RECENT ARCHAEOLOGICAL INVESTIGATIONS IN THE BISMARCK ARCHIPELAGO, ANIR – NEW IRELAND PROVINCE, PAPUA NEW GUINEA

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ABSTRACT

This paper presents the initial results of fieldwork on the Anir Island group, which is located 60 km east of southern New Ireland (Figure 1). The fieldwork is part of a larger project that aims to assess the significance of exchange and the nature of interaction in the colonisation of the western Pacific and its role in maintaining cohesion between far flung communities. Anir was selected for fieldwork because of its strategic position, being located between the Bismarcks and the Solomons in a chain of stepping-stone islands. These islands have played an important role in Pacific prehistory. We know that the earliest colonists to reach Remote Oceania moved down the Melanesian Island chain between 3300 to 3000 years ago, their settlements distinguished by a highly decorated form of pottery called Lapita. The long distance movement of stone is evident in these settlements with obsidian artefacts originating from different sources in the Bismarcks reaching the Solomons, Vanuatu, New Caledonia and Fiji. Anir is thus seen as a barometer for not only assessing change over time, but also the degree of interaction between the Bismarcks and islands to the east. The importance of the geographical location of the island should be reflected in the archaeological record.

BACKGROUND

The Anir Island group is made up of two islands. Ambitle and Babase (Figure 2). Both islands are volcanic, with raised limestone at the eastern end of Babase Island. The larger of the two, Ambitle, is 14 km in length and has a maximum width of 10 km; Babase being 10 km in length and having a maximum width of 5 km.

Lapita pottery was first found by a local plantation owner, Grahame Carson, while digging drainage ditches in Malekolon Plantation (White and Specht 1971). Ambrose subsequently undertook archaeological excavations at the Malekolon site (EAQ) in 1970 and 1971 (see Figure 2). Although little has been written on the excavations, the pottery was used by Anson (1983, 1986) in his formulation of a Far Western Lapita style and has proved central in setting a framework for interpreting the region in terms of changes to Lapita pottery. However, as will be presented below, major gaps remain.

MAJOR ISSUES

Of importance in addressing the nature of interaction and exchange is identifying the movement or transfer of materials found in the archaeological record. Attention has focused on pottery and obsidian and, to a lesser extent, shell. These three types of artefact are used to measure the degree to

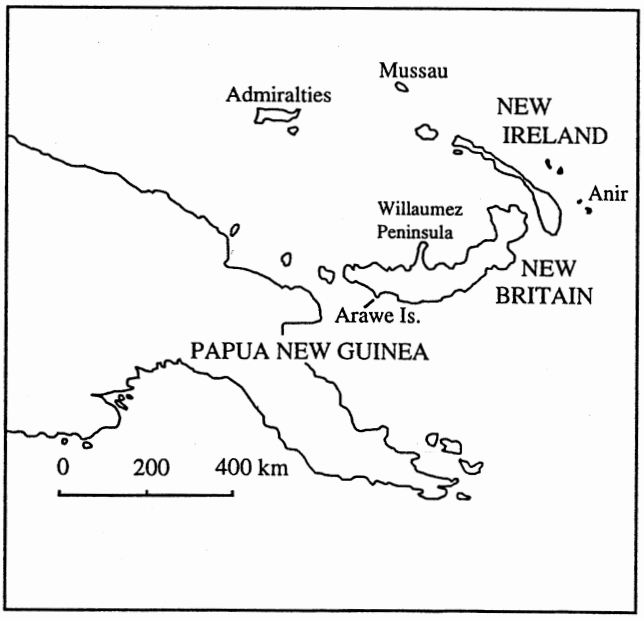

Figure 1: Map of Papua New Guinea.

