

**ARCHAEOLOGICAL FIELDWORK IN
WEST NEW BRITAIN, PNG**

June-August 1997

Reported by

Dr. Robin Torrence¹ and Dr. Bill Boyd²

NOTE: This report summarizes PRELIMINARY results compiled immediately following fieldwork. For confirmed and accurate data, please consult publications.

1. Division of Anthropology
Australian Museum
6 College Street
Sydney, NSW 2000
Australia

2. Faculty of Resource Science
Southern Cross University
P. O. Box 157
Lismore, NSW 2480
Australia

This project is affiliated with the PNG National Museum and Art Gallery.

SUMMARY

The aim of our research in West New Britain is to reconstruct the history of settlement, subsistence, and trade during the past 6,000 years. The research combines archaeological studies directed by Dr. Robin Torrence from the Australian Museum, Sydney with analyses of ancient environments directed by Dr. Bill Boyd of Southern Cross University, Lismore. In 1997 they were assisted by a team of specialists, university students, and volunteers from Australia, Papua New Guinea and the United States. During six weeks of fieldwork we (1) made maps; (2) conducted surveys; (3) excavated 40 test pits; (4) collected soil samples for the analyses of ancient plant fossils; (5) carried out geomorphological studies aimed at reconstructing landscape history; and (6) recorded rock engravings.

On Garua Island four new archaeological sites were discovered. An unusual form of stone tool was found at site FAAT and cup marks were recorded at new sites FAAU and FAAV. The most important discovery were rock engravings on large boulders at site FAAS. Rock art sites are rare in West New Britain and petroglyphs have not been recorded previously in the Talasea region. In addition, survey and coring at site FAAH on Namundo Plantation has clarified the coastal history of the site and provided important new data for reconstructing the history of vegetation in this region.

The Garua project is important because it has introduced a new methodology into Pacific archaeology. Archaeologists usually study 'sites,' which are thought to have been villages or camping places. These are defined as relatively small and discrete areas where high concentrations of artifacts have been found. Obviously people did not carry out all their activities in single places, even permanently occupied villages. We have therefore expanded our study to include the whole landscape and to study a wide variety of settings.

To achieve our aim, we have excavated numerous test pits which are distributed widely over the island, rather than concentrated in a few locations. This new approach has enabled us to learn a great deal more about ancient settlement and subsistence practices. We are beginning to show that during the past 6,000 years there have been significant differences in the way people have perceived and used the landscape on Garua Island. These results significantly improve our understanding of prehistoric life in Papua New Guinea.

PARTICIPANTS

Dr. Robin Torrence, Dr. Jim Specht, Australian Museum, Sydney

Dr. Peter White, James Stevenson, University of Sydney

Dr. Bill Boyd, Niall Boyd, Southern Cross University, Lismore

Ken Mulvaney, Northern Territory University, Darwin

Rhondra Harris, University of South Australia, Adelaide

Karen Holmberg, Columbia University, USA

Robert Mondol, Alois Kuaso, National Museum and Art Gallery, Port Moresby

Daniel Gono, Joseph Kabul, Wai Tombe, Isabella Abiari, University of Papua New Guinea

Brenda Senior, Mosa, WNB

Ann Ryan, Port Moresby National High School, Port Moresby

Diogo Rau, California USA

Emma Josty, Bedford, England

ITINERARY

June 8 Torrence to Port Moresby.

June 9 Specht to Port Moresby.

June 10 Specht and Torrence meet with staff at National Museum and are briefed by the Director, Soroi Eoe, on plans for new museum facilities and park.

June 11 Torrence and Specht to Walindi Plantation; meet with Nick Thompson, New Britain Oil Palm Pty, Bob Wilson, Numundo Plantation, Brenda Senior, Mosa, and John Namuno, West New Britain Provincial Cultural Centre.

June 12 Torrence, Specht, Senior meet with Les Hartwig at Garua Plantation to plan research strategies, accommodation, etc. Mulvaney arrives at Walindi Plantation.

June 13 Torrence, Specht, and Mulvaney assemble equipment and supplies. Remainder of team arrives (Harris, Holmberg, Stevenson, Ryan, Gono, Kubul, Tombe, Kuaso).

June 14 Team transfers to Garua Island. Set up headquarters, unpack equipment, etc.

June 15 Begin archaeological research on Garua Island.

June 19 Torrence assists at teachers' in service day at Gigo Primary School, Kimbe.

June 22 Senior joins team on Garua Island.

June 23 UPNG students (Gono, Kubul, Tombe) return to POM.

June 26 Specht and Torrence to Kimbe, collect truck from Mosa, and then meet White and Boyds at Walindi Plantation.

June 27 Team with John Namuno survey and sample environs of FAAH, Numundo Plantation.

June 28 Specht, Ryan, Senior leave Garua and return home.

July 4 Kuaso returns to POM.

July 9 Boyds, Torrence, and Mulvaney assisted by Senior take environmental cores from mangrove swamp near FAAH on Namundo Plantation.

July 10 Boyds leave for Rabaul. Mondol joins team on Garua Island.

July 12 Rau arrives on Garua Island.

July 17 Team visits hot river, Garu village, Kimbe. Abiari arrives on Garua Island.

July 24 Fieldwork finishes; begin packing up.

July 25 Visit and seminar by John Namuno and Sydney University architectural students.

July 26 Stevenson, Harris, Kuaso, Holmberg, White, Abiari leave Garua Island.

July 28 Torrence, Mulvaney, Mondol take equipment and artifacts to Kimbe for storage/shipping.

July 30 Torrence et al. meet with Martin Metta, Station Manager, Talasea. Torrence talks to students at Hoskins High School.

July 31 Torrence, Mondol, Mulvaney return to Port Moresby and present seminar to staff at the National Museum

August 1 Mulvaney to Darwin. Torrence gives Distinguished Lecture at the University of Papua New Guinea.

August 3 Torrence to Sydney.

FIELDWORK IN 1997

Garua Island is an important place for archaeological research for at least three reasons: (1) two sources of obsidian are found on the island and were used extensively in the past; (2) previous work shows that the island has been occupied for a very long time; and (3) over the years our extensive geological research has provided us with an excellent understanding of the volcanic layers of ash which are very important for interpreting and dating archaeological units. Since we can use our knowledge of the stratigraphy to compare and contrast buried soils all over the island, we are pioneering archaeological methods which are novel for Papua New Guinea.

In 1996 we began a new programme of archaeological research that aims to find out how prehistoric life on Garua Island has changed over the past 6,000 years. The archaeological layers are divided into three chronological periods which are separated by thick falls of ash from two major volcanic eruptions: Witori WK-2 eruption at c. 3,600 years ago and Dakataua at 1,100 years ago.

Period 1: c. 6,000 - 3,600 years;

Period 2: 3,600 years - 1,100 years;

Period 3: 1,100 years up to the present day.

In order to build up a detailed prehistory, we are asking **two basic research questions**, for each of the 3 periods.

(1) Where did people carry out their various activities?

(2) How did they obtain their subsistence-- e.g. through collecting food, gardening and/or trade?

Previous archaeological research on Garua Island cannot adequately address the first question because in our previous work the location of archaeological material was not studied systematically. Only sites exposed accidentally by road building, quarrying, or erosion have been recorded and excavated. Our new work aims to go far beyond the information from these incidental finds. By searching across the entire island for ancient villages and fields that have been buried by ash from previous volcanic eruptions from Dakataua and Witori, we will gain a better picture of where people carried out their various daily activities. The analysis of micromorphology and plant samples in the soils collected from the test pits provides the necessary data for studying prehistoric subsistence patterns. Trade is studied by analysing the obsidian tools from the excavations.

