LAPITA INTERACTION

By
Glenn Summerhayes

2000

A Joint Publication by ANH Publications and The Centre for Archaeological Research
The Australian National University, Canberra, Australia
*Terra Australis* reports the results of archaeological and related research within the region south and east of Asia, through mainly Australia, New Guinea and Island Melanesia – lands that have remained *terra australis incognita* to generations of pre-historians.

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.
Glenn Summerhayes was born in Redfern in 1954 and raised in Blacktown, Sydney. He graduated with an MA from Sydney University in 1986. His thesis title was *Aspects of Melanesian Ceramics* and it involved the analysis of pottery recovered by Dr Jim Specht during his dissertation research on Buka in the Northern Solomons. During his student years at Sydney he developed many of the archaeometric skills which he has consistently deployed in subsequent years in the characterisation of pottery and obsidian using PIXE-PIGME, XRF and Electron Microprobe analyses and published further analyses of prehistoric Javanese ceramics (based on his MA Qualifying thesis of 1979).

He enrolled as a PhD student in the Department of Archaeology at La Trobe University under Professor Jim Allen and Dr Chris Gosden in 1989 and completed the thesis which forms the basis for this volume in 1996. He complemented his laboratory analysis skills with regular fieldwork forays as part of the La Trobe-Australian Museum team investigating the archaeology of West New Britain from 1989 onwards, spending some six seasons based either on the north coast of New Britain in the vicinity of the Talasea and Mopir obsidian sources or on the south coast in the Arawe Islands and adjacent areas of the New Britain mainland. It is an analysis of ceramics from the Arawes Lapita sites which forms the basis of this *Terra Australis*. Since the completion of his thesis he has instituted a major program of research into the archaeology of New Ireland Province, starting with a reinvestigation of the significant but barely published early Lapita sites of the Anir Group off the south eastern end of New Ireland itself, linking to my own research in the next island group south, Nissan or the Green Islands, low atolls from where the Anir Group and occasionally New Ireland itself are visible. In 1998 Dr Summerhayes was awarded a three-year ARC Postdoctoral Fellowship in the Department of Archaeology and Anthropology, Faculty of Arts, The Australian National University.

The study complements the more traditional stylistic analyses of Lapita pottery decoration and vessel form with advanced characterisation techniques to examine a central conundrum of Lapita studies, that stylistic similarity between Lapita pots is generally not a result of pottery trade but ‘trade in ideas’. It is the design system that moves but the pots usually don’t, except in areas without access to suitable potting clay. One of the most significant results of his broad-ranging comparison of Lapita assemblages is that time is seen to be more important than space in defining changing sub-styles of Lapita. Thus what used to be described using a spatial metaphor as ‘Far Western’, ‘Western’ and ‘Eastern’ sub-styles is better-described as ‘Early’, ‘Middle’ and ‘Late’ Lapita. Summerhayes contends that the stylistic similarities between late Lapita ceramics from the Arawes and Late Lapita ceramics from Fiji and Western Polynesia outweigh any differences that have been described until now as ‘Western’ as opposed to ‘Eastern’ Lapita. This is not to deny an important component of regionalism in Lapita stylistic variability but merely to redress the imbalance between perceptions of spatial as opposed to temporal difference in the ceramics.

The study of pottery in this *Terra Australis* is juxtaposed in other publications with his continued research into the characterisation, sourcing and trade of obsidian in the Bismarck Archipelago. Much of this research has been carried out in collaboration with members of the Australian Nuclear Science and Technology Organisation (ANSTO) and is reported in several recent jointly-authored papers.
Glenn Summerhayes is a rare kind of archaeologist, being as much at home in front of a scanning electron microscope as in a Melanesian leaf-house discussing the day’s excavation results. It is this combination of fieldwork and laboratory expertise which makes his arguments in this volume all the more persuasive. As someone equally at home in one of these contexts and in abject fear of the other I can only express my sense of wonder that there are rare individuals who can accomplish both.

Matthew Spriggs
# CONTENTS

**FOREWORD**

**ACKNOWLEDGEMENTS**

1 INTRODUCTION

- A new challenge for Pacific archaeologists
- Background – models of colonisation and interaction
  - Origins of the Lapita Cultural Complex
  - Nature of interaction
- Addressing the problem – meeting the challenge
  - The nature of the pottery assemblage
  - The regional perspective
  - Pottery production in West New Britain

2 LAPITA PROVINCES AND THE REGIONALISATION OF THE SOUTH WEST PACIFIC: MODELLING LAPITA INTERACTION

- Near and Remote Oceania
- Stylistic provinces
  - A Western and Eastern Lapita
  - A Far Western Lapita
  - North and South Eastern Lapita
  - Section summary
- Lapita exchange networks – interaction spheres
  - Far Western
  - Western Lapita
  - Eastern Lapita
- Summary of exchange networks
- Discussion

3 WEST NEW BRITAIN – THE SITES, THEIR HISTORY AND THEIR SETTING

- Location
  - North Coast – Talasea area
  - South Coast
- Archaeology in West New Britain, Papua New Guinea
  - Phase 1 1972 – 1974
  - Phase 2 1979 – 1982
  - Phase 3 1984 – 1985
  - Phase 4 1986/7 – present
- Areas of investigation
  - Arawes

4 IDENTIFYING THE PRODUCTION AND DISTRIBUTION OF POTTERY – METHODOLOGICAL ISSUES

- Production and consumption patterning: Modelling change in the archaeological record
  - Stylistic similarity and model building
  - The need for physico-chemical analyses
  - Setting the parameters of production
- Methodology for pottery analysis – form and decoration
  - Formal descriptive methodology of pottery
  - Pottery database
Methodology for pottery analysis – chemical characterisation and the electron microprobe
The electron microprobe
Statistics and definition of pottery chemical groupings

5 THE NATURE OF THE POTTERY ASSEMBLAGES FROM
WEST NEW BRITAIN – ADWE – FOH SQUARES D, E AND F
Sherd distribution
Introduction
Decoration
Vessel form
Vessel form I – bowls
Vessel form II – vertical walled vessel (upper body)
Vessel form III
Vessel form IV – restricted neck jars with flat horizontal rim
Vessel form V – carinated jars with outcurving neck
Vessel form VI – everted round bodied pots
Vessel form VII – conical restricted upper vessel form
Vessel form VIII – stands
Bases
Chapter summary

6 THE NATURE OF THE POTTERY ASSEMBLAGES FROM
WEST NEW BRITAIN – ADWE – FOH SQUARES G1 AND G2
Sherd distribution
Introduction
Decoration
Vessel form
Vessel form I – bowls
Vessel form II – vertical walled vessel (upper body)
Vessel form III
Vessel form IV – restricted neck jars with flat horizontal rim
Vessel form V – carinated jars with outcurving neck
Vessel form VI – everted round bodied pots
Vessel form VII – conical restricted upper vessel form
Vessel form VIII – stands
Chapter summary

7 THE NATURE OF THE POTTERY ASSEMBLAGES FROM
WEST NEW BRITAIN – APALO – FOJ SQUARES 01–04
Sherd distribution
Introduction
Decoration
Vessel form
Vessel form I – bowls
Vessel form II – vertical walled vessel (upper body)
Vessel form III
Vessel form IV – restricted neck jars with flat horizontal rim
Vessel form V – carinated jars with outcurving neck
Vessel form VI – everted round bodied pots
Vessel form VII – conical restricted upper vessel form
Vessel form VIII – stands
Miscellaneous – stoppers
Chapter summary

8 THE NATURE OF THE POTTERY ASSEMBLAGES FROM
WEST NEW BRITAIN – PALIGMETE – FNY SQUARES M4/M5, N4/N5
Sherd distribution
Introduction
Decoration
9 THE NATURE OF THE POTTERY ASSEMBLAGES FROM WEST NEW BRITAIN – THE NON-ARAWE ASSEMBLAGES

South coast assemblages
- Apugi Island – FFS
- Alanglongromo – FLF
- Kreslo – FNT

North coast assemblages
- Garua Island – FSZ
- Boduna Island – FEA

10 WEST NEW BRITAIN ASSEMBLAGES – FORM, DECORATION AND FABRIC

Decoration and form
- Changes in decoration - sherd count
- Vessel form
- Vessel form and decoration
- Dentate decoration

Defining a regional character
- Dentate motifs – comparisons with Anson’s motif catalogue
- Motif sharing between the West New Britain and Eastern Lapita assemblages

A regional framework

11 IDENTIFYING PRODUCTION AND EXCHANGE – THE RESULTS OF THE CHEMICAL ANALYSIS

Results of the electron microprobe analysis on minerals
- River sands
- Analysis of filler

Sampling strategies and results of the electron microprobe analysis on pot matrix: Arawe assemblages
- Chemical analyses of pottery from Adwe – FOH squares D, E and F
- Chemical analysis of pottery from Adwe – FOH square G
- Chemical analysis of pottery from Apalo – FOJ
- Chemical analysis of pottery from Paligmete – FNY

Results of the electron microprobe analysis on the pot matrix: Arawe inter-site comparisons
- Adwe FOH squares D, E and F and Apalo FOJ
- Paligmete FNY and Apalo FOJ
- Paligmete FNY and Adwe FOH squares D, E and F
- Paligmete FNY and Adwe FOH square G
- Adwe FOH square G and Apalo FOJ
- Adwe FOH squares D, E and F and G
- Summary of Arawe inter-site comparisons

Results of the electron microprobe analysis on the pot matrix: Non-Arawe assemblages
- Kandrian area – FLF and FFS
- Talasea sites – FEA (Boduna) and Garua sites FSZ and FAO
- North versus south: FSZ and FAO (Garua Island), FEA (Boduna), FLF (Alanglongromo), FFS (Apugi Island), and FNT (Kreslo)

Summary of inter-site comparisons between the non-Arawe assemblages
Comparison between the CPCRUs from West New Britain: Arawe and non-Arawe

FOH squares D, E and F

FOH square G

FOJ squares O1-O4

FNY

Production and distribution of pottery from West New Britain

Context of production

Change in production

Summary

12 CONCLUSIONS

The nature of the pottery assemblage

The regional perspective

Stylistic provinces

Contact between east and west

An earlier assemblage in the west?

Pottery production in West New Britain

Concluding comments and future directions

BIBLIOGRAPHY

LIST OF TABLES

3.1 FOH squares D, E and F – conjoining of sherds per unit

3.2 Spit attributions to units – FNY

5.1 Distribution of sherds per unit. FOH squares D, E and F

5.2 Total population of sherds analysed per unit. FOH squares D, E and F

5.3 Sherds on the database per unit. FOH squares D, E and F

5.4 Distribution of sherds by number per decoration type and unit. FOH squares D, E and F

5.5 Summary of the distribution of decoration per unit – number of times a type of decoration occurs. FOH squares D, E and F

5.6 Summary of the distribution of decoration per unit – % of decorated sherds per decoration type. FOH squares D, E and F

5.7 Distribution of vessel form (no.) per unit. FOH squares D, E and F

5.8 Distribution of vessel form (%) per unit. FOH squares D, E and F

5.9 Distribution of decoration per vessel form. FOH squares D, E and F

5.10 Distribution of dentate vessel forms. FOH squares D, E and F

5.11 Distribution of plain vessel forms. FOH squares D, E and F

5.12 Vessel form I – distribution of fabrics and decoration per unit. FOH squares D, E and F

5.13 Vessel form I – distribution of the orifice diameters of dentate vessels. FOH squares D, E and F

5.14 Vessel form I – rim thickness of dentate vessels. FOH squares D, E and F

5.15 Vessel form I – distribution of orifice diameters, rim features and fabric on plain vessels. FOH squares D, E and F

5.16 Vessel form I – cross tabulation of rim thickness at and below the lip. FOH squares D, E and F

5.17 Vessel form I – distribution of rim features on plain vessels per fabric. FOH squares D, E and F

5.18 Vessel form II – distribution of fabrics per unit. FOH squares D, E and F

5.19 Vessel form III – distribution of fabrics per unit. FOH squares D, E and F

5.20 Vessel form III – distribution of orifice diameters (cm) per fabric. FOH squares D, E and F

5.21 Vessel form IV – distribution of fabrics per unit. FOH squares D, E and F

5.22 Vessel form IV – distribution of orifice diameters (cm) per fabric. FOH squares D, E and F

5.23 Vessel form V – distribution of decoration per unit. FOH squares D, E and F

5.24 Vessel form V – distribution of fabrics per unit. FOH squares D, E and F

5.25 Vessel form V – distribution of orifice diameters. FOH squares D, E and F

204

204

205

211

218

218

218

228

229

231

231

232

233

233

233

234

235

237

23
5.26 Vessel form V – cross tabulation of rim thickness at and below the lip. FOH squares D, E and F