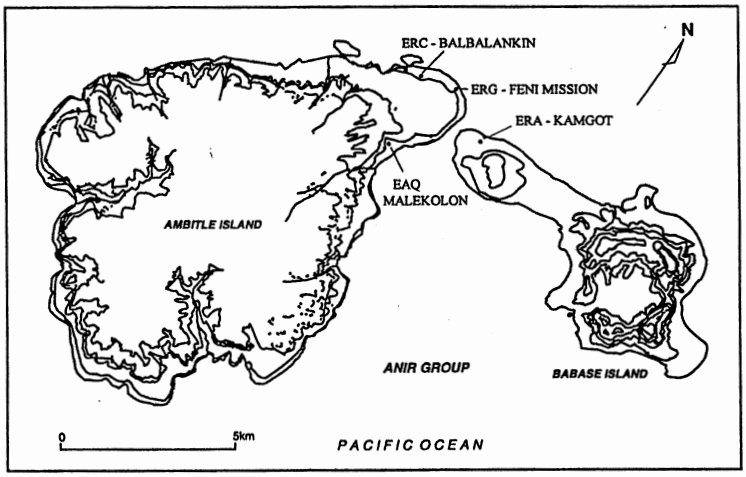

Figure 2: Map of Anir.

which exchange took place, or if it did not, the degree to which ideas moved between prehistoric communities.

Pottery

The project has two major aims. The first is to identify new Lapita pottery sites on Anir and to assess whether decorative changes found in the other main Bismarck assemblages, such as those from the Arawe Islands or Mussau, are also found here. Similarities in decoration, in particular dentate motifs, have been used by Pacific archaeologists to identify interaction and exchange between geographically-separated sites. It is argued that the move out of Near Oceania down into Remote Oceania is reflected in changes in decoration and vessel form. Indeed, stylistic provinces have been defined.

Put very briefly, the earliest Lapita pottery assemblages in the Bismarck Archipelago were called "Far Western". This style contained intricate dentate decoration on a wide variety of vessel shapes. This preceded a later "Western" Lapita style that is associated with the colonisation out of Near Oceania and down into Remote Oceania, to areas such as the southeast Solomons, Vanuatu and New Caledonia. Once people crossed the water barrier from Vanuatu to Fiji it was argued that a process of isolation occurred, as seen in the "Eastern" Lapita style of Fiji, Tonga and Samoa. A simplification of Lapita dentate design decoration was seen to occur over space.

Recent research, however, has shown that these stylistic provinces are the product of time and should be replaced with the terms Early, Middle and Late Lapita (Summerhayes 2000). It was intended that the analysis of Lapita decoration and form from Anir would help fine-tune the level of interaction with other Bismarck Archipelago assemblages and those further east.

The second aim is to assess the degree of exchange by using physico-chemical analyses on pottery. Were vessels made locally or not? With a strong database now set up for West New Britain and Mussau assemblages, the production strategies from Anir can be assessed. This is important as exchange is seen by some as a mechanism in explaining the similarity in pottery found across the Western Pacific. Terrell (1989), for instance, sees the distribution of Lapita pots as evidence of trade. Kirch (1988) envisages a formal exchange network. He sees exchange as an adaptive mechanism in the colonisation process forming a "lifeline" back to a homeland. This is linked with a society geared to status enhancement and prestige good acquisition and it was the latter that kept the exchange system continuing when the colonisation process was complete.

Recent studies on the West New Britain Lapita assemblages show that most Lapita pottery production was local. This suggests that any stylistic similarities were the result in an exchange of "ideas" (Summerhayes 2000). A study of Lapita pottery production from Anir will allow an assessment of the nature of exchange.

Obsidian

Obsidian from Anir in stratigraphically secure contexts is seen as crucial for confirming changing regional patterns of production and distribution. Obsidian has a naturally restricted occurrence. In the Bismarck Archipelago, obsidian is found in three regions: the Admiralties, the Willaumez Peninsula, and Mopir (see Figure 1). Within both the Admiralty and the Willaumez Peninsula sources, chemically distinct sub-groups are identified. Because of their restricted natural distribution and distinct chemistry, obsidian found in archaeological sites can be sourced back to their natural occurrence, thus providing important distributional information to the archaeologist.

