Terra Australis reports the results of archaeological and related research within the region south and east of Asia, though mainly Australia, New Guinea and Island Melanesia—lands that have remained terra australis incognita to generations of prehistorians.

Its subject is the settlement of the diverse environments in this isolated quarter of the globe by peoples who have maintained their discrete and traditional ways of life into the recent recorded or remembered past and at times into the observable present.
Plate 1  The Wanigela Region: aerial view with overlay
This monograph is a record of the first serious archaeological work to be carried out on the Papua New Guinea coast, as recently as 1967. The research at Collingwood Bay which it describes was designed to investigate the significance of possibly the first archaeological materials ever to be made known from New Guinea, more than 60 years before. These created a flurry of interest in the years before the First World War and found their way into museum collections in London, Vienna and Sydney. There was a brief revival of interest on the eve of the Second World War when the characteristic pottery was reported from the Trobriand Islands, recently made world famous through the work of Malinowski. Dr Egloff thus included the Trobriands within the scope of his investigations.

Brian Egloff was born in Chicago in 1940. He had his high school education in Wisconsin and became an undergraduate student in anthropology at the Milwaukee campus of the University of Wisconsin, where he graduated Bachelor of Science in 1963. During his undergraduate years he worked as a student aid in the Milwaukee Public Museum, then headed by Stephan de Borhegyi, one of the world's great museum directors. From 1963 to 1967 he was an MA student at the University of North Carolina, Chapel Hill, where he did research on the recent prehistory of the Cherokee Indians. He also worked as Archaeological Assistant to the State Archaeologist, with responsibility for the organisation and direction of salvage excavations. This combination of experience attracted us to accept him as a research scholar to work in Papua New Guinea. The scholarship which he took up in 1967 resulted in the dissertation on which this monograph is based.

After graduating in 1971, Egloff returned to the United States and worked during 1972 as Contract Archaeologist with the Pennsylvania Historical and Museums Commission, Harrisburgh. In 1973 he went back to Papua New Guinea as Curator of Anthropology at the National Museum and Art Gallery, Port Moresby. In late 1978 when he returned to Australia, he was Assistant to the Director of the Papua New Guinea National Museum and Art Gallery and had had a major responsibility in the planning of the new museum complex, which was officially opened on June 27, 1977. In preparation for this he overhauled the registration and cataloguing system of the museum collections, built up workroom and repair facilities and trained local staff to operate them. As his other duties permitted, he undertook archaeological and ethnographic surveys and several excavations and trained Papua New Guineans in the procedures.

Jack Golson
As a research scholar in prehistory in the Department of Anthropology and Sociology, Research School of Pacific Studies, The Australian National University, I conducted archaeological fieldwork from November 1967 to March 1968 and from October 1968 to April 1969 in eastern Papua. The materials were studied and a thesis on them submitted in May 1971. Since the completion of this thesis, Collingwood Bay and the Trobriand Islands in recent prehistory: settlement and interaction in coastal and island Papua, immediately comparable data have been published, which have been incorporated in this revised and somewhat modified version of the original. The present manuscript was completed in early 1975, so that literature after that date is not included.

The archaeological materials on which the work is based are stored in the National Museum and Art Gallery in Port Moresby, with the exception of ceramic type collections at the Department of Prehistory, The Australian National University, Canberra, and the Department of Anthropology and Sociology, University of Papua New Guinea, Port Moresby. The computer print-out and matrices used in the ceramic analysis are kept in the Department of Prehistory, ANU. Appendix 6 lists the designations that my sites have been given in the files of the Niugini Archaeological Survey in the Department of Anthropology and Sociology, UPNG.

B.J. Egloff
ACKNOWLEDGEMENTS

Throughout the course of my fieldwork in eastern Papua many individuals assisted me. The hospitality I received was often beyond the means of the people who generously shared their food and shelter with me. Without the enthusiastic support of the local villagers my project would certainly have been doomed to failure. Although I worked in a number of areas in eastern Papua, my strongest association lies with the people of Rainu and Oreresan villages. For six months I lived and worked with these pleasant coastal villagers. A complete list of the people who contributed directly to my well-being would closely approximate a village census. Father Gregory Awui and his wife Melita must be especially thanked for their role; Melita treated me as a member of her family and our evening meals together were the most rewarding of my Papuan experiences.

Sister H. Roberts and Sister M. Young of the Wanigela Anglican Mission must be thanked for their continued efforts to restore my health and vitality. Father A.H. Ledbetter, Priest-in-Charge, continually offered me the hospitality of the mission, as did, on the occasions of my visits there, Father I. Lovell at Dogura, Goodenough Bay; Father K.R. Young and Brother B.J. Cunneen at Wataluma, Goodenough Island; and Father T. Cope at Samarai. Mr and Mrs A.E. Cridland of Wanigela, Mr D. Wolf of Menapi, Mr T.J. Ward of Nuanatu and Mr J. Stuart of Utuaba offered me the hospitality of their homes and assisted with my travel and supply problems.

Upon my return to Canberra, Professor J. Golson exerted a continued influence upon my research and suffered unduly with the drafts of the thesis. During the absence of Professor Golson, Professor D.J. Mulvaney served as my supervisor and assisted with many problems. P.K. Lauer, a fellow research scholar, willingly shared with me the data from his investigations of the pottery traditions of the D'Entrecasteaux Islands. Technical preparation of this volume rested in the able hands of the following persons: Ms A. Drakakis-Smith - editing; Ms W. Mumford and Ms J. Ramsay - drafting; Mr D. Markovic - photography; Ms M. Johnson - typing.

The following colleagues, at the time associated with the listed institutions, discussed and assisted me with my research:

**Canberra**


**Sydney**

The University of Sydney: C. White, Department of Anthropology. The Australian Museum: D.R. Moore, J.P. White.

**Port Moresby**

New Guinea Research Unit: A. Dani, J. Toner. The University of Papua New Guinea: F.J. Allen, S.E. Bulmer, Department of Anthropology and Sociology; D.K. Holdsworth, Department of Chemistry; C.D. Ollier, Department of Earth Sciences; W. Tomasetti, Dean of Students.

The Research School of Pacific Studies, ANU, supported every aspect of the fieldwork and preparation of the thesis. The Trustees of the Papua New
Guinea National Museum and Art Gallery kindly permitted the export of the specimens for study purposes. Photographs by Mr C.V. Turner were made available by the Trustees of The Australian Museum and are incorporated in Plates 12, 14, 15 and 16. Plate 3 is reproduced with the permission of Seeley Service and Company Ltd., London. The aerial photographs reproduced in Plate 1 have been made available through the courtesy of the Department of National Resources, Canberra.

The tedious and often contentious chore of editing for publication has fallen to the person who lived through the production of the original thesis: Professor Golson's patience and advice has again been most appreciated. I must apologise to anyone who has been omitted from the acknowledgements due to oversight on my part. Individuals whose work and assistance is directly reflected in the report are acknowledged within the text.
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I INTRODUCTION

The fieldwork which supports this study was initiated in November 1967. At that time the prehistory of the world's second largest island was relatively unknown. Social anthropologists had produced an extensive corpus of literature dealing with the cultures of New Guinea. In sharp contrast, published studies concerning the prehistory were few in number. A pot-pourri of reports touched upon the subject and made pronouncements regarding the antiquity of the island's cultures, for the most part focussing upon a sequential introduction of racial elements (see Swindler 1968). However, these efforts were not based on archaeological fieldwork. Prior to 1967 only a few archaeological projects of any consequence had been attempted and these within the previous decade. Moreover they were concentrated in the Central Highlands of former Australian New Guinea, while Papua and Irian Jaya were all but ignored by archaeologists.

The first decade of this archaeological work has given rise to summary statements of the general course of Highlands prehistory (Allen 1972b; White 1972:142-8). At some time prior to 25,000 BP man had come to the Papuan highlands, presumably supporting himself by hunting and gathering (White 1972:147; White, Crook and Ruxton 1970). Stratified sites in the Central Highlands pick up the sequence at the end of the Pleistocene and depict a relatively conservative lithic tradition (S. Bulmer 1964a, 1964b, 1966a; White 1965a, 1965b, 1967b, 1972). By 6500-5000 BP pig remains, possibly from domesticated animals (S. Bulmer 1966b; White 1972:147), and by 5000 BP local forest clearances (Powell 1970) give direct evidence for the presence of an agricultural system. Intensified localised agricultural activity is truly established by 2500 BP in the Wahgi Valley, while the subsequent introduction of the sweet potato has had an unassessed impact on the Highlands as a whole (Brookfield and White 1968; Powell 1970, 1973). These common experiences in Highlands prehistory are reflected in the wide distribution of the interrelated languages of the Central New Guinea Macro-Phylum (Wurm 1970).

During the same years archaeological work was being undertaken in Island Melanesia. Interpretations of this research have been published (Garanger 1972; Golson 1972a:553-81; Green and Kelly 1971). They are concerned with the movement of sea-borne communities into the islands of the Pacific during the second millennium BC, much later in time than the initial settlement of New Guinea but related to the expansion of Austronesian-language speakers who are also represented on the New Guinea mainland. The interest and importance of coastal New Guinea archaeology lies partly in relation to its participation in both the prehistory of the hinterland and in the settlement of the Pacific island world.

Reports of rock paintings and stone monuments were enticing reminders that coastal New Guinea had a provocative past (cf. Riesenfeld 1950). The brief report by Leask (1943) of a coastal shell midden in the Central District of Papua is the first description of faunal remains from a prehistoric site in New Guinea; pottery and flint implements were found associated with a rich collection of wallaby bones and sea shells. Miller (1950), operating in the same war-time situation as Leask, found a shell midden with ceramics at Cape Kassoe on Humboldt Bay in what is now Irian Jaya. Other brief reports describing archaeological finds in Irian Jaya were published by Galis and Kamma (1958), Solheim (1958), Bruyn (1959) and Röder (1959). The last of these is the only report of any length describing an archaeological excavation.

Amongst the known sites of archaeological interest was an unparalleled complex of middens at Wanigela on Collingwood Bay, reported by C.A.W. Monckton (1905) when Resident Magistrate of the North-Eastern Division. In the course of an archaeological survey in 1964 J.P. White (1965a) visited Wanigela but did not manage to locate any undisturbed midden deposits. Today the name Wanigela refers to an area rather than a specific village, but earlier it was the name of the village where the Anglican Mission was established in 1898. In 1904 the mission was moved to a new location 1 km north, where it became a focus for local resettlement in the form of the contiguous modern villages of Rainu and Oeresan. It was here that the series of large mounds was discovered during clearing and partially demolished to provide spoil for fill. The following account is by Rev. A.K. Chignell (1911:19-20), who joined the mission
shortly after its establishment at the new site. Chignell probably received his information from P.J. Money, a lay missionary present at the time of the shift, who sent collections of archaeological materials to the Australian Museum, Sydney.

While the ground was being levelled, a series of mounds, ten or twelve feet high and fifty to one hundred feet in length were cleared away, and used for filling swamps. Within these mounds, which must have been kitchen middens of an earlier and much larger settlement, were found quantities of broken pottery and engraved bones and shell.

Dr Rudolf Pöch, who was in the South Pacific photographing and collecting for the Museum für Völkerkunde in Vienna, became interested in the discovery when he saw some of the sherds at the Cape Nelson administrative station. In December 1905 he went to Rainu with G.O. Manning, Resident Magistrate of the North-Eastern Division, and conducted an excavation (Pöch 1907a:168).

First we visited the site in the village of Rainu where in the previous year the first excavations had been carried out. Here we found a mound about 1.5 metres high and approximately 5 metres wide. This, I was told, had formerly been about 200 metres long. It was now practically dug away, but, in the part that remained, a cross-section through its sandy structure could be seen, and this was rich in broken potsherds. For my own excavations I chose a hitherto untouched mound on the edge of the village, lying to the north of the mission station. This mound was similar in height and width to the one already excavated, but of lesser length. I had it dug through in transverse section, and the excavated material was packed into bags in layers. At a depth of approximately one metre beneath the surface, I came upon four human skeletons which, to judge from their position and completeness, had been buried there. No artifacts had been buried with these persons, but I did find a piece of shell which had apparently served as a personal ornament.

In spite of the find of skeletons, I do not regard the mound as a burial mound or 'tumulus' but simply as a rubbish heap in which dead persons were sometimes buried.

Manning (1905) briefly described his day of digging with Dr Pöch.

In a mound near the northern village three complete skeletons were found. These were all on the same level, about 4 feet above that of the present village.

Pöch's material was deposited in the Museum für Völkerkunde in Vienna. The original stratification of the finds referred to by him has been lost (F.J. Allen, pers.comm.). At the same time material collected by Monckton when the mounds were first discovered had been presented by him to the British Museum and a report on it was published by Seligmann and Joyce (1907). This and the publications by Pöch (1907a,b) illustrated the more striking of the material, particularly the decorated pottery, for which Joyce (1912) was to suggest Jomon parallels, and the carved shells which exhibit an elaborate artistry using flamboyant curvilinear motifs in which scroll forms dominate the pattern (Joyce 1912:Plates LXVI and LXVII; Monckton 1905; Pöch 1907a:69-70; 1907b; Seligmann and Joyce 1907:Plates VIII-XIII). Recently Golson (1968:30-1; 1972a:582-6) has argued that the carved shells may be evidence for southeast Asian Bronze Age Dong-son influence in art and ritual. The prehistoric Wanigela curvilinear designs are similar in many respects to the basic elements found in contemporary Massim art, for which Heine-Geldern (1937:199-200) has claimed partial Dong-son inspiration.

The term Massim received its current meaning when Haddon (1894:184) applied it to the coastal populations from Mullin's Harbour to Bartle Bay and those of all the islands off eastern Papua (Fig.1). Hamy (1889) discusses the earlier history of the term which came to be applied to the inhabitants
of the D'Entrecasteaux Islands and the Louisiade Archipelago. Later Seligmann (1909:Fig.3) further extended the Massim to include the southern half of Collingwood Bay.

Malinowski, in considering the earlier descriptions of the Massim, equated this relatively homogeneous area with that of kula influence, to the extent where 'we can speak about the kula type of culture and the Massim almost synonymously' (Malinowski 1922:29), the kula being an extensive inter-tribal exchange system circulating economic resources throughout the Massim (Malinowski 1922:81-104). Within the major Massim islands the kula operates in a circular fashion with ceremonial armshells (mxali) moving in a counterclockwise direction and necklaces (soulava or bagi) going in the opposite. The kula brought resources from peripheral regions into the system and no doubt served as a major integrating factor in island eastern Papua.

Haddon's (1894) survey of the decorative art of British New Guinea brought to light the highly sophisticated art form which marks this region. The style is best developed in island Massim and does not reach a comparable degree of elaboration in the Collingwood Bay area. The people of Wanigela on the far northern fringe of the Massim are not known for their artistic talents, except in the fields of facial tattooing and tapa cloth decoration. The women excel in their handsome tattooed scroll work which is often combined with the croix à enveloppe or linear motifs (Barton 1918:Plate XV). Tapa is embellished with a variety of complex angular patterns which are joined by curvilinear elements.

The Massim art style reaches its apogee on the Trobriand Islands. The Trobriands were known to have had connections with the Collingwood Bay region at some time in the past. Prehistoric ceramics from the Trobriand Islands were recognised by Austen (1939:40-6) as having close affinities with the prehistoric pottery from Collingwood Bay. Austen illustrates eight vessels found in the caves of Vakuta and Kiriwina Islands, of which seven are of the prehistoric Collingwood Bay style. Pottery currently in use on the Trobriands is derived primarily from the Amphlett Islands, a major ceramic centre in the kula (Malinowski 1922:282-6). One of the vessels illustrated by Austen is similar to the Amphlett pots which were traded to the Trobriands in recent times (Lauer 1971:207-8). Prehistoric sherds collected in 1967 by J. Golson and C.A. Key from surface sites in the Trobriands were shown by petrographic analysis to be made of clay from two distinct sources, Collingwood Bay and the D'Entrecasteaux Islands (Key 1968).

About the time I was planning my research at Wanigela, P.K. Lauer began his study of ceramic traditions in the D'Entrecasteaux (Lauer 1970b, 1974; see also Lauer 1973a, 1973b). These islands lie at a point midway between the Trobriand Islands and Collingwood Bay (Fig.1). Obsidian found at the village of Uiaku, south of Wanigela, is known to have come from a source in the D'Entrecasteaux (Key 1969). This gave support to the concept of a large prehistoric interaction sphere which encompassed Collingwood Bay, the Trobriand Islands and the D'Entrecasteaux Islands. The necessity of coordinating my research with Lauer's project is readily apparent. The obvious linking point was the Trobriand Islands where island and mainland ceramics had been found.

The reports describing the mounds at Wanigela indicated that the area was ripe for further investigation, particularly since it appeared that the prehistoric cultures of Collingwood Bay entered into a complex pattern of interaction with the D'Entrecasteaux Islands and the Trobriand Islands. Any excavation in the Wanigela area would then have wider implications for the prehistory of the Massim as a whole. Linguistic evidence was obviously relevant for this wider view. This has been interpreted by Capell (1943, 1962, 1969) to suggest that the southeast Papuan area was peopled by a series of migrations. The interplay between the earlier non-Austronesian-speaking peoples and Austronesian-speaking populations arriving later resulted in the present intermingling of linguistic groups.

Aside from the delineation of culture history, other avenues of enquiry were open. Archaeology in Papua offers many opportunities which are denied prehistorians working in the more technologically advanced regions of the world. Seldom is the archaeologist able to excavate the remains of activities, some of which are still practised by a culture living in exactly the same location. Many of these crucial fields of interest are disappearing as the
Papuan way of life changes to meet the demands of the twentieth century.

Chignell (1931:19-20) and Pösch (1907a:68) considered the mounds at Wanigela to be kitchen middens or refuse dumps. Although the middens were not described in detail, the presence of faunal remains, particularly shell fish, was implied. Further excavations would then produce material relevant to a reconstruction of the prehistoric environment and its utilisation through time. This could be compared with the pattern of exploitation practised by the local villagers and analogies drawn between the prehistoric and modern patterns.

Wanigela is one of the major pottery-making centres in eastern Papua (Tuckson 1966). Although Key (1968) had looked at certain aspects of the technology, the major areas of economics, ethnotaxonomy and individual variation within the industry remained unstudied. The information from such a study would no doubt assist in the interpretation of the prehistoric ceramics. In America and Europe 'new' archaeologists (S.R. and L.R. Binford 1968) attempted to draw anthropology and archaeology closer together, but these attempts were hindered because the prehistorians interested in this line of enquiry were often well removed from appropriate ethnographic situations (cf. Lee 1968).

Although Wanigela was ignored by the world of science except for the short visit by Pösch in 1905, a few government officials and missionaries have collected an amazing amount of material from the area. Sir W. MacGregor acquired specimens from Collingwood Bay during the 1890s in the course of his program of exploration and pacification; most of the material is stored in the Queensland Museum in Brisbane. The largest and best documented collection was made by P.J. Money, the Anglican lay missionary at Wanigela, just after the turn of the century. To the distress of his bishop, Money spent a good deal of time not only collecting items of material culture but also photographing scenes of village life. His photographic albums are held by the South Australian Museum in Adelaide and a few pictures have been published (Chignell 1911, 1913). The Money collection at the Australian Museum in Sydney includes pottery, ornaments, clothing and tools. Many specimens are identified by local name and their function described in detail. Pösch's collection at the Museum für Völkerkunde in Vienna includes moving pictures and sound recordings which were made during his trip to New Guinea in 1904-6. These sources of information, which could be used to link the past with the present, encouraged me to stress an ethnographic approach to the study of Collingwood Bay prehistory.

Further information bearing on the early contact situation is present in the Commonwealth Archives, Canberra. This consists of patrol reports made by the officers of the Cape Nelson administrative station during the period from 1901 to the present. Numerous sketch maps record the settlement pattern and a complete census of the area was made in 1928.

My research objectives focussed upon certain specific goals, often shifting to new lines of enquiry when avenues of approach became blocked and others opened. The following list details the major objectives at the beginning of the project or as they evolved during the course of field research and subsequent analysis of the materials. A vast amount of data was acquired in the process and only the information directly relevant to the prehistoric situation is presented in the sequel.

1. Search for and excavate suitable prehistoric middens in the Wanigela area and use these data to establish a local chronology.

2. Conduct a comprehensive surface survey in the Collingwood Bay region to ascertain the spatial features of the prehistoric settlement.

3. Attempt to relate the settlement of Collingwood Bay to that of the Trobriand Islands and the northern D'Entrecasteaux.

4. Relate the settlement of these areas as much as possible to the peopling of Melanesia, placing particular emphasis on the pottery-associated colonisation of coastal New Guinea and suspected metal-age influences within this context.

Further, it was envisaged that certain procedural problems would have to
be considered in detail.

1. The relevance of the ethnographic data to the archaeologically derived materials would have to be tested with respect to settlement pattern, the pottery industry, trade systems and environmental exploitation.

2. Particular regard would need to be paid to the interpretation of midden formation in respect of social and environmental variables.

Although I was concerned with the straightforward issues of chronology and areal distribution at the beginning, problems were posed at an early stage by apparently inexplicable variations in the data. Certain ceramic attributes were distributed within the middens in such a fashion that sociological factors appeared to be of significance. These variables became understandable when seen in the light of the data derived from an intensive enquiry into the fabrication, form and function of contemporary pottery carried out in the village of Rainu. The information relevant to the archaeological questions is presented in the text and some of that which is peripheral is published elsewhere (Egloff 1973b). Further research into the social forces which control the pottery industry at Rainu is scheduled. Virtually every facet of the research benefitted from the direct application of information from the ongoing social situation. By following this line of enquiry I found myself within the realm of the 'new perspectives' in archaeology. I then became aware of inconsistencies in this approach, as exemplified in the models presented by Longacre (1970) which have been reviewed by Stanislawski (1973). These theoretical issues are only brought forward when directly pertinent to an understanding of the prehistoric situation in eastern Papua.
Two distinct geographical areas in eastern Papua were investigated in the course of the field program. Primary consideration was given to the Wanigela-Cape Vogel region (Fig.1). This region is separated from the second area, the Trobriand Islands, by 230 km of sea, reefs and scattered islands. The cultural picture of the Trobriand Islands is described in detail by Malinowski (1921, 1922, 1929, 1934, 1935) and only the more salient aspects are presented within this chapter. The culture of Wanigela has never been described but Williams (1930) gives an accurate account of the Orokaiva to the northwest. Seligmann (1910) describes in detail the cultures south of Collingwood Bay. At the time of European contact (c.1874-90) the inhabitants of Collingwood Bay probably had a pattern of life with specific elements in common with the peoples both south and north. The archaeological survey and excavations in the Wanigela-Cape Vogel area were limited in most instances to the coastal belt. The following description of the entire region is designed to place the specific area of research, Wanigela, within its proper setting.

THE WANIGELA-CAPE VOGEL REGION
(Fig.2)

Geography

The Wanigela-Cape Vogel region as defined by Haantjens et al. (1964) covers 4874 sq km between 9° 00' and 9° 50' S and 148° 50' and 150° 05' E in the Northern and Milne Bay Districts of Papua. It includes those lands which
adjoin Collingwood Bay and its northern and southern capes. This area is bordered south and west by the massive northern slopes of the Owen Stanleys. The metamorphic rocks of this range have been weathered into reddish silty clay soils which are covered with a *Lithocarpus* sp. – *Cryptocarya* sp. forest (all forest identifications are from Saunders and Taylor 1964:map). The large central region, extending from the thoroughly dissected uplands of Cape Vogel to the Cape Nelson volcanic mountains, is composed of piedmont terraces and lower-lying flood plains. Upon this terrain grows a variety of secondary forests which include *Terminalia canaliculata*, *Bischofia javanica*, *Casuarina* sp. and *Pometia pinnata*. The lower-lying coastal parts support extensive mangrove forests. Cape Nelson, at the north, is formed by the coalescence of two volcanic mountains. Mt Trafalgar has long been extinct and its thoroughly dissected slopes are covered with an *Anisoptera kostermansiana* – *Alstonia scholaris* – *Rhus taitensis* forest. The more westerly of the two volcanic mountains, Mt Victory, is reported to have erupted about 1880 (Fisher 1957: 54–5). An *Octomeles sumatrana* – *Albizia falcata* forest is found on its steeply eroded slopes.

Extensive areas of grassland dotted with fire-resistant trees are found on the slopes of Cape Vogel and to a limited extent on the east coast of Cape Nelson (Fig.3). Smaller patches are found on the fluvial plain of the central area where they begin 2–3 km inland from the coastal swamps and extend in scattered patches for a short distance west.

![Diagram](image)
Climate

The climate is marked by a seasonal increase in rainfall which begins in November and lasts until April, as well as a concomitant decrease in the prevailing SE winds. Annually 1800-3300 mm of rain can be expected along the coast, with increased rainfall closer to the mountains (Fitzpatrick 1964:46). The temperature has an annual average of 24.2°C. Temperatures below 21.1°C are rare, but they frequently exceed 32.2°C between October and April (Fitzpatrick 1964:50).

Population

The linguistic situation around Cape Nelson and Collingwood Bay is considered by Dutton (1971:7) to be very 'tangled' as a result of extensive recent pre-European movements of populations. Non-Austronesian groups and Austronesian-speaking communities are distributed in a confusing fashion, with two languages remaining unclassified (Dutton 1971:Map 1). The Austronesian speakers are confined to the coast, with a non-Austronesian, Binanderean group at the tip of Cape Nelson, and the Dagan, also non-Austronesian, occupying the base of Cape Vogel.

The population of the region, exclusive of the tip of Cape Nelson, is less than 4 persons/km² and is concentrated along the coast. The tip of Cape Nelson has a population density of 4-19 persons/km² (Australian School of Pacific Administration 1968:Fig.12). The bulk of the population is engaged in subsistence agriculture, while a few individuals are employed by missions or government administration or work on plantations. Taro (Colocasia esculenta) is the principal crop of the indigenous agriculturalist except on Cape Vogel where plantains are important.

Along the coast of Collingwood Bay, at a point just south of Mt Victory, a cluster of small settlements is located near the largest mission station and airfield in the whole Wanigela-Cape Vogel region (Plate 1). The general name for this area comes via the mission whose initial establishment, just prior to 1900, was in the now abandoned village of Wanigela at the mouth of the Anina River. This general area was the focal point of my archaeological research. Lying at the junction of the central fluvial plain and the volcanic outwash slopes of Mt Victory, the fertile, gently sloping terrain is littered with numerous concentrations of prehistoric sherds. Today, most of the population inhabits the low beach ridge bordering the bay. Only a few recently established villages are inland from the sea. Taro is and has been the primary cultigen, with sago from the coastal swamps augmenting it during the slack seasons. The volcanic soils are well drained by rivers and streams which feed into extensive swamps. Apart from the swamps, the vegetation is mainly grassland of Saccharum spontaneum - Imperata cylindrica - Ophiuros exaltatus and regrowth or secondary forest of Anisoptera kostermansiana - Pometia pinnata (Haantjens and Taylor 1964:36).

Ceramic Industry

Pottery continues to play an important role in the lives of the Wanigela people. Although this role is undoubtedly diminishing, the manufacture, distribution and consumption of pots remains an ever present aspect of village life. The pottery industry at Rainu was studied in detail (Egloff 1973b) in order to document more fully a description by Key (1968). General observations were made at Komabun and Oreresan, confirming that there is no significant inter-village variation with respect to the major features of pottery production and usage in the Wanigela area. The only vessel form currently being produced in large numbers is a spherical, round-bottomed pot which is primarily used for water storage or cooking (Plate 2a). An increased dependence upon European pots has had its greatest impact not in supplanting the village industry but rather in restricting the variety of forms produced. The ramo (plate), simun (water jug) and sewaf (water dipper) are traditional forms specifically mentioned by the Ubir speakers of Rainu as having been commonly used in the past (Plate 2a,b) but they have now been supplanted by European vessels.
Plate 2  Contemporary Wanigela ceramics: a. naukwat nobo, a newly made vessel which will be used for cooking and water carrying; b. ramo, plate or bowl used for serving food (note the crocodile motif); c. aima, water jug; d. sewaf, water dipper or container for small valuables.
Wanigela is the major pottery-producing centre in the Wanigela-Cape Vogel region (Tuckson 1966:12). As such, its ceramics are widely sought after and are the basic commodity which Wanigela contributes to the local trade system. The vessels are in demand because of their thin walls, which permit rapid cooking of the food while using a minimum amount of firewood. At Boga Boga on the tip of Cape Vogel (Fig.2) a ware is manufactured which is quite similar in form and decoration to that made at Wanigela; however, the vessel walls are thicker and the local potters admit that their product is inferior to that of Wanigela. The nearest coastal ceramic centres are a considerable distance northwest on Dyke Ackland Bay (Williams 1930:76-7) and as far southeast as East Cape (Lauer 1973a:64). These industries have not been described in detail. On the D'Entrecasteaux Islands a number of villages make pottery. These have been investigated by Lauer (1970b, 1973b, 1974). His study is the only comprehensive description of pottery manufacture in eastern Papua.

The factor which limits the dispersal and influence of Wanigela pottery is not the competition encountered from other ceramic centres but rather the problems involved in transportation and distribution of the wares. Wanigela ceramics are distributed over short distances by carriers and over longer distances by canoes or European-managed coastal boats. The last of these is marginal in terms of the number of vessels handled but it does account for a wider dispersal.

Discovery

In 1874 John Moresby explored and charted the southeast coast of New Guinea. This was one of the last inhabited coasts of the world to be explored by Europeans. The maze of reefs and islands belonging to the D'Entrecasteaux Islands and Louisiade Archipelago had proved to be an impenetrable barrier in June 1793 when Antoine Joseph Bruné Raymond d'Entrecasteaux attempted to chart this area (Rossel 1808). Moresby's later explorations delimited the position of the D'Entrecasteaux Islands and determined that they were not part of the mainland as d'Entrecasteaux believed them to be (Moresby 1876:222-3). In May 1874 Moresby (1876:269) spent two days in a good anchorage at the head of Collingwood Bay cutting wood for the Basilisk and noted extensive areas of trampled grass and the droppings of a large herbivore which he thought was evidence of the rhinoceros inhabiting New Guinea. Little was observed and recorded about the inhabitants of Collingwood Bay except that they were 'a dark, dirty-looking people, wholly destitute of clothing with somewhat hostile ambitions' (Moresby 1876:270). Moresby left Collingwood Bay on May 5 and charted the unknown coast to the north.

The mainland coast and the D'Entrecasteaux Islands were declared hostile by the Administration in 1885-6 and a warning was issued against entry into the region. In the 1890s Sir W. MacGregor, the first Administrator of British New Guinea, explored and extended government control over the coastal region. In the process of pacification he collected valuable ethnographic specimens which are now housed in Australian museums, particularly the Queensland Museum, Brisbane, and in Scotland at Marischal College of the University of Aberdeen. It was not until the arrival of the missionaries at Wanigela in 1898 and the establishment of an administration post at Tufi, on Cape Nelson, in 1901 that European control of Collingwood Bay became permanent. After the missions became firmly established and many aspects of traditional village life were altered, the area fell into a peaceful slumber. To some extent it was awakened during World War II when Wanigela became a base for the Allied attack on Japanese-held Buna. Although the region underwent few physical changes during the war, many of the inhabitants became impressed with the material wealth of modern civilisation.

Traditional and Historic Settlement

Information used to reconstruct the traditional and historic settlement of the Wanigela area is derived from four sources: living residents of Wanigela, mission reports, annual reports of the Administration, and patrol reports from the Cape Nelson (Tufi) administrative station. Difficulties arise in
determining the foundation or abandonment of some villages. Certain villages continued to be occupied by remnants of the population for a few years after the majority of the inhabitants had shifted elsewhere. Figure 4 diagrams the pattern of settlement for the years between 1900 and 1969 (see also Plate 1). Before the arrival of the missionaries and the enforcement of Pax Britannica the people of Wanigela had found themselves forced by hostile neighbours into defensive positions.

Fig. 4 The Wanigela Region: traditional and historic settlement pattern

The pre-European inhabitants of Wanigela were divided into three groups. To this day they have retained their individuality. The languages used by two of the groups, the Ubir and Oyan, belong to the Austronesian language family. The third group, the Onjob, speak a non-Austronesian language (Capell 1969: 126-7; Dutton 1971:Map 2). Informants from the three groups agree upon the following account of their own history, although oral traditions are not extensive and there is no genealogical depth beyond the second generation.

The Ubir arrived in the Wanigela area after leaving a settlement on Cape Vogel. This village was situated somewhere on the slopes of the north coast of the cape. They travelled inland along the coast and finding an uninhabited area founded the village of Wanigela. The village was located on a small island in the swamp at the mouth of the Anina River. Houses were built upon piles and a stockade protected the settlement. The Ubir were then joined by the Oyan who claim to have come from a location approximately 4 km north.

These two Austronesian groups lived in the stockaded village while being raided and generally oppressed by their neighbours from the west and south. The non-Austronesian Onjob speakers came down from the slopes of Mt Victory and settled the villages of Aiafi, Murin and Aieram. These villages were adjacent to each other and well fortified. The Onjob lived in some degree of harmony with the Oyan and Ubir, while serving the useful function of warning the Wanigela villages of impending raids by the inland Doriri (Monckton 1900).

When the area came under permanent European control, the people of Wanigela, either voluntarily or under government pressure, moved from the swamp to a healthier location. Plate 3 is a picture of Wanigela village about 1905, some time after the majority of the population had moved to the present villages of Rainu and Oreesian. The stockade is not pictured, perhaps having fallen into a state of disrepair and been removed. There is an interesting raised area, which could well be a midden, in the right hand section of the picture and another in the left. The entire village area has subsequently settled and in 1969 most of it was continuously underwater.
Plate 3  Old Wanigela village about 1905 (after Newton 1914)
An Anglican mission had been established at this site in 1898. By 1904 it had moved to a new location about 1 km north. The Ubir settled Rainu north of the station and the Oyan founded Oresesan south of it (Plate 1). In 1950 the mission moved to a new site inland and near the airstrip. The satellite village Sarad came into being at this time. Although there has been a shift inland from the coast, the majority of the population is centred around the airstrip-road or on the beach. This is significantly different from the prehistoric settlement pattern where sites were found over much of the inland alluvial plain. Needless to say, the road and airstrip are twentieth century settlement determinants. At the beginning of the century the settlement of the Wanigela area was entirely defensive.

Surface collections were made at the former Onjob villages of Aieram (Col.22), Aiafi (Col.23) and Murin (Col.24). Two sites, Kakika (Col.28) and Ruwage (Col.29), were described by informants as having been temporary Ubir hamlets (Fig.2 and Plate 1). The sherds from the Koreaf village midden (Col.25) are the only specimens from a modern village included in the ceramic analysis. All these collections contain ceramics similar to the contemporary Wanigela ware.

Prehistoric Settlement Pattern

Any attempt at reconstructing the prehistoric settlement pattern of the Wanigela area is handicapped considerably by the terrain and vegetation. The grasslands and thick bush are difficult to traverse except by footpaths. On the other hand agricultural plots, which are scattered over a considerable area of the alluvial plain, afford excellent conditions for collecting. Travel along the coast is difficult at low tide and impossible at high tide without a canoe. Movement by canoe along the coast is often interrupted by rough seas.

The 32 sites located in the Wanigela-Cape Vogel region are mostly near the Wanigela airstrip or north along the coast (Fig.2 and Plate 1). Although I attempted a reconnaissance of the south coast of Collingwood Bay, the results were negligible. By actually living in Rainu I was able to visit many gardens and enlist the villagers' assistance in locating sites. The apparent concentration of prehistoric sites in the immediate vicinity of Wanigela is a reflection of my greater activity in this area.

Figure 2 and Plate 1 indicate the precise location of all protohistoric and prehistoric sites. These sites are usually no more than a concentration of broken sherds on the surface of the ground. A few of the coastal beach sites were marked by shell fish remains as well as ceramics. Chipped or ground stone artifacts were rarely encountered. The sites are grouped into six geographical categories: coastal, coastal swamp, inland plain, mountain slope, island and miscellaneous.

Coastal sites

This group includes all sites located on or near the slightly raised berm of the beach. These are sites Col.1, 2, 7, 8, 18, 20, 28, 29 and 30. Col.1 is the Rainu-Oresesan mound complex where the excavations were conducted which are discussed in detail in this study. Aside from Col.1, only one other coastal site is associated with a midden containing shell fish remains. This site, Col.8 at the village of Gigori, is a small remnant of a once larger site which has been extensively eroded by sea action. Site Col.20, near the village of Marasa, is located on a high hill close to the sea to which it would have afforded its inhabitants easy access.

Coastal swamp sites

Three sites, Col.3, 26 and 27, are located in the mangrove swamps which lie immediately inland from the beach berm or directly adjacent to the sea. Col.3 is the site of the original village of Wanigela. The surface collection indicates that this site had an earlier occupation during prehistoric times. Sites Col.26 and 27 are deep in the swamp about 0.5 km inland. These two middens lie in close proximity to each other. Only a small area of each is
more than 20 cm above high tide. The presence of shell and bone refuse mark them as being similar to the mounds at Rainu and Oreresan villages (Col.1).