The 1996 fieldwork season initiated the programme of landscape sampling with 29 small test pits which were distributed widely across the Mt. Hamilton side of the island (Figure 1). In 1997 we concentrated our efforts on the opposite side, which is dominated by Mt. Baki. Thirty-

nine test pits were excavated during six weeks in June and July (Figure 2). We also completed a north-south transect linking FSZ and FYS as well as an east-west transect beginning on the highest point on the island on Mt Hamilton and running to the coast at FCY. Sampling in Area D was extended to include coastal locations. Our work at site FAS was carried out as part of the wider geomorphological study of coastal change.

The results of the 1997 fieldwork are summarized in the remainder of this report in terms of five major activities:

- (1) Test pit sampling;
- (2) Mapping and surveying;
- (3) Rock art recording;
- (4) Geomorphology;
- (5) Survey and sampling at FAAH.

Test Pit Sampling

One of the main objectives of the Garua archaeological project is to understand the long-term history of human land use. During the past two years we have been collecting data which will enable us to evaluate a set of hypotheses put forward by Torrence in a number of research papers. Torrence argued that shifts in the obsidian technology as well as in the spatial patterning of artifacts could be observed on the basis of excavations at sites FRL at Bitokara Mission and FSZ, FAO, and FAQ on Garua Island. She then argued that a change from a highly mobile way of life, in which there were no "villages" or long-term occupations, to one with "villages" that were settled for increasingly longer periods of time could be inferred on the basis of these data. The major change was proposed to have occurred between Periods 1 and 2 followed by a minor reorientation between Period 2 and 3. The primary causal factor put forward for these changes was a slow, gradual intensification in subsistence practices, defined as an increase in the amount of food obtained per unit area of land. One of the primary aims of the current fieldwork is to test these hypotheses by examining the spatial patterning of artifacts across ancient landscapes on Garua Island. To do this we have excavated a series of test pits located in a wide range of environmental settings and distributed throughout the island.

In order to excavate test pits in as many different settings as possible, given our restricted resources and time, we have designed a sampling strategy. The island was divided into a nested set of zones based on geology, stream catchments, physiography and topography. We then chose samples which included all the identified zones and which attempted to reflect their relative abundance on the island. To allow us to incorporate data from previous fieldwork in 1992-5, the same excavation techniques were employed. Excavation was by hand within natural stratigraphic units dug in 10 cm. thick arbitrary units. All soil was sorted by hand since the heavy soils cannot be dry sieved. In 1996 twenty nine pits measuring one square metre and one at half that size were excavated in the region surrounding Mt. Hamilton (Figure 1). The 1997 season of fieldwork therefore concentrated on the Mt. Baki side of Garua Island, but also

completed two transects running across the island: a north-south transect through Areas A and B and an east-west transect from the highest part of the island to the coast, between Areas A and C (Figure 2). Additional work was carried out on the coastal plain in Area D and near sites FAS and FCY in order to investigate the apparent lack of sites with early Lapita style pottery on the island. Thirty-nine test pits were completed in 1997. In the final analyses of landscape variation, we will have a very substantial sample by combining the roughly 40 one metre pits excavated at so-called 'sites' in 1992-5 with the 69 'off-site' test pits from the 1996-7 fieldwork seasons.

Table 1 shows the distribution of the 1997 test pits among physiographic regions and topographic settings, presents the quantity of obsidian and ceramic artifacts recovered, and indicates where soil samples were taken. As in 1996 all the pits excavated, as well as gully sections and auger holes studied were scored by Torrence and Boyd according to the following variables: physiographic region, topographic setting, altitude, distance from sea, base geology, aspect, slope gradient, slope shape, adjacent topography, and visibility of the middle horizon. Geographical and stratigraphic data from well over 100 locations from the 1993-7 fieldwork seasons has now been collected. Analyses of our very substantial data base will proceed over the next few years.

At this stage a number of important observations can be made on the basis of data collected in 1997. Probably the most important finding is that the distribution of archaeological material across the landscape observed in 1996 was not replicated by the 1997 fieldwork, especially for Period 2 (compare Tables 2 and 3). In other words, there appear to be significant differences in the use of the landscapes studied in 1996 and those in 1997. This result emphasises the need for a very comprehensive sampling strategy in studying prehistoric land use. In our case it has been shown that samples from the region surrounding both volcanic centres on the island (i.e. the Hamilton and Baki cones) are required to obtain a representative picture of human land use on Garua Island as a whole. For example, contrary to our initial assumptions that Areas B (Hamilton) and G (Baki) would prove to have similar archaeological records because their physiography is directly equivalent or that the hinterlands of sites FSZ and FAO would be identical because both are located on relatively isolated, coastal hilltops, we found significant differences in the quantity of Period 2 obsidian artifacts and ceramics from the Hamilton and Baki sides of Garua Island. An interpretation of these differences is discussed below.

In contrast, the astounding wealth and wide distribution of artifactual material over the surfaces of the ancient buried landscapes on Garua Island was confirmed by the 1997 programme of test pit sampling. As in the previous year, artifacts were recovered from nearly every excavation unit in every test pit. What is also surprising is the relatively large quantities of material recovered from settings normally given little attention by previous archaeological research in the Pacific region: e.g., the inland zones. Since artifacts are so abundant. In future

analyses absence or scarcity of artifacts is likely to be as important, if not more so, than the presence of cultural material.

The abundance and widespread distribution of archaeological material on Garua Island have two important implications for Pacific archaeology. Firstly, it is no accident that archaeologists have found "sites" in places where they expected them to occur, since artifacts appear to occur almost anywhere on the landscape. For this reason studies of site location and settlement patterns that do not include testing of all physical settings are likely to be invalid. Secondly, it is clear that activities involving the use of artifacts on Garua Island were not limited to so-called "sites," i.e. places which have a very high density of cultural material. To understand the broadest possible range of human actions, one must sample a very wide spectrum of landscape forms, including areas which might be considered "off-site."

Despite the widespread distribution of artifacts within the test pits, there are significant differences through time in the relative abundance of material in test pits and in the location of artifact clusters. An initial test of Torrence's hypotheses concerning changes in human land use can be carried out by analysing the nature of artifact discard across space for each of the 3 chronological periods identified in this study: Period 1 is c. 6,000 - 3,600 years; Period 2 is 3,600 - 1,100 years; and Period 3 is 1,100 years up to the present day. Following the procedure adopted for the 1996 report, the average quantity of obsidian per 10cm thick spit for each period represented in a test pit was grouped into 3 classes: 0-6 pieces = Low; 6-60 pieces = Medium; and >60 pieces = High (L, M, H in Table 1). Table 2 summarises the results for the 1997 test pits and the combined 1996 and 1997 data are presented in Table 3. Table 4 lists the results of chi-square analyses of chronological changes in the abundance of obsidian using the total sample. In summarising the results of the 1997 fieldwork, two aspects of the data will be considered. Firstly, the degree to which material is clustered in space relates to the presence or absence of discrete "sites" and is one indication of the degree of settlement mobility. Secondly, the distribution of artifacts in terms of physiographic or topographic zones provides a measure of where various activities occurred.

The 1997 data replicates the results from 1996 concerning the distribution of obsidian artifacts in Period 1. Once again deposits belonging to this period are very well preserved throughout the island and are equally well represented in most physiographic zones and in all topographic settings. Not only are Period 1 deposits ubiquitous, but there is very little difference in the quantity of material represented in each test pit: nearly all the samples are scored as "High." The significant exception to the overall pattern are samples from the coastal plain. Most of the "Low" rankings are derived from this physiographic zone. Geomorphological research suggests that there was very little, if any coastal plain on Garua Island at this time. It is also worth noting that the alluvial fans present FCY and possibly FAS (see discussion of Geomorphology below), appear to have been unstable and may not have been particularly suitable places for human activities.

