009	
		48-54"	3.636	7.284	.253	.006	.014

* Large piece of coral or stone included.

TABLE 18

ANALYSIS OF CONSTITUENTS BY WEIGHT IN KILOS, EXCAVATION C

Layer	Stone	Coral	Shell	Bone	Charcoal
2	3.405	13.409	.106	.010	.002
3	(1.589) 6.136	(11.804) 42.270	.897	(.002) .008	(.005) .015
4a	(14.300) 19.091	(10.886) 41.360	(1.000) 3.108	(.001) .065	.009
4b	(4.313) 11.136	(12.031) 35.000	(1.405) 3.887	(.004) .082	(.004) .035
4c	(2.043) 6.136	(3.859) 18.409	(.326) 1.595	.009	.011
5	(.227) 4.540	(3.632) 11.590	(.303) .802	(.008) .016	(.005) .015
feature	.454	1.816	.514	.023	.001
6	(3.632) 17.270	(1.589) 10.900	(.242) 1.000	.009	(.001) .002
7	3.632	4.540	.185	.006	.001
8a	(3.138) 13.409	(8.172) 28.630	1.151	(.016) .086	(.001) .005
8b	(7.945) 32.915	(14.300) 36.590	(.383) 1.388	(.030) .059	(.001) .002
8c	(5.675) 40.900	(6.810) 38.409	(.861) 1.721	(.012) .044	(.002) .003
8d	(1.816) 6.810	(2.724) 11.810	(.800) .756	(.001) .006	(.001) .007
feature	.681	2.724	.046		
9a	(2.043) 8.863	(13.620) 29.318	(.770) .429	(.002) .007	(.001) .006
9b	(.227) 4.318	(1.135) 3.409	.234	(.001) .006	(.001) .003
10a	2.720	3.863	.326		.025
10b	.908	9.534	.358		

(Amounts in parentheses are amounts from the northeast quadrant only, when this was excavated separately.)

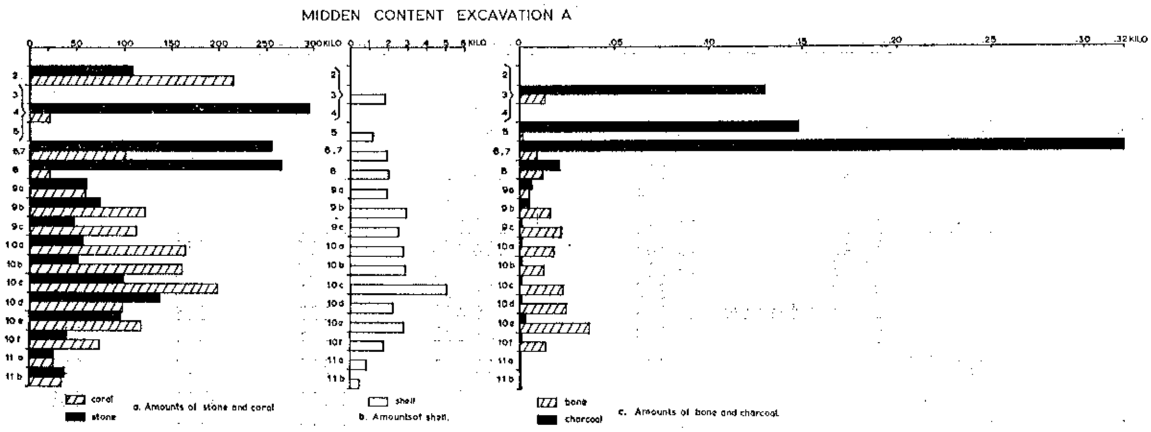

Fig. 99. Diagram of midden content by layers, excavation A, Lo-1.

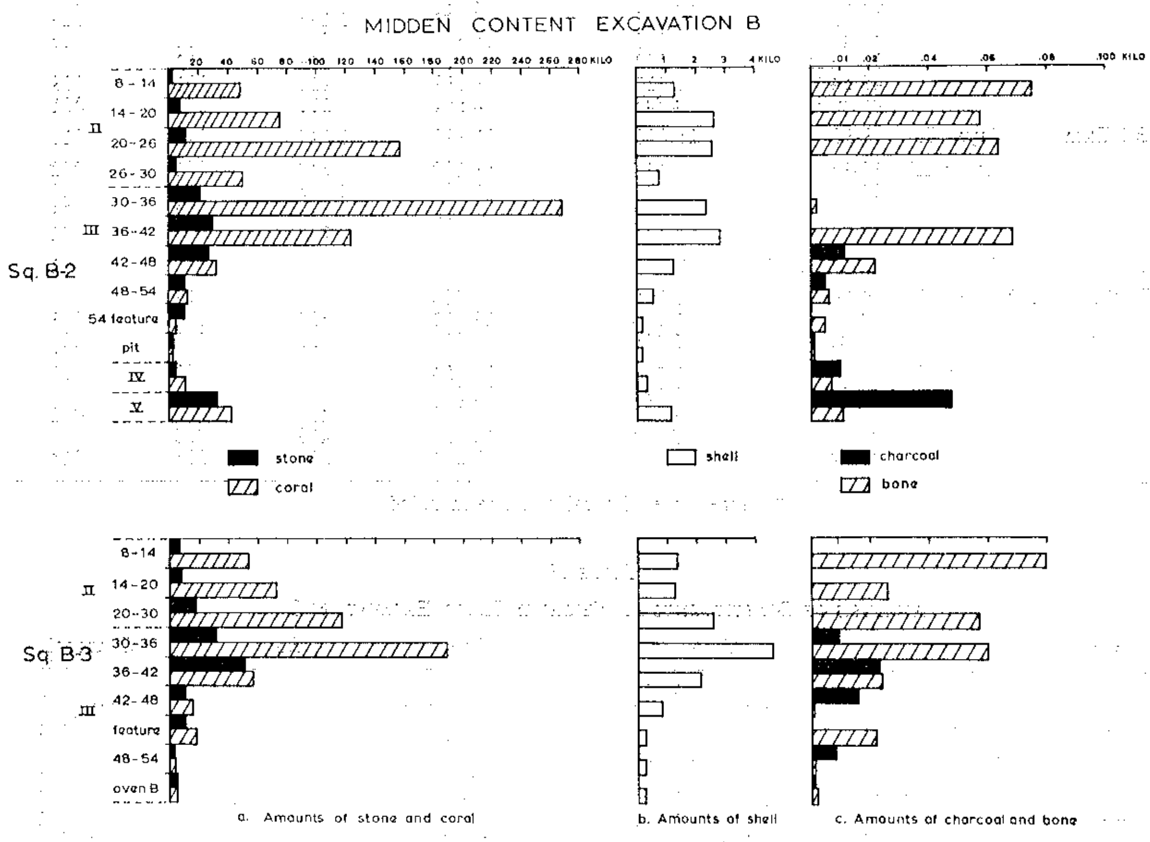

Fig. 100. Diagram of midden content by layers, excavation B, Lo-1.

Bearing in mind that the excavated area at A was much greater than excavation C or the individual squares at B, it is apparent that the fluctuations in the various constituents at all three excavations are much the same, with only the post-European layers at A showing marked extremes, particularly in high charcoal content, which are not apparent in the lower layers at A, or at the other sites.

Stone and Coral

Little can be added about these two constituents. The coral was almost entirely branch coral, such as can be collected on the beach,

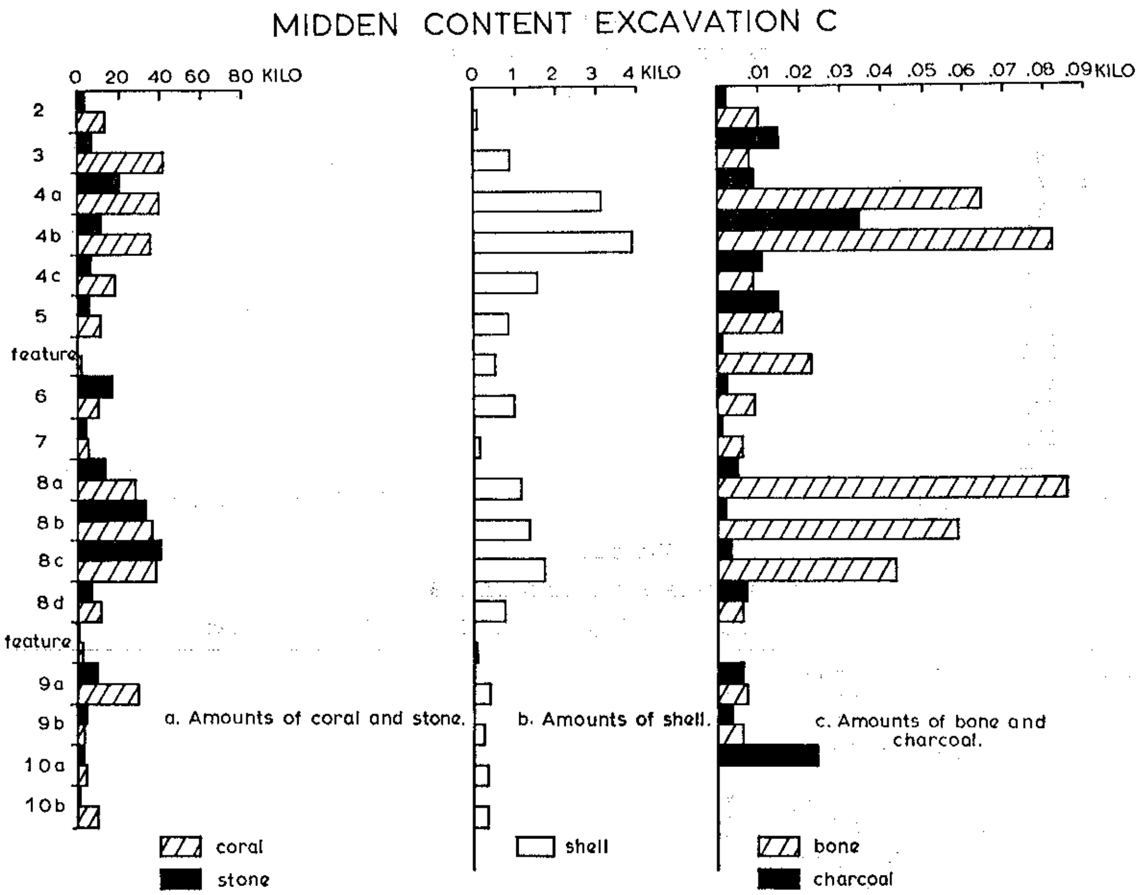

Fig. 101. Diagram of midden content by layers, excavation C, Lo-1.

or at the edge of the lagoon. Villagers were often seen passing the excavation with baskets filled with fresh coral from the beach which they were taking for house floors and paths and which was identical to that in the growing pile from the excavations. This coral is carefully collected today, and when culturally redeposited is more concentrated than when it occurs naturally on the beach. The modern situation is paralleled by the higher coral content in layers interpreted as cultural accumulations than in those thought to be naturally deposited.

The stone consisted of unworked volcanic stone, usually water worn stones or fragments of these. Many showed evidence of repeated firing. Most were smaller than fist size, though larger stones weighing a kilo or more were encountered (the stones forming the alignment next to the burial in excavation B were not included in the midden analysis). Isolated large stones were not recorded as a separate constituent, but their presence was usually noted, and is indicated in tables 16 and 17.

BONE

Much of the bone material recovered consists of small isolated fragments, often too small for species identification. A major exception is an almost complete dog skeleton recovered from layer 5 in excavation C. It is the skeleton of an immature dog. The head was severed from the body and the backbone broken. Otherwise the bones were buried in a position of articulation.

Preliminary analysis of the bone material has been undertaken by Mr R. J. Scarlett of the Canterbury Museum, Christchurch, New Zealand. This showed it to be predominantly pig, with smaller quantities of dog, rat, and bird bone, and occasional human teeth and skull fragments. The only sizable piece of human bone is the tibia from the layer V oven in excavation B.

The presence or absence of different kinds of bone in each layer of each excavation is shown in tables 19 to 21. The almost complete absence of bone other than pig in excavation

TABLE 19

OCCURRENCE OF BONE IN EXCAVATION A

Layer	Pig	Dog	Bird	Rat	Man	Other
2 – 4	x		x			
5	?					
6 – 7	x					
8	x					
9a	x					
9b	x					
9c	x					
10a	x					
10b	x				?	
10c	x					
10d	x					
10e	x					x
10f	x					
11a	?					
11b						

x present ? identification uncertain

TABLE 20

OCCURRENCE OF BONE IN EXCAVATION B

			Pig	Dog	Bird	Rat	Man	Other
B–2	Layer II	8 – 14″	x					
		14 – 20″	x					
		20 – 26″	x					
	Layer III under burial		x					
		30 – 36″	x		x			
		36 – 42″	x					
		42 – 48″	x					
		48 – 54″	x		x	x		
		54″ & features	?					
		pit			x			
	Layer IV		x					
	Layer V		x		x	x		
B–3	Layer II	8 – 14″	x					
		14 – 20″	x					
		20 – 26″	x	x			x	
		26 – 30″	x					x
		oven B	x		x			
	Layer III	30 – 36″	x		x		x	
		36 – 42″	x			x		
		42 – 48″		x		x		x
		features	x					
		48 – 54″	?					
B–2 extn	Layer II		x				x	
	Layer III	30 – 36″	x				x	
		36 – 42″	x		?			
		42 – 48″	?					
		48 – 54″						
Baulk	Layer II	8 – 14″	x		x	x		
		14 – 20″	x					
		20 – 30″	x					
	Layer III	30 – 33″	?				?	
		33 – 36″	x					
		36 – 42″	x					
		42 – 48″	x					
		48 – 54″	x					

x present ? identification uncertain

TABLE 21

OCCURRENCE OF BONE IN EXCAVATION C

Layer	Pig	Dog	Bird	Rat	Man	Other
2	x		x			
3	? ?		x –			
4a	x –		x ?			
4b	x x		x –	– x		x –
4c	x	– x	x			
5	x ?	burial				
5 feature	x					
6	x –					
7	x					
8a	x x		x –			
8b	x x	– x		x –		
8c	x x		x x	x x		
8d	? –					
9a	x ?					
9b						

Double columns indicate occurrence in single quadrant (right) and remaining three quadrants (left) where these were excavated separately. Single central x represents occurrence in layer where quadrants were not distinguished.

A contrasts with the other excavations. The absence of dog from excavation A and much of excavation B is also surprising. It may be related to the fact that dogs are said to have been sacred, if not to all Samoans, at least to many families (*Samoan Reporter* no. 11, July 1850).

Until further specialist identification of the bird bones is undertaken it will be impossible to determine whether or not the domestic chicken is present. Unfortunately, however, the few bird bones are so fragmentary that identification may prove impossible.

The quantity of bone is so small that percentage representation of different kinds of bone seems not to be very meaningful. However, the weights of fish and other bone, remembering that the latter consists very largely of pig, are shown in tables 22 to 24.

In an excavation such as this it is difficult to take the analysis of midden content further. One major aim in undertaking midden analysis is to learn as much as possible about diet and economy in the past. However, when the sample of the total midden is so small, and the material recovered so fragmentary and sparse that identifications are often in doubt, and no estimate of numbers of individuals can be made, there is little more that can be said.

CHARCOAL

Little analysis of charcoal has been undertaken beyond weighing it, and charcoal from excavation B was unfortunately discarded after weighing. The rest was retained, however, and the possibility of its analysis for various kinds of wood remains. Much of the charcoal is probably derived from the burning of various parts of the coconut palm, and distinctive fragments were seen to occur in layers 2-4, 6 and 7, 8, 9b, 9c, 10a, 10c, 10e, 10f, and 11b, in excavation A, and layers 2, 3, 4a, 4b, 5, 6, 8a, 8b, 8c, 8d, 10b in excavation C.

As indicated above, the charcoal collected is not an accurate measure of the charcoal present in the excavations, and it would be desirable in future to devise more satisfactory methods of collecting charcoal if possible. It is certain, however, that the very high proportion of charcoal in some of the upper layers at excavation A does reflect a greater concentration of charcoal in these layers than in any others. Whether this greater concentration of charcoal is due to increased activity in the

TABLE 22

WEIGHT IN GRAMS OF FISH AND OTHER BONE
EXCAVATION A

Layer	Fish	Other
2-4	1	12
5	–	x
6-7	x	9
8	–	12
9a	x	5
9b	13	3
9c	7	15
10a	6	12
10b	6	7
10c	2	21
10d	x	25
10e	1	36
10f	3	11
11a	–	x
11b	x	–

TABLE 23

WEIGHT IN GRAMS OF FISH AND OTHER BONE, EXCAVATION B

	B–2 Fish	B–2 Other	B–3 Fish	B–3 Other	Baulk Fish	Baulk Other	B–2 Extn. Fish	B–2 Extn. Other
Layer II 8 – 14″	3	72	3	77	2	21		
14 – 20″	3	55	2	24	x	1		
20 – 26″	2	62	3	48	–	–		
26 – 30″		–	x	6	–	–		
burial							14	31
Layer III 30 – 36″	1	1	10	50	x	3	x	1
36 – 42″	1	68	9	15	x	12	–	6
42 –48″	1	11	x	x	3	6	x	3
features			1	21				
48 – 54″	1	5	x	x	1	5	x	–
54 & features	4	1						
pit	1	x						
Layer IV	3	4						
Layer V	6	5						
under burial	x	16						
oven B			x	2				

x present in minute quantity — absent

area in European times, or whether it is merely due to the change in function of the site to a dump, rather than a living site, is uncertain.

SHELL

The most difficult constituent to analyse proved to be shell. From an early stage, it was apparent that not one, but two constituents were involved, which were very difficult to separate. A certain amount of the shell recovered represents the remains of shellfish which served as food, or, in rare cases, waste materials from artifact manufacture. A large amount, however, indisputably consists of small, heavily water rolled fragments, which are not to be interpreted as food remains. The more likely explanation is that these are in fact part of the coral constituent, that is, that they were gathered together with branch coral from the beach, for floors, and are therefore functionally indistinct from coral gravel. In excavations A and B, the amounts of shell from layer to layer closely parallels the fluctuations in coral content, although this is not so apparent in excavation C.

It is hoped ultimately to publish a check list of the shell species present in the three excavations. At present, however, this is not possible, for the identification of species is a very major task. It is probable that the total number of species present in the three sites is indeed large, and would compare with long species lists published from other excavations in the Pacific (e.g. Gifford and Shutler 1956, 29-31, 39-62). The number of species which formed a significant item of diet, on the other hand, is extremely small, and in several instances there is no shell in a given layer which can confidently be identified as food remains, or as manufacturing waste.

Problems arise in separating food remains and artifactual shell from other shell. There appears to be very little shell which could be

TABLE 24

WEIGHT IN GRAMS OF FISH AND OTHER BONE, EXCAVATION C

Layer	Fish	Other
2	–	23
3	(x) 2	(2) 6
4a	(–) 6	(1) 59
4b	(x) 8	(4) 74
4c	5	4
5	(2) 5	(6) 11
6	(–) x	(–) 9
7	–	6
8a	(x) 4	(16) 82
8b	(x) 10	(30) 49
8c	(x) 11	(12) 33
8d	(x) 1	(x) 4
9a	(2) 3	(x) 4
9b	(1) 6	–
10a	–	–
10b	–	–

TABLE 25

ANALYSIS OF SHELL, LAYER, 4b
EXCAVATION C

	Species	minimum no. of individuals	weight in grams
major food species	*Turbo setosus*	10	450
	Turbo crassus	8	400
	Turbo sp. opercula		70
	Trochus maculata	22	350
	Tridacna maxima	4	140
useful univalves	*Vasum ceramicum*	2	70
	Tectus pyramus	1	40
	Cerithium nodulosum	1	20
	Chicoreus brunneus	2	10
	Cypraea arabica	3	60
	Cypraea pelliserpentis	2	20
	Conus literatus	1	50
	Conus striatus	1	15
	Cidarus sp.		40
useful bivalves	*Spondylus ducalis*	1	70
	Periglypta reticulata	2	45
	Asaphis deflorata	2	30
	Quidnipagus	2	10
	Tellina sp.	1	5
	Unidentified fragments		1990

artifactual. The few pieces identified are discussed below. A few fairly unworn shells and broken pieces can be relatively confidently identified as food remains, and a large quantity of small heavily water worn fragments can be clearly set aside as part of the coral constituent. There is a substantial amount of small shell fragments which it is difficult to be sure about.

Even if all doubtful pieces are treated as food, however, the importance of the majority of species as food is negligible. Most species are represented by only one or two fragments in each layer, and only two or three species occur in any quantity.

Table 25 illustrates the composition of shell in a single layer of excavation C. Only those shells are listed which are believed to be edible, or useful as artifacts. Heavily water worn specimens, and shells too small to be of use are not included, even where they were identifiable.

Level 4b produced the largest amount of shell from excavation C, and it should be remembered that most levels produced a good deal less than this. Three species stand out as being much more numerous than others. These, *Turbo setosus, Turbo crassus,* and *Trochus maculata,* were common throughout the excavations, and occurred in most layers, *Turbo crassus* having a slightly more restricted distribution. *Cidarus* spines were also very common. Other edible or useful species were represented by far fewer individuals and also did not occur so frequently in other layers. In particular, *Tridacna* shells occurred only in some levels. They are not now available in Lotofaga, and are occasionally obtained from further down the coast.