5.27 Vessel form VI – distribution of orifice diameters. FOH squares D, E and F

5.28 Vessel form VI – distribution of fabrics per unit. FOH squares D, E and F

5.29 Vessel form VIII – distribution of fabrics and decoration per decoration/unit. FOH squares D, E and F

5.30 Vessel form VIII – distribution of fabrics, orifice diameters and decoration. FOH squares D, E and F

5.31 Flat based vessels – distribution of fabrics per unit. FOH squares D, E and F

6.1 Distribution of sherds per layer. FOH squares G1/G2

6.2 Sherds on the database per layer. FOH squares G1/G2

6.3 Distribution of sherds by number per decoration and layer. FOH squares G1/G2

6.4 Summary of the distribution of decoration per layer – % of decorated sherds per decoration type. FOH squares G1/G2

6.5 Distribution of vessels per class of sherd. FOH squares G1/G2

6.6 Distribution of vessel form. FOH squares G1/G2

6.7 Distribution of decoration per vessel form. FOH squares G1/G2

6.8 Vessel form V (jars) – distribution of fabrics per decoration type. FOH squares G1/G2

6.9 Vessel form V (jars) – distribution of orifice diameters and decoration. FOH squares G1/G2

7.1 Distribution of sherds per unit. FOJ

7.2 Sherds on the database per unit. FOJ

7.3 Distribution of sherds by number per decoration and unit. FOJ

7.4 Summary of the distribution of decoration per unit – number of times a type of decoration occurs. FOJ

7.5 Summary of the distribution of decoration per unit – % of decorated sherds per decoration type. FOJ

7.6 Distribution of vessel form (no.) per unit. FOJ

7.7 Distribution of vessel form (%) per unit. FOJ

7.8 Distribution of decoration per vessel form. FOJ

7.9 Vessel form I – distribution of orifice diameters. FOJ

7.10 Vessel form I – cross tabulation of rim thickness at and below the lip. FOJ

7.11 Vessel form I – distribution of fabrics per unit. FOJ

7.12 Vessel form II – distribution of decoration type per unit. FOJ

7.13 Vessel form II – distribution of orifice diameters. FOJ

7.14 Vessel form II – cross tabulation of rim thickness at and below the lip. FOJ

7.15 Vessel form II – distribution of fabrics per unit. FOJ

7.16 Vessel form III – distribution of fabrics/unit. FOJ

7.17 Vessel form III – distribution of orifice diameters per unit. FOJ

7.18 Vessel form V (jars) – distribution of decoration per unit. FOJ

7.19 Vessel form V (jars) – orifice diameter per decoration type. FOJ

7.20 Vessel form V (jars) – cross tabulation of rim thickness at and below the lip. FOJ

7.21 Vessel form V (jars) – distribution of fabrics per unit and decoration type. FOJ

7.22 Vessel form VII – distribution of fabrics per unit. FOJ

7.23 Vessel form VII – cross tabulation of rim thickness at and below the lip. FOJ

7.24 Distribution of pottery stoppers. FOJ

8.1 Distribution of sherds per unit. FNY

8.2 Sherds on the database per unit. FNY

8.3 Distribution of sherds by number per decoration and unit. FNY

8.4 Summary of the distribution of decoration per unit – number of times a type of decoration occurs. FNY

8.5 Summary of the distribution of decoration per unit – % of decorated sherds per decoration type. FNY

8.6 Distribution of vessel form (no.). FNY

8.7 Distribution of vessel form (%) per unit. FNY

8.8 Distribution of decoration per vessel form. FNY
8.9 Vessel form I – distribution of decoration type per unit. FNY
8.10 Vessel form I (dentate) – distribution of fabrics per unit. FNY
8.11 Vessel form I (dentate) – distribution of orifice diameters (cm) per rim shape. FNY
8.12 Vessel form I (dentate) – distribution of rim thickness. FNY
8.13 Vessel form II – distribution of fabrics per unit. FNY
8.14 Vessel form III – distribution of fabrics per unit. FNY
8.15 Vessel form IV – distribution of fabrics per unit. FNY
8.16 Vessel form V – distribution of decoration per unit. FNY
8.17 Vessel form V – distribution of orifice diameters (cm) per unit. FNY
8.18 Vessel form V – cross tabulation of rim thickness at and below the lip. FNY
8.19 Vessel form V – distribution of fabric and decoration. FNY
8.20 Vessel form VI – distribution of orifice diameters (cm). FNY
8.21 Vessel form VI – distribution of orifice diameters per rim thickness. FNY
8.22 Vessel form VI – distribution of fabric per unit. FNY
8.23 Vessel form VIII – distribution of fabrics per unit. FNY
8.24 Distribution of the fabric from miscellaneous sherds per unit. FNY
9.1 Distribution of fabric per spit. FFS
9.2 Distribution of decoration per fabric. FFS
9.3 Distribution of fabric per trench. FLF
9.4 Distribution of decoration per trench. FLF
9.5 Distribution of fabric and decoration. FLF
9.6 Distribution of decoration per fabric. FNT
9.7 Distribution of decoration. FSZ
9.8 Distribution of fabric per spit. FEA Square 2 Spits 2 and 7
10.1 % of dentate decoration – Arawe sites
10.2 Number of dentate vessels – Arawe sites
10.3 Fabric of dentate vessels – Arawe sites
10.4 Number of motifs per site
10.5 Comparison of motifs found in the Arawe assemblages with sites used by Anson in his PhD thesis
10.6 Nearest neighbours table of West New Britain sites (with distances to their nearest 3 neighbours)
10.7 Site similarity as defined by motif sharing
10.8 % of motifs designated to style areas
10.9 Motifs shared between Tonga and the Bismarcks
10.10 Motifs shared between Naigani and the Bismarcks
10.11 Motifs shared between Niuatoputapu and the Bismarcks
11.1 Chemical analysis of river sands from West New Britain
11.2 Chemical analysis of sherd filler – number of samples and number of analyses
11.3 FEA – Boduna. Chemical analysis of mineral filler
11.4 FSZ and FAO – Garua Island. Chemical analysis of mineral filler
11.5 FNT – Kreslo. Chemical analysis of mineral filler
11.6 FFS – Apugi. Chemical analysis of mineral filler
11.7 FLF – Alanglongromo. Chemical analysis of mineral filler
11.8 FOH square G – Adwe. Chemical analysis of mineral filler
11.9 FOH squares D, E and F – Adwe. Chemical analysis of mineral filler
11.10 FOJ – Apalo. Chemical analysis of mineral filler
11.11 Rim and pot stand sherd distribution per unit/fabric. FOH – square D1. Numbers in brackets = sampled for electron microscopy
11.12 Rim and pot stand sherd distribution per vessel form/fabric. FOH – square D1. Numbers in brackets = sampled for electron microscopy
11.13 Rim and pot stand distribution per unit/fabric. FOH squares D1 and D2. Numbers in brackets = sampled for electron microscopy
11.14 Rim and pot stand distribution per unit/fabric. FOH squares D, E and F. Numbers in brackets = sampled for electron microscopy
11.15 Minimum number of vessels per fabric. FOH squares D, E and F
11.16 Number of vessels sampled for electron microscopy per fabric. FOH squares D, E and F
11.17 No. of samples per CPCRU. FOH squares D, E and F
11.18 Distribution of vessel form per CPCRU. FOH squares D, E and F
11.19 Distribution of decoration per CPCRU. FOH squares D, E and F

xii
11.20 Distribution of fabrics per CPCRU. FOH squares D, E and F 183
11.21 No. of samples per CPCRU. FOH square G 184
11.22 Distribution of vessel form per CPCRU. FOH square G 185
11.23 Distribution of decoration per CPCRU. FOH square G 185
11.24 Distribution of dentate vessel form per CPCRU. FOH square G 185
11.25 Distribution of form V vessel decoration per CPCRU. FOH square G 185
11.26 Distribution of form V vessel fabric per CPCRU. FOH square G 185
11.27 Distribution of form VI fabric per CPCRU. FOH square G 185
11.28 Distribution of fabrics per CPCRU. FOH square G 185
11.29 Rim samples for electron microscopy – distribution of fabric per unit. FOJ 186
11.30 Samples for electron microscopy – distribution of decoration. FOJ 186
11.31 Total number of samples for electron microscopy – distribution of fabrics per unit. FOJ 187
11.32 Distribution of the total number of vessels and the number of samples selected for electron microscopy per vessel form. FOJ 187
11.33 Number of samples per CPCRU. FOJ 187
11.34 Distribution of vessel form per CPCRU. FOJ 189
11.35 Distribution of decoration for per CPCRU. FOJ 189
11.36 Distribution of CPCRU per unit. FOJ 190
11.37 Distribution of fabrics per CPCRU. FOJ 190
11.38 Distribution of rims/stands and samples taken for electron microscopy per fabric/unit. FNY 191
11.39 Distribution of the number of vessel form per unit. FNY 191
11.40 Distribution of the number of vessel forms per unit sampled for electron microscopy. FNY 191
11.41 Sample number per CPCRU. FNY 191
11.42 Distribution of vessel form per CPCRU. FNY 191
11.43 Distribution of decoration per CPCRU. FNY 191
11.44 Distribution of fabrics per CPCRU. FNY 193
11.45 Comparison between FOH squares D, E and F and FOJ 193
11.46 Comparison between FNY and FOJ 195
11.47 Comparison between FNY and FOH squares D, E and F 195
11.48 Comparison between FNY and FOH square G 195
11.49 Comparison between FOH squares G and FOJ 195
11.50 Comparison between FOH squares D, E, and F and G 195
11.51 Total number of CPCRUs in the Arawe assemblages 200
11.52 Distribution of fabric and samples selected per spit. FFS 201
11.53 Samples selected for electron microscopy. FEA 201
11.54 Total number of CPCRUs in the West New Britain assemblages. 221

LIST OF FIGURES

3.1 Map of New Britain 16
3.2 Map of West New Britain showing the location of archaeological sites 18
3.3 Map of the Talasea district showing the location of archaeological sites 18
3.4 Map of the Kandrian district showing the location of archaeological sites 19
3.5 Map of the Arawe Islands showing the location of archaeological sites 19
3.6 Map of FOH – Makekur – Adwe Island – showing the location of test pits 21
3.7 Map of FOJ – Apalo – Kumbun Island – showing the location of test pits 24
3.8 Map of FNY – Paligmete – Pililo Island – showing the location of test pits 25
4.1 Vessel forms – I, II, IV 34
4.2 Vessel forms – V and VI 34
4.3 Vessel forms – VII and VIII 35
4.4 Rim data 35
4.5 Extra rim features 36
5.1 Vessel form I – dentate with grooved lip. FOH squares D, E and F – Adwe 47
5.2 Vessel form I – dentate. FOH squares D, E and F – Adwe 48
5.3 Vessel form I – dentate. FOH squares D, E and F – Adwe 49
5.4 Vessel form I – dentate. FOH squares D, E and F – Adwe 50
5.5 Vessel form I – dentate. FOH squares D, E and F – Adwe 51
5.6 Vessel form I - dentate. FOH squares D, E and F - Adwe
5.7 Vessel form I - plain. FOH squares D, E and F - Adwe
5.8 Vessel form I. FOH squares D, E and F - Adwe
5.9 Vessel form II. FOH squares D, E and F - Adwe
5.10 Vessel form II. FOH squares D, E and F - Adwe
5.11 Vessel form III. FOH squares D, E and F - Adwe
5.12 Vessel form IV. FOH squares D, E and F - Adwe
5.13 Vessel form IV. FOH squares D, E and F - Adwe
5.14 Vessel form V. FOH squares D, E and F - Adwe
5.15 Vessel form V - plain. FOH squares D, E and F - Adwe
5.16 Vessel form V - dentate. FOH squares D, E and F - Adwe
5.17 Dentate sherds. FOH squares D, E and F - Adwe
5.18 Vessel form V - dentate. FOH squares D, E and F - Adwe
5.19 Dentate vessel. FOH squares D, E and F - Adwe
5.20 Vessel form V - dentate. FOH squares D, E and F - Adwe
5.21 Vessel form V - fingernail impressed. FOH squares D, E and F - Adwe
5.22 Vessel form V - notched rim. FOH squares D, E and F - Adwe
5.23 Vessel form V - notched rim. FOH squares D, E and F - Adwe
5.24 Vessel form V - linear incised. FOH squares D, E and F - Adwe
5.25 Grooved decoration. FOH squares D, E and F - Adwe
5.26 Vessel form VI - plain. FOH squares D, E and F - Adwe
5.27 Vessel form VI - plain. FOH squares D, E and F - Adwe
5.28 Vessel form VI - plain. FOH squares D, E and F - Adwe
5.29 Vessel form VII. FOH squares D, E and F - Adwe
5.30 Vessel form VII. FOH squares D, E and F - Adwe
5.31 Vessel form VII. FOH squares D, E and F - Adwe
5.32 Vessel form VII. FOH squares D, E and F - Adwe
5.33 Vessel form VIII and bases. FOH squares D, E and F - Adwe
5.34 Dentate sherds. FOH squares D, E and F - Adwe
5.35 Dentate sherds. FOH squares D, E and F - Adwe
5.36 Dentate sherds. FOH squares D, E and F - Adwe
6.1 Vessel forms I, II, IV and VII. FOH square G - Adwe
6.2 Grooved/channelled decoration. FOH square G - Adwe
6.3 Linear incised sherds. FOH square G - Adwe
6.4 Vessel form V. FOH square G - Adwe
6.5 Vessel form V. FOH square G - Adwe
6.6 Vessel form V. FOH square G - Adwe
6.7 Vessel form VI. FOH square G - Adwe
6.8 Vessel form VIII and legs. FOH square G - Adwe
7.1 Vessel form I. FOJ - Apalo
7.2 Vessel form II. FOJ - Apalo
7.3 Vessel form II. FOJ - Apalo
7.4 Vessel forms III and IV. FOJ - Apalo
7.5 Vessel form V - linear incised. FOJ - Apalo
7.6 Vessel form V - linear incised. FOJ - Apalo
7.7 Linear incised sherds. FOJ - Apalo
7.8 Vessel form V. FOJ - Apalo
7.9 Vessel forms V and VI. FOJ - Apalo
7.10 Vessel forms IV, V, VII and VIII. FOJ - Apalo
7.11 Dentate sherds. FOJ - Apalo
7.12 Decorated sherds. FOJ - Apalo
8.1 Vessel form I - dentate vessels. FNY - Paligmete
8.2 Vessel form I - dentate vessels. FNY - Paligmete
8.3 Vessel form I - dentate vessels. FNY - Paligmete
8.4 Vessel forms I and II - plain vessels. FNY - Paligmete
8.5 Vessel forms VI and VII. FNY - Paligmete
8.6 Vessel form V. FNY - Paligmete
8.7 Vessel form VIII. FNY - Paligmete
8.8 Vessel forms III, IV and VIII. FNY - Paligmete
8.9 Assorted sherds. FNY - Paligmete

dxiv
9.1 Decorated sherds – FLF
9.2 Decorated sherds – FSZ
9.3 Dentate sherds – FSZ
9.4 Vessel form – FSZ
10.1 Vessel forms – Arawe
10.2 Decoration on vessels
10.3 Decoration on vessel forms I, II and VIII
10.4 Decoration on vessel forms III and IV
10.5 Decoration on vessel forms V and VI
10.6 Vessel fabrics
10.7 Decoration and fabric – vessel forms I and V
10.8 Distribution of dentate vessels
10.9 Distribution of fabrics – dentate vessels
10.10 Distribution of non-dentate vessels
10.11 Grouping of sites based on motif similarity using Ward’s hierarchical clustering analysis
10.12 Motif sharing – PCA plot – 1st and 3rd components
10.13 Distribution of motifs on vessel forms – Arawe
10.14 Distribution of fabrics per motif – Arawe
11.1 Map showing the location of sands collected for chemical analysis in West New Britain
11.2 Map showing the location of sands collected for chemical analysis in the Talasea district
11.3a CPCRUs – FOH squares D, E and F – Adwe
11.3b FOH squares D, E and F. PCA plot components 1 and 2
11.3c FOH squares D, E and F. PCA plot components 2 and 3
11.3d FOH squares D, E and F. PCA plot components 1 and 3
11.4a CPCRUs – FOH square G – Adwe
11.4b FOH square G. PCA plot components 1 and 2
11.5a CPCRUs – FOJ – Apalo
11.5b FOJ. PCA plot components 1 and 2
11.6a FOJ. PCA plot components 2 and 3
11.7 CPCRUs – FNY – Paligmete
11.6b FNY – PCA plot components 1 and 2
11.8 CPCRUs comparison between FOH squares D, E and F, and FOJ
11.9a CPCRUs comparison between FNY and FOJ squares D, E and F
11.9b CPCRUs comparison between FNY and FOH squares D, E and F. PCA plot components 1 and 2
11.10a CPCRUs comparison between FNY and FOH square G
11.10b CPCRUs comparison between FNY and FOH square G. PCA plot components 1 and 2
11.11a CPCRUs comparison between FOH square G and FOJ
11.11b CPCRUs comparison between FOH square G and FOJ. PCA plot components 1 and 2
11.12a CPCRUs comparison between FOH squares D, E and F, and square G
11.12b CPCRUs comparison between FOH squares D, E and F, and square G. PCA plot components 1 and 2
11.12c Comparison between FOH square D, E and F’s CPCRU 3 and square G’s CPCRU 5. PCA plot components 1 and 2
11.13a CPCRUs – FLF and FFS – Kandrian area
11.13b FLF and FFS. PCA components 1 and 2
11.14a CPCRUs – FEA, FAO and FSZ – Talasea area
11.14b CPCRUs – FEA and FSZ. PCA components 1 and 2
11.14c CPCRUs – FEA and FSZ. Components 2 and 3
11.15a CPCRUs comparison between north and south coast sites. FLF, FFS, FNT, FEA, FSZ and FAO
11.15b CPCRUs comparison between non-Arawe sites. PCA components 1 and 3
11.16a CPCRUs comparison – FOH squares D, E and F, and FLF
11.16b CPCRUs comparison – FOH squares D, E and F, and FLF. PCA components 1 and 2
11.17a CPCRUs comparison – FOH squares D, E and F, and FFS
11.17b CPCRUs comparison – FOH squares D, E and F, and FFS. PCA components 1 and 2
11.18a CPCRUs comparison – FOH squares D, E and F, and FNT
11.18b CPCRUs comparison – FOH squares D, E and F, and FNT. PCA components 1 and 2
11.19a CPCRUs comparison – FOH squares D, E and F, and FEA
11.19b CPCRU comparison – FOH squares D, E and F, and FEA. PCA components 1 and 3
11.20a CPCRU comparison – FOH squares D, E and F, and FSZ
11.20b CPCRU comparison – FOH squares D, E and F, and FSZ. PCA components 1 and 2
11.21a CPCRU comparison – FOH square G and FLF
11.21b CPCRU comparison – FOH square G and FLF. PCA components 1 and 2
11.22a CPCRU comparison – FOH square G and FFS
11.22b CPCRU comparison – FOH square G and FFS. PCA components 1 and 2
11.23a CPCRU comparison – FOH square G and FNT
11.23b CPCRU comparison – FOH square G and FNT. PCA components 1 and 2
11.23c CPCRU comparison – FOH square G and FNT. PCA components 1 and 3
11.24a CPCRU comparison – FOH square G and FEA
11.24b CPCRU comparison – FOH square G and FEA. PCA components 1 and 3
11.25a CPCRU comparison – FOH square G and FSZ/FAO
11.25b CPCRU comparison – FOH square G and FSZ/FAO. PCA components 1 and 2
11.26a CPCRU comparison – FOJ and FLF
11.26b CPCRU comparison – FOJ and FLF. PCA components 1 and 2
11.27 CPCRU comparison – FOJ and FFS. PCA components 1 and 2
11.28a CPCRU comparison – FOJ and FNT
11.28b CPCRU comparison – FOJ and FNT. PCA components 2 and 3
11.29a CPCRU comparison – FOJ and FEA
11.29b CPCRU comparison – FOJ and FEA. PCA components 1 and 2
11.30 CPCRU comparison – FOJ and FSZ/FAO. PCA components 1 and 2
11.31a CPCRU comparison – FNY and FLF
11.31b CPCRU comparison – FNY and FLF. PCA components 1 and 3
11.32 CPCRU comparison – FNY and FFS. PCA components 1 and 2
11.33 CPCRU comparison – FNY and FNT. PCA components 1 and 2
11.34 CPCRU comparison – FNY and FEA. PCA components 2 and 3
11.35 CPCRU comparison – FNY and FSZ/FAO. PCA components 1 and 3
11.36 Map showing the movement of clay/pots in West New Britain
11.37 Specialist production – 1 CPCRU and 1 fabric
11.38 Specialist production distributing to a number of sites
11.39 Local production
11.40 Selection of fabrics and forms in the Arawes CPCRUs
ACKNOWLEDGEMENTS

I am indebted to Jim Specht, Chris Gosden, Robin Torrence, Richard Fullagar and Christina Pavlides with whom I have worked closely in Papua New Guinea. Also special thanks goes to Jim Specht who introduced me to Melanesian prehistory many years ago and has provided encouragement ever since. His sagely advice has been heeded on many occasions.

