A STYLISTIC ANALYSIS OF THE MANGAASI TRADITION, CENTRAL VANUATU

A THESIS SUBMITTED TO THE GRADUATE DIVISION OF THE
UNIVERSITY OF HAWAII IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

IN ANTHROPOLOGY

AUGUST 1982

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ABSTRACT

This study is an attempt to apply a decorative motif analysis similar to those used successfully in the past with the Lapita ceramic tradition on the Mangaasi ceramic tradition of central vanuatu. Definition was made of those elements which typified the tradition. These elements were then applied to other ceramic assemblages from the western Pacific.

Definition of the Mangaasi tradition allowed for re-examination of the Mangaasi site assemblage and extra-areal comparisons with other incised/applied relief traditions. Results indicate that the Mangaasi site was intact, as originally deduced by Garanger. Strong associations were found between the various assemblages within Vanuatu, indicating that the Mangaasi tradition was common throughout central Vanuatu. Other results indicate a strong relationship between the earliest layer at the type site and assemblages from both Fiji and New Caledonia.

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I. INTRODUCTION

The purpose of this study is to apply the methods of ceramic analysis used in the past on the Lapita Tradition (Poulsen 1971; Mead et al 1975) to the Mangaasi Tradition. It is anticipated that this study will aid both to accurately define the Mangaasi incised/applied relief pottery tradition and also examine possible inter-relationships between the Mangaasi Tradition and other incised/applied relief assemblages recovered in the Pacific. In addition, the information generated in this study will be used to examine the contentions of Graeme Ward that the Mangaasi site materials need to be re-interpreted (Ward 1979; Garanger 1971).

As the use of decorative design system analysis has assumed wide popularity in Lapita studies in the Pacific, a brief discussion of this form of analysis with cautionary notes is included. Illustrated and detailed description of the specific design categories used in this analysis will be provided, as will the rationale behind the units selected for examination. Results will be discussed both at the level of conclusions reached within this specific study and finally with an integration of this study into the larger perspective of Western Pacific prehistory.

II. HISTORICAL BACKGROUND

As the orientation of this work is towards a specific areal analysis, a general survey of the literature on the pottery present throughout the western Pacific will not be made. In any case this would be a largely redundant activity, as is has been thorougly covered in recent publications.

The earliest European accounts of pottery in Vanuatu are those of the Quiros Expedition which visited the islands in the early 1600's. They noted that:

> "The natives make from a black clay some very well-worked pots, large and small, as well as pans and porringers in the shape of small boats. It was supposed that they make some beverage, because in the pots and in cavities were found certain sour fruits." (Quiros 1904:269)

On Espiritu Santo (from where Quiros made his observations) pottery is still being produced (Shutler 1971).

In the 1930's a rising interest in determining the origin of "Pacific peoples" led to detailed examination of the then available ethnographic and archaeological material with emphasis on the material culture of various island populations. Based on the then popular diffusionist theories of single-point invention and dispersal, various

patterns of single-point migration for the Pacific were formulated. Two examples of this approach were those of Heine-Geldern (1932) and Speiser (1946) (Shutler and Shutler 1967:94-95). The most detailed and complex study dealing specifically with the Melanesian area was Reisenfeld's The Megalithic Culture of Melanesia (1950).

While the approach used by Riesenfeld has fallen in disrepute, much of his work is still valuable both as a general source and for his suggestions of the possible ties among various Melanesian pottery assemblages.

> "And in spite of many dissimilarities, particularly in ornamentation, between the prehistoric and the recent coiled pottery (in Melanesia) we can conclude that the recent coiled pottery is but a perpetuation of the prehistoric pottery, and that its modifications are accordingly due to the various racial and cultural intermingling of its introducers, the stone-using immigrants, and apparently also to a development of its own...That the coiled pottery in the whole of Melanesia actually forms a relatively homogeneous element belonging to one and the same culture is moreover confirmed by the fact that it is alike, to a certain extent, even in shape and function." (Riesenfeld 1950:638-639)

The dangers of such a limited approach as the diffusion-migration theory are visible in Riesenfeld's work, which naturally had to deal with the available material of the time:

> "It further ensues from our investigation that the Papuans originally had no knowledge of pottery at all, which explains why in the west, south and the interior of New Guinea - the very centre of the Papuan tribes - pottery is completely non-existent. This might seem to be a somewhat surprising conclusion, since the Papuans have a neolithic culture, but it is quite consistent when it is recalled that it was the stone-using immigrants who introduced the pig and numerous food plants, and that the Papuans were previously ignorant of these things." (Riesenfeld 1950:639)

With the advent of detailed archaeological work done in the area in the 1950's the first detailed descriptions of in situ pottery assemblages became available. Following these initial investigations in Fiji and New Caledonia (Gifford 1951; Gifford and Shutler 1956) the areas under investigation were expanded. Early recognition of the importance of the Lapita were present at many sites under investigation during the 1960's led unfortunately to a rather narrow focus of interest. The diagnostic Lapita were, in combination with rich assemblages

of adzes, fishhooks and other forms of material culture left little attention paid to the incised ware present at many sites. Thus reports which provided description of Lapita ware would often simply comment on the incised ware without any detailed discussion of design or decorative features present. In large part this was due to the fact that there was no detailed examination of the decorative system of incised/applied relief assemblages enabling archaeologists to correlate their material with other assemblages.

In part this problem is the same as Clark and Terrell noted in the earlier Lapita studies:

> "Similarities among potsherds today identified as Lapita ware - found at sites on islands as far apart as New Guinea in the west and Samoa in the east - were first recognized in the 1940's. "Lapita" implies a distinctive style of pottery decoration with stamped dentate and other design elements used in clearly structured motif bands. Yet until recently similarities and differences within the class called "Lapita ware" were so incompletely and unsystematically reported in the literature that no one could possibly be sure what the Lapita problem actually was, even when it was phrased solely as the fortunes and fate of decorative potsherds." (Clark and Terrell 1978:308)

During the 1960's theory development was able to incorporate archaeological work done during this period. The most important of these was that of Solheim (196_) who developed the following hypothesis:

"1. Knowledge of pottery manufacture entered the Melanesian area from two different sources and has there become greatly mixed. The two sources were: (a) from the north, probably Japan; and (b) through the Philippines and Indonesia, ultimately from Southeast Asia." (Solheim 196_:10)

"5. Migration to New Caledonia (the southern extension of pottery brought the pottery manufacturing method from the north 1a above, while Fiji (the eastern extension) received methods from both sources." (Solheim 196_:11)

"However, it is my present feeling that the early incised New Caledonia pottery can be traced back to Japan rather than to the Sa-huynh-Kalanay tradition. Its dates of 500 to 800 B.C. are just a bit too early to be traced to Dongson influence but are not at all too early to have come from Japan. On the other hand, I feel that the earliest pottery people on Fiji, making the early types of Sa-huynh-Kalanay pottery, were ancestral or at least related to those early potters that reached Samoa and the Marquesas. I would expect considerably earlier sites

from Fiji to be discovered, going back probably to 500 B.C. or earlier, with the same general pottery." (Solheim 196_:11)

By the late 1960's sufficient information from Melanesia became available to allow for development of hypotheses open to testing, though occasionally these wandered into Clark and Terrell's "culture-historical scenarios" (1978:300)

"A review of Melanesian studies makes it abundantly clear that Melanesian origins can not be sought at a particular place nor at a particular time in history. Rather the people of Melanesia are the result of an extremely ancient and long lasting flow of people from the Asiatic mainland into the islands of the Southwest Pacific. During the latter part of their history they have in addition maintained sporadic contact with people inhabiting island groups to the north and east. From time to time and from place to place new movements of people bring changes in the gene pools, in the languages and customs, and subsistence patterns of the people of the Melanesian islands. New ways of exploiting island environments give impetus to fresh movements within the island groups themselves and modify further the life of the people. Shifting patterns of contact and isolation have brought and continue to bring other changes." (Shutler and Shutler 1967:98)

"In the prehistory of the southern islands of Melanesia, we are thus dealing with a number of distinct ceramics, whatever their ultimate origins and relationships may be; Lapita ware, paddle-decorated ware, and other as yet less well known applique and incised wares. Of these the earliest is the Lapita style, which was the only one to reach Polynesia. The later advent of different traditions represented by the other wares is what makes Melanesia Melanesian as distinct from Polynesian. Their differential movement through the Melanesian islands, their local evolution, and their complex interaction with each other and the prior Lapita tradition, account for the cultural diversity within Melanesia itself." (Golson 1968:10)

"...the incised and applied ware excavated by Garanger in the New Hebrides constitutes a major tradition that contributes to the late incised pottery of Fiji and southern New Caledonia. In northern New Caledonia, however, the late incised pottery has closer links with the northern Solomons." (Golson 1968:12)

The Mangaasi Tradition

The work first defining an incised/applied relief tradition in Melanesia is that of Jose Garanger, who in 1964-1965 and 1966-1967 conducted a series of excavations in central Vanuatu. Of the various locations excavated, two

of the most important were on the island of Efate at Mangaasi on the west coast and Erueti on the south coast. Due to the

> "...abundance and the variety of the pottery [over 15,000 sherds] at Mangaasi, the greater age of the site 600 B.C., the presence in the archaeological strata of kneaded clay, fired or not, and of clay deposits of the same mineralogical nature in the side of the cliffs which overlook the Mangaasi plain give the impression that this region was an important center of pottery manufacture." (Garanger 1971:54)

For these reasons the pottery tradition of incised/applied relief ware was designated the Mangaasi tradition.

Unfortunately the advantage of a large datable collection at the site was in part offset by a complex stratigraphy, which reflected not only upper level incursions by the ocean but also lower levels where:

> "The stratigraphy is hardly discernable. Frequent tidal waves and agricultural activities have contributed to disturbance of the strata, forcing excavation by artificial levels of 20-centimeter levels." (Garanger 1971:54)

Despite problems with the local stratigraphy the Mangaasi site was considered by Garanger to be largely undisturbed, especially in the lower levels, where the bulk of the incised pottery was recovered. The collection was divided

into four different levels - 1. Inferieur (base level); 2. Moyen (intermediate); 3. Superieur (upper level in situ); 4. Surface (collections made of surface finds). The report (Archéologie des Nouvelles-Hébrides) includes a large number of photographs illustrating a portion of the collection recovered. It was on the basis of the photographic material that this paper was developed.

Garanger's study was not limited to the Mangaasi site, as excavations and surface collections were conducted both at other locations on Efate (Erueti, Mangaliliu and Mele), on nearby islets (Lelepa and Retoka), and incorporated a series of earlier excavations to the north in Iles Shepherd (Tongoa) and Makura. At these other excavations the incised/applied relief ware was also present, though not in the quantity present at the Mangaasi site. Thus the Mangaasi site assumed importance not only due to the large datable collection on-site, but also because of the obvious correlations to other sites in central Vanuatu.

As later controversy has arisen on Garanger's interpretation of this site, the following discussion will attempt to summarize the original findings.

Garanger completed a detailed analysis of the decorative patterns present in the recovered sample, as he perceived various stylistic changes in the collection over time.

"Les tessons décorés de plusieurs types de motifs sont plus abondants dans les niveaux inférieurs, leur pourcentage est de 6,47% dans le niveau supérieur, de 12,49% dans le niveau moyen et de 15,10% dans le niveau inférieur. Inversement, les décors «atypiques» sont plus abondants dans le niveau supérieur: 25,4% que dans le niveaux inférieurs: 12,35 et 11,72%. Dans le niveau supérieur, en effet, la zone située au-dessous du diamètre maximum est très largement décorée et il est moins aisé de décorer cette zone que de décorer le haut du récipient. Dans les niveaux inférieurs, au contraire, le décor est plus généralement limité à la zone située au-dessus du diamètre maximum, d'où, d'une part le plus grand nombre de tessons non décorés dans ces niveaux et, d'autre part, le plus grand nombre de tessons soigneusement décorés."[1] (Garanger 1972:53)

Garanger developed a set of ornamental themes based on the large surface collections recovered from the area. This set of themes was applied to the Mangaasi collection in an attempt to determine the change over time of various motifs within each thematic group. This led him to make the following conclusions:

"Le site fut occupé pour le première fois vers les annees 600 avant J.-C. et par une population qui connaissait l'art céramique. Cet art fut pratiqué, a Mangaasi, jusque vers les années 1700 et sans que l'on puisse discerner une évolution notable dans la forme des récipients (《pot》 sphéroides) et leur décor. Nous savons seulement que le corps des récipients est plus largement décoré, mais moins soigneusement, dans les niveaux supérieurs et que les décors dits《foliaces》 sont plus abondants dans les niveaux moyens et inférieurs. Les cordons appliqués et《pinces》, les reliefs appliqués discontinus comme les organes de préhension caractérisent les niveaux les plus profonds comme, également, quelques formes pue fréquentes: petits《bols》 et petits《godets》..."[2] (Garanger 1972:57-58)

It should be noted that Garanger's hypothesis of incised/applied relief tradition in Vanuatu was not limited to the Mangaasi site, but was also based on other excavations in the area. These excavations recovered not only Mangaasi type pottery, but other apparently unrelated decorative traditions:

"Cette poterie décorée d'incisions et de reliefs appliques apparaît, aujord'hui, comme l'une des trois grandes traditions céramique du Pacific sud-

occidental, elle est très caractéristique du site de Mangaasi où l'influence des autres traditions centre-hébridaises est minime (poterie d'Erueti), ou nulle (poterie imprimée «au battoir» de Mele et poterie d'Aknau, décorée d'incisions internes..."[3] (Garanger 1972:58)

These excavations for the first time allowed a detailed definition for an incised/applied relief decorative system which Garanger called the Mangaasi Tradition.