Other edible gastropods, *Tectus pyramis, Cerithium nodulosum, Vasum ceramicum,* and *Chicoreus brunneus* (included as a possible relish, although it is very small), occur in small numbers throughout the deposits, but never in quantity. The frequency of the two species of *Conus* and *Cypraea,* also possibly of use for other purposes than food, is not known without further specialist analysis of all shells. The five species of bivalve (other than *Tridacna*), could be used as scrapers, or for other purposes, and are widely distributed in small numbers in the deposits.

The remainder of the shell content is made up of tiny shells and worn fragments which do not appear to be useful in any way.

The over-all picture which emerges is that shellfish were not much exploited as food, or if they were, the remains were dumped away from the living area. The present lagoon at Lotofaga is not productive of many shellfish, and it is probable that this situation obtained also in the past. Such shell as does occur in the deposits is either the remains of an occasional snack, or, in many instances, the remains of dead shells collected with coral gravel from the beach.

A list of all species present would convey little impression of the nature of the shell constituent, and the reasons shells were introduced into the deposits.

Discussion

The deposits in all three excavations were found to be very similar in content in spite of the apparent observed difference in matrix between excavation A on the one hand, and excavations B and C on the other. In all cases a technique of total collection, rather than sampling, was found to be more suitable for analysis of the deposit, and it is felt that future work on sites of this type should concentrate on improved excavation techniques, and on excavation by smaller units, rather than on sampling.

The variations in total content of layers appear to reflect differing activity emphases, and it should be noted that considerable variations occurred within one defined natural layer, as well as between layers. For instance, during the deposition of a single layer in the midden, which cannot be clearly subdivided on stratigraphic grounds, the focus of activity could vary between cooking and living activities.

Analysis of various constituents was hampered by a variety of factors. Collection of charcoal was felt to be inadequate, owing to the very fragmentary nature of much of it, and also, in the case of excavation A, to the method of sieving excavated material in the lagoon. The bone collection was small and fragmentary, but provided some interesting results, particularly in the prevalence of pig bones. Analysis of shell material strongly suggested that much of the shell in fact belonged to the coral constituent, being merely water worn fragments from the beach. The portion of the shell constituent which could have been food remains was not large, and suggested either that shellfish were not being exploited on a large scale, or that their remains were being deposited elsewhere.

It was not considered feasible to attempt reconstructions of total midden content, or of dietary patterns on the basis of the sparse materials recovered. Nonetheless, it is believed that the midden analysis was worthwhile, and provided additional information on the nature and content of the deposits, which could not have been obtained in any other way.

ARTIFACTUAL MATERIAL

The artifactual assemblage was so small that it was not possible to demonstrate change through time, if such exists, for the period covered by the deposits. The material is therefore described as an assemblage, though the context for each item is given. In addition to excavated items, artifacts collected by various people from the eroding sections, and from the beach near by, between 1964 and 1967 are described.

Fishing Gear

Only three items were recovered which can be regarded as portions of fishing gear.

A single fragment of an unfinished one-piece shell fishhook, F 11/4 (fig. 103a and plate 23) was recovered from layer 10e in excavation A. It consists of one limb (probably the shank) and the bend of the hook. The edges and the top of the limb have been filed, but part of the outer surface of the shell remains on one side. The hook is rendered in *Turbo* shell. It appears to have been broken and discarded before completion, suggesting that it was being made on the spot, rather than introduced from elsewhere.

A worked fragment of *tio*[1], F 11/3, from layer II (14 to 20 inches) in square B-2 may be the proximal part of a lure shank (fig. 103b). It appears to have been one side of a round-sectioned, dorso-ventrally perforated shank which split down the centre during the drilling of the hole. The central division line was then converted to the base of an asymmetrical triangular sectioned shank. Its identification as a lure shank, however, is doubtful, because of its very fragmentary nature. It is also possible that it was an ornament form.

A cut piece of cowrie shell, G 11/81, from layer II (20 to 26 inches) in square B-2, appears to be part of the external trimming of an octopus lure. It conforms to the shape of the shell in ethnographic descriptions but is not perforated.

It was very disappointing that the total fishing gear from these excavations should amount only to three items, one of which is only tentatively identified as a lure shank fragment. Nonetheless, a few statements can be made about fishing gear. Firstly, it is obvious that archaeological definition of Samoan fishing gear is not going to be easy. Durable items of fishing gear were not common enough to be left lying around at any time in Lotofaga, and therefore presumably any coastal midden is unlikely to be productive of such items in quantity. Either a specialised manufacturing site, or a specialised fishermen's camp must

[1]Described by Buck (1930:498) as "a silicaceous rod-like material formed in the borings of certain sea worms in coral rock".

be sought, and there is little ethnographic evidence for the existence of either.

Secondly it must be emphasised that not a single fragment of pearl shell was recovered from any of the excavated areas. This tends to support Buck's contention that pearl shell was not present in Samoa in pre-European times, and has since been imported from the Tokelau or Northern Cook Islands in very small supplies for fishhook manufacture.

However, there appears to be no reason why pearl shell should never have been present in Samoa, and our limited negative evidence is hardly sufficient to justify a conclusion that it was always totally absent. A more likely possibility is that it was originally present, and had been completely fished out by the time occupation began at Lotofaga beach. It may even have been present in small quantities and so valuable that no pieces were wasted.

The probable lure fragment and the cut cowrie shell are both from relatively recent contexts in excavation B. The cut cowrie shell is slight evidence for the presence archaeologically of the octopus lure, although no octopus lure sinkers were found. The lure fragment suggests that lures in material other than pearl shell, and lacking the strongly triangular cross-section with sharp edges, may be recovered archaeologically from fairly recent contexts.

The one-piece hook fragment, from a context well down in excavation A is of considerable importance. Ethnographic evidence suggests that baited hooks were present in Samoa but not well developed (Buck 1930: 490-494, Demandt 1913: 25-29, Krämer 1902, II: 346). Examples known in the early European period seem to have been in wood, or a composite of wood and fish bone. The archaeological evidence for a simple one-piece hook in *Turbo* shell suggests that the one-piece hook may always have been present in Samoan culture, but did not develop because of the success of other methods and a lack of suitable conditions for line fishing other than trolling. The presence of even a single example of a one-piece hook, from a pre-European context in Samoa, has important implications for the origins and development of hooks in Polynesia. The Samoan example is similar to small examples in *Turbo* shell from the Society Islands (Green *et al.* 1967: 184-185, Emory and Sinoto 1965: 88). A single example of a one-piece hook in shell is also known from an archaeological context in Tonga (Poulsen, pers. comm.).

Filing and Polishing Tools

Of the countless sea urchin spines encountered in the excavations, nine were recovered whose points showed signs of use as files. From excavation A there was one from layer 10d. Excavation B yielded three from various points in layer II, and two from near the surface of layer III, while excavation C produced one from each of layers 8a, 8c and 9a. It is apparent that they occur at various depths in the deposits. Five show considerable wear on one facet of the tip (fig. 103e), one shows slight wear on two facets, and three show slight wear on the very tip only.

Where these files occur elsewhere in Polynesia they are thought to have been associated with bone working, and their absence or rarity in some island groups is correlated with an absence or scarcity of worked bone (Emory and Sinoto 1965: 87, Green *et al.* 1967: 196, Green [MS]). They occur, however, in small numbers in these groups, as in Samoa, suggesting that their use was widespread in Polynesia, even if this type of file only became important as a result of bone working, as in Hawaii. Here it is important to note that no worked bone was found in association with these files at Lotofaga.

No coral files of any kind were recovered. The general absence of files is strong evidence that fishhook manufacture was not common in the area.

A fragment of weathered basaltic rock which in grain size and composition appears very similar to sandstone was recovered from layer 10c in excavation A. It has been used as a file (fig. 102b) and it would appear that this is the type of file most likely to have been used in working the fishhook fragment from the same level.

Four pieces of grindstones were recovered from excavation B. G 11/58a, from layer III (30 to 36 inches) is merely a chip from the edge of a grindstone, measuring 23 mm. in length, and showing one polished surface. G 11/86, from the same layer, is also a fragment, apparently from a rather small grindstone. It is polished on two opposite surfaces, varying in thickness from 8 to 14 mm. Another tiny fragment of a grindstone, G 11/91, was recovered from layer III (42 to 48 inches). The polished surface is 9 mm. long. A much more substantial portion of a grindstone, G 11/63, was recovered from the same layer. The single polished surface measures 90 by 75 mm. The thickness of the stone is 95 mm.

These few fragments are sufficient to suggest that while grindstones were in use during the occupation of the area they were not carelessly thrown away. Today some large ones, now used as kava pounding stones, are incorporated in the stone platforms of present day houses.

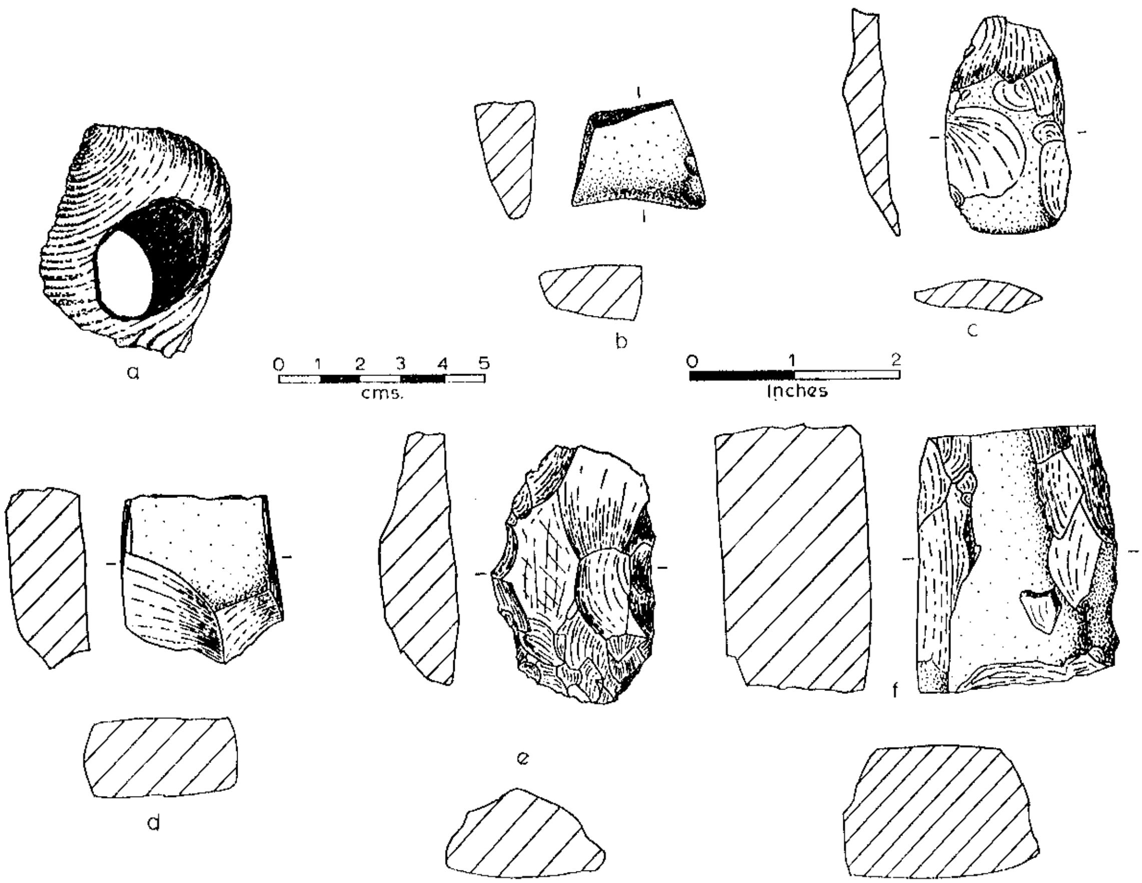

Fig. 102. Artifacts from excavations at Lo-1, Lotofaga. a. *Turbo* shell scraper, G 11/175. b. stone file, G 11/152. c. stone adze made on a flake, A 11/82. d. stone adze fragment, Type III, A 11/124. e. coconut grater, G 11/137. f. broken adze, Type IX, A 11/51.

No grindstones or fragments of such were found in excavations A and C. However, a very large stone, showing multiple grinding depressions on several facets was found on the beach in front of excavation A early in 1967. It was too large to move, and was left there.

A single grindstone fragment, G 11/1, similar in size to G 11/63 but worn on two surfaces, was donated by a child who found it in or near the village in 1964.

Scrapers and Graters

Two *Turbo* shells which appear to have been used as food scrapers were recovered (fig. 102a). G 11/175 comes from layer 9a in excavation C, and G 11/185, from layer II in B-2 extension, excavation B. One of these shells has been chipped since excavation, and now no longer has the smooth worn edge, but at the time of excavation there did appear to be a deliberately made perforation. Of the numerous *Turbo* shells recovered, these were the only two which appeared to have been used in this way. No other shells appeared to have this kind of use, although it might be expected that stronger shells could be more suitable. Buck records this type of scraper (1930: 109, plate IVc) and Green (1963b: 249) has discussed its distribution elsewhere.

A broken piece of *Periglypta reticulata* shell, G 11/82, showing a well worn edge opposite the hinge was recovered from layer II (20 to 26 inches) in square B-3. Shells of this kind are said to be used for scraping fibres in mat and bark cloth making.

A worked piece of stone, G 11/137 from layer 10a, excavation A, may have been prepared as a coconut grater head (fig. 102e). It appears to have been a large flake from a polished adze which has been further flaked on one side.

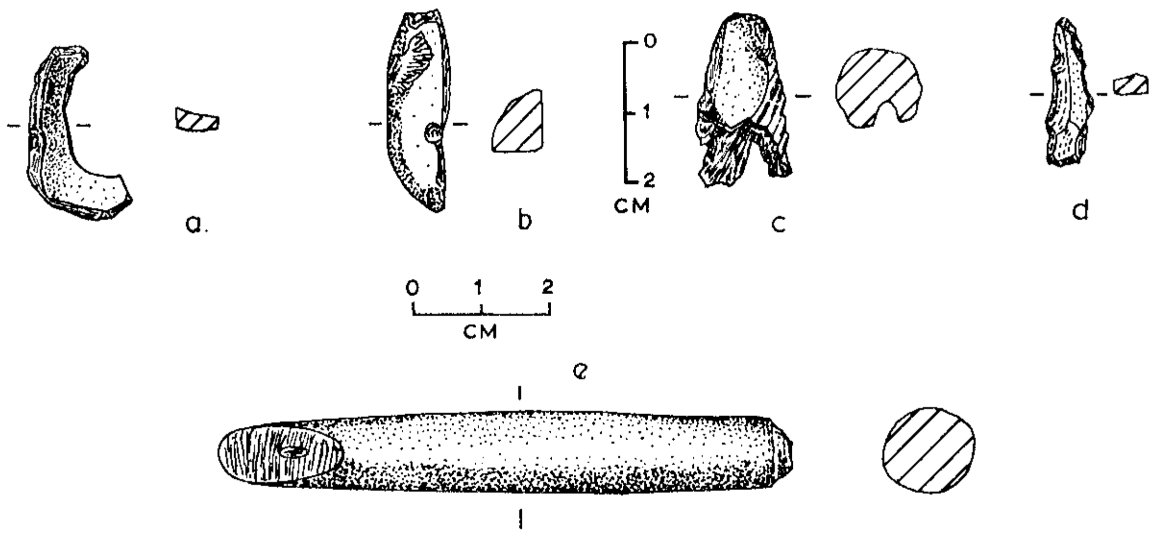

Fig. 103. Artifacts from excavations at Lo-1, Lotofaga. a. *Turbo* shell hook fragment, F 11/4. b. lure shank fragment, F 11/3. c. tip of shell chisel A 11/75. d. stone drill point, G 11/2. e. sea urchin spine file, G 11/180.

The other group of scrapers and possible scrapers is the relatively large collection of stone flakes, which because of uncertainty as to their function, are described in a separate section below.

Drill Point

A single very neatly made stone drill point, (G 11/2), was recovered from near the base of the eroding section in area A, prior to excavation (fig. 103d). It is a small elongated flake from a ground stone adze, which has been carefully flaked along both sides to produce a tapering point.

Adzes and Chisels

Only four items large enough to be described were recovered from the excavations, although the number of flakes showing polishing on one or more surfaces to indicate that they were derived from adzes was quite large.

A 11/51 from layer III (36 to 42 inches) in square B-2 is the butt end of what was probably a Type IX adze (fig. 102f). It shows traces of grinding on all four surfaces, but this is only very slight on the back and sides, and would not appear sufficient to justify classing the adze as Type X.

A 11/75 is the tip of a chisel in shell, probably from the columella of a *Cassis* shell (fig. 103c). It is the only example of a shell chisel found at Lotofaga. Chisels of this kind seem to occur in small numbers in various tropical Polynesian groups, including the Marquesas (Suggs 1961: 115, fig. 35n).

A 11/82 is from the base of layer II in the baulk between squares B-2 and B-3. It is a flake which has been polished to form a cutting edge. There is slight polish on the sides and on the front and back, but its form as a flake is still quite apparent (fig. 102c). Adzes of this kind seem to occur in various parts of Samoa from time to time.

A 11/124, from layer 8a in excavation C is the central section of a Type III adze, ground on all surfaces. It has an almost quadrangular section and was well finished (fig. 102d).

There were no adzes from excavation A.

In addition to the excavated adzes, several adzes and parts of adzes were recovered from the beach in front of the excavations where they had eroded out from the section.

Four pieces were found near excavation A in 1964, before excavations were commenced. A 11/2 is a central section of a small type II adze. It had a well ground front and only slight traces of grinding on other surfaces. It is slightly water worn and was found on the beach in front of excavation A. A 11/3 is a very battered fragment of a fairly small triangular sectioned adze. It is almost certainly Type VI. It was found at the base of the eroding section. A 11/4 is the butt end of a small quadrangular sectioned adze. It has traces of grinding on all surfaces including the poll, and when complete might have belonged to Type III. If the grinding was not extensive, however, it would belong to Type I. It was found actually in the section well down in the prehistoric layers, probably in layer 10. A 11/7, also found *in situ* in the prehistoric layers in the section, was probably in layer 9. It is merely the cutting edge of a small or medium sized adze, but shows a very well ground and finished edge.

After the storm in 1965, when flood waters cut a channel through the deposits near excavation C, and caused severe erosion near excavation A, several more parts of adzes were found. A 14/5 is a battered fragment of what was probably a medium sized Type I adze. It has been reflaked at one end, either to form a new cutting edge, in which case it would become a Type IV adze, or more likely, to form a coconut grater head. Also from the vicinity of excavation A came a flake from a ground adze, A 14/7. At the same time, four items were found near excavation C. A 14/6 is the central section of an unfinished adze, apparently of Type II. It is not ground on any surface. A 14/8 is the butt and central portion of a well made Type I adze. It is ground on the front and well flaked with traces of grinding on the other surfaces. It measures 125 mm. in length, and may have been part of a fairly large adze. A 14/9 is the butt end of a fairly thick sectioned adze, probably of Type IX. A 14/10 appears to be an unfinished fragment of a Type Va adze.

Two more adzes were found in 1967, near the large grindstone on the beach in front of excavation A. A 17/100 is a small neatly made Type I adze, whose cutting edge has been broken off and was being reflaked. A 17/136 is the bevel end of a small Type IX adze, well ground on the front and bevel surface.

Although the excavated adzes were so few, the sample is enlarged by the other finds which almost certainly came from the deposits near excavations A and C, although their age within the period covered by the deposits cannot be precisely determined. None the less an age bracketed between the 13th and 19th century A.D. would appear to be indicated, which is consistent with other evidence on adzes of these types. On the whole the adzes are rather small and fragmentary, only two, A 14/8 and A 14/9, attaining a larger size. Types I, II and IX predominate, as might be expected, with isolated examples of Types III and VI, and, surprisingly, apparently one example of Va. The adzes are in all stages of manufacture and use. Two appear to be possibly incomplete, while most of the others seem to have been finished tools which broke and were discarded. Two specimens, A 11/3, and A 14/5, appear to belong to the category of tools which have been broken and reworked many times. The assemblage seems to suggest that tools were not discarded unnecessarily, but that a small number of tools were being used in the area, and where necessary, being reworked. It is interesting to note that there are several outwardly distinct varieties of stone represented among the adzes, and these apparent varieties recur in the flake collection.

Stone Flakes, Chips, and Cores

Under this heading are described all pieces of worked stone not described elsewhere. Unlike most other artifact types, these stone items cannot confidently be identified by their function, and they are therefore discussed as a stone assemblage, and their possible functions described below.