Sourcing the obsidian within Lapita assemblages tells us something about "social distance" (see Green 1987). Sites at some distance from the obsidian sources have a mixture of both Admiralty and Willaumez Peninsula obsidian. The proportion is dependent not only on closeness to the source, but also on the nature of social distance between those communities within the exchange network. Changes in the proportion of obsidian over time thus represent the changing nature of social distance between those communities providing obsidian from the source, either directly or as part of the exchange link. Mussau, for instance, is much closer to the Admiralties than it is to the Willaumez Peninsula (see Figure 1). If nearness to the source were the only factor, then the Mussau assemblages would have contained one hundred percent Admiralty obsidian. Yet this is not the case.

In its earliest Lapita levels in Mussau (sites ECA and EKQ), obsidians from both the Admiralties and the

Willaumez Peninsula are found in equal number. Over time though, Admiralty obsidian dominates and the Willaumez Peninsular obsidian declines (see Kirch 1990). This could reflect a decrease in the social distance between the inhabitants of Mussau and those populations to the southeast that formally exchanged or brought in the Willaumez Peninsula obsidian. Sites close to the Willaumez Peninsula sources, on the other hand, have no Admiralty obsidian, and only three pieces were found in the Arawe assemblage (Summerhayes *et al.* 1998). Site locations in between, such as the Duke of Yorks and Watom, have varying mixtures indicating changing exchange links with the source areas (White and Harris 1997; Green and Anson 1991). Later sites on New Ireland, however, are dominated by Admiralty obsidian.

It was expected that obsidian in Lapita levels from Anir would allow these changes in exchange and social distance to be assessed and fine-tuned. If Admiralty Island obsidian is a late piece of the action and only found in large proportions with later Lapita wares in New Ireland, then any Early Lapita (Far Western) assemblages from Anir should be expected to be associated with West New Britain obsidian, or at least in equal proportion with Admiralty obsidian. Later sites on Anir should have a higher proportion of Lou Island (Admiralty) obsidian present.

Shell

It is hoped that Anir might contribute to what little is known about shell technology from Bismarck assemblages. On the basis of shell manufacturing by-products (unfinished rejects, manufacturing debris) and their lack in other sites, Kirch (1988, 1990) argues that the Mussau sites were making and exporting shell to other Bismarck Archipelago communities. At the Talepakemalai site, Kirch records the presence of manufacturing debris of *Conus* shell discs and rings, shell rings of *Tridacna,* and *Trochus* fishhooks. Such debitage is also present (unpublished) in the Arawe assemblages. Its presence or absence in the Lapita sites from Anir would help to model and assess the nature of shell exchange within this region.

FIELDWORK: FIELD SEASONS 1995, 1997, 1998

Four weeks was spent on Anir in July/August 1995, three weeks in February 1997, and six weeks in April/May 1998. The results of fieldwork on the following sites are presented:

EAQ – Malekolon
ERC – Balbalankin
ERG – Feni Mission
ERA – Kamgot

EAQ – Malekolon

The objective at Malekolon was to establish the geomorphological processes behind the site's formation. Ambrose found pottery half a kilometre inland and believed that the site was disturbed. The plantation is part of a "V" shaped valley, bordered on the north and south side by cliffs that join together on the western perimeter. To the east the area is bordered by the sea with an outlying reef just offshore. To get a handle on formation processes, test pits were excavated along an east-to-west transect from the beach to inland (Figure 3 and Table 1). Test pit 4 is located 10 m east of where Ambrose found pottery.

After analysing the nature of deposits a tentative history of site formation can be made. Test pit 4 was originally at the edge of an embayment. Twentythree hundred years ago the volcano on Ambitle erupted (Licence *et al.* 1987:274) and ash was deposited and subsequently eroded into the valley and built up behind the reef. This build-up acted as a dam with the clays from the top of the island eventually filling in the embayment. Evidence for the damming effect is seen in TP 1, 2 and 3. Apart from thin topsoil, TP1 contains over 3 m of built-up volcanic ash sitting on the coral bedrock. TP 2 and 3, on the other hand, are mostly clay, derived from the ash. TP 3 has a black sand layer beneath this clay. TP 4, which is further inland, was situated close to the original shoreline with the stratigraphy showing the light brown ash sitting on top of black beach sand. The black beach sand is 25 cm deep and is found 1 m below the ground surface. It overlays a white beach sand.