Work was underway at the same period in other areas of Melanesia including that of J. Specht on Buka Island, near Bougainville. His lowest excavation levels recovered what he termed Buka Style pottery, which appeared to be Lapita Tradition ware, in close context was a very different pottery which he defined as Sohano Style pottery. While his Sohano Tradition does not appear to correlate completely with Garanger's Mangaasi Tradition, there does appear to be close association:

"The Sohano Style appears not to have developed out of this tradition [Lapita-Watom], though whence and just when it came to Buka remains to be clarified. I am impressed by some general similarities between this style and some of the Micronesian ceramics, though the presence of sherds with Sohano Style affinities in New Britain and on the Tami Island may indicate an alternative source. However that

may be, the Sohano Style represents a second tradition, which I have named the Sohano Tradition. During the Sohano Incised and Relief substyle this tradition was in contact with industries of the central New Hebrides, or with industries closely related to them. I suggest that the Incised and Relief substyle represents the amalgamation of the Sohano Tradition and elements of the Mangaasi Tradition." (Specht 1969: 349)

This reluctance to press for closer association between the two apparently similar traditions was due to both questions of initial dates, and that the Sohano ware recovered did not appear to have the entire complex of incised motifs present in the lower Mangaasi site layer. He believes that the appearance of the Mangaasi traits on Buka post date their appearance in Vanuatu (Specht 1969:241). But he does note very close parallels between the Sohano ware and that of the Navutu phase from Fiji:

"The most striking connections exist between the ceramics of the early Navutu Phase and my Sohano Style, for which the relative chronologies are fully acceptable. Several other authors have noted links between the Navutu Phase and the Mangaasi pottery of the New Hebrides. In view of the connections between my Sohano Style and the Mangaasi pottery, it is not

suprising that the Sohano Style can be compared with the Navutu Phase." (Specht 1969:247)

As noted earlier there are questions regarding the dates for initial occurrence of the incised/applied relief traditions on Buka and Efate, in that while Garanger's dates appear to place initial occurrence at around 600 B.C. (Garanger 1972:57) Specht's dates from Buka indicate that the Sohano Style

"...appears to have extended through 500 to 700 years. The date of its origin may lie at some point between 235-165 B.C. and 25-585 B.C...." (Specht 1969:215)

If both sets of dates are accurate and reflect initial occupation then there is an obvious problem in positing the common pattern of eastward migration.

The initial dating of the Sohano Tradition does not seem to be very firm:

"Whether or not the Buka and Sohano Styles overlap in time can not be ascertained from the present evidence, though the possibility must be borne in mind. The evidence for the earlier position of the Buka Style is presumptive rather than conclusive. Moreover, it is possible that the two styles are contemporary, but one represents vessels traded into the area." (Specht 1969:214)

For the next roughly ten years the initial premises developed by Garanger and Specht continued to be generally accepted, as new information elaborated but generally supported the patterns of associations among incised/applied relief assemblages in different areas of the western Pacific. A detailed ceramic analysis of Nissan Island material by Kaplan (1976) while focusing mainly on more recent ceramics, did note indications of possible related material (1976:64). Other works expressed the assumption of a long term pan-Melanesian incised/applied relief tradition, though called by various names:

> "La poterie la plus abondante en Nouvelle Caledonie se rattache sand aucun doute à la grande tradition céramique océanienne des ensembles culturels melanesiens. Son apparition en Nouvelle Calédonie est plus tardive que celle des deux autres traditions, le Lapita et l'imprimé au battoir, mais elle a subsisté jusqu'à la période contemporaine."[4]
> (Frimigacci 1977:57)

The situation of general acceptance of the long-term incised/applied relief tradition still rested in large part upon the work done by Garanger. In 1979, on the basis of work done in the Banks Islands Graeme Ward contended that the Mangaasi site information had been mis-interpreted by Garanger.

"In Chapter 1, the question was raised of the longevity claimed for the Mangaasi Ware in the Central Islands. In the light of the evidence from the Banks Islands, the question of the dating of the Central Islands' 'Mangaasi Tradition' is thrown into added relief. The results of the analyses detailed here offer considerable support for the re-interpretation made of the dating of the Linear Incised and Applied Relief Ware of the Central New Hebrides, which it is now suggested is restricted to a period beginning about the middle of the first millenium BC and extending into the initial centuries of the first millenium AD. As such, it post-dates Lapita Complex materials (pace Erueti) and marks the end of the major utilization of ceramics in the New Hebrides, with the exception of the poorly-dated Aknau Ware of the Shepherd Islands." (Ward 1979: 7-41)

As Ward's critisim of the Mangaasi Tradition is based on a re-examination of Garanger's material, not just Ward's own excavations, his remarks should be closely examined to determine their validity. His major premise is that the Mangaasi site stratigraphy was mis-interpreted by Garanger, that the upper levels (i.e. moyen et superieur) are in actuality redepositions of the base (inferieur) layer through marine action.

"It is suggested that the pottery was originally in situ only in the lowermost level. The implication is that its manufacture and use were restricted to a period of less than one thousand years, two millenia ago." (Ward 1979:7-43)

"From this hypothesis of site redeposition the following propositions can be drawn: Firstly, sherds recovered from Layers I through IId will be smaller, 'more wear, etc,'. Secondly, one would expect there to be only as much difference-in factors such as decoration and vessel form between the two groups (that is Layer III versus non-Layer III material) as there is within groups if the sherds were eroded 'non-selectively'. Thirdly, sherds from individual vessels will be found scattered throughout the strata and, inversely, the proportion of whole pots and matchable sherds will be greater in Layer III than any within the other strata. Positive indications that these conditions were in operation would provide suggestive (but not conclusive) evidence that the sherds were not in primary position but had been relocated by either natural force or subsequent cultural events such as gardening." (Ward 1979:I-8)

"It is possible to hypothesize that the pottery at EF-17 Mangaasi derived entirely from the lowest level, Layer III, and was redeposited adventitously in both the several marine sediments forming Layer II and the second occupation level, Layer I." (Ward 1979:I-8)

In large part this assumption is founded on the variability in terminal dates for Mangaasi Tradition pottery throughout central Vanuatu as Garanger noted, pottery supposedly continued at the Mangaasi site long after the apparent disappearance of pottery at other sites tested in the area:

"Le second fait remarquable est la disparition de la poterie ver les années 1200 de notres ère à Makura et Tongoa, vers 1700 dans le Nord d'Efate. La poterie décorée d'incisions et de reliefs appliqués est apparue la première, elle avait été la seule à survivre alors que trois autres traditions céramique n'ont fait qu'une apparition plus ou moins prolongée."[5] (Garanger 1971:121)

Ward counters that the terminal dates for the other sites of approximately 200 A.D. are correct for the entire sequence. Garanger has since modified this date, as it initially reflected an intrusive feature, down to around 1500 A.D. Ward contends however that even the 1200 A.D. terminal date for the other sites is far too late, arguing for a sequence stretching from the latter half of the first

millennium B.C. to the earlier part of the first millennium A.D. (Ward 1979:7-32). To support his contention for misinterpretation Ward posits a set of propositions which if tested will support his argument:

1. Sherds recovered from Layers I-IId (middle and upper layers) will be smaller and exhibit more wear;
2. There will be only as much difference in factors such as decoration and vessel form between the two groups (i.e., lower layer with the rest of the upper layers) as there is within groups if the sherds were eroded 'non-selectively'.
3. Sherds from individual vessels will be found scattered throughout the strata and inversely, the proportion of whole vessels and matchable sherds will be greater in the lower layer than in the upper layers (Ward 1979:I-8).

"Positive indications that these conditions were in operation would provide suggestive (but not conclusive) evidence that the sherds were not in primary position but had been relocated by either natural forces or subsequent events such as gardening." (Ward 1979:I-8)

As he later notes, several of his propositions could not be verified without access to the complete collection of material recovered from the site. Even with the massive number of illustrations in the Archéologie des Nouvelles Hébrides report (Garanger 1972) only roughly 500 sherds

out of a total of over 15,000 sherds are shown, a small percentage of the total. Apparently Ward does not think the sample illustrated in the report is a balanced reflection of the sherds recovered. Nonetheless, if his propositions are to be tested without access to the original material, the only proposition amenable to testing is the second proposition - the 'lack of visible variation in decorative forms over time'. This study will allow for testing of this proposition.

Despite Ward's criticisms of the Garanger material it is still generally accepted that there is a incised/applied relief tradition extending throughout Melanesia. At present the earliest dates have appeared from Vanuatu of around 600 B.C. with somewhat later dates (0-100 B.C.) to the north (Banks Islands, Tikopia and Buka) and the south (New Caledonia) (100 A.D.). At a later date similar ware appears in Fiji (Vuda Phase) (1100 A.D.). Terminal dates appear to vary with the area, though a generally consistent date of around 1200 A.D. is present at various sites in the Vanuatu area (Green 1982).

III. APPROACH RATIONALE

Two basic points were central to the decision to use motif analysis on the Mangaasi ware: 1) the collection was limited, both in amount recovered through excavation, and more importantly, in the amount available for analysis; 2) the stylistic pattern of decoration utilized was extremely abstract and very limited in unique distinguishing motifs.

The first problem is in large part due to the lack of work done to date in the area, especially Vanuatu, where many areas still await even surface investigation by an archaeologist. Thus the sample of material is both small and geographically selective. While this does not present an insurmountable problem to the design analysis of Mangaasi Tradition ware, it does severely restrict the comparative analysis of possible association between the Mangaasi Tradition and other incised/applied relief assemblages in the Western Pacific.

To deal with this problem it was necessary to use the decorative motif form of analysis that was so successfully used in the past on Lapita pottery and was used previously in limited form by Garanger for his Mangaasi ceramics. This form of analysis allows for some examination of assemblages through decorative motifs present without the necessity of detailed evidence of association. Naturally there is the

assumption that a ceramic tradition will be unique due to the limitless variations of plastic decoration available to the potter.

The second problem is much more crucial to the design analysis. Mangaasi ware is noted for formal geometric designs which are simplistic at the individual motif level in contrast with the complex motifs utilized in the analysis of Lapita pottery in the past (Mead et al 1975). The Mangaasi geometric motifs are undistinguished to the extent that they could serve as sub-sets of many pottery styles. This lack of distinguishing motifs does not allow for an analysis of unique distinguishing trademarks as has been done for Lapita Tradition ceramics.

Instead it became necessary to define this tradition on the basis of exclusion - a negative approach in which the units are defined in terms of the absence of designs within the tradition, rather than emphasizing the uniqueness of designs. This obviously has several disadvantages over a positive approach, not the least of which is the lack of a detailed set of motif indicators unique to the tradition. Yet another problem with this approach is that it is very difficult to provide a firm definition of just which decorative motifs are within the confines of the tradition and which are intrusive. Without unique characteristics the process of design change over time and space is much

more difficult to analyze. The closest approximation can be arrived through the use of statistical packages which deal specifically with association between various assemblages.

When dealing with statistical packages it must be remembered that the negative approach has a high level of uncertainty, due both to the lack of definition of the tradition and the problem of defining which variables are the result of individual variation and which are significant.

The influence of the individual has often in the past been minimized in archaeological analyses (Hill and Gunn 1977). This would appear to be especially true when dealing with decorative motifs on pottery which have no obvious functional purpose and therefore no innate limitations on personal expression. Even in a society such as ours which is based on mass production, small perturbations in a decorative design can appear highly significant to group members (i.e., a 1972 Ford vs. a 1974 Ford). But when the archaeologist is dealing with a culture where not only mass production was not present but also with only a small sample of the original production, such small and possibly significant perturbations disappear. In a society where the individual is often responsible for all stages of the pottery manufacture (Specht 1972) it should be anticipated that individual tastes and ability will be reflected in the

finished product. Any analysis must be adjusted to take into account this factor which would appear to limit both the level of definition of the tradition and the significance of perturbations in the analysis.