Inland plain sites

These sites lie on the rolling alluvial plain and are located in dense bush, in grassland or in garden plots. They comprise Col.4, 5, 6, 11, 13, 14, 15, 16, 17 and 21. Their location upon the plain does not appear to be dependent upon ready access to fresh water and in a few instances they lie in the centre of extensive grasslands. Although large quantities of sherds were found on the surface, limited test excavations on the more promising sites failed to reveal any depth to the deposit. Sherds were never found more than 10-15 cm below the surface of the ground.

Mountain slope sites

Approximately 14 km north-west of the villages of Rainu and Oreresan is the site of a now abandoned rest house. This was once used by government patrols when travelling from Wanigela to the Musa River region. The prehistoric sites, Col.9 and 10, are in the same location on a high rocky ridge above the Kwin River. Sherds were easily found over a wide area of the densely forested ridge.

Island sites

Col.19 on the small island of Nanu, 18 km north-east of the Wanigela airstrip, is the only prehistoric site located on an island. Prehistoric sherds are scattered over its rocky surface.

Miscellaneous sites

Prehistoric and modern sherds were found in the Murin River bed. Site Col.31 is the collection from the river bed near the present village of Naukwate and Col.32 is derived from the river near the abandoned village of Murin. The material was probably eroded out of an original deposit in the river bank but this was never located. Site Col.12 is a garden plot on a recently deposited bed of the river. The sherds from this site were definitely deposited by river action. The original site location was searched for but not found.

The sherds recovered from these sites are discussed in Chapter V. Only the collections from those sites which yielded more than 25 rim sherds are included in the ceramic analysis.

THE TROBRIAND ISLANDS
(Fig.5)

Geography

The Trobriand Islands lie between 8° 00' and 9° 00' S and at 150° 30' E. The actual physiography of these coral islands has never been described in detail. The group is composed of one large island (Kiriwina), three smaller islands (Kaileuna, Kitava and Vakuta) and approximately a dozen islands of minimal size. Kiriwina is 44 km long and up to 16 km wide. The southern tip of the island is separated from Vakuta Island by a narrow passage. The flattish topography of Kiriwina is dominated by a large coral ridge which runs along the northern and eastern edge of the island and reaches a maximum height of 55 m. Much of the low-lying western sector of the island is swampland. Kitava, east of Kiriwina, is the highest island of the group. It rises sharply out of the sea to a height of over 142 m. Except for a few of the smaller and uninhabited islands, most of the arable land appears to have been cultivated at least once. Terrain which is not currently being cultivated is in a phase of bush regrowth or grassland; strips of land which are too rugged or swampy for cultivation support forest. Mangrove forests grow in the swamps and tropical hardwoods are dotted along the higher coral ridges. Throughout the islands small caves occur in the coral bedrock, which figure prominently
Contemporary village
Surface collection by Egloff
• - - - Lauer
• - - - Egloff and Lauer
△ Cave
▼ Stone arrangement

Fig. 5 The Trobriand Islands
in oral traditions regarding the origins of the islanders. Many of the caves contain human burials sometimes accompanied by pottery (Austen 1939; Egloff 1972, 1973a; Ollier and Holdsworth 1968b, 1969).

Climate

The climate of the Trobriand Islands is not unlike that described for the Wanigela-Cape Vogel region, except for a slightly higher rainfall. Annually 3800 mm of rain can be expected. This is distributed fairly evenly throughout the year, with a slight increase during the months of January, February and March (Australian School of Pacific Administration 1968:Figs 7 and 8).

Population

The Trobriand Islands have a population density of over 19 persons/km² (Australian School of Pacific Administration 1968:Fig.12). Subsistence agriculture is based upon the cultivation of yams. This primary food source is supplemented with a considerable quantity of fish (Malinowski 1922).

The people of the Trobriand Islands vary in physical appearance. An aquiline profile, light skin and straight hair are observed in some individuals while others have negroid faces and frizzy hair (Malinowski 1922: 51-2). These physical types appear to be scattered throughout the islands. The islanders exploit the sea to a greater extent than do the coastal mainlanders of the Wanigela-Cape Vogel region. They also participate in an extensive trading network called the kula. The kula has been described by Fortune (1932), Malinowski (1922) and Seligmann (1910) as one of the factors which serve to integrate the islands of the northern and southern Massim. The Trobriand Islanders derive most of their pottery from trading partners in the Amphlett Islands (Lauer 1970a). It must be remembered that the Wanigela area is not known to have ever been associated with the kula.

The Trobriand social system differs from that found in the Collingwood Bay region, particularly in the high status ascribed to women and in the institution of chieftainship. Kiriwinian is the lingua franca of the region. It is an Austronesian language and to this extent related to the Ubir and Oyan languages of Wanigela. Capell (1969:127-9) classifies Kiriwinian as an object-dominated language while Ubir and Oyan are designated as event-dominated. The object-dominated languages are restricted in Papua to the northern and eastern Massim.

Discovery

The Trobriand Islands were charted by d'Entrecasteaux in 1793 when he sailed around their eastern fringes looking for a passage through the reefs which would enable him to sail west towards the mainland (Beaumé-Beaupré 1807:No.28). Early in the nineteenth century the islands became provisioning stops for whaling ships (Hunter 1839). The last years of the century saw them pacified and an administrative post established at Losuia on Kiriwina. During World War II airstrips were developed on Kiriwina and Allied military personnel garrisoned it.

Traditional and Historic Settlement

Considerable effort and time were expended trying to reconstruct the historic settlement pattern of Kiriwina Island. It appears that most of the villages have occupied their current locations for as long as living memory or traditional sources can attest. Only a few of the sites located were those of recently abandoned villages - a result of inter-village conflicts at the turn of the century which involved the burning of villages (Seligmann 1910: 664-5). The villages included on the maps of MacGregor (1898), Seligmann (1910:Fig.46) and Malinowski (1922:Map IV) are the same as those which exist today with very few exceptions.
Prehistoric Settlement Pattern

In 1968 and 1969 a total of two months was spent on the Trobriand Islands while I investigated prehistoric sites on Kiriwina, Vakuta and Kitava. Lauer (1970a, 1970b, 1971, 1974:227-40) conducted a short reconnaissance of Vakuta, Kiriwina, Kailleuna and Kuyava Islands while taking part in a trading expedition from the Amphlett Islands to the Trobriands. We had hoped to integrate our surface collections; however, Lauer's material was delayed in transit and he has presented it in a separate study (Lauer 1970b, 1974). Figure 5 locates the sites which we visited. Here I am concerned primarily with those sites which I recorded (Tro.1-28). These are divided into three categories: sites yielding surface collections, caves and stone arrangements.

Sites yielding surface collections

Surface collections were derived from many localities and consisted primarily of sherds. Occasionally ground stone axe and adze fragments or obsidian flakes were found with the sherds. Most of the sites are probably abandoned villages and as such they are found in much the same localities as the present villages. In fact, many of the prehistoric sites are adjacent to villages which are currently inhabited. Lauer (1974:229) records two sites (my Tro.20 and 35, see Lauer 1974:260) on Vakuta Island which the local villagers remember as having been inhabited at some time in the past (Fig.5). Although my notes state that these were not known to have been villages, there is a distinct possibility that my informants were not as knowledgeable as the subject as I believed them to be. This certainly is true for the abandoned village of Kwadagila (my Tro.21, see Lauer 1974:260) which is featured on maps compiled by MacGregor (1898), Seligmann (1910:Fig.46) and Malinowski (1922:Map IV). My local informants did not remember Kwadagila as having been occupied. Near Labai Lauer (1974:229-30) collected ceramics from three historic sites (my Tro.34, 36 and 49, see Lauer 1974:260). I obtained a large sample of sherds from a fourth historic site in this locale. The inhabitants of Labai remember it as the abandoned village of Obwenuga (Tro.28) and vaguely state that the former residents moved to the Amphlett Islands.

Caves

Small caves are found in many places on the Trobriand Islands (Ollier and Holdsworth 1968b, 1969). Some of them are listed as archaeological sites since they contain pottery, human bones and large sea shells (Fig.5). In a cave near Labai (Obuwaga, Tro.27), two large vessels of the prehistoric Wanigela style were found (Egloff 1973a). One pot was filled with human skeletal material and the other was empty. The custom of placing human bones in caves or rock fissures is common throughout much of the Massim (Egloff 1972). It was practised at some time in the past on Goodenough Island and at Goodenough Bay where I observed sites of a similar nature. Lauer (1974:239) records cliff burials on the Amphlett Islands and Lyons (1922) documents them on Woodlark Island. Seligmann (1910:228) describes the process used to convert the body of a Woodlark Islander into a compact bundle capable of being interred in a shallow cliff cavity.

One site included in the cave category is a small rock shelter on the north coast of Kiriwina (Tro.8) which has the appearance of an overnight resting place. A few sherds, charcoal and burned shell were found under the sheltering rock.

Stone arrangements

Large stone arrangements are recorded on Kiriwina, Vakuta and Kitava Islands (Austen 1939; Holdsworth and Ollier 1973; Ollier and Holdsworth 1968a; Ollier et al. 1970, 1973). Prehistoric sherds were found near many of these arrangements (Fig.5). Only two sites, Tro.1 and 2, provided samples which were large enough to be included in the analysis. Givakenu, Tro.1, is the largest and best preserved stone group recorded on the Trobriand Islands. This monument is constructed of at least 20 rectangular slabs of calcareous beachstone arranged in a rectangular pattern. The slabs have broken and fallen into the interior or lie along the perimeter of the arrangement. The largest
broken slab has 54 cm of its base standing and 2 m of the upper portion lies adjacent to the base. The slab is 1.5 m wide and 20-25 cm thick. Stone of this type can be found along the north shore of Kiriwina Island. The large flat slabs would require substantial trimming and carrying before reaching the site and being erected. Approximately 317 m northeast of this group is the larger complex of four stone groups, Tro.2, which is described by Austen (1939: 33). Sherds were collected in the bush adjacent to the stone arrangements. The relationship, if any, between the makers of the stone groups and the users of the pottery is unknown.

Those surface collections from the Trobrïand Islands which included more than 25 rim sherds have been analysed according to the same criteria employed in the analysis of the Wanigela ceramics. The procedures employed in the analysis and the results are presented later.
The location of the Anglican Mission station in Wanigela village proved to be an unhealthy spot. The swamps were close on all sides and blackwater fever was weakening the missionaries. In 1902-4 the mission shifted 1 km north and established a new church and school. The discovery of large mounds here was fortunate for the mission since the new site was swampy also. The mounds were truncated and buildings erected on them. Mounds E and F suffered this fate (Fig.6). Mound F was probably the location of the excavation which Pöch (1907a:68) describes as being in an untouched mound north of Rainu village. Somewhere along the sea front between Mounds E and F a third mound existed (Money 1905). This feature could have been destroyed by sea action or quarried and used to raise the ground level at Rainu. The upper portions of Mound E were spread to the west and Mounds D and F were quarried and placed upon the adjacent village areas. Thus four of the recorded mounds were either partially or completely destroyed by the establishment of the mission station and the satellite villages of Rainu and Oreresan.

Fig.6 Oreresan and Rainu: contour map of the mound complex.
THE EXCAVATED SITES

Mound A is the largest existing mound. Its configuration probably has not been greatly altered even though it has been used as a cemetery for at least 60 years. The crest of the mound is more than 2 m above sea level and its base is 85 m long. Excavating Mound A presented two major problems, firstly obtaining permission to dig upon sacred land, and secondly locating an undisturbed area.

Mound B was reported by the villagers to be undisturbed. This mound then became the focus of my attention and permission to excavate was readily given by the Oreresan village councillor. Mound C, which had been a heathen burial place, was scheduled for less extensive excavation. It took a period of involved negotiations before it was possible to obtain permission to excavate here. Oreresan villagers required digging to stop if burials were encountered. Mound D is just south of Oreresan and in the centre of the modern rubbish dump. The northern portion of the mound is said to have been used as fill during the early 1900s, leaving the southern sector undisturbed.

The soil in the mounds is a coarse-to-fine sand which is stained by humic-rich water. The mounds are in fact midden deposits, the exact nature of which will be described in detail later. It is sufficient at this point to say that the deposits are extremely rich in cultural debris. The midden has an acidity of approximately 6 to 7 which resulted in relatively good organic preservation. The mounds rest upon river-mouth sediments and are gradually becoming drowned. The basal 30-40 cm of Mounds B and C are inundated with every high tide. A comparison between the 1903 survey of the Rainumiission station (Richmond 1906) and a modern map indicates that more than 30 m of beach has been washed away by the sea. By 1950 the habitable area had become so reduced that the mission moved inland.

EXCAVATION PROCEDURES

Mounds B, C and D were excavated in the same basic pattern. The sector was cleared of grass, brush and coconut debris. Following the clearing, 1 x 2 m rectangles were surveyed with the long axis running east-west. These units were arranged to form a trench which could be, and in the case of Mound B was, expanded to cover a larger area. The grid coordinates are based upon a datum lying west of Mound B (Fig.6). Reference coordinates for any particular point or find are expressed as metres north and right (east) of the datum. All units extend 1 m north. For example, the unit of Mound B (Fig.7) which provided the ceramics for analysis is unit 33R66 to 33R68. This unit lies 33-34 m north of the datum and between 66 and 68 m to the right (east).

The soil was excavated with trowels and transported in buckets or shovels to be dry sifted or washed through 0.5 cm mesh screens. Material was washed through the screens following heavy rains and while working with the flooded basal deposits. All cultural debris and non-molluscan faunal remains were retained for study. Shell was collected from designated units while all stone and pumice were recorded by weight and count. Charcoal was recovered from specific localised burned areas or by the painstaking removal of scattered lumps throughout the unit. Features and burials were serially numbered and given specific attention.

Vertical and horizontal control was maintained by the use of a surveyor’s level and a tape measure. All elevations are given with reference to what is assumed to be the normal high tide. However, the tide regularly rises 30-40 cm above this point. The elevation of 0.0 cm coincides approximately with the base of the cultural deposits in Mounds B and C. The excavation of each mound began using 10 cm levels except where natural strata were visible. As the stratigraphy was defined, all previously excavated levels were redesignated.

The excavation of Mounds B and C took place in October, November and December 1968. The excavation at Mound B covered 22 m² and was considerably larger than that of C or D. The excavations at C and D were designed to recover specimens and information regarding the stratigraphy of the mounds. The larger surface area excavated at B was an attempt to locate dwelling or other
areal patterns within the midden. Mound D was excavated during a 'dry' period in January 1969 which proved to be so wet that sterile subsoil could not be reached because of the high water level.

MOUND B
(Figs 7,8)

The elongated southern side of Mound B drops sharply into the Sasap River while the remaining slopes, when covered with grass, blend into the surrounding terrain (Figs 7,8). Approximately 722 m² of its surface is above the 60 cm contour line. At this height the mound is over 40 m long and 20 m wide. Only a small area at the crest is above 1.4 m.

Excavation (Plate 4)

The program commenced with the excavation of unit 34R70 to 34R72. Following the excavation of this unit, the trench was extended as far as the R66 line and excavated to subsoil level. This laid bare the 34 line section which was used as a control when excavating the units to the south. In the six units south of the 34 line each stratigraphic zone was stripped from all the units before the next zone was excavated. It was hoped that this would facilitate the definition of structural patterns if they were encountered. With the excavation of these units to subsoil, a trench from 32R66 to 32R62 was dug. The aim of this was to extend the cross-section of the mound. It could have been done more profitably by extending the trench along the 35 line to get a continuous section but a coconut tree prevented this extension.

Contour map

Units providing material for analysis

Fig. 7  Mound B: plan
The excavation of Mound B: a. northern trench excavated to subsoil, Zone I removed from entire southern block and Zone IIA removed from unit 33R68 to 33R70 (looking southwest); b. northern trench excavated to subsoil, Zones III, IVA and IVB remain in block to south and Zones IVA and IVB of the central block have not been excavated (looking west at section 31R66 to 35R66); c. section 35R66 to 35R70 (looking north)
Stratigraphy (Fig. 8)

Zone I

The surface zones were a markedly darker colour and Zone I of this mound ranged from a very dark brown (Munsell 10YR2/2) to a black (Munsell 10YR2/1). Sherds were small and shells highly fragmented. The zone was easily recognised and presented few if any problems in its excavation. Occasionally an intrusion from the surface was defined but examples were few and appeared to be randomly distributed.

Zones IIA, IIAB, IIB and IIC

Lying at the top of Zone IIA was a shallow deposit of shell, similar to a deposit below the zone called Zone IIAB. These concentrations of molluscan remains were thickest in the central area of the excavation but diminished rapidly towards its edges. Zone IIA was marked by a moderate amount of shell in a very dark grayish brown (Munsell 10YR3/2) soil. The dark grayish brown (Munsell 10YR4/2) soil of Zone IIAB lightened towards its base where it blended into Zone IIB. The distinction between Zones IIB and IIC rested upon an increase of burned areas at the junction of the two zones. Feature 4, an extensive burned area, covered a large part of the western portion of the excavation. The soil and texture of Zones IIB and IIC were identical and in some instances a strict separation was not possible. A few small intrusions penetrated from Zone I into Zones IIA and IIAB. These were easily located and isolated.
Zone III

The transition from Zone IIC to Zone III was characterised by a sharp increase in shells, particularly Fasciolariiidae and Neritidae, at the base of Zone IIC. Zone III itself had considerably fewer molluscan remains per unit than any other zone in Mound B. This zone is significant in that it appears from the sections to be a purposeful mounding. It tapered rather steeply at its extremities and was composed of loose soft fill which was not as consolidated as the soil found in the other zones of the mound. In the far northeast corner of the excavation was the only burned area associated with Zone III (Fig.8). The soil of the zone was a dark reddish brown (Munsell 5YR3/3) with a dark yellowish brown (Munsell 10YR4/4) mottling.

Zones IVA and IVB

The surface of Zone IVA was marked by an increase of molluscan remains and a firm texture. The very dark grayish brown (Munsell 10YR3/2) soil of Zones IVA and IVB was regularly flooded at high tide. The distinction between these two zones was arbitrary.

Subsoil

The subsoil of Mound B, like that of C, was a very dark grayish brown (Munsell 10YR3/2) sand and permanently saturated with water. Only a few intrusions penetrated into this soil from Zone IVB.

Features

Extensive burned areas were present throughout Mound B exclusive of Zones I, IIA and III where they were all but absent. A feature number was assigned when charcoal, burned plant remains and cultural debris were associated with these areas and needed specific referencing.

Features 1 and 3

These burned regions were located in the southeast corner of the excavation (Fig.8). Feature 1 was situated on the surface of Zone IIC and Feature 3 upon Zone IVA. These two features were the remains of intensive fires and had sherds, charcoal, burned shell or bone, and grey ash associated with them.

Feature 2

Like Features 1 and 3, Feature 2 had a region where the fire appeared to be centred. This lay just slightly above the subsoil at the very base of the midden. It was in this area, not more than 0.5 m in diameter, that the ash, charcoal and depth of discoloration was greatest. Outward from this a lenticular bed of crumbled charcoal, large sherds and discoured soil extended.

Feature 4

This was a charcoal-rich area on the surface of Zone IIC, located in the western portion of the excavation. The areal extent and thickness of the feature indicated that the fire was of a considerable magnitude.

Burials and rock hearths similar to those found in Mound C were not located in Mound B. Only a few pits or other intrusive features were encountered. Seldom were more than two or three pits found in any single zone. These intrusions diminished in number towards the base of the midden deposits.

Radiocarbon Dates

Zone IIA

1240 ± 145 BP (ANU-371A)
810 ± 100 BP (ANU-371B)

This sample consisted of charred material from the interior of a small
shattered ceramic vessel found at 31.6R66.8 in the base of Zone IIA. The sample came from 30 cm below the surface of the mound. The material had mineralised and an analysis by J.K. MacLeod, Research School of Chemistry, ANU, indicated that there were no volatile or partially volatile fats or other substances present in the sample. The sample was divided in half and two age determinations were made.

**Feature 4**

560 ± 80 BP (ANU-419)

The extensive burned area between Zones IIB and IIC representing Feature 4 was thick with charcoal. Only the material gathered from unit 32R62 to 32R64 was submitted for dating. This burned area was 56 to 63 cm below the surface of the mound and would be expected to date between ANU-371 and ANU-369.

**Feature 3**

770 ± 90 BP (ANU-369A)  
670 ± 235 BP (ANU-369B)

Feature 3 was on the surface of Zone IVB at a depth of 80 cm below the mound surface. The sample was composed of wood charcoal from an extensive, burned area which in some places was 10 cm thick. This was presumed to be the remains of a hearth.

**Feature 2**

1040 ± 90 BP (ANU-370)

The burned area designated as Feature 2 was 3-4 cm thick and rested upon a grey ash deposit which was almost 6 cm in depth. The sample came from within 7 cm of the base of the midden in Zone IVB, primarily from the north face of the excavation. This feature had a definite hearth-like appearance and dates from the very early stages of the midden.

**MOUND C**  
(Fig.9)

This small ovoid mound is immediately south of the southern tip of Mound A (Fig.6). The mound becomes differentiated from the surrounding terrain at an elevation of about 60 cm above sea level. At this height it is approximately 29 m long, not including the north extension toward Mound A, and 17 m wide. The total area above the 60 cm contour line is 528.55 m². The western side of the midden borders on thick bush and is relatively steep, while the remaining slopes form a gradual approach. During the early years of this century it was used as a heathen burial place while Mound A was reserved for Christians.

**Excavation (Plate 5)**

The positioning of the excavation was determined to some extent by the coconut trees which occupy the crest of the mound. An east-west trench on the southern slope of the midden, consisting of four 1 x 2 m units, was initiated by excavating unit 75R15 to 75R17. When the excavation of this unit was complete Zone I was removed from the remaining three units. Three burial pits were recorded and the burials excavated; the skeletal remains were so badly fragmented that the villagers assumed that they were rubbish and the elders were not concerned when it was pointed out to them that the bones were human remains. Each zone was then removed in turn from the entire length of the trench, using the 75R15 to 76R15 section as a guide. Problems arose in the excavation of unit 75R9 to 75R11. The western portion of the unit below Zone II and above Zone IVB was disturbed. This disturbance resembled a large pit or perhaps a ditch.
Plate 5  The excavation of Mound C: a. Feature 1 after removal of Zones I and II, unit 75R15 to 75R17 excavated to subsoil (looking west); b. Zone III B removed from entire trench (looking west); c. excavation of trench completed (looking northwest at section 76R9 to 76R17); d. Feature 3 in base of trench after reaching subsoil (looking west)
Stratigraphy

Zone I

This was a shell-free zone of very dark brown (Munsell 10YR2/2) sandy humus, quite distinct from the reddish brown sand of Zone II. It extended from the surface to a depth of 18-34 cm. This zone was successfully removed along the entire length of the trench with no intrusions from the surface being evident.

Zone II

This unit was relatively free of shell and distinct from the adjacent zones. The dark reddish gray (Munsell 5YR4/2) soil stopped abruptly on a line with the surface of Feature 1. Three burial pits intruded into this zone from an undetermined point in Zone I. The thickness of the zone tapered from 20 cm in the middle of the trench (76R13) to 7 cm at the east (76R17) while remaining fairly constant to the west.
Zone IIIA

Shell fragments began to appear in this zone of dark yellowish brown (Munsell 10YR4/4) soil. From approximately 76R15 to 76R13 the base of the zone rested upon a hard-packed, charcoal-stained surface. Scattered charcoal was present throughout the zone. West from 75R10 to 76R10 the soil texture changed from a firm sandy soil to a softer material which appeared to be disturbed.

Zone IIIB

The charcoal-stained hard surface of Zone IIIB served to separate it from Zone IIIA. The texture and soil colour of these two zones were the same. The disturbed soil at the western extent of the trench continued downwards from Zone IIIA.

Zone IVA

The soil in this zone was less compact and a lighter colour (dark brown, Munsell 10YR4/3) than that of Zones IIIA and IIIB. Shells increased markedly toward the base of the unit. This zone and all lower zones were regularly inundated by high tides and the flooding river.

Zone IVB

The surface of this zone was marked by scattered charcoal and a slight lightening in soil colour. The quantity of shells increased slightly.

Zones IVC and IVD

The zones were indistinguishable from Zone IVB in their colour and soil composition. The distribution of shells decreased in these zones which were separated primarily on the basis of patches of darkened soil caused by burning. Seldom did these discolorations have a depth of more than 1 or 2 cm.

Subsoil

The sterile subsoil is a very dark grayish brown (Munsell 10YR3/2) sand. Like the subsoil at Mound B, but to a lesser degree, it was saturated with water at all times. No intrusions into the shell-free subsoil were recognised.

Features

Feature 1

This distinctive and marked feature consisted of a concentration of sherds, stones, charcoal and burned bone and shell between Zones II and IIIA (Plate 5). It extended for a distance of 2 m along the north section and 1.2 m along the south section. At a minimum of 40 cm below the surface of the mound it appeared to be free from later intrusions. Stones were scattered the entire width of the trench and for 1.2 m of its length. The thickest concentration of debris was at the north wall.

It is possible to consider Feature 1 as the remains of a hearth. The rocks, which were probably derived from stream beds 1-2 km inland, were certainly used for some activity associated with fire. The basin which is part of Feature 1 would appear to be too shallow to have been used as an earth oven, although it is possible to conceive of an oven consisting of a shallow pit with a large earth covering.

Feature 2

Five small rocks in the far northwest corner of the trench at 75.889.3 were recovered. No charcoal or evidences of burning were associated with these stones. The feature was 10 cm above the subsoil. The rocks were identical in shape and size to those found with Features 1 and 3.

Feature 3

This feature rested upon the subsoil at the base of Mound C (Plate 5).
A cluster of rocks, centred at 75.6Rl4.6 in a patch of charcoal, constituted the feature. This was unlike Feature 1 in that the rocks were closely grouped and not scattered. The heavy concentration of sherds found with Feature 1 was not matched in Feature 3.

These hearths indicate a consistent pattern of usage for the mound through time; however, the exact definition of this pattern would require complete excavation of the mound. The stones found in the features are significant in terms of current village practice. Rocks have to be carried from at least 1-2 km inland where they are found in stream beds. Seldom are rocks left lying around if they are of a size suitable for use in a hearth. During the course of the excavation many of the unwanted stones were eagerly gathered by the villagers and used in their fire places or in canoe anchors. Feature 3, a rock hearth, is the remains of a purposeful activity and perhaps indicates that the burned areas at other levels in the mound resulted from similar activities even though there were no stones associated with them. This supports the hypothesis that some form of activity occurred on the mounds other than the random dumping and burning of rubbish.

Radiocarbon Dates

Feature 1

880 ± 60 BP (ANU-361)

Wood charcoal from this feature, 43-58 cm below the surface of the mound, was dated. This is the uppermost date obtained from the mound.

Zone IVA

810 ± 95 BP (ANU-362)

This sample came from scattered wood charcoal in unit 75R13 to 75R15 at a depth of 70 cm below the surface of the midden. Zone IVA was 15-22 cm thick at this point, approximately 20 cm above the sample from Zone IVD and an equal distance below Feature 1.

Zone IVD

920 ± 85 BP (ANU-363)

Charcoal for this sample came from unit 75R11 to 75R13 at the very base of the mound. This was at least 115 cm below the surface of the midden. The charcoal was probably scattered from Feature 3 - a sample collected from this feature was too small to be dated - which lay at the same level directly east of the unit from which the sample was collected. This dates the basal deposits of Mound C and correlates closely with ANU-370 which dates the bottom zone (IVB) of Mound B.

Burials

The three burials found in the excavation all rested in pits which had their origins somewhere in Zone 1. The pits were not definable until they entered Zone II. The pits stopped at the base of Zone II or went a few centimetres deeper into the surface of Zone IIIA. They were diffuse, basin-shaped intrusions and in each instance extended outside the excavation trench. The burials had definitely undergone some form of post-mortem disturbance, probably due to pigs scattering the bones and shattering the crania. The human remains were friable, while wallaby and pig bones found in the mound were firm and solid. At the time of European contact the natives of the area buried their dead in large shallow pits which were covered by a small shelter (Williams 1930:Plate XXVIIIa). Complete pots with small holes in their bases were often placed near the graves (Chignell 1911:facing 342).

Other Intrusions

The only intrusion isolated was a small pit at the southeast corner of the excavation.
MOUND D

Mound D is elongated in an east-west direction and parallels what appears to be an old bed of the Sasap River (Fig.6). The 60 cm contour line encloses an area of 342.25 m² with a small part of the midden lying above the 1.20 m interval. At 60 cm elevation it has a maximum length of 35 m and breadth of 10 m.

Excavation

The excavation of Mound D was started by digging unit 12R224 to 12R226 as deep as possible. Sterile subsoil was not reached even though the excavation penetrated to a depth comparable to that reached in Mounds B and C. Marked stratigraphy was not present and when the excavation was extended by excavating unit 12R222 to 12R224 it seemed advisable to subdivide Zone II and the lower portion of Zone III (Fig.7). The excavation was prematurely terminated when the rainy season began. The recovery of large quantities of cultural debris, which had typified the excavations in Mounds B and C, was not an aspect of Mound D. Quite a few sherds were recovered but very few faunal remains were found. Extensive burned areas, intrusions, burials and other features of interest were absent in this small and incomplete excavation.

Stratigraphy

Zones IA and IB

The humic-stained sandy soil of these zones was a very dark brown (Munsell 10YR2/2) in colour. Zone IA was differentiated from IB by a marked decrease in shells and an increase in the size of sherds.

Zones IIA and IIB

The soil of this zone was lighter (dark brown, Munsell 10YR3/3) and had a loose texture similar to Zone III of Mound B.

Zones IIIA, IIIB and IIIC

Small burned areas and an increased quantity of shell typified Zone III. The soil texture and colour (very dark grayish brown, Munsell 10YR3/2) were homogeneous throughout the zone and the division was arbitrary rather than natural.
Radiocarbon Dates

Three samples derived from scattered charcoal found in unit 12R222 to 12R224 were submitted for dating. None of this material was associated with features.

Zone IIA

600 ± 100 BP (ANU-416)

This date comes from the uppermost reliable sample, 34-53 cm below the surface of the mound.

Zone IIIA

650 ± 120 BP (ANU-418)

The sample is from 73-94 cm below the surface of the mound and dates the assumed medial period of mound accretion.

Zone IIIC

510 ± 120 BP (ANU-417)

Found at 1.06-1.34 m below the surface, this sample dates the lowest zone excavated. Unlike the lowest dates from Mounds B and C, this date does not pertain to the basal deposits since subsoil was not reached and an unknown quantity of cultural material lies below it.

SUMMARY

Whilst similar in many respects, each mound proved to have distinctive features. Large quantities of ceramic debris, shell fish remains and animal bones were found throughout Mounds B and C. Food refuse is not common in Mound D. Mounds B and C have horizontal zones at their bases upon which cultural refuse and sand have accumulated. Zone III of Mound B has the definite appearance of being added to increase the height of the midden. Zonation is readily visible throughout Mounds B and C but almost absent from Mound D. Mound B is marked by the presence of large burned areas which, when found in Mound C, are accompanied by what have been interpreted as hearth stones. Structural evidence in the form of posthole patterns is absent from all three mounds.

The current drowned status of the lower zones of the mounds indicates that the immediate area has become lowered in relation to the water table. It is possible that the mounds were initiated upon already existing middens when the water level began to rise. In the absence of structural evidence it can be proposed that the mounds were activity areas associated with adjacent structures. Unfortunately the area next to the mounds was too swampy to permit excavations. The mounds certainly are not simply shell fish middens since they have a quantity of cultural debris within them and a large volume of sand as a matrix. This sand could have been deliberately introduced from another context. If this is true, then there is the possibility that some of the material within the mounds is of secondary deposition.

Twelve radiocarbon dates from Mounds B, C and D range between AD 420 to AD 1680 when two standard deviations are considered (Polach and Golson 1966: 15-21). Because of the short time span delineated and the overlapping of the radiocarbon dates within this interval, the determinations are not particularly acute indicators of specific inter-mound relationships. Chronologically the evidence from Mound B is ambiguous and the analysis of the various types of excavated material will largely involve the question, to what extent is the formation of Mound B contemporary or not with that of Mound C.

Mound D furnished three overlapping dates. These determinations indicate a very rapid and late development of this portion of the midden, perhaps during a period coeval with the formation of Feature 4, Mound B.
Fig. 11 Mounds B and C: major components by weight/m³
IV THE MIDDEN ANALYSIS

The deposits are marked by large quantities of sherds, molluscan remains and mammal bones. The bones are extremely well preserved and in many cases almost intact. The large size of the sherds and bones recovered from the middens suggests that this material was not subjected to intensive scuffage. This could indicate that activity on the midden surface was limited; however, the presence of stone hearths in Mound C would be indicative of purposeful activity there.

A close scrutiny of the main constituents of the midden deposits in Mounds B and C indicates that while basically similar they vary in certain salient aspects.

Figure 11 charts the contents of each zone of Mounds B and C in terms of kg/m$^3$ of deposit. These are estimates based upon data from a series of differing units which are designated in Appendix 1. Units selected for sampling were located as far as possible across the entire extent of the excavations. Certain units were not included in the analysis if their stratigraphy was confused. These units and the units designated in Appendix 1 were internally consistent and no undue intra-zone discrepancies were detected. The selected units were then bulked according to zones.

Mound D is not included in the midden analysis. This is due to the incompleteness of the excavation and the paucity of faunal material found.

MAIN ARTIFACTUAL CONSTITUENTS

In this section of the midden analysis the main artifactual constituents are discussed in general terms. The categories of artifacts, including manuports, which contribute significantly to the midden are ceramics, obsidian, unworked pumice and stone, and worked pumice.

Ceramics

Figure 11 indicates that there is a difference in sherd density between the middens of the two mounds. Mound C has an average of 72.05 kg of sherds/m$^3$ in each zone while Mound B has 51.85 kg in the same volume of deposit. The sherd density is fairly consistent throughout each midden, except for a marked increase in Zones I and IIB of Mound B and Zone IIIA of Mound C. The latter is exceptionally rich in ceramics due to its close proximity to the thick layer of sherds and burned material designated as Feature 1.

Obsidian

Small flakes of obsidian were frequently encountered throughout the deposits. This material is most likely derived from sources on Fergusson Island, 160 km to the east (Key 1969:49). Mound B has a marked paucity of obsidian in the basal Zones IVA and IVB, and a uniform distribution in the upper zones. Mound C presents a scattered picture which is similar to Mound B only in the decreased quantity of obsidian in the basal zone.

Unworked Pumice and Stone

The alluvial deposits upon which the mounds lie are normally devoid of rocks and pumice. Pumice is reported to be washed onto the beaches during heavy seas. Rocks are obtained from stream beds 1-2 km inland from the coast. Unworked pumice and stone from Mound C shows an irregular pattern of distribution in the midden. This is probably due to the exceptionally small quantity present overall and the fact that one or two large rocks could account
for the entire stone content of any zone. Mound C has an average of 11.04 kg/m³ in each zone. This is double that found in Mound B and can be explained by the occurrence of two burned areas with associated rocks and one cluster of rocks which was not associated with a burned area. No localised rock concentrations were excavated in Mound B.

**Pumice Artifacts**

Pumice was used primarily as an abrader of one form or another. The distribution of worked pumice within Mounds B and C does not present a regular picture. Mound C shows a diminishing frequency towards the upper zones, with a peculiar absence in Zone II and a near absence in Zone IVA. The zones with the highest density of worked pumice are basal in both mounds.

**NATURE OF THE FAUNAL REMAINS**

The faunal material can be divided into vertebrate and molluscan remains. These show a markedly different distribution in the two mounds (Fig.10). The basal zones of Mounds B and C are to some extent similar in the small quantity of vertebrate remains which they contain. However, the average density of bone in Mound C is half that of Mound B. This is in opposition to the molluscan remains where Mound C has a density double that of Mound B. Both mounds have an identical weight of shell/m³ of deposit in the basal zones. The main component of these coastal middens is not molluscan remains but rather a combination of bone, shell and ceramics, of which shells are no more a salient feature than ceramic debris.

---

**Ethnographic categories**

<table>
<thead>
<tr>
<th>Number of varieties</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riverine</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mangrove forest</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Sea weeds</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Shallow sea</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Deep sea</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

**Zoological categories**

<table>
<thead>
<tr>
<th>Number of species</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riverine</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Tidal ; mud</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Subtidal ; sand</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Subtidal ; reef</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Deep sea</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Fig.12** Mounds B and C: percentage distribution of shell fish, by weight and zone, according to ethnographic and zoological categories and including unidentified material.
Molluscan Remains

The shell analysis was carried out in the field and because of its uniqueness it deserves some explanation. Shell was collected from designated 1 m square units (Appendix 1). Many of these shells are still regularly collected by the villagers and they were sorted into 40 named varieties by individuals who demonstrated a facility for the work. After a few preliminary tests it was apparent that the categories were firm, mutually exclusive and nearly as explicit as a zoological classification. Data were recorded on the informed or observed environment of each variety, as well as on its dietary or utilitarian function (Appendix 2). The procedure has its drawbacks but it has advantages too. The primary advantage being that large samples can be handled. This is offset by the reluctance of the workers to categorise highly fragmented pieces. A further advantage is that when transportation of specimens is difficult it may be desirable to abandon large shell samples in the field. Type samples of the ethnographic varieties were submitted to G. Buick, University of Papua New Guinea, Port Moresby, E. Coleman Glover, Canberra, and W. Ponder, The Australian Museum, Sydney. These authorities supplied identifying and distributional information. Further distributional data were obtained from Kira (1962). A paper by Ambrose (1967) outlines some of the potentialities of coastal shell deposits and focused my attention upon lines of enquiry.