In general Period 1 deposits contain much higher quantities of obsidian artifacts than those in Periods 2 and 3. Whereas for Periods 2 and 3 a "High" rating may be in the range of 60-100 artifacts, Period 1 samples often contain several hundred pieces of worked obsidian. Whether the considerably higher densities of material can be explained by a longer period of exposure for the Period 1 landscape, or reflects a change in the rate or strategies of stone tool manufacture and use in Periods 2 and 3, merits further attention in future analyses.

These data suggest that there is a very even spread of material across the Period 1 landscape, possibly reflecting a pattern of land use characterised by very little differentiation in terms of the location of activities. There are, for example, no obvious places that were occupied longer than anywhere else and therefore seemingly no "villages." At this stage of the analysis, these data lend support to the Torrence's hypothesis for high mobility at this time.

Turning to Period 2, the 1997 data are significantly different from the 1996 results. Whereas in 1996 only 25 per cent of the pits were ranked as "High," nearly half of the 1997 test pits fall into this category. The reason for this change is quite interesting. As noted in the 1996 report, test pits located in the coastal zone were most likely to contain "High" concentrations of obsidian dating to Period 2. Only 17 per cent of the sample, however, was placed in coastal locations, because it was felt that the 1992-3 fieldwork, which was concentrated in coastal settings, provided a biased picture. In contrast, of the 1997 test pits, 44 per cent are within the coastal zones. Not surprisingly, then, the 1997 sample contains a higher proportion of pits with abundant obsidian than does the 1996 inland focussed sample.

For characterising the degree to which obsidian is clustered in space, the grouped data presented in Table 3 probably represent the best available sample of past behaviour. What is important in examining the data are the percentage distributions among the classes, rather than the quantities themselves, since the length of time represented by each period is not equal. Although the pattern is not as striking as that reported in 1996, there is a definite shift in the distribution of obsidian between the three periods. Note that the chi-squares comparing Periods 1 and 2 and also Periods 2 and 3 are highly significant (Table 3). The data exhibit a marked change from an even distribution of high densities of obsidian in nearly all locations for Period 1 to a more clustered pattern in Period 2: only 38 per cent of the test pits are characterised as "High abundance" in Period 2. What this suggests is that usage of the landscape has become differentiated such that the majority of obsidian producing activities were carried out in a relatively few places. This trend continues into Period 3 since the proportion of "High" densities in relation to the rest is further reduced and there is a greater contrast between the "hot spots" and the rest of the landscape which has generally low quantities of obsidian.

The long-term trend from a widespread to a more clustered pattern of obsidian artifacts supports Torrence's hypothesis for a gradual decrease in settlement mobility and an increase in the length of occupation of particular places, because with longer term occupation, a greater number of activities would have been focussed in one location, rather than spread around the landscape. On the other hand, despite an increase in the degree of clustering, obsidian artifacts

were discarded over a significant proportion of the landscape in all periods. At no time were there large empty spaces, devoid of artifacts, and by implication of human usages. What will be important in future, more detailed analyses of the obsidian assemblages will be a comparison of the nature of the activities represented in the Period 2 and 3 clusters versus those responsible for the more dispersed materials.

In terms of the location of activities within each period, it has already been noted that in Period 1, all areas appear to have been used to the same degree. In contrast, during Period 2 there is a focus on places within the coastal zone, although there are no examples from beaches or reefs as might be expected during the time of Lapita style pottery. As discussed below, the Period 2 shoreline is not represented in the areas that were sampled. When one considers the distribution of pottery (Table 1), the coastal bias is also pronounced. The highest density of ceramics was recovered from test pit D7, which is situated on the coastal plain. Of the 5 other localities with more than 10 sherds, 3 are coastal and a fourth, G11 is perched on a cliff top directly above Malakuka Bay and is therefore quite close to the sea. This leaves G12 as the only truly inland pit with relatively abundant pottery.

The difference noted above concerning the Hamilton and Baki sides of the island are largely explained by the lower altitude of the inland plain on the Baki side (e.g. compared to the sampled inland plain on the Hamilton side in Area A and most of Areas B and C) and in terms of relative proximity to the coast (compared Figures 1 and 2). Area G test pits contain considerably higher densities of pottery than the 1996 sample of test pits in Area B, although the physiographic setting of both is quite similar. Area G, however, is bounded by the coast on the east and Malakuka Bay on the west, whereas the Area B test pits were located much further from the shoreline. Clearly, unlike Period 1 for which material is spread uniformly across different zones, in Period 2 activities involving the discard of obsidian and pottery were concentrated near the coast.

In terms of ceramics, the 1997 test pits produced some surprising new information about colonisation during Period 2 that are worth noting. Although our work on Garua Island has shown that during the time in which pottery was used in this region, people appear to have moved their activities from a primarily beach setting during the early, "Far Western" style of dentate stamp decoration up onto coastal hills (e.g. FSZ, FAO), we had not found much evidence for use of the inland regions, with the exception of a few sherds in 1996 test pit C5. In the 1993 field report and an unpublished paper Torrence and Summerhayes had proposed that the move to easily defensible hills was due to social change. This hypothesis appears to be in need of serious revision given our 1997 season which explored the hinterlands of sites FSZ and FAO as well as the inland plain in Areas G. Much to our surprise, pottery was recovered, often in small numbers, from nearly all the test pits excavated in 1997 (Table 1). Furthermore, considerable quantities were obtained from three test pits in Area G (G2, G11, G12) which are located on relatively low ridge tops within a relatively level plain.

Three previous conceptions about settlement pattern during Period 2 require correction. Firstly, the spatial distribution of pottery is not as highly localised as was expected, but is spread across much of the landscape. The distribution is not even, however, as there are definite concentrations which might relate to "settlements." Secondly, the densities of pottery, as with Period 2 obsidian, are mainly coastal in orientation but are on hills and cliffs as well as near beaches or on the coastal plain. Thirdly, it seems likely that there are some Period 2 clusters of pottery and obsidian which are situated on relatively flat land on the inland plain. We suspect that what is being recorded in these data is the gradual recolonisation of the island by people who arrived at an unoccupied landscape following the disastrous effects of the W-K2 volcanic eruption. So far, all of the pottery recovered from the test pits appears to be very late: i.e. some fingernail impression and incision but mainly plain bodies and notched rims. Previous work on Garua dates these forms roughly too around 2400-2000 bp. Interestingly, it appears to have taken as much as a 1000 years or longer to gradually move the full set of activities into the interior of the island. We plan to undertake a detailed programme of dating in order to monitor the colonisation process in more detail.

In direct contrast, Period 3 has a distinctively inland orientation. All the test pits ranked as "High" abundances are in the inland region and 9 of the 11 test pits ranked as "Low" abundance (82 per cent) are located near the coast. This dramatic change from a coastal to an inland orientation in activities was not predicted before the research began, although a similar pattern has been reported by Gosden and Pavlides for the Arawe Islands. It seems most likely that a change of this nature is due to social factors with an increase in local conflict (?feuding, ?warfare) as the most plausible explanation.