As mentioned earlier, decorative analyses have been very useful in the past in the Pacific. During the early period of western Pacific archaeology, pottery decorative analyses were usually limited to either generalizations based on techniques of decoration (such as incising) or to direct detailed descriptions of motifs present (Gifford 1951, Gifford and Shutler 1956). This was obviously due on large part to the lack of a corpus of comparative assemblages with which to work.

While there were some advances, this situation continued into the early 1960's. At this time there was an increasing realization of a general pottery tradition (Lapita) present throughout the western Pacific. This realization began to focus interest on pottery, specifically decorative patterns as the major distinguishing trademark. But the specifics of defining the Lapita Tradition were not completed till Poulsen's 1971 and Mead et al 1975 works. These studies both dealing with Lapita pottery analysis, showed the value of analyzing pottery traditions on the basis of decorative motif systems. The use of this form of analysis has now become accepted in Lapita research, enhanced by the continuity of decorative patterns over time and space in this tradition.

Unfortunately other pottery assemblages in the Pacific have not been so fortunate in the application of detailed motif analysis. Specht (1969) applied this method to his assemblage from Buka Island and was later echoed by Kaplan's work with the Nissan Island collection (1976). But the only detailed decorative analysis on Mangaasi Tradition ceramics is that done by Garanger in 1972.

Based on his large surface collection (13,206 sherds) Garanger was able to develop a set of decorative motifs for the tradition:

1. Continuous rectiliner incised lines, which were used for orienting: parallel lines (a), space limiter on geometric motifs (b), zone delimiter (c), simple decoration (d), multiple decoration (e).
2. Discontinuous rectiliner incised, with the following subdivisions: independent motifs (a), space delimiter for geometric motifs (b), simple chevrons (c), composite chevrons and lines (d), an element in foliate designs (e).
3. Foliate decorations that consist of continuous and discontinuous rectilinear incised elements: a simple incised rib with chevrons (a), multiple leaf ribbing with parallel incisions (b), a set of single or multiple parallel lines fringed by parallel and diagonal discontinuous lines (c), combination of 3-a and 3-c in larger foliage pattern (d).

4. Punctiform designs of varied size: border or zone delimiter (a), space filler or independent element (b).

5. Curvilinear motifs are very rare, present on only seven pieces out of the entire assemblage.

6. and 7. Incised bands, consisting of two parallel lines with perpendicular or oblique lines (6) or with punctiform incisions (7): border or zone delimiter (a), independent elements either isolated or as multiple units, composing various geometric figures.

8. Applique borders are always associated with one or more of the preceding elements and were present in 76% of the decorated sample. The face of the applique is always incised or otherwise decorated: as zone delimiter with 'diamond points' (a), zone delimiter on 'honeycomb' pattern (b), multiple parallel borders (c), simple border element (d), zone delimiter for area, possibly not applique, where it appears that the zone delimiter has been carved away after firing. This technique is very unusual, being present on only six pieces in the sample.

9. Applique borders pinched from surface, always associated with one or another of the incised decorations. The transverse section is triangular with an incision from the potter's nails often present in the borders.

10. Nubbin: isolated nubbins, in which case the vessel surface was probably depressed to assure fixation of the nubbin (a), used as border or zone delimiter (b).

11. Small nubbins, consisting of small lines, round and elongated nubbins or protruberances: simple lines, either single or multiple (a), superimposed over applique borders (b), as elements of complex motifs (c).

12. Curvilinear, undulating reliefs, very rare and not applique but rather pinched from the vessel surface (Garanger 1972:47-48).

Garanger's system of analysis appeared not only to define the important motifs present in the Mangaasi Tradition, but to also allow discussion of relationships with other incised assemblages a similar approach. Due to different perceptions, the categories of analysis used for this study while similar to those used by Garanger in the majority of circumstances have a number of variations. First, the collections are smaller so statistical discussions of presence could be misleading. Secondly, as the main focus was on comparative assemblages no effort was made to verify Garanger's discussions of frequency or patterns of motif association within the Mangaasi assemblage (Garanger 1972: 53-56)

As this study was dealing with comparative collections, it was felt that simple percentages or pure numbers could be misleading in interpreting possible association between

sites. Therefore, very simple statistical indices were utilized in order to better analyze the frequencies within and between assemblages. The two selected were the Jaccard Index and the Robinson Index. Both have been previously used in Pacific pottery analyses for similar purposes (Frost 1974, Babcock 1976).

The Jaccard Index is a simple equal weighting co-efficient. In such a statistical comparison measurement and index of agreement is based on presence and absence in the assemblages. The formula used is

$$S_j = \frac{P}{P + M}$$

in which Sj is the Jaccard Index, P represents the category present in both assemblages and M represents those categories present in only one of the assemblages. With this measurement 1.0 would indicate total agreement, while .001 would indicate total disparity between the two assemblages.

The Robinson Index is not an equal weighting comparison, but is rather a differential weighting co-efficient measurement allowing the relative proportion contributed by a motif to the entire assemblage to be measured. These results are then contrasted with those from other assemblages. The sum of the differences between the two assemblages is then subtracted from 200 to obtain the Robinson Index between the two assemblages. As Frost has noted, the Robinson Index has some advantages in ceramic studies:

"The Robinson Index measures the similarities in the range of presences and absences of ceramic categories in the inventories of the two compared sites just as the Jaccard's equal weighting coefficient does. But the Robinson Index also measures the relative frequency of occurrence of each variable, hence differentially weighting the qualitative variables according to their relative popularity in the two compared inventories. Conversion of the inventory frequencies to percentages allows normalizing of the differences in the relative size of the ceramic category inventories between compared sites." (Frost 1974:89)

When dealing with a situation such as presents itself in this study where there are extreme variations in sample size (See Chapter V) the Robinson Index can be expected to give more reliable results than the Jaccard Index, though in most situations the two should reflect similar results.

As Frost faced a similar situation (with varied sample sizes) it is worth noting his comments on the two statistical approaches:

"If two sites with identical artifact assemblages are excavated, the one receiving the greatest amount of excavation is liable to have the artifact inventory with the greatest range of variation. A Jaccard's

coefficient comparison of two sites -- one with a wide range of types due to extensive excavations, the other with only a small range of types due to minimal excavation -- will result in a low coefficient of similarity when actually the sites could be very similar. In the same situation, the Robinson Index would deemphasize the infrequent, rare types and compare sites primarily according to the relative frequency of the more common types." (Frost 1974:99)

Since the raw numbers present from the various assemblages in this study vary considerably from a high sample size of 207 (Lelepa) to a low of 18 (Siviri Mantae and Guam) it would be predicted that both the numbers and the Jaccard Index will in similar situations reflect variations in sample size rather than in sample presence. But with the addition of the Robinson Index to counteract this problem, variations that occur in both indices can be assumed to have some correlation fact rather than sample size. With these statistical packages it will be possible to develop predictions of assemblage similarity and contemporaneity.

IV. DESIGN DESCRIPTION

The form of analysis used on the Mangaasi material was based on the design motif. Though discussed earlier it is worth re-emphasizing the fact that the Mangaasi Tradition ceramics are not distinguished by a unique set of design attributes, but are rather anonymous both in form and decoration.

In such a situation defining the unique characteristics in form and style, as has been done for the earlier Lapita Tradition is not possible. Thus the negative approach of determining what makes the Mangaasi Tradition unique through absence was followed. Obviously such an approach does not have the diagnostic value of one defining unique distinguishing characteristics, but it can be extremely valuable in the rare situations such as that present with the Mangaasi Tradition, where design unity is obviously present but cannot be defined in the usual manner.

Due to the limited number of shapes (ovoid or spheroid) present, form did not seem to be a valuable criteria for distinction. The same problem was present in other commonly used distinguishing shape criteria such as rim shape and form. Combined with the fact that the examination was through library research rather than physical examination again limited the analysis to those points presented by the authors of the various reports. The

only attributes that fulfilled these criteria in sufficient quantity were those of surface decoration.

Due to the presence of sherds rather than complete vessels analysis was further limited to partial decorative patterns, specifically to the level of design motifs. This study will focus on the variation in design motifs, both singly and in patterns throughout the various sites.

Unfortunately, despite the long use of pottery and design characteristics as a diagnostic tool in archaeology, many reports from otherwise valuable sites limit pottery descriptions to composition, physical description, and a brief note on decorative technique without any detailed description of decorative patterns.

Mangaasi Tradition pottery utilized two distinct decorative techniques, incised decoration and applied-relief decoration. Both decorative techniques are present throughout the entire Mangaasi type site sequence, though there appears to be a significant decrease in both the frequency of applique decoration and in the total variety of decorative motifs present in the upper layer. In a more subjective analysis the quality and detail evidenced in the lower layer in incised design is replaced in the upper layer with a limited impressionistic assemblage with little consideration for design symmetry or motif application.

Difference both in complexity of motifs and their utilization in design patterns made for variation in the level of segregation used in the analysis. Within the category of applied relief the initial level of segregation was that between linear designs and nubbins. This division appears to reflect not only the differentiation in shape, but also a conceptual differentiation in utilization within designs. The linear designs were generally utilized as decorative zone demarcators, while the nubbins were commonly used as independent decorative motifs. These levels were further subdivided into the lowest level of segregation in the specific motif, which in this study was defined both by overall design function and spatial orientation.

In contrast to the rather simple subdivisions of applied relief patterns the incised motifs are much more complex.

As with the applied relief, incised designs were first segregated into nine intermediate categories based on design attributes. These levels were then further subdivided into the lowest level of the motif, defined by specific design function and spatial orientation.

Punctations are incised designs used as design fill. A further level of segregation was formed based on the angle of the punctation, as it was noted that specific design patterns were more commonly associated with various punctate forms.

The term hatching is used to describe a series of motifs in which various linear patterns were used for spatial fill.

Chevron was used for the series of chevron designs that are common in the Mangaasi Tradition, the detached chevron (5-3) being one of the more popular design motifs present.

The category of angled line was not nearly as common as the chevron as a design motif. Variations including parallel angled lines and hatched versions are present in small numbers. While occasionally used as an independent element the major use for this motif was apparently for zone demarcation.

Also of limited frequency but considerable variation, were rectangular zone designs - motifs in which a delineated rectangular area had fill added to the interior.

A very rare pattern present was the foliate pattern. This appears as either zone demarcator or as an independent motif.

Border patterns were common in part due to the fact that this category not only included specific zone demarcation motifs but also independent design motifs, as they were not used as fill motifs but were rather independent decorative elements in the overall design.

The next design category was that of triangles-triangular design areas delineated by incised lines. Again clear or hatched fill designs were most common. The

triangular motif is very popular in the Mangaasi ware, and along with the chevrons provides one of the more common patterns. It should be noted that triangles do not appear only as a separate design pattern, but were also present as insets within rectangular configurations, where triangular fill patterns were common.

Of the last category, curved lines, only limited examples were noted. The most distinctive anomaly in the Mangaasi Tradition is the general lack of curved linear designs, whether as simple lines, floral designs (leaf) or as circles. Common in most other traditions, the curvilinear pattern is almost completely absent from the Mangaasi Tradition.

It should be noted that one of the prime criteria used for motif categorization was that of orientation relative to the probable vessel orientation. Vertical, horizontal and diagonal designations were used in most patterns as subsidiary categories for design motifs, as it was noted that certain orientations seemed more popular at various periods. It should be noted however, when dealing with library research material rather than physical artifacts these orientations were based entirely on the author's interpretations.

Following are detailed descriptions of the various design motifs used in this study. For visual examples of the categories, see Appendix A.

A) Applique designs: These designs are three-dimensional motifs applied to the vessel with additional clay. The Mangaasi Tradition appears to utilize two major forms of applique work-nubbin applique and linear ridge applique.

A.1) Nubbin applique: This decorative element is formed by working small beads of applique on to the surface of the vessel to form nubbins.

Variations within this category were made at two levels. The first was based on the intent to produce a border or linear element versus a decorative fill element (-1,-2); the second was a further subdivision into the orientation of the nubbins, in either vertical (a), horizontal (b), diagonal (c) or multiple units (d).

A.1-1) Round nubbins: Semi-spherical applique nubbins used as decorative items, rarely as borders.

A.1-2) Oval nubbins: Semi-ovoid applique nubbins generally used as decorative fill rather than border linear elements.

A.1-3) Hub nubbins: Round nubbins used as focal point intersections for several applique ridge elements, usually radiating out from the central hub.