Graphs of the distribution of midden shells by the environmental zones described for them, on the one hand by informants and on the other by zoologists, illustrate that the riverine and mangrove forest-tidal mud categories are fairly similar in both taxonomies (Fig. 12). Where the two classification systems vary is in the varieties ascribed to the marine environment. The zoological system places more species in the reef category. This means that the categories of deep sea and subtidal-sandy are diminished and that of sea weeds is completely omitted in the zoological taxonomy.

<table>
<thead>
<tr>
<th>Ethnographic categories</th>
<th>Zoological categories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of varieties</strong></td>
<td><strong>Number of species</strong></td>
</tr>
<tr>
<td>B C 2 2</td>
<td>B C 2 3</td>
</tr>
<tr>
<td>Riverine</td>
<td>Riverine</td>
</tr>
<tr>
<td>10 11</td>
<td>8 9</td>
</tr>
<tr>
<td>Mangrove forest</td>
<td>Tidal; mud</td>
</tr>
<tr>
<td>1 1</td>
<td>7 6</td>
</tr>
<tr>
<td>Sea weeds</td>
<td>Subtidal; sand</td>
</tr>
<tr>
<td>3 3</td>
<td>7 10</td>
</tr>
<tr>
<td>Shallow sea</td>
<td>Subtidal; reef</td>
</tr>
<tr>
<td>2 4</td>
<td>4 4</td>
</tr>
<tr>
<td>Reef</td>
<td>Deep sea</td>
</tr>
<tr>
<td>10 10</td>
<td></td>
</tr>
</tbody>
</table>

| **Fig. 13** Mounds B and C: percentage distribution of shell fish, by weight and zone, according to ethnographic and zoological categories and excluding unidentified material |
Riverine species show a gradual decline through time in Mound B with a concomitant increase in tidal species. This could reflect a change in the immediate local environment. It would be expected that as the alluvial deposits in the area of the mound compacted and the terrain was gradually submerged, rivers which were previously salt-free would become subjected to marine encroachment. Thus the streams which once supported riverine varieties would now contain tidal species. However, Mound C does not reflect this change but acts in opposition to Mound B and has an increase of riverine species. The zoological classification shows a marked decrease of marine species in Mound C through time.

Figure 13 calculates the occurrence of shell in the middens as a percentage of total identifiable shell and sets the information out in terms of the ethnographically and zoologically derived categories. The description of molluscan remains in Mound B by this method does not differ to any great extent from that calculated on the basis of the entire sample, identifiable plus unidentifiable. However, the picture from Mound C is somewhat different. The riverine species show a marked and continuing increase. The decrease in marine species registered in the zoological category in both figures is now visible in the ethnographic category of Figure 13. There is thus an opposition in the molluscan remains in the two mounds, whereby the riverine species in Mound B follow the same pattern as the marine species in Mound C. One explanation that could be offered is that the high frequency of unidentifiable material in Mound C has biased the sample. This would hold true if shells from one particular environment proved to be more easily degraded than shells from other environments. The other explanation is one which considers the fact that Mound B is 65 m closer to the river than Mound C. It could be argued that because of this close physical proximity Mound B is more sensitive to any change in the ecology of the river. This is conceivable and cannot be discounted, but the question can always be asked where the Sasap River was during the period of mound formation. An examination of the terrain indicates that the river has changed its course many times in the recent past.

Vertebrate Remains

The collection of bone consists of material which was fractured for food use. Considerable assistance and guidance were given by J. Hope, ANU, in the identification of these fragmented mammal remains. Mound C provided such a small collection that the occurrence of particular species is best represented as present or absent. This is true for all but two species in Mound B. *Sus scrofa* (pig) and *Macropus agilis* (Agile Wallaby) represent over 80% and 10% respectively of the identifiable vertebrate remains from Mound B (Table 1).

<table>
<thead>
<tr>
<th>Zone</th>
<th>I</th>
<th>IIA</th>
<th>IIAB</th>
<th>IIB</th>
<th>IIC</th>
<th>III</th>
<th>IVA</th>
<th>IVB</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Sus scrofa</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Total Bone</td>
<td>34</td>
<td>50</td>
<td>51</td>
<td>59</td>
<td>60</td>
<td>58</td>
<td>62</td>
<td>57</td>
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<tr>
<td>% of Identified Bone</td>
<td>82</td>
<td>84</td>
<td>86</td>
<td>87</td>
<td>83</td>
<td>82</td>
<td>86</td>
<td>83</td>
</tr>
<tr>
<td>Minimum Numbers</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td><em>Macropus agilis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Total Bone</td>
<td>06</td>
<td>05</td>
<td>08</td>
<td>07</td>
<td>11</td>
<td>12</td>
<td>08</td>
<td>11</td>
</tr>
<tr>
<td>% of Identified Bone</td>
<td>14</td>
<td>09</td>
<td>13</td>
<td>11</td>
<td>16</td>
<td>16</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Minimum Numbers</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>10</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Total Bone in Grams</td>
<td>2320</td>
<td>3385</td>
<td>2094</td>
<td>6625</td>
<td>4480</td>
<td>8945</td>
<td>7803</td>
<td>2622</td>
</tr>
<tr>
<td>Total Identified Bone in Grams</td>
<td>957</td>
<td>1998</td>
<td>1248</td>
<td>4460</td>
<td>3241</td>
<td>6326</td>
<td>5650</td>
<td>1816</td>
</tr>
</tbody>
</table>

Table 1: Mound B: distribution of pig and Agile Wallaby by weight and minimum number of individuals

Appendix 3 discusses the present-day availability and utilisation of mammals, birds and reptiles in the Collingwood Bay region and their occurrences in Mounds B and C. Certain areas of the faunal spectrum would appear at first glance to be under-represented but this actually reflects a fairly close
approximation to the fauna available in the area. Early descriptions of the hunting practices of the Wanigela people describe large communal hunts using nets and spears to dispatch large numbers of pigs and wallabies. This is the same type of hunt which is common in contemporary Wanigela except that some shotguns are used and nets have been completely discarded. Fire is frequently used to drive the animals. The results are the same in that pigs and wallabies are the dominant species taken. Occasionally bandicoots are flushed from the burning grass. This is the pattern reflected in the excavated remains where pigs predominate and wallabies are the second most popular species, followed by bandicoots.

Small mammal, bird and fish remains are rare in the archaeological deposits. Leader of the 1953 Archbold Expedition, L.J. Brass, comments that the coastal area of Collingwood Bay is particularly limited in mammal species. Members of the expedition found far more species on the mountain slopes inland from Collingwood Bay than they did on the coastal lowlands (Brass 1956). They also noticed that the people of Collingwood Bay did not gain very much of their subsistence from the sea. A paucity of small mammal remains could thus be expected in the mounds and little evidence of fishing would occur if the culture did not fully exploit marine resources. The further factor of differential preservation has probably destroyed many small bones. A few coprolites, possibly of dog, from Mound B contain many small fishbones. Higham (1968; see also Lyon 1970) discusses dogs as a factor affecting an archaeological sample in such a manner that large bones are broken and small bones consumed, thus giving a biased picture.

The presence of shell net weights in the deposits indicates that there was fishing and in so far as the weights are identical to those used ethnographically, we might assume that the prehistoric exploitation was similar to that practised today. Up to 100 and more shells of *Anadara* sp. are used to weight a large net. The distribution of these weights is shown in Table 2.

### Table 2  Mounds B and C: distribution of shell net weights by weight

<table>
<thead>
<tr>
<th>Zone</th>
<th>Gm/m³</th>
<th>Zone</th>
<th>Gm/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>II A</td>
<td>28.46</td>
<td>I</td>
<td>2.53</td>
</tr>
<tr>
<td>II AB</td>
<td>135.53</td>
<td>II</td>
<td>5.63</td>
</tr>
<tr>
<td>II B</td>
<td>32.97</td>
<td>III A</td>
<td>135.00</td>
</tr>
<tr>
<td>II C</td>
<td>30.37</td>
<td>III B</td>
<td>101.61</td>
</tr>
<tr>
<td>III</td>
<td>43.06</td>
<td>IVA</td>
<td>114.71</td>
</tr>
<tr>
<td>IVA</td>
<td>44.10</td>
<td>IVB</td>
<td>101.62</td>
</tr>
<tr>
<td>IVB</td>
<td>85.05</td>
<td>IVC</td>
<td>78.86</td>
</tr>
<tr>
<td>IVD</td>
<td>85.10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The absence of cassowary bones, except as artifacts, and of crocodile remains in the deposits is interesting. Some natives in areas adjacent to Collingwood Bay eat crocodiles (P.K. Lauer, pers.comm.). Cassowary bones are used in contemporary Wanigela to make lime spatulae similar to those found in the middens. Both these animals figure strongly in local oral traditions. Bats are common in the area (Van Deusen 1958) and frequently eaten but were not found in the excavations. Their larger bones are used as needles and awls by the Wanigela villagers.

Some wallaby mandibles and the distal portions of certain humeri excavated in the middens appear to be polished. These specimens could have been retained as trophies and achieved a degree of polishing through handling. Mandibles, humeri and foot bones are the most frequently encountered wallaby remains.

Dog is represented in all zones of the two mounds, except IIC of Mound B and I and IVD of Mound C. Generally only a few fragments of the skeleton were found, but Zone IVA of Mound B produced 13 pieces. Bored canine teeth were present in the excavations (see Chapter VII). Today the dog is a valuable hunting aid as well as serving as a household guard.
If we turn specifically to Mound B (Table 1), we see that pig bone shows a slight increase in Zone IVA if regarded as a percentage of the total sample of the zones. When the minimum numbers are considered a different picture emerges. There is a significant difference between Zones IVA and IVB since IVB has considerably fewer pigs and wallabies.

Zone IVB is also distinctive in its variation from the normal distribution in regard to the portions of pig skeleton recovered. Pig bones were divided into cranial, pectoral, pelvic, vertebral and distal. The distribution of these categories in the various zones of Mound B is shown in Table 3 and compared with a modern domesticated Australian pig in the reference collections of the Department of Prehistory, ANU. No comparative material from Papua was available, so strict comparisons were not possible. The cranial bones of the domesticated pig account for 21% of the skeletal weight. For all levels of Mound B except Zone IVB, cranial parts account for over 50% of the excavated pig bone. The bases of the skulls show signs of having been smashed to facilitate the extraction of the brain. Distal and vertebral bones are under-represented which may reflect butchering practices or differential preservation. The axis and atlas are frequently encountered, perhaps because of their close and secure attachment to the skull.

<table>
<thead>
<tr>
<th>Zone</th>
<th>I</th>
<th>II A</th>
<th>II AB</th>
<th>II B</th>
<th>IIC</th>
<th>III</th>
<th>IVA</th>
<th>IVB</th>
<th>Modern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranial</td>
<td>54</td>
<td>50</td>
<td>59</td>
<td>55</td>
<td>51</td>
<td>53</td>
<td>63</td>
<td>33</td>
<td>21</td>
</tr>
<tr>
<td>Pectoral</td>
<td>18</td>
<td>25</td>
<td>16</td>
<td>18</td>
<td>16</td>
<td>24</td>
<td>15</td>
<td>26</td>
<td>18</td>
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<tr>
<td>Pelvic</td>
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<td>16</td>
<td>19</td>
<td>17</td>
<td>18</td>
<td>16</td>
<td>19</td>
<td>28</td>
<td>16</td>
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<tr>
<td>Vertebral</td>
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<td>6</td>
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<td>Distal</td>
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<td>4</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 3  Mound B: percentage distribution of major categories of pig bone by weight

<table>
<thead>
<tr>
<th>Zone</th>
<th>I</th>
<th>II A</th>
<th>II AB</th>
<th>II B</th>
<th>IIC</th>
<th>III</th>
<th>IVA</th>
<th>IVB</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molar 1, not erupted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 4 months</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Molar 1, erupted to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 months</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td></td>
<td>2</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Molar 2, erupted 8 to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>12 months</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>-</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Molar 3, erupted 18 to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 months</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>5</td>
<td>-</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Molar 3, worn &gt; 20 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

1 Using dentition of mandible. The average periods of teeth eruption are after Sison and Grossman 1961:488

Table 4  Mound B: distribution of age of pigs at death by minimum number of individuals

Table 4 indicates that many pigs were butchered before their third molars had erupted. The consumption of pigs before they reached their maximum size would appear to parallel a situation described by Pospisil (1963:204-5) amongst the Kapauku of the Wessel Lakes, Irian Jaya, who slaughter their pigs when they weigh between 80 and 120 kg. This is presented as the most economical stage in that up to this size the animal can obtain most of its food requirements by foraging. To raise pigs above this weight requires purposeful feeding by the villagers. A few pig bones show butchering cuts, but these are not frequent enough to indicate specific methods of butchering.

The upper jaws of 16 Macropus agilis specimens recovered from Mound B were measured and their molar index determined by J. Hope. The age estimation criteria established by Kirkpatrick (1964) for a Queensland
population were then applied to the specimens (see also Kirkpatrick and Johnson 1969). The figures in Table 5 are to be regarded as rough estimates which lose some degree of reliability when a specimen has an age greater than four years. The comparability of the Queensland *Macropus agilis* with the Papuan is unknown.

<table>
<thead>
<tr>
<th>No. of individuals</th>
<th>Molar index</th>
<th>Age in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1.7–1.9</td>
<td>1.5–1.8</td>
</tr>
<tr>
<td>5</td>
<td>2.2–2.5</td>
<td>2.3–2.8</td>
</tr>
<tr>
<td>3</td>
<td>2.6–2.9</td>
<td>2.9–4.1</td>
</tr>
<tr>
<td>4</td>
<td>3.1–3.2</td>
<td>4.7–5.1</td>
</tr>
<tr>
<td>1</td>
<td>3.9</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Table 5 Mound B: age estimates of 16 Agile Wallabies using dentition of maxilla

**SUMMARY**

The major subsistence activity of the ethnographic population at Wanigela is horticulture and while there is no direct evidence for this in the excavations, we may confidently assume its presence. The pattern of environmental exploitation portrayed by the surviving faunal remains falls well within that recorded for the area at the turn of the century.

Two models can be described to explain the nature of the faunal data. The first is sociological and considers Mounds B and C as being coeval. The second, a temporal model, regards the bulk of Mound B as later in time than Mound C.

The sociological model is one in which the two middens are envisaged as the products of distinct social groups with varying patterns of environmental exploitation. The group contributing their rubbish to Mound B deposited greater quantities of pig and wallaby bones than the group at Mound C which discarded a larger bulk of shell fish. The shell fish remains from Mound C indicate an increasing importance of riverine species which was matched by a concomitant decrease in Mound B. Tidal varieties in the two middens also act in opposition. This could be interpreted as a complementary exploitation of the environment where the utilisation of specific zones shifted between the social groups through time.

It is possible to account for the faunal distribution by constructing a temporal model which states that the bulk of Mound B is later in time than Mound C. This presents a more or less even curve in the distribution of riverine species whereby they achieve increasing importance through time in Mound C and decrease in importance in Mound B (Figs 12 and 13). Mangrove varieties then present a distribution which reaches a position of dominance in the upper zones of Mound B. The marine species decrease through time. However, this model presents some problems in that the top zones of Mound C have a larger proportion of riverine and a smaller proportion of mangrove species than is found in the basal zones of Mound B. Thus, there is not a precise fit between the upper zones of Mound C and the lower zones of Mound B.

Both the sociological and temporal models will be investigated and discussed further with respect to the ceramic analysis.
The excavations and surface collections in the Wanigela–Cape Vogel region and the Trobriand Islands produced more than 5 tonnes of ceramics. The sherds belong to at least two major ceramic traditions. One of these was centred in the Wanigela–Cape Vogel region and the other had its locus in the northern D'Entrecasteaux Islands. On the whole these traditions were characterised by a relatively well made pottery which was free from flaws. The clay used in the vessels was naturally suitable and tempers were not needed. Few if any visible traces were left to indicate the manufacturing process. The sherds do not exhibit any paddle or anvil marks, nor do they break along obvious planes of weakness, as is seen in some coil-built wares.

Prehistoric sherds from Collingwood Bay possess a suite of traits which differentiate them from the D'Entrecasteaux material. Collingwood Bay vessel forms include jars, globular pots, open to restricted hemispherical bowls, complex composite forms and pedestalled bowls. Flat bottomed vessels are not a part of this ceramic complex. The size range is extreme. Some vessels are no bigger than a cup and others are large enough to hold 20–30 kg of food. The average size would lie at approximately 30–40 cm in width and perhaps 20–30 cm in height, depending on whether it is a bowl or pot form. Surfaces are normally smoothed or burnished.

Rim form assumes a wide variety of shapes. The simplest rim is nothing more than a continuation of the vessel wall and terminates at the lip without any modification. Elaboration of the lip and rim area in some instances is amazingly complex and a variety of forms is present. Decoration on these areas is often complex, although many rims are plain. Channelling (grooving), punctuation and shell stamping are the commonest decorative elements and are often combined into rather simple curvilinear or rectilinear decorative motifs.

Appendages take the form of single tab handles (Plate 9g) or large lugs (Plate 10e) which are affixed to the lip or shoulder area. Large lugs are occasionally found in pairs, extending from the lip to the shoulder. A large sherd from Zone IVA of Mound C indicates that at least 12 double lugs could be attached to a single vessel (Plate 10e).

A pedestalled bowl with a high cylindrical stand was found on a Collingwood Bay surface site (Plate 8a). Rectangular cut-outs embellish the stand and triangular cut-outs pierce the labial flange.

On the Trobriand Islands many surface collections contain Collingwood Bay and D'Entrecasteaux ceramics. The majority of the D'Entrecasteaux sherds are from relatively simple spherical to hemispherical vessels with restricted or open mouths. Lauer (1974:Plate 27, Figs 30-1) describes in detail the complete range of forms found in the ceramic tradition. The variation he presents lies primarily in the treatment of the lip area and involves simple thickening or no modification at all. Shoulders are relatively high on the vessel and abrupt composite forms are rare. Relatively simple decoration combining grooving, punctuation and shell impression is found on the prehistoric sherds.

The overall impression of the Collingwood Bay and D'Entrecasteaux ceramic traditions is one of a sophisticated and vital craft which produced ceramics on a par with other neolithic societies of the world.

The problem at hand is the ordering and presentation of the mass of information pertinent to the understanding of these prehistoric ceramics. The researcher embarks upon an analysis and classification when faced with the definition of a system, in this case prehistoric ceramics, which has too many properties and values to permit an economical description. This certainly is the case with the ceramics accumulated for this study. Theoretical and practical aspects of the ceramic analysis and classification are divided into four stages, each of which has a number of steps.

Stage 1 The guidelines, units of analysis and procedures to be used in the analysis are explicitly stated.

Stage 2 This stage is concerned with the distribution of the various attributes through the site.
Stage 3  The attributes are clustered into larger groups through proximity analysis.

Stage 4  The composition of the ceramic groups and some general features of their distribution are detailed.

The significance of the analysis is discussed in Chapter VI.

STAGE 1 : PROCEDURES

The theoretical and practical aspects of the ceramic analysis and classification are outlined for all steps employed in this initial stage of the analysis. They are similar to those diagrammed by Sokal and Sneath (1963: 1).

Step A  a definition of the guidelines determining the nature of the ceramic study;
Step B  an explicit statement of the objectives of the analysis and classification;
Step C  the selection of the sample to be studied;
Step D  a definition of the attributes to be used in answering the questions formulated in Step B. These attributes must be explicit and free from value judgements in order to conform with the principles laid down in Step A.

Step A: Guidelines

The choice of procedures to be employed in this study is controlled by three concepts. The first of these is based on the premise that the scheme should be as independent as possible of value judgements and 'experienced' intuition (Clarke 1970:26). The second prerequisite of any analysis is a set of clearly defined units and objectives with a broad enough base to exploit fully the information content of the data. Over both of these principles a third concept operates. This clearly states that the problem at hand is the analysis and classification of a specific body of archaeological material in as concise a manner as possible. At no time is the procedure to be regarded as an exercise in which the archaeological facts become submerged and lost in the classification process.

Step B: Objectives

The immediate objectives of the analysis and classification are best expressed as a series of questions.

1. What are the basic traits (attributes) of the ceramic complex and which of them carry the most information?
2. Can these attributes be used to determine if the archaeological deposits have been disturbed to such an extent that a meaningful interpretation of the ceramics derived from them is vitiated?
3. Can the attributes be clustered into groups, perhaps defining types?
4. What are the significant features of the ceramic groups?

Step C: Sampling

Sherds were selected for coding from those units which had arrived intact from the field at the commencement of the analysis. This is not a random sample but rather a sample of necessity due to the brutal fact that many specimens spent over half a year in transit from field to laboratory. Rim sherds were utilised as they have a higher information content than body sherds. Many of the rim sherds were large enough to estimate vessel form and define the mode of decoration.
Sherds were only included in the analysis if the lip area was present and there was a reasonable chance of determining the correct orientation of the rim. Appendix 1 lists the excavation units from which 3284 rim sherds from Mounds B, C and D were derived for analysis. Thirty surface collections provided 2926 rim sherds. Sites represented by fewer than 25 sherds were excluded from the analysis and collections of more than 250 sherds were reduced to that number by a random selection of specimens.

Step D: Attributes

The attributes are listed and defined in the ceramic code included in Appendix 4, Figure 20. Attributes were chosen on the basis of distinctive qualities and their ability to describe the ceramics. They are grouped into 14 classes, each of which includes one or more quantitative or qualitative attributes (Clarke 1968:140). Only three attribute classes are quantitative: Class III, percent of rim present, Class IV, orifice radius and Class V, maximum body radius. Class VI, rebating, refers to the small groove which lies just below the lip on the interior of many vessels. This appears as if it was made by trailing the thumb, with considerable pressure, around the inside circumference of the rim.

Within each class only one attribute may occur. This procedure, when applied to the decorative elements, often resulted in the combining of two or more already defined attributes into a third. Thus, punctuation is a separate attribute and so is channelling. These were combined into a third decorative attribute, punctuation and channelling.

Only one attribute class, Class III, is used which is not common to other ceramic studies. In so far as only rim sherds were being studied, it seemed possible that a better system could be applied in counting specimens than the weight or number of individual specimens present. The method adopted was devised by C.D. Smart and I.C. Glover, fellow scholars at ANU, and is a development of the traditional system of measuring rim diameter by a graded series of concentric circles. By adding radii at intervals of 5% of the total circumference it is possible to measure the fraction of the vessel rim represented by a rim sherd (Fig.14). This fraction, which will be referred to as the 'percentage factor', has two prime uses. Firstly, it is possible not only to state how many sherds there are of a given variety, but also to indicate the minimum number of vessels of a given type represented by the sherds of that type. This is accomplished by the simple procedure of adding the percentage factors of the individual sherds. Secondly, it states the size of each individual sherd. In the following stage of the analysis the use of the 'percentage factor' is discussed in greater detail.

Fig.14 Device for measuring orifice radius of a sherd and calculating its 'percentage factor'
STAGE 2: ATTRIBUTE ANALYSIS

Procedures

The distribution of the attributes with respect to number and size of sherd s is investigated in this stage. In order to do this as efficiently as possible a computer was employed to count and factor the data. This was necessary because of the large number of attributes defined by Stage 1. The data concerning each sherd were punched on a single card. This identified, located and described the individual specimen according to the code presented in Appendix 4.

J. Palmer of the Division of Computing Research, Commonwealth Scientific and Industrial Research Organisation, wrote a 'Programme for Tabulating Archaeological Data'. This is a straightforward tabulation program. However, the magnitudes involved presented difficulties which could only be overcome by a well planned program.

The distribution of rim sherds according to size is a significant aspect of this program which generated tables of attribute distribution for all excavated units and surface sites. The tables pertaining to the excavations are presented in graphical form (Appendix 5, Fig. 21). The attribute classes concerned with decorative elements and surface finish are plotted using three distinct methods.

1. The entire population of rim sherds from the specified archaeological units is employed.
2. The entire population is weighted by the 'percentage factor' as outlined in Appendices 4 and 5.
3. All sherds which constitute less than 5% of the vessel's orifice are omitted and the remainder are weighted by the 'percentage factor'.

Initially, the mounds at Oreresan were not accepted as being completely undisturbed. The integrity of an archaeological deposit can and should be questioned. Too many investigators assume that their source of data is valid. The logic behind such an assumption is often very weak. In many instances suppositions based upon an analysis of artifacts from the deposit are the sole test of legitimacy. If these suppositions present a neat picture, then the deposits are assumed to be valid. Needless to say, this argument is circular.

Both primary and secondary deposition could have been operating during the formation of the Oreresan middens. It therefore seemed necessary to determine if displacement from the original use location was a significant factor in redistributing the midden content (Schiffer 1972). If the middens were partially disturbed or formed in part by secondarily deposited debris, then the cultural material within the mounds should vary with regard to size and distribution. Sherds which have been disturbed or displaced would perhaps be smaller in size than those of primary deposition. Areas of increased cultural activity and zones which had been exposed for a long period of time would also be expected to contain small sherds. This oversimplifies the problem but does present a testable hypothesis.

The distributions in Appendix 5, Figure 21 remain fairly constant in their overall pattern regardless of which of the three techniques is used. Looking at the graphs belonging to Class VIII, lip decoration, it can be seen that the triangles (below the line for method 3 and above the line for method 2) fall fairly close to the end of the bar which indicates the percentage by sherd count (method 1). Method 3, which discounts all sherds representing less than 5% of the rim and factors the remaining sherds, often reduces the sample to such an extent that minority attributes disappear. Method 2, where the rim sherds are weighted by the 'percentage factor', by and large only affects the small samples, particularly those from specific features.

The hypothesis, that the absence of variation in the distribution graphs is an indicator of the validity of the deposits, will be discussed later in the light of the complete ceramic analysis. Nevertheless, on a preliminary basis it supports an hypothesis that the material within the mounds has not been subjected to a large amount of redeposition. This of course is contingent on
the assumption that sherd size is reduced during the process of secondary displacement.

Certain aspects of the graphs in Appendix 5, Figure 21 should be noted. These pertain to the emergence of a definite distinction between Mounds B and C. This is clearly exhibited in the attribute classes concerned with vessel decoration. In this respect the data are quite rewarding; however, only a few attributes vary significantly with regard to their distribution within the mounds.

Results

Here I summarise the salient features of the attribute classes.

Classes I and II: surface finish

Surface finish refers to the treatment of the entire exterior or interior surface of the vessel. Mound D has the highest frequency of eroded sherds. These constitute the 'not observable' category. Of the remaining five attributes, red-slipped sherds have the most significant distribution. This minority attribute is almost entirely confined to Mound C. On the whole burnished sherds are more common in Mound C and decrease in frequency in the upper zones, where they are replaced by sherds with a smoothed surface finish. This tendency is not paralleled in Mounds B and D.

Class III: percent of rim present

Within Mounds B and C the uppermost zone contains the highest ratio of small (0-5%) sherds. In Mound B the high ratio in Zone I (73% of 0-5%) is approximated only by the sherds found associated with the features (Feature 4 = 70%, Feature 1 = 50%, Feature 3 = 47%). The other zones have 31-44% of their sherds falling into the 0-5% group. This is not the case in Mound C where the features have low values in respect to small sherds (Feature 1 = 37%, Feature 3 = 46%). The features of Mound C also have high values in the 10-15% group. The lower zones of Mounds B, C and D have a high proportion of sherds which represent more than 5% of the rim.

Class VI: rebating

Approximately 40% of the sherds from all the zones of Mound C have a shallow groove on their interior surface just below the lip. Rebating is slightly less popular in Mound B and is only found on about 30% of the sherds from Mound D. The presence of rebating remains fairly consistent through time for each midden.

Class VII: rim form (Rf)

The 115 attribute models (hereafter referred to by their attribute number and the prefix Rf) of this class present a rather diffuse picture. A few of these attributes are significantly distributed, but the number of these is nowhere as high as would be expected. The more popular forms of the everted rim (Rf 6, 7) are prevalent in Mounds B and D. To a lesser degree this is also true for Rf 9 and 10. These forms are similar in their gently outcurving shape, which is common to globular vessels. The forms representing a straight-necked jar form (Rf 22, 23, 24, 26, 27, 31) are more common in Mound C. The open bowl form, typified by Rf 60 and 61, is commonest in Mounds B and D. Mound C would appear to have more of the restricted forms as represented by Rf 38, 39, 42 and 53.

Class VIII: lip decoration (Ld)

The lip area of each particular rim form is indicated in Appendix 4, Figure 20. The criteria used to define the lip area are not specific in relation to vessel form. Rather, the lip is defined as the area of the vessel orifice which best separates the inner rim from the outer rim area. Punctuation (Ld 2) and broken line incision (Ld 3) are common in Mounds B and D, while Mound C has significantly fewer sherds decorated with these attributes. Shell stamping
or impressing (Ld 5, 16 - edge of shell, and 15 - side of shell) occurs primarily in Mound C. Channelled or grooved lips (Ld 8) are absent from Mound D, as are notched (Ld 13) lips. Plain lips (Ld 1) dominate the collection and account for more than 50% of the sherds in some zones. On the whole there are more plain lips from Mound C than from Mounds B or D.

**Classes IX and X: rim decoration (Rd)**

The classes of outer and inner rim decoration reflect the same tendencies as those seen in the attribute class of lip decoration. Shell stamping (Rd 5, 18, 21, 23) is found predominantly in Mound C. Rd 33, punctuation, found in small quantities in Mounds B and D, is absent from Mound C. Notching (Rd 15) and many of the channelled motifs are conspicuous by their near absence from Mound D, particularly in the class of outer rim decoration. Plain rims (Rd 1) are a dominant feature and account for close to 90% of the excavated ceramics.

**Class XI: body decoration placement**

This class has eight divisions which are concerned with the particular area of the vessel which is decorated and to what degree of certainty a sherd can be said to come from an undecorated vessel.

Lower body decoration normally occupies that portion of the body below the vessel equator. Usually this area is separated from the upper body by a line of design elements. This may consist of punctuation, grooving or shell stamping. The graphs indicate that some rim sherds belong to vessels with 'apparently' undecorated bodies and that these are more common in Mounds B and C than in Mound D. In part this is a function of the relationship between vessel form and the placement of body decoration. The globular vessels (Rf 6, 7), when decorated, tend to have the motif high on the vessel body, whereas the straight-sided jar forms (Rf 31, 32, 33, 34, 35) usually have the motif situated 4-6 cm below the rim. The latter is more easily separated from the rim during breakage than the former.

**Class XII: body decoration (Bd)**

Channelling, possibly with a seed pod or univalve shell, is the primary decorative technique found on the excavated sherds. Univalve shells are used by the contemporary Rainu potters to make grooves and Lauer's Amphlett Islanders use a seed pod for grooving and burnishing (Lauer 1974:Plate 18). Sherds from the mound excavations have relatively simple combinations of decorative elements compared with the complex motifs found in the surface collection. The graphs demonstrate the popularity of parallel grooving (Bd 11, 12, 13, 16 etc.) as an element of body decoration on the ceramics from all the excavated middens. However, it is apparent that this same attribute when combined with punctuation, as in Bd 21 and 22, is with a few minor exceptions limited to Mounds B and D. The conjoined half circle design (Bd 25, 27) is almost entirely restricted to the upper zones of Mound C. The arc (Bd 30) is commonest in the lower zones of Mounds C and D. Both of these designs are made by grooving.

**Class XIII: shoulder decoration (Sd)**

Punctuation (Sd 10) is again found at Mounds B and D; however, shell impressing (Sd 9) is also found in Mound B to a greater degree than was encountered in the other decorative classes. Broken line incision (Sd 18) is absent from Mound C. Approximately 10-15% of the sherds are from vessels without shoulders.i.e. shallow bowls, and fall into the 'not applicable' group (Sd 1). On more than 50% of the sherds from the excavation the shoulder area is absent (Sd 2, 'not observable'). Of the sherds from the excavated zones 10-30% have plain shoulders.

**Class XIV: appendages**

A few sherds from Mounds C and B have tab or lug handles. This attribute is all but absent from Mound D.
Summary of Stage 2

A high proportion of the mound ceramics is plain. The dominant decorative attributes found upon the lip area are punctation, broken line incision and shell stamping or impression. Punctation and broken line incision are found predominantly in Mounds B and D, while shell stamping dominates Mound C. This distribution, which is almost mutually exclusive, also occurs with the attribute classes of rim decoration, body decoration and to a lesser extent shoulder decoration. The graphs demonstrate the popularity of parallel grooving as an element of body decoration on the midden ceramics. However, it is clear that the same design when combined with punctation is found only in Mounds B and D. Thus, it can be seen that the ceramics from Mounds B and D manifest a different complex of decorative elements from that found upon the sherds from Mound C. This dichotomy is seen also in vessel form. Everted rim forms belonging to globular vessels are prevalent in Mounds B and D, with straight-necked jar forms occurring in Mound C. This is not a mutually exclusive distribution but one of relative proportions.

Although there are differences between the mounds, they are also similar in many respects; the majority of the ceramics belong to the same major tradition. The distinction between Mounds B and C does not operate with respect to their basal zones. Zone IVB of Mound B shares many attributes with Zone IVD of Mound C.

Whether the distinctions between Mounds B and C are the product of temporal or social factors is not readily apparent. The radiocarbon dates, as mentioned earlier, are not clear on the exact relationship between Mounds B and C. The value of the attribute analysis in establishing chronological markers or delineating trends is restricted. The multiplicity of attributes confuses the overall picture. The subsequent stage of the analysis reduces the number of units in order that the relationship between the various zones of the excavation and the surface collections can be investigated.

Stage 2 of the analysis produced a complex mass of data which described the distribution of the attributes within the excavations. The large number of attributes handled in the analysis did not facilitate an economical or clear comparison of the excavated units with the surface sites. For this reason it was deemed necessary to ignore the surface collections at the attribute level of the analysis and emphasise the excavated ceramics. The distribution of the attributes was plotted by the computer. The bulk of the tables negated their complete presentation within this study.

STAGE 3 : GROUPING THE ATTRIBUTES

The next logical step would then be one which reduced the number of rim form units by forming groups which were internally homogeneous with respect to the other attribute classes. This meant designing a system which would place relatively similar rim forms into a specific group if they shared a significant number of attributes with the other members of that group. The procedure used to accomplish this is outlined below.

Step A

The entire sample of 6210 rim sherds was regarded as a single unit. Matrices were constructed using the 115 rim forms defined in the analysis grouped in terms of the five major subunits of Class VII (Appendix 4, Fig.20).

1. Direct rims belonging to restricted spherical vessels.
2. Everted or thickened rims belonging to various jar forms.
3. Rims belonging to restricted composite vessels.
4. Rims belonging to unrestricted vessels.
5. Rims belonging to composite vessels having a shoulder to lip height greater than 3.5 cm.
The matrices were of the two-way correlation type and plotted each rim form in terms of four specific attributes: exterior surface finish, rebating, lip decoration and body decoration. These attribute classes were considered as having a high information content. Classes such as rim decoration, shoulder decoration and appendages had too many sherds in the plain 'not observable' or 'not applicable' categories to be of much utility in defining groups. Twenty matrices were produced. Their size vitiated presentation within this study and they remain in the archives of the Department of Prehistory, ANU.

Step B

The matrices resulting from Step A were subjected to a proximity analysis in order to determine which rim forms could be clustered together on the basis of shared attributes. The technique employed is known as the Brainerd (1951) and Robinson (1951) method. This method is usually employed to order archaeological deposits; however, the agreement coefficient can be used to define relationships which exist between groups of artifacts. If we can use the agreement coefficient to state that Zone X is related to Zone Y on the basis of a numerical index of the degree to which the two zones have similar proportions of ceramic types, then the same method can be used to state that rim form X is related to rim form Y on the basis of their sharing similar ratios of specific attributes.

The agreement coefficient in this instance was calculated by taking all possible pairs of rim forms within each of the five subunits and subtracting the sum of the differences between the percentages of the attributes from 200. The maximum agreement between each pair is 200 and complete disagreement scores as 0. It was then possible to plot the agreement between rim forms as a series of links (Renfrew and Sterud 1969). When rim forms proved to be closely linked, they were considered a cluster. The use of four separate and independently derived matrices multiplied the work but served as a valuable cross-check. Rim forms which were related by the agreement coefficient in terms of lip decoration were only placed in the same cluster if they also had a high agreement with respect to exterior surface finish, rebating and body decoration.