The data from the 1997 test pit sampling when combined with the 1996 data set add support to Torrence's proposal for a gradual decrease in mobility and an increase in the length of occupation of specific locations. Whether this pattern is due to an intensification of subsistence patterns involving a greater dependence of gardening as predicted by Torrence will need to be tested with different data. A number of planned analyses involving obsidian hydration and radiocarbon dating, studies of obsidian technology, plant fossils including phytoliths and starch grains are planned to further evaluate the meaning of the spatial patterns detected in this preliminary analysis of the data derived from the test pit sampling from 1996-7. In addition to the dating and artifact samples collected during the test excavations, soil samples were taken to assist the reconstruction of prehistoric environments and subsistence practices. Analyses of plant fossils, phytoliths and starch grains, will be used to find out what kind of vegetation was surrounding the test pit and if any root crops were used at this location. In 1997 soil samples were taken by Boyd and Torrence from the pits noted in Table 1. The samples were chosen to represent examples of levels with Low, Medium, and High densities of artifacts for each of the three periods in each sampling area. Samples of loose soil were collected from within 4 mm thick units along a column located on one wall of an excavated square. Paired samples were taken for starch grain and phytolith analyses.

At this stage the results from the test pit excavations from 1996 and 1997 demonstrate that there were significant changes in the nature and location of human activities as well as in the social organisation of the groups which occupied Garua Island during the past 6,000 years. In addition, the distributional approach employed during 1996-7 has provided a very rich source of data that could not be obtained by traditional approaches which are based on "sites."

Rock Art Recording

A number of rock engravings or "petroglyphs" were found within 4 clusters of boulders located at the southeastern side of the island adjacent to a very steep cliff over looking a reef-fringed coastline. The four sets of boulders were assigned site code FAAS, whereas the test pits dug near this area have been assigned to the general Area G code, FAAQ, since there is no indication that they are associated. Investigation of the engravings was limited to clearing away the surrounding vegetation, photography, and tracing. Copies of the tracings of the main motifs have been deposited at the West New Britain Provincial Cultural Centre in Kimbe and the National Museum in Port Moresby. We made no attempt to examine the deposits adjacent to the boulders, although it seems likely that there are additional engravings buried by recent sediment since one of the motifs was partially covered. Ken Mulvaney was in charge of recording at site FAAS and the following descriptions are largely based on his field report.

Three of the 4 clusters of boulders are located either at the top or on the slope of a small ridge running roughly east-west from the cliff line. Area Z, located at the eastern end, nearest the cliff at the crown of the ridge, consists of two rough lines of boulders and covers an area of approximately 400m². The cluster of boulders at Area W is at the opposite, western end of the ridge about 70 m away from Area Z. At this point the boulders are spread down the gentle slope, covering an area of about 15m by 15m. Unlike Area Z, at Area W a few rocks are piled up on top of others. Area Y is located in a slight depression on the southern slope of the ridge about half way down the from the top. This is the smallest boulder pile measuring 10m east/west and 5 m north/south.

Area X, which is a very large pile of boulders, is located directly on the cliff edge about 80m southeast of area Y. A few large and smaller boulders extend southward along the cliff line from the prominent stack. On the land side the stack of boulders is 3.8m high, but from the top to the steep slope on the seaward side, the drop is nearly 8m and the cliff then falls steeply to the reef directly below. The full extent of this area was not cleared because of the steepness of the cliff, but an attempt was made to examine as many faces as possible. All the engravings appear to be on boulders on the cliff top and not on the steep slope.

The rock engravings can be divided into three classes: cupules, figurative motifs, and grinding hollows. Due to the absence of superimposition, the relative age of the various types cannot be determined. It is interesting, however, that they appear to respect each other's space with the cupules mainly on upper, more level surfaces and the figurative motifs always on slanting, nearly vertical surfaces. The grinding hollows were placed on horizontal slabs now located at ground level.

Cupules are the most common and widespread form at FAAS. They are small, shallow, rounded depressions pecked into the rock. In some, but not all, cases natural weathering in the surface of the banded, volcanic tuff has been modified to form the cupules. They can be distinguished from pitting on the rock caused by weathering because they have a regular shape with shallow depressions and are smooth with a curvilinear rather than an angular cross section. In contrast, natural pits formed through weathering are irregular in depth and outline and are very rough. The natural pits are also frequently aligned along fissures in the rock. Cupules are abundant in all four areas of the site. They cover the upper surfaces of nearly all the boulders, although in several cases they also occur on steeply sloping surfaces. At Area X there is an almost vertical panel with cupules which is also partially hidden by the rocks above. The cupules range in diameter from c. 12-47mm with an average of about 25-30mm. At Area Y there is a higher percentage of cupules in the 35-40mm range, particularly on one vertical face.

A total of 79 figurative engravings were recorded at FAAS. They occur in all areas except Area W, are abundant on the prominent boulder stack at Area X, and are rare in Areas Y and Z. The most common form are circles or rings: 38 in Area X; 2 in Area Y; and 1 in Area Z. At Area X there are also 12 circles with a depression pecked in the middle. Two concentric circles with a pecked central depression (cup and ring) were observed in Area Z. Two concentric circles were noted 10 times in Area X. One three ring figure was found once in Area Z (partially buried by sediment) and two were observed in Area X. Three circles with a cross inside were noted only at Area X. A number of rarer motifs were also recorded: a U shape, a single triangle, two contiguous triangles, wavy and jagged lines, straight lines, and two perpendicular lines.

All the motifs are relatively small, ranging from 6-30cm with a median of c. 12 cm. Generally the single rings are between 6-10cm, the cup and ring c. 10-12 cm, and the concentric circles are the largest, averaging around 14-20 cm. Most engravings are placed within a single flat face of a boulder, although there are several examples at the top boulder in Area X which extend around the edge linking one panel with the adjacent one. This technique gives these designs a three dimensional effect lacking on the flat surfaces.

As noted previously, the figurative motifs are concentrated within Area X on the landward side. These motifs also appear to be less weathered than those not on other faces. A particular feature is the placement of what appears to be a group of three double, concentric circles such that two are above the other in a triangular arrangement that resembles two eyes and a mouth. This possible 'composition' occurs twice within Area X. One example occurs near the top of the boulder stack at Area X and has a wavy line above it and a jagged line down the side (see front cover of report). The other covers two adjoining faces of a boulder.

The third type of rock engravings are what can be loosely called "grinding hollows." These smoothed hollows and depressions are larger than the cupules and tend to occur at ground level on the horizontal surfaces of buried boulders. There are three distinct forms. The first are represented by two shallow grinding patches which were observed, one each at Area X and Area

W. They are in the order of 20 by 15 cm. The second category have deeper hollows: c. 2-4 cm. There are two each at Areas Y and W. In the case of these two types, it seems likely that the grinding hollows were used to prepare food or pigments. The hollowed-out portion of the third group, represented by a single example at Area W, is much smaller, only 5-7 cm in diameter. It occurs in the center of a flat boulder and is surrounded by smaller and shallower cupules. Its function is unknown.

The present rock surface ranges in colour from dark to light grey, but the unweathered interior is white. When the engravings were fresh, the colour contrast would have been quite striking and the patterns would have been visible from quite some distance, unlike the present situation. The age of the engravings is unknown, but given the relative softness of the stone, it is doubtful that they are extremely old. Three shell artifacts, cut pieces of clam shell, were found tucked into crevices in the stone at the back of the boulder stack in Area X on the seaward side. The nature of some of the cut marks look as if they had been made with a metal implement. John Namuno, WNB Cultural Centre, noted that Area X looked to him like an excellent place for women to refuge when in trouble with their kin. Whether the shell tools have any direct association with the rock engravings, rather than the boulder stack as a refuge, cannot be determined at this stage.

The simplicity of the motifs makes detailed comparison with other rock art sites difficult. On the whole, however, the designs are not dissimilar to other sites in New Britain. Some of the motifs (concentric circles, circle with a cross) have been recorded by Specht at a rock engraving site near Gloucester and cupules appear on top of the carved heads on Bali Island. None of the rock art sites in West New Britain have been dated. Additional library research will be carried out to put this site into the wider context of Pacific rock art. Further study and excavation at the site is warranted since it appears that some of the engravings are buried under recent sediments and therefore may be dateable by material in the overlying sediment.