A.2) Applique ridge: A linear application of clay used to form a ridge on the side of the vessel, used mainly as a border device to delineate decorative zones. Again further specifications were made as to the position and design intent of the motif: First, the design intent was divided into two categories for either linear motif or zone demarcation motif; secondly, each of these two categories were further divided, the linear motifs into categories of orientation - vertical (a), horizontal (b), diagonal (c), multiple units (d), or curved (e); while the zone demarcation motifs were subdivided into the forms the enclosed space took - rectangular (x), triangular (y) and other (z).

A.2-1) Continuous ridge: Linear applique forming a border on the vessel dividing the area into decorative zones, or acting as an independent design motif.

A.2-2) Hatched ridge: A linear applique forming a border on the vessel demarcating decorative zones or independent motifs, distinguished by incised hatching on the ridge.

A.2-3) Punctate ridge: Linear applique forming a border on the vessel dividing the area into decorative zones or independent motifs, distinguished by punctations on the ridge.

B) Incised designs: The incised designs in the Mangaasi Tradition fall into two major categories, punctate incision and linear incision. While both of these decorative categories are represented in a high proportion of the decorative motifs, the linear incision forms the bulk of the assemblage. Various subdivisions of these decorative categories were utilized for this analysis, under two basic premises - orientation, where applicable, and the presence of single or multiple units (repetition).

B.3) Punctations: Punctations are produced in leather-hard clay by inserting a pointed object into the clay at various angles. In the Mangaasi Tradition punctate designs appear to have mainly served as decorative filler elements for design zones, rather than as independent motifs. The punctate categories are initially subdivided into design intent-design filler (.1), linear patterns (.2), and zone demarcators (.3); then further divided by orientation - vertical (a), horizontal (b), diagonal (c) and multiple (d).

B.3-1) Round punctations: These small round holes in the vessel surface are formed by incision into the clay at approximately a perpendicular angle. Within the Mangaasi Tradition it was commonly utilized as a design filler within decorative zones.

B.3-2) Angled punctations: Angled punctations were formed by incision into the clay at roughly a 30 degree angle. This forms an oval hole in the vessel surface, and was mainly used as a design filler within decorative zones.

B.3-4) U punctation: This pattern was formed by incision into the clay at roughly a perpendicualr position by a u-shaped utensil. This pattern was not present at the Mangaasi type site, and was very rare in the study. Where present it was used as design filler in decorative zones.

B.4) Hatching: Hatching consists of a series of parallel or intersecting lines incised into the vessel surface. In this study it was divided not only into orientation, but also by length into either long (2cm or more) or short (under 2cm) categories. It was used on Mangaasi ware both as filler within decorative zones and as an independent decorative motif.

B.4-1.1) Vertical hatch: A series of parallel incised lines vertical to the vessel orientation utilized mainly as an independent decorative motif.

B.4-1.2) Horizontal hatch: A series of parallel incised lines horizontal to the vessel orientation, utilized mainly as an independent decorative motif.

B.4-3) Diagonal hatch: A series of parallel incised lines at angles other than vertical or horizontal to the vessel orientation, utilized mainly as an independent decorative motif.

B.4-4) Cross hatch: Two sets of parallel incised lines, placed at right angles to form a grid of incised lines on the vessel. Further subdivisions were made based on orientation: 4-4.1 if one set of lines is vertical relative to the vessel orientation, 4-4.2 if neither set is vertical relative to the vessel orientation. Mainly used as a filler within decorative zones, cross hatching occasionally appeared as an independent decorative motif.

B.4-5) Curved hatch: A series of parallel curved incised lines used mainly as an independent decorative motif- not present at the Mangaasi type site.

B.4-6) X hatch: A series of incised X designs on the vessel, used as an independent decorative motif, not present at the Mangaasi type site.

B.5) Chevrons: A series of angle lines resembling an incised V on the vessel surface which appears in both single rows of chevrons and in multiple rows. This design is often referred to as foliace and leaf pattern designs though purely geometric in form, and in the Mangaasi ware appears both as a

filler for decorative zones and as an independent decorative motif.

B.5-1) Chevrons: A series of V of similar orientation, used both as a filler of decorative zones (usually in multiple format) and as an independent design motif (usually in single format).

B.5-2) Spined chevrons: A series of V of similar orientation, joined by an incised line. This motif is commonly found as an independent design motif.

B.5-3) Detached chevrons: A series of broken V where the two lines do not intersect to form a point. This motif is common both as a decorative filler and as an independent design motif.

B.5-4) Spined detached chevrons: A series of detached V where the two intersecting lines do not form a point but are attached instead to a set of parallel lines. This motif appears mainly as an independent design motif.

B.5-5) Spined half chevrons: A line with a series of angled lines of parallel orientation attached to it, forming half of B.5-4. It was used mainly as an independent decorative motif.

B.6) Angled lines: A line or lines incised in zig-zag forms, often as a set of parallel linear incisions. Occasionally the lines are broken rather than solid. This motif was commonly used as an independent design motif.

B.6-1) Angled line: A single line zig-zag used primarily as an independent design motif.

B.6-2) Multiple angled lines: A series of parallel zig-zag primarily used as an independent design motif.

B.6-2.1) Clear angled lines: A pair of zig-zag lines.

B.6-2.2) Cross-hatched angled lines: A set of two or more zig-zag lines with interior right-angle hatching, utilized as an independent design motif.

B.6-2.3) Multiple parallel hatch angled lines: A series of zig-zag lines with internal parallel hatching utilized as an independent design motif.

B.6-3) Wavy lines: A set of two or more wavy lines utilized as an independent design motif. Not present at the Mangaasi type site.

B.7) Rectangular zones: This subdivision covers units in which rectangular borders demarcate decorative zones. Within the decorative zone, various decorative motifs appear, the most common being various forms of hatch fill.

B.7-1) Clear rectangle: This is a rectangular decorative zone which does not contain further internal decorative motifs.

B.7-2) Vertical fill rectangle: This is a rectangular decorative zone with internal vertical hatching.

B.7-3) Horizontal fill rectangle: This is a rectangular decorative zone with internal horizontal hatching.

B.7-4) Diagonal fill rectangle: This is a rectangular decorative zone in which the interior contains diagonal hatching.

B.7-5) Triangular fill rectangle: This is a rectangular decorative zone in which a triangular portion of the interior has been filled with hatch. It should be noted that the triangular area is not specifically delineated by borders, but rather by the presence or absence of decorative fill. This fill commonly consists of horizontal or diagonal hatching.

B.7-6) Triangular hatch: This occurs in a rectangular decorative zone where multiple diagonal lines connect corners forming an X design within the rectangle. The B.7-6 X design contains multiple lines, while the variant 7-6.1 contains only single lines.

B.7-7) Cross hatch fill: In this rectangular decorative zone the interior is filled with cross hatching oriented parallel to the sides of the rectangle.

B.7-8.1) Mixed triangular fill rectangle: In this rectangular decorative zone, diagonal lines connect corners forming an X design within the rectangle (as for 7-6). Opposing triangular zones within the rectangle have interior decorative fill, the upper triangle with vertical hatch fill while the lower one contains punctate line fill. Thus the design appears as a rectangle with two opposed internal triangles containing varied fill.

B.7-8.3) Cross hatch triangular fill rectangle: In orientation this is similar to 7-8.1 in that the upper and lower triangles within the subdivided rectangular zone have decorative fill. In this variation the fill consists of cross hatch oriented parallel to the rectangle.

B.7-9) Punctate line fill rectangle: Within a rectangular decorative zone an alternating pattern of parallel solid and punctate lines fills the interior.

B.7-10) Diamond hatch rectangle: Within the rectangular decorative zone a series of parallel lines form a diamond, the rest of the interior area remaining clear of design fill.

B.8) Leaf design: This series of design patterns were used mainly as an independent design motifs.

B.8-1) Single leaf: A stylized leaf design consisting of a curved outlined and bisecting inner spine. This design used primarily as an independent design motif.

B.8-2) Multiple leaf cluster: This design consists of a series of leaf motifs similar to those of 8-1 in rectangular patterns, the tip of one leaf intersecting with the back of the next leaf at right angles. This motif occurs as an independent design motif.

B.8-3) Leaf border: In this design the basic leaf shape is combined with a series of parallel lines which form a symmetrical border design.

B.8-4) Open leaf border: This design is a variation of that of 8-3, with a modification in the elimination of internal spines on the leaves, leaving an open border design.

B.9) This collection of linear motifs is grouped by their common use as bordering devices to demarcate decorative zones. As such there is not a great deal of internal stylistic design compatability, though all are straight lines. Within this category a further subdivision was made based on alignment

relative to vessel orientation: a) vertical, b) horizontal, c) diagonal, d) broken lines.

B.9-1) Single line: This is a single incised line used to demarcate the decorative zone.

B.9-3) Point: This consists of a pair of intersecting lines which end at the intersection forming a V.

B.9-4) Double parallel lines: This is a pair of parallel incised lines.

B.9-5) Multiple parallel lines: This consists of a series of parallel incised lines used to demarcate decorative zones.

B.9-6) Hatched double lines: This motif consists of parallel lines with the interior space filled by right-angled hatching.

B.9-7) Broken fill double lines: As with B.9-6 this motif is based on parallel lines, the interior being filled with either a third broken line parallel to the first two (9-7.2) or a punctate line parallel to the first two (9-7.1).

B.9-8) Diagonal hatch double lines: This is again a variation on 9-6 where the fill consists of diagonal hatch.

B.9-9) T-border: This is a border motif based around double lines intersecting other sets of lines at right angles forming T shaped borders.

B.9-10) V-border: This motif is again based on paired lines, this time formed into a larger pattern of parallel sets of lines with interior space filled by smaller diagonal lines forming V designs. Of interest is the fact that this design, unlike 9-9, does not have an open interior space as the long parallel lines define the space occupied by the shorter V lines. Of note also is that the V design is formed with the intersection of the two interior lines rather than by intersection with the two exterior lines.

B.9-11) Y-border: This is again a border motif, different from the others in this series in that it is formed of single rather than double lines. In this design a series of ranked short vertical lines are staggered below another set of vertical lines, the two sets being joined by diagonal lines, the whole design forming a series of inter-connected inverted Y patterns.

B.10) Triangles: This series of motifs is based on clearly delineated triangular decorative zones. This is specified as being an independent zone, and not a portion of a larger rectangular motif such as B.7-8.1.

B.10-1) Clear triangle: This motif demarcates a decorative zone without internal decorative fill.

B.10-2) Hatch fill triangle: A triangular decorative zone in which the interior contains hatching.

B.10-3) Cross hatch fill triangle: A triangular decorative zone in which the interior contains cross hatching.

B.10-4) Punctate line fill triangle: A triangular decorative zone with internal parallel alternating solid and punctate lines.

B.10-5) Broken line fill triangle: A triangular zone containing parallel broken line fill.

B.10-6) Punctate fill triangle: A triangular zone containing punctate fill.

B.11) This subdivision covers units in which diamond shaped borders delineate decorative zones.

B.11-1) Diamond zones: This is a diamond shaped decorative zone aligned vertical to the vessel orientation. Frequently appearing with a clear interior, 7-10(a) is a variant in which the interior contains hatch fill.

B.12) Curved lines: These incised motifs are used mainly as independent decorative motifs or as zone demarcators. They are not present in the Mangaasi type site collection. They have been further subdivided by linear alignment relative to vessel orientation: a) vertical, b) horizontal and c) diagonal.

B.12-1) Curved line: This is a single incised line used mainly as a separate decorative motif.

V. ANALYSIS RESULTS

The collections utilized in this study varied both in the size and unity of assemblage. Several prime sources such as Specht's (1969) Buka material and Kaplan's (1976) Nissan Island material were not included in the study. This was due to the fact that the raw data used in their analyses was not included, preventing re-examination of the material by other archaeologists. While a detailed discussion of the mode of analysis and categories of decoration were in both cases included in the reports, the actual decorative patterns on the sherds were not reproduced. The only way to re-examine the material would be to have access to the original collections. As this was not possible several otherwise logical choices for this comparative analysis were deleted.

This situation was compounded by the mode of analysis commonly used in Pacific studies - based on the Lapita studies of Poulsen (1971) and Mead et al (1975). While this analysis is admirably suited to detailed design systems with complex unique design motifs, it does not work nearly as well with undistinguished design systems like the Mangaasi Tradition. The lack of complexity and unique characteristics within many incised/applied relief assemblages in the Pacific limits the definition available with this mode of analysis.

Unfortunately this deficiency has not been corrected by the development of an alternative mode of analysis more suited to deal with less unique design systems. Instead, incised/applied relief assemblages have either been limited to integration into Mead's system of analysis, or simply referred to in generalized descriptions, neither of which allows for detailed comparison of varied incised/applied relief assemblages.