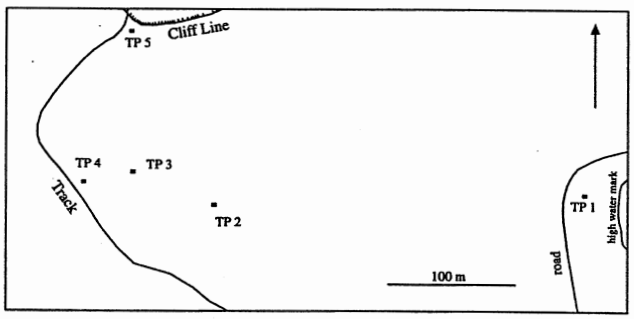

Figure 3: Plan of EAQ - Malekolon.

Table 1: EAQ. Placement of sites and heights above sea level.

Test Pit	Metres inland	Height above sea level
TP 1	25	3.3
TP 2	374	3.8
TP 3	444	4.6
TP 4	486	5.0

Artefactual material in TP 4 is abundant with 2559 sherds and 211 obsidian pieces excavated. The bulk of the material is found in the lower 40 cm of brown ash which overlays the black sand. Also found were a stone adze, a possible stone chisel and a few pieces of quartz and chert. Decoration on the pottery includes dentate stamping, linear incision, shell impression, striation and nubbins.

TP 3, which is culturally sterile, also has black sand but below a clay layer. The sand here is 40 cm below that from nearby TP 4. This test pit would have been located within the embayment at the time of Lapita occupation.

ERC – Balbalankin

Balbalankin is an area of raised flat land south of the hamlet of Farangot and extending towards the edge of the escarpment (Figures 2, 4). A garden area is located 140-180 m in from the sea and is littered with pottery. After a 15 minute surface collection by local children, over 500 sherds (27 decorated) and 26 pieces of obsidian were collected.

Eight test pits were laid out over a grid (Figure 4). The aim was firstly to find cultural material, and secondly, to understand the depositional history of the site. Test pit 1 is located approximately 180 m inland from the sea's high water mark. Its base is 2.74 m above sea level.

Over 1400 sherds were excavated (Table 2) from the test pits. Pottery decoration includes dentate stamping, linear incision, nubbins, appliqué and shell impression. Also found was one piece of chert, parts of two *Tridacna* armbands, earth oven stones and plenty of fish bone. Bone was also recovered from TP7, including a pig cranium cemented in the coral bedrock at the base of the excavation.

Cultural material is primarily found within a white beach sand layer located only in those test pits closer to the sea: TP 1, 3, 4, 5 and 7. This layer was covered by a light brown soil (ash). The depth of the sand layer varied with the deepest deposits in TP 3 and 5 only. The white sand layer was missing in those test pits closer to the escarpment (TP 2, 6 and 8) which had the light brown soil sitting directly on the reef.

Artefact densities are directly related to the presence/ absence and depth of the artefact-bearing coarse white sand layer, that is in turn related to the amount of uplift and subsequent taphonomic processes. The most northerly test pits, 3, 5 and 7, have the highest artefact concentrations. They also have the thickest deposits of the coarse white sand layer and the least tectonic uplift. Test pits 2, 6 and 8, on the other hand, have little if any of the coarse white sand layer, and fewer artefacts. Further details must wait until an analysis of artefacts and sands is complete. Suffice to say this site is important not only for its assemblage, but also for explicating the survival of assemblages by post-depositional processes.

Note that within the white sand layer bivalves were found in the death position in association with finger coral. This indicates that either (a) the finds were originally deposited into water from above, such as a stilt village, or (b) original occupation was on the shoreline.