Mapping and Surveying

Detailed topographic maps are essential for comparison and interpretation of the stratigraphy found in our widely-spaced test pits. Peter White completed contour maps of the locations sampled this year and tied new areas and test pits into our base maps. Mapping was carried out in Areas A, D, E, G, H and at sites FCY and FAS.

During every field season surveys are made around the coast and along Malaial Stream (FAP) to check for new exposures created by erosion. Surface collections were made in a number of localities as noted below. Four new "sites" were found this year. The detailed, systematic survey of the coast was finally completed and resulted in the addition of three new sites: FAAT; FAAU; FAAV. In addition, survey in Area G prior to test pit sampling identified rock engravings at four locations near the southeastern tip of the island: site FAAS. Finally site codes were assigned to three sampling areas: Areas G (FAAQ); Area H (FAAR); and the

plateau near the manager's housing (FAAP). These localities are described in more detail below.

Ceramics

Another attempt was made to discover the source of the distinctive ceramics found in 1996 on the beach at site FXO (plain bodies; squared, notched rims) but again no progress was made and this year very few pieces were recovered. It must be concluded that either the material is in situ, suggesting a beach level site possibly relating to the fresh water source at this location or, more likely, that the material is eroding from the slopes of the steep hill above it where deposits dating between the W-K2 and Dakataua eruptions were shown in our 1993 excavation to have been eroded prior to 1,100 bp. As in previous years a few plain, highly eroded sherds were also collected at FCY and FEK. A small number of plain ceramics were also found at site FAAL. Unfortunately, we did not have time to carry out a planned test excavation on the plateau above the FAAL beach to investigate whether the material had eroded from above. A thorough search of the gully which empties at this locality failed to find any intact deposits.

Stemmed tools

FAP

FAP and the gully associated with site FAAL were systematically surveyed on several occasions but we were again unable to find artifacts in situ, although they are abundant in the stream bed at FAP and on the outwash fan of FAAL. It seems unlikely that intact deposits will be located in the upper reaches of FAP where the majority of stemmed tools are found, because there is so much slumping on the sides of the gully. The absence of the W-K1 tephra in the upper reaches of the stream compounds the difficulty of locating artifacts in a dateable context. A number of stemmed tools, mainly of Araho's type 1, i.e. retouched blades, were collected in order to increase the type sample. No unusual forms were found this year.

Recent analyses using PIXE-PIGME to determine the source of the obsidian used to make the stemmed tools found in previous years at FAP have revealed that the majority of this tool type are made from the Kutau/Bao source and not the local raw material which outcrops in the lower reaches of the stream. The question then arises whether completed stemmed tools were brought to Garua, or if unworked raw material was imported to the island and stemmed tools were manufactured in this area. The latter hypothesis is supported by the relatively large quantities of unretouched blades present at FAP. In order to investigate this problem, we collected a sample of blades and other waste by-products from the stream. They will be submitted to PIXE-PIGME analysis in 1998.

FEK

Stemmed tools were found to be relatively rare at this locality this year, whereas conical, single platformed cores were numerous. There are no examples of these cores in previous surface collections and so a sample of cores, as well as retouched artefacts, were collected to increase the type collection at the National Museum. In addition, a sample of waste by-products were collected as part of the larger PIXE characterisation project.

FAAJ

We returned to this locality to reinvestigate the stone lines visible in the walls of the gully and to obtain a larger sample of artifacts from in situ contexts. Wal Ambrose, Australian National University, has recently carried out obsidian hydration dating on some of the artifacts collected in 1996. According to his preliminary results the age increases with depth of the stone lines and ranges between c. 4,000 and 8,000 years. His results confirm that the tools are in situ and that the W-K1 tephra is absent at this site. Unfortunately, one of the sections studied in 1996 is no longer accessible due to erosion. We relocated the stone lines but we unable to trace them more than about 1-2 metres in either direction. Deposits therefore appear to be preserved in a much smaller area that had been suspected on the basis of last year's survey. A small number of additional artifacts were collected, but the density of artifacts in the stone lines is very small and no retouched forms were retrieved. We concluded that further excavation at this locality would produce too small a sample to warrant the time and effort.

FAAL

A large surface collection was made here in 1996, but stemmed tools are still plentiful on the surface of this outwash fan. Type 1 stemmed tools (retouched blades) are common at this locality, but unlike the Malaiol stream site, type 2 artefacts are also fairly abundant, although they are smaller in size than at FAP. An unusual, bifacial, triangular form similar to one found last year was recovered. Also an eccentric form with two large notches which matches an example from the Bamba beach, FCH site was collected. A sample of waste by-products was collected for PIXE characterisation.

FAAT

A small scatter of obsidian artifacts was found on the beach at this location. Among them was an usual form of stemmed tool with a thick, narrow, pointed handle. The tool belongs to Araho's type 1F and has not previously been found on Garua Island before, although it is known from the mainland at site FCH.

Cup marks

Cup marks were found scattered on stones along the beaches opposite the end of the reef in Malakuka Bay (FAAU) and the southeast coast of the island (FAAV). The cup marks have been pecked into the volcanic rock (welded tuff). They occur both singly and in groups. Size

range is mainly from 10-30cm in diameter and 4-10cm in depth, although there are a few ranging up to 50cm in diameter at the southern end of site FAAV. These larger examples appear to be more weathered and are often on rocks which are no longer lying flat, suggesting that they are slightly older. The cup marks at FAAU are quite fresh and according to local residents are still used to pound up fish poison. There were no artifacts associated with either site.

Geomorphology

Current geomorphological research on Garua Island is directed to understanding the interaction between people and their physical setting during the past 6,000 years. This year's fieldwork concentrated on three themes:

- (1) examination of the coastal plain to determine the possibilities for human occupation;
- (2) continued study of Holocene surficial processes, with particular reference to the extent of tephra deposition and erosion as determined from the test pit excavations;
- (3) reconstruction of the gross topography of the Baki-Hamilton intermontane areas prior to the major Holocene tephra falls;
- (4) identification of a long sequence of Pleistocene and Holocene tephra.

Coastal Plain

Fieldwork concentrated on Area D and near sites FCY and FAS. A test pit was excavated at FAS on a slightly raised ground surface that had been hypothesised in the 1996 report as a raised coral platform dating to c. 5,000 BP. The results from the excavation, which were also supplemented by auguring, however, confirmed the stratigraphy in the FAS I test pit in 1993. At this point on the coastal plain there is a series of layers which post-date the Dakataua event which is not preserved here and which were mostly deposited underwater. This region therefore represents a very young coastal plain. We therefore conclude that the pottery found in the adjacent stream channel must be in a secondary context and is not from an old shoreline located nearby

Four sediment sections which were examined at Area D (D5 and 3 auger holes) provide evidence for several changes in sea level as follows.

1. During the mid-Holocene high sea level (c. 6,000 bp), the area witnessed growth of an off-shore coral reef and infilling of inter-reef areas with sand derived from onshore. The shoreline at this time would have been inland of its present position and possibly was near the foot of the hills to the north.
2. This was followed by a relative lowering in sea level exposing and killing the reef but with sandy areas still under water. The shoreline was inland from its current position and may have differed little from the previous period.
3. Around 3,500 BP, the W-K2 tephra was deposited into the water, infilled the bay, and covered the coral reef to form dry land. At the same time additional W-K2 tephra from the

surrounding slopes was redeposited into low lying areas. The shoreline probably extended beyond its present position.