While the mode of analysis devised for this study is much more simplistic than that of Mead, it provides a means of comparison between incised/applied relief traditions. The utility of this approach would be enhanced if further assemblages were analyzed in this format, allowing for a wider and more detailed area of analysis.

All of the assemblages used in this analysis were analyzed on the basis of library information - none were analyzed as the result of first hand examination. Assemblages were selected with a main emphasis on the presence of a sufficiently large sample to make comparisons valid. Each assemblage is assumed to be a balanced representation of the sample collected.

Mangaasi: This site (EF-17) (Garanger 1972) is discussed in detail in the text, and is located on the northwest coast of Efate, central Vanuatu. It was divided by Garanger into three in situ layers - inferieur (lower), moyen (intermediate) and superieur (upper), along with a

surface collection from the same site. Sample size for this study was: Inferieur 72 sherds; moyen 90 sherds; superieur 70 sherds; and surface 18 sherds.

Mangaliliu: This site (EF-15) (Garanger 1972) is located near the Mangaasi site to the southwest and is again a coastal site. Sherds recovered from this site were the result of surface collection. A total of 62 sherds were analyzed.

EF-16: This site (Pwanmwou) (Garanger 1972) is located on the coast between site EF-15 (Mangaliliu) and EF-17 (Mangaasi). Again the sherds are surface recovery, with a total of 100 utilized in the analysis.

Makura: This is a small island between Efate and Tongoa, and was the site of excavations by Garanger in 1963 (Garanger 1972). Sherds represented are from Lapua and Lindoroa, Layer II. A total of 38 sherds were analyzed from this location.

Mele: This site (EF-22) (Garanger 1972) is located slightly inland of the southwest coast of Efate on an alluvial plain. The sherds were collected from the surface with a total of 42 being analyzed.

Retoka: A small islet near Efate, directly off the coast from EF-15 and EF-17 (Garanger 1972). Sherds collected were surface finds with a total of 20 sherds being analyzed.

Erueti: This site (ER-30) (Garanger 1972) is located on the south coast of Efate. A total of 68 sherds were analyzed from the excavation at depths from 0-80cm.

Siviri Mantae: A coastal site (EF-13) (Garanger 1972) located to the south of EF-15 on Efate. The sherds analyzed were surface collection with a total of 18 being studied.

Lelepa: This is an islet just off the coast of Efate, directly opposite EF-17 (Garanger 1972). The sherds recovered were from various locations, the majority from surface collections while the remainder were from various test excavations. A total of 207 sherds were analyzed.

Tongoa: Tongoa is the largest member of the Shepherd Islands to the north of Efate, and was the location of several of Garanger's excavations in 1963 (Garanger 1972). The majority of the sherds analyzed were excavated from two sites on the island, TO-23 and TO-27. The sherds, of which 113 were analyzed, were recovered from various layers at the sites.

New Caledonia - Gifford/Shutler: As this work was done in the 1950's prior to the definition of pottery traditions for the region, a selective sample of the incised decorated sherds were analyzed (Gifford and Shutler 1956). This was due to the large number of punctate Lapita sherds present which if included in the analysis

would have badly skewed the data. A toal of 91 sherds were analyzed from various sites and proveniences.

New Caledonia - Frimigacci: This work was done in 1977 as a general discussion of New Caledonian ceramics and as a result took material from varied locations and proveniences (Frimigacci 1977). The sherds analyzed were those that Frimigacci has defined as belonging to the Melanesian cultural assemblage (incised/applied relief tradition). A total of 93 sherds were analyzed.

Fiji - Modern: This is a collection of ethnographic pottery from various locations (Palmer et al 1965, Palmer and Shaw 1966, Palmer 1968). A total of 50 units were analyzed.

Fiji - Navutu and Vunda: This was Gifford's excavation series from the 1950's (Gifford 1951) and as with the New Caledonian material was prior to the development of ceramic traditions for the region. The majority of sherds not identifiable as Lapita were included in this analysis resulting in 48 sherds from various sites and proveniences.

Guam: This material was taken from Reinman's Guam survey (Reinman 1977). A total of 18 incised sherds were analyzed.

Within the Mangaasi sequence the design analysis of the decorative motifs revealed the following patterns. On the purely numerical basis of frequency presence at

the different layers (inferieur, moyen and superieur) there was a relatively even pattern of change in the stylistic repetoire (See Table I).

The following design elements showed a decrease in frequency in the upper layers at the type site: 1-1 (all), 1-2 (all), 2-1.1 (all), 3-1 (all), 3-2 (all), 4-1.1 (all), 4-1.2 (all) and several individual motifs including 4-3b, 5-3b, 5-5a, 6-2.3 and 9-5a.

Increases in frequency in the upper layers was limited to individual motifs including 3-1, 7-6, 9-1c, 9-3a, 10-1, 10-2, 10-3 and 10-4.

Several motifs exhibited the highest frequency in the intermediate (moyen) layer, reflecting decreases in both the upper and lower layers: 1-1.2b, 2-2.1b, 5-1a, 7-8.1 and 9-5c.

From this analysis it appears that over time the Mangaasi Tradition design repetoire discarded most of the nubbins, punctate patterns, detailed parallel hatching, several of the chevron motifs and the parallel border lines. A scatter of diverse designs gained popularity during the intermediate period only to be neglected in the later period. Linear borders, usually pointed and triangular space units with various fill elements became more common in the later period.

TABLE I

MOTIF PRESENCE BY LOCATION

Sites	Mangaasi				Vanuatu									Fiji		N. Cal.		
Motifs	Infer.	Moyen	Super.	Surface	EF-16	Mangalil.	Mele	Makura	Erueti	Retoka	Lelepa	Tongoa	Siv. Man.	N./V.	Modern	G./S.	Frim.	Guam
1-1	2	-	-	1	1	1	1	1	-	1	2	2	1	1		-	1	-
1-1.1	1	-	-	-	-	-	-	-	-	-	-	-	-	-		2	2	-
1-1.1a	-	-	-	-	-	-	-	-	1	-	-	-	-	-		-	-	-
1-1.1b	2	-	-	-	-	-	-	-	2	-	-	1	-	-		2	2	-
1-1.1c	-	-	-	-	-	-	-	-	-	-	-	-	-	-		1	-	-
1-1.1d	2	-	-	-	-	-	-	-	-	-	-	1	-	-		-	-	-
1-1.2a	4	-	-	1	-	1	-	-	-	-	-	-	-	-		-	-	-
1-1.2b	-	3	-	-	1	-	-	-	1	1	4	-	-	1		-	1	-
1-1.2c	-	1	-	1	1	1	-	-	-	-	1	-	-	1		-	2	-
1-1.2d	-	2	-	2	-	2	-	-	-	-	-	-	-	-		-	-	-
1-2	2	2	-	-	2	-	1	-	-	-	-	4	-	1		-	-	-
1-2.1a	1	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-
1-2.1c	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	1	-
1-2.1d	1	-	-	-	-	-	-	-	-	-	-	1	-	-		-	-	-
1-2.2a	1	-	-	-	1	-	-	-	-	-	-	1	-	-		-	-	-
1-2.2b	1	-	-	-	-	-	-	-	-	-	2	2	-	-		-	1	-
1-2.2c	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	1	-
1-3	-	-	-	-	1	1	-	3	-	-	1	-	-	-		1	1	-
2-1.1a	3	1	-	-	2	1	1	-	-	-	6	-	2	-		-	-	-
2-1.1b	1	-	-	-	3	1	-	1	-	-	11	-	-	1		-	-	-
2-1.1c	9	3	-	1	5	1	-	1	-	1	10	2	-	1		-	-	-
2-1.1d	-	-	-	-	1	-	-	-	-	-	2	-	1	1		-	-	-
2-1.2x	-	-	-	-	-	-	-	-	-	-	-	-	1	-		-	-	-
2-1.2y	-	1	-	1	-	-	-	-	-	1	-	-	-	-		-	-	-
2-1.3y	2	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-
2-2.1a	-	1	1	1	6	1	1	4	1	-	16	-	1	-		-	-	-
2-2.1b	-	4	-	4	13	5	7	3	-	3	33	1	2	-		-	-	-
2-2.1c	1	3	3	3	7	2	1	3	-	1	23	1	-	-		-	-	-
2-2.1d	-	1	2	4	10	3	3	3	1	3	43	-	2	-		-	-	-
2-2.1e	-	-	-	1	-	-	-	-	-	-	1	-	-	-		-	-	-
2-2.2x	-	-	-	-	1	1	-	-	-	1	3	-	-	-		-	-	-
2-2.2y	1	-	-	-	-	-	-	2	-	-	-	-	-	-		-	-	-
2-3.1b	-	-	-	-	-	-	-	1	-	-	1	-	1	-		1	-	-
2-3.1d	-	-	-	-	-	-	-	-	-	-	1	-	1	-		-	-	-
3-1	1	-	4	-	-	1	-	-	-	-	-	1	-	-		-	-	-
3-1.1	2	1	-	-	-	-	-	1	-	-	-	-	-	3		-	2	-
3-1.1a	1	-	1	-	1	-	-	-	1	-	2	-	-	-		4	-	-
3-1.1b	3	-	1	-	2	-	-	3	1	3	1	4	-	1		3	-	-
3-1.1c	-	2	-	1	1	-	-	1	1	-	4	3	-	1		4	-	-
3-1.1d	4	2	2	1	-	-	-	-	-	-	7	6	-	-		-	-	-

TABLE I

MOTIF PRESENCE BY LOCATION (Cont.)

Sites	Mangaasi				Vanuatu									Fiji		N. Cal.		
Motifs	Infer.	Moyen	Super.	Surface	EF-16	Mangalil.	Mele	Makura	Erueti	Retoka	Lelepa	Tongoa	Siv. Man.	N./V.	Modern	G./S.	Frim.	Guam
3-1.2a	1	1	2	-	-	-	2	-	-	-	-	-	-	-		-	-	-
3-1.2b	2	-	1	-	-	-	-	-	-	-	7	1	-	1		1	1	-
3-1.2c	2	2	2	-	2	1	-	-	-	-	4	3	-	-		1	2	-
3-1.2d	4	3	1	-	2	-	1	-	-	-	3	2	-	1		2	2	-
3-2	-	-	-	-	-	-	-	-	-	-	-	-	1	-		-	-	-
3-2.1	1	1	-	-	1	1	-	1	-	-	-	-	-	-		-	1	-
3-2.1a	-	-	-	-	1	-	-	-	-	-	-	-	-	-		-	-	-
3-2.1b	1	-	-	-	-	-	-	-	3	-	-	-	-	-		3	-	-
3-2.1c	-	-	-	-	-	-	-	-	6	-	-	-	-	-		6	-	-
3-2.1d	1	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-
3-2.2a	-	-	1	1	1	-	-	-	-	-	-	-	-	-		-	-	-
3-2.2b	-	1	1	1	-	-	-	-	-	-	1	-	-	-		-	-	-
3-2.2c	-	-	-	-	1	-	-	-	-	-	-	-	-	-		-	-	-
3-2.2d	-	1	-	-	1	-	-	-	-	-	-	-	-	-		-	-	-
3-4.1b	-	-	-	-	-	-	-	-	-	-	-	-	-	1		-	-	-
3-4.1c	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	1
4-1.1a	11	11	3	-	5	1	5	2	1	1	14	11	-	1	-	1	5	5
4-1.1b	11	12	4	1	2	1	1	3	6	1	14	11	-	2	3	2	7	1
4-1.2a	1	-	1	-	-	2	2	4	-	-	11	-	-	8	-	3	-	1
4-1.2b	5	4	-	-	5	2	2	3	-	-	10	2	-	4	2	15	3	-
4-3a	10	9	10	2	7	3	1	1	11	-	39	27	2	9	1	5	9	2
4-3b	29	29	11	3	7	5	6	3	19	5	40	36	1	7	5	15	6	-
4-4.1a	-	-	-	-	3	1	2	3	-	1	4	-	-	-	-	-	1	-
4-4.2a	-	-	4	-	3	2	3	2	1	1	5	3	-	5	-	1	4	-
4-4.2b	-	-	-	1	-	1	-	-	1	-	-	1	-	1	-	2	2	2
4-5	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-
4-6b	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5-1a	-	4	2	-	1	1	-	2	3	-	6	1	-	2	-	3	1	-
5-1b	4	1	2	-	1	-	-	1	1	-	3	-	-	4	-	3	2	-
5-2a	3	1	-	-	-	2	-	1	11	-	4	10	-	3	1	2	6	-
5-2b	-	-	-	1	1	2	-	1	1	1	3	2	1	-	-	-	4	-
5-3a	4	4	3	-	4	-	1	-	2	1	6	2	-	2	-	2	4	-
5-3b	11	12	1	2	4	-	1	2	-	1	5	2	-	-	-	2	1	-
5-4a	2	3	1	1	1	-	-	-	2	1	-	-	-	-	1	1	3	-
5-4b	2	1	1	2	4	-	-	1	1	-	-	-	-	-	3	-	-	-
5-5a	2	2	-	-	1	2	1	1	2	1	6	5	-	-	2	1	3	-
5-5b	-	-	-	-	2	1	-	-	2	-	-	2	-	-	-	1	1	-
6-1	1	2	-	-	-	-	-	-	-	1	2	7	-	1	2	1	1	-
6-1a	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
6-2.1	1	-	1	-	1	1	1	1	-	-	-	-	-	1	1	-	5	-
6-2.1a	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
6-2.2	1	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE I

MOTIF PRESENCE BY LOCATION (Cont.)