Fieldwork in Papua New Guinea was made possible by ARC grants to Chris Gosden and Jim Specht, and to Robin Torrence. The assistance of the following institutions is also acknowledged: the National Research Institute, the National Museum and Art Gallery, the Department of Anthropology and Sociology, University of Papua New Guinea, and the West New Britain Provincial Government. In particular I’d like to thank Pamela Swadling, Baiva Ivuyo, Herman Mandui, Robert Mondol, Wilfred Oltomo, Jacob Simmet, John Muke, Jo Mangi, Charles Rukuva and John Namuno.

In the Arawe Islands a special thank you to the communities on Pililo Island, Kumbun Island, Amalut and Maklo Island. Thanks also to Max and Cecile Benjamin, Walindi Plantation, for their cordial hospitality.

My stay in Melbourne was made all the more worthwhile by the friendship and advice provided by Ian McNiven, Lynette Russell, Ronald Southern, Brendan Marshall and Cathy Webb.

Electron microscopy was made financially possible by a Humanities Grant from La Trobe University. Members of staff from the Department of Geology, School of Physical Sciences, La Trobe University provided valuable assistance in arranging access to the electron microprobe, housed at Melbourne University, and teaching me the particulars of the machinery. In particular I would like to thank Jorg Metz, John Webb, Peter Jackson and Alan Jacka. Alan Jacka in particular spent long hours devising ways to perfect the preparation of ceramic samples for sectioning.

From the School of Archaeology, La Trobe University, I’d like to thank my supervisor Professor Jim Allen for his valuable comments and suggestions on the drafts of this monograph. Thanks also to both Rudy Frank and Wei Ming for their help in providing access to materials and also for introducing me to Adobe illustrator. Special thanks to Stella Bromilow and Ross Allen for providing administrative support.

From Sydney University, special thanks to Peter White for his valuable comments on the monograph and for his encouragement over the years.

From The Australian National University, thanks to Matthew Spriggs for comments and providing institutional support to complete this monograph. Also thanks to Geoff Clarke, Stuart Bedford and Matthew Leavesley for useful discussions on Lapita archaeology. I’d also like to thank Dave Burley, Simon Fraser University, for extensive comments when this monograph was in dissertation form.

Special thanks to Jo Bushby, ANH Publications, for getting the publication ready. Without her help the publication of this monograph would not be possible.

I’d like to acknowledge three colleagues whose seminal work on Pacific prehistory has influenced my own work: Jack Golson, Roger Green and Pat Kirch. This monograph is only possible because of their ground-breaking work on the archaeology of the Western Pacific.

Lastly I’d like to thank Wal Ambrose. Wal’s work on obsidian and ceramic characterisation studies has provided inspiration and stimulus to my own research.
INTRODUCTION

This study is concerned with the nature of interaction between Lapita communities in the Western Pacific in the third millennium BP, and in particular between and within Lapita sub-regions or provinces. These Lapita provinces, which were defined primarily on pottery similarities and inter-island exchange patterns, were argued to be communication boundaries or 'a network of social interactions' (Kirch 1997:70) which led 'to the differentiation, both linguistically and culturally, of more localised ethnic identities' (Green and Kirch 1997:30). By examining the nature of production, exchange and use of pottery from West New Britain, Papua New Guinea, the degree of interaction between Lapita communities in Lapita provinces is re-assessed and re-evaluated. This will be done by examining firstly, the nature of the pottery assemblage from West New Britain; secondly, the placement of the West New Britain assemblages into the wider Western Pacific context and how the nature of interaction, based on decoration, found within the West New Britain assemblages applies to the Western Pacific; and lastly, the role of production and distribution in explaining regional similarities of pottery.

A NEW CHALLENGE FOR PACIFIC ARCHAEOLOGISTS

Although Near Oceania has been populated for over 35,000 years, the settlement of the Pacific Islands east of the main Solomons Island chain, known as Remote Oceania, is a relatively late phenomenon by world standards. In the late fourth millennium BP the colonisers left the Bismarck Archipelago, moved down the Solomon Island chain and populated Vanuatu, New Caledonia, Fiji, Tonga and Samoa for the first time. The archaeological signature of these colonisers is a distinctive type of pottery called Lapita, named after an archaeological site in New Caledonia where it was found during excavations in the 1950s. Indeed, the name Lapita is now associated with these colonisers and the material culture they left in the ground (the Lapita Cultural Complex). Once they crossed the large ocean gap to colonise Fiji, Tonga and Samoa, these colonising groups were argued to have developed in isolation from islands to the west. This lack of interaction with the more westerly communities was thought to be reflected in changes of pottery style and an absence of imported goods.

The major issues for archaeologists working in the region today are to understand the processes of colonisation and the nature of interaction and exchange which allowed these widely spread colonising communities to survive. In addressing these issues, much attention has focussed on Lapita pottery. Similiraties in pottery decoration, in particular dentate stamped motifs, have been used by Pacific archaeologists to identify the spread of settlement over the Pacific and also the presence of inter-island interaction and exchange between geographically separated areas. These areas have been grouped into a number of Lapita provinces primarily on the basis of pottery stylistic similarities, and to a lesser extent on the nature of inter-island exchange: Far Western, Western and Eastern. As outlined below, these provinces are important heuristic devices in modelling the process of colonisation and the nature of inter-group interactions. They are particularly important in defining the nature of the regionalisation and subsequent break-up of the Lapita Cultural Complex, based on the emergence of stylistic differences between regions over time.

In addressing the nature of interaction and the definition of the stylistic provinces, however, two problems exist. The first concerns the pottery. In modelling interaction and exchange on similarities of pottery decoration, basic questions such as whether similarities between assemblages are the product of ceramic exchange need to be answered before developing models about the nature of interaction. Why was the dentate pottery similar over such vast distances? As great emphasis is placed on ceramic decorative similarities, questions concerning the
function of dentate pottery in the society that produced, perhaps exchanged, and used it need addressing. If the pots were not exchanged other mechanisms must be looked at.

The second problem concerns the gaps in our knowledge of regional sequences. Until the late 1980s most models of colonisation and interaction were based on partial sequences from Remote Oceania (East Solomons – Reef Islands/Santa Cruz; Vanuatu; New Caledonia; Fiji; Tonga; Samoa and Polynesian Outlier islands). Serious anomalies existed. For instance, the movement of people into the previously unoccupied islands of Remote Oceania may explain similarities in material culture, but this could not apply to the Bismarcks which had been occupied for over 35,000 years. As well exchange relationships were not expected to be the same in both Near and Remote Oceania (Kirch 1990:119; Green and Kirch 1997; Kirch 1997). Little archaeological work had been undertaken in the Bismarck Archipelago until the mid 1980s. Prior to that time, excavations had been undertaken at Eloaua, Ambitle, Watom, Talasea, Balof and Lesu. Only with the Lapita Homeland Project in 1985 (Allen and Gosden 1991), had long Lapita sequences been defined for the Bismarck Archipelago. Research was undertaken in Manus, Mussau, New Ireland, Nissan Island, and East and West New Britain (Allen and Gosden 1991). From 1986 on, further fieldwork was undertaken in the Bismarcks and adjacent areas. Kirch was to extend his excavations at Mussau, Gosden and Specht developed the West New Britain Project to look at assemblages on both the north and south coasts, and Torrence was later to continue work at Garau Island, also in West New Britain. Further work was also undertaken by Allen and Gosden at Matenkupkum and Matenbek in New Ireland, White at Balof Cave in New Ireland, Spriggs on Nissan, Wickler on Buka Island in the North Solomons, Pavlides at Yombon in the interior of New Britain, and recently, by Summerhayes on Anir in New Ireland Province. Detailed cultural sequences from these areas, challenged the definition of stylistic provinces and indeed the interpretations of regionalisation that went with them.

The aim of this study is to address the problems outlined above, and assess models of colonisation and interaction by evaluating the definition of Lapita provinces using recent data obtained from a detailed analysis of the production, distribution and use of Lapita pottery from West New Britain, Papua New Guinea. Prior to outlining the methodology used in the research, a brief outline of the models used in colonisation and the nature of interaction are presented.

**BACKGROUND – MODELS OF COLONISATION AND INTERACTION**

### Origins of the Lapita Cultural Complex

There are two main models for the Lapita colonisation of Remote Oceania. The first involves a movement of Austronesian speaking people out of Southeast Asia and into Remote Oceania, passing through the Bismarck Archipelago, carrying with them their material cultural repertoire. The spread was originally seen as archaeologically instantaneous (see Kirch and Hunt 1988; Kirch et al. 1987), and seem to account for the similarity in material culture over a vast region. This model sees domestication of animals, people, the Austronesian languages of the Pacific and many elements of the material cultural kit deriving from Southeast Asia. Note that any subsequent change in the pottery style has been seen as due to subsequent isolation of these populations, an important point that will be examined later. To take into account the possibility that Lapita may have been in the Bismarcks for 300 years before spreading out into Remote Oceania, Roger Green (1991a) has defined the Triple I model. Triple I stands for Intrusion/Innovation/Integration. Intrusion equates with Austronesian speakers coming into the area from Southeast Asia bringing with them items of material culture. Innovation equates with new developments within the Bismarck Archipelago, while integration equates with adopting elements of material culture from the area’s original inhabitants. Thus people may have paused in the Bismarcks before going on with the long trek, and indeed picked up local elements of material cultural on the way (Green 1991a), perhaps learning to adapt ‘to an area with a complex continental island environment, which possessed a wide range of resources’ (Green 1979:45) – a kind of ‘homeland’ (see also Spriggs 1989:608).

The second model views the colonisation of Remote Oceania as having its origins in the Bismarck Archipelago, with the Lapita Cultural Complex arising from internal social and economic developments of the previous 35,000 or so years of occupation (Allen 1984; White and Allen 1980). Despite this, people did not live in a vacuum and could have had contacts with the west from which they may have acquired the skills to make pottery. As Allen noted (1991:7) ‘such contacts would have facilitated the flow of materials, technologies and people in both directions’.

Although differences exist between the two models as pointed out by Gosden et al. (1989), Green (1991a) and Spriggs (1992), pottery similarity in both models was initially seen as either an ethnic or an exchange marker. In Remote Oceania, it is also seen as a by-product of colonisation. Other aspects of the archaeological record have been investigated and debate has moved on to looking at non-ceramic artefacts, subsistence, exchange, etc. (Kirch 1997). Yet, as cogently put by Sharp (1991:324) ‘all of the archaeological ‘facts’ considered relevant to such a definition are relevant precisely because they occur with Lapita style pottery: decorated pottery, especially dentate-stamped decoration’.

### Nature of interaction

The nature of interaction between Lapita communities was dependent on the initial nature of colonisation, its geographical spread, and the nature of the social ties between communities. Important in modelling Lapita
interaction is the construction of Lapita provinces which have been based on firstly, regional changes in pot style, and secondly, on regional differences in inter-island movement of materials. Exchange is important here and is one form of interaction that has taken centre stage. Indeed, exchange plays a prominent role in both 'origin' models. As shown below it is not only used in explaining the success of a rapid dispersal of people, it is also used to explain similarities in material culture, in particular pottery, over a 500-800 year period.

Lapita pots have a distinctive set of designs and decorative techniques making them highly visible and suggestive of a complex exchange system or communication network. One of the overarching issues is the significance of exchange in the colonisation of Remote Oceania and its subsequent role in maintaining a cohesion between far flung communities. Views vary on the nature of exchange. Terrell (1989), for instance, sees the distribution of Lapita pots as evidence of trade. Kirch (1988a), on the other hand, envisages a formal exchange network where exchange is an adaptive mechanism in the colonisation process forming a 'lifeline' back to a homeland (see also Green 1976, 1979a, 1987:246). This is linked to a society geared to status enhancement and prestige goods acquisition and it was the latter that kept the exchange system continuing when the colonisation process was complete. It is important to note that within these models it was the social dimension that kept the system going, with exchange maintaining the system. Exchange is viewed in this context as an adaptive strategy for colonists moving east (Kirch 1987) and as a maintenance of social ties (Green 1987).

Yet when these colonists moved east, it is argued that they began to fragment into smaller regional entities with local patterns of communication and interaction between Lapita settlements. In brief, when colonising populations settled in Fiji, Tonga and Samoa, it was supposed that the major sea gap separating them from Vanuatu became an effective barrier making two way voyaging difficult (Green 1974a, 1979). Settlements to the west of this major sea gap were defined as Western Lapita and those to the east from Fiji, Tonga and Samoa were called Eastern Lapita (see Green 1976, 1978, 1979).

This fragmentation was mostly modelled on pot decoration and form, with subsequent stylistic provinces defined. Within each province it was argued that different networks of exchange (a Western and Eastern exchange network) and interaction took place and communication between these provinces was virtually nil (Kirch 1988a). Thus stylistic provinces, interaction spheres or exchange networks are used, sometimes interchangeably, in the literature. For instance, the terms Far Western Lapita, or Early Western Lapita as Spriggs (1995:116) prefers, Western Lapita, Southern Lapita and Eastern Lapita, have been given to 'geographical subregions of Lapita' or 'provinces' (Kirch 1997:58,71). They can also describe exchange networks or different interaction spheres. These interaction spheres are not only based on pottery stylistic similarities, but also the distribution of artefacts such as obsidian, chert and shell (Green 1978:3).

These provinces are interpreted as the result of isolation after initial colonisation and the beginning of regional social systems (Kirch 1997:70). They are thus a spatial and temporal phenomenon (Kirch 1997, Spriggs 1995:116). These are what Green and Kirch (1997:30) have recently called 'communication' boundaries and which they interpret as 'the differentiation, both linguistically and culturally, of more localised ethnic identities'. This is reflected in changes in material culture.