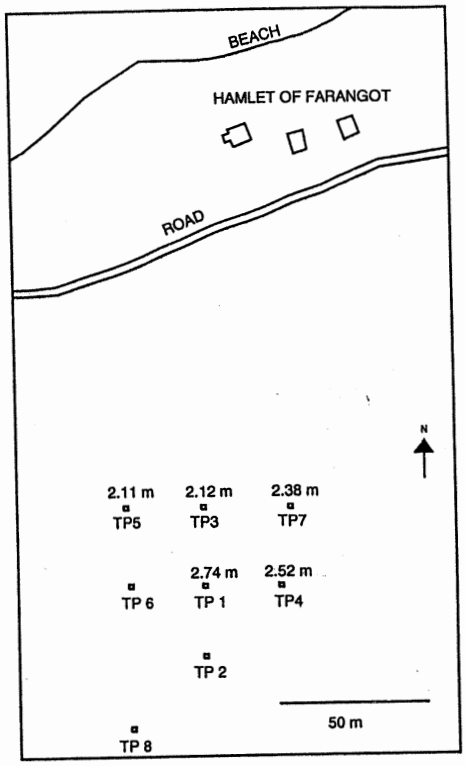

Figure 4: Plan of ERC - Balbalankin (with height above sea level for selected test pits).

Table 2: ERC. Distribution of sherds and obsidian at Balbalankin.

Test Pit	Sherds	Obsidian
TP 1	434	55
TP 2	59	3
TP 3	264	31
TP 4	102	8
TP 5	124	17
TP 6	144	52
TP 7	264	35
TP 8	25	3
Total	1416	204

ERG – Feni Mission Site

A single 1 x 1 metre test pit was excavated behind the Feni Mission. It was intended to ascertain the rate of uplift for this section of the island. The mission is situated on the northeastern tip of Ambitle, next to Salat Strait that separates Ambitle from Babase Island (Figure 2). The mission area is flat and wide, 170 metres from the beach front to the beginning of the slope towards the escarpment.

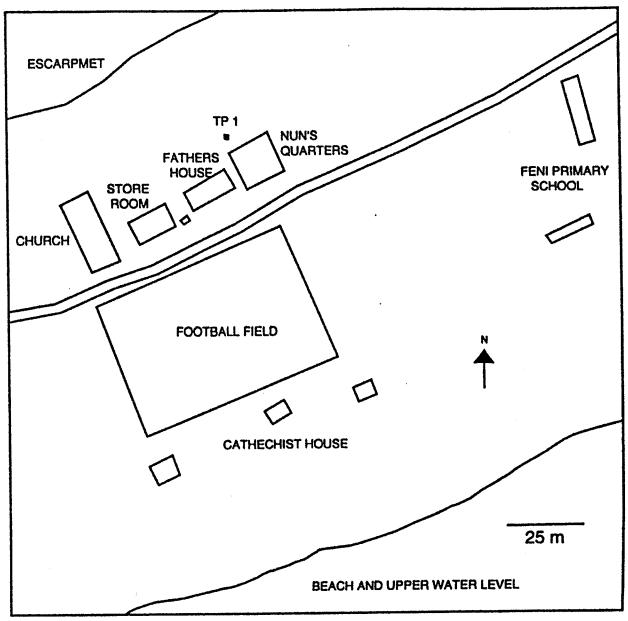

Figure 5: Feni Mission - ERG.

Test pit 1 was located 4 m behind the nuns' quarters, and 135 m in from the beach. It is 5.4 metres above sea level (see Figure 5). The stratigraphy is basically clay that becomes stickier with depth. Limestone bedrock is reached at 110 cm depth.

Five-hundred and sixtynine sherds and 113 pieces of obsidian were found in TP 1. No material was found in the bottom 10 cm. The pottery looks eroded and probably redeposited. Decoration includes dentate stamping, linear incision, applied bands and flat knobs. From a cursory examination, the dentate decoration is more open and loose. It fits in with the Middle Lapita (Western) pottery from other Bismarck Archipelago sites.