Sites	Mangaasi				Vanuatu									Fiji		N. Cal.		
Motifs	Infer.	Moyen	Super.	Surface	EF-16	Mangalil.	Mele	Makura	Erueti	Retoka	Lelepa	Tongoa	Siv. Man.	N./V.	Modern	G./S.	Frim.	Guam
6-2.3	2	3	-	-	6	4	-	-	-	-	4	1	-	2	-	1	-	-
6-3	-	-	-	-	-	-	-	-	-	-	-	-	-	3	6	1	6	-
7-1	1	1	1	-	-	5	1	2	-	-	5	2	1	-	-	-	-	-
7-2	-	-	-	-	1	1	1	2	-	-	4	1	1	-	-	-	-	-
7-3	-	1	1	-	1	2	-	-	-	-	1	-	-	-	-	-	-	-
7-4	1	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-
7-5	2	1	2	1	-	-	1	2	-	1	3	2	1	-	-	-	-	-
7-6	-	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
7-6.1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
7-7	-	1	-	-	-	1	-	2	-	-	2	-	-	-	-	-	-	-
7-8.1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7-8.3	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-
7-9	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
7-10	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-
8-1	-	-	-	-	-	3	-	-	-	-	4	-	-	-	-	-	1	-
8-2	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
8-3	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
8-4	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
9-1a	2	14	5	-	5	2	3	1	17	3	16	12	2	1	2	2	-	2
9-1b	3	9	4	-	4	4	2	4	3	-	11	10	-	3	7	1	2	3
9-1c	2	8	12	1	5	3	7	4	13	4	17	20	-	1	3	6	6	3
9-1d	1	-	1	-	-	-	-	-	1	-	1	1	-	-	1	-	-	-
9-3a	5	11	9	-	7	1	4	1	3	-	1	4	-	-	1	2	3	-
9-3b	-	1	-	-	-	-	-	-	1	-	-	1	-	-	-	1	-	-
9-3c	-	2	2	1	-	-	2	-	3	1	5	2	-	-	1	1	1	-
9-4a	7	1	1	-	6	4	2	1	5	-	1	1	1	-	-	-	3	1
9-4b	-	-	1	1	2	4	1	1	1	1	3	3	-	-	2	5	1	-
9-4c	2	3	1	-	4	6	6	6	4	2	8	1	-	4	-	7	1	-
9-4d	1	-	-	-	2	1	-	-	1	-	-	-	-	1	-	1	-	-
9-5a	8	7	3	-	2	4	-	1	-	1	2	-	1	1	3	-	1	-
9-5b	4	-	-	-	2	-	-	1	-	-	1	-	-	-	7	1	-	-
9-5c	4	20	1	-	2	-	1	2	2	1	5	-	-	1	7	1	4	-
9-5d	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
9-6a	1	1	3	2	8	10	1	1	1	-	9	1	4	-	-	-	1	-
9-6b	2	-	2	1	4	7	4	3	1	1	6	1	2	-	2	-	-	-
9-6c	2	-	2	1	3	6	3	2	1	-	10	3	1	1	-	-	1	-
9-7.1a	-	-	1	1	1	3	2	-	-	-	2	-	1	-	-	-	-	-
9-7.1b	-	-	-	-	2	-	1	-	-	1	-	-	2	-	-	-	-	-
9-7.1c	-	-	1	-	3	2	2	-	-	-	1	1	-	-	-	-	-	-
9-7.2a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-
9-7.2b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
9-8a	-	-	-	1	-	2	-	-	2	-	1	-	1	-	-	-	-	1
9-8b	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-

TABLE I

MOTIF PRESENCE BY LOCATION (Cont.)

Sites	Mangaasi				Vanuatu									Fiji		N. Cal.		
Motifs	Infer.	Moyen	Super.	Surface	EF-16	Mangalil.	Mele	Makura	Erueti	Retoka	Lelepa	Tongoa	Siv. Man.	N./V.	Modern	G./S.	Frim.	Guam
9-8c	-	-	-	-	1	1	-	1	2	-	2	3	-	-	-	-	-	-
9-9a	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-
9-9c	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-
9-10	-	-	-	-	-	4	-	-	-	-	-	-	1	-	-	-	-	-
9-11	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	2
10-1	-	1	15	-	7	1	1	1	-	3	15	6	2	1	1	-	-	-
10-2	-	1	10	-	6	-	1	1	-	3	9	3	1	-	1	-	-	-
10-3	-	-	9	-	1	-	-	1	-	-	-	-	-	-	1	-	-	-
10-4	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-5	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-
10-6	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1	-	-	-
11-1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
11-1a	-	-	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-
12-1a	-	1	-	-	-	-	-	-	2	-	3	-	1	-	-	-	-	-
12-1b	-	-	-	-	-	-	-	1	-	-	1	-	1	-	3	5	1	1
12-1c	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	1	5	-

Utilizing the Jaccard Index the predicted pattern of change is fulfilled, each layer having most in common with immediate adjoining layers (See Table II). This receives further verification in the contrast between the surface layer with the lower layer (inferieur) where an extremely low correlation of .193 was obtained.

With the Robinson Index a somewhat more ambiguous result is obtained (See Table III), for while the lower (inferieur) and intermediate (moyen) layers have a high correlation, the other comparisons reflect no clear pattern of association between layers.

When comparing the Mangaasi type site sequence to the other assemblages several interesting patterns appear. With the Jaccard Index it may be seen that the various sites located by Garanger in Vanuatu are in fair agreement with each other with correlations from .3 to .5 (See Table II). These correlations indicate that the design motif collection is not identical at these different sites and in fact there are higher correlations between the lowest layer at Mangaasi type site and more distant areas such as New Caledonia than there are within central Vanuatu.

Bias in the form of the incomplete sample utilized for this study from the type site, combined with the largely surface assemblages recovered at the other sites within central Vanuatu is in part possibly reflecting the range of values in the study. Yet the Jaccard Index does indicate

a lack of uniformity in the various assemblages present in the study. When compared with the type site the highest correlations occur not between spatially close units such as in the Efate and other Vanuatuan assemblages, but rather between the Mangaasi lower layer (inferieur) and the New Caledonian material (See Table II). The .64 factor recorded for the comparison between the Mangaasi inferieur layer and the material presented by Frimigacci (1977) was the highest recorded, while the next highest was that of the Mangaasi inferieur layer with the New Caledonian material of Gifford and Shutler (1956) with a value of .58. This close correlation did not continue between the higher layers of the Mangaasi site and the New Caledonian material. The third highest value was again between disparate groupings - the Mangaasi inferieur layer and the Fijian material presented by Gifford (1951) with a value of .57. As with the New Caledonian assemblages there is a very distinct decrease in shared motifs over time, the Mangaasi upper layers having very low correlations with the Fijian material.

As noted earlier the combination of a suspect sample series in the varied assemblages limits the detail with which these statistics can be safely used. In order to minimize unreliability it would be best to view these numbers as general indicators at the .1 level of significance rather than interpreting too much from the limited data.

This situation also applies for the Robinson Index, as it uses the same data.

The Robinson Index generally corroborated these patterns of associations (See Table III). In contrast to the Jaccard Index however, the highest correlations recorded were not those of the Mangaasi inferieur layer with the New Caledonian assemblages, but were rather between various sites within Vanuatu, of which the highest was EF-16 and Retoka.

TABLE II
Jaccard Index

	Mangaasi					Vanuatu								Fiji		N. Cal.		
	Infer.	Moyen	Super.	Surface	EF-16	Mangalil.	Mele	Makura	Erueti	Retoka	Lelepa	Tongoa	Siv. Man.	N./V.	Modern	G./S.	Frim.	Guam
Infer.	1.0	.47	.45	.19	.43	.37	.53	.41	.47	.37	.42	.47	.17	.57	.31	.58	.64	.13
Moyen	-	1.0	.46	.30	.40	.36	.41	.44	.37	.36	.49	.43	.21	.36	.33	.33	.37	.13
Super.	-	-	1.0	.31	.48	.36	.50	.44	.40	.34	.47	.43	.21	.30	.32	.32	.35	.14
Surface	-	-	-	1.0	.28	.29	.27	.29	.27	.31	29	.27	.25	.15	.28	.14	.20	.12
EF-16	-	-	-	-	1.0	.52	.44	.52	.39	.36	.55	.43	.24	.36	.29	.33	.37	.09
Mangalil.	-	-	-	-	-	1.0	.43	.54	.34	.28	.53	.38	.28	.32	.25	.26	.38	.18
Mele	-	-	-	-	-	-	1.0	.50	.31	.42	.47	.45	.31	.27	.38	.26	.33	.16
Makura	-	-	-	-	-	-	-	1.0	.39	.38	.54	.43	.30	.36	.39	.33	.39	.16
Erueti	-	-	-	-	-	-	-	-	1.0	.31	.39	.42	.19	.31	.30	.47	.39	.19
Retoka	-	-	-	-	-	-	-	-	-	1.0	.38	.35	.23	.28	.31	.29	.30	.10
Lelepa	-	-	-	-	-	-	-	-	-	-	1.0	.52	.33	.36	.28	.38	.41	.13
Tongoa	-	-	-	-	-	-	-	-	-	-	-	1.0	.26	.37	.28	.41	.42	.13
Siv. Man.	-	-	-	-	-	-	-	-	-	-	-	-	1.0	.12	.18	.07	.11	.10
N./V.	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	.29	.41	.40	.17
Modern	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	.30	.30	.15
G./S.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	.49	.17
Frim.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	.15
Guam	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0

TABLE II
Jaccard Index

TABLE III
Robinson Index

	Mangaasi				Vanuatu									Fiji		N. Cal.		
	Infer.	Moyen	Super.	Surface	EF-16	Mangalil.	Mele	Makura	Erueti	Retoka	Lelepa	Tongoa	Siv. Man.	N./V.	Modern	G./S.	Frim.	Guam
Infer.	200	169	133	147	137	122	132	144	145	138	143	162	82	162	133	168	159	116
Moyen	-	200	147	122	155	145	158	158	171	155	142	167	119	149	137	156	147	138
Super.	-	-	200	113	145	124	141	147	135	156	131	144	114	119	120	127	112	111
Surface	-	-	-	200	154	118	122	150	119	147	162	123	124	120	125	119	127	77
EF-16	-	-	-	-	200	118	151	173	129	184	160	143	153	118	143	120	118	99
Mangalil.	-	-	-	-	-	200	168	149	136	144	121	121	145	98	140	105	102	128
Mele	-	-	-	-	-	-	200	162	151	155	146	136	147	110	133	117	110	140
Makura	-	-	-	-	-	-	-	200	138	175	162	150	148	123	140	131	123	108
Erueti	-	-	-	-	-	-	-	-	200	122	124	152	108	135	124	150	150	149
Retoka	-	-	-	-	-	-	-	-	-	200	152	143	146	116	139	123	116	104
Lelepa	-	-	-	-	-	-	-	-	-	-	200	138	139	125	88	125	128	102
Tongoa	-	-	-	-	-	-	-	-	-	-	-	200	98	168	105	169	147	139
Siv. Man.	-	-	-	-	-	-	-	-	-	-	-	-	200	70	130	85	79	101
N./V.	-	-	-	-	-	-	-	-	-	-	-	-	-	200	122	125	135	127
Modern	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	125	135	107
G./S.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	154	132
Frim.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	114
Guam	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200

TABLE III
Robinson Index

VI. CONCLUSION

This study was focused on two separate issues, one being a stylistic re-examination of the Mangaasi type site material, the other an areal survey of possible relationships between various incised/applied relief assemblages. The examination of the Mangaasi site assemblage is especially important for two reasons - 1) the controversy surrounding the site excavations and conclusions after re-examination by Graeme Ward; 2) the need to develop a more specific definition of changes in the site pottery assemblage in order to aid association of specific layers at the type site with other site assemblages.