The collection was initially sorted into two major groups according to the presence or absence of a ground surface or surfaces indicating that the item was derived from a stone adze. Both groups were then sorted into struck flakes, on which a striking platform was clearly identifiable, and chips, or other pieces on which no striking platform was apparent. Some of these are probably broken pieces from struck flakes, while others may be natural spalls. They were retained because they are of the type of basalt used for adze making, rather than coarser stone used for building and cooking. Two other categories included in the analysis are bevel chips, small fragments from the actual cutting edge of adzes which are probably the result of accidental breakage during use, and cores, which show various flake scars, but no single scar and striking platform to identify them as flakes.

All pieces were examined by the naked eye but not microscopically for signs of use or wear on the edges, and a minority were found with use marks in the form of tiny chips along one or more edges.

The dimensions of the various categories from each excavation, and from layers II and III at excavation B, are shown in figures 104 and 105. Struck flakes were measured so that the width is the greatest dimension parallel to the line of the striking platform, and length the greatest dimension perpendicular to the line of the striking platform. Other chips, and cores, however, were measured so that the greatest dimension is the length, a procedure which means they should strictly not be compared with struck flakes, on which the width is often equal to or greater than the length.

It will be seen that the size range from the different excavations, and among adze flakes and other flakes, is very similar. There are occasional large flakes in both groups, but most are small, while the chips are predominantly

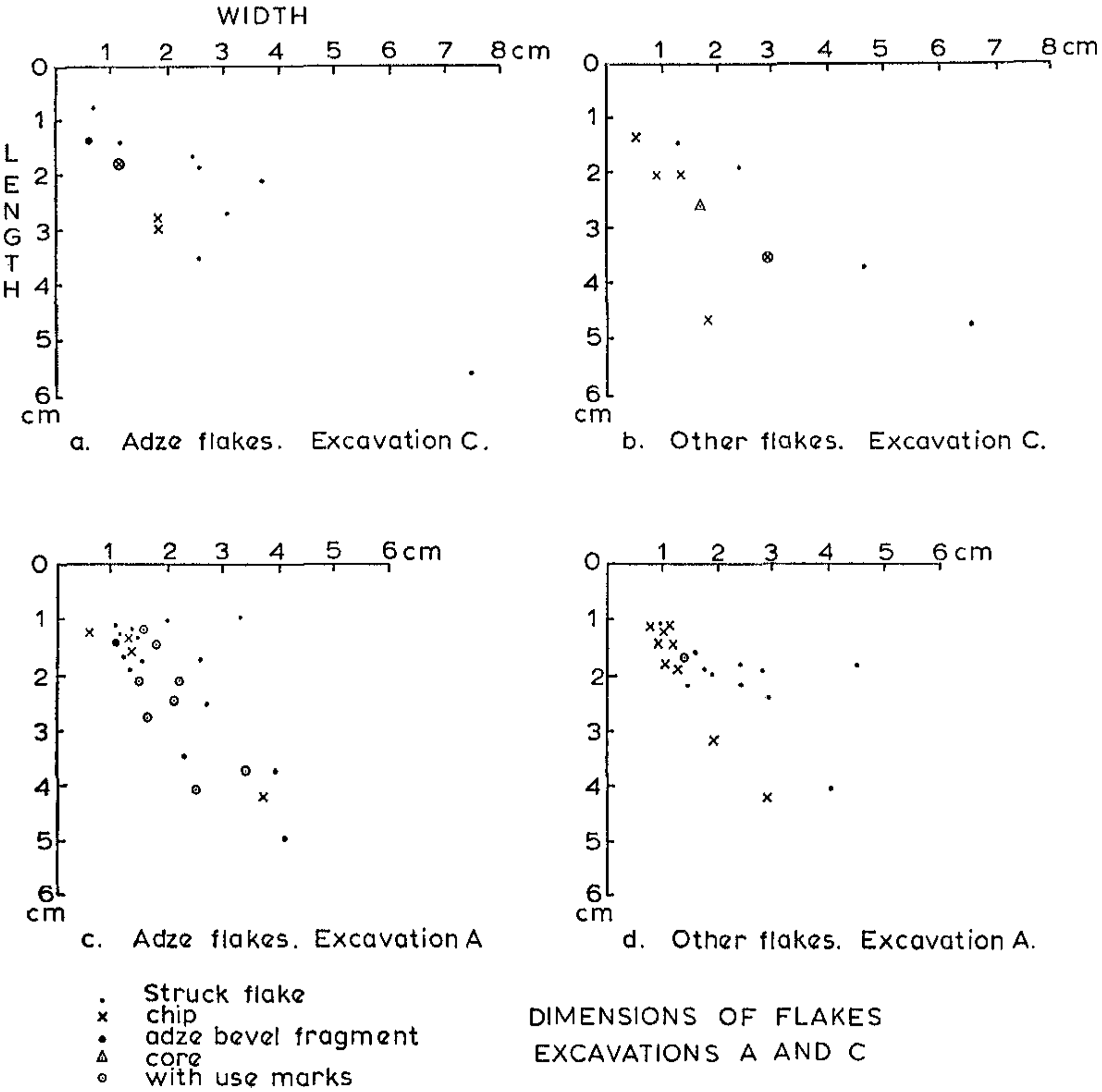

Fig. 104. Diagram of flake dimensions, excavations A and C, Lo-1.

small. Use marks occur on both adze flakes and other flakes of various sizes. It should be noted that where use marks occur on adze flakes, they more often than not occur on an edge which does not coincide with the polished surface by which the item was identified as an adze flake. In other words, these flakes were not being struck deliberately from adzes for some other use simply because a ground surface would tend to terminate in a particularly sharp edge. There were no recurring shapes among used flakes, nor had any been carefully prepared by retouching the edges.

Because so many flakes show signs of being from adzes, and because they are mostly small, it is rather probable that almost all are from the use and reworking of adzes. The bevel chips, and some of the other chips could be accidental, while the majority of struck flakes are probably the result of repairs to adzes which broke, but were still complete enough to be reused. If this is so, the division into adze flakes and other flakes is probably misleading, for most Samoan adzes have extensive unground areas from which "other flakes" could be derived. A number of both adze flakes and other flakes could be created in the course of reworking one adze.

It is also possible that small supplies of stone were kept from which ordinary flakes could be struck, but the fact that no large cores or large

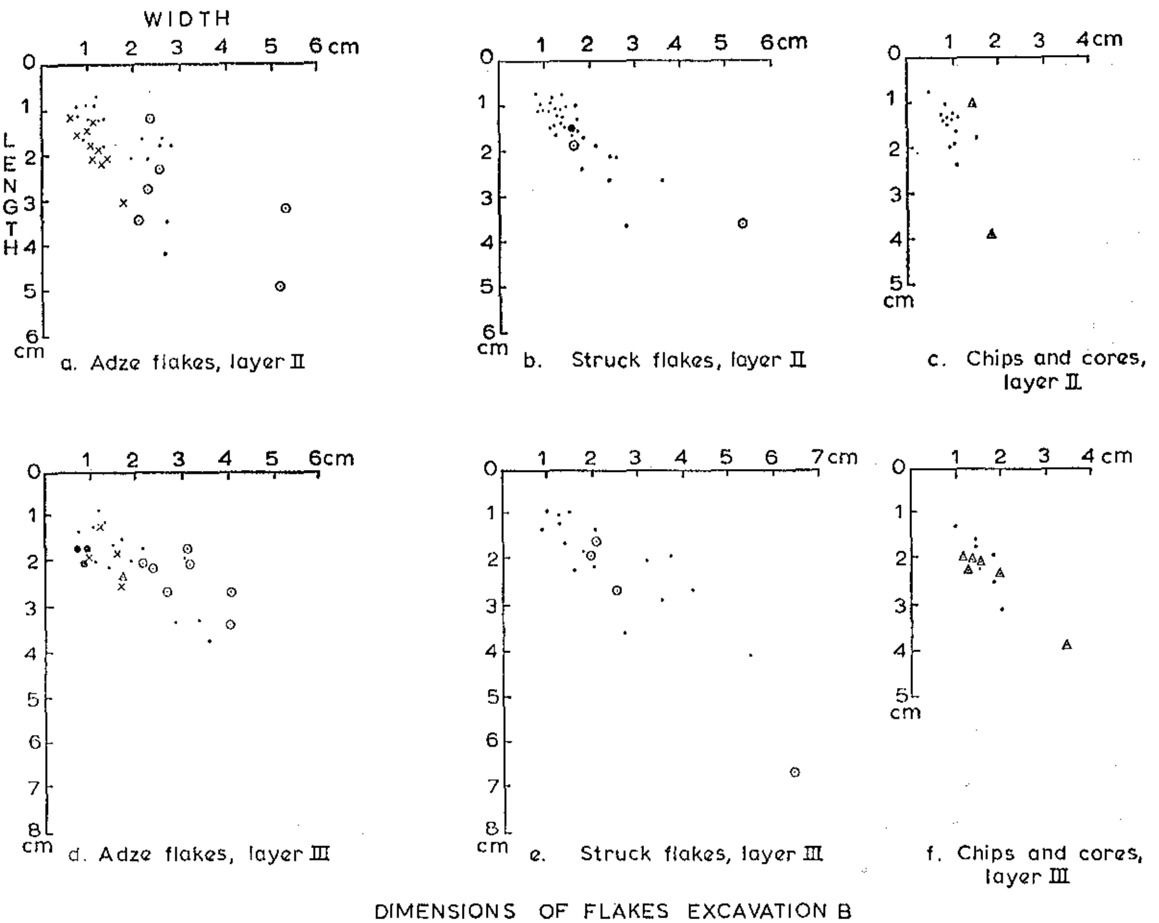

Fig. 105. Diagram of flake dimensions, excavation B, Lo-1.

flakes were found, suggests that indeed most of the flakes were from adzes which had been made elsewhere, and that in the course of reworking adzes, some flakes were struck which could be used for various cutting and scraping purposes.

The occurrence of various bevel chips suggests that adzes were actually being used in the area from time to time.

Obsidian Core

A single small core of obsidian was found in layer 10 of excavation A. It is the only piece of obsidian from the Lotofaga excavations, and was very similar in manufacture to the small cores of obsidian found in excavations at Vailele (Report 10).

Worked Bone and Shell

Two pieces of worked bone were recovered from upper levels of excavation A. G 11/123, from layer 6, is almost certainly cut with a metal tool, while G 11/125 from layer 8 may not be. Their use, if any, is not apparent. A straight piece of bone, 12 cm. long, tapering from 17 mm. to 8 mm. in width, was recovered from layer V in excavation B. No other worked bone was found.

European Artifacts

The majority of European artifactual material consists of very modern seeming iron and glass. Large quantities of this kind of material were recovered from layers 1 to 4 of excavation A, and smaller and diminishing amounts from layers 5 to 8. Also from layers 1 to 4 came two small beads, some fragments of china, a few pieces of slate, and a slate pencil.

Only one layer provided a small amount of material suggestive of an earlier European stratum. This was layer 2 in excavation C, from which parts of the bowl, and a broken stem of a clay pipe were recovered, together with a thin strip of copper (in contrast to the larger amounts of rusted iron nails and other iron from excavation A) a battered and broken glass marble, and a piece of glass with the curious distinct rainbow patination characteristic of old glass, and absent from the other glass fragments recovered. While these are probably of no great age, they would appear to be older than the material from excavation A.

Summary

It has already been stressed that the artifactual material was disappointing. It is obvious that coastal middens of this kind are not likely to be productive of sufficient artifacts to assist in documenting the chronological sequence even of stone adzes, let alone of rarer kinds of artifact.

As stratified artifact bearing deposits, sites of this kind do not justify the amount of work needed to excavate even a single six foot square.

Nor does the collection provide a very firm basis for deductions concerning the activities carried out in the area. It is fairly obvious that present day patterns of tidiness and cleanliness around dwellings extend back into the past. The bulk of the artifactual collection appears to relate to the use and modification of stone tools, particularly adzes. There was insufficient waste flake material from the area excavated to suggest that adzes were actually being made in Lotofaga, although the flake collection, and the various pieces of grindstones, suggest that adzes were being used, and when necessary, reshaped and reground.

The unfinished fishhook, the lure shank fragment, and the octopus lure shell are evidence that manufacture of items of fishing gear was very occasionally indulged in in the vicinity, but the lack of files and of much waste material suggest that it was very occasional at least in the area excavated. The shell food scrapers, the occasional sea urchin spine file, and the single *Periglypta* shell scraper are tantalising evidence of the domestic activities which must have taken place in the area over several centuries, but it seems that the peculiar habits of garbage collection and midden deposition operating in Samoa will, under normal circumstances, combine to produce a form of deposit which is very sparse indeed in artifactual material.

CONCLUSIONS

While a certain amount of success was obtained in realising the first of the two aims for which this excavation was undertaken, almost no progress was made with the second.

The most significant artifactual find of the excavation, was, however, the single fragment of a one-piece shell hook, which shows clearly that although this form of fishing gear may not have been highly developed in Samoa, it did exist in pre-European times. The deposits at Lotofaga are not old enough for this hook to be itself a prototype of Eastern Polynesian one-piece hooks. That a shell one-piece hook did exist in prehistoric Samoa at one time, however, makes it more likely that it also existed in an earlier period.

No progress was made in developing an archaeological definition of the various lure hooks which in late prehistoric times at least, formed the bulk of the durable fishing inventory. Moreover it is extremely difficult to suggest sites which might prove more successful in future for this line of investigation. Neither the Lotofaga excavation nor the reconnaissance which has continued for several more years in Samoa has led to a suggestion as to how this problem is to be tackled.

Very little is known of tool manufacture in the past, and whether there were specialists, who worked in their own houses, or specialised activity sites where fishhooks, for instance, were made. These are the sorts of sites which could be expected to produce more artifactual material. There is no ethnographic evidence for their existence, however, and so far we have not been able to identify such sites from surface evidence.

The major achievement of the Lotofaga excavation was to reveal something of the structure of a coastal midden deposit of this type. It has been shown that the midden is structurally complex, and cannot be quickly sampled or carelessly excavated. The amount of time which must be devoted to disentangling postholes, burials, ovens and other features from the body of the deposit, so that portable items are seen in their correct context, makes it doubtful whether excavation of many such sites would be justified in view of their poor returns of artifacts and faunal material.

The coral sand of coastal midden deposits, however, does preserve bone which perishes in the acid soils of other sites, and it would appear that only from coastal midden deposits is there any chance of recovering faunal remains, sparse though they may be.

At present conclusions about the occupation of the coastal area in the past must be drawn largely from negative evidence. Still it is from small amounts of very fragmentary bone, from small amounts of shell (much of which is derived neither from food remains, nor from artifact manufacture) and from very small quantities of artifacts, that a picture of coastal occupation in the past will have to be pieced together. And in this respect there is no doubt that the deposits are the result of not inconsiderable amounts of occupation over a number of centuries. But as a record of the details of that occupation, the deposits are disappointing in the extreme.

People lived on the coastal flat, cooked there, carefully removed their rubbish from around their houses, buried their dead near their houses, used and repaired tools there, much as they do today. But one suspects that rubbish was removed by the sea, and nothing was carelessly left lying around houses. Only in recent times has the pattern of dumping rubbish at area A developed, and the material dumped there is as yet much too recent to be of interest to archaeologists.

It is very likely that a great many coastal villages in Samoa are built on such deposits. But they are not likely to provide as satisfactory answers as was hoped to many of the questions which should now be raised both about fishing gear, and about the more general exploitation of the coastal environment. Thus a search should now be directed to the exceptional midden site, the prehistoric dump, the concentrated manufacturing site, the fishermen's camp, if such sites exist, before investing large amounts of time and money in investigating the sparse remains of normal coastal living.

ACKNOWLEDGMENTS

The excavations at Lotofaga were made possible largely by two people. The L.M.S. Pastor, Rev. T. Enosa, and his wife Muta'aga took me to their hearts and made me welcome in their home for the duration of my stay in Lotofaga. They assisted in every possible way, and have remained most dear and valued friends of all who participated in the archaeological research programme in Samoa. My debt to them is too great to express. Others who contributed much were my crew, Ruta, Tasi, Asini, Lafoga, Pulega and Lulu, the landowners who gave us permission to excavate, and the many other individuals of Lotofaga who helped to make my stay in the village enjoyable.

I must also thank the girls who assisted in sorting the midden material in Apia, and the officials of the Agriculture Department who kindly made available facilities at Nafanua for this purpose.

Lastly, I am grateful to Mr R. J. Scarlett of the Canterbury Museum, Christchurch, for preliminary analysis of bone, and Dr A. W. B. Powell, of Auckland, for shell determinations. Mrs S. Bulmer read the manuscript and offered helpful comment.

VII. MISCELLANEOUS REPORTS

EXCAVATION OF A MOUND SU-MO-1 AT MOAMOA

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At the conclusion of the first period of field work in Western Samoa a number of aims were formulated. One of these was to find and excavate another pottery-bearing site (Introduction, p. 6). Between 1964, and the commencement of the final season of fieldwork in late 1966, however, only one possible pottery-bearing site other than those at Vailele had been reported. This was considered necessary to investigate.

The site is located on the Apia map, Sheet 19 of the Western Samoa topographical map series, with a grid reference 150676. It lies on the plantation road leading from the Catholic Mission settlement at Moamoa west towards the plantations. Bishop Pearce, then Bishop of Samoa, reported that ten years previously a large stone mound was situated on this site. The mound was destroyed and the stone used in construction of the existing plantation road. The Bishop remembered finding, beneath the stones, part of an adze and what he thought was a sherd of pottery. However, these items were not kept.

In 1966, the site of the former stone mound was visible as a low earthen mound, located in a coconut plantation, and covered with much undergrowth. The stone mound which formerly occupied the site was said to be the *tia* of Telesa, a very famous female *aitu* (spirit) of the Faleata District. The site is still remembered for this reason.

Earlier in 1966, Dr. Scott, acting on the report of the pottery find, made a test excavation on the highest remaining part of the "mound", on the south side of the road. His report (personal communication) indicated that only natural earth had been encountered, so that he considered the visible remains of the "mound" to be a natural formation.

In view of these findings, it was decided to excavate a trench bisecting the existing edge of the mound, and extending a short way on the flat area both above and below the slope. Here clearing of the ground indicated that it was at least possible to identify the remains of the stone mound. It would probably be possible, by clearing a larger area, to establish with certainty its former extent.

THE EXCAVATION

The initial trench excavated was 1½ metres wide, and 7 metres long. A further 2½ metres were later excavated on the top of the existing mound, at an angle to the initial trench (fig. 106). The object of this extension was to get as close as trees permitted to the place where the Bishop remembered finding the adze and pottery.

The stratigraphy revealed was as follows (fig. 106):

Layer 1: Topsoil, present only on the slope and at the base of the slope.

Layer 2: A stone pavement, presumably the base of the former mound. This was formed of closely laid large scoria boulders, many of which were over 50 cm. in diameter. Very little soil had formed between these boulders. In amongst them were found flakes of stone, a piece of adze, three pieces of bone, one nail, and a very rusty piece of metal. In view of the cracks between the boulders, it is possible that some of these items are intrusive. However, the depth at which the European

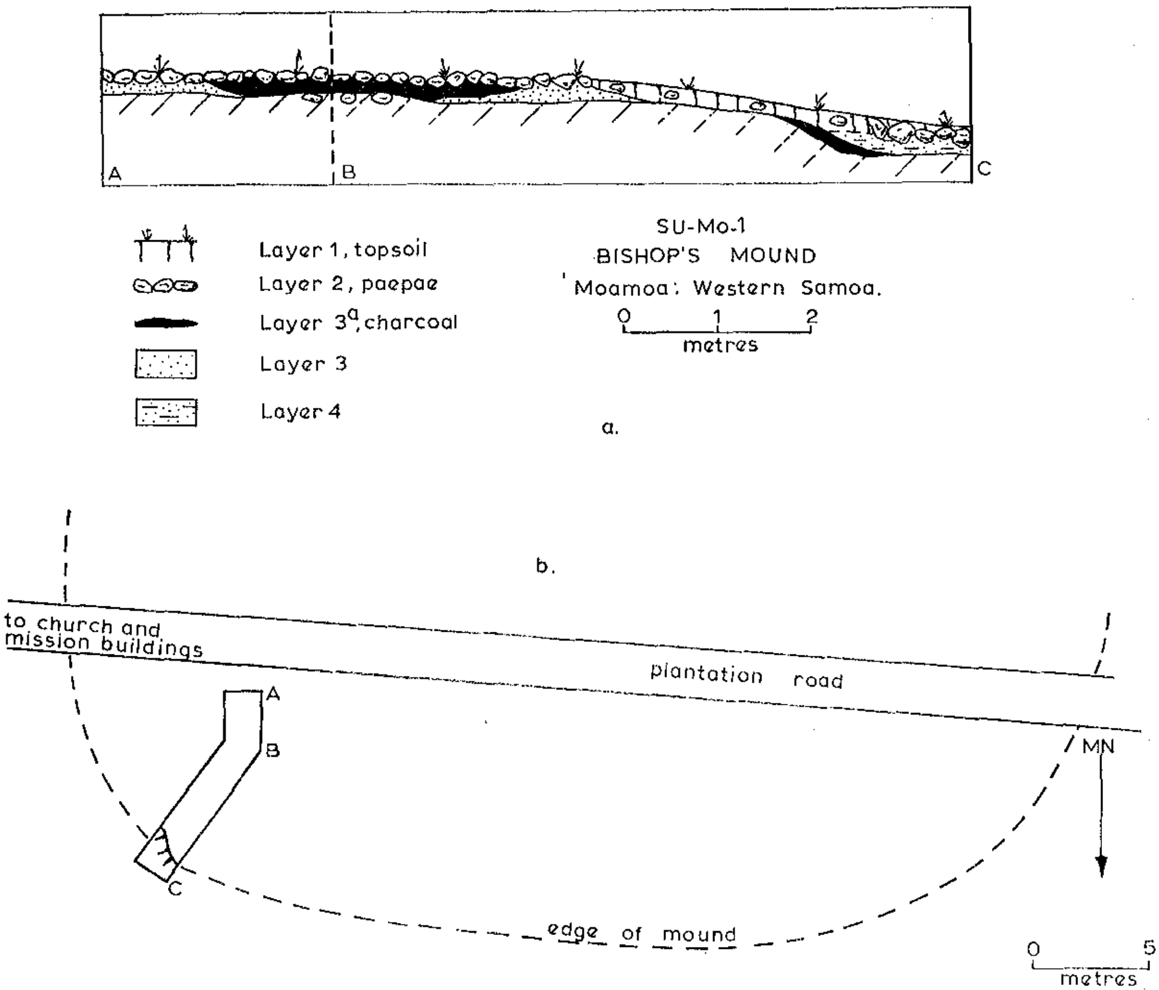

Fig. 106. Plan and section of excavation in SU-Mo-1, Moamoa, Upolu.

items particularly were found, and the fact that they often appeared to lie under the boulders, makes it more probable that they were there when the mound was being built. This would suggest that the stone mound itself is very recent. One piece of the bone also appears rather "fresh". The three pieces were found widely scattered and no similar pieces were found on the surface suggesting that the chance of their being intrusive is slight. However, it is impossible to estimate the extent of disturbance to this basal layer of the stone mound during construction of the road, and demolition of the greater part of the mound.