4. W-K2 tephra was exposed and weathered to form a soil.
5. Dakataua tephra was deposited on dry land and then weathered to form a soil.
6. Due to a relative sea level rise around 650BP (dated by Webb in 1992), the W-K2 and Dk tephtras were eroded along the shoreline and replaced by a sandy beach deposit.
8. Partial infill of the eroded Period 2 coastline with slope wash has created a new, small coastal plain at this location.

The archaeological implications of this reconstruction are that during Period 1 the current coastal plain was open water. The plain was created at the onset of Period 2 and could therefore have been occupied by people using Lapita pottery. The rich deposit of pottery and obsidian in test pit D7 confirms the presence of people near the coast at this location. However, post-Dakataua erosion means that the Period 2 strandlines (beaches) have not been preserved in Area D. For this reason one would be unable to determine if a stilt village, such as those discovered in the Arawe Islands and associated with early Lapita pottery, had been situated in this part of the coastal plain.

The history of the coastal plain at site FCY (the site code has been extended to include the area stretching from beach to the foot of the cliffs at site FAAJ) is quite different from Area D. Interpretation of the sediment history here is based on two test pits and two spade and auger holes. In this locality the coastal plain is based on alluvial sediments from a very old fan issuing from a gully formed on the slopes of Mt. America. The base of the fan is a gravel bed, which at FCY II lies on top of an unidentified pumiceous, white tephra (? W-K1). That the fan is still active is demonstrated by the surficial gravel at test pit FCY I, which was abandoned after only 20 cm of excavation. The fan is composed of gravelly sand and gravel and was eroded shortly after the emplacement of W-K2 tephra. The W-K2 tephra was removed to various degrees in different places and the sand was then weathered to a sandy soil from which 4 small sherds of pottery were recovered in FCY II. The genesis of the plain was completed by the deposition of a very thick layer of Dakataua tephra on top of the sandy soil. No cultural material was recovered from above the Dk tephra.

The plain around FCY has therefore been subaerial throughout the ?mid to late Holocene. Since it has been an active gravel fan during most of this time, the area may not have been very attractive for human use until parts of it became relatively stable, as indicated by the patches of weathered sand (post W-K2). It is worth noting that in test pit FCY II no artifacts were recovered below the sandy soil. The seaward extent of the gravel fan and associated coastal plain was not determined by our investigations. It seems likely, however, given the presence of a low cliff (less than 1m tall) about 10-20m from the current high water mark that, as in Area D, an older shoreline has been eroded and this low lying area has been formed by very recent silting. We propose that the very eroded pottery found on the beach at FCY derives from the erosion of the coastal plain and not from site FAAJ on the adjacent cliffs as previously

hypothesised. Materials of Lapita age are certainly present in this region, although probably not in very high quantities. Systematic test pitting within the coastal plain would be required to find out the density and exact age of cultural material and to associate contemporary activities at FCY and FAAJ on the cliffs above. As with Area D, however, there is very little likelihood of finding materials associated with a stilt village or beach site.

Tephra Deposition and Erosion

Detailed study was made of the stratigraphy for test pits in Areas E, G, and H. From these analyses a number of observations can be made. To begin with, a post-Dakataua tephra was observed within the stratigraphy of a large proportion of the test pits. In 1996 it was noted that in many pits a lighter layer was observed superimposed on top of a dark soil which was formed on top of the Dakataua tephra. At that time Sullivan's hypothesis that the pattern was due to worm action was accepted. However, a closer look at the 1997 profiles revealed that in most cases there is a very small topsoil layer which has formed on top of the lighter layer. We now believe that we have identified a new tephra, which may be equivalent to the Wangore eruption of the Dakataua recognised by Machida *et al.* as subsequent to the Dk eruption, but as yet undated. A number of samples of the possible Wangore tephra were collected for geochemical analyses.

Secondly, unlike our observations in previous years, there is surprisingly little evidence for possible human-induced erosion in the test pits studied this year. Pits E1, G1, G12 and possibly G2 are notable exceptions. Secondly, it appears that the likelihood of erosion varies among the different tephras and so differences between periods may not be solely due to intensity of human land use as previously suspected. For example, the W-K2 tephra is present throughout the area, but appears to have been quite mobile and was systematically eroded from steep slopes, whereas the distribution of the Dk tephra is much more ubiquitous. It is proposed that possibly due to its texture and/or weather conditions after its emplacement, the W-K2 tephra was more susceptible to erosion than was the Dk tephra. The post-Dk tephra may also be less stable as it is also absent from the steepest slopes.

Thirdly, there is very little good evidence for erosion or human modification of pre-W-K2 soils in the 1997 test pits, except for pit E3. Fourthly, very intensive use of the soil is implied by the very dark, organic rich and stony Dk topsoil in pits G5 and G8 and the W-K2 topsoil in G10 and D7. Finally, the occurrence of the "new" tephra (post W-K2 and pre-Dk) which was first identified in 1993 is also quite patchy. It is best preserved in the flat saddle of test pits H1 and H2 where all the tephras occur undisturbed and are unusually thick. Interestingly, very few artifacts dating post W-K2 were recovered from these two test pits.

In summary, the very large sample of erosional profiles which we have assembled from the excavations from 1993-7 provide an excellent data base for comparing and contrasting the nature of erosion through time in a very broad range of topographic settings.

Baki-Hamilton Inter-Mountain Area

The area between the Baki and Hamilton volcanic cones forms a saddle of land which has been deeply incised by Malaiol stream. Given the presence of in situ archaeological deposits exposed along the stream bed, particularly in its lower reaches, the region has undergone a sequence of infilling prior to the modern downcutting. It is important to understand the geomorphological history of this region for two reasons. Firstly, we are interested in the effects of sea-level and coastal changes. For example, given sections observed in 1989, it seems likely that at some time sea level reached nearly up to the current exposures of obsidian outcrops near the excavation at FAP. Changes in the shoreline could be quite important for understanding obsidian procurement and land use in this region, particularly prior to the emplacement of the W-K1 tephra which sealed the source and quarry. Secondly, a large number of stemmed artifacts have been recovered from the Malaiol stream bed, particularly upstream from the obsidian sources. Despite much effort, we have not been able to find stemmed tools within dateable sediments in the cliffs along the stream. What is the source for these tools? Were they deposited in the context of human use on a presumed saddle region prior to Malaiol stream or do they occur within the redeposited colluvium which makes up the walls of the stream at present? Reconstructing the history of this area is one step forward in answering these questions.

John Webb had previously established a stratigraphy for the volcanic rocks and overlying tephtras exposed in the gulying of Malaiol Stream. The present study focussed on the geomorphological implications of this infill, with particular attention paid to trying to identify landscape history. In addition to observations made walking up the stream, six sections along the gully walls were studied in detail. The conclusions of this work can be summarised as follows.

1. Beginning from an unknown date there were two separate islands (Baki and Hamilton) with coral reef forming a barrier around their shores.
2. Uplifting and faulting of the reef followed by the deposition of pyroclastic flows infilled the reef to provide a dry saddle between the formerly separate islands.
3. In the ?late Pleistocene a succession of tephtras, each with soil development (see description of HIV below), further infilled the area forming a smoothed landscape with a very broad shallow valley between the mountains dropping to the sea on both sides.
4. Downcutting began forming several small valleys.
5. Deposition of Holocene tephtras (W-K1 to Dk) partially infilled the valleys. To the seaward end, there may have been mass movement of sediment on the coastal plain following erosion after the deposition of a pre W-K1 and the W-K1 tephtras (described in next section).