The second part of the conclusion is the comparison of the Mangaasi Tradition assemblage with other sites of incised/applique relief traditions elsewhere in Vanuatu and the western Pacific. Obviously this comparison is dependent on the validity of the original Garanger conclusions about the Mangaasi site - otherwise the use of such a detailed examination on a series of ceramic decorative traditions of uncertain date and provenience would be wasted effort.

Intra-Site Variation

As noted earlier in the discussion about Graeme Ward's criticisms of the original Garanger report, (Garanger 1971;

Ward 1979) several basic propositions were put forth by Ward as tests for the veracity of his criticisms. The only one of his three propositions that is testable through a ceramic decorative analysis is the second. He predicts that site turbation occurred which will result in no more variation being present between the lower (inferieur) material and the upper layers than would be encountered in a random selection from the lower layer material alone (Ward 1979;I-8). If his prediction is correct then both the Jaccard and Robinson indices should show a general lack of variability over time in the various layers and more importantly the nearest neighbor association expected with intact site stratigraphy should not be reflected in the data. Thus there should be no appreciable change in variation whether the inferieur/moyen layers or the inferieur/superieur layers are examined.

If tables I and II are examined it will be noted that this situation does not occur. In the Jaccard Index a small but perceptible variation does exist when the inferieur layer is contrasted to the moyen and superieur layers. This variation is more evident in the Robinson Index, where the inferieur/moyen comparison is 169.3, while the inferieur/superieur comparison is 132.6.

The evidence from this stylistic analysis does not support Ward's contention. In fact it provides a good example of a normal predicted pattern of change in a design

system over time as reflected in an undisturbed site. Adjacent layers of a site will show more commonality than non-adjacent layers, as a reflection of deposition over time.

Based on this stylistic analysis, it appears that the Mangaasi site consists of an intact deposit exhibiting the normal expected pattern of increased change over time. This corroborates Garanger's original analysis of gradual change over a long period of time on-site, with distinctive differences between the inferieur and superieur layers, rather than Ward's predicted pattern of site turbation.

Inter-Site Variation

Utilizing the Jaccard Index, the closest ties between the Mangaasi type site assemblage and that of other tested locations is the correlation between the Mangaasi lower layer (inferieur) and the New Caledonian material, both that of Gifford/Shutler and that of Frimigacci. There were also very high correlations between the Mangaasi lower layer with both the Gifford Fiji material and the Mele assemblage from Efate. Other than a high correlation between the upper Mangaasi layer (superieur) and again the Mele assemblage, the other various assemblages from Vanuatu fell in the median range of values. While such sites as Lelepa, Tongoa, Makura and Erueti show both

associations with the Mangaasi site and limited variation over time there is not the close association between these sites that might be predicted. When this result is combined with the surprisingly low correlations from both Mangaliliu and Retoka, (especially in light of their physical closeness to the type site) it appears that the Vanuatuan assemblages are not as closely associated as might be predicted.

The closest associations represented in the Jaccard Index are of associations in time and tradition between the Mangaasi lower layer (inferieur) and that of the New Caledonia area, a similarity that decreases over time. Close associations of a similar nature are present between, again, the Mangaasi lower layer and the Fijian material.

Examining the Jaccard Index results over the entire sample shows the highest correlations within the Vanuatuan assemblages, especially between Mangaliliu/Makura/Ef-16. The rest of the Vanuatuan assemblages are typified by the same conditions noted in comparison with the type site assemblage - one of association without the high degree of similarity that might be expected. Of interest is that the correlations between the majority of the Vanuatuan assemblages and those from New Caledonia and the Fiji N./V. groups fall in the range of values present between the various Vanuatuan assemblages. In contrast to this high level of association is the unexpected lack of correlation

between the Siviri Mantae assemblage with the other assemblages, possibly a reflection of the small sample. Not surprising was the very low association between the Guam assemblage and the others in the study.

These relationships tend to verify the Mangaasi Tradition as being a distinct tradition rather than a mere sub-set of other traditions. The tradition definition was not only strong enough to show positive correlations but also detailed enough to reflect exclusion of unrelated or insufficient assemblages such as the Guam assemblage.

A somewhat different pattern emerges from the Robinson Index, in part a reflection of the differing mode of examination. The Mangaasi material again reflected very high scores between the Mangaasi lower layer (inferieur) the New Caledonian assemblages and the Gifford Fijian assemblage. Nonetheless, the closest association was not recorded with the Mangaasi lower layer but was instead between Mangaasi intermediate layer (moyen) and the Erueti assemblage.

In general the Robinson Index reflected the same results as that of the Jaccard Index - the highest consistent associations were between the lowest layer of the Mangaasi site assemblage and those of the New Caledonian and Fijian material, with a marked decrease in this similarity over time.

High correlations were obtained for various units within the Vanuatuan group, especially between the Mangaasi

intermediate layer (moyen) and the Erueti assemblage. High correlations were also recorded between the lower layers of the type site and Tongoa, while the Lelepa assemblage registered a high correlation with the Mangaasi surface assemblage. Of more importance in the analysis of the type site were the fairly high correlations between the various layers of the site, with the variations reflecting nearest neighbor associations. Other high scores were noted between Mangaliliu and Mele, Makura and Mele, Makura and Lelepa. Possibly more significant was the high correlation of Tongoa with both the Fiji N./V. assemblage and the New Caledonian G./S. assemblage. Correlations between various sites within the Vanuatuan assemblages again reflected a relatively high pattern of similarity, but there was more internal variation between the assemblages than was reflected in the Jaccard Index. While the Guam material again scored consistently lower than the average, the Siviri Mantae material revealed a wide range of fluctuating values with various units. These fluctuations appear to again be related to the small sample present, as the average would fall within the range of the other Vanuatuan sites.

The highest association on the Robinson Index was not within the Mangaasi assemblage but was instead that of EF-16 with Retoka, followed by EF-16 with Makura and Retoka with Makura.

The various interrelationships among the larger Vanuatuan assemblage reinforce the larger generalized pattern of association validating the concept of the Mangaasi Tradition. The high correlation between the various sites with the Vanuatu system reflects not only localized, but also early close ties to the south and east.

VII. INTEGRATION

Prior to drawing extended hypotheses from this study, it should be re-emphasized that caution must be taken in putting too much weight on purely stylistic examinations. As Rye and Allen have noted:

> "Ceramic typologies have been rigorously constructed [in the past], but entirely on the basis of morphological and decorative traits (occasionally fleshed out in functional terms as well). This is not to deny the necessity of such an approach - its success both in Melanesia and elsewhere is self-evident - but rather to suggest that a case can be made that such approaches while necessary may still not be sufficient to provide the basis to support the models and reconstructions being offered for the prehistory of the region." (Rye and Allen 1976:198-199)

However, such studies do offer possibilities of examination not otherwise available at present. If these problems are kept in mind during development of hypotheses, valuable progress may be attained with limited material.

Three main points seem to be clear from this study:

1. The refutation of a large and vital portion of the Graeme Ward criticism of the Mangaasi material.
2. The presence of a stylistic unity within Vanuatu supporting Garanger's contention for a Mangaasi Tradition.

3. The strong indications of early close associations between the Mangaasi site and both the New Caledonia area and Fiji.

In the conclusion Graeme Ward's criticism of the Mangaasi material was covered, but as his main contention dealt with time depth of the Mangaasi Tradition it is worth further discussion. While Ward contended that the central Vanuatu sequence should follow the same time frame as his sequence from the Banks Islands in the north, he noted that:

> "The main body of the ceramic assemblage excavated at Area A on Pakea fits more closely with the Mangaasi Ware defined by Garanger for the Central Islands of the New Hebrides than with any other pottery known in the region. The main points of similarity are found in the proportions of inclusions, construction and finishing techniques and condition of the excavated sherds, in the vessel shape and rim characteristics and the presence of handles, in the decorative techniques used and a number of motifs in common; the chronology of the two assemblages is not dissimilar. Significant differences in each of four classes of evidence distinguish the major part of the Pakea assemblage from several other ceramic wares in the Western Pacific." (Ward 1979:7-31)

In fact it appears that the Banks Islands material falls within the Mangaasi sequence, specifically in the later portion of the sequence. This raises a very interesting question in regards to the original 'source' of the Mangaasi Tradition. I will try to resist writing yet another of what Clark and Terrell have so aptly called culture histories, of which in Oceanic prehistory:

> "...there seems to be a strong predilection for writing what may be called culture-historical scenarios that are often little more than "just-so" stories telling how X came to be X." (Clark and Terrell 1978:300)

This is especially tempting in the case of the Mangaasi Tradition where the earliest dates (around 600 B.C.) come from central Vanuatu (Garanger 1972). To the north and south the dates are at present substantially younger. To the north both Garanger's (1972) dates for Makura/Tongoa and Ward's (1978) dates for the Banks do not extend to 500 B.C. Further afield those of Specht (1969) with roughly 3-500 B.C. (1969:215) from Buka, Clay (1974:9) with roughly 500 B.C. from New Ireland and Irwin (1973) with post 800 A.D. dates (1973:249) from the Shortlands also post date those of Garanger for central Vanuatu. To the south the initial presence of Mangaasi ware in New Caledonia (Oundjo Tradition) is apparently around 100 A.D. (Green 1982).

With the present data it appears that Mangaasi was an internal development in Vanuatu with later expansion or movement to the north and south. During the later period (from 100 A.D.-1200 A.D.) of the Mangaasi Tradition, increasing lack of unity in the design system would seem to indicate either there was an increasing lack of contact between islands, or more likely there were increasing perceptions of villages or immediate areas as the dominant group of association. This perceptual contraction appears to be reflected in the greater diversity of the assemblages as a means of defining group identity and individuality. An ethnographic parallel can be made with the situation in coastal New Guinea, the great diversity of pottery style within areas of mutual trade and contact (Egloff 1972:161-162).

In the larger context of the Mangaasi Tradition compared with other regions of the western Pacific, the strongest associations are with other areas of Melanesia. There appears to be little correlation at present with Micronesian assemblages, though whether this is a result of the limited information available rather than a reflection of actual conditions is unknown at present.

By contrast the strong correlations between the Mangaasi Tradition and that of the New Caledonian and Fijian assemblages implies that the Mangaasi pottery

tradition was present in both New Caledonia and Fiji. The rapid decrease in similarity between the three areas suggests that actual physical isolation rather than merely a desire for group identity was the major factor in the lack of design association in later periods. In a general context it appears that an early pattern of wide spread dispersal of a design system was rapidly replaced by restricted movement and communication.

In the opposite direction, Garanger noted similarities between the Mangaasi material and that of Bougainville and Watom (Garanger 1971). Specht suggests contact between his Sohano Tradition and the Mangaasi Tradition. Work in New Ireland (Clay 1974) and the Shortlands (Irwin 1973) also points up possible parallels. Unfortunately the extremely wide variety of pottery assemblages recovered from the New Guinea area make identification of specific parallels to the Mangaasi Tradition precarious at best, in large part because of the basic design anonymity within the Mangaasi decorative tradition. While Scott and Segmen (1968) note the parallels between Gona Bay pottery and that from Vanuatu, examination of decorative systems from sections of New Guinea such as Arona Valley (Swadling 1973), Wewak (May and Tuckson 1973) and Egloff's coastal survey (1979) show that the Mangaasi Tradition decorative motifs can occur as a sub-set of more complex overall design

systems present in these areas. Thus drawing ties of associations between these areas and Vanuatu does not seem viable at this time.

While the direct information from this study can not provide proof of a single unified design tradition, nonetheless it does indicate a pan-Melanesian incised decorative system which can be called the Mangaasi Tradition. If this is the case then an interesting problem appears - what was the relationship between the various pottery traditions in the area of Melanesia?