ERA – Kamgot

The area to the north and east of the limestone rise at the western end of Babase had been earmarked for extensive archaeological surveying in 1997. Due to past uplift it was hypothesised that this low-lying area was once either underwater, or the water's edge was further inland. It was ideal to find evidence of Lapita occupation. During community discussions on the nature of the survey, Bruno Sianlon from Kamgot showed me pottery he had recovered from digging a well south of the hamlet. He had attended a community discussion I had previously had in 1995, and kept the pottery to show me. The well was found 114 m south from the high tide mark. It was abandoned when the coral was hit. The pottery was Early Lapita (Far Western) in decoration.

Seventeen test pits were spread over a distance of 200 m in a grid (Figure 6). All pits are 1 x 1 m, except for TP 2 which is 2 x 1 m. Surface pottery was also found for a further 200 m east of the last TP. Further excavations are planned for 2000.

A number of points can be made about this site. Firstly, the site is large and extends over 400 metres in an east-west direction, 60 m in a north-south direction. Secondly, the cultural deposits are primarily found in an orange/brown sand layer overlying a white beach sand. Over 14,000 sherds and nearly a thousand pieces of obsidian were found (Table 3). Thirdly, this layer thins out from west to east. The deepest deposits (1.4 - 1.6 m) are in the western portion of the site: TP 1, 2 and 17. Fourthly, the density of material is directly related to the thickness of layer 2. Finally, the thickness of layer 2 is directly related to the amount of tectonic uplift. The greatest uplift is towards the eastern end of the site. For instance, the base of TP 17 is 2.35 m above the high water mark, TP 2 is 2.4 m, TP 1 is 2.54 m and TP 15 is 4.25m.

Apart from pottery and obsidian, a variety of shell artefacts are found: part of 17 rings (*Tridacna* and *Trochus*), ten fishhooks (*Trochus* and ?pearl shell) including a fish hook reduction sequence, two shell *Tridacna* adzes, one perforated pendant, numerous *Conus* rings, a shell pendant and nine shell beads. Shell debris was also found, the by-products of manufacturing shell tools. Other artefactual materials include an abrader made from echinoid spine, a shark tooth, a coral pendant (with a drilled hole), a coral file, a chert flake, two drilled dog teeth, an engraved bone, two stone adzes and earth oven stones. Also found are fish bones and teeth, burnt shell, crab shell, a pig incisor and mandible, and plenty of shell. This is an extremely important

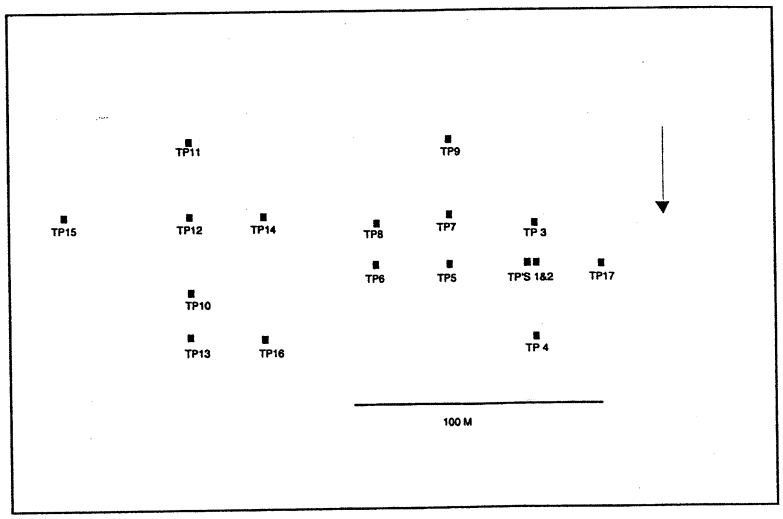

Figure 6: Plan of ERA - Kamgot. Bruno Sianlon's abandoned well is located between TPs 1 and 2.

Table 3: ERA. Distribution of pot and obsidian at Kamgot.

Test Pit	Sherds	Obsidian
TP 1	3106	103
TP 2	5866	188
TP 3	195	39
TP 4	24	2
TP 5	1090	57
TP 6	40	8
TP 7	48	22
TP 8	115	14
TP 9	737	30
TP 10	404	142
TP 11	106	85
TP 12	75	37
TP 13	148	30
TP 14	500	82

Lapita assemblage, on a par with the Arawe and Mussau assemblages in terms of cultural richness.