Layer 3: A cultural layer clearly sealed in by layer 2 which shows marked differences to the soils above and below, and has charcoal scattered through it. It extended beyond the stones of layer 2, and a little way down the slope.

Layer 3a: A black greasy layer with large lumps of charcoal from which a charcoal sample was collected. It overlay layer 3, and in part replaced it, but was still clearly sealed by layer 2. The layer appeared to be of limited extent, and was probably the remains of a fire.

Layer 4: A mixed layer, occurring at the bottom of the slope. It contained little pockets of soil similar in composition to layer 3, although most of the layer consisted of a sterile deposit very similar if not identical in composition to the natural subsoil. Interspersed with this layer, but concentrated at the foot of the slope, and nearly resting on layer 5, were large lumps of charcoal. These appeared to be a secondary deposit, from charcoal that had been burned elsewhere, or from a burnt tree. This charcoal cannot be directly related, on the basis of this excavation, to any activities occurring on the top of the slope. A carbon sample was collected.

Atonio, who helped collect the charcoal samples both from this layer and from layer 3a, volunteered the following comments unasked. He believed that the charcoal composing the two samples was different, that from layer 3a containing fragments of coconut palm trunk, and husks of seeds thought to be from *lama*, an oil bearing plant, while that from this layer appeared to be entirely from wood.

Layer 5: The natural subsoil, consisting of yellow-brown clay containing intermittent boulders of varying sizes. Both layers 3 and 4 rested on this layer.

Material Recovered

A fragment of an adze, A 17/5, was recovered from the surface of the mound. It appears to be the butt end of a small Type I. The front is well ground, with slight traces of grinding on the sides. There is no grinding on the back. Also from the surface of the mound came a fragment of bone, apparently immature pig, and, from the surface near the base of the mound, a fragment of a bivalve.

The remaining material was recovered from layer 2. There was no artifactual or faunal material from deeper layers.

A 17/6 is a small weathered central portion of what appears to be a Type Va adze. However, its surface is so weathered that it is possible that it was actually of Type I. One flake, apparently from a polished adze, G 17/4b, showing signs of wear along one edge, was also recovered. Two small flakes of a fine-grained basalt, G 17/4c and G 17/4d, lack ground surfaces, and show no signs of use.

The two pieces of metal from layer 2 are a small rusty nail 2 inches in length, with a square head, and a small thin rusty fragment from an unidentified object.

Also recovered from layer 2 were a weathered piece of stone, G 17/4a, which has possibly been flaked, a small piece of water worn coral of the kind used in Samoan house floors, a single fragment of shell, and the three pieces of bone mentioned above. Two are too small to be identified, while the third is probably pig.

The material from layer 2 is typical of the minute quantities likely to be recovered from mound sites. The association of a fragment of a probable Type Va adze with metal may be due to the disturbance to the mound, or may reflect merely the assortment of material on the surface in the area when the stone mound was built. The highly weathered surface of the adze in contrast to the recent European items suggests they are not contemporary.

Discussion

The Bishop, when viewing the excavation, said that the adze and potsherd he found were lying on the natural soil, not within the stones. It is probable that the items he found were associated with layer 3 and 3a. Layer 3 is a homogeneous mixed layer, not necessarily contemporary with layer 3a, although the charcoal collected from 3a may incorporate charcoal from layer 3, as this was already present when the final fire of layer 3a was made.

I believe that the Bishop did find pottery, for while scoria may look, at first glance, like pottery, the differences once a fresh break is made are obvious. The Bishop reports breaking the piece he found, before he threw it away.

However, the uncovering of 6 square metres on top of the mound, not including the slopes and base, without finding any pottery, would indicate that a large amount of labour would be required to extend investigations at this site to verify this point and for probable small returns. The areas that could be excavated are limited in extent, because of the road, the trees, and the fact that in the centre of the mound, the natural subsoil apparently stands exposed on the present surface.

Since this site was investigated, excavations in another area of Upolu have produced abundant pottery. At Falevao, one rich pottery-bearing site was located and excavated. Several other sites in the same valley, while they could not be considered pottery-bearing sites, produced very small amounts of pottery or isolated sherds suggesting that small amounts of pottery could be diffused over a considerable area from a few major pottery-bearing sites, The presence of a few sherds of pottery in mound Va-2 at Vailele is a similar case (Report 8, p. 150). Moamoa presents conditions favourable for settlement, similar to those which directed research to the Falevao area. It is more than likely that a major pottery bearing site does exist in the vicinity of Moamoa, but that the site described here, like the later sites at Falevao, contains only minute amounts of pottery.

The excavation of this site also suggests that stone mounds may repay investigation, even though the work is difficult. The layers showed up distinctly, and several portable artifacts were incorporated in the stone mound itself. Moreover, at least in this site, cultural materials were preserved beneath the base of the stone mound which may at least be of help in assigning a *terminus post quem* to the stone mound.

The exact age and nature of the stone mound itself cannot now be determined. The persistent traditions associating it with Telesa, and its presence on land which has belonged to the Catholic mission for many years suggest that it is not recent, but the finding of apparently undisturbed European items beneath its base is, on the other hand, strong evidence for its construction in the historic period.

ACKNOWLEDGEMENTS

The author wishes to thank the authorities at the Catholic Mission at Moamoa, and more particularly Bishop Pearce, for permission to excavate, and for the interest shown in the investigation.

ARTIFACTS FROM UPOLU AND APOLIMA

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ADZES

The final collection of surface artifactual finds is from the remainder of Upolu, other than Luatuanu'u, and from Apolima Island. It consists almost entirely of adzes. The adze collection has been analysed according to the classification described in Report 2 and the distribution of adzes according to type and locality is shown in table 26. In this case, very few adzes are from recorded archaeological sites, and there are no large collections from single areas, only the collections from Vaitele and Apolima being at all substantial.

Before discussing the distribution of various types of adze, a few remarks should be made about the ways in which these adzes were acquired, and the localities from which they come. The modern coastal villages are listed in clockwise order around Upolu, beginning at Apia. The occasional finds from these villages, and from the presently uninhabited coastal strip at Tuiolemu on the south coast were made by members of the research programme and visitors, with the exception of one from Salelesi found by Atonio, and one from Lepa, donated by a child of Lotofaga village.

Of the modern inland settlements, only Falevao and Lalomauga are true villages. Finds in these areas were made by participants in the research programme. The remaining four settlements are inland from Apia. Finds from Vaivase and Vailima were donated, or collected by Atonio, while those from Sinamoga and Moamoa were collected during site surveys. Some of the plantation areas mentioned are village lands, and others are European or government controlled. Adzes from Lotofaga were donated by villagers who had found them while gardening, inland from the village. Adzes from the coastal strip in this village are discussed in connection with the coastal midden excavation, (Report 15). Similarly, the items from Pago, a former settlement inland of Lalomauga, were donated, while a unique specimen from Solosolo was found by Atonio far inland on land named Autu. Adzes from the coffee plantation at Lana, inland from Fasito'o-uta, were donated. Those from Folasa, a former settlement near Falevao, were collected during site surveys there.

The collection from Vaitele is a rather special case. All these adzes were exposed during the bulldozing of earth mounds on the Vaitele plantation to obtain spoil for the harbour reclamation in 1964.

Finally, a large collection of Upolu adzes is without localities. These adzes were collected by Atonio in 1964. In the course of their being transhipped to New Zealand information concerning them was lost. It is probable that many of them are actually from the Luatuanu'u area, but as the data are lost, these adzes have been added to the general Upolu collection.

DISTRIBUTION OF TYPES

Very little can be said about distribution of types. There is a slightly greater range of types from inland and uninhabited areas, compared with coastal villages, and while the range of types from the south coast is greater, the sample is too small to attach any signifi-

Table 26

Distribution of Surface Adzes, Upolu and Apolima

		I	II	III	IV a	IV b	IVb/Va	V a	V b	VI a	VI b	VII	VIII a	VIII b	IX	X	unique	total
Apolima Island		2 6	1	1 1			1	1		1					2	1		17
Modern Coastal Villages	Fagali'i	2 2																4
	Vailele																1	1
	Salelesi	1																1
	Falefa														1			1
	Faleapuna		1															1
	Ti'avea		1					1										2
	Uafato									1								1
	Lepa			1														1
	Saleapaga									1								1
	Sa'anapu														1			1
	Lefaga									1								1
	Leulumoega	1																1
Other Coastal	Tuiolemu									1		1						2
Modern Inland Settlements	Falevao	1 2				1		1		1					1			7
	Lalomauga	1 4	1 1							2								9
	Vaivase	2	2												1	1		6
	Moamoa		1							1								2
	Vailima																1	1
	Sinamoga												1				1	2
Plantations	Lotofaga		2							1	1						1	5
	Solosolo																1	1
	Folasa	1 1	2												1			5
	Lana	1													1			2
	Pago		1 1															2
	Vaitele	2 6	2 1	2 2						5					1 2	2	1	26
Unlocalised Upolu		2 25	1 8	4	1			2	2	6		4	3		7			65

N.B. Complete specimens are listed on left of column, fragments on right.

cance to this fact. Types I, II, VI, and IX, are most common, with a heavy representation of Type III at Vaitele, which will be further discussed below.

Of the coastal villages on Upolu, one produced 4 examples of Type I only, and two produced single examples of Type I. One produced a single example of Type II, two, single examples of Type IX, one, a single example of Type III, and three, single examples of Type VI. Only one village produced more than one type, II and V, to which may be added the presently uninhabited coastal strip of Tuiolemu, which also yielded two types, VI and VII. Thus it is apparent that finds from coastal areas are scattered and varied, and Types, IV, VII, VIII, and X are not represented at all.

The modern inland settlements and plantations present a somewhat similar picture. Types I, II, VI, and IX are best represented, with other types rare or absent. There is a greater range from single villages or areas, owing to more intensive work in these areas than on the coast, with five types from Falevao, four from Vaivase, three and a unique specimen from Lotofaga, three from Lalomauga and Folasa and two from Moamoa, Sinamoga and Lana.

The assemblage from Vaitele is particularly interesting. As stated above, these adzes were found on the surface of a large field at Vaitele plantation in which were a number of earth mounds. They were collected after the area was bulldozed to obtain spoil for the harbour reclamation. The adzes in descending order of frequency are Types I, VI, III, II, IX and X. Common to this collection is a high degree of surface finish, apparent in the high proportion of adzes of Types III and X. This assemblage is very similar to that hypothesised for the later stages of occupation of the *tula* ridges at Luatuanu'u (Report 12, p. 198), and can, in this instance, be related to the period of mound building and use on the north coast of Upolu. Again, the greater number of Type III adzes contrasts with that from the coastal areas.

Also of interest is the small assemblage from the village area on Apolima Island. This includes a greater range of types than any other in this collection. In view of its natural strategic importance Apolima has undoubtedly been occupied for a long time, and this is probably reflected in the range of adze types found there.

Unique Specimens

The Upolu collection contains a rather high number of unique and unclassifiable adzes which are worthy of description.

A 14/1 (fig. 107) is to all appearances a typical Eastern Polynesian adze, such as occurs from time to time in Western Polynesia (Palmer 1963). It is triangular, apex to back, in section, ground all over, and with a pronounced tang in the form of a reduced front. The particular interest of this specimen is that it is said to have been found among the stones of a stone platform in the grounds of Avele College, by the donor, a resident of Vailima Village. There are known to have been settlements in this area in early historic times (Williams 1838: 394); it is possible that this adze was a souvenir obtained from missionary or other visitors from the Cook Islands, as it is identical to Rarotongan examples.

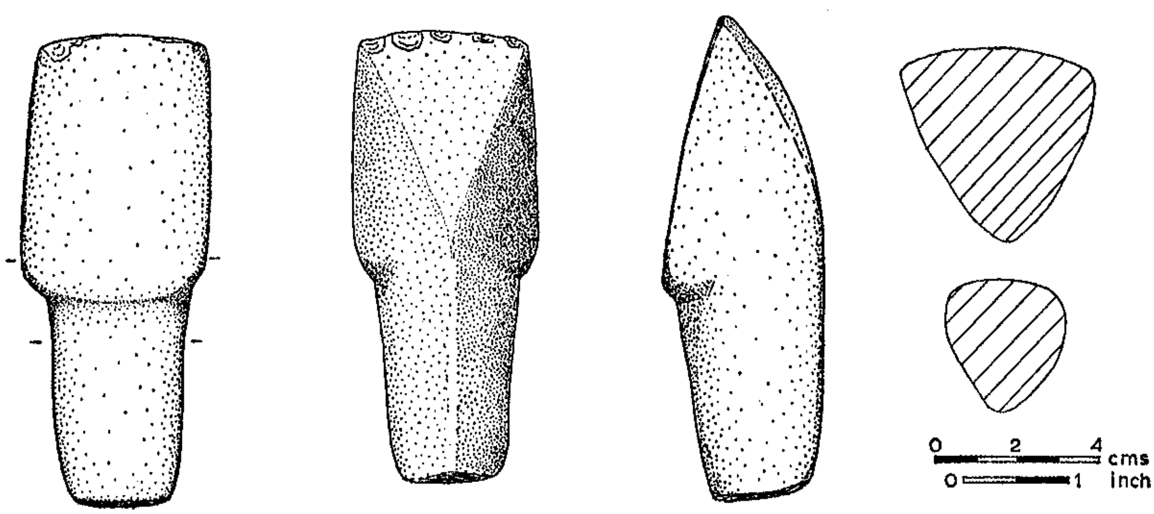

Fig. 107. Adze of East Polynesian type from Vailima, Upolu, A 14/1.

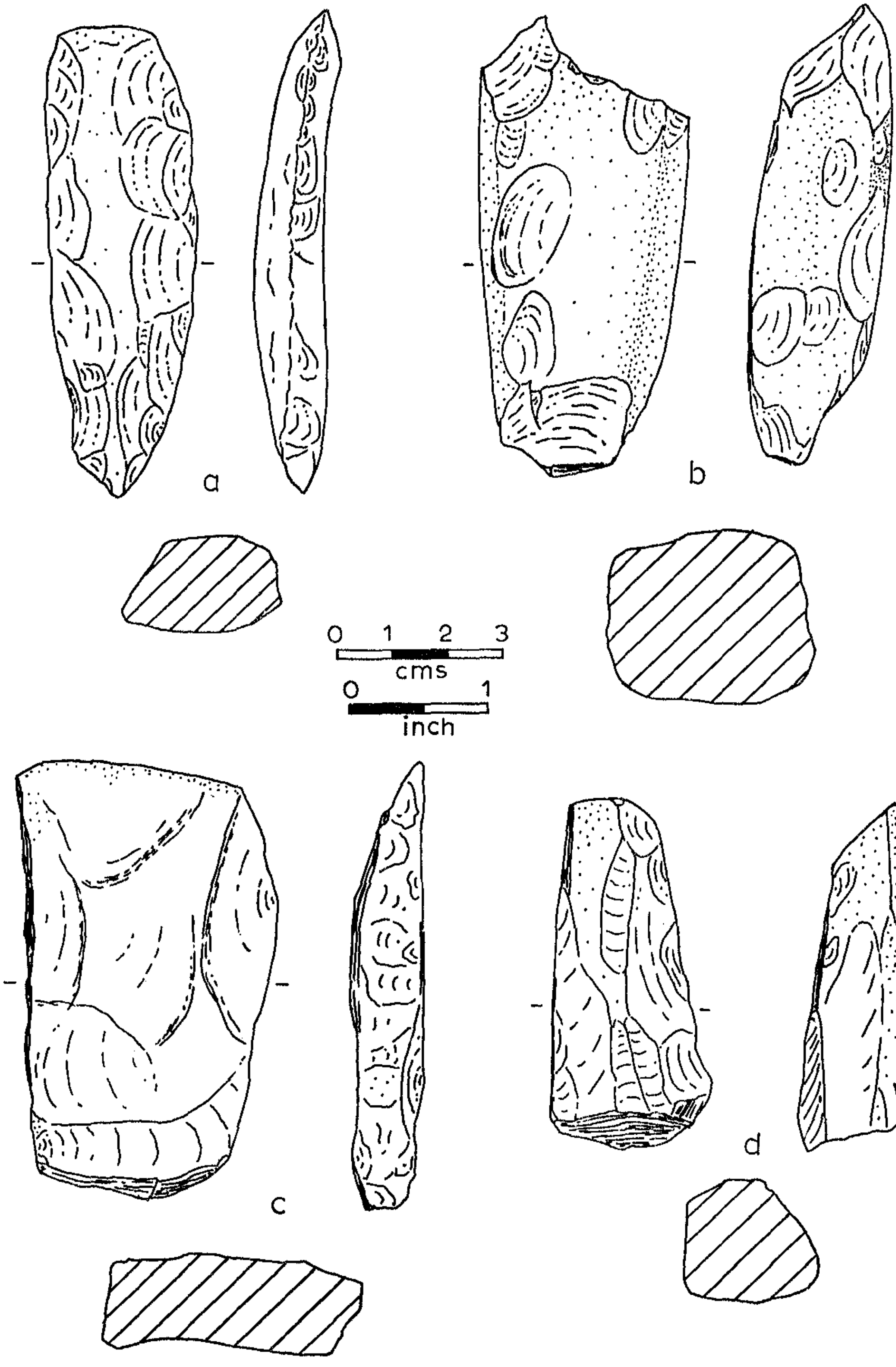

Fig. 108. Unique adzes from Upolu. a. A 12/183, Vaitele. b. A 11/132, Lotofaga. c. A 12/70, Sinamoga. d. A 10/36, Vailele.

Unlike the previous specimen, A 11/132 (fig. 108b) would appear to be a Samoan adze, but does not fit into any established category. Found in the village lands of Lotofaga it perhaps deserves a new type to be created for it. It has a rounded rectangular cross-section, with flat back and front of equal width, and rounded sides. Its closest relatives appear to be Tongan adzes, rather than any of the Samoan types.

Yet another unique example is A 12/183, from Vaitele (fig. 108a). It is most closely related to Type II, but with its concave front, pointed poll, and rounded cutting edge differs significantly from known examples of that type. In the appearance of the stone, and the technique of flaking and finishing employed, this adze obviously belongs in the Vaitele assemblage. It has close similarities to a Type II adze from site Lu-51 (Report 12, p. 196) which also has a concave front. Its straight cutting edge, and poll, however, make it possible for the latter to be regarded as a Type II adze, although a rather unusual one. With their concave fronts, both these specimens have at least superficial resemblance to small *Tridacna* shell adzes, which are widespread in the Pacific, but do not often occur in Samoa.

There is one example of an edge ground flake in the Upolu collection, from Sinamoga (fig. 108c), and one example of a broken larger adze with slight regrinding to form a small, curved cutting edge (fig. 108d).

Finally among the unique specimens is a large flat piece of stone, with somewhat the shape of a European axe blade, which shows signs of flaking and grinding along what would be the cutting edge. It appears to be a natural stone, which has been slightly worked, perhaps in an attempt to imitate a European tool.