Later, a further stylistic province was defined for the Bismarck Archipelago called Far Western Lapita, which was argued to be earlier than the Western and Eastern Lapita assemblages and as providing evidence for an earlier Lapita occupation before the colonisation to Remote Oceania (Anson 1983). This was seen by the proponents of the indigenous Bismarck model for Lapita as evidence that styles developed within the Bismarck Archipelago prior to the settlement of Remote Oceania. Early adherents to the 'Out of Southeast Asia' model originally argued that this province did not exist and was defined on inadequate sampling (Kirch et al. 1987). For them, initially at least, the spread of Lapita should have resulted in a uniform style across Western Melanesia with any subsequent change in the pottery style the result of the subsequent isolation of these populations. Thus the Bismarck assemblages, unique motifs may 'signal little more than local stylistic divergence after the initial Lapita dispersal through eastern Melanesia' (Kirch et al. 1987:126). Kirch has, however, recently redefined Far Western Lapita as a regional term, with both an early and later phase (1997:287). As these spatial boundaries that are placed on the Pacific are argued to be the result of colonisation and interaction strategies leading to cultural fragmentation, a detailed outline and discussion on the definition of Lapita provinces, reviewing stylistic and inter-island evidence, is provided in Chapter 2. The role of exchange and its relationship to stylistic groupings per province is re-assessed.

ADDRESSING THE PROBLEM – MEETING THE CHALLENGE

In meeting the challenge of re-evaluating the processes of colonisation and the nature of interaction and exchange, this study will:

1. redress the Remote Oceania bias by focussing research on areas to the west in Near Oceania, particularly West New Britain;
2. evaluate the role that Lapita dentate pottery played within the society that produced and used it;
3. re-evaluate to what extent similarities of pottery were due to exchange, the movement of pots or the movement of people and ideas;
4. re-evaluate the definition of Lapita provinces.

West New Britain is critically placed within the Bismarck Archipelago, being the location not only for obsidian sources, but also having Lapita sites with lengthy ceramic sequences which allow examination of
the changing nature of ceramic production and exchange patterns.

In 1989, the opportunity arose to join Dr Chris Gosden, then of La Trobe University, Dr Jim Specht and Dr Robin Torrence, both at the Australian Museum, working on Lapita assemblages from West New Britain. Areas under investigation included the Arawe Islands, Talasea and Kandrian. It was hoped that the examination of long ceramic sequences from West New Britain would allow the assessment of the concept of Far Western, Western and Eastern Lapita provinces and the implications derived from them. Indeed, Anson had hoped (1983:163) that the excavation of more sites from West New Britain would shed new light on the definition of stylistic boundaries. The Arawe assemblages in particular showed promise in answering many of the questions raised above as they showed both temporal and spatial variability. The other assemblages were used mainly to provide a comparison and contrast to the Arawe assemblages (see Chapter 3 for a background to West New Britain archaeology).

The West New Britain pottery analysis has three components.

The nature of the pottery assemblage

The first component of the analysis deals with a formal study of the pottery assemblage. It is directed towards characterising the Lapita pottery assemblages from West New Britain in order to assess the role of dentate vessels in the assemblage, in particular how they fit into the already defined style provinces. It set out to test:

a. whether a Lapita pause existed in the Bismarck Archipelago, prior to the colonising of Remote Oceania. That is, do the West New Britain assemblages contain Far (or Early) Western Lapita?

b. whether the Lapita pottery from West New Britain underwent changes particular to the Bismarck Archipelago, as expected by a model of interaction within a single province, or whether similar changes are found in other parts of the Pacific, suggesting interaction beyond a single stylistic province?

In order to do this, pot decoration and vessel form were analysed with the aim of building up a definition of what constitutes a Lapita assemblage, the role that dentate decoration played, and what changes occur over time within West New Britain (see Chapter 4 for the results of this analysis).

The regional perspective

The second component deals with a detailed comparison between the West New Britain assemblages and those from the Western Pacific. It is directed at assessing firstly, the break-up of the Western Pacific into stylistic provinces; secondly, the notion that any similarities and subsequent change in pottery assemblages from the West and Eastern Lapita assemblages had their origin in the initial dispersal and not from regular two way contact; and lastly, that the Bismarck assemblages, unique motifs may ‘signal little more than local stylistic divergence after the initial Lapita dispersal through eastern Melanesia’ (Kirch et al. 1987:126).

Detailed comparisons are made not only with other assemblages within the Bismarck Archipelago, but also with those further afield from the Solomons to Samoa (see Chapter 10). Such a regional perspective complements Kirch’s (1987, 1997; Kirch et al. 1991) work in Mussau. It is in response to a need to examine local level production of pottery in the Bismarcks and to place this within a larger regional Western Pacific framework.

Pottery production in West New Britain

The third component deals with the physico-chemical analysis of the pottery assemblages (see Chapter 4 for an outline of the methods used). It is aimed at assessing the role of production and distribution in explaining regional similarities of pottery. As style and form have been used to identify regional interaction networks and their changes over time, the logical question to be asked next is: ‘was the pottery traded?’ A number of testable models can be set up:

1. Is the pottery made at a single or a number of production centres within West New Britain and then exchanged outside the production area?
2. Is pottery production local? If so, other mechanisms to explain the similarity in pottery can be examined.

To test these models the fabrics of the West New Britain assemblages have been analysed, and samples from each fabric group chemically analysed (see Chapter 11 for the results). The chemical analysis of minerals has allowed comparisons to be made with local beach and river sands, while the analysis of pottery fabric has allowed definition of chemical groups in order to define resource procurement, that is, whether they could be local to the area or not. Used together they provide powerful tools in identifying local or ‘foreign’ manufacture. This data also allow an assessment of the number of production centres and any reduction or increase in these over time.

By examining the nature of production, exchange and use of Lapita pottery from a single region, this study demonstrates that production of pottery in West New Britain was mainly local. In contrast, an analysis of style and form in relationship to production supports the theory that people were moving regularly over vast areas of the Pacific. Furthermore, it is argued that there is no evidence that the strength of interaction diminished through time or across space during the duration of Lapita ceramics. The study presented here leads to the positing of an Early/Middle and Late Lapita to replace previously geographically-centred definitions of stylistic ‘provinces’. The variability is shown to be chronological more than it is geographical.
LAPITA PROVINCES AND THE REGIONALISATION OF THE SOUTH WEST PACIFIC: MODELLING LAPITA INTERACTION

The aim of this chapter is to explore and tease out in detail the relationships between Lapita provinces (or sub-regions), the nature of interaction and chronology with ceramic style and the inter-island exchange of goods which are found in the archaeological record. The definition of Lapita provinces, or the regionalisation of the Western Pacific, is important as they are the result of the spread of Lapita across the region and the subsequent level of interaction between Lapita communities. They are, according to Kirch (1997:70), cultural or communication boundaries each having a network of social interactions and regional social systems. Measuring and defining the nature of interaction is a primary goal of the archaeologist working in this region.

Ceramic stylistic similarities are important here. The regionalisation of the Western Pacific has been based on the distribution of material culture and different exchange or interaction spheres have been set up to explain these distributions. Structuring the Western Pacific into regional compartments on the basis of stylistic similarity and the movement of goods allows ideas such as isolation and regional development to be explored. As this study will test such ideas by reassessing stylistic differences in light of new analyses on assemblages from West New Britain, a fuller account follows.

This chapter is structured into three sections. Firstly, it begins the review of the regionalisation of the Pacific by examining the terms Near and Remote Oceania and their usefulness for Pacific prehistory.

Secondly, it looks at the construction of Lapita provinces, looking at the initial definition of ‘stylistic provinces’ and ‘interaction spheres’. As noted in Chapter 1 terms such as stylistic provinces, interaction spheres or exchange networks are used, sometimes interchangeably, in the literature. Provinces were initially defined on ceramic style, thus there is a Western Lapita style province. Within this province the nature of inter-island exchange was seen as different to other style provinces, thus there is a Western interaction sphere. When combined, the term Western Lapita province will be used here. Such provinces are seen as important in modelling the divergent histories of the region. As the definition of these provinces are based in part on the regional similarities of pottery, a detailed review of ‘stylistic provinces’ is presented.

Thirdly, as the definition of these provinces is defined, in part, upon inter-island exchange (interaction spheres), an examination is made of the physical evidence for the exchange of pottery and the development of exchange networks within the provinces.

NEAR AND REMOTE OCEANIA

Over twenty years ago Pawley and Green found the label ‘Melanesia’ limiting for the prehistory of the region and defined what they saw as a more relevant division – the distinction between Near and Remote Oceania (Pawley and Green 1973:4). The former area comprises New Guinea, the Bismarck Archipelago, and the Solomons down to San Cristobal, forming a chain of archipelagos and intervisible land masses separated from Remote Oceania by a 350 km water gap beginning with the Reef/Santa Cruz group, in the Eastern Solomon Islands (Pawley and Green 1973:4). They considered the boundary important for a
number of reasons. The first is biogeographical – the 'cutoff point in the natural distribution of animal and plant species' with diversity in flora and fauna diminishing east of the Solomons. The second is that the boundary also marks the edge of human colonisation in the Pleistocene (Pawley and Green 1973:4-5). Twenty years on, such a distinction is still viewed relevant as Green (1991b) reiterates the usefulness and significance of the terms 'Near' and 'Remote Oceania' in explaining the colonisation of the Pacific and subsequent development of their societies. Although over twenty years have passed and archaeological discoveries have increased dramatically with human occupation now extended to c.40,000 years in Near Oceania, the first evidence of human occupation in Remote Oceania is at c.3300 years ago. This later colonisation is associated with a material cultural inventory called the Lapita Cultural Complex.

There is no doubt that populations colonising Remote Oceania for the first time were inhabiting a different environment to their original one. Green (1978:3) saw the original Lapita settlement of the New Britain-New Ireland area as an adaptation to a complex continental island environment with wide ranging resources (Green 1976:264; Green 1979:45). Of importance is the idea that this adaptation was continued in the Remote Oceanic islands of Reef-Santa Cruz by the 'maintenance of long distance as well as local exchange networks' (Green 1976:264; Green 1979:45). The exchange of goods was therefore used to bridge the 350 km leap between the two areas allowing new and different areas to be colonised.

Although distinctions between Near and Remote Oceania may be useful in pointing out that assemblages in the latter area were representative of a founding population, the distinction is limiting in looking at the nature of societies that persisted once that water gap was crossed. This can be seen in the subsequent regionalisation of the Western Pacific based on the decorative system of dentate pottery, and also the distribution of non-ceramic trade items, in particular obsidian.

**STYLISTIC PROVINCES**

Important in understanding the divergent histories of the Western Pacific is Green's definition of Western and Eastern Lapita, the former made up of New Caledonia, Vanuatu and areas to the west in Near Oceania, the latter made up of Fiji and islands to the east (Tonga, Samoa) (Green 1978). He argued that once the islands east of Vanuatu were settled, they became isolated due to the large water gaps between islands. The large water distance prohibited effective two way voyaging and communication which 'constitutes a significant break in the Lapita exchange network across which few, if any, goods flowed' (Green 1979:47).

The definition of these two regions is important as it is based on regional similarities of:

a. pottery (stylistic provinces),
b. obsidian distribution (exchange networks) (Green 1978:3), and
c. to a lesser extent the distribution of other portable artefacts such as chert, stone and shell.

As the regional trends are used to compare and contrast my own results from West New Britain a fuller account follows. The rest of this section looks at stylistic provinces within the Western Pacific. This is followed by a review of the exchange of pottery and obsidian, other lithics and shell.

**A Western and Eastern Lapita**

Based on 'differences in vessel shape and by the style and frequency of decoration' Green (1974b, 1978:7) recognised an Early Western, and Early and Late Eastern Lapita style. The distribution of dentate motifs is significant here. Based on the previous work of Donovan (1973), Mead et al. (1975), his students and indeed his own work Green (1990:36) compiled a total of 122 motifs from Watom in the west to Tonga in the east. He identified:

- 29 basic design elements, including eight zone markers, 18 two-dimensional and four three-dimensional design elements ... A small body of rules have been formulated which can be applied to these design elements to produce at least 122 individual motifs (Green 1978:8).

For an area comparison between sites Green subtracted from these 122 motifs those that were unique to a site – '23 in the Reef/Santa Cruz region, 6 in New Caledonia, 6 in Fiji, and 15 in Tonga' (Green 1978:8). He also subtracted a further 13 motifs shared within the Reef/Santa Cruz sites only (Green 1978:8). This left 59 motifs in the Lapita decorative system from which another five were subtracted due to their presence in Fijian sites and their uncertain presence in others (Green 1978:10). This left 54 motifs in which to compare sites from six areas – Watom (SAC), Reef/Santa Cruz (RL-6, RL-2, SZ-8), New Caledonia (Site 13, Vatcha), Fiji (Natumuku, Yanuca), Tonga (TOl-5), and Samoa (MU-1). This work is a cornerstone for interpreting Oceanic prehistory for three reasons.

First it the recognised a 'substantial corpus of early motifs spread from Watom to Samoa' (Green 1979:40):

- the core around which continuity in the Lapita decorative system was maintained over 4000 km of space and up to 1000 years in time ... The Lapita ceramic series is in fact a very cohesive and unified system, one highly likely to have been produced by a group of culturally very closely related communities (Green 1978:9).

Secondly, despite this corpus of early widespread motifs, Green identified 'separate style areas' (Green 1979:43; Pawley and Green 1973:11) – an Eastern and Western Lapita component based on a distinction in their motifs (Green 1978:9). He also noticed a *distance decay in the Lapita design system the further one proceeds east*:

- from the rather ornate curvilinear and fairly elaborate rectilinear design patterns of the western
Lapita to the more simplified and generally rectilinear forms of the eastern Lapita (Green 1979:42).

Thirdly, Green identified temporal change in decoration and shape. Within these two areas the ceramic series underwent different changes. The Reef/Santa Cruz ceramic inventory showed decorative decay over time (SZ-8; RL-2; RL-6):

these trends suggest that following the establishment of the local design system in the area, there was initially some local efflorescence, after which innovation in the system declined (Green 1978:13, 1979:43).

Yet the variety in vessel shape (shouldered jars, bowls and flat bottomed dishes etc.) stayed the same (Green 1978:13, 1979:43). In the east, on the other hand, Green noted that the elaborate vessel forms disappear and only simple bowls and globular shaped pots with little or no decoration remain (Green 1978:13, 1979:44 – also see Parker 1981:124). In between Green noted that incising increases and there are fewer vessel forms at the site of Malo in Vanuatu.

In the east Green defined a transition from his Early Eastern Lapita to Late Eastern Lapita to Polynesian plain ware based on ‘differences in vessel shape and by the style and frequency of decoration’ (Green 1974b:251 and Fig. 90:252, 1979: Fig. 2.9:42). Since his initial definition, excavations on Niuatoputapu (Kirch 1988b), Uvea and Futuna (Kirch 1976, 1981), Lakeba (Best 1984), Naigani (Best, 1984; Kay 1984), Ha‘apai (Shutler et al. 1994) and Samoa (Jennings et al. 1976; Jennings and Holmer 1980) have reinforced this distinction.

The division between the Western and Eastern Lapita provinces did not correlate with Near and Remote Oceania, but occurred within Remote Oceania itself: i.e. between Main Reef/Santa Cruz, Vanuatu, New Caledonia on one hand, and Fiji and islands to the east on the other. Isolation is seen as the key reason for the development of the Western and Eastern Lapita provinces. It resulted in a decline in communication reflecting the lessening of shared motifs between the areas:

It is my view that the sharp drop in the figures for Jaccard co-efficients for shared motifs between the Reef/Santa Cruz centre and New Caledonia or Fiji is significant, accurately reflecting in decoration on ceramics the lesser degree of communication (Green 1978:11).