By latest estimate there are either three or possibly four generalized pottery traditions present in parts of Melanesia: Lapita, Podtanean (paddle-impressed), Mangaasi and possibly plain ware (Green 1982). The Lapita Tradition at present appears to extend from 1600 B.C. to roughly 100 A.D. in New Caledonia, disappearing earlier in other locations (Green 1979). The Podtanean impressed tradition at present has roughly the same time span as the Lapita Tradition in New Caledonia (1982). The plain ware tradition appears to post-date the Lapita Tradition with a time frame extending from 1000 B.C. to the time of Christ (Green 1982). By contrast the Mangaasi Tradition dates are from roughly 600 B.C. to 1200 A.D. (Green 1982). With the present limited data it appears that the Mangaasi Tradition is the youngest of the four. This hypothesis is based both on the datable material and also that

when found in association with the other traditions it appears to post-date them. The situation has led to the rise of several competing theories to explain this phenomenon. Bellwood opts for the migration hypothesis:

> "In brief, throughout eastern Melanesia it is tempting to recognize an early Lapita ceramic series whose makers were ancestral to the Polynesians, and which was contemporary with and eventually replaced by a parallel impressed, incised, and applied series whose makers have contributed substantially to the present Melanesian culture and phenotypes. The latter series, with its very simple pottery forms, does not have any close extra-Melanesian parallels, and the whole group may be ultimately of Lapita inspiration." (Bellwood 1979b:20)

Green, by contrast does not posit a single source of change factors:

> "My impression is that in the central New Hebrides the earliest Mangaasi is more likely the founding cultural complex, and the Lapita the intrusive one, as the occurrence of a few Mangaasi sherds in the Erueti site suggests." (Green 1979:47)
>
> "Elsewhere [than Polynesia] these populations [Lapita] may have suffered cultural collapse and absorption as the result of a failure in their exchange system, or they may have been replaced or their population

"Buka Island is a prime example of village craft specialization. Only three villages produce pottery, while others produce specialities such as the mona canoe, pandanus capes, and certain stone artefacts. This pattern reflects to some degree resource distribution on the island, but this is not true in all cases. For example, potting clays are quite widely available, as the Tung situation demonstrates, nor are there immediately apparent reasons why the atoll of Nissan should be regarded as the source of the best pigs in the Buka area. An explanation of this distribution of activities may lie less in ecological factors than in social sanctions to sustain the economic networks of the area. Each community or group of communities holds a monopoly over certain products or manufactured goods, the distribution of which forces the communities into social interaction with each other." (Specht 1972:136)

I would suggest that an analogous situation may be reflected in the archaeological record in regards to the general pattern of Mangaasi Tradition ceramics superceding Lapita Tradition ware. As Lauer has noted in the Amphletts, the quality of the product or the decoration complexity does not seem to determine the market potential of the ceramics.

"As a result [of surface collections], very interesting changes were seen to have taken place in two industries during the period covered by the surface collections. On Goodenough Island, the historic pottery had a wide variety of designs while later patterns became simpler and were less skillfully executed. The latest phase, indeed, shows a strong influence of Amphlett wares, with which Goodenough potters came into first contact at the time of the Second World War.

In contrast to the Goodenough tradition, Amphlett ware achieved its present high standards only in recent times. The historic ware is rougher and often lacks the skill and variety of decoration which is one of the outstanding features of the contemporary pottery." (Lauer 1973:3)

It appears that change can be a reflection of market values rather than social change. If this situation is applied to the archaeological evidence, instead of waves of migrants superseding each other across the expanses of the Pacific with varied pottery traditions, the actual situation may be a reflection of social stability and trade relationships.

On this basis a short series of predictions can be formulated. First, if these ceramic changes are the

result of trade then there should be no large scale changes in the archaeological context except the change in pottery style. Second, it would be possible for small scale innovation to take advantage of this situation, so in the archaeological record various short lived and localized pottery traditions should abruptly appear and then cease. Third, distribution of the pottery traditions should overlap to the extent that they will cover almost the same area, as they would reflect changes in taste rather than trade patterns.

At this time firm answers can not be obtained for these propositions, though it is of interest that none conflict seriously with the evidence available at present for the region.

Based on the assumption that the Mangaasi Tradition is a reflection of such a situation, what predictions could be made about future findings? First, if this is a reflection of the actual past situation, then it would be entirely feasible for the Mangaasi Tradition to have started at most any location involved in existing trading patterns. Thus Vanuatu could be the initial starting point, or another location could have served. At present, due to earlier dates, the apparent long period of occupation and the complexity of the archaeological record it appears that central Vanuatu was the initial development point of the Mangaasi Tradition.

Secondly, if this situation is a reflection of trade variation, then one would expect that it will appear in most areas already involved in the Lapita trading complex. The important distinction would be not only in the lack of disruption in the archaeological record during the period of transition, but also that the transition will be variable, being based on human taste rather than necessity it will have varying dates of occurrence with no particular correlation to geographical areas. Thus contiguous sites with identical occupation periods could contain distinctly different traditions.

Possibly most important is that this proposition does not involve the mechanism of human migration but instead detailed trade contacts. For detailed trade relationships one must be dealing not only with a settled and stable population but also with a fairly well integrated trade system over long distances. This of course does not fit into the majority of the models proposed by Clark and Terrell (1978) for the Lapita cultural complex. The trader model will fulfill the requirements of this proposition in that it allows for the development of stable, long term populations.

While many other theories could be generated to account for the rise of the Mangaasi Tradition, the use of a trade

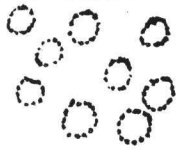
related economic mechanism has the advantages of not contradicting present evidence and allowing the development of several testable hypotheses.

A. DECORATIVE MOTIFS

A. Applique

1. Nubbins

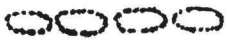
1-1.1: Round fill



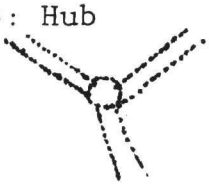
1-1.2: Round linear

1-2.1: Oval fill

1-2.2: Oval linear



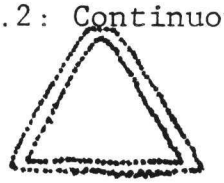
1-3: Hub



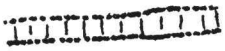
2. Ridge

2-1.1: Continuous linear

2-1.2: Continuous encloser



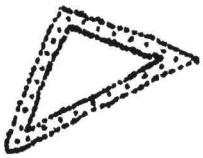
2-2.1: Hatch linear



2-2.2: Hatch encloser

2-3.1: Punctate linear

2.3-2: Punctate encloser



B. Incised

3. Punctate

3-1.1: Round filler

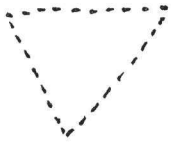
3-1.2: Round linear

3-1.3: Round encloser

3-2.1: Angled filler

3-2.2: Angled linear

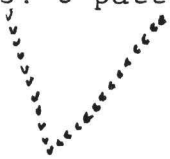
3-2.3: Angled encloser



3-4.1: U pattern filler

3-4.2: U pattern linear

3-4.3: U pattern encloser



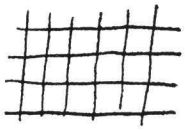
4. Hatch

4-1.1: Parallel vertical

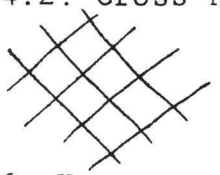
4-1.2: Parallel horizontal

4-3: Diagonal

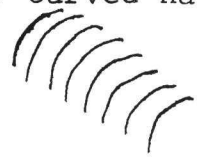
4-4.1: Cross hatch vertical



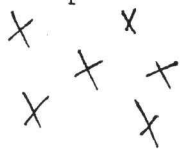
4-4.2: Cross hatch diagonal



4-5: Curved hatch

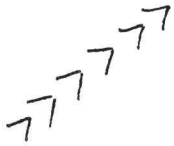


4-6: X pattern hatch

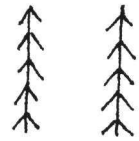


5. Chevrons

5-1: Chevrons



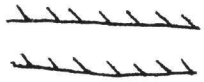
5-2: Spined chevrons



5-3: Detached chevrons

5-4: Spined detached chevrons

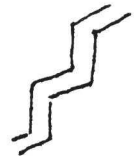
5-5: Spined half-chevrons



6. Angled lines

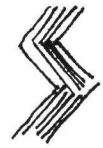
6-1: Angled lines

6-2.1: Clear Parallel



6-2.2: Cross hatch parallel

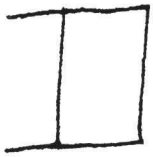
6-2.3: Hatch parallel



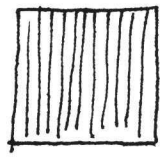
6-3: Wavy band

7. Rectangle

7-1: Clear



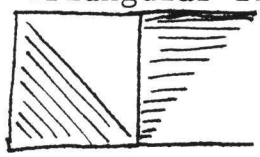
7-2: Vertical fill



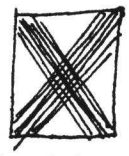
7-3: Horizontal fill

7-4: Diagonal fill

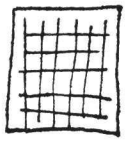
7-5: Triangular fill



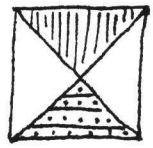
7-6: Triangular hatch



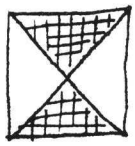
7-7: Cross hatch fill



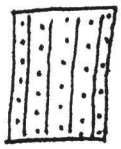
7-8.1: Mixed triangular



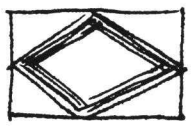
7-8.3: Cross hatch triangular



7-9: Punctate-line fill



7-10: Diamond hatch

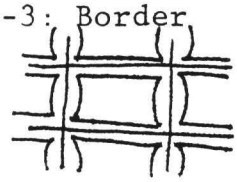


8. Leaf pattern

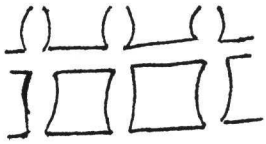
8-1: Single

8-2: Multiple

8-3: Border



8-4: Open border



9. Border

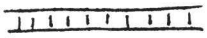
9-1: Single

9-3: Point

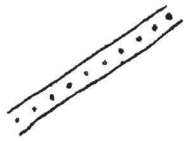
9-4: Double parallel

9-5: Multiple parallel

9-6: Hatch double

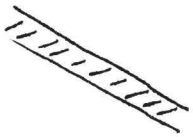


9-7.1: Punctate fill double

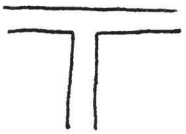


9-7.2: Broken line double

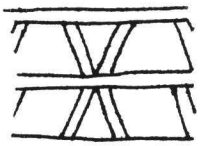
9-8: Diagonal hatch double



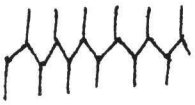
9-9: T border



9-10: V border

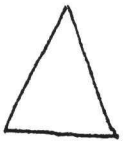


9-11: Y border

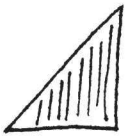


10. Triangle

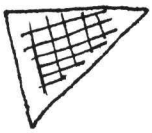
10-1: Clear



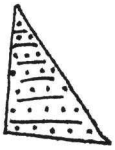
10-2: Fill



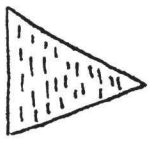
10-3: Cross hatch



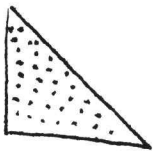
10-4: Punctate line



10-5: Broken line

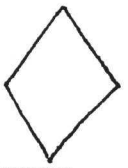


10-6: Punctate

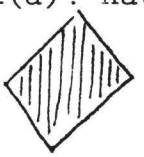


11. Diamond

11-1: Clear



11-1(a): Hatch fill



12. Curve

12-1: Single

B. NOTES FOR FRENCH QUOTATIONS

1. Within the decorative type categories assigned the numbers present of decorative potsherds were highest in the lowest layer (inferieur). 15.10% of the collection fitted within type categories in the lowest layer, in comparison with only 12.49% in the intermediate (moyen) layer and 6.47% in the upper layer (superieur). Inversely atypical decorative patterns were higher in the upper layer, where 25.4% fell into this category while in the intermediate layer 12.35% and 11.72% in the lowest layer fell into this category. In part this is due to the fact that while in the lowest layer the zone of decoration is limited to a banded area at the widest diameter of the vessel, in the upper layer decorative motifs are not confined to this band.

2. The Mangaasi site was initially occupied around 600 B.C. by a pottery making group. This continuous tradition extended till around 1700 A.D. without any major changes in either decorative system or pottery form. Foliated decorative motifs were most common in the lower layers, while handles of small bowls were most common in the lowest layer.

3. While the incised/applied relief pottery that characterizes the Mangaasi site now appears to be one of the three main ceramic traditions in the south

Pacific, the influence of this tradition upon the other ceramic traditions in the central New Hebrides is either minimal in the case of the Erueti pottery, or not present at all in the case of the Mele impressed ware or the Aknau internal incised decorated ware.

4. The most abundant pottery on New Caledonia is without a doubt a portion of the melanesian cultural ensemble. Though it appears in New Caledonia much later than the other two traditions, Lapita and impressed ware, it has continued up to the present period.

5. The second unusual fact is the disappearance of pottery on Makura and Tongoa around 1200 A.D., while it continues till 1700 A.D. on the north coast of Efate. The incised/applied relief pottery is not only the first pottery tradition to appear in the area, but is also the last to disappear.

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