Comparison With Other Collections

While the assemblages from individual villages or areas of Upolu are too small to be compared satisfactorily, the total Upolu collection of 162 classifiable specimens among 168 adzes is large enough to be compared with the Luatuanu'u collection of 117 classifiable specimens out of a total 118, and the Savai'i collection of 192 from a total of 195. In all these collections, Type I is twice as numerous as any other type, and is regarded as very common. In each of the collections there is then a group of Types II, VI, IX and III, which are classed as common. Type II is more numerous than the others in this category in the collections from Savai'i, and Apolima and Upolu generally, though not in the Luatuanu'u collection. The remaining types are much less well represented and are classed as uncommon. They are, in approximately descending order of importance, Types X, V, VIII, VII, and IV. To these may be added a small group of fragments with plano-convex sections which may belong either to Type IVb or to Type Va, without affecting the uncommon status of either. There is little variation in proportions between the three collections.

This analysis of the total surface collection and its three component parts into very common, common, and uncommon, may be compared with the results from four other collections, and it becomes apparent that results are fairly uniform except for Types VI and IV.

The surface collections of Samoan adzes in the Auckland Museum, the Dominion Museum, Wellington, and the Canterbury Museum, in New Zealand, and the Bernice P. Bishop Museum, Honolulu, were also analysed according to types. The results are presented in table 27. All collections are smaller than the smallest of our collections, and consist mainly of complete specimens. Some examples in each of the New Zealand collections were hafted, but hafted examples in the Bishop Museum collections were not included in the analysis.

In every collection Type I was most numerous, and only in the Canterbury Museum collection was it not considerably more numerous than any other type. The position of this type as very common, and by far the most numerous of Samoan adzes is reinforced.

The numerical importance of the four common Types, II, VI, IX, and III, fluctuated far more in the smaller museum samples than in our own collections. When the total number of each type from all the museum collections is considered, however, Types II, IX and III are still clearly far more numerous than other types, and may still be classed as common, in contrast to the remaining types, classed as uncommon. Type VI, however, is consistently poorly represented in all museum collections, and on the basis of these collections alone could not be classed as common. The reason for the difference in frequency of Type VI in our collections and the museum collections is probably that few complete specimens occur. The majority of our Type VI adzes are fragmentary and small. Such examples would not normally find their way into museum collections, which, as mentioned above, tend to consist only of complete specimens.

The types classed as uncommon in our sample proved to be uncommon in museum collections also. Fragments of Type IVb or Va were totally lacking, as were examples of Type VII. Types X, V, and VIII occurred in

TABLE 27

FREQUENCY OF ADZE TYPES IN VARIOUS SAMOAN SURFACE COLLECTIONS

	Surface Collections: 1963-1967				Museum Collections				
	Upolu	Luatuanu'u	Savai'i	Total	Auckland	Dominion	Canterbury	Bishop	Total
Very Common									
Type I	62	33	67	162	20	13	19	43	95
Common									
Type II	26	17	28	71	8	3	15	23	49
Type VI	22	14	22	58	1	—	3	6	10
Type IX	18	14	25	57	5	10	16	7	38
Type III	11	9	18	38	3	—	5	14	22
Uncommon									
Type X	4	7	9	20	1	1	6	2	10
Type V	7	6	7	20	3	—	1	5	9
Type VIII	4	6	6	16	—	—	1	1	2
Type VII	5	4	4	13	—	—	—	—	—
Type IV	2	3	2	7	4	1	2	6	13
Type IVb/Va	1	4	4	9	—	—	—	—	—
Unique	6	1	3	10	—	1	1	2	4
Totals	168	118	195	481	45	29	69	109	252

decreasing order of frequency. Surprising was the high incidence of Type IV in the museum collections. Whereas in our collection it was least common in each of the three subsamples, as well as in the total collection, in the museum collections it was most numerous of the uncommon types, and more numerous than Type VI. Moreover, it was present in each of the collections although other uncommon types, except Type X, were not. We can offer no explanation for this, which stands out as the most noticeable discrepancy between our collections and the museum collections.

Mention should be made of the unique specimen in the Canterbury Museum. E.144.15 is a hafted specimen which exhibits the same extreme thickness in relation to width, and a similar over-all shape to examples we have defined as Type VII. Instead of a triangular cross-section, however, it has a very thick rectangular cross-section. Moreover, the back surface of the butt appears to have been reduced for hafting. In this respect it is unique. Because it is hafted, much of the adze is covered by lashing and cannot be adequately examined. Thus the exact nature of the apparent back reduction cannot be determined. It may be that this is a recent modification of an older adze, although the lashing is well done and appears more authentic than that of many hafted examples. The particular interest of this adze, however, lies in its thick rectangular section. As stated above (Report 2, p. 26) Type VII consists only of adzes with a thick triangular section and a median ridge for much of the front surface. This specimen cannot therefore be classified as Type VII. It does, however, resemble some of the fragments mentioned above which conform more closely to Buck's original definition of Type VII, and is further evidence that thick sectioned adzes of both triangular and rectangular section occur in Samoa.

Little need be said concerning the individual museum collections. It is apparent in table 27 that the smaller the collection, the fewer the types represented. In most cases, adzes are not well localised, and have been collected by a number of different people at various times. With the exceptions discussed above, however, the proportions of the various types in these collections when taken together, do follow fairly closely the proportions in our surface collections.

One other surface collection may be referred to. These are the adzes, most of them fragments, collected by Sinoto and Kikuchi in American Samoa which were analysed by Kikuchi (1963: 140) according to Buck's original classification. Types IX and X are therefore not indicated, while Types VII, VI and I were somewhat differently defined by Buck (Report 2, p. 22 ff.). Type I is again by far the most numerous, followed by Type II, which is also considerably more numerous than other types. Of the remaining types, Type V is most numerous, followed by Types III and VII, then Types IV, VIII and VI, in that order. This suggests a division of very common for Type I, common for Type II, and an undifferentiated group of uncommon for the remainder. Whether this different grouping, and in particular the relatively higher occurrence of Type V, reflects an actual cultural difference between the larger western islands of Upolu and Savai'i on one hand, and the smaller islands of American Samoa on the other, remains to be seen. As the bulk of this collection apparently comes from the isolated eastern Manu'a group it may be that the different proportions actually reflect a difference in preference between the different parts of the Samoa group which is not apparent in the more uniform collections from Western Samoa.

Other Artifacts

There are very few items other than adzes in the collection from Upolu and Apolima. None of these is from Apolima. The various items from Upolu are described below.

Files and Grindstones

A number of large grindstones were encountered during the site survey, and recorded. These were invariably too large to be easily removed, and were left *in situ*. Such stones are today much in demand as kava pounding stones, and are regarded as such by Samoans. It seems more likely that they were originally grindstones. Some showed wear on one surface only, others on two or more surfaces. No small portable fragments of grindstones or stone files were found.

A single elongated shaped coral file G 10/281 was found on the surface among the old house platforms of Vailele Village (fig. 109a). It is a flat piece of coral, 125 mm. long, 47 mm. wide, and 11 mm. thick, with five ground facets.

Flakes and Flaked Stone

A well weathered core, G 14/1, was found on the surface in Falevao village. Its purpose is unknown, as it does not appear a suitable blank for an adze or a coconut scraper. A flake of fine-grained stone, G 14/3, was found on the surface at Tuiolemu, in the same area where adzes were also found. It does not show signs of use or retouch on the edges.

Three apparently natural flakes with signs of use or flaking along one or more edges were found in a small area at Faga, inland of Falevao. It is possible that these were scrapers of some kind, as they were found near stone platforms.

A single water worn flake which has been reworked to form a drill point, was collected on the side of a road on the east side of the Falefa falls (fig. 109b). It is 53 mm. long, 30 mm. wide, and 12 mm. thick. The bulb of percussion is on the long axis of the flake, one end of which has been reworked to form the point.

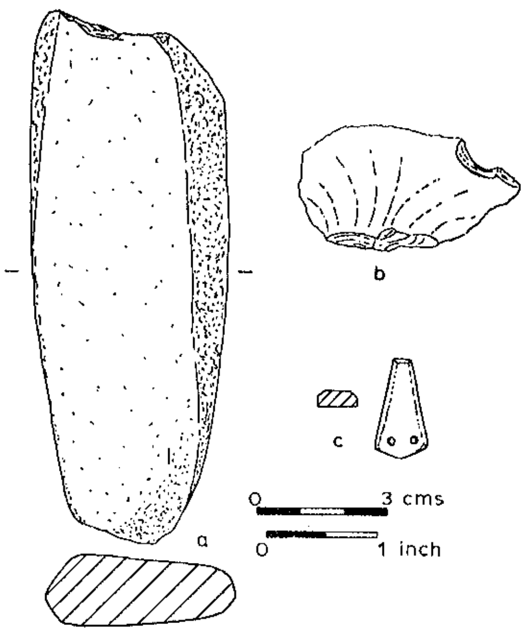

Fig. 109. Other artifacts from Upolu. a. coral file, G 10/281. b. drill made on flake, G 10/282. c. shell lure, F 10/1.

Fishing Gear

A single item of fishing gear was found on Upolu, in the entire course of the research programme, during which a number of people prospected over a considerable area of coast. The item recovered, F 10/1, is a small lure shank of the *pa laiti* type, apparently made from *Conus* shell. In shape it most closely approximates the shanks of the types called *tofe,* or *alili,* figured by Demandt (1913: plate III) although made in different material (fig. 109c). It has two dorso-ventral perforations and the following measurements: length 22 mm., greatest width 13 mm. and thickness 4 mm. No pearl shell items of fishing gear were obtained on Upolu, and despite much searching, only a single piece of cut pearl shell, which was found at Satitoa, Aleipata.

Other

A piece of apparently cut human bone was found at Lotofaga beach, washing out of an eroding beach front. It is a small tab apparently from a human cranium. No other artifacts were found on Upolu, the remaining items in the general collection being samples of stone from possible quarry areas.

Conclusions

The surface collection from Upolu and Apolima consists almost entirely of stone adzes and adze fragments. These are relatively numerous in modern villages, and in some plantation areas. There is every indication that a more systematic search of villages and plantations would yield many more adzes. Collecting is much more difficult in plantation areas, where adzes are only found when land is completely cleared of vegetation. Nonetheless, it appears that adzes are in fact equally common or more common in inland situations than in coastal villages. This is hardly surprising as tools would be needed both in the bush, and in the plantations. In addition to those items we ourselves collected, and those which were donated to us, we were informed of several private collections in existence, or donated to overseas museums, which consisted largely of adzes collected in inland areas.

Our collections from individual localities are too small for conclusions to be drawn, but the total surface collection has been shown to be surprisingly similar in the proportions of various types to other surface collections from Western Samoa. This makes it possible to establish the relative frequency with which each of the adze types occurs in Samoa, and to assess the significance of variations from this pattern in more closely controlled assemblages. For instance, intensive collecting in small areas would undoubtedly produce collections comparable to that from Luatuanu'u, on the basis of which conclusions about length and age of occupation could be drawn. The collection from Vaitele is also sufficiently large to indicate the possibilities of this type of approach.

The only other artifacts encountered in any number were large grindstones. As these were seldom portable, they were left in position, and do not form part of the surface collection. Other artifacts were rare or absent from the surface collection, including fishing gear, only one item of which was found. This is typical of our experience throughout Western Samoa, and contrasts with the situation in some other Polynesian groups where fishing gear often forms a substantial part of the surface collection.

ACKNOWLEDGEMENT

I should like to thank all those people who donated adzes to us during the several years of the research programme. The Upolu collection, more than the others, is dependent on donated specimens. I should also, at this point, like to thank those people who provided hospitality, or arranged for visits in those areas of Upolu, and on Apolima, where brief reconnaissance surveys not reported on in this volume were carried out.

A LAVA TUBE REFUGE AT MULIFANUA

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INTRODUCTION

Lava tubes are reported as the only distinctive type of cave site encountered in Samoa (see Golson, Report 1, p. 19; Buist, Report 3, p. 41; Scott, Report 4, p. 79). They may be divided into three principal categories: waterholes, temporary refuge habitations and religious sanctuaries. Most of those in the first category serve primarily as sources for fresh water and are best known on the coast. They are still in use today, though much modified by recent construction in accord with the dictates of the present day washing and bathing activities which take place there. Presumably they were also used in the past as sources of drinking water, as well as for bathing and washing. None has been investigated archaeologically for obvious reasons.

The second category of cave site is that with evidence of habitation. For these tradition usually suggests that they functioned as a place of refuge. They are generally located inland. Similar sites with the same function are known from elsewhere in Polynesia, in particular Hawaii and Easter Island. Seuao and Falemauga, two such sites on Upolu in Western Samoa which have been very carefully investigated, are described by Freeman (1943, 1944a). Both have small platforms on either side along the walls of the tube and a paved pathway down the central portion. The platform described by Freeman as typical is 10 feet long and 9 feet wide. In the Falemauga caves these platforms stand 2 to 3 feet above the cave floor; in the Seuao Cave they were pavements almost level with the central path and cave floor. In both caves this evidence for occupation was associated with a variety of marine shells belonging to types of shellfish commonly used for food, pig bone and teeth, and ovens and fireplaces that were often filled with ash. From Falemauga cave red stones from Uafato used for pigment and remains of four kinds of plant including the coconut were also recovered. However, the artifact best attesting prehistoric use was the adze. In both caves the most common type of adze was Type I (four examples from Seuao and seven from Falemauga) with one of Type II and one of Type III also being found in Seuao cave. In the adze chronology both results would suggest a fairly late rather than an early date for occupation, although Freeman (1944a :92) has used the Falemauga results to imply an earlier date for that cave.

Tradition places the occupation of the Falemauga cave as a place of refuge by the people of Tuamasaga at the time of the Tongan domination of Samoa, which according to the standard means for estimating genealogical time would be the 13th century A.D. or before. An even more famous and reliable local Samoan tradition places the occupation of Seuao cave as a refuge for another defeated Tuamasaga party in the 15th century A.D. (Freeman 1944a: 105). Golson (Report 1, p. 19) obtained a date in the 17th or 18th century for a carbon sample associated with occupation in this cave.

In the third category are sites with no habitation evidence, but which were sanctuaries, usually for mythological personages in Samoan tradition and religion. While such sites are difficult to identify archaeologically, one such cave was well described by members of the United States Exploring Expedition in 1839 as it was well known to the early resident missionaries. It was on the south coast of Upolu about three miles from Saga and about a mile and a half inland. Apart from an artificial wall across the mouth, only natural features were encountered inside. It was dedicated to the God "Moso". (Wilkes, 1844 II:102-103; Poesch 1961:163). Another cave on Savai'i with similar mythological associations is described by Buist (Report 3, p. 59), while one with one wall of an old roadway leading to its mouth on the Letolo plantation in Savaii, but with no occupation and no associated tradition may well belong to the same category (Report 4, p. 79).

Cave sites belonging to all three of these categories have been reported in American Samoa (Kikuchi, 1963: 68-71).

Faia'ai cave

The lava tube explored on the 'Olomanu part of the Mulifanua plantation of the Western Samoan Trust Estates Corporation near the locality called Faia'ai belongs to the second category, i.e. a refuge cave. It was brought to our attention by Mr. P. W. H. Kelly who had found it when that portion of the plantation was cleared and brought into production some years ago.

The entrance to this lava tube lies about forty yards east of a long stone wall known locally as a *pa toga*. The lava tube passes under the wall, but it is impossible to judge whether the two are otherwise associated. The wall itself is an old one belonging to a time prior to the establishment of the plantation, an event which dates to 1865 A.D. (Lewthwaite, 1962:142, fn. 30). The wall is five or more feet across and six or more feet in height, and extends from Mount 'Olo in a southerly fashion off into uncut bush in the direction of Samatau. Not far from the cave entrance is an original gap in the wall (now widened on one side) and this is associated with a low stone paved roadway that is said to come from the coast and to be part of an inland track to Apia. Both the gap and the formed roadway are of pre-plantation origin. Some distance to the south, the wall appeared to have been robbed in one place and the stone piled further along to form a more recent pigeon mound some 10 to 13 feet in height. Local tradition, of no great reliability, insists that Samoans, forced by the Tongans to make the wall, were kept in the cave as slaves.

The entrance to the lava tube is at a point where the roof has collapsed, leaving a rubble filled depression (fig. 110). On the eastern edge of the depression, where the roof of the tube remained intact, a narrow gap gave access down the rubble-strewn slope to the cave floor. This slit-like gap was artificially modified by piling additional boulders along most of its length, leaving only a narrow rounded opening towards the centre. This opening had formerly been sealed by a large artificially rounded slab, now fallen on to the slope inside. The slope itself had been stabilised by arranging some of the larger boulders into stone terraces or steps.

Unlike the two caves described by Freeman, in this cave the platforms do not commence at the mouth, but start beyond the point where any light penetrates from the entry way. In the interval the cave floor is damp and a shallow scoop well, 10 to 12 inches deep, has been excavated, which is outlined in stone. A similar source of water within the two caves described by Freeman is not reported.

The interior of the cave was mapped with brunton compass, tape, gas light and matches. The length of this portion of the tube, before being blocked by another extensive rockfall, is about 428 feet. This is much shorter than either of the two caves described by Freeman. Signs of habitation cease before the rockfall, however, because the debris filled floor steadily rises, making it impossible to stand or move about comfortably. As a consequence the number of platforms is far less than in either of the caves described by Freeman, only 13 being in evidence. Also, the central pathway does not extend the entire distance but is confined to the central portion where the cave floor is fairly rough. It begins just before a constriction in the cave caused by rock falls from either side. These are apparently natural and not a form of artificial defence as in some caves in Hawaii.

The platforms, like the path, are raised above the cave floor only the thickness of the rock paving. Thus in type they are like those in Seuao cave rather than the raised type in Falemauga cave. Each platform is normally outlined by larger blocks of lava, and has one of two forms of interior paving. The first is of stone of small size, making an even pebbly surface much as in the interior of house structures. The second uses larger flat blocks throughout as in pavements outside habitations. Freeman records both forms of surface on the platforms in Falemauga cave. In Faia'ai cave, platforms 1, 2, 3, 7, 10, 12 and 13 are of the latter type, while 5, 6, 8, 9 and 11 are of the former type. Platform 4 is a combination, in which a regular square pavement of small stones is joined to an irregular pavement of larger stones. This is the best made platform in the cave.

No artifacts or other remains of occupation were found, although we were not able to

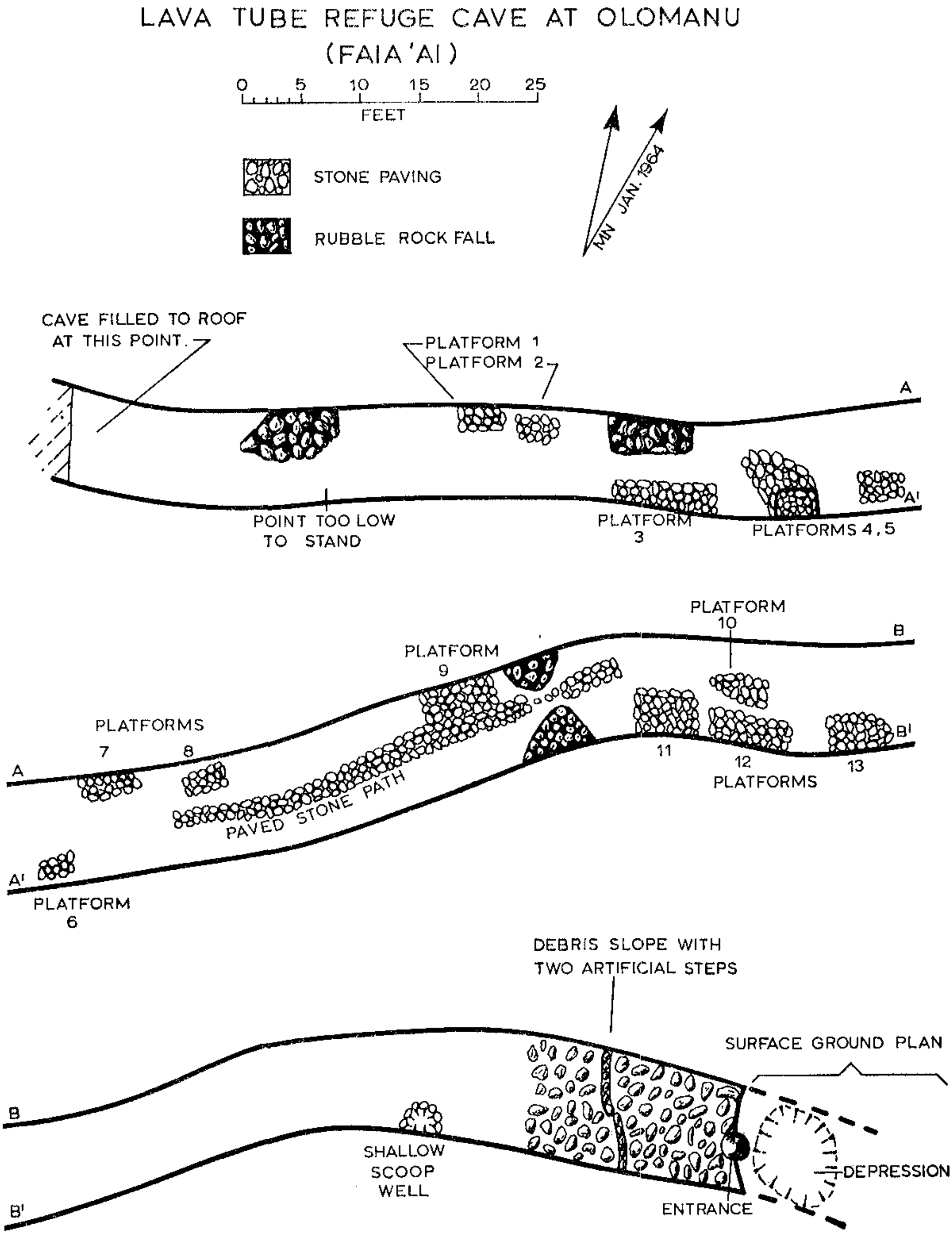

Fig. 110. Plan of entrance and interior floor of Faia'ai Cave, Mulifanua, Upolu.

give this cave the same thorough search that Freeman gave the other caves, where he employed several Samoans for this purpose.