That is, motif exchange in the westerly sites continued to occur. Islands in the east (Fiji, Tonga, and Samoa) were still communicating with each other but not with those in the west (Green 1979:42-3).

Green saw close interaction within each province indicated by pot decoration. Those settlements to the east though were ‘cut off from an internal exchange network which had allowed the more westerly communities to sustain their initial adaptation’ (Green 1978:3). They ‘proceeded in their own fashion more or less in isolation from events in Lapita communities farther west’ (Green 1979:47). This included a loss of decoration, and a reduction in vessel form (Green 1974a:256, 1974b:251-3).

In the Western Lapita province, on the other hand, elaborate forms were retained throughout the Reef-Santa Cruz Island sequence (Green 1976:261). Green argued that Watom (SAC), RF-2 and RF-6 in the Reef Santa Cruz group:

though 1300 km apart, are very similar in detailed aspects (allomorphs) of the decorative motifs they employ, suggesting continued contact between widely separated localities (Green 1982:10).

Kirch also uses and expands upon this model of two Lapita regions each with different interaction spheres or networks. Like Green he sees the water barrier between east and west being crossed ‘at least once (and perhaps several times)’ (Kirch 1988a:106), thus explaining the sharing of an early set of decorative motifs, with any later differences resulting from ‘subsequent isolation and local stylistic divergence’ (Kirch 1988a:105).

Kirch sees the reduction in the range of vessel shapes and loss of decoration as signalling ‘some fundamental changes in the functional role that ceramics played in these early societies’ (Kirch 1988b:245). Rather than seeing it as a reduction in variability, Kirch prefers to view it as the ‘wholesale elimination of the decorated ceramic component, leaving only a restricted group of plainware vessel forms’ (Kirch 1988b:245). Kirch sees the concept of proletarianization, a concept espoused by Yen at the first Lapita Homeland meeting in Sydney, 1986, as important when assessing the change in western Polynesian pottery:

The adduction of Lapita pottery sequences to social terms may be the proletarianization of its use, as the societies move to more highly organised forms .... Indeed, what we would be viewing ... are the transformations of symbols of rank that were to be eventually replaced in large part by other symbols that may have had material expression, but whose ultimate manifestation, with the rise of heredity in social ranking, could have been the importance of genealogy in Polynesia (Yen n.d.:6 quoted in Kirch 1988b:245).

A Far Western Lapita

Another dimension to the Western Lapita style area was provided by Anson (1983) who further developed Green’s idea of regional style boundaries, and added Far Western to the literature. Anson undertook a stylistic analysis based on motifs from sites within the Bismarck Archipelago and subsequently compared them both quantitatively and qualitatively with sites in Remote Oceania. From within the Bismarck Archipelago he compared the decoration of pottery from Talasea, Ambitle, Eloaua, and Watom. Anson adapted Mead’s and Donovan’s original motif lists to include their alloforms (variations of a motif) as separate motifs, thus expanding the motif list to over 500 (Anson 1983:59, 1986:160, 1990:53). Anson’s work on motifs provided two major conclusions:

First, on the basis of stylistic similarity between assemblages from Talasea, Eloaua, and Ambitle, he identified a Far Western style particular to the Bismarck archipelago which he argued was earlier than the later
Western style of Watom, the Reef/Santa Cruz area, Vanuatu and New Caledonia.

Secondly, by looking at decoration on an alloform level, he proposed that decoration at any given site and from any given region more strongly resembles that of other sites in the same region than it does the decoration of sites in other regions, irrespective of chronology (Anson 1986:163).

He goes on to argue that this is:

best explained as the result of gradual changes within each of the widely dispersed regions, and suggests that communication between them was rather less frequent than the Coloniser model would imply (Anson 1986:163).

This is important as according to Anson it counteracts Green's implication that sites such as Watom, RF-2 and RF-6 are 'similar in detailed aspects of their decoration, suggesting continued contact between distant localities' (Anson 1986:163). Anson argues for infrequent communication between communities.

Far Western Lapita is therefore viewed by adherents of the 'indigenous Bismarck model' as evidence for the development of the Lapita Cultural Complex within the Bismarcks. Adherents to the fast train model, however, do not accept the temporal primacy of the Far Western Lapita, and view its definition as the product of inadequate sampling (Kirch et al. 1987).

North and South Eastern Lapita
Kirch has gone further and sub-divided the Eastern Lapita province into two sub-groups making a distinction between a northern Lapita network (Mulifanua, 'Uvea, and Niuatoputapu - Sigatoka), and a southern one (Tongatapu and other Fijian sites such as Natunuku, Yanuca, Naigani) (Kirch 1988b:246). With regard to decoration, the northern group share a simplified set of design elements and motifs. On the basis of a comparison of motifs between sites he sees that a 'wider array of design elements and motifs, indicating more elaborate decorative styles' are found from Tongatapu, Yanuca and Natunuku (Kirch 1988b:187). 'Uvea, Mulifanua and Niuatoputapu (NT 90) on the other hand share many motifs, suggesting that they are more 'closely linked, either temporally, spatially or both' (Kirch 1988b:187). Tikopia and Sigatoka are 'more simplified derivatives of the NT-90/Uvea/Mulifanua complex' (Kirch 1988b:187).

Tikopia is unusual as it is in the geographical domain of the Western Lapita province (Kirch 1988b:188). Kirch and Yen proposed settlement from the east to explain its similarity with easterly sites (Kirch and Yen 1982:337-8). Kirch sees this connection strengthened by his subsequent analysis of the Niuatoputapu assemblages, and suggests that it was colonised by one of the 'northern groups' outlined above (Kirch 1988b:188). Tikopia and Niuatoputapu share similar decoration, vessel form and technique of manufacture (i.e. calcareous filler). All motifs found in Tikopia are found in Mulifanua, Niuatoputapu (NT-90), and 'Uvea (Kirch 1988b:189). To add support Kirch notes that the date for this corresponding ware c.900 BC makes it contemporary with the Reef/Santa Cruz assemblages which have more elaborate decoration (Kirch 1988b:189). To explain the presence of Talasea obsidian Kirch sees 'early Tikopian colonists established some intermittent contact with Lapita peoples in the Reef/Santa Cruz islands' (Kirch 1988b:189). To further strengthen the argument Kirch notes that the near island of Anuta which contains 'Lapitoid' plain pottery at 900 BC had chert which is probably from Futuna (Kirch 1988b:189).

**Section Summary**
On the basis of decoration and form the Western Pacific Lapita pottery assemblages are divided into style provinces based on similarities within each region. This stylistic division is interpreted as the result of isolation after the initial colonisation which led to the development of two interaction spheres. Once the two interaction spheres separated the respective pottery assemblages underwent change with decoration on the eastern pottery eventually disappearing. This has led Kirch to argue for a change in the functional role of the pottery in society (Kirch 1988b:245). The research presented in this report will be critical in assessing the validity of the above claims as it aims to re-investigate the parameters which originally defined Far Western, Western and Eastern by analysing several new Bismark assemblages. The next section looks at the physical evidence of such interaction spheres and the role that exchange played in such networks.

**LAPITA EXCHANGE NETWORKS – INTERACTION SPHERES**

The exchange of pots, obsidian, and other material are seen as crucial in the development of exchange networks and evidence for the 'interaction spheres' within each province outlined in the last section. Models incorporating exchange have taken centre stage in explaining not only the distribution of cultural material we know under the name of the Lapita Cultural Complex, but also the heterogeneity of today's exchange networks in the Pacific (Kirch 1988a:104-5). In particular, attention has been given to the significance of exchange in the colonisation of Remote Oceania and its subsequent role in maintaining a cohesion between far-flung communities. Yet the nature of Lapita exchange varies over time and space, and of importance is the realisation that there is no 'single integrated' Lapita exchange system (Green 1996:126; Kirch 1997:241; Green and Kirch 1997). Exchange networks are seen to vary per province, with some interaction between the Far Western and Western Lapita provinces, and little between the Eastern Lapita province and the rest.

But what is the actual evidence for inter-island exchange? Lapita pottery for instance has been called a trade ware (Terrell 1989). Exchange may be a useful mechanism in explaining stylistic similarity across wide areas, yet what is the evidence? Each of the provinces
will be reviewed and examined for evidence of interaction networks based on exchange.

**Far Western**

Based on the movement of pottery and obsidian, exchange is viewed in the Bismarck Archipelago as complex (Green and Kirch 1997:28). This complexity was seen as part of the cultural baggage brought into the area by Austronesian ‘newcomers’. Green and Kirch argue that the intrusive ‘Austronesian’ speaking peoples already had social and cultural ‘commitments’ to complex exchange prior to their arrival in the Bismarck Archipelago (Green and Kirch 1997:28). That is:

- obsidian immediately became incorporated into a complex, multi-nodal, multi-directional, decentralised and diverse (content) exchange network linking numerous communities around the Bismarcks, all distinguished by having ceramics decorated in a highly distinctive, semiotically-charged decorative style (Green and Kirch 1997:27).

The complexity of the exchange system apparently simplified over time as was evident by first, the reduction in pottery producing centres and the inter-island importation of pots into Mussau, and secondly the reduction in the number of sources supplying obsidian to Mussau over time. Such changes eventually ended up with the regionalisation of the area:

- with the breaking of the original network at critical points along the chain, leading to smaller, less complex regional networks in the later part of the Lapita period (Green and Kirch 1997:28).

Yet what is the evidence for exchange?

**Pottery**

Within the Bismarcks the production of Lapita pottery was predominantly local. Only two assemblages are seen as fully imported, Eloaua (Kirch 1987; Kirch et al. 1991; Hunt 1989; Anson 1983) and Nissan (Spriggs 1991a), with limited imports identified from numerous other sites such as Watom (Anson 1983; Green and Anson 1991). Both Eloaua and Nissan are reef limestone and have no clays, thus it is expected that the pots or clays had to have been brought in. Production of pottery from Talasea, Kandrian, Lossu and Malekolon is probably local with limited imports identified from numerous other sites (Bird et al. 1981; White and Downie 1980:203), Lossu (Bird et al. 1981; White and Downie 1978:792) and Lasigi (Golson 1991:225) assemblages on New Ireland, and those assemblages to the south east: Nissan (Spriggs 1991a:237-9), Malekolon and Buka (Bird et al. 1981; Specht 1969; Ambrose 1976:359). From Buka, no Willaumez Peninsula material is found.

suggesting a reduction in the complexity of the ceramic exchange network over time. In short, at the same time that the ceramic assemblage was being stylistically simplified, the number of production centres was declining, and the volume of imported ceramics was decreasing in relation to locally produced ware (Kirch 1990:123).

**Obsidian**

Unlike pottery, there is extensive evidence for the movement of obsidian. The presence of obsidian is important because of its restricted natural distribution and the success in sourcing archaeological specimens using chemical characterisation. In the Bismarck Archipelago obsidian is found naturally in three regions: the Admiralties, the Willaumez Peninsula and Mopir. When found outside those areas it is direct evidence for importation. Sites close to the sources, such as Talasea, have, as expected, local source material. Those further away have a mixture of the two sources with the proportion dependent on not only closeness to the source, but also to the nature of the social distance between those communities in the exchange network. Changes in the proportion of obsidian over time thus represents the changing nature of social distance between those communities providing obsidian from the source, either directly or as part of the exchange link. Mussau, for instance is much closer to the Admiralties than it is to Talasea. Yet in its earliest Lapita levels (sites ECA and EKQ), obsidian from both the Admiralties and the Willaumez Peninsula are found in equal number. If nearness to the source was the only factor, then Mussau assemblages would have contained 100% Admiralty obsidian. Over time though, Admiralty obsidian dominates and the Willaumez Peninsular obsidian declines (Kirch et al. 1991:157; Kirch 1991:148). This could reflect a decrease in the social distance between the inhabitants of Mussau and those populations to the south east which formally exchanged or brought in the Willaumez Peninsula obsidian.

Watom, which is closer to the Willaumez Peninsula, also shows changes in obsidian procurement over time, although not the same as Mussau. Watom is a mid to late Lapita site with the earliest material dating later than the earliest Mussau assemblages. The earliest obsidian here was from three sources (Admiralties, Willaumez Peninsula and Mopir), with those from the first two sources in equal amounts (Green and Anson 1991:177). Yet unlike Mussau, in Watom the proportion of obsidian from the Willaumez Peninsula increases at the expense of the Admiralty material in the upper levels. The proportion of Mopir remains the same (Green and Anson 1991:177).

Shell
Although a lot has been made of shell exchange in Lapita sites, there is no direct evidence for the movement of shell valuables. It is based on first, the presence of worked shell debris in the Mussau assemblages, and the lack of this debris in other sites, and secondly, ethnographic analogy. For instance, Kirch argues that Mussau, lacking natural resources such as obsidian or adze stone, functioned akin to the kula ring villages in Trobriand and Woodlark Islands ‘specializing in the production of shell armrings (mwali) which are exported to the wider long-distance network where they come to take on increasingly greater prestige value’ (Kirch 1988a:112). According to Kirch, shell artefacts were exchanged against high volumes of imported pottery and obsidian (Kirch 1991:145 – see also Kirch 1988c:339, 1990:124).

Other
Evidence for transfer of other items are few and far between. From Watom in the Bismarck Archipelago little can be said about the transfer of chert and other rock. Elsewhere in the Bismarck Archipelago imports have been identified from Mussau, where chert, stone abraders, stone adzes and volcanic and metavolcanic ‘manuports’ were imported (Kirch 1987:178).

Far Western exchange - summary
The movement of obsidian from sources in the Admiralties and West New Britain through out the Bismarck sites is evident, and changes in the proportion of obsidian in sites away from the sources are indicators for the regionalisation of the Pacific. With the exception of Mussau and Nissan, however, pottery production is local and is not moving in great numbers. Specialist shell production is argued to have taken place in Mussau, however this is based on inferential evidence. In short, the only evidence for materials moving on a large scale and regular fashion is obsidian.

Western Lapita
As Remote Oceania was populated for the first time by the makers of Lapita pottery, the associated exchange networks were brought in with these colonisers. However these exchange networks within the Western Lapita province were not uniform, with differences seen between the movement of goods into the Lapita Reef and Santa Cruz Islands and those assemblages further to the east.

Based on assemblages from the Reef and Santa Cruz Islands, exchange is argued to be both an adaptive strategy for colonists moving east plus a social strategy to maintain social ties (Green 1987; Kirch 1987). That is, contacts with the west were seen as necessary for survival which formed a ‘lifeline’ back to an ancestral homeland (Green 1976:258, 1979:45, 1987:246; Green and Kirch 1997:28). Kirch (1988a) sees this as maintaining community viability by providing marriage partners – ‘connections between kin and related communities were essential to survival’ (Green and Kirch 1997:30). Also, as Green noted it was importing alone that made possible the continuance in the Reef-Santa Cruz area of a culture adaptation more in keeping with the physical resources of the larger continental islands to the west than with the rather limited resources available on raised atolls of the Main Reef Islands, or even the high volcanic island of Nendo (Green 1976:258; also see Green 1974a:256).

Yet this ‘adaptive strategy’ is also linked to a society geared to status enhancement and prestige goods acquisition and it was the latter that kept the exchange system continuing when the colonisation process was complete. Obsidian was seen as a status item. Green and Kirch argue that there were social reasons to import Bismarck Archipelago obsidian through status enhancing items ‘which were socially and ideologically charged’ (Green and Kirch 1997: 29). Chert or even the obsidian from Vanua Lava could have performed those tasks equally well, but obsidian from over 2000 km was also used. Why? Green argues as follows:

people used this obsidian because they had learned to use it in their homeland, and they wished to maintain ‘ties’ with their relatives there by importing a luxury and status maintaining item with social and ideological significance, rather than depend on, for example, a slightly inferior and less prestigious replacement import from a non-homeland community much closer to hand (Green 1987:246).