RESULTS

Although detailed analysis is still taking place, some preliminary results on the pottery, obsidian and shell are to hand which have a bearing on the nature of Lapita interaction and exchange.

Pottery Decoration and Form

The percentage of dentate pottery in an assemblage can be used as a crude temporal indicator (see Green and Anson 1991 for Watom). For instance, earlier research on West New Britain Lapita assemblages demonstrated that the number of dentate sherds is directly related to the number of particular vessel forms. Early sites have a higher proportion of dentate bowls and stands (Early Lapita), while later sites (Middle and Late Lapita) contain fewer bowls and stands and a have slightly higher proportion of dentate jars. The rest of the assemblage in terms of vessel types remains the same (Summerhayes 2000: Chapter 10). Thus, by identifying the percentage of dentate pottery in the Anir assemblage, some preliminary observations can be made.

First, in a comparison with Arawe and Garua Island assemblages, only ERA (Kamgot) has a high percentage of dentate stamping on a par with the Arawe Early Lapita (Far Western) sites of FOH squares D/E/F and FNY. Kamgot has between 8 and 11 % of dentate stamping, while the Arawe Early Lapita sites vary between 4 and 9% (see Table 4). The percentage of dentate is not available from Mussau.

Table 4: Percentage of dentate sherds from Bismark assemblages.

Site	Sherd No.	% dentate
Anir		
ERA Kamgot TP 1	3106	11.11
ERA Kamgot TP 2	5866	8.06
ERA Kamgot TP 17	2083	10.37
ERC Balbalankin	1416	1.03
ERG MISSION	569	0.18
EAQ Malekolon	2459	0.53
Garua Island		
FSZ	2978	2.22
Arawe		
FOH sq. D/E/F	10169	3.0
FOH sq. G	2883	0.9
FNY	2420	8.64
FOJ	6998	

Secondly, the other assemblages from Anir (ERG, ERC and EAQ) have a low percentage of dentate decoration. This is on par with the Middle Lapita (Western) Lapita assemblages from the Arawes and Garua Island. All three Anir assemblages have linear incised, shell impressed and appliqué decoration. Of interest is the placement of EAQ with ERG and ERC. The EAQ pot assemblage was used by Anson (1983) to define the "Far Western" tradition.

Changes in the proportion of vessel forms from Anir are also similar to the Arawe assemblages. Although analysis is not yet complete, preliminary results are available for the EAQ (Malekolon) assemblage and the Sianlon collection from ERA (Kamgot). From EAQ and ERA, only 35 and 40 sherds respectively were large enough to determine shape. Although the numbers are small, some interesting similarities with the Arawe assemblages are seen (Table 5). The vessel profile from ERA fits well with the Early Lapita (Far Western) assemblages found further west, except for one

Table 5: Percentage of selected vessel forms per assemblage.

Style	Site	Bowl	Carinated Jar	Globular Pot	Stand
Middle (Western) Lapita					
	FOH Adwe Sq. G	6%	63%	18%	2%
	FOJ Apalo	14%	50%	1%	7%
	EAQ Malekolon	14%	60%	25%	0%
Early (Far Western) Lapita					
	ERA Kamgot	36%	36%	10%	12%
	FOH Adwe sq. D/E/F	21%	33%	14%	8%
	FNY Paligmete	32%	21%	6%	1%

major difference. Here, 50% of all jars have dentate decoration compared to just 7% in the Arawes. The percentage of dentate on bowls is 88% (14 of the 16), which also fits the Early Lapita Arawe assemblages (Summerhayes 2000). The vessel profile from EAQ, on the other hand, fits well with the Middle Lapita (Western) Arawe assemblages (see Table 5).