In Figure 15 an example of this procedure is presented with respect to the clustering of rim forms 6 and 7 which constitute Ceramic Group D. The coefficient of agreement used by Renfrew and Sterud (1969:Table 1) consists of the two highest figures in each column of the matrix. The third highest number is shown for comparison in Figure 14. Rim forms 6 and 7 demonstrate a consistent clustering in the four attribute classes under consideration. The pattern is weakest in Class VI, rebating, where Rf 7 is closest to Rf 9 and Rf 13, while Rf 6 clusters with Rf 20 and Rf 7. Rf 6 and 7 are closely linked with Rf 9 in Classes I, VIII and XII to such an extent that the three rim forms were considered for membership of the same cluster. At this point it was decided to retain the distinction between Rf 6 and 7 (Ceramic Group D) and Rf 9 (Group EE), in order to see if they were distributed in a significantly different fashion within the archaeological units. If combined, the resultant group would have accounted for 1240 sherds, almost twice as many specimens as Group Q, the largest cluster of rim forms.

Step C

The previous step defined clusters, each of which contained one or more rim forms, which often needed further refinement. Since these clusters were formed by a coefficient of agreement based upon the magnitude of similarity, certain distinctive and significant minority attributes lost their power of discrimination. In other words, rim forms would belong to the same cluster if they had a similar distribution of attributes; however, within this cluster there might be a group of rim forms having a distinctive attribute which was not possessed by the other members of the cluster. Thus, a cluster might include ten rim forms, five of which shared the minority attribute notching as an element of lip decoration and five of which did not. This cluster could then be split into two groups: those possessing the distinctive attribute as one group and the remaining rim forms as a second group.
Only one distributional criterion was employed when searching for groups. Rim forms commonly occurring in Mound D were seldom grouped with those rim forms which were not present in the Mound D deposits. The radiocarbon dates indicate that the ceramics from Mound D were deposited about 600 BP. With this rather tight temporal control, it seemed best to regard the ceramics commonly found in Mound D as a discrete unit which should be kept uncontaminated by material not found in this context.

Step D

The resulting clusters were termed ceramic groups and labelled alphabetically (Fig. 16). Ceramic Group Z is composed of rim forms which did not fit into any particular cluster. For the most part each unassigned rim form represented very few sherds, their total amounting to 11% of the 6210 sherds analysed.

Not all the groups can be considered as being equally tight-knit units. Ceramic Groups G, J, Q and perhaps L are weak internally, in so far as their individual members frequently possess disproportionate numbers of specific attributes.
Fig. 16 The Ceramic Groups, by Rim form
The groups are described (Tables 6-10) and their distribution in the excavations and surface collections plotted. Figure 17 is concerned with the excavated sherds proportioned by sherd count, while Figure 18 presents the proportions using the 'percentage factor'. It is quite clear that the general trend in the distribution of the ceramic groups remains the same regardless of which method is used. However, the 'percentage factor' method, which factors all sherds representing 0-5% of the vessel rim by 2.5, 5-10% by 7.5, 10-15% by 12.5, etc., noticeably alters the proportions of some ceramic groups. This is particularly true with respect to Group W sherds in Mound B. Ceramic Group W was considerably inflated by the 'percentage factor', indicating that large sherds of this variety were present in the upper zones of Mound B.

The material from the surface collections is graphed in Figure 19. The data from the 'percentage factor' count are presented rather than those from the sherd count. The seriation is the same regardless of which method is employed. The ordering of the surface collections is considered in a subsequent chapter and the graphs are presented at this point only to illustrate the distribution of the ceramic groups, not the seriation of the surface sites.

An outline of each of the 25 ceramic groups is now presented which summarises the salient aspects of their composition, form, decoration and distribution. Each ceramic group in Figures 17, 18 and 19 is represented by an idealised vessel form. In certain cases the step from rim form to vessel form is not at all secure. The procedure used was one which selected the dominant rim form of the group and a reconstruction of the typical vessel was based upon this form. A few of the ceramic groups include rim forms which obviously belong to different vessel styles. This certainly is the case with Group J. In this instance Rf 16 was selected because large sherds were present in the collections and the complete vessel shape was known. This was not the case for the other rim forms in the group. A particular problem was presented by those ceramic groups believed to include pedestal bowl forms. Only Rf 73 of Group P can be said to be found on pedestal bowls, but ceramic groups such as S and J, by virtue of their sharing specific attributes with Group P, may well include pedestal vessels.

The attribute analysis and subsequent definition of ceramic groups has taken into account the majority of rim forms and decorative attributes. However, certain sherds found during the excavations or while surface collecting were not included in the sample selected for analysis. The significant material is discussed at relevant points in the text dealing with the excavated and collected sample. It is regrettable that the entire collection of 5 tonnes could not be handled in detail.

Ceramic Group A (Plates 6a,b)

Rim forms 1, 3, 4 and 5; 122 rim sherds (Fig.16, Table 6).

Shape This group includes all of the 'spherical' vessels with direct and slightly constricted rims. This is the same vessel form as that of the modern Wanigela ware.

Exterior surface finish Most sherds are smoothed (93%) with the remainder falling into the 'not observable' category (Table 7).

Rebating Rebating is found on only 1% of the rim sherds (Table 8).

Lip decoration Approximately 95% of this group are plain while 4% are decorated with raised applied rolls (Ld 12) which mark them as modern Wanigela ware (Table 9).

Body decoration In this group 38% of the sherds are decorated with applied rolls (Bd 8), 4% with punctuation (Bd 3), 4% with vertical channels (Bd 13) and 14% with shallow channelled motifs (Bd 41, 43) (Table 10).
Plate 6  Rim sherds: a. Group A (D'Entrecasteaux variety), Tro.26; b. Group A (contemporary Wanigela variety), Col.3; c. Group C, plain body with shell stamped lip, C/Feature 3; d. Group C, burnished body decorated with applied ribbon, shell stamped lip, B/IVA; e. Group D, burnished and channelled body, broken line incision on lip, Col.26; f. Group EE, channelled body and punctated lip, B/IVA
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- **tn** = Total sherd sample
- **mn** = Sample with measurable orifice radius (O.R.)
- **$\tilde{\sigma}$ O.R.** = Expected value of sample variance of O.R. (after Yamane 1964:470-3)

See Appendix 4, Fig. 20 for attribute code

Table 6 Ceramic Groups: sample size and mean orifice radius

Table 7 Ceramic Groups: exterior surface finish (%)

Table 8 Ceramic Groups: presence of rebating (%)
| Ceramic Group | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| A             | 95| 1 |   |   |   |   |   |   |   | 4  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| B             | 59| 3 | 2 | 8 | 9 |   |   |   |   | 0  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| C             | 45| 12| 9 | 7 | 8 | 2 | 1 |   |   | 5  | 10 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| D             | 25| 31| 26| 3 | 4 | 5 | 0 | 0 | 1 | 0  | 1  | 1  | 1  | 1  | 2  | 0  |    |    |    |    |    |    |    |    |    |
| E             | 56| 7 | 9 | 5 | 0 |   | 1 |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| EE            | 32| 23| 25| 1 | 4 | 0 | 8 | 1 | 0 |    | 1  |    |    |    |    |    |    |    |    |    |    | 3  |    |    |    |
| F             | 53| 24| 11| 3 | 0 | 2 | 3 | 0 |   |    |    | 1  |    | 1  |    |    |    |    |    |    |    |    |    |    |    |
| G             | 50| 12| 7 | 8 | 1 | 1 |   |   |    |    | 1  | 5  | 0  | 6  | 1  |    |    |    |    |    |    |    |    |    |    |    |
| H             | 53| 8 | 5 | 4 | 4 | 2 | 5 | 3 | 1 | 2  |    |    | 4  | 5  | 1  | 1  | 1  |    |    |    |    |    |    |    |
| I             | 69| 8 | 1 | 7 | 5 | 4 |   |   |   |    |    | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |
| J             | 83| 1 | 1 | 1 | 2 |   |   | 1 |   |    | 5  | 8  |    |    |    |    |    |    |    |    |    |    |    |    |
| K             | 78| 5 |   | 1 | 1 | 0 | 13| 0 |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| L             | 91| 0 | 1 |   | 1 | 2 | 2 | 2 |   |    |    |    |    |    |    |    |    |    |    |    |    |    |
| M             | 80| 1 |   | 3 | 3 | 10|   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |
| N             | 91| 3 |   | 1 |   | 4 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| O             | 91| 5 |   | 2 |   | 2 |   |   |   |    | 2  |    |    |    |    |    |    |
| P             | 83|   |   | 2 | 3 | 1 |   |   |   |    |    |    |    |    |    |    |    |    |
| Q             | 90| 2 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |    | 0  |    |    |    |    |    |    |
| R             | 73| 5 | 2 | 4 | 2 | 3 | 0 | 2 | 1 |    | 0  | 2  | 4  |    |    |    |    |    |
| S             | 80| 3 |   |   | 3 |   |   | 8 | 3 |    |    |    |    |    |    |    |    |    |
| T             | 72| 6 | 1 |   | 1 | 6 | 7 | 0 |   |    |    |    |    | 6  | 1  |    |    |
| U             | 88| 1 |   | 1 | 1 | 3 |   |   |   |    |    |    |    |    |    |    |    |    |
| V             | 89| 3 |   | 0 | 5 | 1 |   |   |   |    |    |    |    |    |    |    |    |
| W             | 80| 6 |   |   |   | 15|   |   |   |    |    |    |    |    |    |    |    |
| X             | 55| 11| 4 | 2 | 2 | 9 | 4 | 3 | 2 |    | 6  |    |    |    |    |    |

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Table 9  Ceramic Groups: decorative elements on lip area

see Appendix 4, Fig. 20 for attribute code
### Table 10  
**Ceramic Groups: decorative elements on body area**  

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See Appendix 4, Fig. 20 for attribute code (table 10...continued over)*

Table 10  Ceramic Groups: decorative elements on body area
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*45 - sherds too small to determine if vessel is decorated on the body
*46 - sherds large enough to determine that body decoration is positively absent
0 - present
See Appendix 4, Fig. 20 for attribute code

Table 10  Ceramic Groups: decorative elements on body area (cont.)
Fig. 17 Mounds B, C and D: distribution of Ceramic Groups by zone, using sherd count
Fig. 18 Mounds B, C and D: distribution of Ceramic Groups by zone, using 'percentage factor'

m.n.v. = minimum number of vessels (i.e. sum of the percentage factors)
Fig. 19  
Surface Sites: distribution of Ceramic Groups and proposed chronological ordering, using 'percentage factor'
**Discussion**

A roughly spherical vessel with a simple restricted rim is produced in Wanigela and was made on the Amphlett Islands. In general form they are similar; however, the Amphlett vessel usually has a more abrupt shoulder and where the Wanigela pot is nearly spheroid in profile, the Amphlett pot tends to be ellipsoidal. The Wanigela wares are decorated with raised shell-impressed ridges and the Amphlett vessels have shallow grooves and stippled motifs (Lauer 1974:Plates 21-4, Figs 24-8).

Ceramic Group B

**Rim forms**

31 and 32; 223 rim sherds (Fig.16, Table 6).

**Shape**

The generalised vessel form of this group is that of a relatively straight-necked jar with a slightly everted and thickened rim.

**Exterior surface finish**

Approximately 58% of this group have a smoothed finish, while slightly over 20% are burnished (Table 7).

**Rebating**

More than 73% of the sherds in this group exhibit rebating (Table 8).

**Lip decoration**

The technique used most commonly is shell impressing (Ld 5 + 15 = 24%), although a fairly wide range of decorative elements is present. Over 59% of the lips are plain (Table 9).

**Body decoration**

Simple channelling (Bd 1, 11, 12, 30) is the commonest decorative device and accounts for 11% of the sherds. The body region is definitely plain on 73% of the rim sherds (Table 10).

**Distribution: excavations**

This group has its strongest representation in the basal half of Mound C. It also constitutes over 10% of the sherds in the basal zone of Mound B. Mound D is devoid of this ceramic group (Figs 17, 18).

**Distribution: surface collections**

The group is present in the surface collections from sites whose ceramic constituents closely resemble those found in the basal sectors at Mounds B and C (Fig.19). These sites are Col.11, 13, 14, 18, 20 and 21. Site Tro.1 has the strongest representation (8%) in the Trobriand Islands. This site is characterised by a high frequency of Ceramic Groups P, Q and R.

**Discussion**

See Group C: discussion.

Ceramic Group C (Plates 6c,d)

**Rim form**

33; 214 rim sherds (Fig.16, Table 6).
Shape  This is the same basic vessel form as that characterising Group B, that is a jar with a relatively straight neck and slightly everted rim.

Exterior surface finish  Smoothed sherds account for 64% of this group and burnishing for 28% (Table 7).

Rebating  Rebating is present on only 40% of the sherds as opposed to the 73% found in Group B (Table 8).

Lip decoration  Punctuation or short line incision (Ld 2, 3, 4) decorates 28% of the lips (Table 9). Shell impressing (Ld 5, 15) is found on 18% of the lips.

Body decoration  This group is similar to Group B in that 73% of the sherds are plain and 12% are decorated with simple channelling (Bd 11, 12, 13, 29, 30) (Table 10).

Discussion  This straight-necked jar form resembles Group B in general form and in having a distribution which is strongest in the basal sectors of Mounds B and C. In Zone IVB of Mound B Ceramic Group C accounts for 35% of the pottery and in Feature 3 of Mound C for 15% of the sherds. However, a fair number occur in the upper zones of Mound B. These zones produced the aberrant radiocarbon dates (ANU-371A and B) and their status will be discussed later in the summary of the ceramic analysis.

Group B differs slightly from C in the shape of the rim. Group B, with shell impressing (Ld 5, 15), is more common in Mound C, while Group C with punctation (Ld 2, 3, 4) is somewhat better represented in Mound B. Both groups are predominantly plain (73%) in respect of body decoration, with simple channelled motifs occurring on some sherds. This decoration usually lies on the vessel body some distance below the rim rather than adjacent to the rim as is found in Group D.

Ceramic Group D (Plate 6e)

Rim forms  6 and 7; 929 rim sherds (Fig.16, Table 6).

Shape  A markedly everted rim on a globular vessel characterises this ceramic group.

Exterior surface finish  66% of the sherds are smoothed on the exterior and 14% are burnished (Table 7).

Rebating  This attribute is present on 17% of the sherds (Table 8).

Lip decoration  Punctuation (Ld 2) decorates 31% of the lips and short line incision (Ld 3) is found on 26% (Table 9). Only 25% of the lips are plain.

Body decoration  Punctuation (Bd 3 = 7%) and channelling (Bd 11 + 12 = 12%) are the commonest decorative techniques. Plain sherds account for 33% of this group (Table 10).

Distribution: excavations  Ceramic Group D is well represented in Mounds B and D (Figs 17, 18). It is strongest in the upper zones of Mound B and throughout Mound D.
Distribtion: surface collections  This group is best represented in the Collingwood Bay collections (Fig.19). Group D represents 35-48% of the ceramics found at sites Col.3, 19, 26, 27. Site Tro.25 has a significant quantity (25%) of this group in its collection; only two other sites have greater than 5% (Tro.7 and 24).

Discussion  Ceramic Group D has a distribution which acts in opposition to that of Groups B and C. The globular vessel with a gradually everted rim appears to be a middle to late mound manifestation with only small quantities occurring in the basal zones of Mound C and Zone IVB of Mound B. Group D is found in significant quantities on sites Col.26 and 27. These sites are situated deep within a mangrove swamp 0.5 km south of Oresesan. Although Group D is best represented on these more or less isolated sites, it is also common on other sites in the Collingwood Bay region.

Ceramic Group E

Rim form  8; 81 rim sherds (Fig.16, Table 6).

Shape  This group falls midway in form between the jars with a relatively straight neck (Groups B and C) and the globular vessels with a slightly constricted neck and expanded body (Group D).

Exterior surface finish  62% of the sherds have a smoothed surface finish, 30% are burnished and almost 5% manifest the intensive burnishing which has been labelled polishing (Table 7).

Rebating  More than 47% of the sherds are rebated (Table 8).

Lip decoration  Linear incision (Ld 3) is present on 9% of the sherds, shell impressing (Ld 5, 15) on 15%, punctuation (Ld 2) on 7% and oblique incision (Ld 4) on 5%. The lip area is plain on 56% of the sherds (Table 9).

Body decoration  Most are plain (73%); horizontal channelling (Bd 11 = 7%) and complex channelling (Bd 1 = 5%, Bd 18 = 3%) are the only forms of body decoration which occur on more than 2% of the sherds (Table 10).

Distribution: excavations  Group E has its strongest representation in the lower halves of Mound B and C (Figs 17, 18). It is restricted in Mound D to a few sherds in Zone IA.

Distribution: surface collections  This group is not found on the Trobriand Islands (Fig.19). The 4% recorded for site Col.11 is its strongest representation in the Collingwood Bay surface collections.

Discussion  Group E, as a relatively straight-necked jar form, is similar to Group B and Group C. As a minority group it never amounts to more than 10% of any zone in the mounds or more than 4% of any surface collection. In the excavations it is best represented in Mound C with a lower frequency of occurrence in Mound B. It is present only in Zone IA of Mound D.

Ceramic Group EE (Plates 6f, 7a)

Rim form  9; 311 rim sherds (Fig.16, Table 6).

Shape  A gradually everted rim on a globular vessel.

Exterior surface finish  In this group 70% of the sherds are smoothed and 12% are burnished (Table 7).

Rebating  This attribute is present on only 15% of the sherds (Table 8).
Plate 7  Rim sherds:  a. Group EE, decorated with pattern burnishing, B/IVA;  b. Group F, decorated with punctuation, raised ridges and channels, Col.6;  c. Group G, shell stamped lip and channelled body, C/Feature 1;  d. Group I, plain lip and channelled semicircles on body, C/Feature 3;  e. Group J, incised criss-cross pattern on body, B/IVB;  f. Group K, channelled decoration and small tab handle on shoulder, C/IIIIB;  g. Group L, plain lip, shell stamped shoulder and channelled body, C/IVA
Lip decoration  Group EE has 25% of the lips decorated with linear incision (Ld 3) and 23% with punctuation, while 32% are plain (Table 9). To some degree this resembles the lip decoration of Group D.

Body decoration  41% are without decoration. Punctuation (Bd 3 = 7%) and simple channelled motifs (Bd 11 = 7%, Bd 12 = 3%) are the most popular decorative techniques (Table 10).

Distribution: excavation  Mound D is marked by a substantial number of Group EE sherds (Figs 17, 18). The lower zones of Mounds B and C also have Group EE ceramics.

Distribution: surface collections  In the Collingwood Bay region and on the Trobriand Islands, Group EE is commonly found on the sites which also contain Group D ceramics (Fig.19).

Discussion  It is readily apparent that Group EE and Group D are related in many respects. On ceramics of both groups rebating is not common (15-17%). most of the exteriors are smoothed (66-70%) and only 25-33% have plain lips or undecorated bodies. In the surface collections the groups tend to occur on the same sites. However, the distribution of Group EE within the excavations presents some problems. In Mounds B and C it is best represented in the basal zones. In Mound D it constitutes over 35% of Zone IIIA.

Ceramic Group F (Plate 7b)

Rim forms  11, 12 and 13; 489 rim sherds (Fig.16, Table 6).

Shape  A thickened everted rim on an almost straight-necked jar is the general form characterising this group.

Exterior surface finish  Most are smoothed (77%) and only 6% are burnished (Table 7).

Rebating  12% of the sherds are rebated (Table 8).

Lip decoration  Punctuation (Ld 2 = 24%) is the dominant technique and short line incision (Ld 3 = 11%) is second in importance (Table 9). 53% of the lips are plain.

Body decoration  Group F is distinctive in its high frequency (22%) of punctuation (Bd 3). Another 11% are channelled and punctated (Bd 22). 17% are decorated with complex channelled motifs (Bd 37, 38) which are often combined with raised ridges (Table 10).

Distribution: excavations  This group is best represented in the basal halves of Mounds B and C (Figs 17, 18). Although 17% of this group are decorated with complex motifs (Bd 37, 38), not one of these was derived from the mound deposits.

Distribution: surface collections  Group F is well represented in the surface collections, where it often accounts for more than 20% of the ceramics (Fig.19).

Discussion  Group F is intermediate in form between the straight-sided jars and the globular pots. Within the mound deposits it is best represented in Mound C. As such it is limited to less than 15% of the ceramics found in any single zone. In the surface collections from the Trobriand Islands and Collingwood Bay it frequently accounts for 20-30% of the ceramics.

Ceramic Group G (Plate 7c)

Rim forms  22 and 23; 508 rim sherds (Fig.16, Table 6).
Shape: The straight neck found on this ceramic group is similar to that of Groups B and C; however, the body of the vessel is slightly globular in appearance. This means that Group G falls midway in form between the straight-necked jars of Groups B and C and the globular pots of Group D.

Exterior surface finish: Within this group 73% are smooth and 21% are burnished (Table 7).

Rebating: 44% of the sherds are rebated (Table 8).

Lip decoration: The common decorative elements are present in the following proportions: punctation (Ld 2), 12%; incision (Ld 3, 4), 15%; shell impressing (Ld 5, 15), 14%. 50% of the lips are plain (Table 9).

Body decoration: The most common decorative elements are channelling (Bd 11 + 12 + 13 = 13%) and punctation (Bd 3 = 2%). 61% of the rim sherds have plain bodies (Table 10).

Distribution: excavations: This group is found in Mounds B, C and D (Figs 17, 18). Its most significant occurrence is in Mound D. There it is strongest in the basal zones and gradually diminishes towards the surface of the mound.

Distribution: surface collections: Although ceramics of this group were found in 20 of the 30 surface collections, on only four sites (Col.10, 19, 26, 27) did it constitute more than 10% of the ceramics (Fig.19). All these sites are marked by the presence of Ceramic Groups D, EE, Q, U and V. Two of these, D and EE, are forms with gradually everted rims.

Discussion: It appears as if Group G falls midway between the straight-necked jar forms (Groups B, C and I) and the globular styles with gradually everted rims (Groups D and EE).

The two rim forms, 22 and 23, which comprise this ceramic group do not form a tight cluster with respect to their decorative attributes. This is the weakest unit formed by the grouping procedures and should be regarded as such.

Ceramic Group H

Rim forms: 26, 27 and 28; 238 rim forms (Fig.16, Table 6).

Shape: The heavy thickening of the lip area and the general vessel form are similar to Group F.

Exterior surface finish: 78% of the sherds in this group are smooth and 14% are burnished (Table 7).

Rebating: 61% of the rims are rebated (Table 8).

Lip decoration: The attributes commonly used on Group H vessels are similar to those found on Group G: punctation (Ld 2), 8%; incision (Ld 3, 4), 9%; and shell impressing (Ld 5, 15), 9%. Linear incision (Ld 7 = 5%) is present and 53% of the lips are plain (Table 9).

Body decoration: Punctation (Bd 3 = 5%) and simple channelling (Bd 11 + 12 = 8%) appear along with a significant quantity of more complex motifs (Bd 37 + 38 = 8%). In respect of Bd 37 and 38 this group resembles Group F (Table 10).

Distribution: excavations: The only significant occurrence of Group H is in the upper zones of Mound C. No other ceramic group is distributed in this fashion (Figs 17, 18).

Distribution: surface collections: Sites where Group H sherds are present also tend to have a significant quantity of Group F ceramics (Fig.19).
Discussion  Group H resembles Group F in its reinforced lip area, vessel form and in the high proportion of elaborate channelled motifs which decorate the body area. The two groups appear in the same surface collections; however, Group F is strongest in the lower half of Mound C with Group H replacing it in the upper zones of the same mound.

Ceramic Group I (Plate 7d)

Rim forms  34 and 35; 65 rim sherds (Fig.16, Table 6).

Shape  A straight-necked jar with a thickened lip distinguishes this group.

Exterior surface finish  58% of the sherds are smoothed and 30% are burnished (Table 7).

Rebating  81% are rebated. This is the highest proportion found in any ceramic group (Table 8).

Lip decoration  Plain lips are common (69%), with punctation (Ld 2 = 8%) and oblique incision (Ld 4 = 7%) being the most important decorative techniques. Shell impressing (Ld 5 + 15 = 10%) and finger nail impressing (Ld 6 = 4%) are also encountered (Table 9).

Body decoration  Group I has a high proportion of plain bodies (77%) and a limited variety of decoration (Table 10). Channelled arcs (Bd 30 = 7%), channelled oblique lines (Bd 12 = 2%) and channelled - punctate motifs (Bd 22 = 2%) are the only elements occurring on at least 2% of the bodies.

Distribution: excavation  The only significant occurrence of Group I is in the basal zones of Mound C (Figs 17, 18).

Distribution: surface collections  Group I seldom accounts for more than 5% of any collection and does not appear to be commonly found with any particular suite of ceramics (Fig.19).

Discussion  This is a straight-necked jar form which is best represented in the basal zones of Mound C. To this extent it conforms with the general trend established for the other straight-necked jar forms found in the excavation.

Ceramic Group J (Plate 7e)

Rim forms  14, 15, 16, 17, 18, 19 and 20; 168 rim sherds (Fig.16, Table 6).

Shape  This group is characterised by a relatively flat lip on a variety of jar forms.

Exterior surface finish  Group J has a high frequency of smoothed sherds (80%) (Table 7).

Rebating  Less than 10% of the rims are rebated (Table 8).

Lip decoration  83% of the lips are plain. Notching (Ld 13 = 8%) is the most commonly applied decorative technique (Table 9).

Body decoration  Two decorative techniques mark this group as unusual (Table 10). Bd 34 (a criss-crossed incised pattern) and Bd 35 (a series of shell-edge impressions) are found on 11% of the sherds. 53% of the ceramics are plain.

Distribution: excavations  This group is found scattered throughout Mounds B and C, but never accounts for more than 5% of the ceramics in any zone (Figs 17, 18). In Mound D it is restricted to Zone 1A.
Distribution: surface collections  In the material from Col.16, Group J represents 54% of the ceramics (Fig.19). At this same site Groups S and Q are present (13% and 12%) as is Group G (5%). No other group accounts for more than 4% of the sherds found at Col.16.

Discussion  Group J is definitely unique in form and decoration. Most of the sherds found in Mounds B and C were small and battered. As such, small quantities are found throughout Mound C and a lesser amount comes from Mound B.

The form depicted as typical of this group is a straight-necked jar form. Of the seven rim forms (Rf 14-20) included in this group, this was the single vessel shape which could be positively reconstructed. It is readily apparent that a variety of vessel forms are included in the group. Some of these have constricted necks and expanded bodies. Although it contains a number of vessel styles, Group J is internally homogeneous with respect to rebating, surface finish and vessel decoration. A flat lip area is common on sherds belonging to Group J but seldom found on sherds belonging to other ceramic groups.

Ceramic Group K (Plate 7f)

Rim forms  38, 39, 40 and 41; 253 rim sherds (Fig.16, Table 6).

Shape  Shallow bowl forms with restricted rims are typical of this group.

Exterior surface finish  54% of the sherds are smoothed and 35% are burnished (Table 7).

Rebating  This attribute is present on 25% of the rim sherds (Table 8).

Lip decoration  78% are plain and 13% are decorated with a single channel or groove (Ld 8). Punctuation (Ld 2), the next commonest element, is found on 5% of the lips (Table 9).

Body decoration  23% of the sherds are decorated with horizontal channels (Bd 11) and 7% with a complex motif consisting of channeling and raised ridges (Bd 38). 38% of the ceramics are plain (Table 10).

Distribution: excavations  Group K is best represented in the lower zones of Mound C. It appears in small quantities throughout Mounds B and D (Figs 17, 18).

Distribution: surface collections  This group is present in the majority of the collections. It does not regularly appear with any particular suite of ceramic groups (Fig.19).

Discussion  Group K is represented in all of Mound C. The form is common throughout the surface collections and excavations, indicating that this rather simple bowl form with a restricted orifice was produced over a considerable span of time.

Ceramic Group L (Plate 7g)

Rim forms  44, 45, 46, 47, 48 and 49; 98 rim sherds (Fig.16, Table 6).

Shape  An irregular thickening of the rim area on the exterior and/or the interior is common on this shallow to deep bowl form.

Exterior surface finish  41% in this group have a smoothed finish and 46% are burnished (Table 7).

Rebating  Rebating is found on 49% of the rims (Table 8).
Lip decoration  91% of the lips are plain (Table 9). Incised (Ld 7 = 2%) or channelled (Ld 8 = 2%) grooves, and ridges (Ld 9=2%) are the only relatively common decorative techniques found.

Body decoration  Horizontal channelling (Bd 11 = 13%) and oblique channelling (Bd 12 = 3%) are the commonest forms of decoration in a group where 46% of the sherds are without body decoration (Table 10).

Distribution: excavations  This group is present in virtually all of the zones of Mounds B and C. It is found only in Zone IIIA of Mound D (Figs 17, 18).

Distribution: surface collections  Group L has its strongest representation in the collection from Col.20 (11%). Ceramic Group B (18%) is the most common ceramic group found on this site (Fig.19).

Discussion  This ceramic group is virtually absent from Mound D and is best represented in Mounds B and C. As such it could be considered to be an early to middle mound phenomenon.

Ceramic Group M

Rim forms  42, 52 and 53; 130 rim sherds (Fig.16, Table 6).

Shape  The group is composed of restricted bowls with composite profiles. Shoulders are pronounced and often have a slight flange. Shallow bowls can be easily reconstructed and there are indications that deeper bowls are also present.

Exterior surface finish  33% of the sherds are smoothed and 52% are burnished (Table 7). Polishing is present on 11% of the ceramics.

Rebating  27% of the sherds are rebated (Table 8).

Lip decoration  A single channel (Ld 8 = 10%) is the commonest decoration; however, this area of the vessel is left plain on 80% of the sherds (Table 9).

Body decoration  The body of the vessel is decorated with horizontal channels (Bd 11 = 29%), punctated (Bd 3 = 3%) or left plain (38%). 22% of the sherds are broken at or near the shoulder and only a small portion of the vessel body remains attached to the rim. These sherds were placed in the category 'not observable', since it was impossible to discern not only the mode of decoration, but if indeed they were decorated (Table 10).

Distribution: excavations  Group M is found in every zone of Mound C and scattered throughout Mounds B and D (Figs 17, 18). In this respect it is comparable with Group K, also a restricted bowl form.

Distribution: surface collections  At sites Col.11 and 20 Group M has its highest frequency of occurrence (approximately 6%) in the surface collections (Fig.19). Group K is also found at these sites. However, in a number of surface collections (sites Col.14 and 28, Tro.7 and 21) where Group K is relatively common, Group M is absent. Group K is present on all but one of the Trobriand sites (Tro.1). Group M is not found on the Trobriands.

Discussion  The paucity of Group M sherds in Mound D indicates that its period of greatest use predated this mound's accretion. The surface collections from sites Col.11 and 20 confirm this by the constant association of Group M with ceramics which are best represented in Mound C or the lower zones of Mound B (Groups B, C, E, F, K, R). However, since this group never amounts to as much as 10% of any single excavation zone or surface collection, its placement in time and its relationship to other ceramic groups must be regarded as tentative.
Ceramic Group N (Plate 9a)

**Rim forms** 50 and 51; 73 rim sherds (Fig.16, Table 6).

**Shape** The typical vessel is a hemispherical bowl with a sharp break at the shoulder. The shoulder area is thickened and the rim consists of a short inward projection of the body wall.

**Exterior surface finish** 81% of the sherds are smoothed and 4% are burnished (Table 7).

**Rebating** None (Table 8).

**Lip decoration** 91% of the lips are plain (Table 9). A small fraction is incised (Ld 7 = 4%) or punctated (Ld 2 = 3%).

**Body decoration** 66% of the vessels appear to be without body decoration. A shallow channelling of angular (Bd 41 = 14%) or curvilinear (Bd 43 = 13%) motifs is common (Table 10).

**Distribution: excavations** None (Figs 17, 18).

**Distribution: surface collections** This group is limited to the Trobriand Islands where it is present in sizeable quantities (Fig.19).

**Discussion** See Group O: discussion.

Ceramic Group O (Plate 9b)

**Rim forms** 43; 67 rim sherds (Fig.16, Table 6).

**Shape** A hemispherical bowl comprises this group. The shoulder presents a definite break in the profile which is less abrupt than that found upon Group N vessels.

**Exterior surface finish** Burnishing and polishing are not found on sherds of this group. Virtually all of the vessels have smoothed exteriors (88%), except for 2% which are slipped with a red iron oxide compound. Of the relevant sherds 11% have their exterior eroded to such an extent that the nature of the surface finish is undefinable (Table 7).

**Rebating** None (Table 8).

**Lip decoration** Only four techniques were used to decorate the lips: punctation (Ld 2 = 5%), incision (Ld 4 = 2%), a single channel (Ld 8 = 2%) and notching (Ld 13 = 2%). The remaining 91% are plain (Table 9).

**Body decoration** The use of shallow channels to decorate the body area is common (Bd 40 + 41 + 42 + 43 = 24%). 60% of this group have plain bodies (Table 10).

**Distribution: excavations** None (Figs 17, 18).

**Distribution: surface collections** Group O is limited entirely to the Trobriand Islands and is commonly found on historic sites there (Fig.19).

**Discussion** Groups N and O are products of the northern D'Entrecasteaux Islands and are frequently found on sites ranging from prehistoric to modern. Lauer (1973b, 1974) describes the manufacture of vessels having this same general form and rim profile. The pottery-making community of Buduna, in the northern sector of Goodenough Island, regularly produces vessels having the same form and rim profile as Group N (Lauer 1974:Fig.23). Lauer also describes the production of pottery vessels at Gumawana in the Amphlett Islands. There
Special ceramics: a. Group P, pedestalled vessel with rectangular cutouts in stand and triangular cutouts in labial flange, Col.17 (see Egloff 1973a for drawing); b. Group P, interior of rim with triangular cutouts, Col.31-32; c. unassigned minority ware, small hemispherical bowl with plain lip, shell stamped upper body and triangular cutouts in medial flange, Col.31-32; d. fragment of pedestal, incised angular motif, C/IIIA
the women make a large cooking pot, the nokuno, which has the same rounded shoulder as is characteristic of Group O (Lauer 1974:Fig.23). This in turn is similar to the kaakao (Lauer 1974:185) which was produced and traded to the Trobriand Islands during the early historic period (Lauer 1974:233; Malinowski 1922:284-6). Shallow channelled decorative motifs (Bd 41, 43) are only found on sherds belonging to Group O, Group N and that portion of Group A which was manufactured in the D'Entrecasteaux Islands.

Ceramic Group P (Plates 8a,b,d)

Rim forms 68, 71, 72, 73, 74 and 75; 138 rim sherds (Fig.16, Table 6).

Shape This group consists of shallow bowls with thickened or flanged lips. Only one vessel of this category has been reconstructed. This is a shallow dish on a pedestal. The lip flange is pierced by triangles and the pedestal has rectangular cut-outs (Egloff 1973a:Fig.2).

Exterior surface finish 75% of the sherds are smoothed and only 5% burnished (Table 7).

Rebating Only 5% of Group P is rebated (Table 8).

Lip decoration The thickened or flanged lip area is pierced or impressed with triangles (Ld 24) on 9% of the rim sherds (Table 9). 83% of the sherds have plain lips.

Body decoration Bd 11, 22 and 42 are the only decorative elements applied to the body area and their combined proportion is 2%. 98% of the sherds are plain or fall into the 'not observable' category (Table 10).

Distribution: excavations This group is found in every zone of Mound C (Figs 17, 18). It never amounts to more than 5% of the ceramics in any of the zones of Mounds B, C or D.

Distribution: surface collections In three surface collections Group P amounts to approximately 45% of the sherds (Col.12, Col.31-32 and Tro.2) (Fig.19). It is well represented also on sites Tro.1, 7, 15 and 22.

Discussion It is not possible at this time to associate all the rim forms included in this group with pedestalled dishes; however, the only reconstructable vessel belonging to Group P is pedestalled.

Ceramics with pedestals are morphologically unique in the southwest Pacific. This vessel form is found in Southeast Asia (Chang 1966:Plate IIIb) but has not been recorded in Melanesia. Its striking resemblance to pedestalled wares described by Solheim (1961) as belonging to the Sa-huynh ceramic complex is remarkable. Further speculation upon this fact and the placement of Group P in the ceramic sequence are reserved for later.

Two distinctive sherds were found on sites where Group P ceramics were in the majority. They belong to a composite bowl form with a restricted rim. The shoulder is delineated by a flange which is decorated with impressed triangles. The field above the flange is embellished with a well executed impressed rectilinear design made with the edge of a shell (Plate 8c).

Ceramic Group Q (Plates 9c-f)

Rim forms 60, 61, 62, 63, 64 and 65; 628 rim sherds (Fig.16, Table 6).

Shape This group includes a diverse collection of six rim forms. The commonest form is a shallow bowl with a direct rim; however, some of the bowls are relatively deep and have a composite profile.
Plate 9

Rim sherds: a. Group N, punctated upper body, applied decoration on shoulder and channelled lower body, Tro.28; b. Group Q, Amphlett Island kaokao, Tro.28; c. Group Q, channelled body decoration with shell stamped shoulder, C/II; d. Group Q, burnished and punctated body, B/III; e. Group Q, polished body with shallow channels and punctuation, D/IIIB; f. Group Q, burnished body with punctuation, D/IIIC; g. Group R, tab handle with channelled body decoration, Col.13; h. Group S, plain body with gambeled shoulder, Col.16; i. Group V, burnished body with channelled semicircles, C/IIIA

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Exterior surface finish  The exterior of the vessel is frequently burnished (24%) or polished (6%). 57% of the sherds have a smoothed surface finish (Table 7).