Apart from the importation of prestige goods from the west, there was a complex exchange network within this province. Green defines it as part of a ‘multi-mode, complex, generalised exchange system between related communities’ (Green 1982:15; see also Green 1974a, 1987). Green argues for direct access (over 26 km distant), local reciprocity (over 26 km distant), and one-stop reciprocity (275-380 km distant) modes of goods exchange (Green 1982:15, 1987:246; Green and Bird 1989).

The long distance inter-island movement of obsidian to the Reef and Santa Cruz Islands was argued to have lasted 500 years (Green and Kirch 1997:28). This did not apply to assemblages further east. Indeed, Green views the exchange pattern from the Reef/Santa Cruz group as not typical of exchange in Remote Oceania (Green 1991a, 1996). Apart from ‘heirloom’ objects, links with the ‘ancestral west’ were evident in assemblages further east according to Green and Kirch (1997:30). Thus obsidian from the Bismarcs found in assemblages from Vanuatu and New Caledonia were explained away as imported in the colonisation process. Green and Kirch (1997:30) see it as a result of a rapidly fast colonisation front, where descendants ‘were in effect recreating their social worlds, and were only intermittently in contact with other down-the-line descendants’.

Yet what is the evidence for exchange?

Pottery
Like those assemblages further west, most of assemblages were probably local. The pottery deemed not of local origin are those with volcanic sands and found on coraline islands or atolls. The Reef Islands (Green 1974a, 1976, 1978), Bellona (Poulsen 1972; Dickinson and Shutler 1979), and Santa Ana (Kirch and Rosendahl 1976) are examples. Importation of pottery to the Reef
Islands from Santa Cruz has been used as an example of both direct access (26 km) and local reciprocity (26 km) modes of exchange (Green 1982:15; see also Green 1974a). Those assemblages not from coralline islands such as Malo (Dickinson 1971; Dickinson and Shutler 1971; Dickinson and Shutler 1979:1696), or the Santa Cruz group, have mostly local origins. From Malo only one of the six sherds examined petrographically were deemed to be not of local origin (probable origin in New Caledonia) (Dickinson 1971:245; Dickinson and Shutler 1971:203). From Santa Cruz (Nendo), Green interprets some of the earliest pottery as containing fabrics originating from outside the Reef/Santa Cruz group (Green 1976:261). The importation of 'a few pots' into the one Santa Cruz site (SZ-8) is seen as evidence for a one stop reciprocity (275-380 km) mode of exchange (Green 1976:261, 1982:150). Yet the majority contain sands local to the island. Pottery from Tikopia (stylistically Eastern Lapita) are also locally made (Dickinson 1982a:370).

From New Caledonia a more complex picture emerges. Most of the pottery examined by Galipaud from northern New Caledonia were made from resources found in that part of the island. Yet one fabric characterised by the presence of spinels could only have been mixed with a clay from a different location also located on the north coast. Thus minerals used as filler and/or clays were moving within the north coast region. Sherds with this type of fabric were also found in sites further south and on the Loyalty Islands indicating the movement of pots (Galipaud 1990:140; Huntley et al. 1983). Thus although there is some evidence of the movement of pots, manufacture was mostly local.

**Obsidian**

Again the presence of obsidian equates with importation with the Reef/Santa Cruz group assemblages providing the primary focus. Although sites from New Caledonia and Vanuatu belong to this Western Lapita style region and obsidian in their assemblages originates from sources in the Bismarck Archipelago, it is the sites in the Reef/Santa Cruz group that produced evidence of prolonged participation in an exchange network to the west (Green 1978:11).

Obsidian brought into the Reef and Santa Cruz Island assemblages mainly originates from the Willaumez Peninsula and to a lesser extent the Admiralties, with only one piece from Fergusson Island in the D’Entrecasteaux group (long distance down the line exchange). A small amount originates from the Banks Islands to the east (Vanua Lava and Gaua) (one stop reciprocity) (Green and Bird 1989; Green 1987, 1976). The quantity of obsidian reaching the Reef and Santa Cruz Islands decreases over time (Green 1991c:199-200; Sheppard 1993:127) (in comparison to chert – see below).

Sheppard sets out a number of possible scenarios for this:

a. steadily decreasing contact with groups to the north
b. supply available in the chain
c. decline in obsidian value over time,
d. decline in visits to the source (Sheppard 1993:127).

This ties in well with Kirch’s argument for a decline in the Lapita exchange network.

Little obsidian is found in the other sites of the Western Lapita province. Only a handful of obsidian was found on Malo (Vanuatu), Ile des Pins (New Caledonia) and Tikopia. The Malo obsidian originated from a number of sources: Willaumez Peninsula, Admiralties and local Banks Islands, while one obsidian piece from the Ile des Pins was sourced to the Willaumez Peninsula (Ambrose 1976; Bird et al. 1981). Obsidian from Tikopia originates from the Admiralties and Banks Islands (Spriggs 1997:137).

**Other**

There is not much evidence for the transfer of other lithics here despite Kirch’s assertion that chert is found in almost all Western Lapita assemblages (Kirch 1988a:106). From the Reef/Santa Cruz area small amounts of chert from the earliest times came from Lakao in the Duff Islands to the east. The majority of chert probably comes from the west either from Ulawa 400 km north west of the Reef/Santa Cruz, or Malaita and Maramasike – one stop reciprocity mode of exchange over 275-400 km (Sheppard and Green 1991:99; Sheppard 1993:124). The importation of chert remains constant in the earlier sites and only decreases later (RF-6) (Sheppard 1993:127). Sheppard interprets the late decline in chert as resulting from a decline in the exchange network suggesting a reduction in contact outside the region (Sheppard 1993:129). This ties in well with the reduction in obsidian.

Other stone (oven stones) were imported to Reef Islands from the Santa Cruz group or Tinakula (direct access mode of exchange – 26 km), and adzes were imported into the area from the west (one stop reciprocity). Muscovite-garnet schist (small amounts) and metamorphosed sandstone was also imported from the west over long distances (down the line exchange) (see Green 1982:15 for a list of exchange modes; Green 1976, 1987:246).

There is little evidence outside the Reef/Santa Cruz area for the movement of stone. Finished adzes of metavolcanic stone found in Malo and Tikopia (adzes) were imported from the west. Chert found in Tikopia and Malo was also brought in from the west, probably from the Solomons (Kirch and Yen 1982:236; Kirch 1988a, 1988b:188; Green 1996:125). One piece of chert from Anuta was chemically analysed and a possible source is Futuna to the east (Kirch and Yen 1982:344). This is the first evidence of material being transferred from the Eastern Lapita province to the west.

**Western Lapita exchange – summary**

Western Lapita exchange networks can be divided into two: Reef/Santa Cruz group and the rest. Those from the Reef/Santa Cruz sites are seen by Green as more typical of the exchange network operating in Near Oceania in the west. Models which argue that exchange is both an adaptive strategy for colonists moving east plus a social strategy to maintain social ties, are only applicable to Reef/Santa Cruz assemblages. And here it relied mostly on the importation of obsidian at the expense of closer obsidian or chert supplies.
The presence of imported obsidian is not the only evidence for obsidian being a status item. Recent work by Sheppard (1992, 1993) who analysed obsidian and chert flakes from the Reef/Santa Cruz sites of SZ-8, RF-2, and RF-6, looking at extraction, transport, core reduction, tool use and deposition, noted the lack of 'fit' with resource maximisation models incorporating economising behaviour (Sheppard 1993). According to Sheppard, his results suggest that obsidian's value is not that of a scarce utilitarian resource, but should rather be judged in social terms (Sheppard 1993:135).

What of exchange systems in the rest of this province? Green interprets the small amount of obsidian found in the other assemblages as baggage brought by the initial colonists as part of the colonisation process (Green 1991a:297). Sustained contact with the west did not occur. Thus Green sees the Reef/Santa Cruz area as unusual as it was the only area where contacts with 'distant communities to the northwest in Near Oceania maintained over a period of 600 years or more' (Green 1991a:297).

**Eastern Lapita**

The exchange networks of the Eastern Lapita province were argued to have been isolated from the west. Kirch envisages that once the Eastern Lapita interaction sphere was set up, the eastern sites became isolated from the westerly sources of obsidian, stone, and shell artefacts:

Thus to a significant degree the Eastern Lapita network, finding itself cut off from the older and established Western network, recreated a new, self-contained exchange network within the Fiji-Tonga-Samoa region (Kirch 1988a:112).

Any long distance movement of goods from the west were seen in terms of 'heirloom' effects, the results of colonists baggage (Green and Kirch 1997:30). This area was characterised by regionalised exchange interactions (Green and Kirch 1997:30).

**Pottery**

Most of the pottery from this region are deemed to be of local origin. Evidence of inter-island movement of mineral filler could be evident on Upolu in West Samoa (Dickinson 1976a:103) and is evident in Fiji. Dickinson has identified non-local wares from Sigatoka and Natumu, although non-local does not mean non-Viti Levu. Both could have originated from other parts of the island (Dickinson 1980b:216). On Niuatoputapu most of the sands were probably local although some could have originated from the Tongan Island arc (Dickinson 1974; Dickinson 1988). Kirch argues that a small number of pottery from Niuatoputapu were manufactured on nearby Tafahi (Kirch 1988b). Those from other Tongan assemblages show a similar pattern (Dickinson 1974; Dickinson 1987). One sherd from Mulifanua has a Fijian origin, the rest were local (Green 1996:122). Other assemblages which have Lapita sherd of local origin include Futuna, Uvea and Alofi (Dickinson 1976b:64) and To'aga (Dickinson 1993).

The movement of pottery is found on Naigani and the Lau group. Here a limited amount of imported pottery was identified which probably originated within the Fiji group (Best 1984:355; Kay 1984).

This review of the literature from the East Lapita province suggests that little movement of pottery took place. Like the scenario in the West, mechanisms other than exchange must be entertained to explain the widespread similarities of the Lapita pottery.

**Obsidian and Volcanic Glass**

The only evidence of the long distance transfer of material from the west into the Eastern Lapita province is two flakes of obsidian from the Willaumez Peninsula found at Naigani, Fiji (Best 1987:31). Naigani is 3700 km from the source. Of note is the age of the deposit. A pooled mean of 2800±25 BP makes it younger than the earliest dates for Fiji, and the pottery decoration has closer affinities with Western assemblages of comparable ages according to Best. These include the Reef/Santa Cruz and New Caledonian assemblages, which suggests the occupation of Fiji took place over time (Best 1987:32). Green and Kirch, however, see these two obsidian flakes as residue from a one way sea crossing from west to east (Green and Kirch 1997:32).

Although there are a couple of sources of volcanic glass within the province (Niuatoputapu and nearby Tahafi from North Tonga, and Tutuila in Samoa) the amount moving within the province was never great (Kirch 1988b:215). Little is found in the Samoa and Tongan sites according to Davidson (1978:387; Poulsen 1987:214). Those pieces were 'tiny cores or small detrital pebbles' (Davidson 1977:88, 1978:387). From Samoa the excavated volcanic glass did not come from Tafahi – and Davidson thinks it may even be local (i.e. Samoan) (Davidson 1977:88, 1978:387; Ward 1974a – see Sheppard et al. 1989).

In Fiji volcanic glass is rare. Best reports only twenty flakes from Lakeba. Those from early deposits are from Tafahi Island (only five pieces), while those from later contexts are from the Banks Islands, Vanuatu (Best 1984:431, 1987:31). Thus although evidence of contact between Fiji and Tonga is evident (500 km), twenty flakes does not equate with a large scale exchange network.

**Other**

Chert occurs naturally in both Fiji and Futuna (Davidson 1978:387), and possibly on 'Eua in the southern Tongan archipelago (Kirch 1988b:214). It is found only in early contexts in Tonga, Samoa, and Niuatoputapu. Those on Niuatoputapu may come from Futuna (Davidson 1978:387; Kirch 1988b:214), although Green, citing work by Sheppard, thinks that Fiji and 'Eua may still be contenders (Green 1996:122). Those from Tongatapu were imported from an unknown source possibly from 'Eua. Those in Samoa are imports (Kirch 1988b:217). Chert is also found in the Naigani and Lakeba assemblages (Kay 1984; Best 1984).

All stone artefacts were imported to the coraline islands of southern Tonga, including Tongatapu, probably from other parts of the Tongan archipelago. Stone adzes, beads, grinders and cutters, 'bowling disks',
hammer stones and red ochre are noted and are thought to have come from 'Eua and the volcanic islands of western Ha'apai group (Poulsen 1987:214; Davidson 1977:87, 1978:387).

A possible example of inter-archipelago exchange could be two excavated adzes from To-6 (mid to late 1st millennium BC) made from hawaiite (Poulsen 1987:177). This stone is foreign to the archipelago. It occurs, however, in the Loyalty group, Vanuatu, Samoa and 'Uvea (Poulsen 1987:177). As Davidson points out, they are not the baggage of the first arrivals and may come from 'Uvea or Samoa, or Vanuatu (Davidson 1977:88, 1978:388). Poulsen sees the 'Uvea source as a likely candidate due to close pottery similarities between Futuna and this late Tongan site (Poulsen 1987:177). Thus although stone was sent to these coralline islands, two adzes and a small amount of chert do not amount to an established trade network.

Another two examples of the inter-archipelago movement of stone is from Samoa. Firstly, Green notes that one of the two adzes found from Mulifanua was probably imported from Tonga. Secondly, surface collected adzes from Samoa (in a supposed early Lapita period) were made from green metamorphic rock from Vitu Levu (Green 1996:121). Again, these are isolated examples of the movement of stone between archipelago's.

Shell
Attention has focused on shell as an important export item. Kirch sees the lack of manufacturing debris in his Niuatoputapu assemblages as indicating that shells were imported there. He found Conus and Tridentina rings, Conus disks, and Spondylus beads in site NT-90 as whole or broken finished artefacts (Kirch 1988b:255). Only Naigani and Lakeba showed evidence for the production of shell artefacts (Kay 1984; Best 1984). Kirch (1988b:255) calls his shell artefacts 'high value imports' because of the absence of shell manufacture on Niuatoputapu.

Therefore, he argues that one of the eastern sites 'had to assume the role of a shell valuable manufacturing centre' (Kirch 1988a:112). He mentions Lakeba and Naigani in this context – as both, like Mussau, are relatively resource poor, and shell detritus is found there in Lapita assemblages.

Eastern Lapita exchange - summary
Volcanic glass, 'other stone' and chert may be the only evidence of inter-island contact (Davidson 1977:88). Even then they are only associated with the early period when pottery was used. Chert was only used in the Early Eastern Lapita, while volcanic glass does not survive into the aceramic period of Western Polynesia. Kirch prefers the term volcanic glass, as those pieces which derive from the Niuatoputapu and Tafahi sources are not translucent and are lower in silica than obsidian (Kirch 1988b:247).

Davidson argued that once these islands were closed off from the Western network, the main islands of Fiji, Tonga, Samoa, Futuna and Uvea maintained regular contact with each other during the next 1000-1500 years (Davidson 1977:86, 1978:386, 1979:91). She does not see contact in the form of extensive exchange of goods as 'there is little evidence of a Lapita trade network in the region' (Davidson 1978:388). She bases this not only on the uniformity in regional changes of pottery vessel form and decoration from Early to Late Eastern Lapita to Polynesian Plain ware in Samoa (Green 1974b), but also changes in adzes (Davidson 1977:88, 1978:388):

It seems too much to suppose that five different island groups that were later characterized by regular inter-island contact independently went through the same process (Davidson 1978:386).

Based on the limited work on ‘temper analysis’ Davidson notes that all pots were produced locally – it was the idea of pottery that was moving, not the pots themselves (Davidson 1977:87, 1978:386, 1979:91).