Pottery Production

Characterisation and petrographic analyses have not yet been undertaken. However, preliminary results on fabric analysis using a low power microscope have shown a reduction in fabrics over time. The ERA pottery was made using a variety of fabrics. Ferro-magnesium fabrics make up 67% of the assemblage, while light fabrics make up 28%. Calcareous fabrics make up a small 4%. Other Anir assemblages, on the other hand, are predominantly made from one fabric. From EAQ, ferro-magnesium fabrics make up 97% of all pottery. From ERG, 81% of the pottery is made up of ferro-magnesium fabrics, and the rest are made up of light fabrics.

This trend is not unlike that occurring in West New Britain and Mussau. That is, there is reduction in production centres over time that occurs at the same time that dentate decoration becomes less complex (Kirch 1990: 123; Summerhayes 2000). As noted below, these changes occur at the same time that a change in the distribution of obsidian occurs.

Obsidian

A total of 186 obsidian pieces were analysed using proton-induced x-ray and proton induced gamma-ray emission (PIXE-PIGME). The results show that the proportion of obsidian from different sources changes over time (Table 6). Obsidian from ERA is predominantly from Willaumez Peninsula sources (80%) while the rest came from Admiralty sources. EAQ and ERC, on the other hand, have predominantly Admiralty obsidian. ERG falls in between with 56% from West New Britain and 44% from the Admiralties.

These results confirm a change from an east-west to a north-south obsidian distribution network over time. As predicted, Willaumez Peninsula obsidian is found in these early contexts with Early Lapita pottery. Also, like Mussau, the proportion of Admiralty obsidian increases over time.

Table 6: Distribution of obsidian by source area per site.

Site	No. analysed	% of population	Willaumez Peninsula	Admiralties
EAQ Malekolon - TP 4	89	42%	36%	64%
ERC Balbalankin TP 1	24	44%	33%	67%
ERG Mission	25	22%	56%	44%
ERA Kamgot – TP 1	48	47%	80%	20%

Anir thus follows a similar pattern of obsidian exchange like other assemblages in New Ireland and Mussau.

Shell

Evidence of shell debitage was found in the ERA assemblages. This included *Tridacna* (adzes and armbands), *Conus* (rings), and *Trochus* (rings and fish hooks) debitage. Shell bead blanks were also found. This is similar to that found in both the Arawe and Mussau assemblages.

CONCLUSIONS

Although the analysis of the Anir assemblages is still under investigation, some interesting trends are seen that fit the pattern of Bismarck Lapita assemblages. First, pottery production on Anir is not unlike that from Mussau and Arawes. There is a change in the decoration of pottery from Early to Middle Lapita that is associated with both changes in vessel form and production.

The results back up a statement made earlier in this paper that such similarities within the Bismarck Archipelago are no doubt connected to socially related groups with strong communication ties. Similar changes in form and decoration equate with similar uses of the pottery. This is not what could be expected from a socially passive design that is the result of exchange and the result of contact between socially unrelated groups who produce a similar pottery. Mussau, the Arawes and now Anir are part of a social network in which changes in decoration and vessel form, and therefore use, occur at the same pace. It can be argued that pots do not move – people and ideas do.

Obsidian, on the other hand, does move. It is exchanged and the pattern of this distribution reveals a complex scenario that adds depth to the nature of interaction between societies. By looking at the proportion of obsidian from the Admiralties and Willaumez Peninsula found in these Bismarck Archipelago sites, we can start to see that exchange patterns between New Ireland and New Britain form into two obsidian networks at the same time that decoration changes from Early (Far Western) to Middle (Western) Lapita. Measuring changing proportions of obsidian reaching an area over time is important in ascertaining the changing nature of exchange and regionalisation developing the Bismarcks.

Further analyses will seek to confirm the initial patterns outlined above. First, radiocarbon samples have been sent for dating to test the tentative sequence outlined above. Secondly, petrographic and chemical analyses will be undertaken on the pottery to confirm if manufacture was local or not, and to identify the production strategies

employed and their change over time. Thirdly, an extensive analysis of pottery decoration and form will be undertaken on all the assemblages. Yet, as these initial investigations show, the archaeology of Anir is proving an important link in understanding the past of this region.

ACKNOWLEDGEMENTS

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