For archaeology the implications of this reconstruction are that the current gully is post Dk and likely to be very recent. For the majority of human prehistory the intermontaine area was a broad, shallow valley. The source of the artifacts now in the stream bed is most likely soils

formed on recent tephra. This implies that the valley was used fairly intensively during the time when the stemmed tools were in use (?between W-K1 and W-K2).

The work in 1997 was concentrated near the top end of the valley in Area H since this is the source for the majority of stemmed tools found in the stream bed. Additional studies concentrated on the lower reaches of Malaiol stream and the current coastal plain are required to work out the history of shoreline changes and the timing for the large amount of recent (i.e. post-W-K1 and possibly mainly post Dk) alluviation which is visible downstream from the obsidian source and FAP excavation.

Tephra Sequence at HVI

An important section c. 13m high section (HVI) has recently been exposed at the head of a branch of Malaiol stream. At this point a large number of tephra have been preserved within a small pocket in the underlying landscape. Since it provides the geological background to human land use, it was measured and sampled. Beneath the Dk, W-K2 and W-K1 tephra are a series of 7 tephra with soils, which are further underlain by a basement complex comprised of a weathered bedrock and a raised coral reef surrounded and partially overlain by a pyroclastic flow (described by Webb in 1992). The lower part of the sequence is also exposed in Boyd's sections HII-IV. It is hoped that the HVI section can be correlated with the other long sequences on Garua Island at FAAJ and FSZ.

A very small scatter of artifacts was observed beneath the W-K2 and W-K1 tephra. Unfortunately, we were unable to excavate at this locality because erosion has removed most of the deposit in the area where a small pocket of W-K1 is preserved. Only a small free-standing pinnacle of material remains.

Two unconformities which are important for human prehistory were recognised. Firstly, erosion appears to have taken place shortly after the emplacement of the tephra immediately preceding W-K1. It seems likely that the soil formed on this tephra underlies the W-K2 tephra in most of the test pits. A much more drastic period of erosion took place not long after the W-K1 tephra was deposited. Only a small pocket of this tephra is preserved at HVI. Based on the degree of soil development on top of the W-K1 tephra here, the erosion must have occurred early in the post W-K1 period. Given the almost total lack of W-K1 tephra on Garua, this was quite a massive period of erosion.

Survey and Sampling at FAAH

A very rich archaeological site was discovered at FAAH on Numundo Plantation during the 1996 fieldwork (Figure 3). The site comprises a small hill on which archaeological material was found interbedded among a series of 6 recent tephra. Lapita pottery is stratified between the W-K2 and W-K3 tephra and obsidian artifacts were removed from soils under both the W-K1 and W-K2 tephra. At that time a survey of recent terraces revealed that the artifactual

material was concentrated on the southeastern side of the hill. The site was revisited in July to assess the potential of archaeological excavation and environmental sampling at this location.

The 1997 survey on the road below the gully where the archaeological material was first discovered and to the northeast identified a small area at the most eastern end of the site that was slightly higher than the surrounding region. Ceramics (including a very worn piece with dentate stamped design) were found to be restricted along the road immediately below the rise (labelled FAAH on Figure 3). Given our experience from Garua Island and the distribution of pottery on the road, it seems most likely that the Lapita site is situated on this rise. It is in this region, therefore, where further excavation would be most profitable. Based on models from the Arawe Islands and Mussau Island in New Ireland, trenches should also be excavated at the foot of the hill to search for the likely possibility of an early Lapita site situated close to the lagoon.

The second objective of the survey was to locate evidence for sea level change in the vicinity of the site. Previous work by Machida suggested that the coastal plain may have been formed as a result of the emplacement of airfall tephra from the W-K2 eruption. On the other hand, the eastern end of the FAAH hill appears to have been abandoned after the fall of the W-K3 tephra, possibly because the site was no longer an offshore island. In other words, W-K3 may have been responsible for the formation of the current coastal plain. It is possible that settlement was relocated to the western end of the site as Machida observed artifacts in the road cutting there.

Survey was also undertaken along the drainage ditches running through recently planted oil palm blocks to the south of the site. We were unable to find the coral which has been reported to lie at the base of the main ditch. Probing revealed a layer of inter/subtidal muds overlain by two tephras. At locality 2 (Figure 3) the sequence of two tephras was observed to be overlying muddy sand with lenses of stiff clay and with a layer of timber. A sample of the wood, thought to be mangrove, was taken and has returned a radiocarbon date of 1550 ± 50 bp (uncal Beta-108147). The date indicates that the overlying tephra is W-K4, but geochemical tests are needed to confirm this hypothesis. In conclusion, it appears that the coastal plain was formed much later than had previously been suspected and after the abandonment of the FAAH Lapita site. Clearly, a detailed analysis of the history of the coastal plain is desirable and further survey work in this region is planned.

Initial survey of the mangrove forest and lagoon (visited by boat) indicated that there is a strong possibility of a long sequence of sediment being present in this area. Both contain at least 2 metres of fine mud with small shells and tephras. If continuous, stratified deposits are present in this locality, they could provide invaluable information about the sequences of environmental and vegetational changes following the emplacement of the Witori air-fall tephras. This record would provide the environmental background for interpreting abandonment and re-colonisation of the FAAH site and the wider region. Furthermore, there is

no pollen record for the whole of New Britain and very little is known about vegetational change in the lowlands of PNG.

An attempt to recover a core on the edge of the mangrove swamp (Figure 3) using plastic piping proved to be relatively unsuccessful due to the lack of suitable equipment and the presence of thick layers of tephra. We hope to return to the site in the future with more sophisticated equipment which will have to be brought from Australia. It may also be valuable to attempt to remove a core from the lagoon, although that will involve more elaborate coring equipment, boats, and the construction of a platform. In the meantime, the upper part of the sequence which was removed will be assessed for the presence of plant fossils, including pollen, phytoliths, and starch grains.

FUTURE PLANS

The major programme of test pit sampling which was planned to investigate landscape history on Garua Island has now been completed. The Australian Research Council funds for this work terminate at the end of 1997. In the immediate future our work will be focussed on analyses designed to reconstruct environmental change and human use of landscapes: e.g. dating by radiocarbon and obsidian hydration, stratigraphy, stone technology, use-wear residues, obsidian characterisation, ceramics, and studies of the plant fossils and soil micromorphology. A monograph bringing together the results from the 1992-3 and 1995-7 field projects is planned.

There are, however, a number of unsolved problems that would benefit from further fieldwork, if funds become available. In particular, the study of coastal change on Garua Island and the search for beach deposits contemporary with Lapita pottery would benefit from a wider use of auguring, especially within the coastal plain along the western side of the island. Secondly, excavation at a number of coastal Lapita sites is warranted to increase the sample of early Lapita sites (only FYS is currently known on Garua). The rich deposit located at D7 is a prime candidate for further research as is the region around FCY where Lapita age beach deposits may still be intact. Thirdly, excavation in Area G near G11 or G12 is required because we lack data on Lapita settlement from an inland setting. Due to the high density of ceramics at these two localities, they are prime candidates for future excavations. Fourthly, although the search for in situ deposits with type 1, stemmed tools has been very unsuccessful, there are a number of possible avenues still open for research. For example, the catchments surrounding FAP and especially FAAL could be further explored and sampled. It is possible that too much emphasis has been placed on the places where redeposition has occurred, rather than searching in the wider region. Fifthly, excavation at the rock art site, FAAS, might help date the art by locating engravings buried under dateable deposits. It would also be interesting to investigate the nature of archaeological material in direct association with the engravings to see if there is any evidence for ritual use of this locality.

One of the results of the landscape study will be a predictive model for changes in the location of activities through time. Archaeological research has rarely been carried out to evaluate the conclusions of a major project. It would be quite exciting to return to Garua Island in the future and test the models which result from the current research.