Summary of exchange networks
This review of Lapita pottery assemblages suggests that irrespective of provinces, the production of Lapita pottery was predominantly local. Only two assemblages are seen as fully imported, Elouaua and Nissau, with limited imports identified from numerous other sites. Similarities between the assemblages are thus not to be seen in terms of exchange. Other processes are taking place which account for the similarity in material culture.

Unlike pottery, obsidian was moving from its sources in the Bismarck Archipelago out into Remote Oceania. Yet it never moved in any quantity beyond the Reef/Santa Cruz sites. Furthermore, obsidian can be used to identify the regionalisation of the Bismarck Archipelago.

Provinces and exchange networks
Although exchange networks were argued to be existing within Lapita provinces, and a great deal made out of the lack of exchange between the Western and Eastern Lapita provinces, the nature of Lapita exchange can be grouped into two: The Bismarck Archipelago and Reef/Santa Cruz group on one hand, and the Remote Oceania assemblages on the other.

Apart from the Reef/Santa Cruz assemblages, there seems to be little difference between the nature of exchange networks in Remote Oceania. Indeed, it can be argued, that excluding the Reef/Santa Cruz group, which Green sees as more in common with Near Oceanic exchange networks, the nature of exchange in both the Western and Eastern Lapita provinces were similar. That is, there is little, if any inter-island movement of materials - it was more localised. Green and Kirch see this pattern as reflecting a 'rapidly continuing 'colonisation front' in which local exchange networks were repeatedly established in previously unoccupied areas' (Green and Kirch 1997:30).

Thus, on reflection, the use of exchange as both an adaptive strategy for colonists moving east (Kirch 1987) and as a maintenance of social ties has a Reef/Santa Cruz only ring to it and is not applicable to Remote Oceania as a whole. The separation of Eastern Lapita and Western Lapita exchange networks thus is not viable.

Green still sees 'merit' in the division between Western and Eastern Lapita, noting that 'exports rarely made it
across the water gap from Vanuatu to Fiji (Green 1996: 126). But exports rarely made it anywhere – they are relatively few. It seems, as Green notes (1996:126), that within each of these regions there are exchange systems operating which have some ties with adjacent areas, albeit limited.

**DISCUSSION**

The regionalisation of the Western Pacific is primarily based on similarities and differences in pottery decoration and to a lesser extent form in Lapita assemblages. Similarities cannot be explained by exchange as the review on the production of pottery presented above indicates little movement. With the exception of Eloaua/Mussau and Nissan, production is predominantly local. Obsidian, on the other hand, is distributed outside its source areas in the Bismarck Archipelago into Remote Oceania as far as Fiji, yet the amount moving is not great. Other stone is also moving, but its volume is also small. This does not conclusively constitute an exchange system as evidenced in parts of Melanesia or Polynesia today.

What is evident from the review presented in this Chapter is that the identification of pottery production and exchange, or lack of it, coupled with the definition of Far Western, Western and Eastern provinces, is crucial to understanding the nature of interaction between societies that used Lapita pottery within the Western Pacific. The study presented here will reassess the definition of these provinces by focusing on the assemblages from one area in the Bismarck Archipelago, West New Britain. This study follows on from Kirch’s work in documenting the changing nature of exchange at one Bismarck Archipelago locality using a detailed analysis of pottery and obsidian (see Kirch 1991:148). Such an analysis will address two major issues.

The first concerns assessing the definition of Lapita styles/provinces. Anson (1986:163), noting the limited fieldwork undertaken in the Bismarck Archipelago at the time he defined his Far Western Lapita style, predicted that with further fieldwork, sites would be found with decoration intermediate between Far Western and Western Lapita. He (1986:164) called for better dated sites with larger samples of decoration from the Bismarck Archipelago to test hypotheses concerning colonisation strategies in the Pacific. The research presented in this monograph attempts to answer Anson’s call. Unlike those assemblages used to originally define the Far Western Lapita style, the Arawe assemblages have long sequences which should allow the definition of stylistic change over a long time span. As outlined in Chapter 1, the analysis will allow an assessment of whether a Lapita pause existed in the Bismarck Archipelago prior to the colonising of Remote Oceania, by ascertaining whether the West New Britain assemblages contain Far (or Early) Western Lapita. The study will also ascertain whether Lapita pottery from West New Britain underwent changes particular to the Bismarck Archipelago, as expected by a model of interaction within a single province, or whether similar changes are found in other parts of the Pacific, suggesting interaction beyond a single stylistic province.

The second issue concerns the undeveloped nature of Lapita exchange patterns. Kirch has addressed this issue through his work on Mussau. For instance, he identifies long term trends in Lapita exchange with the reduction of a wide ranging, long distance network to a more regional one over time (Kirch 1990:128). The early network connected Mussau with New Britain and probably islands further away, while the late Lapita network was geographically restricted to the Admiralties and the north coast of New Ireland (Kirch 1990:128). Why the contraction of Lapita exchange? Kirch sees one answer lying in long-distance exchange being part of a colonisation strategy. Once the colonisation finished and ‘communities had reached demographically more stable levels, the impetus to high-risk, long-distance voyaging might have declined’ (Kirch 1990:128). Kirch associates a reduction in long distance exchange with a decline in pottery source localities over time. This parallels changes in the pottery stylistic sequence (Kirch 1990:123).

Kirch sees this model being tested on the data set produced from the Arawes – i.e. data sets on long-distance exchange over time. The study presented here does so by analysing the changing nature of pottery production over time and the corresponding change in vessel form and decoration. As noted in Chapter 1, an extensive physico-chemical analysis of pottery from West New Britain was undertaken to identify production strategies and their changes over time.

Furthermore, as part of this research, the identification of production and exchange of obsidian from West New Britain using PIXE-PIGME was undertaken to compare and contrast with the pottery data. As the results from this analysis have already been published they will not be repeated in detail here (Summerhayes and Allen 1993; Summerhayes and Hotchkis 1992; Summerhayes et al. 1993; Summerhayes et al. 1993; Summerhayes et al. 1998). They will be discussed in the final chapter of this report when the results of this research are brought together.

In short, the definition of the Lapita provinces need addressing by looking at long assemblages within the Bismarck Archipelago. At the time when the concept of these interaction spheres was first postulated by archaeologists, Bismarck Archipelago assemblages were few and far between. The time is now right for such a reassessment.
WEST NEW BRITAIN – THE SITES, THEIR HISTORY AND THEIR SETTING

This chapter introduces the area under study: its geology, previous archaeological work, and a description of the archaeological sites. The chapter is structured into three sections. The first details the location of the area under study and describes its geology. Such a background is necessary in order to make a distinction between the different geological histories of the north and south coasts of West New Britain. Such geological histories are important when making distinctions in the characterisation of pottery from these coasts. The second section outlines the previous archaeological fieldwork in the area, and how the current investigations fit into the overall archaeological strategies of the region. The third section details the archaeological sites under investigation, their location, excavations, and depositional history.

LOCATION

The island of New Britain forms the southern landmass of the Bismarck Archipelago. It is crescent shaped and has an area of 39,000 square kilometres. It is 482 km long with varying widths from 80 to 50 km (Fig. 3.1.). Running along the main axis of New Britain is a central mountain chain separating the north and south coasts. South of Talasea the mountain chain is known as the Whiteman Ranges and is characterised by rugged mountains. To the east it is known as the Nakanai mountains, while to the west it gives way to the Lamogai plateau, a broken dissected limestone plateau (Allied Geographical Section 1943). The Whiteman range separates two different landscapes: the volcanic north coast (Talasea) from the limestone/karst south coast (Kandrian, Kreslo, Arawe Islands). Further west on the south coast beginning at Sauren (West Arawe) the coral reef terraces, marine platforms, limestone and karst formations give way to dissected hilly and mountainous landscape, with rivers draining from the western volcanic areas of Mt Schrader (Fig. 3.1).

Published geological reports are few. The following description is derived from the following references: Stanley (1923a, 1923b); Noakes (1942); Ryburn (1975); Ryburn (1976); Johnson (1976); Johnson et al. (1973); Lowder and Carmichael (1970); Pain (1981); and Blake (1976).

North Coast – Talasea area

The north coast of West New Britain is characterised by the volcanics of the Bismarck Arc (Johnson et al. 1973:523). Within this area obsidian is found at two localities: The Willaumez Peninsula and the Cape Hoskins area. On the basis of chemical composition and distributions Johnson divides the Bismarck arc into two: an eastern and western arc. The Willaumez Peninsula and Hoskins localities, called by Ryburn (Ryburn 1975:13; Blake 1976 for Witori) the Kimbe volcanics, fall into the eastern arc (Johnson 1976:102). Further west past the Lamogai Plateau near the tip of West New Britain is Mt Schrader and Mt Andewa, still part of the east Bismarck volcanic arc. Ryburn calls these the Andewa Volcanic complex, and Stanley notes that augite andesite is common this end of New Britain. Johnson notes that these volcanoes are older than the rest, and have not been well surveyed (Johnson 1976:103).

At the western tip of West New Britain in the Cape Gloucester area, Mt Tangi, Mt Aimaga and Mt Talawe volcanoes form part of the western volcanic arc, along with the volcanoes of northern New Guinea (Johnson 1976:104). Ryburn calls these the Cape Gloucester Volcanic complex (Ryburn 1976:13).

Chapter 3  
West New Britain – the sites, their history and their setting

Figure 3.1  New Britain.

The Willaumez Peninsula is made up of a series of volcanoes and a large caldera at the tip of the peninsula, Lake Dakatau (Lowder and Carmichael 1970:18). The eleven volcanoes that are found on the peninsula are andesitic composite volcanoes (Lowder and Carmichael 1970:18). Lavas range from basalt to rhyolite with andesite dominant (Lowder and Carmichael 1970:17). Rhyolitic flows are located in the centre of the peninsula around Talasea. Flows are also found on Garua (composed of two rhyolitic domes) and Garala Islands, in Talasea Harbour, and also north of Talasea emanating from Mt Gulu. Rhyolitic flows from Gulu are estimated to be 60 km square and flow east and west (to Voganakai village) to reach the coasts on both sides of the peninsula (Lowder and Carmichael 1973:18-19).

Located just north of Talasea, Mt Wangore, at 1200 m, is the highest peak on the peninsula. Lowder and Carmichael suggest that the most recent eruption of Wangore was only a few hundred years ago (Lowder and Carmichael 1973:18). Specht notes oral history testimony that recalls the eruption closing a passage between Wangore and Dakatau (Specht 1981:342; see also Specht 1980a). He suggests that the Voganakai-Pangalu and Volupai-Talasea areas may also have been separated by a similar channel (Specht and Sutherland 1975:3). The area is still volcanically active and thermal activity is evident by the hot springs at a number of places on the peninsula, in particular around Talasea and on the southern end of the peninsula (Lowder and Carmichael 1973:23).

Of importance in this area is a Benioff zone which dips 70 degrees northward beneath New Britain (Johnson et al. 1973:526; Johnson 1976:107). Differences across this zone are seen in the changes in chemical composition of lavas as one progresses northwards. Johnson notes that in rocks with similar silica content the total alkali content increases northward across the eastern arc volcanics. He also notes that potassium, sodium, titanium and phosphorous also change northward (Johnson 1976:108; Johnson et al. 1973:529; Lowder and Carmichael 1973:27). This is correlated with the changing depth of the underlying Benioff zone (Johnson et al. 1973:529; Johnson 1976:108). Obsidian from the Cape Hoskins area (Mopir) will have less alkali and potassium (K) for instance than those from the Willaumez Peninsula. Furthermore, Johnson notes that rocks from the northern part of the peninsula differ in composition from those of the southern part (Johnson 1976:108). This has important implications not only for the differentiation of obsidian sources in the Kimbe volcanics, but also the available beach sands for pottery production.

Stanley goes into more detail on the geology around Garua Harbour. The petrology around Garua Government station he describes as 'a mixture of irregular shaped grains of quartz and a little feldspar with a small percentage of a light greenish decomposition product' (Stanley 1923a:41). He mentions a bright red clay source north and below the Talasea station, but south of Pangalu. The rocks close to the hot springs decompose to form the red clay mixed with geyserite. He notes that the rocks here are rhyolite and a vesicular basalt containing partially absorbed phenocrysts of feldspar, augite or hornblende (Stanley 1923a:36). These clays are the product of a 'highly
vesicular type of lava caused by the actions of hot chemical solutions assisting in the oxidation process’ (Stanley 1923a:47). Pottery made from these clays should be chemically distinctive when compared to those produced from the clays of the south coast. He recorded that these clays were in demand and traded with obsidian produced from the clays of the south coast. He recorded which he says are similar to those found along a fissure up of Eocene and Oligocene volcanics and occasional hilly and mountainous landscape. Apart from volcanics bordering the coast is an extensive marine platform (Johanna beds). On the coast itself late Cainozoic uplift produced raised terraces (Specht 1983; Pain 1981; Ryburn 1976) of coralline limestone (Gosden and Webb 1994:32). The raised marine platforms form islands as high as 120 m such as Apugi Island near Kandrian, and 40 m in the Arawe Islands. This area is subject to tectonic movements. Stanley reports 20 inches of uplift after a severe earthquake at Gasmata in 1918 (Stanley 1923a:20).

This karst topography continues westward to the Lamogai plateau. Further west beginning at Sauren the coral reef terraces, marine platforms, limestone and karst formations are overlain by volcanics making a dissected hilly and mountainous landscape. Apart from volcanogenic sediments, sandstone, siltstone, and conglomerates of marine and terrestrial sediments are found.

Major rivers drain throughout these formations and end up on the coast – the Alimbit River, Anu River and Pule River. The Alimbit River, west of Kandrian, and the Anu River, near Kreslo, cut through and drain from the karst formations and underlying volcanics to the south coast (Fig. 3.1).

Further west, the Adi River, east of Sauren, has its headwaters in the southern flank of Mt Schrader in the Andewa Volcanic complex, draining through the volcanics of that area (Ryburn 1976:6). The mineral sands in these rivers will be dominantly augite. The Pule River, east of the Arawe islands, also has its headwaters in the Andewa Volcanic complex although it drains from Mt Andewa rather than Schrader (Fig. 3.1; Ryburn 1976: Fig. 1). This is important as Ryburn notes that subvolcanic intrusives are exposed in the eroded caldera of Mt Andewa. These intrusives, like those elsewhere in central New Britain, have quartz (Ryburn 1976:11). If this is so, a more varied array of mineral (quartz) is expected in the augite dominated river sands.

As seen above each of these major river systems drains areas with different geological formations. It could be expected then that differences might be expected in the river sands making the geology of the area and the river structures important in identifying whether sands used in pottery manufacture were local or not. Samples of sands were collected from the major river systems on the South coast from Kandrian to Sauren, and the results of chemical analysis will be presented in Chapter 11.

**ARCHAEOLOGY IN WEST NEW BRITAIN, PAPUA NEW GUINEA**

The aim of this section is to set the background for the current analysis and how it fits in with the long term strategies for the region. It also provides a background to the sites under study. Figures 3.2 to 3.5 provide the location of sites mentioned in the text. All site codes were designated under the National Museum and Art Gallery of Papua New Guinea’s registry of archaeological sites.

Despite occasional finds (e.g. Chowning and Goodale 1966) and some archaeological reconnaissance in West New Britain (Lampert 1966) the first fruitful, planned research project in archaeology was by Jim Specht in the early 1970s. Work undertaken since that time can be examined through a series of four phases.

**Phase 1 1972 – 1974**

Specht had previously worked in East New Britain at Watom, the site of the first Lapita findspot in the Pacific (Specht 1968). In what he termed ‘Trade and Culture History across the Vitiaz Strait’ project, Specht hoped to reverse the ‘terra incognita’ status of the area’s prehistory (Specht 1973a, 1973b). He initially focused attention on four geographical regions of interest which covered the same area as that encompassed by Harding’s famous treatise on Melanesian trade (Harding 1967): Talasea, Kilenge, Umboi-Siassi, and Sio-Gitua.