Rebating  Rebating is present on 30% of the sherds (Table 8).

Lip decoration  90% of the rim sherds have undecorated lips and a wide spectrum of decorative elements is found on the remaining 10% (Table 9).

Body decoration  Channelling (Bd 11 + 12 = 16%), punctation (Bd 3 = 8%) and complex combinations of channelling and raised ridges (Bd 38 = 5%) are the commonest of a variety of decorative elements found upon the ceramics of Group Q. 46% of the rim sherds are without body decoration (Table 10).

Distribution: excavations  Group Q is prevalent in Mound B and present to a lesser degree in Mounds C and D. An enigmatic bimodal distribution is a feature of Mound D (Figs 17, 18).

Distribution: surface collections  This group is present on all but one of the surface sites which provided material for this analysis (Fig. 19).

Discussion  The wide range of decorative elements described for the body area, and of rim forms represented, suggests that the group is too diverse to have explicit meaning. This supposition is supported by its distribution throughout the excavations and surface collections. It would appear as if Group Q should be interpreted only in very general terms. The simple bowl form comprising this group has its greatest popularity in Mound B. The open bowl form, specifically RF 61, is one of the shapes currently being manufactured in the Wanigela area.

Ceramic Group R (Plate 9g)

Rim forms  78, 79, 80 and 81; 193 rim sherds (Fig. 16, Table 6).

Shape  The typical form of this group is that of a shallow hemispherical bowl with a labial flange.

Exterior surface finish  52% of the sherds in this group are smoothed, 21% are burnished and a small minority (3%) are polished (Table 7).

Rebating  44% of the rims are rebated (Table 8).

Lip decoration  73% of the lips are undecorated, 5% are punctated (Ld 2), 9% are incised (Ld 3, 4, 7) and 6% are shell impressed (Ld 5, 15) (Table 9).

Body decoration  72% of the sherds are undecorated (Table 10). The commonest form of decoration is a series of horizontal channels (Bd 11 = 8%).

Distribution: excavations  This group, which is present throughout the excavations, has its highest frequency of occurrence in the medial zones of Mound C (Figs 17, 18).

Distribution: surface collections  Ceramics of this group are found on many sites in the Collingwood Bay region and on the Trobriand Islands (Fig. 19).

Discussion  This group clusters in the medial zones of Mound C and has a subdued presence in Mounds B and D.

Ceramic Group S (Plate 9h)

Rim forms  84, 85, 86 and 87; 42 rim sherds (Fig. 16, Table 6).
Shape This is a composite vessel form which is distinguished by the presence of a concave profile between the shoulder and rim.

Exterior surface finish 62% of the sherds are smoothed, 13% are burnished and 6% are polished (Table 7).

Rebating Rebating is present on 30% of the sherds (Table 8).

Lip decoration Five decorative elements are found upon the lip area of this group: notching (Ld 13 = 8%), punctuation (Ld 2 = 3%), ridges (Ld 9 = 3%), shell impressing (Ld 15 = 3%) and incision accompanied by a channel (Ld 20 = 3%). The remaining 80% are plain (Table 9).

Body decoration 74% of the bodies are plain (Table 10). A restricted range of decoration appears on the body area. The most significant of these is a motif consisting of criss-crossed incisions (Bd 34 = 6%).

Distribution: excavations This group constitutes no more than 2% of the ceramics in any single zone (Figs 17, 18). As such it is found primarily in Mound C.

Distribution: surface collections Group S accounts for 13% of the ceramics from Col.16. 53% of the sherds from this site belong to Group J (Fig.19).

Discussion Criss-crossed incisions (Bd 34) are found on sherds belonging to Groups S and J. This sharing of a relatively rare decorative attribute could indicate some form of a relationship.

Ceramic Group T

Rim forms 76 and 77; 105 rim sherds (Fig.16, Table 6).

Shape The bowls belonging to this group have a composite profile and a slightly flanged lip.

Exterior surface finish This group has a high frequency of burnished sherds (59%) and a correspondingly low percentage of smoothed sherds (36%) (Table 7).

Rebating Rebating is present on 41% of the rim sherds (Table 8).

Lip decoration 72% of this group have plain lips, 6% of lips are punctated (Ld 2), 13% have an incised or channelled line (Ld 7, 8) and 6% are notched (Ld 13) (Table 9).

Body decoration The commonest form of decoration is channelling (Bd 11 = 9%), in a group where 80% of the sherds are plain (Table 10).

Distribution: excavations Group T is best represented in the upper deposits of Mound C (Figs 17, 18). It is scattered in small quantities throughout Mound B and entirely absent from Mound D.

Distribution: surface collections Sherds of this group are seldom found in the surface collections and when present never constitute more than 3% of the sherds from any given site (Fig.19).

Discussion Of all the contexts in which this group is found, only in the upper zones of Mound C does it amount to more than 5% of the ceramics.

Ceramic Group U

Rim form 66; 118 rim sherds (Fig.16, Table 6).
Shape  The single basic form which this group includes is that of a hemispherical bowl with a lip which is markedly thickened on the exterior.

Exterior surface finish  10% of the sherds are polished, 36% are burnished and 46% are smoothed (Table 7).

Rebating  Rebating is present on 45% of the rim sherds (Table 8).

Lip decoration  The majority of the lips in this group are undecorated (88%), with applied dots (Ld 11 = 3%) and chanelling (Ld 8 + 18 = 6%) being the commonest form of decoration (Table 9).

Body decoration  Bd 39, a motif consisting of wavy shell-edge impressions, is found on over 4% of the sherds. Many of the sherds of Group U are plain (59%). Incision (Bd 4 = 11%) or chanelling (Bd 10 + 11 = 12%) are often encountered (Table 10).

Distribution: excavations  This group has its strongest representation in the middle to upper zones of Mound B (Figs 17, 18). Only a few sherds were recovered from Mounds C and D.

Distribution: surface collections  Group U is found in small amounts on many of the Collingwood Bay sites and on two of the Trobriand Island sites (Fig. 19) but never accounts for more than 5% of the ceramics in any collection.

Discussion  Group U is best represented in the middle to upper zones of Mound B; however, it is present in only one zone of Mound D. Since the upper zones of Mound B and most of Mound D have a similar content of ceramic groups, the contrary distributional pattern of this group is striking.

Ceramic Group V (Plates 9i, 10a)

Rim form  82; 209 rim sherds (Fig.16, Table 6).

Shape  This group is composed of hemispherical bowls with a small exterior flange or ridge just below the lip. Often there is a very slight shoulder no more than 1-2 cm below the lip.

Exterior surface finish  The exterior of the vessels is well finished and polishing is common (20%). A fine burnishing was applied to 37% of the sherds and 34% are smoothed (Table 7).

Rebating  50% of the rim sherds are rebated (Table 8).

Lip decoration  89% of the lips are undecorated (Table 9). Punctuation (Ld 2 = 3%) and a small ridge (Ld 9 = 5%) are the main elements used.

Body decoration  70% of the vessels have plain bodies (Table 10). Punctuation (Bd 3 = 8%) is relatively common and various channelled motifs are also present (Bd 11 = 4%, Bd 21 = 4%, Bd 29 = 3%). 2% of the sherds have a wide channel just below the lip area (Bd 10).

Distribution: excavations  Group V sherds were recovered from the upper zones of Mounds B and C and particularly from Mound D (Figs 17, 18).

Distribution: surface collections  Group V ceramics were not found on the Trobriand Islands (Fig.19). In Collingwood Bay this group is found on five sites (Col.3, 10, 19, 26, 27). These sites are dominated by pots belonging to Group D, Group EE and for all but Col.3, Group G.

Discussion  The data from the excavations place Group V towards the terminal end of the mound sequence.
Plate 10  Rim sherds: a. Group V, plain body with shell stamping on outer rim area, C/II; b. Group W, polished and channelled body, B/IIB; c. Group X, channelled body decoration with large handle, Col.13; d. Group X, channelled decoration with shell stamping on outer rim, C/Feature 1; e. Rim form 90, large hemispherical bowl with channelled decoration and large lug handles, C/IVA
Ceramic Group W (Plate 10b)

**Rim forms** 96, 102 and 105; 58 rim sherds (Fig.16, Table 6).

**Shape** This group is a distinctive series of large composite bowls with vertical walls and pronounced shoulders.

**Exterior surface finish** The exteriors of the vessels are well formed and finished (Table 7). Polishing (23%) and burnishing (39%) are extensive. 37% of the ceramics are smoothed.

**Rebating** Rebating is found on 76% of the vessels (Table 8).

**Lip decoration** Only two forms of lip decoration are found on Group W ceramics: punctation (Ld 2 = 6%) and channelling (Ld 8 = 15%). The remaining 80% are plain (Table 9).

**Body decoration** The majority are decorated, only 12% of the vessels having plain bodies (Table 10). Horizontal channelling (Bd 11) is the dominant decorative element (26%).

**Distribution: excavations** Group W is strongly represented only in upper zones of Mound B (Figs 17, 18).

**Distribution: surface collections** The distribution of Group W is similar to that already described for Group V (Fig.19).

**Discussion** Like Group U, the strong presence of W in upper Mound B and its weak occurrence in Mound D contrast with the normal ceramic relationship of these deposits.

Ceramic Group X (Plates 10c,d)

**Rim forms** 98 and 100; 56 rim sherds (Fig.16, Table 6).

**Shape** The large and robust bowls of this group have marked shoulders, heavily reinforced rims and a large orifice radius (average is 18.03 cm). Four to six handles are found on some of the vessels. The handles consist of large, roughly triangular lugs, single or paired. When paired, they are joined at the apex of the triangle and form a strap which usually extends from lip to shoulder (see Appendix 5, Fig.21, Class XIV). Not every vessel has appendages constructed in this fashion. Some of the handles are not paired but single triangles and in this form resemble lugs.

**Exterior surface finish** 53% of the sherds are smoothed, 21% are burnished and 13% are polished (Table 7).

**Rebating** Rebating is present on 58% of the rim sherds (Table 8).

**Lip decoration** 55% of the lips are plain, 11% are punctated (Ld 2) and 9% are channelled (Ld 8) (Table 9). A variety of other decorative elements is found on the lips of this group (Ld 15 = 6%; Ld 3 = 4%; Ld 9 = 4%; Ld 10 = 3%; Ld 5 = 2%; Ld 7 = 2%; Ld 12 = 2%; and Ld 21 = 2%).

**Body decoration** Only 11% are plain and the commonest decorative elements are: punctation (Bd 3 = 7%), simple channelling (Bd 11 + 12 = 33%), wide channelling (Bd 9 + 10 = 16%) and complex channelled motifs (Bd 14, 17, 18, 19, 30, 37 and 38 = 29%) (Table 10).

**Distribution: excavations** Group X is found scattered throughout Mounds B, C and D (Figs 17, 18).
Plate 11  Rim and body sherds: a-d. sherds collected by C. Key and D. Songer at Eroro Mission, Dyke Ackland Bay, Papua; e. and f. sherds belonging to Lauer's (1970b) PRL7 classification, Tro.21 and 22


**Distribution: surface collections**  When present in the surface collections, Group X sherds are always a decided minority (Fig.19).

**Discussion**  The decorative elements present on Group X vessels are not particular to this group but are found on ceramics belonging to other groups. The specific placement of Group X within the mound tradition is ambiguous due to its scattered distribution within Mounds B, C and D. Group X is similar to Group W in having the form of a compositely walled hemispherical bowl. In the excavations both groups are strongest in Mound B.

Ceramic Group Z

**Rim forms**  All rim forms which have not previously been assigned to a specific ceramic group are placed in this category: 694 rim sherds or 11% of the ceramics analysed.

**SUMMARY**

The ceramic analysis began with the definition of a series of guidelines and the selection of the sherds to be studied. To some extent both of these actions were predetermined. The goal of the analysis had to be an empirical detailed ordering of the material. This was necessitated by the fact that at that time no prehistoric ceramic material from Papua had ever been described in detail. Thus no previous study could be used to order the ceramics and thereby circumvent the tedious procedure of constructing a classification. The sample of sherds was derived from the only shipment of specimens which had managed to reach the laboratory within six months of my leaving the field.

After the attributes were defined and their distribution charted, the 115 rim forms were clustered by a proximity index. The procedures involved combining rim forms into ceramic groups on the basis of their sharing common attributes in like proportions. The attributes used were rebating, exterior surface finish, lip decoration and body decoration. This entire process was no mean task and even with the aid of the computer took two months.

Eighty nine percent of the sherds were placed into 25 ceramic groups. The remaining small sherds and unique forms were assigned to Group Z. The groups defined and described, when viewed as a whole, synthesise the range of variation found within the sherd sample. Most of the ceramic groups have a mean orifice radius of 13-15 cm (Table 6) with the largest being 19.10 cm (Group P) and the smallest 12.33 cm (Group G). Burnishing is frequent and often intensive on some bowl forms (Groups K, L, M, T, U, V and W); however, a smoothed exterior surface finish is more common within the entire sample (Table 7). Rebating is extremely specific and almost absent from some groups (Group A 1X, Group P 5%) while dominating others (Group B 73%, Group I 81% and Group W 76%).

The groups made up of pot and jar forms can be represented as a continuum ranging from globular pots (Group D) at one end to relatively straight-sided jars (Group B) at the other. The open and restricted bowl forms are placed into groups which are characterised by the shoulder profile and the degree of modification found upon the lip area. The pot and jar forms (Groups B to J) frequently have decorated lips while a high proportion of the bowl forms are plain. Body decoration varies from group to group with channelling and punctuation being the most popular elements. Motifs are restricted to fairly simple curvilinear and rectilinear patterns.

Certain ceramic groups have been designated as marginal or unrelated to the basic Collingwood Bay ceramic tradition. Groups N and O are restricted spherical vessels belonging to the D'Entrecasteaux tradition. This tradition appears to be related to the modern Wanigela industry through the spherical vessel form (Group A) which is common to both. The second peripheral cluster of groups (J, P and S) has been tentatively associated with the pedestalled bowl (Group P) by virtue of shared decorative attributes, a common occurrence on specific surface sites and a distribution in the excavations which is limited primarily to a scattered appearance in Mound C.
VI  IMPLICATIONS OF THE CERAMIC ANALYSIS

From the data set out in Chapter V two major divisions can be isolated with regard to the distribution of the ceramic groups. Groups which are frequently found in the excavations and surface collections belong to the first division. The second division includes groups that are present in the surface collections and weakly represented in or absent from the excavations:

1. Groups N and O which are D’Entrecasteaux wares and restricted to the Trobriand Islands.
2. Group A, with a D’Entrecasteaux subgroup limited to the Trobriand Islands and a Wanigela subgroup representing the recent pottery industry and as such confined to the mainland.
3. Groups like J, P and F which are found in quantity on some surface sites and account for only a small proportion of the sherds from the excavations.

THE EXCAVATED MOUNDS

The ceramic groups belonging to the first of these divisions can be discussed with regard to their distribution in the stratified excavations. The distribution of the ceramic groups is presented in graphical form (Figs 17, 18) and the following interpretation of these groups could be advanced.

Mound C

There is a continuous and consistent trend through the deposits of Mound C, whereby an initial preference for relatively straight-sided jars (Groups B, C and I) is reversed by the growing popularity of vessels with a form intermediate in the continuum that ranges from globular pots at the one end to straight-sided jars at the other. The shift has its greatest impact upon the straight-necked groups with abrupt and short rim eversion (Groups B and C). Group EE acts contrary to this major trend and actually declines in popularity. Group G, an intermediate jar form that is neither globular nor straight-sided, is found throughout the mound. However, Groups E and F, which can also be classified as intermediate, are strongest in the middle to basal zones.

The full range of bowl forms is present in Mound C, although none of them dominates the deposit. Restricted bowls in the form of Groups K and M are found throughout the mound, while open bowl forms, when present in significant numbers, cluster towards the middle (Group R) or towards the top (Groups T, V and perhaps Q). Figure 21 (Appendix 5, Class XIV) indicates that the small quantity of large lug handles present in Mound C decreases through time and that tab handles appear as a minority throughout the deposit.

Mound B below Zone IIB

The lower zone of Mound B (IVB) is more closely linked with Mound C deposits than it is with the rest of Mound B. A number of considerations links Zone IVB convincingly with the whole of Mound C and particularly with the lower zones.

1. The greater popularity of straight-sided jars as against globular pots is evident. This is especially noticeable with respect to Group D, a globular pot which is found in significant numbers throughout Mound B and is all but absent from Zone IVB.
2. Open and restricted bowl forms are present, but not to the degree which is evidenced throughout the other zones of the mound.
3. The zones above IVB, up to and including II C, represent an intensification of the trends developing in Mound C. Upwards through Mound B the globular
pot replaces not only the straight-sided forms (Groups B, C and I) but also the intermediate forms (Groups E, F and G). Only Group G continues to be of some importance and this is considerably diminished. Of the globular forms it is Group D which is dominant.

The full range of bowls is present and, as distinct from Mound C, open bowls are better represented than restricted forms. Group Q is the most significant open bowl and is followed in importance by Groups V and W. Tab and lug handles are rarely encountered (Appendix 5, Fig. 21, Class XIV).

Mound D

The trends established in Mounds B and C are amplified in Mound D (Fig. 18). Straight-sided jars (Groups B, C and I) are all but absent and only Group G of the intermediate forms is present. Group G exhibits a marked decline in the upper zones from relatively high values at the base. Globular vessels (Groups D and EE) are common within the restricted range of ceramic groups found in Mound D. Of the bowl forms, Groups Q and V are the only significant groups. Other bowl forms are of little importance and appendages are virtually absent (Appendix 5, Fig. 21, Class XIV).

Mound B above Zone IIC

The uppermost zones of Mound B (I, IIA, IIAB and IIB) are contrary to the trends established by the basal and medial zones. This is apparent in the sudden increase of Groups C and G at the expense of the globular vessels of Group D and to a lesser degree with the reappearance of Group B and the slightly increased popularity of the bowl forms belonging to Groups K, L and M.

The distribution of the ceramics would indicate that earlier material has been redeposited in a late context. Not all of the material in these zones needs to be regarded as redeposited, only enough to offset the established trends. The distribution of the attributes and ceramic groups within the upper zones of Mound B was not noticeably changed when sherd size was taken into consideration (Figs 17, 18 and Appendix 5, Fig. 21). The inability of the newly developed 'percentage factor' technique to recognise this redeposition could have been based in a faulty operating hypothesis which stated that sherd size was reduced during redeposition. Although this is probably true, it need not be the major factor in size reduction. Intensive activity on the surface of a deposit would probably reduce sherd size more rapidly than the act of transporting trash from one location to another. Zone I of Mound B has a considerably reduced sherd size since it has lain open for a long period of time without the protective cover of a superimposed zone. Thus, post-depositional disturbances, perhaps gardening, have reduced the sherds to a uniform small size. The 'percentage factor' may not have been acute in defining redeposition due to the fact that many of the rim sherds probably reached a 'minimum' size early in their depositional history. As a descriptive device the 'percentage factor' undoubtedly has its utility. The ability to describe in a fairly precise fashion the size of the sherds being analysed and estimate the minimum number of vessels of that type in the sample is a significant advance over the traditional method of counting the number of rim sherds.

Chronological Considerations

If we rank the radiocarbon dates derived from the excavations in terms of their central value, we see that they can be fitted harmoniously with the pattern elucidated in the preceding discussion of the distribution of the ceramic groups. Table 11 outlines the proposed order of the excavated zones. Following the proposed scheme, Mound C would represent an early occupation which continued uninterrupted through the history of the mound. Mound B is more complex in that the occupation does not appear to have been continuous and the upper zones (I, IIA and IIB) consist in part of redeposited material.
Thus the mound can be divided into three units. The basal unit, Zone IVB, is considered as being contemporary with Mound C and clearly distinct in content from the adjacent Zone IVA. The second unit includes Zone IVA and those zones and features which lie above it but below Zone IIB. This unit represents a later occupation, probably subsequent to that of Mound C. Suspected redeposited material has contaminated the third and uppermost unit of Mound B. All of the zones above Zone IIC would fall into this category. Early radiocarbon dates (ANU-371A and B) were determined for charcoal removed from a large fragmented sherd recovered from Zone IIA. Mound D would then be the youngest deposit, having Zones IIA-IIIC conformable with Zones IIC and III and Features 1 and 4 of Mound B.

This synchronisation of the distributional data from the ceramic groups and the radiocarbon dates would then support the later occupation of Mound B, in part coeval with Mound D, and the earlier position of Mound C. However, serious objections can be raised against this reconstruction. Two age determinations on the same sample (ANU-371A and B) overlap only at two standard deviations. Following the practice recommended by Polach and Golson (1966:15-23), which stresses the necessity of operating with respect to two standard deviations, we see that all of the dates from Mounds C and D overlap. This means that in terms of the recommended interpretation of the radiocarbon dates, the proposed most recent deposit of Mound D is in fact indistinguishable from the earlier deposit of Mound C.

The proposed relationship between Mounds B and C states that Zone IVA of Mound B is distinct and later in formation than the basal zone (IVB). This would then require a period of abandonment following the formation of Zone IVB and a later period of development which was initiated in Zone IVA at a time following the termination of Mound C. Presumably, if the period of abandonment was of any duration, a break in the stratigraphy would have been apparent. However, there was no visible break in the stratigraphy and the zonation was entirely arbitrary. In both zones the sherd size is large (Appendix 5, Fig.21, Class III) and this would argue against any extensive abandonment of Zone IVB. A stabilisation of the surface of Zone IVB, while a nearby mound was a centre of activity, would have resulted in the exposure of the surface to conditions adverse to the preservation of large sherds. Thus sherds should have been reduced to a size comparable with the ceramics found in Zone I of Mound B. However, this was not the case since the sherds found in Zones IVA and IVB were relatively large and well preserved.

<table>
<thead>
<tr>
<th>Mound B</th>
<th>Mound D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IIA</td>
</tr>
<tr>
<td>IVB</td>
<td>IIB</td>
</tr>
<tr>
<td>IVA</td>
<td>IIIB</td>
</tr>
<tr>
<td>IVC</td>
<td>IIIC</td>
</tr>
<tr>
<td>IVD</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>880 ± 60</td>
</tr>
<tr>
<td>II</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td></td>
</tr>
<tr>
<td>IIIA</td>
<td>770 ± 90</td>
</tr>
<tr>
<td>IIIB</td>
<td>670 ± 235</td>
</tr>
<tr>
<td>IVA</td>
<td></td>
</tr>
<tr>
<td>IB</td>
<td>600 ± 80</td>
</tr>
<tr>
<td>IIIC</td>
<td>650 ± 120</td>
</tr>
<tr>
<td>IIIB</td>
<td>510 ± 120</td>
</tr>
<tr>
<td>IIIC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>(suspected</td>
<td></td>
</tr>
<tr>
<td>redeposited</td>
<td></td>
</tr>
<tr>
<td>zones)</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>1240 ± 145</td>
</tr>
<tr>
<td>II</td>
<td>810 ± 100</td>
</tr>
</tbody>
</table>

Table 11 Mounds B, C and D: correlation of zones (roman numerals), features (arabic numerals) and radiocarbon dates
With a closer inspection of the ceramic distribution, further arguments can be offered against the proposed chronological ordering of the mounds. Certain ceramic groups reappear or are clustered in embarrassing contexts when Mound C is compared directly with Mound B. Group C disappears in the upper zones of Mound C, to re-enter the sequence in Mound B. This can be accounted for in part by proposing an upward movement of sherds from the considerably earlier Zone IVA into the more recent Zones IVA, III and IIC of Mound B. Group H is a firm block in the upper zones of Mound C and all but absent from Mound B. Group EE is present initially in Mound C, disappears in the upper zones and obtains its highest degree of popularity in Mound D.

Similar confusing distributions can be seen regarding Mounds B and D. Group W is all but absent from Mound D but present in the upper units of Mound B. In Mound D the total absence of Groups B and T and near absence of Groups U, J, L and E, after their persistent presence in Mound B, speaks for some degree of differentiation between these mounds.

Some of these differences may be due, where a minority ware is concerned, to sampling hazards which would be particularly acute when considering the small number of sherds from Mound D. The structure of the ceramic groups could be affecting the comparisons, since some groups are not as tightly knit as others. However, it is doubtful if any minor reconstruction of the ceramic groups would alter the significant trends.

Non-chronological Considerations

The chronological factor may not be the only agency operating on the differentiation and distribution of the ceramic groups. Earlier, two models were described with regard to the faunal remains from Mounds B and C. The first of these proposed an ordering which placed Mound B later in time than Mound C and was referred to as the temporal model. In apparent opposition to this a second was constructed, the sociological model. The operation of this factor is most obvious in the sphere of vessel decoration. This has been detailed in the discussion of the ceramic attributes. Shell stamping was shown to be commonest in Mound C, as opposed to punctation and linear incision which assumed a contrary distribution and clustered in Mound B. Although this dichotomy existed between the deposits as a whole, it was not strongly developed in the basal zones.

An apparent contradiction to this dichotomy is presented by the distribution of Ceramic Group D, a globular vessel form. Punctation and incision are the most characteristic forms of lip decoration found in this group and shell stamping is a minority element (Table 9). Yet this group is found in all but one zone of Mound C (Fig. 18). The major elements of lip decoration were charted for this group to see whether the sherds were similarly or differently decorated when found in one or the other mound. At the same time, Group G, which is better represented in Mound C than Group D and has a higher proportion of shell stamping, is looked into in the same way.

The differential distribution of Ld 2, 3 and 5, as presented in Table 12, is of such a magnitude that the probability of its occurring by chance is extremely low. The entire collection of Group D sherds has 31% punctation (Ld 2) and 26% broken line incision (Ld 3) upon the lip area. In Mound B the combined total is 64% as opposed to 9% in Mound C. On the other hand, 4% of Group D lips have shell-stamped decorations (Ld 5, 15). Only 1% of the sherds in Mound B are decorated in such a fashion, while these elements are found on 19% of the Group D sherds from Mound C. Mound C has many more undecorated lips in Group D (54%) than has Mound B (21%).

These differences between the two mounds are amplified by the distribution of the decorative elements of Group G. Overall, 19% of the lips are decorated with punctation (Ld 2) and broken line incision (Ld 3) and 14% with shell stamping (Ld 5, 15). Mound B has 46% of the former category and 6% of the latter; Mound C has 2% and 23% respectively.

A second table was prepared to investigate whether or not the consolidated totals masked an increasing trend over time which resulted in the replacement of shell stamping by punctation and incision. This would be required to support the temporal explanation of the differences between the two mounds.
### Ceramic Group D

<table>
<thead>
<tr>
<th></th>
<th>Mound B</th>
<th>Mound C</th>
<th>All sherds of the group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ld 1 plain lips</td>
<td>21</td>
<td>54</td>
<td>25</td>
</tr>
<tr>
<td>Ld 2 punctuation</td>
<td>27</td>
<td>4</td>
<td>31</td>
</tr>
<tr>
<td>Ld 3 broken line incision</td>
<td>37</td>
<td>5</td>
<td>26</td>
</tr>
<tr>
<td>Ld 4 oblique incision</td>
<td>5</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Ld 5 shell stamping</td>
<td>1</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Ld 15 shell stamping</td>
<td>—</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

### Ceramic Group G

<table>
<thead>
<tr>
<th></th>
<th>Mound B</th>
<th>Mound C</th>
<th>All sherds of the group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ld 1 plain lips</td>
<td>34</td>
<td>58</td>
<td>50</td>
</tr>
<tr>
<td>Ld 2 punctuation</td>
<td>33</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Ld 3 broken line incision</td>
<td>13</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Ld 4 oblique incision</td>
<td>11</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Ld 5 shell stamping</td>
<td>3</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>Ld 15 shell stamping</td>
<td>3</td>
<td>10</td>
<td>6</td>
</tr>
</tbody>
</table>

**Note:** The sum of the columns may not equal 100% since all classes of lip decoration have not been included.

---

**Table 12**  Mounds B and C: percentage distribution of certain classes of lip decoration on vessels of Ceramic Groups D and G

### Ceramic Group D

<table>
<thead>
<tr>
<th>Mound B</th>
<th>Ld 1</th>
<th>Ld 2</th>
<th>Ld 3</th>
<th>Ld 4</th>
<th>Ld 5</th>
<th>Ld 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone I</td>
<td>22</td>
<td>22</td>
<td>28</td>
<td>9</td>
<td>3</td>
<td>32</td>
</tr>
<tr>
<td>Zone II A</td>
<td>19</td>
<td>33</td>
<td>42</td>
<td>2</td>
<td>—</td>
<td>42</td>
</tr>
<tr>
<td>Zone II B</td>
<td>23</td>
<td>38</td>
<td>26</td>
<td>4</td>
<td>2</td>
<td>47</td>
</tr>
<tr>
<td>Zone II C</td>
<td>16</td>
<td>40</td>
<td>36</td>
<td>4</td>
<td>—</td>
<td>25</td>
</tr>
<tr>
<td>Zone III</td>
<td>23</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>—</td>
<td>31</td>
</tr>
<tr>
<td>Zone IV A</td>
<td>25</td>
<td>11</td>
<td>36</td>
<td>—</td>
<td>3</td>
<td>36</td>
</tr>
<tr>
<td>Zone IV B</td>
<td>25</td>
<td>—</td>
<td>50</td>
<td>25</td>
<td>—</td>
<td>4</td>
</tr>
</tbody>
</table>

### Mound C

| Zone I  | 45   | 2    | 14   | 10   | 18   | 6     |
| Zone II | 52   | 9    | —    | —    | 9    | 21    |
| Zone III A | 50  | —    | —    | 19   | 19   | 6     |
| Zone III B | 85  | 14   | —    | —    | —    | 7     |
| Zone III C | 80  | —    | —    | 20   | —    | 5     |
| Zone IV A | 71   | 5    | —    | 10   | 10   | 21    |
| Zone IV B | 50   | 5    | —    | 10   | 15   | —     |
| Zone IV C | 57   | 7    | —    | 7    | —    | 14    |

### Ceramic Group G

<table>
<thead>
<tr>
<th>Mound B</th>
<th>Ld 1</th>
<th>Ld 2</th>
<th>Ld 3</th>
<th>Ld 4</th>
<th>Ld 5</th>
<th>Ld 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone I</td>
<td>17</td>
<td>—</td>
<td>17</td>
<td>10</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Zone II A</td>
<td>47</td>
<td>16</td>
<td>10</td>
<td>10</td>
<td>—</td>
<td>19</td>
</tr>
<tr>
<td>Zone II B</td>
<td>22</td>
<td>22</td>
<td>33</td>
<td>11</td>
<td>—</td>
<td>9</td>
</tr>
<tr>
<td>Zone II C</td>
<td>20</td>
<td>60</td>
<td>10</td>
<td>—</td>
<td>—</td>
<td>10</td>
</tr>
<tr>
<td>Zone III</td>
<td>35</td>
<td>35</td>
<td>12</td>
<td>18</td>
<td>—</td>
<td>17</td>
</tr>
<tr>
<td>Zone IV A</td>
<td>32</td>
<td>11</td>
<td>16</td>
<td>21</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>Zone IV B</td>
<td>37</td>
<td>—</td>
<td>12</td>
<td>25</td>
<td>—</td>
<td>8</td>
</tr>
</tbody>
</table>

### Mound C

| Zone I  | 47   | —    | —    | 5    | 26   | 5     |
| Zone II | 35   | —    | —    | 18   | 18   | 11    |
| Zone III A | 35  | —    | 6    | 9    | 20   | 24    |
| Zone III B | 75  | —    | —    | 7    | 7    | 4     |
| Zone IV A | 77  | 5    | —    | 5    | 5    | 5     |
| Zone IV B | 93   | 3    | —    | 3    | —    | 31    |
| Zone IV C | 77   | 5    | —    | 5    | 5    | 9     |
| Zone IV D | 86   | 7    | —    | 7    | —    | 15    |

**Note:** The sum of the rows may not equal 100% since not all classes of lip decoration have been included.

---

**Table 13**  Mounds B and C: percentage distribution of certain classes of lip decoration on vessels of Ceramic Groups D and G by zone
Table 13, although derived from a small proportion of the total sherdage, fairly convincingly illustrates that this trend does not exist. Punctuation on Groups D and G is actually strongest in the basal zones of Mound C and shell stamping does not diminish through time within the mound.

Thus to some extent both the temporal and sociological models are supported by the ceramic analysis. The basic difference between the two models rests in the relationship of Mound B to Mound C. The sociological model would consider the greater part of their accretion to have been coeval while the temporal model stresses their separation in time. Neither model renders invalid the basic trends established in the ceramic analysis. These were defined in terms of globular vessels replacing straight-sided jars, open bowls supplanting restricted bowls and a diminishing occurrence of appendages. These changes were initiated in Mound C and intensified in Mounds B and D.

THE SURFACE SITES

The surface collections were ordered by applying the Brainerd (1951) and Robinson (1951) technique. Robinson's coefficient of agreement was arrived at by taking pairs of sites and adding the differences between the percentages of each ceramic group and subtracting the sum from 200. The agreement coefficients were arrayed in a matrix. Ordering of the matrices was done by considering the most similar neighbours of each unit in turn and arranging them in a linear sequence (Renfrew and Sterud 1969). These procedures were applied first to the Collingwood Bay surface collections and secondly to the material from the Trobriand Islands. The matrices have not been presented due to their large size. They remain in the archives of the Department of Prehistory, ANU.

The all too frequent incorrect application of seriation in the ordering of surface collections has been discussed at length (Dunnell 1970; McNutt 1973). Seriation, as it is used within this study to order the Collingwood Bay and Trobriand Islands' collections, would appear to be correctly applied in that there is recourse to an excavated sequence which serves as a check against any major disorder being incorporated in the sequence.

The Collingwood Bay Region

Surface collections from the Collingwood Bay region, when treated as described above and seriated, separate into four units (Fig. 19). The ordering within the units was controlled by the correlation index and the actual sequence of the units was determined by considerations which emphasise the distribution of the ceramic groups belonging to the second major division. The second division, as discussed earlier, is composed of those ceramic groups which are found in the surface collections and weakly represented or absent in the excavations.

On the mainland, Group A consists of spherical pots of a type and with a decoration similar to wares presently being made in Wanigela. The group can then be used to define the modern end of the Collingwood Bay sequence, i.e. Col.25, (Fig. 19).

Group F, which includes at least some pedestalled bowls, and Group J although poorly represented in the mounds, are nevertheless present and exhibit a pattern of diminishing occurrence through Mound C and into Mound B. The case can be made that the three collections, Col.12, 16 and 31-32, having large amounts of these ceramics are early in the sequence (Fig. 19).

The distribution of the ceramic groups which were well represented in the mound excavations established certain trends. The sequence derived from the mounds detailed an early popularity of straight-sided jars giving way to globular pots and an early equality of open and restricted bowls shifting to a later preference for open bowls. These same trends are present in the sequence from Col.20 at the base to Col.3 at the top (Fig. 19).

The Trobriand Islands

As distinct from the Collingwood Bay exercise, an uninterrupted linear
sequence emerged in the ordering of the collections by applying Robinson's correlation index (Fig. 19). Two sites, Tro.21 and 28, could be readily placed at the modern end of the sequence; both are historically attested and pottery collections made there emphasise vessel forms N and O which form part of the ethnographically known D'Entrecasteaux tradition. Tro.1 and 2, the collections made near the large stone groups, then fell at the early end of the continuum. These collections contain a high proportion of Group P ceramics, thus confirming the placement of sites where this group is common at the early end of the Collingwood Bay sequence.

A further observation involves the apparent continuity that exists in the Trobriand Islands as opposed to the disjointed Collingwood Bay sequence. This continuity in the Trobriand Islands could be a factor of certain sites being occupied for a considerable period of time and actually bridging what could be interpreted as discrete ceramic phases in the Collingwood Bay sequence.

THE CERAMIC PHASES

The surface sites, when considered in the light of the ceramic sequence established by the excavations, can be discussed as representing four major phases.

Early Ceramic Phase

The earliest block of sites on the mainland, Col.12, 16 and 31-32, are difficult to handle, with the high proportion of Group P ceramics on Col.12 and 31-32 and the large quantities of Group J on Col.16 (Fig. 19). Both of these ceramic groups are poorly represented in the other collections from the mainland and have a limited distribution in Mound C and a sporadic occurrence in Mound B. Group J is somewhat better represented in the mounds and surface collections. To some extent Groups P and J display an early and regular pattern of decreasing popularity through the mounds. This might suggest that they represent wares which were popular at a time prior to the formation of the mounds and only their terminal stage is represented in the excavations. It is possible to consider Groups J and P as being some of the earliest known pottery from this region of Papua and to some degree apart from the later tradition which was dominant during the formation of the mounds. Group S was shown to be decorated with criss-crossed incisions (Bd 34) and in this respect related to Group J (Table 10). Since Group S is a minority ware, it is difficult to use distributional data to support this proposed relationship. Nevertheless, Group S is best represented on site Col.16 where more than 50% of the ceramics belong to Group J.