In contrast to Garua Island, research at the Numundo Plantation site FAAH and its environs has just begun. Clearly, there is an interesting story about the relationship between volcanic disasters, coastal change, and human settlement that could be uncovered from a fairly extensive programme of excavation at the site and environmental research in its environs. Nick Thompson, managing director at New Britain Oil Palm, Pty has shown support for our proposals for further work. A grant proposal has been submitted to the Australian Museum for further coring in 1998. We also plan to seek funds from a number of granting agencies for a major field project to begin in 1999.

SIGNIFICANCE OF THE GARUA ISLAND PROJECT

The Garua Island research project is important because it is the first systematic study in Papua New Guinea of prehistoric communities who quarried and traded obsidian. We are also collecting much new information about how people lived in West New Britain in the past 6,000 years. The work is especially significant because it can be inferred from marked changes in the distribution of artifacts across the island that there were major shifts in how the landscape was used and perceived by people in the past. The finding of rock engravings, which are very rare in this region, adds an important extra dimension to the study of how humans have attempted to modify their environment to conform with their world view.

Although Pacific archaeologists have suspected that the ancient past was different, there are very few detailed studies like this one which consider the past 6,000 years in such depth. Our work on Garua Island is one of the few attempts in Papua New Guinea to understand whole landscapes, rather than small, isolated locations through large scale, exploratory excavations. To achieve this aim, we have undertaken a range of relatively new methods in Pacific archaeology: e.g. analyses of phytoliths; starch grains; and soil micromorphology. The results of our work are not limited to Garua Island or West New Britain but are important for archaeology in the Pacific region as a whole.

COMMUNICATION OF RESULTS

At the beginning of the field trip Torrence and Specht visited the National Museum in Port Moresby in order to return material which has been thoroughly studied and to discuss fieldwork plans. At that time we also discussed plans for the expansion of the National Museum with the Director, Soroi Eoe and his staff. Torrence also met with Professor Hugh Davies, University of

Papua New Guinea, and made arrangements for a Geology student, Isabella Abiari to join the team.

In West New Britain Specht and Torrence advised John Namuno at the Provincial Cultural Centre about cataloguing and storage of artifacts. The team also met with him on several occasions to brief him on our results. Namuno also visited the new rock art site on Garua Island. A full scale tracing of the main motifs at the rock art site was presented to the Cultural Centre. A full photographic record was made of the mortars and pestles in the Cultural Centre collection to assist the National Museum with its survey of these artifacts. Torrence also met with Martin Metta, Acting Station Manager for Talasea several times during the course of the fieldwork.

Torrence gave two short talks in West New Britain. First, she assisted John Namuno with a teachers' in service day at Gigo Primary School. Secondly, accompanied by Mulvaney and Mondol, she talked to 60 geography students at Hoskins High School. Torrence met with Nick Thompson and Bob Wilson of New Britain Palm Oil to describe the results of exploratory fieldwork at the FAAH site on Namundo Plantation and with Vince Freedman and Nick Lyons of Kimbe Bay Shipping to explain the work on Garua Island.

On completion of the field trip, Torrence and Mulvaney gave a seminar about the rock art site to staff at the National Museum. A full scale tracing of the main motifs at the rock art site was presented to the museum. Torrence delivered a public lecture entitled "Volcanic Disasters and Human Settlement in West New Britain," at the University of Papua New Guinea. Torrence also discussed the results of the fieldwork with Dr. John Muke, Professor Hugh Davies, and students from the University of Papua New Guinea.

ACKNOWLEDGEMENTS

A large multinational project of this type is highly dependent on the goodwill and assistance of a great many organisations and individuals. We thank them all. The project is sponsored by the Australian Museum and is funded by grants from the Australian Research Council and Earthwatch. Dr. White also received support from the University of Sydney. Abiari's airfare was provided by the Department of Geology, University of Papua New Guinea. We also thank our overseas volunteers who paid their own airfares and devoted so much hard work to the project.

We are especially grateful for the enormous support which we received in Port Moresby and in West New Britain. As always we have benefited in numerous ways from our affiliation with the National Museum and Art Gallery. Alois Kuaso joined us for the first time and Robert Mondol was again an invaluable member of the team and organiser of local work crews. We especially want to thank Pamela Swadling for help with permits and hospitality in Port Moresby. We also acknowledge Michael Laki of the National Research Institute for his prompt and efficient handling of our research permit request and for assistance with obtaining visas.

We are once again indebted to the Provincial Government and residents of West New Britain for permission to work in the area, their moral support, and for technical assistance. John Namuno and the staff of the Provincial Cultural Centre in Kimbe offered much support and invaluable advice. Max and Cecilie Benjamin of Walindi Plantation and Resort have once again made a substantial financial contribution towards our accommodation and transport. Their continued interest and encouragement of our research is much appreciated. We are also grateful to the Walindi staff for their never failing cheer and goodwill toward their very unusual guests. Shannon Seeto, manager of the Kimbe Bay Marine Conservation Area, kindly provided a boat and driver which were invaluable for examining the potential of the Namundo swamp for coring.

We are especially grateful to Ivan O'Hanlon, Vince Freedman, Nick Lyons, Fidelma Babe, Dorothy Kadeu, Gordon and Margaret Gunther, and the many employees of the Kimbe Bay Shipping Agency and associated companies who gave their enthusiastic support and assistance to our project, permission to work on Garua Plantation, and transport by road and sea. Nick Thompson and Bob Wilson of New Britain Palm Oil gave permission for our survey on Namundo Plantation and have donated aerial photographs of the FAAH site.

We owe a special thanks to Brenda Senior, the project patron, who acquired aerial photographs and delivered them to Sydney, dug with us, supplied furniture and household equipment, lent her vehicle, took us on an excursion, fed us on numerous occasions, provided enthusiastic support, but most of all gave us her friendship. We hope she will become a permanent member of our team.

Our successful fieldwork depended to a very large extent on the excellent hospitality, transport, and innumerable forms of technical assistance provided by Les Hartwig, manager of Garua Plantation. We greatly appreciate the extra effort to provide luxurious accommodation in two houses with plentiful water and early morning electricity even on Sundays! His ice cream will be enshrined in the history of archaeological research. We are extremely grateful for his tolerance of our frequent disruptions to his peaceful routine and for his interest in our work. We would also like to thank the employees who worked with us: Monica, Wipu, John, Ester, Didi, Abacou, Simba.

In Sydney we are very grateful to Ruth Dika, Niugini Tours, for her enormous patience, help with visas, airfares, accommodation, and for all the money she saved the project!

TABLE 2: Relative Abundance of Obsidian: 1997
(Based on Table 1)

OBSIDIAN ABUNDANCE	NUMBER OF TEST PITS					
	Period 1		Period 2		Period 3	
	No.	%	No.	%	No.	%
High	21	61	14	47	8	20
Medium	10	21	14	47	17	46
Low	2	6	2	7	12	34
Totals	33		30		37	

TABLE 3: Relative Abundance of Obsidian: 1996 and 1997

OBSIDIAN ABUNDANCE	NUMBER OF TEST PITS					
	Period 1		Period 2		Period 3	
	No.	%	No.	%	No.	%
High	39	64	19	38	13	21
Medium	19	31	20	40	27	44
Low	3	5	11	22	22	35
Totals	61		50		62	

TABLE 4: Comparisons of Relative Abundance of Obsidian for 1996 and 1997
(based on Table 3)

PERIODS	CHI-SQUARE	P<
1 and 2	26.921	.0001
1 and 3	70.779	.0001
2 and 3	10.084	.0065