SUMMARY

Three functional categories of cave site are identified in Samoa: water sources, temporary refuge habitations, and sanctuaries. A lava tube located at Faia'ai on the 'Olomanu part of the Mulifanua plantation which is typical of the temporary refuge habitation is then described in detail. It is found to conform very closely to the two previous sites of the same type described by Freeman, the greatest similarity being the kind of platforms level with the cave floor found in this cave and Seuao.

TEMPER SANDS IN PREHISTORIC POTSHERDS FROM VAILELE AND FALEFA

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A total of 27 prehistoric potsherds from Vailele and Falefa, Upolu, Western Samoa were received for examination at Stanford from R. C. Green. Table 28 gives the distribution of numbers of sherds received by type of ware, site and excavation.

All sherds received were examined on their surfaces with hand lens and binocular microscope. The least weathered 20 of the sherds were examined in thin section using a standard polarising petrographic microscope. Thin sections of standard 0.03 mm. thickness were prepared by R. Laniz, who first impregnated most sherds with suitable resin. Microscopic examination reveals that about one-third of the body of the sherds by volume is sand imbedded in the fired clay paste. Sand grains are sharply bounded, discrete particles and evidently were deliberately added to the clays as temper by the ancient potters. The proportion of temper observed is similar to that reported from prehistoric sherds throughout Melanesia and western Polynesia (e.g., Curtis, 1952). Semiquantitative estimates of the frequencies of different types of sand grains in the tempers were made in all thin sections examined.

TABLE 28
TYPE AND ORIGIN OF SHERDS EXAMINED

Number	*Type*	*Site*	*Excavator*
3	Coarse	SU-Va-1	Golson
3	Coarse	SU-Va-1	Green
3	Fine	SU-Va-4	Crosby
5	Fine	SU-Va-4	Green
2	Coarse	SU-Va-4	Green
1	Unique	SU-Va-4	Green
5	Coarse	SU-Sa-3	Green
5	Fine	SU-Sa-3	Green
27 Total			

TEMPER TYPES

Three distinct types of sand temper are recognisable among the sherds examined (see table 29). No gradational or mixed tempers were observed; only the three distinctly different types of sand are present in the collection. The three temper sands occur in sets of sherds whose typology and stratigraphic occurrence are regular. Sherds of the finer ware have ferromagnesian or black sand tempers, but sherds of the coarser ware contain paler, feldspathic temper sands.

FERROMAGNESIAN BASALTIC TEMPER

A ferromagnesian basaltic temper sand (table 29, col. 1; plate 24) occurs in 13 sherds of relatively thin, fine ware. Of these, 8 are from the Va-4 mound at Vailele and 5 are from the lower layer 5 stratigraphic level at site Sa-3 in Falefa Valley (see table 28). The temper sands in these sherds are well sorted. Grains are water worn with rounded to subrounded shapes. The main constituents are: (a) basalt rock fragments, half to two-thirds of each sand; and (b) ferromagnesian silicate mineral grains, one-third to half of each sand. The mineral grains are mainly augite clinopyroxene and olivine, with pyroxene commonly the more abundant of the two in typical proportions of 1.5-1 to 2.5-1. The basalt fragments are microporphyritic aphanitic olivine basalt, which is Samoa's most abundant rock type. These tempers were probably black beach sands, although a possible fluvial origin is not entirely precluded by the petrographic data. Each temper sand of the group contains rock fragments of variable textures, from which circumstance it is clear that each sand represents a mingling of basaltic detritus erod-

TABLE 29

APPROXIMATE MEAN COMPOSITIONS OF MAIN TEMPER TYPES IN PREHISTORIC POTSHERDS FROM VAILELE AND FALEFA, UPOLU, WESTERN SAMOA

	Ferromagnesian Basaltic Temper	Feldspathic Basaltic Temper	Feldspathic Trachytic Temper
Basaltic Aphanite Fragments	60 ± 10%	60 ± 10%	—
Trachytic Aphanite Fragments	—	—	60 ± 10%
Pyroxene Crystals	40 ± 10% { 25 ± 15%	0-1%	0-5%
Olivine Crystals	20 ± 15%	—	—
Opaque Iron Oxide Grains	~1%	0-1%	1-5%
Plagioclase Crystals	0-1%	40 ± 10%	20-25%
Orthose Crystals	—	—	10 ± 5%
Hornblende Crystals	—	—	1-5%

ed from multiple sources. The possibility of identifying on petrographic grounds the specific site from which the temper of any one of these sherds was collected is slim. The Mulifanua Volcanics of northwest Upolu, the Salani Volcanics of central and southeast Upolu, and possibly the Fagaloa Volcanics of northeast Upolu all might yield similar beach sands (Kear and Wood, 1959:37-42).

FELDSPATHIC BASALTIC TEMPER

A feldspathic basaltic temper sand (table 29 col. 2; plate 25) occurs in 5 sherds of relatively thick, coarse ware: one sherd from layer 4 in the excavation at site Sa-3 in Falefa Valley, and two sherds each from the basal layers at mounds Va-1 and Va-4 at Vailele. A very similar temper occurs in a uniquely decorated thin sherd from layer F-1b at mound Va-4 at Vailele. The temper sands in these sherds are moderately sorted, but grains have almost unabraded angular to subangular shapes. The main constituents are (a) basalt rock fragments, half to two-thirds of each sand; and (b) plagioclase feldspar mineral grains, one-third to half of each sand. The textural similarity of all the aphanitic basalt fragments in each sherd, and within the group of sherds as a whole, is particularly striking. This type of uniformity presents a situation quite different from the uniformity of the ferromagnesian basaltic tempers in which each sherd contains basalt fragments of varying texture. It may be of great significance to record that some rock fragments in some sherds with the feldspathic basaltic temper have cuspate margins typical of microscoria particles in basaltic ash. The sand may have been fresh ash collected from a new-grown cinder cone. Although there are no active volcanoes on Upolu, eruptions of the Puapua Volcanics may have been in part contemporaneous with site occupations at Vailele and Falefa (Kear and Wood, 1959: 45). If so, fresh ash and cinders may have been available to prehistoric potters on Fito Peak, which is a young but now forested cinder cone south of Vailele and west of Falefa Valley. Both the Puapua Volcanics in eastern Upolu and the slightly older Lefaga Volcanics in western Upolu are characterised by feldspar-phyric basalts apparently similar to the basalt type represented in the feldspathic basaltic temper (Kear and Wood, 1959: 43-44).

FELDSPATHIC TRACHYTIC TEMPER

A feldspathic trachytic temper sand (table 29, col. 3; plate 26) occurs in 8 sherds of relatively thick, coarse ware. Half are from layer 5 at Va-1 mound at Vailele and the other half from layer 4 in the excavation at site Sa-3 in Falefa Valley. The temper sands in these sherds are poorly sorted but grains have partly abraded subangular to subrounded shapes. The main constituents are: (a) trachyte rock fragments, half to three-quarters of each sand; and (b) feldspar mineral grains, one-quarter to half of each sand. The feldspar mineral grains include both plagioclase and orthose, with plagioclase uniformly the more abundant of the two in typical proportions of 1.5-1 to 2.5-1. In most sherds of this group there is more hornblende than pyroxene, but the basaltic tempers lack hornblende entirely. The microporphyritic aphanitic trachyte fragments have fluidal felted textures quite unlike the intergranular and intersertal textures in rock fragments of the two basaltic tempers. The ratio of felsic to mafic minerals is also much higher in the trachyte fragments than in the basalt fragments. All the trachyte fragments in a given sherd have virtually identical textures, but each sherd contains trachyte of a particular distinctive type different from the trachytes of other sherds in the group. The poor sorting of the temper, its great homogeneity within sherds, and its great variability among sherds together suggest that the temper sands were winnowed from residual sandy soils or slightly transported slope colluvium. Outcrops of trachyte and related rocks are known in Western Samoa only from the Fagaloa Volcanics whose main exposures are in northeast Upolu, although similar rocks of similar age occur also on Tutuila in American Samoa.

Megascopic Recognition of Temper Types

The three temper types are instantly distinguishable in thin section with the petrographic microscope on the basis of the descriptions and illustrations given. The three temper types can also be recognised by hand lens or binocular microscope examination of untreated sherds on the basis of the appearance of the sand grains that protrude from the paste on sherd surfaces, both smooth and weathered. In sherds containing the ferromagnesian basaltic temper, the prominent protruding grains are mainly dark green and black ferromagnesian silicate crystals; some stony multicrystalline basalt fragments of dark shades of grey may also be visible. In sherds containing the feldspathic basaltic temper, the prominent protruding grains are mainly grey and white feldspar crystals, many of pseudo-glassy appearance; some stony multicrystalline basalt fragments of dark shades of grey may also be visible. In sherds containing the feldspathic trachytic temper, the prominent protruding grains are mainly pale grey, stony multicrystalline trachyte fragments in which overlapping subparallel tablets of feldspar may be discernible; some feldspar crystals may also be visible but the consistent presence of minute black specks of ferromagnesian mineral grains within trachyte fragments helps to distinguish them from feldspar crystals of either feldspathic temper.

Implications of Data

Petrographic study of prehistoric potsherds from Upolu thus supports the following conclusions:

1. Temper sands in sherds excavated at Vailele and Falefa contain only mineral grains and rock fragments of types common in the bedrock of Samoa, and the sands could have been collected from appropriate sites in northeast Upolu.

2. Temper types among the sherds vary in regular patterns with respect to typology and stratigraphy.

3. Coordinated microscopic and megascopic examination of the three prominent temper types observed has established empirical rules of megascopic recognition that should permit the sorting of total sherd collections on the basis of temper type.

BIBLIOGRAPHY

ANON.
1965. Notes and News. *J. Polynes. Soc.* 74: 262-263.

APPLE, R. A.
1965. *Hawaiian Archaeology: Trails.* Spec. Publ. Bernice P. Bishop Mus. 53. Honolulu.

BIRKS, LAWRENCE AND HELEN
[MS] Stone Artifacts from Tonga and Fiji.

BROWN, G.
1908. *George Brown D.D. Pioneer Missionary and Explorer. An Autobiography.* Hodder and Stoughton, London.

BUCK, P. H. (TE RANGI HIROA)
1930. *Samoan Material Culture.* Bull. Bernice P. Bishop Mus. 75. Honolulu.
1957. *Arts and Crafts of Hawai'i.* Spec. Publ. Bernice P. Bishop Mus. 45. Honolulu.

BUCK, P. H., K. P. EMORY, H. D. SKINNER AND J. F. G. STOKES
1930. Terminology for Ground Stone Cutting Implements in Polynesia. *J. Polynes. Soc.* 39: 174-180.

BUIST, A. G.
1966. Preliminary Report on Field Archaeology in Savai'i, Western Samoa, No. 3. Auckland, Department of Anthropology, mimeographed.
1967a. Report on Further Field Archaeology in Savai'i, Western Samoa, No. 5. Auckland, Department of Anthropology, mimeographed.
1967b. Field Survey in Savai'i, Western Samoa. *N.Z. Arch. Assoc. Newsletter* 10: 35-52.

BULOW, WILHELM VON
1897. Kentnisse und Fertigkeiten der Samoaner. *Globus* 72: 237-240.

CALKINS, F. G.
1962. *My Samoan Chief.* Frederick Muller, London.

CAMERON, STEWART S.
1962. Vegetation and Forest Resources. In J. W. FOX AND K. B. CUMBERLAND (editors), *Western Samoa, Land, Life, and Agriculture in Tropical Polynesia.* Whitcombe and Tombs, Christchurch.

CARTER, R. M.
1967. *The Geology of Pitcairn Island, South Pacific Ocean.* Bull. Bernice P. Bishop Mus. 231. Honolulu.

CHURCHWARD, WILLIAM B.
1887. *My Consulate in Samoa.* Bentley, London.

CURRY, LESLIE
1962. Weather and Climate. In J. W. FOX and K. B. CUMBERLAND (editors), *Western Samoa, Land, Life, and Agriculture in Tropical Polynesia.* Whitcombe and Tombs, Christchurch.

CURTIS, G.
1952. Petrography of Pottery. In E. W. GIFFORD, *Archaeological Investigations in Fiji.* Anthrop. Rec. Univ. Calif. 13, Berkeley.

DAVIDSON, JANET M.
1961. A Guide to the Description of Stone Adzes. *N.Z. Arch. Assoc. Newsletter* 4: 6-10.
1964a. The Physical Analysis of Refuse in New Zealand Archaeological Sites. Unpublished M.A. Thesis, Univ. Auckland.
1964b. Concentrated Shell Middens. *N.Z. Arch. Assoc. Newsletter* 7: 70-78.
1964c. Processing and Analysing Midden Samples. *N.Z. Arch. Assoc. Newsletter* 7: 152-163.
1965. Samoa and Tonga. *N.Z. Arch. Assoc. Newsletter* 8: 59-71.

DAVIDSON, JANET M., R. C. GREEN, A. G. BUIST AND K. M. PETERS
1967. Additional Radiocarbon Dates for Western Polynesia. *J. Polynes. Soc.* 76: 223-230.

DEMANDT, E.
1913. *Die Fischerei der Samoaner.* Lütcke & Wulff, Hamburg. (Mitt. Mus. Völkerk. III (1)).

DUFF, ROGER S.
1956. *The Moa-hunter Period of Maori Culture.* Government Printer, Wellington. (Canterbury Mus. Bull. 1).
1959. Neolithic Adzes of Eastern Polynesia. In J. D. FREEMAN AND W. R. GEDDES (editors), *Anthropology in the South Seas.* Thomas Avery, New Plymouth.
1965. The Canterbury Museum Expedition to Rarotonga. *N.Z. Arch. Assoc. Newsletter* 8: 53-58.

EMORY, K. P.
1924. *The Island of Lanai, a survey of native culture.* Bull. Bernice P. Bishop Mus. 12. Honolulu.
1962. Three-Year Polynesian Research Programme. *N.Z. Arch. Assoc. Newsletter* 5:96-97.
1968. Eastern Polynesian Relationships as Revealed Through Adzes. In I. YAWATA AND Y. H. SINOTO (editors), *Prehistoric Culture in Oceania: Symposium Presented at the Eleventh Pacific Science Congress.* Bishop Mus., Honolulu.

EMORY, K. P. AND Y. H. SINOTO
1961. *Hawaiian Archaeology: Oahu Excavations.* Spec. Publ. Bernice P. Bishop Mus. 49. Honolulu.
1964. Eastern Polynesian Burials at Maupiti. *J. Polynes. Soc.* 73: 143-160.
1965. Preliminary Report on the Archaeological Investigations in Polynesia. Field Work in the Society and Tuamotu Islands. French Polynesia, and American Samoa in 1962, 1963, and 1964. Honolulu, mimeographed.

EMORY, K. P., W. J. BONK, AND Y. H. SINOTO
1959. *Hawaiian Archaeology: Fishhooks.* Spec. Publ. Bernice P. Bishop Mus. 47. Honolulu.

ERSKINE, J. E.
1853. *Journal of a Cruise among the Islands of the Western Pacific in Her Majesty's Ship Havannah.* John Murray, London.

EVANS, CLIFFORD
1965. The Dating of Easter Island Archaeological Obsidian Specimens. In THOR HEYERDAHL AND E. N. FERDON JR. (editors), *Reports of the Norwegian Archaeological Expedition to Easter Island and the East Pacific. Vol. 2 Miscellaneous Papers.* School American Research and Kon-Tiki Mus. Monog. 24 (2). Esselte Aktiebolag, Stockholm.

FOX, J. W. AND K. B. CUMBERLAND (EDITORS)
1962. *Western Samoa, Land, Life, and Agriculture in Tropical Polynesia.* Whitcombe and Tombs, Christchurch.

FREEMAN, J. D.
1943. The Seuao Cave. *J. Polynes. Soc.* 52: 101-109.
1944a. Falemauga Caves. *J. Polynes. Soc.* 53: 86-106.
1944b. O le Fale o le fe'e. *J. Polynes. Soc.* 53: 121-144.
1944c. The Vailele Earthmounds. *J. Polynes. Soc.* 53: 145-162.

FUGIHIRA INDUSTRY CO. LTD.
1965. *Standard Soil Colour Chart.* Tokyo.

GIFFORD, E. W.
1951. *Archaeological Excavations in Fiji.* Anthrop. Rec. Univ. Calif. 13, Berkeley.

GIFFORD, E. W. AND D. S. GIFFORD
1959. *Archaeological Excavations in Yap.* Anthrop. Rec. Univ. Calif. 81 (2), Berkeley.

GIFFORD, E. W. AND DICK SHUTLER JR.
1956. *Archaeological Excavations in New Caledonia.* Anthrop. Rec. Univ. Calif. 18 (1), Berkeley.

GOLSON, J.
1959. L'Archéologie du Pacifique Sud. Résultats et Perspectives. *J. Soc. Océan.* 15: 5-54.
1962. Report on New Zealand, Western Polynesia, New Caledonia, and Fiji. *Asian Perspectives* 5 (2): 166-180.
[MS] Notes on the Oral History of Vailele.

GOLSON, J. AND R. C. GREEN
1958. *A Handbook to Field Recording in New Zealand.* N.Z. Arch. Assoc. Handbook 1, Auckland.

GRANT-TAYLOR, T. L. AND T. A. RAFTER
1963. New Zealand Radiocarbon Measurements I-V. *Radiocarbon* 5: 118-162.

GREEN, R. C.
1961a. Pacific Commentary. The Tenth Pacific Science Congress (1) Archaeology. *J. Polynes. Soc.* 70: 477-481.
1961b. The Implications of Recent Archaeology in French Polynesia. (Paper read at the 10th Pacific Science Congress in Hawaii.)
1963a. An Undefended Settlement at Kauri Point, Tauranga. *Historical Review, Journal of the Whakatane and District Historical Soc.* 11: 143-156.
1963b. A suggested Revision of the Fijian Sequence. *J. Polynes. Soc.* 72: 235-253.
1964a. Archaeology in Western Samoa. *N.Z. Arch. Assoc. Newsletter* 7: 45-50.
1964b. Sources, Ages and Exploitation of New Zealand Obsidian. *N.Z. Arch. Assoc. Newsletter* 7: 134-143.
1967. Fortifications in Other Parts of Tropical Polynesia. *N.Z. Arch. Assoc. Newsletter* 10: 96-113.
1968. West Polynesian Prehistory. In I. YAWATA AND Y. H. SINOTO (editors), *Prehistoric Culture in Oceania: Symposium Presented at the Eleventh Pacific Science Congress.* Bishop Museum, Honolulu.
[MS] Archaeology in the Mangarevan Archipelago, French Polynesia.

GREEN, R. C. AND JANET M. DAVIDSON
1964. Preliminary Report on Archaeological Field-Work in Western Samoa. Auckland, Department of Anthropology, mimeographed.
1965. Radiocarbon Dates for Western Samoa. *J. Polynes. Soc.* 74: 63-69.

GREEN, R. C. AND A. Y. DESSAINT
[MS] Measurements on Polynesian Adzes: Some Comparative Results from Samoa and New Zealand.

GREEN, R. C. AND D. W. PURCELL
1961. The Relationship of Length, Width and Thickness in Central Polynesian Adzes. *J. Polynes. Soc.* 70: 451-465.

GREEN, R. C., JANET M. DAVIDSON AND K. M. PETERS
1967. Archaeology in Western Samoa 1965-1967. *N.Z. Arch. Assoc. Newsletter* 10: 26-34.

GREEN, R. C., KAYE GREEN, R. A. RAPPAPORT, ANN RAPPAPORT AND JANET M. DAVIDSON
1967. *Archeology on the Island of Mo'orea, French Polynesia.* Anthrop. Pap. Am. Mus. nat. Hist. 51 (2).

HALE, HORATIO
1846. *Ethnography and Philology.* C. Sherman, Philadelphia. (U.S. Exploring Expedition vol. VI).

HANDY, E. S. C. AND W. C. HANDY

1924. *Samoan Housebuilding, Cooking and Tattooing.* Bull. Bernice P. Bishop Mus. 15, Honolulu.

HENRY, FRED

1958. A History of Samoa. As translated by Pastor Faleto'ese. Education Dept. of Western Samoa, Apia, mimeographed.

HOLMES, J. R.