On the Trobriand Islands, Groups J and S are poorly represented, while Group P is present in significant numbers on the earlier sites. Group P is gradually replaced through time by Collingwood Bay ceramics belonging to Groups D, F and H and a progressively increasing quantity of Groups A, N and O of the D'Entrecasteaux tradition. The latter dominate and completely supplant the mainland ceramics in the later stages. Through all but the earliest stages of the Trobriand sequence, Groups N and O of the D'Entrecasteaux tradition are found on the same sites as Group P. Group P ceramics are also found in the immediate vicinity of the stone arrangements (Tro.1 and 2).

The only sites in the Collingwood Bay region with significant proportions of Group P ceramics, Col.12 and 31-32, have been redeposited by the Murin River. Any precise statement concerning the nature of the collections is hazardous. The largest and most reliable collections containing Group P ceramics are from Mound C. The degree to which the pedestalled Group P wares are distinct from the better represented mound ceramics is poorly understood. It could be argued that Groups J and P, when found in the excavations, were redeposited from an earlier phase of occupation. Most of the sherds found in the excavations are small and only one fragmented pedestal was found in the mounds and it cannot be associated with a specific rim form (Plate 8d).
Expansion Phase

A block of ten sites on Collingswood Bay (Col.6, 8, 11, 13, 14, 15, 18, 20, 21 and 28) and four sites on the Trobriand Islands (Tro.3, 24, 25 and 26) follow the Early Ceramic Phase, with sites Tro.22, 15 and 7 occupying a transitional position (Fig.19). Groups D, G and H are present, but Group F is the most popular pot form. Except for Group D, which is a globular vessel with a gently everted rim, these groups belong to the intermediate style that lies midway in form between the globular and the straight-necked jars. During this phase D'Entrecasteaux wares, Groups N and O, assume an increasing importance in the collections from the Trobriand Islands. A variety of bowl forms is present on both the mainland and Trobriand sites, but the restricted form, Group K, and the open form, Group Q, are more prominent in both regions.

We are faced with a major problem when trying to relate these sites to the sequence established by the excavations. Group F is important in the collections, but in the excavations it is a minority and as such is strongest in the lower half of Mound C (Fig.18). Two complex body decorations, Bd 37 and 38 (Appendix 4, Fig.20), combining channelling, punctation and raised ridges, are found upon sherds belonging to Groups F, H, K and X (Table 10). These motifs are well represented on sites Col.6, 8, 10, 11, 13, 15, 18, 21 and 28 on the mainland and sites Tro.3, 7, 24, 25 and 26 on the Trobriand Islands. More than 16% of the recorded body decoration for each of these sites is Bd 37 and 38. The Collingswood Bay pottery found in the burial caves on the Trobriand Islands is in many instances decorated with flamboyant designs, some of which are variations of Bd 37 and 38 (Austen 1939:49-52; Egloff 1973a: Plate IVb). Yet not a single example of these decorative elements was found in the sample of sherds which was analysed from the excavations.

The incidence of punctation and incision on the lip, body and shoulder area can be considered to be indicative of a class of ceramics associated with Mounds B and D. On the other hand, shell stamping is regarded as an attribute which is particular to Mound C. All of the surface collections, except for Col.13 and 14 and Tro.22, have very few sherds decorated with shell stamping. The collection from Col.13 has the highest ratio of shell stamping to punctation and broken line incision (1:2).

Again we are faced with explaining the distribution of ceramic groups in terms of temporal or sociological factors. Either these ceramics with their relatively exclusive decorative features were manufactured by a different ceramic centre from that which produced the ceramics excavated in the middens, or they were made at a time earlier than that represented in the basal zones of Mound C. If they are earlier, we have a widespread distribution of sites belonging to a single related phase of prehistory which speaks for an expansion of settlement in the Collingswood Bay region and a continuation of interaction between the mainland and the Trobriand Islands.

Placing these sites earlier in time than Mound C does not present any problems in the interpretation of the mainland sites; however, it means that a break must have occurred between Tro.26 and Tro.28 (Fig.19). The latter is an historic site and completely devoid of mainland ceramics. Therefore the break would be expected to have been in the order of at least 700-800 years, i.e. before AD 1000 to AD 1700-1800, unless we propose the unlikely situation that sites Tro.26 or 28 were inhabited for 1000 or more years and bridge the phases. The trends established for the D'Entrecasteaux wares in the earlier sites continue through the sequence uninterrupted from Tro.2 to Tro.22. The complete replacement in the sequence of the mainland wares, at a point between Tro.26 and 28, indicates that some form of significant change had taken place, but not necessarily a gap of hundreds of years when pottery was not being traded with the Trobriands.

The strongest single factor relating the mound sequence to the Expansion Phase is that within the two the ceramics belonging to the Early Ceramic Phase diminish to insignificance and there is a gradual replacement of straight-sided jars by globular vessels (Figs 17-19). It would then appear as if the early stages of mound development should tentatively be ascribed to the Expansion Phase, thereby reducing the gap in the Trobriand sequence. The provisional nature of this statement rests with the awkward status of Group F and the difficulty in interpreting the significance of the differential distribution of Bd 37 and 38.
Refuge Phase

A tight cluster of five sites (Col.3, 10, 19, 26 and 27) is placed toward the later end of the mainland sequence and evidences the terminal stages of the prehistoric Collingwood Bay ceramics. Site Col.10 is related to some degree to the earlier group of ten sites. Col.3, Old Wanigela village, appears to have had two entirely separate phases of occupation. One phase was about 600 BP and coeval with the later stages of mound formation and the second shortly before the arrival of Europeans. In spite of these factors, the coefficient of agreement placed these five sites into such a close cluster that it was impossible to integrate them with the proposed earlier group of ten sites.

Ceramics from these sites closely resemble those found in the later zones of Mound B and in Mound D. Ceramic Groups D, G, Q, V, W and EE characterise these deposits and the surface sites. Group D, a globular pot, is the dominant form on all sites except Col.10.

A strong correlation emerges regarding the distribution of these sites, in that they are all located in marginal areas (Fig.2, Plate 1). Col.3, 26 and 27 are found in extensive swamps near the mouth of the Anina River, Col. 10 lies 14 km inland on the slopes of Mt Victory and Col.19 is the only site situated on an island. Thus the positioning of these sites and indeed that of the mounds at Oreresan and Rainu strongly suggests that these were refuge settlements. This phase is poorly, if at all, represented on the Trobriand Islands, suggesting that the trade in mainland vessels may have ceased at an earlier date.

Historic-Modern Phase

Sites Col.25 and Tro.21 and 28 represent the post-mound period (Fig.19). Continuity between the prehistoric and the modern Collingwood Bay ceramics is absent. Group A, a spherical vessel, and the ubiquitous open bowl, Group Q, are the only ceramic forms present in the contemporary village dump at Koreaf (Col.25).

On the Trobriand Islands D'Entrecasteaux ceramics are the sole component of the historic sites except for a few sherds from Tubetube or Wari Islands. Groups N and O are present, as are the D'Entrecasteaux forms of the simple restricted bowl (Group K) and the open bowl (Group Q).
Plate 12

Bone artifacts: a-c. pointed wallaby bones, B/IVB, B/IIA and B/IIC; d. and e. possible bone pins, B/IIA, B/IIB; f. Ubir pin, oreag, Australian Museum, E37482; g. and h. pointed fish bones, B/IIIA and C/IIIA; i. bone chisel, C/IVA; j-o. spatula-shaped bones, B/IIB, B/III, B/IVA, B/III, B/IIB, B/IIB; p-s. carved bone tubes, B/IVA, B/IIC, C/IVB, C/IIIA; t-v. miscellaneous carved bone, C/IVB, C/II, C/IIB; w. bored dogs' teeth
VII THE DESCRIPTION AND ANALYSIS OF ARTIFACTS

In this chapter the classes of artifact recovered from the excavations and notable examples from museum collections are discussed. They are divided into four groups: bone, shell, stone and ceramic. The ceramic section does not include vessel sherds which are the particular concern of Chapter V.

Throughout the chapter comparisons are made between excavated specimens and artifacts which have been used during recent times. The best published sources on the material culture of coastal eastern Papua are Seligmann (1910) and Williams (1930), although both are primarily concerned with social customs. The Orokaiva, who are the subject of Williams' work, are a cluster of non-Austronesian speaking groups living on or near the coast, 100 km northwest of Wanigela. They occupy an area between the 8th and 9th meridians which is well outside of the Massim. Seligmann occasionally mentions Collingwood Bay, but the closest group he discusses in detail lives near Bartle Bay at the head of Goodenough Bay. Many of the prehistoric and modern items of material culture collected or excavated at Wanigela have counterparts to the north with the Orokaiva and to the south and east in the Massim.

In contrast to the widespread distribution of certain traits, others appear to be localised and a few prehistoric items have no direct parallels in the living cultures. Whenever possible, bone, stone and shell artifacts were collected in Wanigela or sought out in museum collections. All excavated and collected artifacts were examined and discussed with the villagers. Informant testimony was then checked by consulting the literature of museum collections.

The modern inhabitants of the district have only vague recollections pertaining to stone and bone tools. But whereas bone needles are made occasionally, shell and bone ornaments are a part of every villager's personal kit. Information concerning the manufacture and use of shell ornaments as well as the specimens themselves were easily collected.

The bone and shell artifacts recovered from the middens in certain instances are identical to or have features in common with those obtained from archaeological sites on Yule Island (Vanderwal 1973:Fig.VIII-7). Carved bone spatula handles, pierced dog's teeth and bone awls are remarkably similar in both complexes, as are the *Trochus* shell armlets and the *Conus* shell arm bands.

**BONE ARTIFACTS**

**Spatula-shaped Bones (Plate 12j-o, Table 14)**

Spatula-shaped bones were found in Mounds B and C. Without implying any specific function, I will refer to them as spatulae. These artifacts have three distinct handle forms: tubular, U-shaped and flat (Plates 12j-o).

1. The tubular variety is made from the proximal portion of a wallaby tibia. A 2-5 cm stretch of the bone retains its tubular shape and the remainder is altered to a flat strip. This gives the spatula a convenient handle and blade which are polished to a high lustre.

2. The U-shaped handle is made by splitting the wallaby tibia longitudinally and flattening only the blade portion.

3. The flat variety is nothing more than a slightly concave-to-flat strip of bone with a rounded or tapered end. The blades are from 2 to 3 cm in width. The only complete specimen found in the excavation is 15 cm long, undecorated and of the flat variety (Plate 12j).

A few flat spatulae fragments are too wide to have been made from wallaby bone. Pig or cassowary bones were probably used as the raw material for these artifacts. All specimens which can be positively identified as spatulae are devoid of elaborate carving and only occasionally are they decorated with notches or grooves. Although the spatulae are usually highly polished, a few
Deep scratches remain from the early stages of manufacture. The rough shape of the artifact was probably made by cutting and scraping with obsidian flakes. Preliminary smoothing was done with pumice and the final lustre produced by rubbing with mildly abrasive plant leaves. Three of the flat spatulae have a small hole drilled into the handle. These are about 2 mm in diameter and exceptionally well made. The reconstruction of the manufacturing process combines informant testimony with the actual archaeological data. The latter consist of numerous pumice abraders and obsidian chips which were found throughout the deposits.

Table 14 considers all the spatula-shaped bones and regards fragments as a single specimen if they do not articulate with any other pieces. The term spatula is used to describe the specimens' form rather than to imply a function. However, the local villagers identify these bone artifacts as being used to carry lime from a gourd container to the mouth when chewing betel nut. If these are lime spatulae, then the much discussed custom of chewing betel nut is at least 1000 years old in this region of Papua.

Speculation concerning the 'betel nut peoples' arose when it was noted that this custom did not extend into Polynesia, Fiji, New Caledonia or the New Hebrides (Riesenfeld 1947:203). Riesenfeld's notable effort towards synthesising the information on betel nut chewing in Melanesia regards this custom as having Indonesian origins.

<table>
<thead>
<tr>
<th>Mound B</th>
<th>Mound C</th>
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<tbody>
<tr>
<td>Zone I</td>
<td>Zone I</td>
</tr>
<tr>
<td>IIA</td>
<td>II</td>
</tr>
<tr>
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</tr>
<tr>
<td>IIB</td>
<td>IIB B</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>IIC</td>
<td>IVA</td>
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<td>1</td>
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<tr>
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<tr>
<td>IVB</td>
<td>IVD</td>
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Table 14  Mounds B and C: distribution of spatula-shaped artifacts by zone

Awls and/or Pins (Plate 12a-e, Table 15)

Plate 12a-e illustrates the complete range of artifacts which are included in this category. The majority of the specimens are made from the fibula of the wallaby. None of them is complete. The longest specimen is 14 cm long and 7 mm thick. One example retains the bulbous terminal portion of the bone. Small scratches remaining from the manufacturing process are common. The polished lustre seen on bone spatulae is only rarely found on this class of artifact.

Although my informants readily identified these as orege and used as awls, no specimens of this type were found in local possession nor were any located in the museum collections. The Australian Museum has a specimen (E37482) from Wanigela which is labelled orege (Plate 12f). This item is made from pig bone and is used as a pin to hold a feather head-piece in the hair. It is possible that some of the smaller broken 'awls' found in the excavations are part of such a pin. One specimen has a notched end and possibly functioned as a pin, with the notches facilitating the attachment of feathers (Plate 12e).

Blackwood (1950:32) describes awls made from the fibulae of wallabies and small piercing tools shaped from the phalangeal bones of flying foxes. The people of the upper Watut River use these bone tools as an aid in fibre lashing or plaiting (cf. Williams 1930:85).

Three small pointed fish bones were recovered from the excavation (Zones IIA and IVA of Mound B and Zone IIIA of Mound C). Two of these bones retain their proximal end which has a natural foramen (Plate 12g, h). It is unlikely that the hole served the same function as that in a needle since the head of the fish bone has not been thinned to permit its easy passage through the material being sewn. The largest specimen is 4.9 cm long and the smallest has a length of 2.5 cm.
Some of the items described as awls could well have been used as bone projectile points. However, the use of bone points has not been recorded for this area during historic times.

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<th>Mound B</th>
<th>Mound C</th>
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<tbody>
<tr>
<td>Zone I</td>
<td>Zone I</td>
</tr>
<tr>
<td>IIA 5</td>
<td>II  —</td>
</tr>
<tr>
<td>IIB 1</td>
<td>IIIA —</td>
</tr>
<tr>
<td>IIAB 2</td>
<td>IVA —</td>
</tr>
<tr>
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<td>IVB 1</td>
</tr>
<tr>
<td>IVA 2</td>
<td>IVC —</td>
</tr>
<tr>
<td>IVB 9</td>
<td>IVD —</td>
</tr>
</tbody>
</table>

Table 15  Mounds B and C: distribution of awls and/or pins by zone

Bored Dogs' Teeth (Plate 12w)

Ethnographically, canine teeth were used for personal ornamentation and entered into economic exchanges in many areas of Melanesia (Harding 1967:49–52). Dogs' teeth are used to decorate the garam or headband which is worn on special occasions by the Ubir. Williams (1930:40, Plates VI and XXVIb) documents a variety of ornaments worn by the Orokaiva. Dogs' teeth adorn necklaces, ear ornaments and headbands.

Six bored dogs' teeth were recovered from the excavation. Five of these are canine teeth while the sixth is a first molar. The roots of the teeth are polished. A small hole approximately 2 mm in diameter is drilled through the root of each specimen. In Mound B, two teeth came from Zone IVA and single specimens were found in Zones IIC and IIAB of the same midden. Additional specimens were located in Zones IIIA and IVA of Mound C.

Bone Chisels (Plate 12i)

Two examples of this tool were found in Mound C (Zones II and IVA). The specimens are made from the proximal portion of pig tibia. The illustrated example is complete and is 10.9 cm long. The local people expressed no knowledge of the function of this artifact. Finsch (1888:Plate V) illustrates a pig bone tool from Finschhafen on the Huon Peninsula which is identical to the archaeological specimens. This is listed as 'a short chisel-like instrument made of bone (chiefly from pigs), for breaking open betel nuts, etc.' (Finsch 1888:26).

Carved Bones (Plate 12p-v)

This heterogeneous category contains all of the remaining undescribed worked bone from the site. Perhaps the most enigmatic specimen is an almost complete bone tube from Zone IIIA of Mound C. The tube is 7.5 cm long and 1.2 cm wide, with two short projecting prongs at one end (Plate 12s). It is similar to specimen E15593 in the Australian Museum which came from the Wanigela mounds when they were destroyed early this century. The surface bears numerous scratches and sharp incisions from the manufacturing process.

Other tubular pieces of carved bone from the site represent too small a portion of the artifact to determine the original shape. These items are illustrated (Plates 11p-r), along with the majority of miscellaneous carved bone from the site (Plates 11t-v).

SHELL ARTIFACTS

Three distinctive shell artifacts are present in the archaeological
Plate 13  Shell artifacts: a. shell triangle, B/III; b. shell pendant, C/IIIB; c. and d. shell discs, C/IVA; e. and f. Trochus shell armllets, B/IVA and B/IVB; g. large shell disc, B/IIC; h. and i. Conus shell armllets, B/IIA and B/IIC; j. headband, Ubir boin
material. Local villagers recognise these as having direct parallels in their material culture.

Shell Armlets (Plate 13e,f,h,i)

The most common shell artifact is the armlet. Specimens from Zones III (4 fragments), IVA (1), and IVB (4) of Mound B appear to be made from *Trochus niloticus* (Plates 12e,f). Specimens from Zones IIA (1 fragment), IIB (3), IIC (1), III (1) and IVA (3) of Mound B and Zone IVA (1) of Mound C are probably made from the *Conus leopardus* shell (Plates 12h,i).

The *Trochus* armlets are rounder in cross-section and have an inside diameter of 6-8 cm. *Conus* specimens have approximately the same diameter but the width of the band is almost 1.5 cm, where usually it is less than 0.8 cm on the *Trochus* armlets.

Over most of the Massim the *Conus leopardus* shell is used in the manufacturing of armshells (Saville 1926:152-6). These are massive shell ornaments which often have a width of 5-6 cm. Large worked pieces of cone shell come from Zone IVB of Mound B and Feature 3, Mound C. Due to their fragmented condition, it is not certain that they are parts of armshells.

Shell Discs (Plate 13c,d,g)

The second type of shell artifact found in the excavation is in the form of a flat disc. These are identical to the *pako* and *yaroyaro* of the Ubir.

The *pako* is a large flat disc, approximately 15 cm in diameter which is made from *Melo amphora*. These continue to be produced by local men and are worn by them and a few special women during dances. Two holes are drilled a short distance apart near the margin of the shell. Australian Museum specimen E13147, a *Turbo setosus* shell, is listed as being used to drill holes in shell discs. Through these holes a small fibre loop is attached to the shell. This loop is held securely in the teeth during dances with the shell disc extending over the chin. Williams (1930:39 and Plate XXXII) illustrates the use of this ornament among the Orokaiva, who also refer to it as *pako*.

The *yaroyaro* is a smaller disc made from *Melo amphora* or alternatively from the shell of a pearl oyster (*Pteridaeae*). The latter can be recognised by its pearly lustre. Two holes are drilled in the disc and it is worn suspended as part of an elaborate shell necklace (Williams 1930:Plate VI). An interesting variant of this is the *yar*. This is a pearl shell crescent which is decorated with shells, beads and fruit seeds. The outer edge of the *yar* is sharpened and used for opening betel nuts. Archaeologically it would be difficult to ascertain if a fragmented piece of pearl shell was part of a *yar* or a portion of a *yaroyaro*.

A partially complete disc from Zone IIC of Mound B was immediately recognised as a *pako* (Plate 13g). Fragmented shell discs came from Zone III of Mound B and Zone II of Mound D (Plates 13c,d). Smaller fragments came from Zones IIC (2 specimens) and IVB (1) of Mound B and Zone IVA (2) and Zone IVB (1) of Mound C.

Within the mounds a complete piece measuring 9 cm long and 4 cm wide and made from pearl shell was found in Zone IIIB of Mound C (Plate 13b). The villagers called this a *yaroyaro* even though it is not disc-shaped.

Shell Triangles (Plate 13a,j)

A small triangular piece of shell from Zone III of Mound B (Plate 13a) is the sole representative of the third shell artifact class. This is identical in form to the pieces of shell found on an Ubir headband (Plate 13j). The *boin* is made from triangular pieces of shell from a large white cowrie, together with bird feathers. The feathers and shell triangles are lashed to a fibre roll. Both the Orokaiva and Ubir forms of this ornament have holes drilled in the shells to facilitate their attachment to the fibre roll (Williams 1930:Plate VIII). The archaeological specimen is made from the lip of *Strombus luhuanus* and is not drilled for attachment.
Summary

The shell triangle, discs and armlets were the only shell artifacts found in the archaeological deposits. A considerably wider range of shell ornaments is found within the ethnographic area. Chignell (1911: facing 216) pictures a 'death dance' costume which consists, among other things, of a wide variety of shell ornaments. The central figure is wearing the Ubir style boin headband.

The excavation failed to yield any carved cone shells comparable to those found when Mounds E and F were destroyed early in this century (Monckton 1922: facing 116; Seligmann and Joyce 1907: Plate VIII). These shells are decorated with spirals, concentric circles and stylised human faces. One specimen is engraved with an extremely well executed and realistic bird motif (White, Disney and Yaldwyn 1970). The bird figure is considered by Van Tets (1971) to be a representation of a Northern Hemisphere crane of a species not found in the Southern Hemisphere. A cut and carved cone shell similar to the excavated specimens was recently reported on the Trobriand Islands (Mackay 1971). The shell was apparently found at a beach on Kitava Island. It is finely carved with scroll motifs and is pierced with small holes. Cowry shells, beads and pieces of pearl shell have been recently attached to the shell. The artifact functions as a mwaï, the traditional shell armband, in kula exchanges. Golson (1972a: 582-6) discusses the possible links which this art form might have with certain 'Bronze Age' influences in the prehistoric cultures of New Guinea. I return to this topic in the concluding chapter.

The designs on the Wanigela shells are considerably more sophisticated than any found on the pottery from the excavations. The complexity of scroll and bird motifs is equalled in the wood carving of the Trobriand Islands (e.g. Malinowski 1922: Plate XXVI). This art style is not at all developed on Collingwood Bay but is a dominant feature of Massim art (Haddon 1894). Finsch (1914:Tafel XX) illustrates a carved coconut shell cup from Normanby Island in the D'Entrecasteaux Islands which is decorated in an equally elaborate fashion.

STONE ARTIFACTS

Ground Stone Tools (Plate 14, Table 16)

The excavations yielded numerous fragments of ground stone tools. A few of these specimens have their cutting edge preserved. A hafted adze collected by Sir W. MacGregor around 1894 on Collingwood Bay (Plate 14a; courtesy of the Australian Museum E6443) is similar in shape to the large blades from Mounds B and C. The flattish cross-section of the blade is symmetrical and the cutting edge is not hollow ground. The blade is set between two tapered and grooved pieces of wood which are tightly lashed together with cordage. A plaited fibre ring securely binds the wooden blade holder to the adze handle. This arrangement allows the blade and its socket to be easily removed and adjusted for proper angle. The blade is manufactured from a green laminated chlorite schist. This stone is readily worked since it naturally parts into sheets and has a hardness of 3-5 on the Mohs scale; however, it also breaks or splinters easily. The Ubir obtained the material through trade with the tribes to the west. It is found inland from Collingwood Bay on the slopes of the Owen Stanley range.

The largest specimen recovered from the excavations (Mound B, Zone IIA) is almost complete with only a portion of its poll missing (Plate 14b). This blade is 10 cm long, 4.6 cm wide and 1.1 cm thick. A second specimen of the same order (Mound C, Zone IVD) is slightly wider and its cutting edge and poll are battered (Plate 14c). Both specimens are lenticular in cross-section, with the lateral edges of the first specimen being squared, while the edges of the second are rounded. Both of these relatively crude blades resemble the ethnographic specimen collected by MacGregor.

A smaller tool (Mound B, Zone I) is only 1.3 cm wide, 0.7 cm thick and 3.9 cm long (Plate 14d). This blade is lenticular in cross-section with a symmetrical chisel-shaped edge. Fragments of large tools have been reworked into small blades e.g. Plates 14e,f. The smallest of these (Plate 14e) is only 3 cm long.
Ground stone tools: a. adze collected by Sir W. MacGregor on Collingwood Bay, Australian Museum, E6443; b-f. chlorite schist blades, B/IIA, C/IVD, B/I, C/IVA and B/IVA; g. poll of ground stone tool, probably manufactured from Woodlark Island hornfels, B/I
A single specimen from Zone I of Mound B is made from a material resembling Woodlark Island hornfels (Plate 14g; cf. Seligmann 1910:Plate LXIV). The fragment consists of the poll end of the tool. It is lenticular in cross-section with squared edges and has a high polish. Woodlark Island adze blades were traded throughout the Massim during historic times (Seligmann 1910:15).

Table 16 divides these stone tools from Mounds B and C into three categories. The first refers to all specimens having a cutting edge. The second group includes all the remaining fragments which appear to be the butt or poll of a stone implement. The remainder fall into a category which includes all worked and polished pieces of schist without an edge or poll. It is quite likely that these are fragments from adzes.

### Table 16 Mounds B and C: distribution of ground stone blade fragments by zone

#### MOUND B

<table>
<thead>
<tr>
<th>Zone</th>
<th>I</th>
<th>IIA</th>
<th>IIAB</th>
<th>IIB</th>
<th>IIC</th>
<th>III</th>
<th>IVA</th>
<th>IVB</th>
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<tr>
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<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Poll</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
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<tr>
<td>Other</td>
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<td>5</td>
<td>3</td>
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<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

#### MOUND C

<table>
<thead>
<tr>
<th>Zone</th>
<th>I</th>
<th>II</th>
<th>IIIA</th>
<th>IIIB</th>
<th>IVA</th>
<th>IVB</th>
<th>IVC</th>
<th>IVD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting edge</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
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</tr>
<tr>
<td>Poll</td>
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<td>1</td>
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<td>Other</td>
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</tr>
</tbody>
</table>

Polished Stone Disc (Plate 15a)

A piece of polished chlorite schist found in Zone IIA of Mound B is roughly circular in diameter (4.6 x 5.9 cm) and .75 cm thick. This stone has no known ethnographic parallels, nor were the villagers able to suggest any function.

Perforated Stone Club Head (Plate 15b)

The only drilled stone artifact found in the excavations is from Zone IIIA of Mound C. The size of the hole (1.9 cm diameter) and the general shape of the fragment indicates that it is a club head. The specimen is 1.85 cm thick and is made from a grey steatite. Ethnographic specimens from the Wanigela area are usually made from a dense igneous or metamorphic rock.

The basic fighting weapons of the Wanigela people were the spear and stone club. Wanigela stone club heads are usually disc-shaped with an outside diameter of approximately 11 cm (Williams 1930:Plate LVIII). The archaeological specimen has only one finished edge preserved and this appears to be only slightly curved. Decorating this edge is a longitudinal groove and a series of cross notches. In Plate 15b I have taken the liberty of indicating that the complete shape of the artifact is probably that of a rounded square, approximately 9.1 cm at its maximum width. Haddon (1900:Plates 2, 22) illustrates a stone club from the Papuan Gulf with similar decoration. The reconstructed shape would assign the specimen to his 'flat club with notched edges' category (Haddon 1900:250).

Hammer and Anvil Stones (Plate 15c)

All stones found in the excavation which exhibit scars from intensive battering are included in this group. Most of these were probably used for a variety of purposes. Blackwood (1950) describes the use of hammer stones in the manufacturing of adze blades and club heads.

Some of the hammer stones are combination tools. Grinding surfaces, hammering bruises and concave depressions are found on the stones. The villagers claim that small rocks with concave depressions served as anvils.
Plate 15  Stone artifacts: a. polished stone disc, B/IIA; b. perforated stone club head, C/IIIA; c. stone anvil, B/IIA; d. and e. grinding stones, B/IIB; f. farum, charm stone collected in Wanigela prior to 1934, Australian Museum, E36425; g. stone resembling farum from excavations, C/I; h. 'magical' stone, B/III; i. stone sphere, B/I; j. oblong stone, B/IVA; k. calcite crystal, D/II
when crushing univalve shells to obtain the meat. The largest anvil stone comes from Feature 3 of Mound B. Only half of the artifact is present but this weighs 2.21 kg and measures 15 x 13 x 9 cm in its maximum dimensions. A second specimen, illustrated, comes from Zone IIA of the same midden. The stone (15 x 7.5 x 7.2 cm) is broken and has a single dish-shaped pit on its surface with a surface depth of 1 cm. Small fist-sized anvils came from Zones I and IVB of Mound B and Zone I of Mound C. A pounding stone came from Zone II of Mound C and a grinding-pounding rock from Zone III of Mound B. These are rather non-descript artifacts which retain their river cobble appearance with only a slight modification through use.

Strathern (1969:314, 320 and Plate XV) and White (1967a:Plate 4-2) document stone anvils and hammer stones in the New Guinea Highlands where they are used for flaking stone tools and roughing-out axe and adze blades. Williams (1928:145) in his study of the Orokaiva states that 'when one sees a stone embedded in the ground with a small worn hollow on the top, it is probably no more than a tauqa breaking stone'. The tauqa is an edible nut.

Grinding Stones (Plate 15d,e)

Within the northeast section of Zone IIB of Mound B two flat grinding stones were found. The larger is a slab of fine-grained basalt showing intensive grinding on both surfaces. The stone is 2.8 cm thick, 13.5 cm long and 9.2 cm wide. The second stone is an oblong river cobble measuring 11 x 5.6 x 2.5 cm. One surface is ground flat while the other is unmodified. The grinding surfaces of the two stones fit each other perfectly and they could well be a set. They could also have been used separately in the manufacturing of stone blades (Blackwood 1950) or shell ornaments. Lewis (1929:13-14) describes the process of making shell discs at Ponam in the Admiralty Islands whereby a flat grinding stone is used to rub the roughly chipped discs smooth.

'Magical' Stones (Plate 15f-k)

Certain rocks found in the excavations were identified as sorcery stones by the villagers. Plate 15f illustrates a farum or faruma which was collected in Wanigela prior to 1934 and is now in the Australian Museum (E36425; cf. Seligmann 1910:Plate XXVII). Fibre cordage encloses part of the farum. The stone closely resembles in shape and material the specimens found in the excavations e.g. 15g. All of them are smooth water-worn pieces of grey, green or red slate. A few of the stones are bruised on the ends or sides and in a couple of instances appear to have been scoured by grinding. The specimens are 5.5-9.5 cm long and range in width from 2.2-4.5 cm. A total of nine stones in this category were found in Zones IIA, IIAB, IIB, IIC (2 specimens), III, IVB of Mound B and Zones I and IVB of Mound C.

A second form of 'magical' stone found in the excavations is shaped like a pencil pointed on both ends. The size ranges from 5-6 cm in length and the width is about 1 cm (Plate 15h). Examples came from Zones III, IV A and IVB (2 specimens) of Mound B. The stones do not appear to be greatly modified from their natural shape. Local villagers attribute to these sorcery stones the ability to 'draw blood'.

A small stone sphere with a maximum diameter of less than 3.8 cm was found in Zone I of Mound B (Plate 15i). The surface of the sphere is pitted and battered. This stone and an oblong rock from Zone IV A (Plate 15j) were identified as sorcery stones. The sphere shows obvious signs of intentional shaping. The oblong rock which is 4.1 cm long has a few pits on its generally smooth surface.

A well formed calcite crystal came from Zone II of Mound D (Plate 15k). This was claimed by the villagers to have great magical powers. Seligmann (1910:284) documents the use of rock crystals for magical purposes among the Roro of the Papuan south coast.
Pumice Abraders (Plate 16a,b)

The gross distribution of pumice abraders has been presented in Figure 10. The worked pieces of pumice vary in size from lumps weighing more than 600 gm to small abraders which are no larger than a man's thumb. A large block of pumice (16 x 13.5 x 11.5 cm) has a trough-shaped groove on one surface (12.2 x 8.6 cm) which is worn to a depth of 1.3 cm. This was probably used to sharpen ground stone blades.

Other pieces of pumice exhibit narrow V-shaped grooves which are 3-4 mm in depth (Plate 16a). These were probably used in the manufacture of bone tools. Smoothed lumps of pumice are also common (Plate 16b). Pumice and shark skin were used in Wanigela at the turn of the century to shape wood, bone and shell.

Pumice Rings (Plate 16c)

Small pumice rings with an outside diameter of 3.5-6.0 cm and an inside diameter of approximately 1 cm were recovered from Zones I, IIA, IIB and III (2 specimens) of Mound B. The villagers were unable to offer any explanation for these artifacts other than they were made by small boys when playing.

Chipped Stone

Obsidian (Plate 16d)

Obsidian chips were found throughout the mounds (Fig.10). Most of the obsidian is in the form of primary flakes measuring a few millimetres in thickness and having a maximum length of 4-5 cm. Only an occasional specimen exhibits purposeful flaking or use wear. Cores, in the few instances found, were exhausted and smaller than the larger flakes. Since this material had to be imported from Fergusson Island in the D'Entrecasteaux Islands (Key 1969), it was no doubt of value and therefore not lightly discarded.

Carved bone excavated in the mounds often has fine sharp cuts at the base of the notches, where it was protected from subsequent polishing. These are similar to cuts that I was able to make on relatively fresh pig bone using obsidian flakes.

Before the arrival of the Europeans, according to my informants, the people of Wanigela traded with the Mukawa group living at the tip of Cape Vogel for this commodity. The Mukawa people acted as middlemen in the trade between the Ubir and the Fergusson Islanders. The normal exchange was one ceramic vessel for a fist-sized lump of obsidian. Saville (1926:-facing 137) documents the use of obsidian flakes by the people of Mailu for head shaving and 'chiroprody'. The flaking technique used by these inhabitants of the south coast amounted to holding the rough core in one hand and striking it with a hammer stone held in the other (Malinowski 1915:540-1).

Chert (Plate 16e,f)

Two flakes of a reddish chert were found in Mound B. Specimen 'e' exhibits fine secondary flaking on the margins, while on 'f' only one small area appears to have been modified. The material is ideally suited for flaking and it is puzzling why only two pieces were found. The villagers could not provide me with any clues as to the source of the stone.

CERAMIC ARTIFACTS

Excavated in 1968-9 (Plate 16g,h)

1. Perforated ceramic discs (Plate 16g) were the only form of ceramic artifact, other than vessel sherds, found in the excavations. It is possible that these were used as fly-wheel weights on pump drills similar to those described by Williams (1930:85-6) for the Orokaiva. The weights are
Plate 16 Stone and ceramic artifacts: a. grooved pumice, B/IIA; b. worked pumice, B/IVA; c. pumice ring, B/III; d. obsidian flake, B/III; e. and f. chert flakes, B/III and B/IIC; g. perforated ceramic disc, B/IIAB; h. ceramic roll, B/IIA; i. ceramic disc, site Col.12; j. ceramic artifact, site Col. 5; k. ceramic vessel spout, Australian Museum, E16687; l. ceramic nose from the Murin River, Australian Museum, E16077; m. ceramic oddity, Australian Museum, E15588
approximately 5-6 cm in diameter with a central perforation ranging from 0.60-0.85 cm. All the weights are made from undecorated sherds and single specimens were found throughout Mound B (Zones I, IIA, IIAB, III and IVA) and in Zone I of Mound C. The hole is neatly bored in most instances and roughly pecked in the specimen from Zone IVA. The bored holes are straight, conical or biconical. The specimen from Zone III has not been finished. A conical hole has been bored in each side and possibly the maker stopped when it became evident that the perforations were not in direct alignment.

2. A ceramic roll (Plate 16h) was found in Zone IIA of Mound B. The specimen is 4.1 cm long and 1.8 cm in diameter. One end has been broken while the other is finished with a concave depression.

Collected in 1903-6 (Plate 16k-m)

P.J. Money sent a sizeable collection of sherds and artifacts from Wanigela to the Australian Museum, Sydney, in the early years of this century. Some of these were found when Mounds E and F were truncated in 1903 and others were collected in the Murin River.

1. Included in the collection are some specimens that have the appearance of small-necked bottle spouts (Plate 16k; cf. Seligmann and Joyce 1907: Plate X). The spouts appear to be made by a coiling technique with applied raised ridges affixed around the neck. This form of ceramic artifact has not been recorded in an ethnographic context in Papua. Spherical water jugs with small double spouts are manufactured on the Admiralty Islands (Nevermann 1934: Abb.113, 7; Schurig 1930:Tafel V, 30-1). These seem to be the closest possible parallels.

2. An anthropomorphic ceramic nose is present in the Money collection and is catalogued as coming from the Murin River (Plate 15Z). The broken edges are worn smooth and there is evidence of a large perforation on each side of the nose. Traces of powdered haematite appear to be present on the surface of the specimen. The nose resembles those found on the anthropomorphic faces of Aibom sago-storage pots and roof-top figures (Moore and Turner 1968: 52-3; cf. Schuster 1969:Plate VI). These figures are paralleled in other Sepik ceramic industries (Kaufmann 1972).

3. Perhaps the strangest specimen of the collection is that illustrated in Plate 15m. The function of this large hand-moulded clay object is difficult to ascertain. Eleven finger-sized holes perforate the side of this ceramic oddity. By stretching the imagination it is possible to envisage this as a headrest, such as those carved from wood which are used in the Wanigela area.

Surface Collections (Plate 16i,j)

Surface collections made upon sites on the banks of the Murin River yielded two different types of ceramic artifact.

1. Ceramic discs, similar to those found in the archaeological deposits but lacking a central perforation, were found at site Col.12 (Plate 1). The four specimens from this site are all made from 'modern' sherds (Plate 16i).

2. A ceramic artifact, which to some extent resembles a mushroom in shape, was found on site Col.5 (Plate 16j). It is possible that this is a broken handle or knob from a vessel, but since it is the only example of its type it is difficult to deduce its function.
As the first of its kind to be attempted in coastal and island eastern Papua, this study is to be regarded as a preliminary effort towards reaching an understanding of the recent prehistoric settlement of, and the interaction between, Collingwood Bay and the Trobriand Islands. The research centred upon the Wanigela area, at the head of Collingwood Bay, where three mounds were excavated and collections obtained from 32 surface sites. The mounds proved to be large and substantial features. They contained quantities of ceramic debris, food shells and animal bones. Pig and wallaby bones were the commonest vertebrate remains and surprisingly, in view of the closeness of the sea, few fish bones were found. Structural evidence in the form of post hole patterns was absent; however, burned areas and associated hearth stones were found in Mound C. The mounds were probably activity areas that were in part formed by village refuse.

Bone, stone and shell artifacts excavated in Mounds B and C often have direct counterparts in the ethnographically known cultures of eastern Papua. This is particularly true of the ground stone adzes and shell ornaments. Worked pumice and numerous obsidian flakes were scattered throughout the deposits. The latter were obtained from sources on Ferguson Island (Key 1969).

The mounds have a restricted distribution, the single locality on Collingwood Bay where they are recorded being in the Wanigela area and more specifically near the mouths of the Anina and Sasap Rivers. Two small mounds were found to the south of the Anina River (Col.26, 27), two are pictured by Newton at Old Wanigela (Plate 3) and at least seven are known to have belonged to the complex at Oneresan and Rainu.

Surface collections were obtained from 28 sites on the Trobriand Islands. Earlier reports had suggested the existence of prehistoric connections bringing mainland wares to the Trobriands (Austen 1939; Key 1968) in addition to the modern kula network linking them with the D'Entrecasteaux Islands (Malinowski 1922). Although over two months were spent in the survey, no stratified sites were located. The Trobriand Islands were considered to be the best possible area to link Lauer's (1970b and 1974; see also Lauer 1971, 1973b) study of the recent ceramic traditions of the D'Entrecasteaux and my research in the Collingwood Bay region.

Surface collections from Collingwood Bay and the Trobriand Islands were ordered with respect to the ceramic sequence which emerged from the excavations. The data from the excavations and surface collections suggested the operation of multiple factors. These factors were considered in detail and a four-phase ceramic sequence proposed, comprising an Early Ceramic Phase, Expansion Phase, Refuge Phase and Historic-Modern Phase.

In now summarising the research and its implications, I will proceed from the specific problems raised by the excavations to the general considerations of a regional prehistory. This involves starting with the mound complex, moving outward from this reference point to include the surface collections from the Collingwood Bay area, then considering the material from the Trobriand Islands and finally the overall implications of the research.

THE MOUND EXCAVATIONS AND THEIR INTERPRETATION

By about 1000 years ago settlement had developed in the swamps at the head of Collingwood Bay. As the terrain was lowered by the compaction of the riverine soils, the slightly raised midden areas became focal points of activity. Data from Mirngadja in Australia's northeast Arnhem Land document the initial stages of midden formation in a swamp environment (Peterson 1973). The Aborigines living in the Arafura swamp are attracted during the wet season to elevated areas. These places may lie only a few centimetres above the surrounding terrain, but they are dry for a longer period during the wet season than the lower-lying areas. Gradually a chosen area is elevated by the accumulation of human refuse. The stratigraphy of Mound C appears to reflect this process.
But there was another factor responsible for the accretion of the excavated mounds. This was the deliberate addition of sandy soil. Sand could well have been brought in periodically to seal in midden refuse and refresh the surface of the mound. At times the evidence points towards there being a conscious effort to increase the height and usable area. This is particularly noticeable in the case of Zone III of Mound B and perhaps Zone IIIA of Mound D. If such sandy soil was obtained from an abandoned midden, it would provide the opportunity for the redeposition of earlier material in a later context.

The Ceramics: Chronological Aspects

At Wanigela the belt of swamps which separates the interior plain from the sea might be looked upon as a protective barrier. It would present an ideal situation in which to establish an initial colony if the inland areas hosted a hostile population. Access to the sea and swamp environments would be assured and the immediate inland regions could be exploited on a temporary basis. If the new settlers were able to expand inland and establish themselves on the alluvial plain, the coastal villages would probably continue to exploit the local environment. However, if pressure was mounted by inland groups, the coastal-swamp villages would then become refuge areas.

In fact, the collections from the surface sites on the inland plain have been interpreted as showing phases of ceramic manufacture which occurred before 1000 BP and were poorly represented in the excavated mounds. Whether this Early Ceramic Phase was represented in the other mounds at the mouth of the Sasap River is not known. The early reports describing ceramics from the immediate area of Rainu and Oreresan illustrate rim sherds decorated with triangular cut-outs (Monckton 1922: facing 118; Seligmann and Joyce 1907: Plate XI). Some of these sherds are specifically referred to as being derived from the Murin River and the others are listed as coming from mounds. A few sherds of this style (Group P) were found in the excavations, particularly Mound C. Either this material is redeposited in the excavated mounds or its presence marks the very terminal stages of the pottery characteristic of the Early Ceramic Phase, a time when Group P had diminished to insignificance. This ware is well represented on the early Trobriand Island sites and possibly the Wanigela area may not have been a major centre during the Early Ceramic Phase.

During the Expansion Phase occupation of the inland plain was intensive and connections with the Trobriand Islands continued. This phase is represented in the earlier zones of the excavated mound deposits. It is impossible to determine from the evidence at hand whether the mounds were inhabited first and the population spread into the inland plain later or whether they belong essentially to a phase of general withdrawal. Certainly by 500 BP the inland plain was being abandoned and the populations associated with the Refuge Phase retreated themselves in the peripheral areas of the region, on the slopes of Mt Victory and in the coastal swamps. The mounds themselves were abandoned around 500 BP and a significant gap in the sequence exists until the arrival of the modern Wanigela peoples. These settled initially in the swamps at the mouth of the Anina River and slowly expanded their control of the immediate inland area. This was accomplished to some extent when the Onjob (non-Austronesian speakers) allied themselves with the Wanigela peoples (Austronesian speakers) and formed a weak barrier against the hostilities of the inland tribes.

Radiocarbon dates from the excavated mounds indicate a period of activity which spanned at least 500 years of prehistory (c.1000-500 BP). However, the dates are not particularly acute indicators of specific inter-mound relationships. The distribution of the ceramic groups within Mounds B, C and D suggests the following sequence which is in agreement with a ranking of the central values of the radiocarbon dates. The basal zones of Mounds B and C are assigned to the same period, immediately followed by the remainder of Mound C. During this segment of the sequence a gradual shift from straight-sided to globular jars and from restricted to open bowls is apparent (Figs 17, 18). This trend continues through Mounds B and D. The uppermost zones of Mound B (Zones I, IIA, ITAB, IIB) contain material which is considered as having been redeposited from an earlier context. Mound D is regarded as being in part contemporary with, and in part later than, the middle zones of Mound B.
The ceramics: Sociological Aspects

It is clear that more than the chronological principle is affecting the distribution of the ceramics. Mound B has a high proportion of punctuation and broken-line incision as a decorative element, while Mound C has more shell stamping. It has been shown that two jar forms (Groups D and G) present in both mounds follow this same pattern of differentiation with respect to their lip decoration. My research at the contemporary pottery-producing centre of Rainu revealed a situation which could produce such archaeological distributions. Lineages have the exclusive use of some design motifs e.g. the crocodile motif on Plate 2b. Members of a particular social group are the only individuals permitted to apply these decorative elements and to use the vessels upon which the specific designs are placed. The members of a specific lineage live in a localised cluster within the larger settlement and their rubbish is added to those middens which are closest to their residences. The differential distribution of pottery debris in Rainu reflects a pattern not only of exclusive manufacture but also, and perhaps more importantly, of restricted consumption. This situation is guaranteed by two circumstances. First, in contemporary Wanigel two social groups, the Oyan and Ubir, have lived side by side for more than 90 years and maintained a residence pattern that is more or less exclusive. Second, various totemic groups own specific plots within the villages and permanent access to this land by non-members is severely restricted. This means that lineages tend to cluster into specific areas within the settlement (M.E. Stephens pers. comm.).

The interlocking of local organisation and kinship in the contemporary societies of Melanesia is noted by Chang (1958:300), who cites Hogbin and Wedgewood (1952-4:241) to the effect that all politically significant groups have their roots in the land and these rights are determined by descent. Chang points to Melanesia as one of the four major regions of the world where a study of contemporary 'Neolithic' (his parentheses) communities emphasises the need for prehistorians to 'look at archaeological sites as local social groups instead of cultures or phases' (Chang 1958:324). He discusses the nature of the segmented 'Neolithic' village which is found in Melanesia, where social groups live in close proximity to each other, yet remain distinct.

These considerations are of general interest to archaeologists. Allen and Richardson (1971) have discussed the problems involved in reconstructing descent and residence patterns from archaeological data, particularly when the ethnographic situation is not clearly understood. Longacre (1964:166; 1970:2-3), faced in his study of black-on-white sherds from the Carter Ranch site with a situation similar to my own at the excavated mounds, that of a non-random distribution where 60% of the design elements are universal and the remaining 40% exhibit a distinctive pattern, interprets this differential distribution as suggesting a delineation of various social aggregates within the site. Longacre goes astray, as Stanislawski (1973) points out, when he attempts to make 'precise statements' concerning the kinship system which produced the ceramic debris. Stanislawski (1973:120-1) illustrates the inadequacy of Longacre's model at this level of analogy.

The basic concept that the spatial distribution of pottery debris could be determined by and reflective of various social controls is sound. It is also probable that social units which have a restricted spatial distribution will under normal circumstances have a particular pattern of solid waste disposal which marks that social unit. Ethnographic reports clearly document the distinctiveness of social groups living in close proximity within Papua New Guinea. At this level of analogy Longacre's model is applicable. However, Kaberry's (1967) review of the literature describing the various societies of Papua New Guinea leaves little doubt that a precise statement of the actual kinship structure of the prehistoric social unit would be straining the model beyond its limits.

It is worth noting that heterogeneity within linguistic groups and major settlement units has been documented by physical anthropologists working in New Guinea. A study of the population of 14 interrelated neighbouring villages in the Markham valley shows inter-village genetic heterogeneity in a situation where the authors thought that 'this might be expected to be minimal' (Giles et al. 1970).
The Fauna: Chronology and Sociology

Sociological factors of the type just discussed might equally be expected to influence the composition of middens in regard to food refuse. Within the New Guinea context Pospilis (1963:13) explicitly states of the Kapauku of the Paneal, formerly Wissel, Lakes of Irian Jaya that law and political structure are profoundly interrelated with the native economy. This is a well known and accepted premise which operates to some extent in all societies. Pospilis's monograph discusses in detail a situation in which sublineages control the exploitation of specific areas in terms of their agricultural, hunting and gathering practices. It is not too difficult to extend this analogy to include a situation which would produce midden deposits comparable to those excavated at Collingwood Bay, if specific groups of the prehistoric population had exclusive or near-exclusive access to specific facets of the environment.

The following observation by E.L. Giblin (1910:744), assistant to the Bishop of British New Guinea, refers to the Kubiri, a close linguistic relative of the Wanigela Ubir living in a similar environment on the southern coast of Collingwood Bay.

Totemism is well-developed among the Kubiri. The crocodile is a totem and its intercession is sought by placing food in the rivers for it to eat. The more common customs of totemism are in full force. The crocodile clan has many subsidiary totems; these include two shell-fish, because their shells are like the scales of the crocodile, three fresh-water fish, because the crocodile feeds on them, a variety of taro, and a kind of banana which has the same name as the crocodile and which is used to feed it. Even subsidiary totems may not be eaten, and in some cases they may not be touched.

It is plain to see that an archaeologist excavating a rubbish heap belonging to these people would not find a mirror image of the local fauna.

Significant differences were observed in the faunal content of Mounds B and C. Throughout the deposits, except for the basal zones, mammal bones are common in Mound B and molluscan remains best represented in Mound C. Within the molluscan category each mound displays a different trend. In Mound C the riverine species increase at the expense of the marine and within Mound B the mangrove species gradually come to dominate the riverine species. The differences between the mounds could be explained in terms of a sociological model or the tendencies regarded as supporting a temporal model. Both models could have been affected by a change in the local environment.

The temporal model would envisage a situation where mangrove and marine species were of equal importance. This equality, as seen in the basal zones of Mound C, changed to an increasing dependence upon riverine species at the expense of the marine species. Following the abandonment of Mound C, there is an abrupt decrease in riverine species through Mound B and an ever increasing dominance of mangrove species. The marked increase in mangrove species could be reflecting a change in the local environment. As the land lowered, the habitat of the riverine species would have become saline. Tidal species would then have replaced riverine species in the immediate area of the mounds. The strongest argument against the model is in the broad contemporaneity of the basal levels of both mounds. The basal zone of Mound B has a significantly higher proportion of riverine shells than its counterpart in Mound C.

Although the changes in molluscan species might be fitted into a temporal model, the preponderance of molluscan remains in Mound C compared to Mound B cannot be explained so readily. The same is true for the mammal remains, particularly those of pig which are common in Mound B and not as frequent in Mound C. The differences in the components of Mounds B and C are consistent throughout the deposits, except for the basal zones. This marked differential distribution of faunal remains might be reflecting sociological factors which resulted in Mound B having a high mammal bone content and Mound C having more shell fish remains.
Summary

The archaeological data from the excavated mounds support a model which combines the spatial, functional and symbolic as well as chronological aspects of the settlement pattern. The salient features of this model are:

1. the interlocking aspects of kinship organisation and local organisation,
2. the heterogeneity and social segmentation found within a neolithic social group,
3. the exclusive access to or consumption of faunal resources by specific social groups,
4. the restricted rights of social groups to use both certain design elements and the objects which bear these motifs.

A bold approach to the situation would carry the archaeological data further and describe the mounds as the rubbish heaps and activity areas associated with a typical segmented village. Chang (1958:306) describes this village as containing two or more lineages, each of which is localised in the community. Until further work is done on the mounds at Oreresan and Rainu villages, this can only be regarded as a hypothesis.

THE PLACE OF THE SURFACE COLLECTIONS

The picture which emerges from the mound excavations is one of localised heterogeneity within a ceramic tradition which is homogeneous in many aspects. Vessel form decoration and the placement of the decorative elements are relatively uniform when viewed as a tradition. The surface collections fall within this general tradition. Five Collingwood Bay collections contained pottery identical with that found in Mound D and the middle zones of Mound B. These excavated deposits are dated at roughly 500 to 600 BP. The five surface sites, which evidence the terminal stages of the prehistoric ceramic tradition, are situated in peripheral areas and as such are part of the Refuge Phase.

A large number of sites, ten on Collingwood Bay and four on the Trobriands, although they fit well within the general tradition as defined from the mound excavations, remain distinctive. The distinctiveness rests in a high proportion of Group F pottery (an intermediate form between jars and pots) and/or flamboyant forms of vessel decoration (Bd 37, 38). The ceramics would appear to relate to another component of the larger tradition. These sites have been interpreted (Chapter VI, The Ceramic Phases, Expansion Phase) as being coeval with the formation of Mound C and the lower zones of Mound B on the basis that they can be arranged in a similar sequence in which jars are replaced by globular vessel forms. A direct comparison of these surface sites and the excavation units is difficult and open to question since the design motifs (Bd 37, 38) were not found in Mounds B, C and D.

As a group the sites under discussion fall in the middle ranges of the Collingwood Bay and Trobriand Islands sequences. Their distribution, and that of related assemblages (discussed below) at Goodenough and Dyke Ackland Bays and on Goodenough Island, are considered to be the manifestation of a phase marked by expansion and the intensification of interaction. As such it has been labelled the Expansion Phase. Needless to say, further research is required before this period of prehistory can be precisely defined in terms of the complete settlement pattern as it existed through time in eastern Papua.

The collection from three sites (Col.12, 16, 31-32) in the Wanigela area is marked by ceramics ascribed to an Early Ceramic Phase. Two of these sites are dominated by a ceramic group (Group P) that includes pedestalled wares. Although this material is represented on the Trobriand Islands (sites Tro.1, 2 and 22), it is not common in the excavated mounds nor widely found in the Collingwood Bay area. Its placement within the ceramic sequence established for the mounds is poorly understood. Although some decorative features are common to both, the early ceramics are quite distinctive from the later and more common ceramics.
The wares belonging to the Early Ceramic Phase experienced their greatest popularity at some time prior to 1000 BP. It is conceivable that the Early Ceramic Phase could have been initiated before or early in the first millennium AD. As early as 2000 years ago the south coast of Papua was settled by pottery-using peoples e.g. Allen 1972a.

The surface collections from the Collingwood Bay sites display a series of major breaks between each phase of the sequence. This situation contrasts with the unbroken sequence that can be reconstructed for the Trobriand Islands. Early ceramics, Group P, decrease gradually as the later Collingwood Bay ceramics become popular. During this process D'Entrecasteaux wares steadily increase until they dominate the Historic-Modern Phase. By this time Collingwood Bay ceramics have been entirely replaced. The replacement appears to have taken place at a time prior to the Refuge Phase (before c.600 BP). In order to date securely this break in the interaction between Collingwood Bay and the Trobriand Islands, stratified sites on the islands must be located and excavated.

REGIONAL OCCURRENCES OF COLLINGWOOD BAY POTTERY

The Trobriand Islands: Stone Arrangements and Burial Caves

Collingwood Bay ceramics are found in two interesting situations on the Trobriand Islands, apart from normal surface sites. The first of these, although it has been documented for only two sites, is of Early Ceramic Phase pottery with stone monuments, and the second is of Expansion Phase ceramics with cave or niche burial.

Ceramic Group P, known to include some pedestal forms, is found in large quantities on the sites (Tro.1, 2) adjacent to the stone arrangements. Contemporary Trobriand Islanders ascribe little importance to these massive monuments, nor do they consider their ancestors as having erected them. However, they do place considerable importance on the burial caves which are filled with the bones of their ancestors. These caves contain pottery belonging to the Expansion Phase, particularly globular vessels decorated with flamboyant motifs (Austen 1939; Egloff 1973a). Early Ceramic Phase pottery has not been recorded in the burial caves. The dichotomy would lend support to the idea that a change occurred on the Trobriand Islands which permitted the stone groups to fall into decay and the custom of cave burial with accompanying mortuary vessels to become popular. The evidence at hand does not permit much expansion of this topic; however, it should be noted that both customs were followed to some extent in other areas of the Massim (Egloff 1970, 1972; Lyons 1922; Riesenfeld 1950:Map IV; Seligmann 1910:228; Tindale and Bartlett 1937).

Burial Pottery: Goodenough Island and Cape Rodney

An interesting burial complex in this context has been described from Nuamata Island, just off the north coast of Goodenough Island in the D'Entrecasteaux (Egloff 1972). Fifty-eight complete or fragmented vessels were found in small shelters or niches on a boulder-strewn hillside. Human bones were associated with many of the vessels. The ceramics found at this site can be divided into three major categories.

1. Prehistoric mainland ceramics (Expansion Phase) belonging to Ceramic Groups D, F, W, and X.
2. Prehistoric-Historic D'Entrecasteaux wares belonging to Groups A and N.
3. An enigmatic style which appears to be a prototype of the modern Wanigela wares with certain stylistic features of the D'Entrecasteaux tradition. These vessels are roughly spherical in form and as such resemble ceramic Group A. They have a direct rim and the body decoration consists of shallow channels arranged in angular patterns i.e. similar to Bd 41.
Early Ceramic Phase wares were not found on Nuamata nor were modern Wanigela wares; however, a boat-shaped vessel similar to a modern Goodenough Island style was present (Lauer 1974:62 and Fig.11C; Egloff 1972:Plate 1D). The Nuamata sepulchral pottery complex contains a sizeable proportion of large vertical-walled bowls of the Collingwood Bay style (Group X = 31.5%) as well as Goodenough Island wares (Groups A and N = 50.8%). Surface collections made by P.K. Lauer on three prehistoric sites on Goodenough Island, G.24, G.25, and G.26 (Lauer 1974:Table 100; Egloff 1972:Table 2), provide material for a comparison with the Nuamata complex. Although taken as a whole the latter resembles sites G.24 and G.25, there are significant differences (Egloff 1972:157). These become marked when the pottery from these three sites is assigned to specific ceramic groups (Table 17). It is now apparent that the groups belonging to the Collingwood Bay style found at Nuamata (Groups D, F, W and X) are absent or poorly represented at sites G.24 and G.25. The uniqueness of the Nuamata complex is probably a feature of the burial-specific nature of the site and the long time span over which it was used.

At Nuamata the wares derived from the mainland are probably at least 600 to 700 years old. However, some of the D'Entrecasteaux wares, particularly the boat-shaped pot, bear a close resemblance to historic Goodenough Island wares. This might mean that the burial site at Nuamata was in use for a minimum of 500 to 600 years. This surprisingly long use of a site for burial is paralleled in a recently reported series of sites on the south coast of Papua. The sites consist of rock shelters or niches which contain bones, sherds and intact vessels (Allen and Littlewood 1974).

These Cape Rodney sites were partially looted making exact comparisons with Nuamata tenuous. Twenty seven vessels and sherds are described in detail by Allen and Littlewood. Other material, donated by collectors and poorly documented, is held in the collections of the Department of Anthropology and Sociology, University of Papua New Guinea. The pottery displays a remarkable range of variation. Allen and Littlewood are convinced that two traditions, if not more, are represented. Some of the pottery resembles historic Wari and Tubetube Island wares (Lauer 1974:Plate 25F,G) or, within the same Southern Massim style, Panaeati Island ceramics (Tindale and Bartlett 1937). Specimens E7028 (PNG Museum catalogue), E7042 and AHC2 (Niugini Archaeological Survey nomenclature) fall well within the range of Lauer's (1974) historic and prehistoric Goodenough Island material (see also Lauer 1973b). Vessel AHC7 is similar to Collingwood Bay Group W wares. This is a large vertical-walled bowl with a deeper basin than those found at Nuamata. The upper body is decorated with a grooved angular motif (Bd 18) which is found on 13% of Group W ceramics. Globular pots with gently everted rims are also reported at Cape Rodney (AD30). With respect to form, the vessels belong to Ceramic Groups D or F. The Cape Rodney material clearly includes multiple traditions and could well have been used throughout a period of time equal in duration to the Nuamata assemblage.

Pottery Distribution and Trade

The Trobriand Islands

The ceramics found on the Trobriand Islands appear to be trade wares; apparently suitable clay sources are not available upon the coral-based islands and hence an indigenous ceramic industry never developed there. Three sources can be recognised for the imported pottery: the mainland, the northern D'Entrecasteaux Islands and Tubetube and Wari Islands in the Southern Massim. This last source accounts for a very few vessels only which probably arrived as part of kula-associated trade. Before the advent of European metal vessels, a brisk trade was carried on between the Trobriand Islands and the Amphlett Islands in the D'Entrecasteaux. The Amphlett Islanders were considered by Malinowski (1922:282-3) to be 'the only purveyors to the Trobrianders of pottery'. The trade which brought mainland ceramics to the islands spans the Early Ceramic Phase and the Expansion Phase of the Collingwood Bay sequence. During most of this time D'Entrecasteaux ceramics were also being traded to the Trobriand Islands. The antiquity of the interaction between these areas must be at least a thousand years and could well be of the order of two thousand.
Goodenough Island

During these same phases mainland wares were traded to Goodenough Island. Some of this material has already been discussed in terms of its relationship to the Nuama complex; however, other features are of equal importance. Lauer (1974:201-12; cf. Lauer 1971:205) recorded three sites on Goodenough Island (G.24, G.25 and G.26) which contained sizeable quantities of mainland sherds. These sherds were distinguishable by their paste, the most characteristic feature of which is the presence of small whitish grains of volcanic ash. This natural inclusion contrasts with mineral assemblage of the local D'Entrecasteaux paste (Key 1968:656) of which talc is the most readily identifiable element. Some sherds made in this local paste but in the mainland style, were found on the three Goodenough Island sites.

Table 17 lists the distribution of prehistoric sherds from sites G.24, G.25 and G.26. The characteristic features of the paste were used to separate the mainland from the island sherds and rim profile was used to determine ceramic group membership. Only rim sherds were analysed, those unclassified being too small to orientate and assign to a specific group. The total number of sherds analysed by Lauer (1974:210-11, Appendix III) differs from that of my own later analysis of the same collections. Certain sherds were probably removed for clay analysis and never returned.

Site G.25 has the highest proportion of sherds of mainland manufacture with a lesser amount at G.24 and very few at G.26. The most popular vessel form represented by the mainland sherds at G.24 and G.25 is Group U followed by Group Q. Both of these ceramic groups are typified by relatively shallow open bowls. In the excavation sequence Group Q is best represented in Mounds B and D, while Group U is strongest in the Mound B deposits (Figs 17, 18). In the surface collections from Collingwood Bay and the Trobriands Group Q (Fig. 19) was popular during both the Expansion Phase and the Refuge Phase. Group U never accounts for more than 5% of the ceramics in any collection. The large vertical-walled bowl form, Group X, is present at G.24. This vessel form accounts for 31.5% of the pots at Nuamata (Egloff 1972:Table 1).

The preponderance of vessels in the D'Entrecasteaux ceramic style, Groups A and N, at site G.24 suggests it has a relatively late position with respect to G.25 and G.26. Site G.26 has two forms, Groups J and P, characteristic of the Early Ceramic Phase. Group P is also represented at G.25. In the
Trobiand Island surface collections Group P is limited to the early stages of the sequence (Fig.18). The sizeable proportion of Group K wares, a restricted bowl form, at G.26 is less meaningful than the presence of Groups J and P. Group K is best represented in the lower zones of Mound C which would indicate a relatively early placement within the ceramic sequence; however, it does not manifest a specific pattern of distribution in the surface collections (Fig. 18). With respect to the sequence established for the Collingwood Bay and Trobiand Island sites, G.24 appears to belong to the later stages of, or to postdate, the Expansion Phase and G.25 and G.26 fit best within the Early Ceramic Phase.

The interaction between Collingwood Bay and Goodenough Island spans at least 500 to 1000 years of prehistory with an apparent base in the Early Ceramic Phase. During this period of interaction not only was pottery being traded from Collingwood Bay to Goodenough Island, but for an undetermined length of time the mental templates relating to ceramic models were shared. There is also the strong possibility of population exchange. This certainly speaks for a very close relationship which to some extent collapsed as the coastal mainland settlements at Collingwood Bay lost their influence over the surrounding area and retracted into refuge status.

Trade between Collingwood Bay and the southwest coast of Goodenough Island was present during historic times. Although it has never been discussed in the reports dealing with trade in this region (Lauer 1970a:Fig.3; Tueting 1935:12), an avenue of communication was established between Goodenough Island and Collingwood Bay. Within living memory the men of Wanigela used to travel annually in canoes to the Mukawa villages on the tip of Cape Vogel. There they would trade pottery for shell necklaces, obsidian and pigs. The people of Mukawa would then trade the pottery to the villages on the southwest coast of Goodenough Island for shell ornaments and obsidian. A shell necklace, called *wakek* by the Wanigela Ubir, which was included into this trading, is similar to the *soulava* which features in the *kula* exchanges (Malinowski 1922: 86-7). The link between the Mukawa peoples at Boga Boga and the Wanigela groups is so strong that there has been a transfer of ceramic technology. The people of Boga Boga make a thick-walled ware which they claim is a copy of the Wanigela pottery (Egloff 1973b).

Trade between Kalokalo on northern Goodenough Island and Kavitari in the Trobiand Islands is reported to have declined after the arrival of Europeans (Tueting 1935:11). Betel nuts, lime gourds, shell ornaments and baskets passed along this trade avenue.

There is no evidence for a major trade link between the southwest coast of Goodenough and the north coast of the island. Some trade goods could have filtered around the coast or perhaps travelled through the rugged interior of the island. However, an avenue which could have brought quantities of Collingwood Bay pottery to the north coast of Goodenough Island has not been recorded. In this connection it must be stressed that historic Wanigela pottery has not been reported on Goodenough Island and only two specimens have been recorded for the Trobiand Islands. These bowls, collected by Austen, are now in the British Museum collection (B.A.L. Cranston pers. comm., British Museum numbers 1936.10-3,2 and 1936.10-3,3). They are relatively shallow bowls decorated with impressed applique ribbons, a hallmark of historic Wanigela pottery (Egloff 1973b). Their specific provenance is not recorded and Austen (1939) does not mention them in his report on Trobiand burial pottery and stone monuments.

**Dyke Ackland Bay**

To the north of Collingwood Bay, sherds collected by C.A. Key and D. Songer at the Eroro Anglican Mission on Dyke Ackland Bay (Fig.1) have characteristics in common with pottery collected on those inland plain sites at Collingwood Bay assigned to the Expansion Phase (Plates 11a-d). The paste of the Eroro sherds contains a slightly different kind of volcanic ash from that of the Collingwood Bay material (C.A. Key pers. comm.), thus suggesting another centre of manufacture for this style of ware.
Goodenough Bay

To the south of Collingwood Bay, prehistoric sherds were found during the field survey near Boiani village. This community is situated at the head of Goodenough Bay, approximately 110 km southeast of Wanigela. Ceramics belonging to the Expansion Phase were found in the collections along with modern Boga Boga and East Cape wares. This village dump had obviously been used for a long period of time. Small stone arrangements and rock carvings are found in Boiani (Egloff 1970). The former could be a manifestation of the stone arrangement tradition which is present throughout much of the Massim and reached its height of elaboration on the Trobriand Islands.

COMPARISONS WITH SOUTH COAST CERAMICS

On the south coast of Papua, in the Port Moresby area, ongoing research is leading towards the development of a regional ceramic sequence (Allen 1972a; Bulmer 1971; Vanderwal 1973).

Bulmer (1971) has divided the material from her excavations and surface collections into four provisional classes, each having a general chronological significance. The earliest is thought to span the first millennium AD (see also Allen 1971) and is characterised by 'red-slipped wares' with some burnished black pottery. Vanderwal's (1973:100-7) work on Yule Island, to the west of Port Moresby (Fig.1), shows the term 'red-slipped' to cover a number of styles, all likely, however, to be decorated on the rim and upper body area with incised and scraped motifs. A specific variety of this red-slipped pottery has been found in the Papuan Gulf, 300 km northwest of Port Moresby (S.E. Bowdler pers. comm.). Bulmer (1971:53-6) relates the south coast red-slipped pottery to the widespread Lapita tradition (Golson 1971). Red-slipping is not well represented as a surface treatment in the Oreresan ceramics and the majority of what does occur comes from Mound C.

Vanderwal discusses the apparent similarities between the Developmental Phase pottery from Yule Island and the Early Ceramic Phase wares from Collingwood Bay (Vanderwal 1973:208). The carinated bowl form found at Collingwood Bay as Group S is strikingly similar to the Yule Island Type W in form; however, as Vanderwal points out, the Collingwood Bay pottery tends to be plain while its counterpart is highly decorated (Vanderwal 1973:Fig.VI-10, 208). The zoned shell impression and the cut-outs (Plate 8) of Group P and associated wares prompt Vanderwal (1973:208-9) into making further comparisons with his Type W. Vanderwal (1973:Fig.VI-11, 50, 236) places Type W within his Late Developmental Phase at a time slightly earlier than AD 1000. With respect to the connections between the D'Entrecasteaux Islands and the south Papuan coast, the small quantity of D'Entrecasteaux obsidian recorded by Vanderwal (1973:214) is of significance even though this comes from his Initial Ceramic Phase dated around the birth of Christ (Vanderwal 1973:196).

This picture has recently been elaborated and confirmed by further tests by W.R. Ambrose (pers. comm.). Of 32 samples from the Port Moresby site of Nebira 4, 30 come from the West Ferguson source of Kukua, while the other two samples gave no determination. The single piece of obsidian from the second millennium site of Motupvere Island is also from Kukua, as are all six samples tested from Maopa village further east on the Aroma Coast. Of 91 samples from the Mailu area three come from East Ferguson while the remainder come from West Ferguson sources, including 71 from Kukua.

Bulmer calls her second class of ceramics from the Port Moresby region 'Massim' and cites it as evidence for a close link with the D'Entrecasteaux Islands at approximately AD 1000 to 1400 (Bulmer 1971:57-9, 84-5). The dominant vessel form of this class is a spherical pot with either a direct rim or an abruptly restricted rim. Decoration is confined to the rim area and consists of relatively simple incised, grooved, appliqué and stippled motifs. Although there are similarities with both the D'Entrecasteaux prehistoric and historic wares, the correlation is strongest with the latter. The Port Moresby 'Massim' wares are similar in body and rim form to the D'Entrecasteaux wares, particularly to those collected from the surface of the historic Manubuleya and Vedakala sites on Goodenough Island (Lauer 1974:Tables 104-5).
The emergence of the D'Entrecasteaux ceramic tradition is undated, but there is sufficient evidence to propose that it has a considerable depth in time, spanning this AD 1000 to 1400 period. Bulmer's (1971:60-2) two other classes of Port Moresby region pottery appear to be significantly different from anything found in the area of my own research. However, it is necessary to note in connection with one of these classes, characterised by heavy globular pots with red 'painted' curvilinear and rectilinear designs, that C.D. Ollier (pers.comm.) found a few sherds of this kind in a Trobriand burial cave.

CULTURE AREAS AND TRADING SYSTEMS

We may now consider the relationships described in the last section in a broader cultural context. Dutton (1969:11-12) has recently summarised older theories concerning the antiquity of the Austronesian language groups in coastal Papua. These include Capell's 1943 statement that there existed in prehistoric times three main Austronesian regional languages in southeast Papua: one centred in the Port Moresby region, another including all of the south coast east of Cheshunt Bay (just east of Marshall Lagoon) and the eastern coast as far north as Cape Nelson, the third comprising all the Papuan islands. Dutton's work (1969:13-14) does not support this model. At the same time he considers all the various theories as having a single point of agreement: the status of the Austronesians as recent immigrants with an implied wider distribution in Papua than is historically evidenced. This proposition is not contradicted by the archaeological data; indeed it is to some extent supported. There is little value in discussing the obvious problems involved in associating prehistoric artifacts with existing language groups. However, since most of the ethnographically known ceramic centres in coastal Papua have inhabitants who speak Austronesian languages or have been strongly influenced by Austronesian speakers, it might be thought safe to assume that the same situation existed during recent prehistoric times. If so, then the prehistoric pottery using and manufacturing centre at Collingwood Bay was in all probability Austronesian linguistically and it certainly did diminish in size and influence about 500 years ago.

The south coast of Papua can be considered as a major area of interaction during prehistoric pottery-using times as can the Massim and the adjacent eastern coast of Papua. Both areas have ethno graphic counterparts in the kula and hiri expeditions. These large-scale trading complexes enabled the coastal and island communities to draw upon resources from a varied geographical area. This commercial activity operated in an area of the world noted for its social fragmentation and relatively isolated linguistic groups. Such marked insularity of local groups would at the first glance seem to hinder, if not make impossible, integrating networks of this scale. However, mechanisms such as the kula operate across the grain of localised social systems to offset their insularity (Ubertoi 1962:67, 74, 158).

The large-scale trading systems are an extension of the local pattern of resource exploitation. A social group exploits diverse elements of the local environment. The gardens, hunting areas, orchards and the sources of raw materials utilised by a single individual within it may be widely dispersed (cf. Clarke 1971:165-8). It is then well within this pattern to broaden as much as possible the resource base of the community through trade. In addition Ubertoi (1962:124-38) states of the kula that it is in part a system that ascribes individual and group status. Economic advantage is the prime mechanism whereby an individual or social group gains authority.

In a study of recent neolithic trade in the New Guinea Highlands, Hughes (1971:360-6) describes networks crossing physiographic, ecological and cultural boundaries which are the situations in which trade becomes imperative and speaks (ibid:351) of nodes or trade centres in the network where the primary determinant is access to natural resources. The study is a refutation of Harding's (1967:242) statement that a maritime canoe complex is necessary in order to achieve widespread regional integration through trade.

One of the links in the recent southeast Papuan trade network was an overland trail from the head of Goodenough Bay to the south Papuan coast, i.e.
Bartle Bay to Orangerie Bay (Belshaw 1955: Map 1; Tueting 1935:24-5). This could well have been used during prehistoric times to bring northern Massim ceramics to the Cape Rodney region. However, Cape Rodney lies well to the west of the traditional westward limit of the kula-associated trade on the south Papuan coast. The Massim groups never went through the Mailu barrier 100 km to the east of Cape Rodney (Tueting 1935:8). The Cape Rodney evidence could argue for a considerably more expansive trade network during prehistoric times than that historically recorded. 