1967. Aboriginal and Modern Samoa: A Study of Cultural Change Based Upon London Missionary Society Journals, 1830-1840. Unpublished M.A. Thesis, Dept. of Anthrop. Wichita State Univ. Wichita, Kansas.

ISHIZUKI, KISAO

1968. A Preliminary Report on the Folasa-a-lalo Excavations. *N.Z. Arch. Assoc. Newsletter* 11: 50-56.

KEAR, D. AND B. L. WOOD

1959. *The Geology and Hydrology of Western Samoa.* Government Printer, Wellington. (N.Z. Geological Survey Bull. n.s. 63.)

KIKUCHI, W. K.

1963. *Archaeological Surface Ruins in American Samoa.* Unpublished M.A. Thesis, Univ. of Hawaii.

1964. Petroglyphs in American Samoa. *J. Polynes. Soc.* 73: 163-166.

KRAMER, A.

1902. *Die Samoa-Inseln,* (2 vols.). E. Scweizerbartsche Verlagsbuchhandlung (E. Nägele), Stuttgart.

LEWTHWAITE, G. R.

1962. Land, Life and Agriculture to Mid-Century. In J. W. FOX AND K. B. CUMBERLAND (editors), *Western Samoa, Land, Life and Agriculture in Tropical Polynesia.* Whitcombe and Tombs, Christchurch.

MCKERN, W. W.

1929. *Archaeology of Tonga.* Bull. Bernice P. Bishop Mus. 60, Honolulu.

MASTERMAN, S.

1958. An Outline of Samoan History. Education Dept. of Western Samoa, Apia, mimeographed.

MERCER, J. H. AND PETER SCOTT

1958. Changing Village Agriculture in Western Samoa. *Geogrl. J.* 124: 347-360.

PALMER, J. B.

1963. Eastern Polynesian Type Adzes from Tonga. *J. Polynes. Soc.* 72: 264-267.

1965. Excavations at Karobo, Viti Levu. *N.Z. Arch. Assoc. Newsletter* 8: 26-34.

1968. Recent Results from the Sigatoka Archaeological Program. In I. YAWATA AND Y. H. SINOTO (editors), *Prehistoric Culture in Oceania: Symposium presented at the Eleventh Pacific Science Congress.* Bishop Museum, Honolulu.

PIRIE, P.

1964. Geography of Population in Western Samoa. Unpublished Ph.D. Thesis, Australian National University, Canberra.

POESCH, JESSIE

1961. *Titian Ramsay Peale, 1799-1885, and his Journals of the Wilkes Expedition.* Mem. Am. Phil. Soc. 52.

POLACH, H. A. AND J. GOLSON

1966. *Collection of Specimens for Radiocarbon Dating and Interpretation of Results.* Australian Institute Aboriginal Studies Manual 2, Canberra.

POULSEN, J.

1967. A Contribution to the Prehistory of the Tonga Islands (2 vols.). Unpublished Ph.D. Thesis, Australian National Univ. Canberra.

1968. Archaeological Excavations on Tongatapu. In I. YAWATA AND Y. H. SINOTO (editors), *Prehistoric Culture in Oceania: Symposium presented at the 11th Pacific Science Congress.* Bishop Museum, Honolulu.

PRATT, GEORGE

1890. The Genealogy of the Kings and Princes of Samoa. *Rep. Australas. Ass. Advmt. Sci.* II: 655-664.

PRITCHARD, WILLIAM T.

1866. *Polynesian Reminiscences or Life in the South Pacific Islands.* Chapman and Hall, London.

The Samoan Reporter, 1846, 1849, 1850.

SCOTT, S. D.

1965. Preliminary Report on Archaeological Fieldwork in Western Samoa, No. 2. Auckland, Department of Anthropology, mimeographed.

1968. Samoan Fortifications and Monumental Architecture from Specific Examples. In I. YAWATA AND Y. H. SINOTO (editors), *Prehistoric Culture in Oceania: Symposium presented at the Eleventh Pacific Science Congress.* Bishop Museum, Honolulu.

SHAWCROSS, WILFRED

1964. Stone Flake Industries in New Zealand. *J. Polynes. Soc.* 73: 7-25.

SINOTO, Y. H.

1966. A Tentative Prehistoric Cultural Sequence in the Northern Marquesas Islands, French Polynesia. *J. Polynes. Soc.* 75: 287-303.

SINOTO, Y. H. AND M. KELLUM

1965. Preliminary Report on Excavations in the Marquesas Islands, French Polynesia. Honolulu, mimeographed.

SMART, C. D. AND R. C. GREEN

1962. A Stratified Dune Site at Tairua, Coromandel. *Dom. Mus. Rec. Ethnol.* 1: 246-266.

STAIR, JOHN B.

1894. O le fale-o-le-fe'e: or Ruins of an Old Samoan Temple. *J. Polynes. Soc.* 3: 239-243.

1895. Flotsam and Jetsam from the Great Ocean; Or Summary of Early Samoan Voyages and Settlements. *J. Polynes. Soc.* 4: 99-131.

1896. Jottings on the Mythology and Spirit-Lore of Old Samoa. *J. Polynes. Soc.* 5: 33-57.

1897. *Old Samoa.* The Religious Tract Society, London.

STEINBERGER, A. B.
1874. Report Upon Samoa, or the Navigators' Islands made to Secretary of State. In *U.S. 43rd Congress, 1st Session. Senate Ex. Doc. no. 45.* Government Printing Office, Washington.

STERNDALE, H. B.
1874. Memorandum on some of the South Sea Islands. *N.Z. Parliament. House of Representatives. Appendix to the Journal:* A-3b.

STERNDALE, R. A.
1890. Prehistoric Remains in Samoa. *Asiatic Quarterly Review.* (extract in *J. Polynes. Soc.* 1:62-64).

SUGGS, R. C.
1960a. *The Island Civilizations of Polynesia.* The New American Library (Mentor Books), New York.
1960b. Historical Traditions and Archeology in Polynesia. *Am. Anthrop.* 62: 764-773.
1961. *The Archeology of Nuku Hiva, Marquesas Islands, French Polynesia.* Anthrop. Pap. Am. Mus. nat. Hist. 49 (1), New York.

TERRELL, JOHN
1965. Limitations on Archaeology in New Zealand. *N.Z. Arch. Assoc. Newsletter* 8: 125-130.
1966. Preliminary Report on the Excavation of Mound Va-4 in 1965, No. 4. Auckland, Department of Anthropology, mimeographed.
1967. Galatea Bay. The Excavation of a Beach-Stream Midden Site on Ponui Island in the Hauraki Gulf, New Zealand. *Trans. R. Soc. N.Z.* (general series) 2 (3): 31-70.

THOMPSON, ANDREW
1927. Earthmounds in Samoa. *J. Polynes. Soc.* 36: 116-121.

THOMSON, J. A.
1921. The Geology of Western Samoa. *N.Z. J. Sci. Technol.* 4: 49-66.

TROTTER, M. M.
1961. A 'Quartzite' Source Site at Nenthorn, Central Otago. *N.Z. Arch. Assoc. Newsletter* 4: 29-32.

TUGBY, D. J. AND ELISE TUGBY
1966. A Stone Artifact from Lower Mondailing, Sumatra. *Asian Perspectives* 8: 166-170.

TURNER, G.
1861. *Nineteen Years in Polynesia, Missionary Life, Travels and Researches.* Snow, London.
1884. *Samoa a Hundred Years Ago and Long Before.* Macmillan, London.

WATTERS, R. F.
1958. Settlement in Old Samoa: 1840. *N.Z. Geogr.* 14: 1-18.
1959. The Transition to Christianity in Samoa. *Historical Studies* 8: 392-399.

WILKES, CHARLES
1844. *Narrative of the United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842.* C. Sherman, Philadelphia.
[MS] Journal of Lt. Charles Wilkes aboard the *Vincennes* and the *Porpoise.* National Archives of the United States, Washington, D.C.

WILLIAMS, JOHN
1838. *A Narrative of Missionary Enterprises in the South Sea Islands.* Snow, London.

WILLIAMSON, R. W. (R. PIDDINGTON, ED.)
1937. *Religion and Social Organisation in Central Polynesia.* Cambridge University Press, Cambridge.

WRIGHT, A. C. S.
1962. The Soils. In J. W. FOX AND K. B. CUMBERLAND (editors), *Western Samoa, Land, Life, and Agriculture in Tropical Polynesia.* Whitcombe and Tombs, Christchurch.
1963. *Soils and Land use of Western Samoa.* Government Printer, Wellington. (N.Z. Soil Bur. Bull. 22.)

PLATES

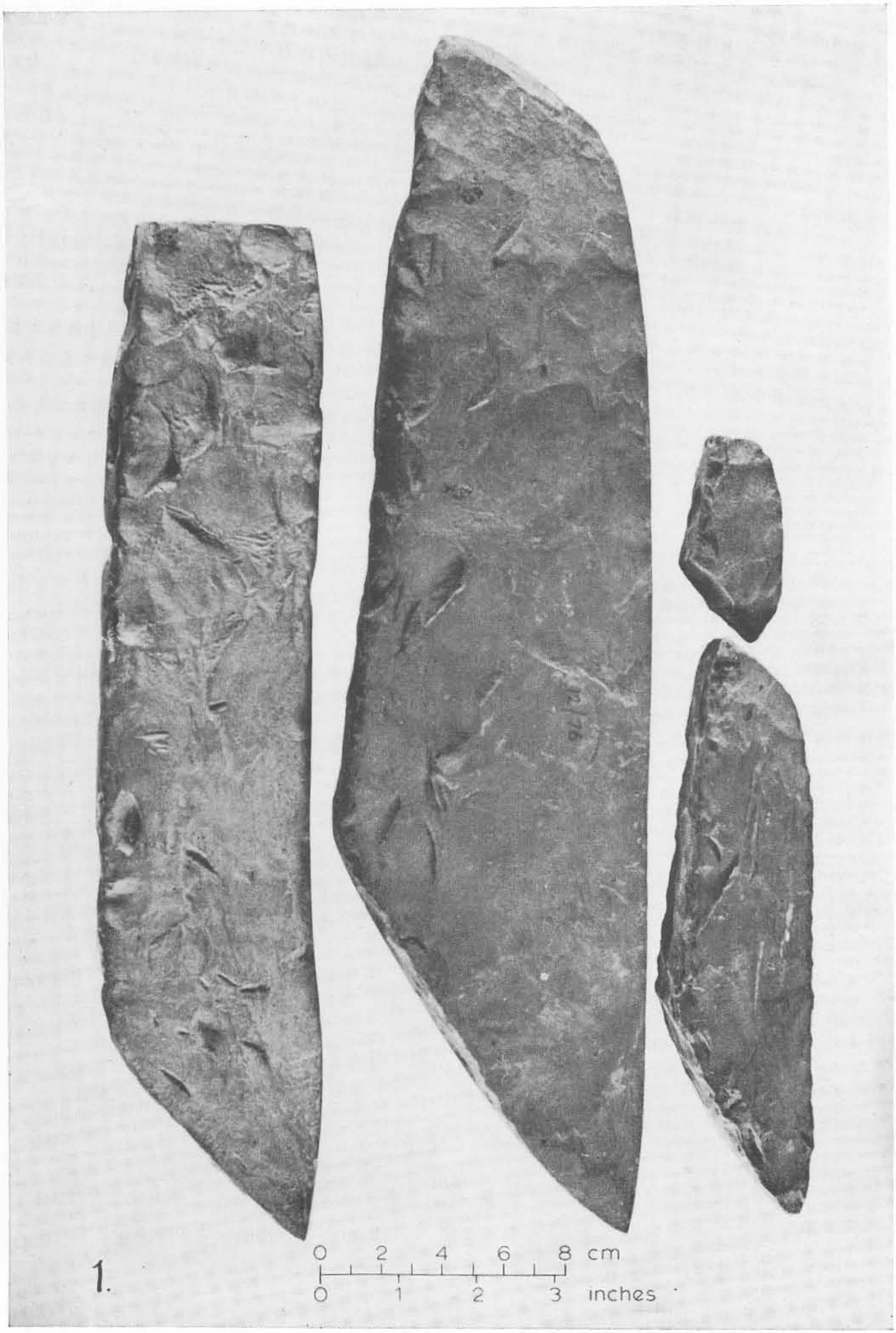
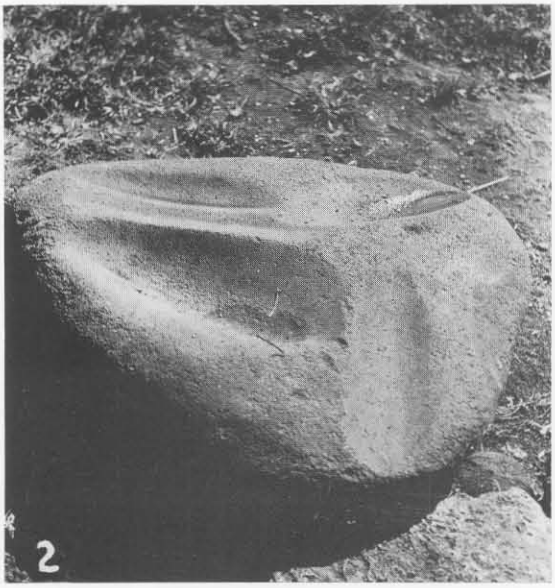
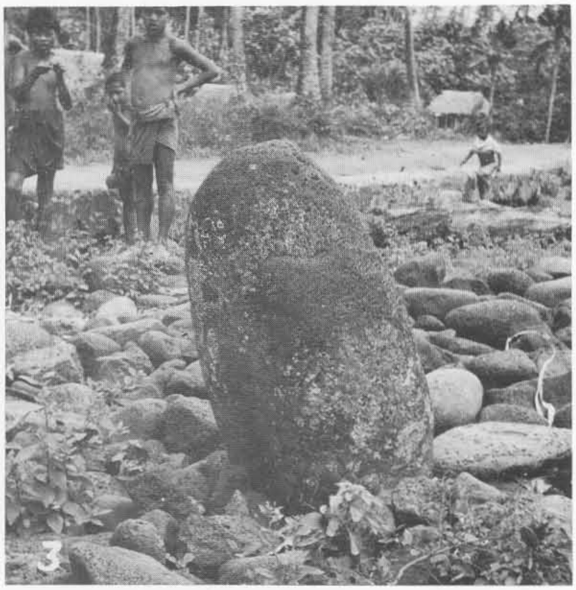


PLATE 1. Triangular adzes with apex to front, Types VI and VII.
Left: A 11/8, Type VI, Lotofaga Variety.
Centre: A 12/76, Luatuanu'u, Type VII.
Right upper: A 14/21, Tuiolemu, Type VII.
Right lower: A 10/131, Luatuanu'u, Type VII.





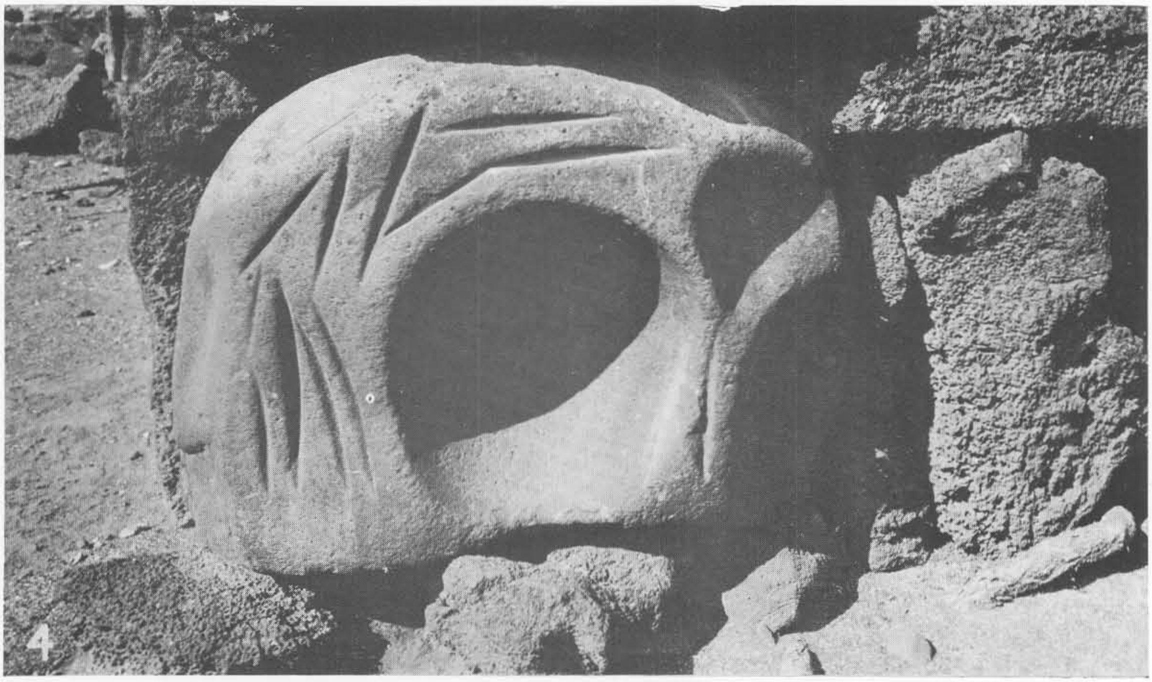


PLATE 2. Hone with linear grooves from Avao, Savai'i.

PLATE 3. "Phallic" stone upright in rough paving near spring at Sasina, Savai'i.

PLATE 4. Circular bowl with linear hollows set in foundation wall of house platform at Faletagaloa, Savai'i.

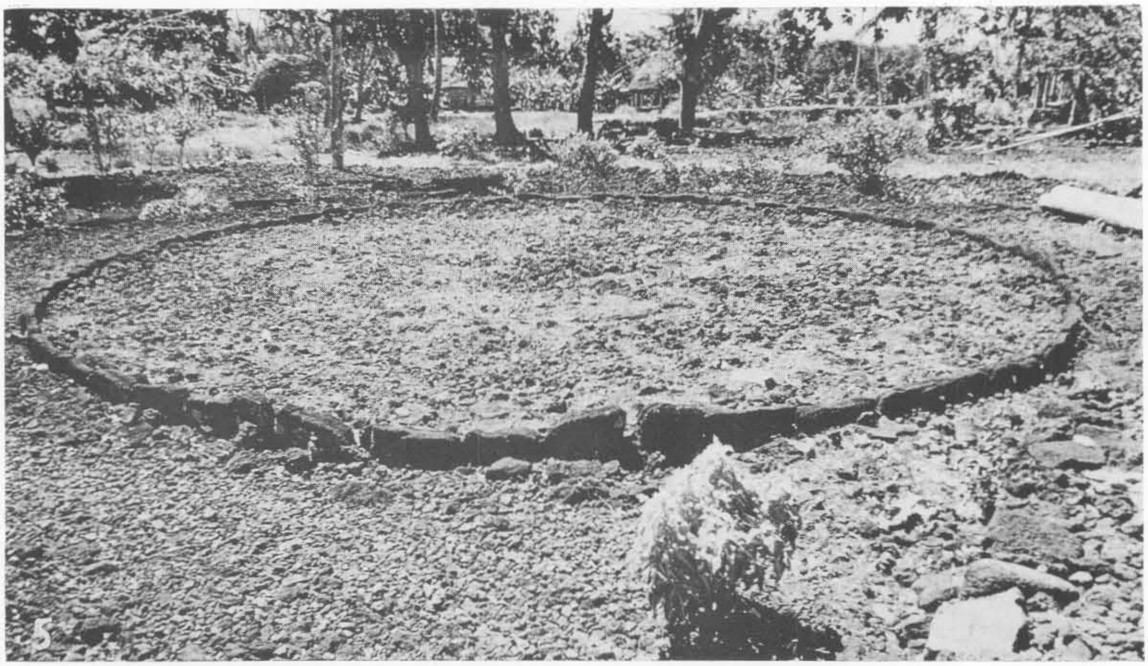


PLATE 5. Stone curbing outlining a circular house structure in house pavement at A'opo, Savai'i.

PLATE 6. House floor, outlined in stone curbing, built on rectangular terrace platform at Fagae'e, Savai'i.