'Pure trade' and 'pure ceremonial exchange' are viewed by Hughes (1971:358 and Table 17) as 'only idealisations, the poles at the ends of a continuum of occasions when goods exchange hands'. Lauer (1970a) broadens our view of the kula and discusses the flow of Amphlett Island pottery along the avenues of ceremonial trade. The extent and duration of the prehistoric trade networks in coastal and island Papua New Guinea must have acted as an integrating system. This integration in eastern Papua is manifested in the characteristic Massim art style.

COLLINGWOOD BAY IN WIDER CULTURAL CONTEXT

How could the widespread Collingwood Bay ceramic tradition vanish without leaving a significant residue of traits in the modern ceramic industries of the region? If these traits exist, they are certainly obscure. The prehistoric D'Entrecasteaux ceramic tradition has continued into the present and it is just possible that the modern Wanigela wares are an offshoot of it. The problem of the disappearance of the prehistoric Collingwood Bay tradition is matched by the equally knotty question of its initiation.

The ceramics which I have assigned to the Early Ceramic Phase are only tentatively related to the mound ceramics. Stylistically these wares are characterised by triangular impressions or cut-outs on the labial flange (Group P), a gambrelled shoulder on the bowl forms (Group S), elaborate pedestals decorated with cut-outs (Group P), and an associated ceramic style which is decorated with shell stamping on the upper body and triangular impressions on the shoulder flange (Plate 8c). Lauer found what could be considered a counterpart to Group P on the D'Entrecasteaux and Trobriand Islands. This ware has a wide labial flange which is often decorated with shell impressions. The vessel form appears to be that of a shallow bowl which is represented as having a gambrel shoulder (Lauer 1974:PR 17 on Plates 27, 28). A few of these sherds were found in my own Trobriand Island collections (Plates lle, f). Unfortunately all of them were so battered they could not be included in the ceramic analysis. Both Lauer's PR 17 and my own 'pre-mound' ceramics (Group P, S and J), upon relatively weak stylistic evidence, can be considered the oldest ceramics from this area of Papua.

It is then possible to consider two primary influences in the early ceramics of eastern Papua New Guinea. The earliest pottery excavated at Watom Island (Specht 1968), Buka Island (Specht 1969) and on the south coast of Papua (Allen 1972a; Bulmer 1971; Vanderwal 1973) belongs or is related to the widespread Lapita Tradition of the western Pacific (see Golson 1971). Investigations in the Massim Islands and along the eastern coast of Papua have failed to produce any evidence of the Lapita Tradition. Its place is apparently taken by the distinctive Early Ceramic Phase material partially defined here, the hallmark of which is the pedestalled bowl. The distribution of Early Ceramic Phase pottery, which is well represented on the Trobriand Islands and to a lesser extent on the mainland, could indicate that it belonged to a sea-faring people. The most likely candidate would be an Austronesian-speaking, marine-oriented population, which perhaps spread southwards along the east coast of Papua.

The wares of the Early Ceramic Phase have no parallel in the pottery of island Melanesia, with one exception. During my reanalysis of Lauer's (1970b) surface collections from the D'Entrecasteaux and Trobriand Islands eight cord-marked sherds were identified (Plate 17). Six are in the collection from the Early Ceramic Phase site G.26 on Goodenough Island (Lauer 1974:202) and the others are from T.74 and T.87 in the Trobriands (Lauer 1974:230). Cord-marked
Plate 17  Cord-marked sherds from Goodenough Island and the Trobriand Islands, collected by P.K. Lauer: a-f. site G.26 (interior and exterior of e.); g. site T.74; h. site T.87
sherds have never been reported in Papua New Guinea; their discovery at the early site of G.26 indicates that the early phases of ceramic use in Papua may reveal a variety of influences when they are fully understood. Garanger (1972:Fig.33) has a remarkable collection of cord-marked sherds from the plaine de Mele on Efate in the central New Hebrides and discusses (ibid:126) the possible relationships of this decorative style with the Lapita Tradition of the Pacific islands and the Sa-Huỳnh-Kalanay material of southeast Asia. Palmer (1972:715) mentions cord-marked pottery from Fiji but fails to make a specific reference to the site or general context. In the same article (ibid:716) he refers to prehistoric paddle-impressed pottery from the Trobriand Islands. Specific particulars are absent and it should be stressed that Lauer (1974:227-38) did not record paddle-impressed sherds on the Trobriand Islands and not a single sherd of this nature was found on the prehistoric sites surveyed for this study.

Although pots with a crude solid pedestal-base or handle, depending on whether it is used as a lid or a dish, are currently being produced by the Aibom of the middle Sepik River, pedestalled vessels, as distinct from cylindrical pot stands (see Palmer 1972:Fig.5), have not been reported in a prehistoric assemblage from the southwest Pacific.

A particularly close resemblance is seen in the Metal Age pedestalled bowls from the Philippines (Fox 1970:Plate XVI). The form is almost identical and the decorative cut-out and labial flange are markedly similar. Fox (1970:103, 112) regards this ceramic material from Palawan as 'Developed Metal Age' and possibly dating as early as 250 to 200 BC. The pedestal is not a form which is easily invented and there is every reason to propose that Collingwood Bay pedestalled wares are derived more or less directly from a southeast Asian prototype. The carved stone mortars found throughout most of Papua New Guinea often have a pedestal base and elaborate raised decoration (Schmitt 1966; Moore and Turner 1968:57). These highly distinctive and often elaborate items are of unknown antiquity and have been regarded as reflecting possible Bronze Age influences (Bulmer and Bulmer 1964:67-72; Hughes 1971:25-7), as is readily apparent in some of the elaborate stone axes from New Guinea (Casey 1939:144-5; Riesenfeld 1955).

Discussing the reality of southeast Asian metal age influence in the south Pacific, Golson (1972a:582-6) points to Collingwood Bay specifically. No actual bronze finds have been made east of Lake Sentani, inland from the north coast of Irian Jaya near Djayapura, where bronze axes of Dong-son style have been discovered (Kooijman 1959). Badner (1972), however, has recently argued for Dong-son influences in the art of the Admiralty Islands, particularly emphasising the canoe prow with its spiral plus bird-and-man designs and the spiral-handled bowl as indicating the presence there of the Dong-son ship-of-the-dead complex. Golson (1972a:584) points to the bird motif found on a shell in the Money collection at the Australian Museum (White, Disney and Yaldwyn 1970) as forming a link between prehistoric Collingwood Bay and the same complex. Additional strength is lent to the argument by the other scroll-decorated shells of Collingwood Bay and the clearly related prehistoric shell from the Trobriands currently being used in kula exchanges (Mackay 1971). The elaborate scroll work on Trobriand canoe prows (Malinowski 1922:Plate XXIV) could have been equally influenced by Dong-son-derived artistic styles.

The absence of the scroll motif from the Early Ceramic Phase wares could be considered as an objection; however, our understanding of this material is so limited that it hardly vitiates the argument. It must be remembered that Golson proposed consideration of Collingwood Bay in connection with the enigmatic 'Bronze Age' features of Papua New Guinea prehistory in 1968 prior to the discovery of pedestalled wares at Waniqela. Thus, perhaps, the case is strengthened. Extensive research remains to be done, however, before the parallels can be explicitly demonstrated and Papua New Guinea can, in this and other respects, be integrated into the picture of world prehistory (cf. Golson 1972b:16-19).
APPENDIX 1

EXCAVATION UNITS PROVIDING THE MATERIAL ANALYSED

Ceramics

*Mound B*  midden analysis - 32R66 - 32R68
            ceramic analysis - 33R66 - 33R68
*Mound C*  midden analysis - 75R11 - 75R15
            ceramic analysis - 75R13 - 75R15
*Mound D*  ceramic analysis - 12R222 - 12R224

Mollusca

*Mound B*  32R64 - 32R65, 32R66 - 32R67, 32R68 - 32R69
*Mound C*  75R14 - 75R15

Bone, Pumice and Stone, Obsidian, and Pumice Artifacts

*Mound B*  all units excavated, excluding 32R62 - 32R64
*Mound C*  all units excavated, excluding 75R9 - 75R11

The location of these units is indicated on Figures 7-9. The units selected for the midden and ceramic analysis were chosen because they proved to be free from intrusions and had a relatively well defined zonation. Material for the ceramic analysis came from units whose specimens arrived from the field after less than six months in transit.
APPENDIX 2

THE PRESENT-DAY AVAILABILITY AND UTILISATION OF THE EXCAVATED MOLLUSCA IN THE WANIGELA AREA

The diet of the Wanigela people is augmented by small quantities of mollusca but it is impossible to estimate just how many shell fish are eaten. Many shells serve as scrapers or ceramic tools, with certain species being used to make ornaments.

The list which follows was prepared from data and specimens gathered in the field, with the later assistance of G. Buick, University of Papua New Guinea, E. Coleman Glover, Canberra and W. Ponder, The Australian Museum. My own observations have been used to qualify their data, so I assume all responsibility for any errors that may have crept into the list. A study by T. Kira (1962) proved to be helpful and was often referred to. A paper by R.N.H. Bulmer (1969) outlines the procedures and problems involved in ethno-zoology. It is apparent that this study falls short of the ideal. Not only was my work handicapped by a shortage of time but my minimal grasp of the language made any acute understanding of the folk-taxonomy impossible.

The Ubir names are spelled in a manner consistent with the Ubir dictionary prepared by the staff of the Anglican Mission, Wanigela. For the use of this document I am indebted to Sister H. Roberts.

KEY

<table>
<thead>
<tr>
<th>Family name</th>
<th>Zoological environment</th>
<th>Scientific name</th>
<th>Ubir name</th>
<th>Ethnographic environment</th>
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<tr>
<td>Anadara sp.</td>
<td>tidal mud flat</td>
<td>sea weeds</td>
<td>1.6</td>
<td>2.27</td>
</tr>
<tr>
<td>Nautilius pompilius</td>
<td>deep sea</td>
<td>roke matan</td>
<td>deep sea</td>
<td>-</td>
</tr>
<tr>
<td>Cardiwm sp.</td>
<td>subtidal, sandy</td>
<td>deep sea</td>
<td>0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>Cardiwm sp.</td>
<td>linked</td>
<td>deep sea</td>
<td>0.5</td>
<td>0.9</td>
</tr>
</tbody>
</table>

ARCIDAE

Anadara sp.
Usage: item of diet and used for net weights

ARGONAUTIDAE

Nautilus pompilius
Usage: item of diet

CARDIIDAE

CARDIIDAE

Cardiwm sp.
Usage: item of diet and as a ceramic tool

CARDIIDAE

Cardiwm sp.
Usage: this species is not eaten
<table>
<thead>
<tr>
<th>Family</th>
<th>Habitat</th>
<th>Species</th>
<th>Usage:</th>
<th>Location</th>
<th>Height</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>CERITHIIDAE</td>
<td>subtidal, sandy</td>
<td>Cerithium nodolosus</td>
<td>item of diet</td>
<td>sisi</td>
<td>mangroves</td>
<td>-</td>
</tr>
<tr>
<td>CONIDAE</td>
<td>subtidal, reefs</td>
<td>Conus (lividus?)</td>
<td>item of diet and for decoration</td>
<td>tutut</td>
<td>shallow sea</td>
<td>2.3 0.5</td>
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<tr>
<td>CORBICULIDAE</td>
<td>fresh water</td>
<td>Batissa violacea</td>
<td>item of diet and as a ceramic tool</td>
<td>kwasas</td>
<td>rivers</td>
<td>12.4 4.3</td>
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<td>subtidal, reefs</td>
<td>Cypraea arabaica</td>
<td>used for decoration</td>
<td>fui</td>
<td>reef</td>
<td>0.3 0.3</td>
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<td>tidal, sandy (beach)</td>
<td>Donax cuneata</td>
<td>item of diet</td>
<td>safe</td>
<td>sea shore</td>
<td>0.1 -</td>
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<tr>
<td>FASCIOLARIIDAE</td>
<td>subtidal, reefs?</td>
<td>Latirus sp.</td>
<td>this species is not eaten</td>
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<td>reef</td>
<td>- 0.1</td>
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<tr>
<td>GELOINIDAE</td>
<td>tidal mud flat</td>
<td>Geloina (coaxam?)</td>
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<td>Lutraria sp.</td>
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<td>kamatan</td>
<td>sea weeds</td>
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<td>subtidal, reefs?</td>
<td>Mitra eremitarum</td>
<td>this species is not eaten</td>
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<td>deep sea</td>
<td>- -</td>
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<tr>
<td>MURICIDAE</td>
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<td>Chicorurus torrefactus</td>
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<td>amur</td>
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<td>Nerita sp.</td>
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<td>matasfot</td>
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<td>0.8 0.4</td>
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<td>Nerita sp.</td>
<td>item of diet</td>
<td>yayab</td>
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<td>9.5 6.3</td>
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<td>1.0 1.1</td>
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<td>Habitat</td>
<td>Species</td>
<td>Location</td>
<td>Usage</td>
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<td>Cerithidea sp.</td>
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<td>Telescopium telescopium</td>
<td>sipa</td>
<td>mangroves</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Terebra palustris</td>
<td>guma</td>
<td>mangroves</td>
<td></td>
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<tr>
<td>SPONDYLIDAE</td>
<td>subtidal, reefs?</td>
<td>Spondylus (ducalis?)</td>
<td>kokaf</td>
<td>reefs</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Spondylus ducalis</td>
<td>korafis</td>
<td>deep sea</td>
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<tr>
<td>STROMBIDAE</td>
<td>subtidal, reefs?</td>
<td>Lambis lambis</td>
<td>daudur</td>
<td>deep sea</td>
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<tr>
<td></td>
<td></td>
<td>Strombus canarium</td>
<td>saurab</td>
<td>shallow sea</td>
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<tr>
<td></td>
<td></td>
<td>Strombus labiatus</td>
<td>jauj</td>
<td>deep sea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THIARIDAE</td>
<td>freshwater</td>
<td>Melania (diadema?)</td>
<td>daur</td>
<td>deep sea</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Stenomelania denisoniensis</td>
<td>giman</td>
<td>river</td>
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<tr>
<td></td>
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<td>Melania junota</td>
<td>tidal mud flat</td>
<td>mangroves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRIDACNIDAE</td>
<td>subtidal, reefs?</td>
<td>Hippopus hippopus</td>
<td>kome</td>
<td>reefs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TROCHIDAE</td>
<td>subtidal, reefs?</td>
<td>Trochus genestratus</td>
<td>kokoar</td>
<td>swamp</td>
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<tr>
<td></td>
<td></td>
<td>Trochus niloticus</td>
<td>jingo</td>
<td>deep sea</td>
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<tr>
<td>TURBINIDAE</td>
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<td>Angaria atrata</td>
<td>kokorek</td>
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<td>VENERIDAE</td>
<td>subtidal, sandy</td>
<td>Anomalodes squamosus</td>
<td>kire</td>
<td>deep sea</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Cafrarium tumidum</td>
<td>warewan</td>
<td>swamp</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Pertiglypta puerpera</td>
<td>nakwer</td>
<td>mangroves</td>
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</table>

Usage: item of diet, unless otherwise noted.
<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
<th>Habitat</th>
<th>Usage</th>
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</thead>
<tbody>
<tr>
<td>Periglypta sp.</td>
<td>fanim</td>
<td>deep sea</td>
<td>this species is not eaten</td>
</tr>
<tr>
<td>Pitar sp.</td>
<td>mogoruf</td>
<td>shallow sea</td>
<td>item of diet</td>
</tr>
<tr>
<td>Pitar sp.</td>
<td>yamum</td>
<td>mangroves</td>
<td>item of diet</td>
</tr>
<tr>
<td><strong>VOLUTIDAE</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Melo amphora</td>
<td>yaroyar</td>
<td>shallow sea</td>
<td>item of diet and for decoration</td>
</tr>
</tbody>
</table>

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APPENDIX 3

THE PRESENT-DAY AVAILABILITY AND UTILISATION OF MAMMAL, BIRD AND REPTILE FAUNA IN THE COLLINGWOOD BAY REGION

The people of Wanigela derive most of their food from vegetable sources. Pigs, both domestic and wild, and to a lesser extent wallabies supplement the basic starch diet. Although the protein portion of the daily diet is almost negligible, on special occasions meat is consumed in greater than normal quantities. Many communities are located along the shore of Collingwood Bay but there appears to be a minimal exploitation of sea resources. The people possess canoes and fishing gear, which gives a somewhat false impression that they regularly harvest the sea. Evidence surviving in the prehistoric middens suggests a dietary pattern similar to that found in the contemporary villages. Pig and wallaby bones predominate, while fish bones are all but absent. Other small mammals are present only in minor quantities. Since the fish remains in the archaeological deposit are negligible and their exact contribution to the modern diet is in question, the utilisation of fish resources will not be treated in detail.

The availability of mammals in the sector adjacent to the midden is relatively difficult to determine. The Archbold Expedition (Brass 1956) researched an area from the south-west coast of Collingwood Bay inland to Mt Dayman. The number of mammal species increased progressively inland and at higher altitudes. At Baiawa, a coastal village in a situation similar to that occupied by Oresesan and Rainu villages, the Archbold Expedition found mammals hard to come by. Only *Macropus agilis* and *Isodon macrourus* were recorded at this camp. This same paucity of mammals could well exist in the coastal sector of Wanigela.

Inland on the grasslands and in the bush more species are found. A list of these animals follows. It is based not only upon the results of the Archbold Expedition (Brass 1956) but also on the experience of J. Hope, Department of Prehistory, ANU, who helped considerably with the faunal material from the excavations. This list is neither definitive nor exhaustive but is designed to present the range of animals that would be available by hunting no more than 8-11 km from the archaeological sites on the coast. It is recognised that this study is compromised by the lack of ethnographic data. Time and energy were directed primarily to the archaeological situation and secondarily towards the ethnographic aspects of ceramics, material culture, settlement patterns and molluscan utilisation.

Many factors can bias the archaeological picture of an environment. Differential preservation may eliminate certain ranges of the faunal spectrum. Dogs and pigs are known to consume the bones of small animals. The animals present in the archaeological deposit may not be representative of the total range of species available because the people were not utilising all the available resources. Aside from preservation, there are many cultural conditions which strongly influence the range of animal remains discarded by any social group, such as the nature of butchering techniques and food preparation. Age, sex, rank and group membership may further restrict the range of species to which any single person has access. These factors must all be held in consideration when an attempt is being made to reconstruct a living culture from dead refuse.

**MARSUPIALS**

*Macropus agilis*: Sandy or Agile Wallaby

This animal is well represented in the archaeological deposit as an item of diet (Table 1) and a material used for tools. Long bones were made into spatulae, awls and tubes. Today large communal hunts are held in the grasslands to the west of Wanigela. The villagers kill wallabies, pigs and bandicoots during the hunt.
Dorcopsis sp: Scrub Wallaby

This small wallaby was not found in the deposits nor did I see it in the area. The villagers spoke of a small wallaby which they sometimes hunted in the bush, as opposed to the larger *Macropus* which was hunted in the grasslands.

*Phalanger maculatus*: Spotted Cuscus

This animal is found in limited numbers in the archaeological deposits. Apparently it is eaten by the villagers whenever it is captured. I did observe killed animals of this genus but I am not certain of the exact species.

*Phalanger orientalis*: Common Cuscus

This species was not identified in the archaeological deposits.

*Phalanger gymnotis*: Grey Cuscus

This species was not identified in the archaeological deposits.

*Dactylorhiza trivirgata*: Striped Possum

This species was not identified in the archaeological deposits nor did I see it in the area.

*Distoechurus pennatus*: Feather-tailed Glider

This species was not identified in the archaeological deposits nor was it seen in the area.

*Petaurus breviceps*: Sugar Glider

This species was not identified in the archaeological deposits nor was it seen in the area.

*Isoodon macrourus*: Short-nosed Bandicoot

The bandicoot present in the archaeological deposits is probably referable to this species and in fact one actually fell into the trenches and was captured. The animal is eaten by the villagers and frequently encountered along the bush tracks and on the grasslands.

*Peroryctes raffrayanus*: Raffray's Bandicoot

This large bandicoot was not observed nor was it found in the archaeological deposits.

**RODENTS**

The only rodent identified in the archaeological deposits was the rat *Uromys* sp. To the best of my knowledge rats are not eaten by the villagers but may well have been in the past. Following is a list of the rodents known to be in the area.

- *Rattus* (exulans?)
- *Rattus* (verecundus?)
- *Melomys* sp.
- *Pogonomys* sp.
- *Uromys caudimaculatus*
- *Hydromys chrysogaster*

**BATS**

Chiroptera remains were not identified in the archaeological deposits but there should be bones of these animals present since today they are eaten and used for tools (bone needles) by many villagers in the region. Although it is difficult to tell which species are present in the area, the following
list gives the range of possibilities.

Pteropus sp.
P. neohibernicus
Dobsonia moluccoens
Macroglossus sp.
Rousettus sp.
Kerivoula sp.
Emballonura sp.
Pipistrellus sp.
Miniopterus sp.
Philetor sp.
Hipposideros sp.

REPTILES

Snakes are frequently encountered along the bush tracks and the natives usually avoid them as much as possible. A few reptile vertebrae were found in the archaeological deposits but these cannot be identified as to genus. Certain snakes, known as 'sleeping' snakes, are thought to be totemic so are not harmed.

A large water lizard is found in the swamps adjacent to the Wanigela villages. It is hunted primarily for its skin, which is used for drum heads. Crocodiles also live in the swamps and reports of their entering the villages during the night in search of pigs are frequent. The crocodile is also totemic and is represented upon ceramic vessels and tapa cloth of individuals belonging to the appropriate clan. Crocodile bones were not found in the archaeological deposits.

Large sea turtles are hunted for their meat and shells. The shell is made into combs and net-making bobbins. The meat of the turtle is often used as bait in crocodile traps. One informant told me that only certain people in the village could eat the meat of 'some' turtles; this also applied to certain fish.

BIRDS

Brass (1956) does not describe the birds collected by his expedition since they were of no particular interest to its members. As a result only those which were actually observed in the area will be discussed.

Any bird with bright plumage is killed if possible. During traditional times the Wanigela people traded pots for feathers with inland tribes. A number of birds are probably eaten, but I saw only the hornbill and pigeon being hunted for this purpose. The villagers claim to hunt brush turkeys, whose presence in the area is attested by the large nests seen in the bush. The cassowary is hunted for its feathers, meat and bones. My only encounter with a cassowary was when neighbours brought me a tibia of this large bird which they were making into a spatula. Some of the fragmented bone spatulae found in the archaeological deposits could well be from this bird, but no positively identifiable specimen was recovered.
Fourteen classes of descriptive attributes were chosen for coding. The classes and the individual attributes were selected because of their ability to describe in a relatively precise manner the ceramics under study. Paste, an attribute class normally considered significant, was not included in this analysis. Earlier research indicated that the majority of the ceramics had their genesis in the clay sources which lie in the Wanigela area (Key 1968). D'Entrecasteaux sherds recovered from the Trobriand Islands were an exception to this rule, since their clays came from Goodenough Island or Ferguson Island. Tempers were not added to the clays and distinctions between the various pastes are best made with a polarising microscope. Since this method requires a thin section of the sherd, it was applied to a small sample only (see Key 1968).

With the single exception of paste, all diagnostic features found on the rim sherds are included in the fourteen attribute classes. Only one attribute is present in each class. An example of this is the attribute class of body decoration (Class XII). Within this class there are 44 attributes, some of which are combinations of elements which appear elsewhere in the class as single attributes. Since the data were being tabulated by computer, the programming was simplified by making it necessary to consider only one entry in each class.

The first entries in the code (Fig. 20) are concerned with the identification of the specimen and its location within the excavations and surface collections. Fourteen reasonably straightforward descriptive classes follow the initial identification. Most of the classes and attributes are assigned nomenclatures which are relatively standard (Deetz 1965; Shepard 1963); however, some of them require clarification.

Classes I and II refer to the finish of the vessel, either in a plain state or after decoration. Attribute 6, red-slipped, is a haematite-rich red slip which, when applied to the surface of the vessel, produced a red chalky film that was easily removed through time and probably more common than the analysis indicates. Evidence of painted designs is not present. Very few examples of pattern burnishing occur (Plate 7a). When the burnishing reached a high lustre over the surface of the sherd, it was termed polishing. Most of the ceramics were lightly burnished or smoothed.

Class III, percent of rim present, is measured on the device pictured in Figure 14. This was calculated in units of 5% and used to factor the data. The 'percentage factor' is the mean of the units: 0-5% = 2.5, 5-10% = 7.5, 10-15% = 12.5, 15-20% = 17.5 and so on to 100%.

Classes IV and V, orifice radius and maximum body radius, were measured. These measurements are not plotted in Figure 21 but the means of the former are recorded in Table 6. Maximum body radius could only be determined on a very few sherds and is of little descriptive use when applied to the entire collection.

Class VI, rebating, is one of the diagnostic features found on many of the prehistoric sherds from Collingwood Bay. It is a small groove or rebate which lies 2-3 cm below the lip on the interior of the vessel. The rebate was probably made by trailing the thumb, with considerable pressure, around the inside circumference of the rim.

Class VII, rim form, was determined by using model attribute forms rather than measurements. The latter method, although applicable in many instances, generated a series of perplexing classes when applied during a preliminary analysis. These proved to be obscure and difficult to relate to actual vessel styles.
To facilitate coding, the 115 rim forms were divided into six major groups, five of which refer to the generalised vessel form believed to be associated with that rim shape. Shape classification of ceramic vessels and its nomenclatures are rather complex and Shepard's (1963:224-55) terminology has been modified to some degree for ease of communication. The six groups of rim forms are described below with respect to Shepard's terminology.

1. Direct rims belonging to restricted spherical vessels: these can also be termed simple restricted spherical (or spheroid) forms (Shepard 1963:Fig.23).

2. Everted or thickened rims belonging to various jar forms: most rim forms in this group belong to Shepard's (1963:Fig.22) 'independent restricted vessels with inflected contours'. Throughout the text members of this group are considered to be either jars or globular vessels. The former refers to the relatively straight-necked varieties, whilst the latter includes those vessels having a more pronounced expansion at the equator.

3. Rim forms belonging to restricted composite vessels: this group includes a diversified range of forms generally referred to as restricted bowls, some of which, particularly Rim forms 56, 58 and 59, would more correctly belong in the 'vessel form unknown' group.

4. Rims belonging to various unrestricted forms: throughout the text 'open bowl' is used to refer to this mixed array of forms. Rim forms 92, 93 and 94 would be better placed in the 'unknown' group. These three rim forms and those mentioned in the restricted bowl group are an extreme minority in the surface collections and excavations.

5. Rims belonging to composite vessels having a shoulder to lip height of greater than 3.5 cm: these are generally unrestricted vessels with composite contours (Shepard 1963:Figs 22, 23). Rim form 105 grades into Rf 64, a composite hemispherical bowl belonging to the fourth group of rim forms.

6. Rims belonging to vessels of unknown form: small rim sherds with less definite indications of vessel form were placed in this group.

Classes VIII to X describe the decorative elements found on the lip (Ld) and rim (Rd) areas. Lip refers to that point on or near the termination of the rim which best divides the inner vessel wall from the outer. The specific sectors of the vessel included in the definition of lip, inner rim and outer rim areas are indicated in Figure 20, Class VII.

Decorative techniques found within this class are described as channelled i.e. grooved, incised, punctated and stamped i.e. impressed. Punctuation and incision were made with a sharp-pointed tool and stamping with the edge or side of a shell (perhaps Cardium sp.). The term 'dished' describes an indentation made by pressing the thumb into the soft clay. Small applied rolls or dots of clay are relatively common and frequently combined with other elements. Ld 24 and Rd 19 are patterns of small triangles taking the form either of cut-outs which completely pierce the lip or rim area, or of shallow impressions made with a triangular tool, or excisions carved with a sharp tool.

Classes XI to XII consider the placement and form of body decoration (Bd).

Most of the techniques used are similar to those described for the lip and rim decoration. Bd 2, ribbon, is an appliqué strip which is only partially welded to the vessel body. The 'wide channel' attribute (Bd 9 and 10) is a groove approximately 1.0-1.5 cm wide and less than 5 mm deep which is found below the lip on some large bowl forms. Shallow channels (Bd 40-43) are narrower and not as deep as the deeper channels (Bd 11-33, 36-38) which are the more common form of body decoration.

Bd 44 was included in the analysis but was found on only two sherds, both of which were from Tro.21, Kwadagila, an historic site on the Trobriand Islands. These sherds probably belong to vessels made on Wari or Tubetube Islands in the Southern Massim and traded through the kula to the Trobriand Islands (Seligmann 1910:536; cf. Lauer 1970b:Plates 50F and O).
Class XIII, shoulder decoration (Sd), includes the same range of elements found on the lip area with the addition of Sd 7, notched flange, which refers to a strip of clay (or flange) which is added to the shoulder area and modified by notching.

Class XIV, appendages at shoulder and rim, includes three attributes:

1. Tab handles (Plates 7f and 9g): a small protrusion or flange found primarily on the lips of jar forms (Rf 23), open bowl forms (Rf 77, 79) and restricted bowls (Rf 40, 52). This is the most popular form of appendage, being present on 1% of the sherds. Over 97% of the sherds are without any form of appendage.

2. Small double lugs: these have the same form as the large lugs described below but are considerably smaller (2-3 cm long and protruding approximately 1 cm from the body). This attribute occurs on three sherds belonging to Rf 82 and single examples are found on six other forms.

3. Large lugs (Plates 10c,e): this attribute occurs either alone or in pairs, usually extending from lip to shoulder. Large lugs are found on a few open bowls, being commonest on Rf 88 and 90.

The 14 attribute classes include almost all the major and minor elements discerned on the 6210 sherds being analysed. A few elements were included which occurred only on a very few sherds; others were omitted. The full range of variation found within the Collingwood Bay and D'Entrecasteaux ceramic traditions is not included within this study. It would have been impossible to analyse and describe the complete collection of 5 tonnes.

Fig.20 The attribute code

<table>
<thead>
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<th>IDENTIFICATION</th>
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<tr>
<td>Sherd serial number</td>
<td>Site number</td>
</tr>
<tr>
<td>Sherd type</td>
<td>Sub unit of site</td>
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<tr>
<td>1. Rim sherd (only this category applies)</td>
<td>Horizontal unit</td>
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<tr>
<td>2. Shoulder sherd</td>
<td>Vertical unit</td>
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<td>3. Body sherd</td>
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<table>
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<tr>
<th>DESCRIPTION</th>
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<tr>
<td>Class I Surface finish – exterior</td>
</tr>
<tr>
<td>1. Not observable</td>
</tr>
<tr>
<td>2. Rough</td>
</tr>
<tr>
<td>3. Smoothed</td>
</tr>
<tr>
<td>4. Burnished</td>
</tr>
<tr>
<td>5. Polished</td>
</tr>
<tr>
<td>6. Red slipped</td>
</tr>
<tr>
<td>Class II Surface finish interior</td>
</tr>
<tr>
<td>1. to 6. Same as Surface finish – exterior</td>
</tr>
<tr>
<td>Class III Percent of rim present coded in five percent units</td>
</tr>
<tr>
<td>Class IV Orifice radius</td>
</tr>
<tr>
<td>1. Not observable</td>
</tr>
<tr>
<td>2. to 30. Centimetres radius</td>
</tr>
<tr>
<td>Class V Maximum body radius</td>
</tr>
<tr>
<td>Class VI Rebating</td>
</tr>
<tr>
<td>1. Absent</td>
</tr>
<tr>
<td>2. Present</td>
</tr>
</tbody>
</table>
Class VII Rim form | Direct rims belonging to restricted spherical vessels
---|---
1 | 2 | 3 | 4 | 5

Class VII Rim form | Everted or thickened rims belonging to various rim forms
---|---
6 | 7 | 8 | 9 | 10 | 11 | 12 | 13
14 | 15 | 16 | 17 | 18 | 19 | 20 | 21
22 | 23 | 24 | 25 | 26 | 27 | 28 | 29
30 | 31 | 32 | 33 | 34 | 35 | 36 | 37

Class VII Rim form | Rims belonging to restricted composite vessels
---|---
38 | 39 | 40 | 41 | 42 | 43
44 | 45 | 46 | 47 | 48 | 49 | 50 | 51
52 | 53 | 54 | 55 | 56 | 57 | 58 | 59

127
Class VII Rim form  Rims belonging to various unrestricted vessels

Class VII Rim form  Rims belonging to composite vessels having a shoulder to lip height of greater than 3.5 cm.

Class VII Rim form  Rims belonging to vessels of unknown forms
Class VIII Lip decoration

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<tr>
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<td>Incised</td>
</tr>
<tr>
<td>04</td>
<td>Channelled</td>
</tr>
<tr>
<td>05</td>
<td>Dished</td>
</tr>
<tr>
<td>06</td>
<td>Notched</td>
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<tr>
<td>07</td>
<td>Applied</td>
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</table>

Class IX Rim decoration — outer

Class X Rim decoration — inner

Class XI Body decoration placement

1. Not observable
2. Apparently absent on upper body
3. Absent on upper body
4. Absent on upper body
   Absent on lower body
5. Present on upper body
   Lower body unknown
6. Present on upper body
   Absent on lower body
7. Present on upper body
   Present on lower body
8. Absent on upper body
   Present on lower body

C = channelled  I = incised  P = punctated  S = stamped
### Class XII  Body decoration

<p>| | | | | | | | | |</p>
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<tr>
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<td>07</td>
<td>08</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>P</td>
<td>I</td>
<td>S</td>
<td>I</td>
<td></td>
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</tbody>
</table>

**Legend:**
- C = channelled
- I = incised
- P = punctated
- S = stamped

### Class XIII  Shoulder decoration

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<td>NOT APPLICABLE</td>
<td>PLAIN</td>
<td>CRIMPED OR RIBBON</td>
<td>CRIMPED OR RIBBON</td>
<td>NOTCHED</td>
<td>NOTCHED FLANGE</td>
<td>RIDGE</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>P</td>
<td></td>
<td></td>
<td>I</td>
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</tbody>
</table>

**Legend:**
- C = channelled
- I = incised
- P = punctated
- S = stamped

### Class XIV  Appendages at shoulder and rim

1. Tab handles
2. Small double lugs
3. Large lugs
The attributes were coded with a single IBM card representing each of the 6210 sherds. The problem was then presented to the Division of Computing Research, Commonwealth Scientific and Industrial Research Organisation, where J. Palmer devised a 'Program for Tabulating Archaeological Data'. This program was run on the Control Data 3600. The complete program and a description of each phase is on file in the Department of Prehistory, ANU.

The program generated four tables for each attribute class. This was done for every unit of the excavation and surface collection. These four Program Tables are:

1. **Program Table 1** The count of attributes present within each class
2. **Program Table 2** The percentage that each attribute represented of the total attribute count of that class
3. **Program Table 3** The weighting of Program Table 2 by the 'percentage factor'. This means that rim sherds representing from 0-5% of the vessel's orifice are weighted by 2.5, 5-10% by 7.5, 10-15% by 12.5, 15-20% by 17.5, etc.
4. **Program Table 4** This Program Table is calculated in the same fashion as Program Table 3 except that all sherds representing less than 5% of the vessel's orifice are dropped.

Figure 21 combines Program Tables 2, 3 and 4 into one chart for each class of the decorative attributes. Program Tables 3 and 4 have not been plotted for Class VII, rim form. Only Program Table 2 is presented for this class. Attribute Classes IV and V, consisting of measurements, have been omitted entirely. Figure 21 details only the excavated sherds.
POPULATION SIZE (all classes except Class XII)

METHOD 1  RIM SHERDS BY COUNT
METHOD 2  RIM SHERDS WEIGHTED by 'PERCENTAGE FACTOR'
METHOD 3  RIM SHERDS REPRESENTING GREATER THAN 5% OF
            THE VESSEL'S ORIFICE, WEIGHTED by
            'PERCENTAGE FACTOR'

CLASS I  Surface finish — exterior

Fig. 21  Mounds B, C and D: percentage distribution of attributes, by zone
CLASS II Surface finish — interior

CLASS III Percent of rim present

Fig. 21 Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21  Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21 Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
CLASS VII Rim form (cont.)

Fig. 21 Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21 Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21  Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Class VII Rim form (cont.)

Fig. 21 Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21 Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21 Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21  Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
<table>
<thead>
<tr>
<th>CLASS IX</th>
<th>Rim decoration — outer</th>
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<tr>
<td></td>
<td>Scale</td>
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<tr>
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<td>50%</td>
</tr>
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<td>C = channelled  I = incised  P = punctated  S = stamped</td>
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<tr>
<td>B</td>
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<td>D</td>
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**Fig. 21** Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21  Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21 Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21 Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21 Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21 Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
CLAS SXII  Body decoration (cont.)

CLASS XIII  Shoulder decoration

Fig. 21  Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
CLASS XIII  Shoulder decoration (cont.)

Fig. 21  Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
Fig. 21  Mounds B, C and D: percentage distribution of attributes, by zone (cont.)
APPENDIX 6

NIUGINI ARCHAEOLOGICAL SITE SURVEY DESIGNATIONS

The official designations in the Nuigini Archaeological Site Survey for the sites mentioned in the text are:

Collingwood Bay

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Trobiand Islands

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Nuamata Island

burial site = BJK

Goodenough Island

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