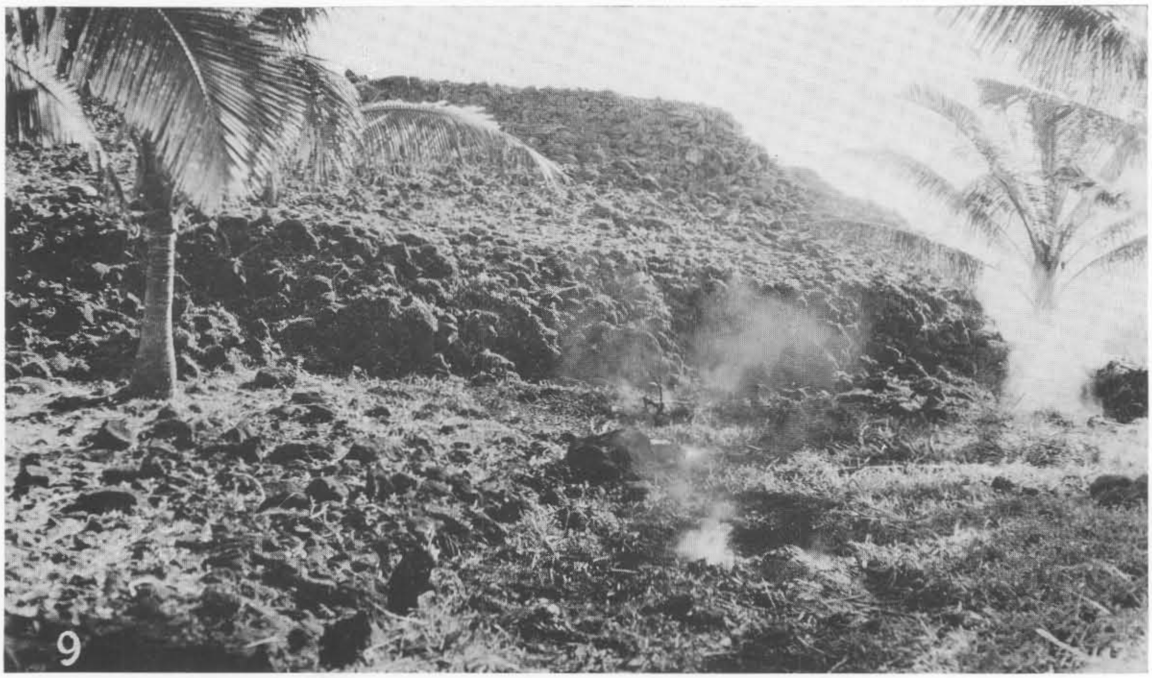
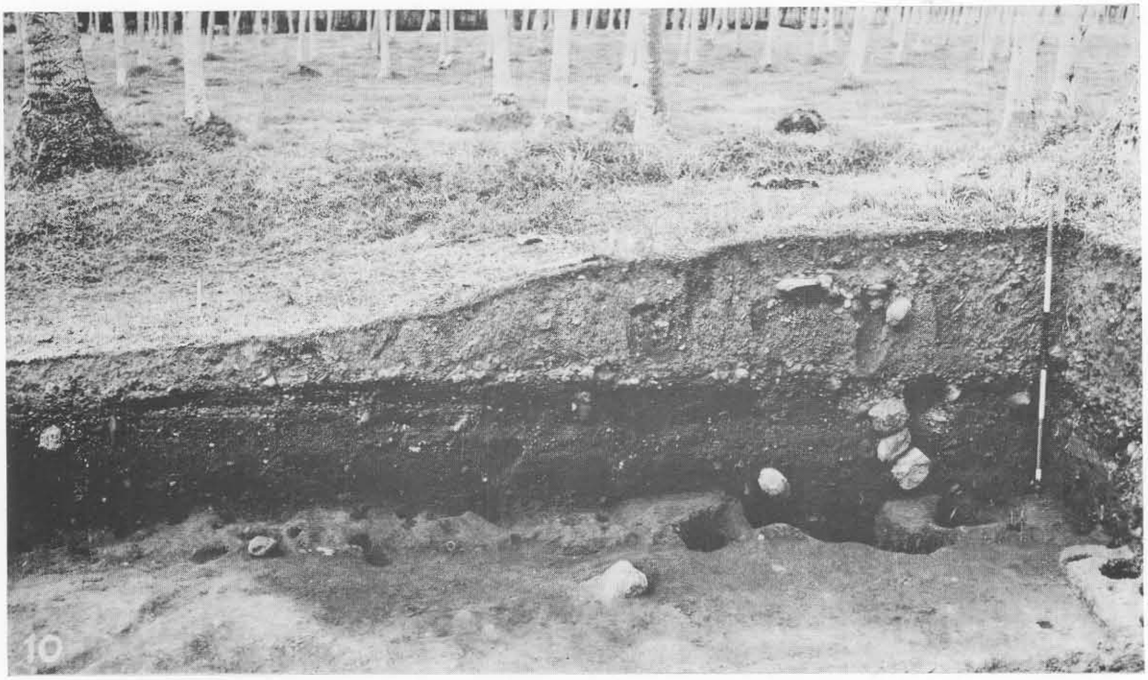


PLATE 7. Large terrace with modern house in background, Sasina, Savai'i.
PLATE 8. Stone platform at Village B, Ologogo, Savai'i.
PLATE 9. Pulemelei Mound, Letolo Plantation, Savai'i.



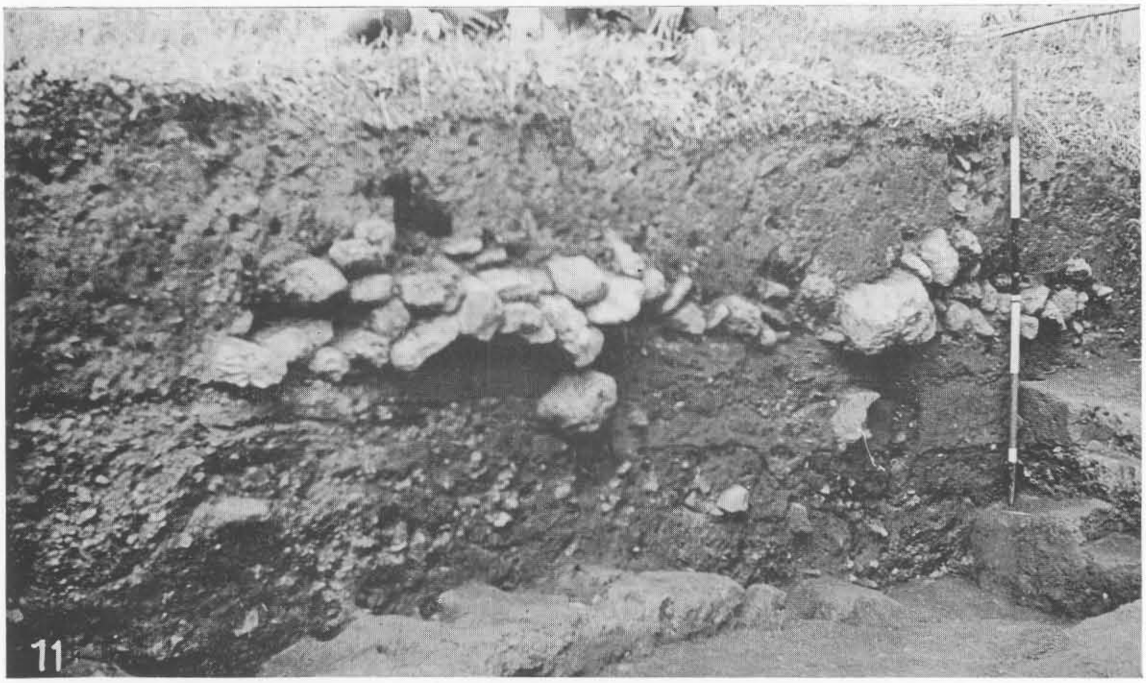


PLATE 10. South face of cutting II, SU-Va-1, Vailele, Upolu, after clean up in 1963.

PLATE 11. South face of mound section, SU-Va-1, Vailele, during 1963, showing stone pavement.

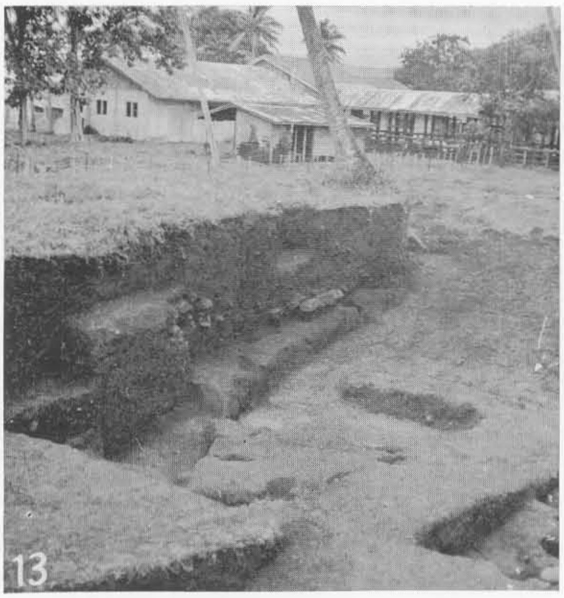


PLATE 12. Stone alignment in layer IIIa, east end of cutting II, Su-Va-1, Vailele, 1957.

PLATE 13. North side of dressed face along bulldozer cutting, SU-Va-1, Vailele, 1964.

PLATE 14. West face of cutting III, showing stone platform with firepit on its surface in centre, SU-Va-1, Vailele, 1964.

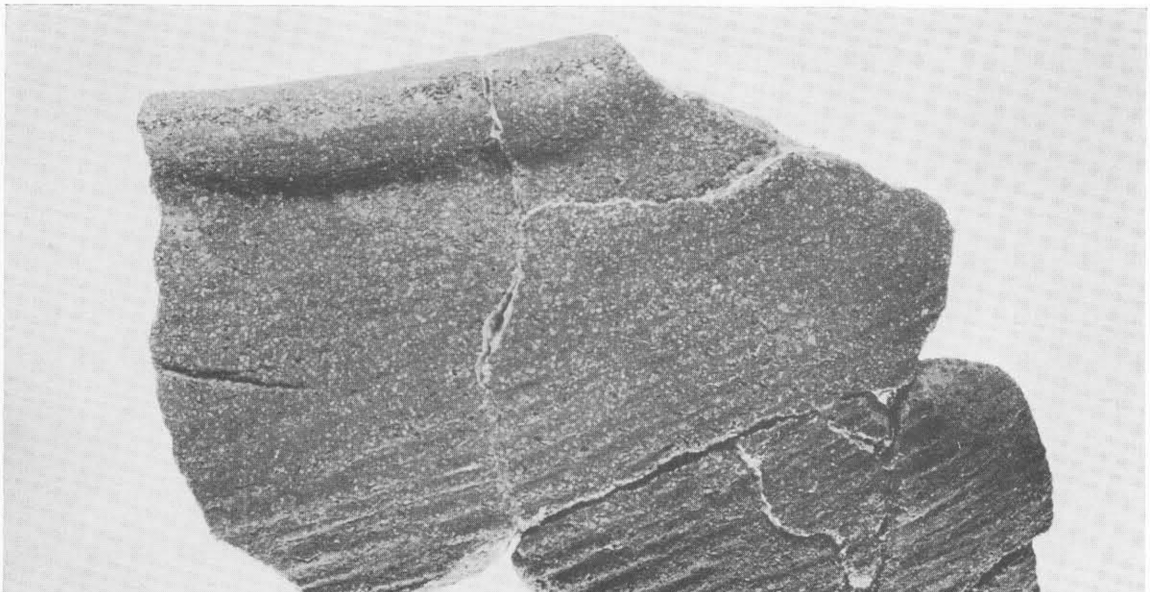


PLATE 15. Dressed northern face of bulldozer cutting, looking west, SU-Va-2, Vailele.

PLATE 16. Stone pavement in square B-10, SU-Va-2, Vailele.

PLATE 17. Rim and part of body of pottery vessel carrying surface decoration, from layer F-lb, SU-Va-4, Vailele.

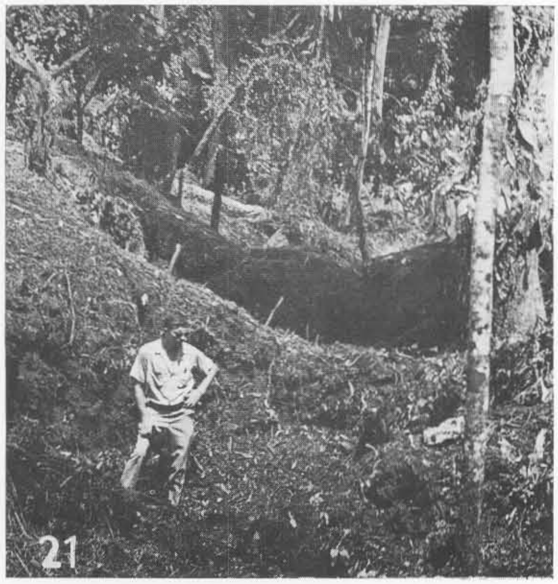
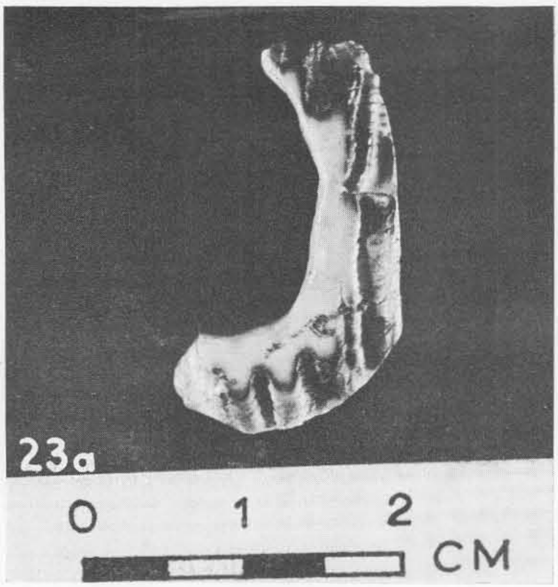


PLATE 18. Earthen terraces on Tula-i-Matafale ridge, Luatuanu'u, Upolu.

PLATE 19. Earthen terrace, site SU-Lu-21, with house pavement (rear) and stone enclosing wall (foreground), Luatuanu'u, Upolu.

PLATE 20. Curbstones in *'ili'ili* pebble spread of house pavement, SU-Lu-21, Luatuanu'u, Upolu.

PLATE 21. Pits forming part of main lower defences at fort SU-Lu-41, behind Luatuanu'u, Upolu.



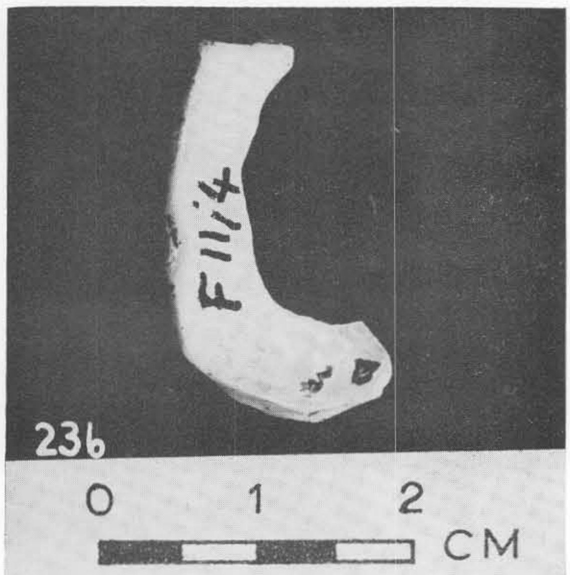
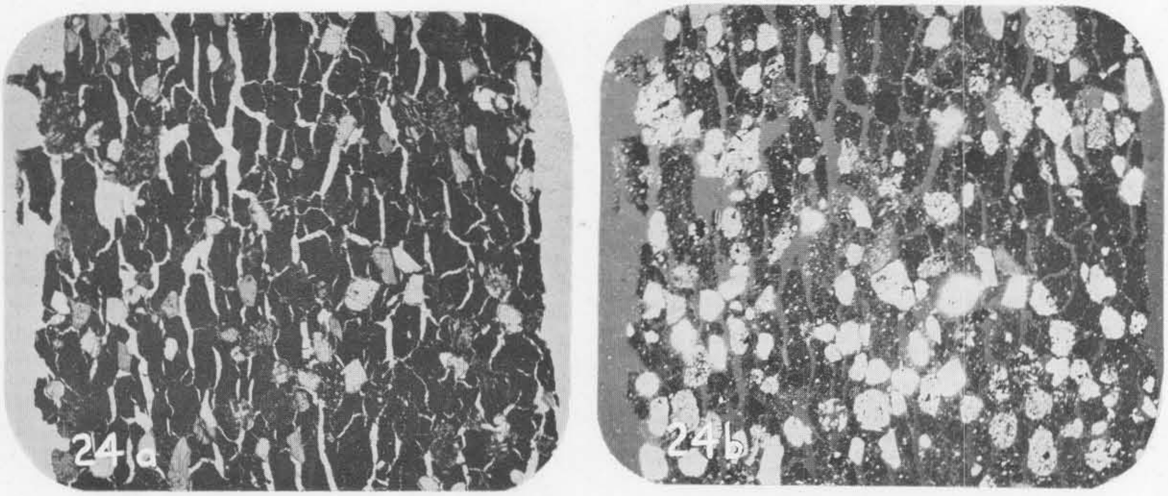
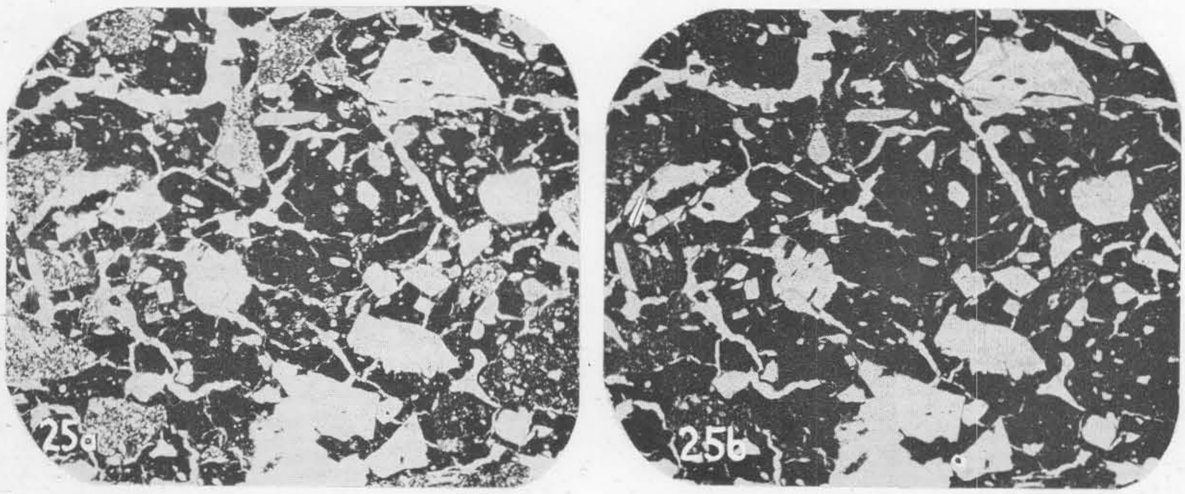
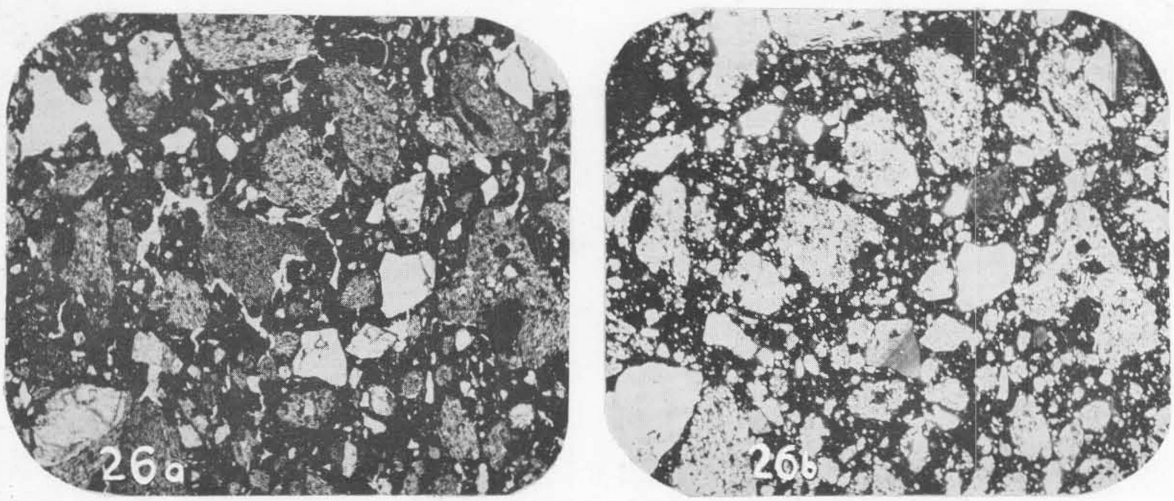


PLATE 22. View of beach at Lotofaga, Upolu, where excavations B and C, SU-Lo-1, were carried out.

PLATE 23. Two views of fishhook fragment F 11/4 from layer 10e, excavation A, Su-Lo-1, Lotofaga, Upolu.







Thin-section photomicrographs of sherd slices by R. P. Laniz showing typical temper sands of the three types observed in Samoan potsherds from Vailele and Falefa. Magnification about 8X.

PLATE 24. Ferromagnesian basaltic temper. a. in plain light. b. under crossed nicols. Sherd no. 25-8, Falefa valley.

PLATE 25. Feldspathic basaltic temper. a. in plain light. b. under crossed nicols. Sherd no. 16-1, Vailele.

PLATE 26. Feldspathic trachytic temper. a. in plain light. b. under crossed nicols. Sherd no. 16-3, Vailele.