The overall aim was to produce a general cultural history of the area, with specific reference to:

a. the date of human entry into New Britain and the economic base of those populations,
b. the origins and development of pottery manufacture and trade in the Sio-Gitua area,
c. the history of use and trade in Talasea obsidian particularly in the Lapita period, and
d. the origins and development of trading systems as described by Harding.

Other aims included investigating rock art, Kandrian waisted blades, and cultural diversity (Specht 1973a:4-5).

The project was ambitious and far reaching and the work is still going on today. I shall try and breakdown the fieldwork components in chronological order.

Fieldwork for this project was in three seasons. In the first two, little time was spent in West New Britain. In the first season (1972) the major emphasis was on the mainland, with only Kamminga, who accompanied Specht on the mainland, venturing to West New Britain. Of note here is Kamminga’s 30 hour visit to Talasea where he discovered obsidian artefacts with bifacially
worked stems or handles at two sites, FCH and FCI, both near Bamba village – Figure 3.3 (Specht 1973a:17; Specht 1973c:446). In the second season (1973b) Specht spent six days at Talasea, his other time spent on Long Island (Egloff and Specht 1982) and at Gitua village on the Huon Peninsula. His objectives at Talasea were first, to undertake a detailed examination of FCH and FCI, and secondly, to look for Lapita sites.

Specht succeeded in both aims. Although finding little on Garua Island he found a dentate Lapita sherd a little south of FCH, and also at FCN at Mondu point (east of Talasea wharf), FCQ – Lagenda Plantation beach (Bola village area) and at FCR and FCS – Chobu beach (Bola village) – Figure 3.3. The latter sites were described as an extensive Lapita site damaged by koronas quarrying (Specht 1973b:7)
A third season, in 1974 again centred on this area. This time Specht was accompanied by J. Rhoads, and for a short period by W. Ambrose, the latter looking for obsidian from outcrops needed for sourcing analysis. During the four weeks in the area no controlled excavations were undertaken. Of note was the discovery of a stemmed tool eroding from beneath a tephra having a refractive index close to that from Buro, a volcano in the Hoskins area. Most time on this trip was spent recording obsidian outcrops, and looking for sites around Talasea and on Garua and Garala Islands (Specht 1974a; Specht 1974b). Lapita pottery was found with obsidian debris near Bamba village; on Boduna Island (FEA – later excavated in 1985 and 1989); and on Garua Island (later excavated in 1993). Plain sherds were also found on Garala Island and at other sites. See Figure 3.3 for the location of sites in the Talasea area.

Phase 2 1979 – 1982
The next phase of research came five years later with an emphasis on the south coast of New Britain. From 1979 to 1982 Specht conducted fieldwork around the south coast township of Kandrian, with surveys into the interior, plus one visit to the north coast.

Specht’s two aims here were explicitly stated:
1. to define the nature of the early settlement of West New Britain, and to compare this with the early settlement of the mainland of New Guinea;
2. to trace the economic history of human settlement of north east New Guinea (Huon Peninsula Coast) and West New Britain, especially in the Vitiaz Strait (which partly separates New Guinea and New Britain), with special reference to the development of extensive trading networks operating in the area at the time of European intrusion (Specht 1983).

Due to the vast size of Specht’s project the New Guinea mainland research had to be abandoned, with West New Britain becoming the focus with an emphasis on the culture history in the Talasea and Kandrian regions (Specht et al. 1981:3-4). On the south coast he wanted to examine the distribution and chronology of waisted chert tools, and to locate sites with evidence of trade both within New Britain and with New Guinea (Specht 1980b:3).

The 1979 fieldwork, in which Specht was accompanied by Leach, Davidson and Kaiku, concentrated mainly around locating sites, which included Misisil Cave (FHC) and Yombon (FGT) both inland of Kandrian; and also Alanglong (FLQ – near Analo),
Yimilo Cave (FLB – near Iumielo), and Langlong (FLA – near Iumielo), all three being caves or shelters; and also Ngaiko (FLX) and Aringilo (FLK – near Iumielo) both on the coast, and also Auraru (FFS) and Auwil (FFQ) on Apugi Island. FFQ was of interest because a bifacially flaked obsidian tool which was presented to Specht, originated from there. FLX, FLK and FFS had surface finds including Lapita pottery, the first finds of Lapita on the south coast of New Britain. Other sites were found but as no excavation took place, they will not be mentioned further. See Figures 3.2 and 3.4 for the location of sites on the south coast.

Some of these sites were further excavated during the 1980 field trip. Specht was joined by Ian Lilley (for part of the trip) and John Normu. Both Yombon (FGT) and Misisil Cave (FHC) were excavated. Misisil produced a radiocarbon date of 11,400±1200 BP (SUA-1490) making it the oldest deposit in island Melanesia, while Yombon produced a radiocarbon age of 4270±130 BP (Beta-1544), and a second date above an ash of 2575±100 BP (Beta-1545) associated with plain pottery. On the coast test pits were put in at FFS (Aurarua) and FFQ (Auwil), both on Apugi. A collection of pottery was made at FFS on Apugi (Specht 1985).

In 1981 Specht and Lilley returned to Misisil and Yombon with Colin Pain, a geologist whose aim was to interpret the geomorphological and the depositional history of the inland sites of FGT and FHC, and also the tephr stratigraphy of the Kandrian hinterland (Specht 1983:2). More excavation took place at FGT and FHC, while a test pit was put in FFS (Aurarua) and FFQ (Auwil), both on Apugi. A collection of pottery was made at FFT (Rapie area) also on Apugi. The deposits of these latter sites were found to be disturbed.

As part of the field season, Specht and Julian Hollis, another geologist, returned to the Talasea area for more investigation of the geology of the area. Hollis’ major goal was to perform tephr stratigraphic correlations of the north coast, particularly to trace the Witori tephras back to Talasea (Specht 1983:2; see Specht 1981, 1983 for a full report). They also conducted fieldwork around Mt Witori, with Specht going inland collecting obsidian samples from the flanks of Mopir Hill (Specht and Hollis 1982).

Phase 3 1984 – 1985

Phase 3 started in 1984 with the Lapita Homeland Project. A preliminary survey of the Talasea area and a visit to the Mopir obsidian source area was undertaken in 1984 by Specht, Allen and Ambrose. This 1984 reconnaissance set the stage for a full on investigation of the Bismarcks. Apart from the meagre material from Talasea and the south coasts of West New Britain, Lapita sites were known from only a handful of areas in the Bismarck Archipelago: Eloaua, Manus, Watom and Ambilobe.

Three geographical areas within West New Britain were investigated as part of the Lapita Homeland Project:

1. Kandrian. Specht returned to Kandrian in 1985 and excavated four test pits at FFT, and a second test pit at FFS on Apugi (Specht 1985).

2. Kreslo. Situated west of Kandrian and next to the village of Wasum, Specht visited the area in 1985 on the advice of a local resident and recorded the surface (or submarine) scatter of Lapita pottery at Kreslo (FNT) (Fig. 3.2).

3. Boduna. In 1984 Specht, Allen and Ambrose visited Boduna Island (FEA) and targeted it for excavation, which was conducted the following year by Gosden and Ambrose (see below for more detail).

4. Arawe Islands. Prior to the arrival of Specht (and shortly afterwards Gosden) the area was in archaeological terms terra incognita. The only finds of archaeological interest were provided by Beatrice Blackwood and an expatriate Mr Jamieson. Blackwood spent a short time in the region just prior to the second world war, and in that time collected a bifacially stemmed obsidian tool (now at the Pitt Rivers Museum, Oxford) (Specht 1973a:18; Specht 1987). Jamieson in 1965 collected a bifacially flaked tool, this time of chert, at Lolmo Cave on Kumbun Island (Specht 1985:3). The latter is similar to those collected by Chowning and Goodale (1966) in the Kandrian area.

Specht and Gosden identified sites of interest on Pililo Island, Kumbun Island (including Lolmo Cave) and Makekur, a sand spit on the northern side of Adwe Island. Lapita pottery was found on both Pililo (FNY) and Makekur (FOH) (Specht 1985). Specht and Gosden dug a test pit on Makekur and found 40-50 cm of deposit above the high water mark. Gosden later excavated a number of test pits around Paligmete village on Pililo and also on the top of the island. The pits round Paligmete yielded pottery, shell and fish bone, and further excavation was planned. Lapita pottery was also found in surveys on Maklo (the northern end) and possible Lapita sherds were reported from Kauptimete and Augusak Islands. Gosden excavated a test pit on the latter island, however, it was heavily disturbed (Gosden 1985). (See Fig. 3.5 for the location of sites on the Arawe Islands.)

Phase 4 1986/7 – present

The last phase comes mostly under the umbrella of Specht and Gosden’s project ‘Settlement history, resource use and development of social and economic systems in West New Britain, Papua New Guinea.’ Following on from both the Lapita Homeland Project and Specht’s previous work on the north and south coasts, from late 1986 to the present a series of fieldwork seasons has been conducted primarily in three areas of West New Britain:

1. Arawe Islands and adjoining mainland
2. Kandrian area
3. Talasea area

It is from these three areas that pottery was selected for detailed analysis. They represent the major areas of archaeological investigations in West New Britain, and cover both the north and south coasts. The only exception is the Kombe area, west of the Willaumez Peninsula, where Lilley undertook limited work (Lilley 1991a).

All major Arawe beach sites excavated at the time of my analyses are examined. They are selected to represent
long pottery sequences covering major changes in the ceramic record. The Kandrian sites, including Kreslo, and the Talasea area sites, are selected for analysis to complete a regional picture of stylistic similarities or dissimilarities, and to identify the nature of regional pottery production. All sites are described in detail below.

AREAS OF INVESTIGATION

Arawes
All the major Arawe pottery assemblages are analysed: FOH, FOJ and FNY. Within each site the major test pits were selected for analysis as they contained the most dense concentration of pottery. For a listing of radiocarbon estimates see Specht and Gosden (1997). All have been adjusted for $\delta^{13}C$ and some will therefore be different from the published accounts. Specht and Gosden (1997:177) used an Oceanic Reservoir Effect value of ~400 years on all marine shell samples (based on work by Chappell and Polach on the Huon Peninsula) in association with the bidecadal atmospheric calibration curve.

**FOH – Adwe Island**

*Location*
Site FOH is located on a sand spit, called Makekur, projecting out from the northern tip of Adwe Island (Fig. 3.5). As reported in Gosden and Webb (1994:41) the sand spit is low lying and is several hundred metres long and at its widest is 200 m across (Fig. 3.6). The significance of the area was first recognised by Specht and Gosden during their 1985 reconnaissance as part of the much larger Lapita Homeland Project, when they found a 100 m X 100 m pottery scatter, which was extensive considering the width of the spit itself (Specht 1985:6).

*Excavations*
Excavations by Gosden over four field seasons (1987/8; 1989/90; 1991; 1992) provided much information on the distribution of cultural material and the geomorphology of the area with 28 test pits excavated. Details on the field strategies undertaken and the results of the geomorphology of the area are provided by Gosden and Webb (1994). A summary is provided below.

Because of gardening activities, only three test pits near the southern end of the spit were excavated in the 1987/88 season, with pottery and obsidian found in two of the pits. The major work was performed during subsequent seasons, in particular 1989/90. To ascertain the spread of cultural material, and secondly the geomorphology of the sand spit seventeen test pits were excavated in 1989/90 (two were not completed – TP17 and TP18) either along a major transect running south-north (TP4, TP5, TP6, TP7, TP8, TP9, TP15, TP10, TP16, TP11) or along a couple of perpendicular transects across the spit (TP12, TP13 and TP14, TP19, TP20) (Fig. 3.6; Gosden and Webb 1994:42; Gosden 1990:41). In the subsequent 1991 and 1992 seasons a further eight test pits were excavated.

Figure 3.6 Test pits on FOH – Makekur – Adwe Island.
test pits were excavated. As the pottery and obsidian analysis is primarily based on the results of the 1989/90 excavations, the following discussion will be limited to those excavations.

Depositional history

Based on the geomorphological history of the island and the distribution of cultural material, Gosden and Webb (1994:42) demonstrate that at the time of Lapita occupation the northern end of the spit known as Makekur did not exist. Instead occupation was over water in stilt houses and not on dry land. The deposits resulted from stilt village occupation with the material deposited in a low energy marine environment. All deposits at this northern end are composed of sands, unlike the deposits at the southern end which are closer to the main component of the island. Here clays overlie the basal limestone. This is most evident in the stratigraphy of test pits along the north-south transect (e.g. TP4). In the centre of the spit the clays overlie white sands with few finds (TP7).

The test pits towards the northern end of the spit lack the clay and contain between 1.5 m to 2 m of sandy deposits overlying basal coral. Heavy concentrations of pottery and obsidian, with evidence of house posts, are found within this white unconsolidated sand directly over the basal coral, and up to a metre of deposit above it. Within squares D, E and F (incorporating TP10) and G and H (incorporating TP15), these deposits are found in a brackish freshwater lens (Ghyben-Herzberg lens after Kirch 1988c:333). Above these cultural bearing deposits and still in the white sand are found concretions due to the interaction of the freshwater lens with the overlying salt water. This concretion is intermixed with fine white unconsolidated sand and forms in:

a. TP10 at between 90-130 cm below ground level, with numbers of sherds appearing in the lower third of this partially concreted level (c.120-130 cm below ground level), and,
b. TP15 between 70-115 cm below ground level, with numbers of sherds appearing in the lower half of this partially concreted level.

Above these concretions the deposit contains little cultural material but includes two Type X sherds. The sand in which it is found is also white and becomes brown due to the humic content. In squares G/H the unit above has been described as a compact grey sand (about 40 cm in depth) with an overlying brown topsoil (30 cm thick). Type X is a ceramic ware found on mainland New Guinea on the north coast of the Huon peninsula, and to the east on Tami Island, Arop Island, the Siassi Islands, and the north coast of West New Britain (Lilley 1986, 1988b, 1991a). Its origin is unknown although Lilley posits an eastern Huon Peninsula origin (Lilley 1988a:95, 1988b:514). It is a distinctive ware having a ‘hard and usually shiny and greasy-feeling red-brown finish’ (Lilley 1988a:92). Dating its occurrence is problematic due to disturbed deposits, however Lilley believes that its production began c.1600 BP (Lilley 1988a:96).

A division can be made between two major levels found with cultural material:

1. within the partially concreted sand layer and,
2. below this layer in fine white unconsolidated sands.

The concentration of finds is not continuous, with TP10 marking the northerly limit of cultural material, and TP28 and TP24 marking the westerly and easterly limits respectively (Gosden 1990:41; Gosden and Webb 1994: Fig. 4).

Due to the heavy concentration of finds TP10 and TP15 were extended to 3 m and 2 m square excavations respectively. Each will be described separately.

**TP10 – Squares D, E and F**

Excavation at TP10 was halted at spit 15 when after 1 m of deposit, a heavy concentration of finds was encountered. The 1 m square was extended to a 3 m X 3 m excavation pit: squares D1, D2, D3, E1, E2, E3, F1, F2 and F3. TP10 became square D3. It is from squares D1, D2, D3, E1, F1, F2 and F3 that pottery was analysed and samples selected for electron microprobe analysis. Due to time constraints pottery from squares E2 and E3 were not analysed (see Chapter 5).

Deposits were removed in 10 cm spits. Two squares (TP10/D3 and F3) were excavated in 10 cm or 5 cm spits from the ground surface to the coral bed-rock. As the top 1 m contained little if any cultural material, the remaining 7 squares had this sterile deposit removed in one block, and thereafter deposit was removed in 10 cm or 5 cm spits.

Squares D, E and F were dug to coral bed-rock at depths of between 170 cm to 160 cm. Pottery is found in the bottom 50 cm. The bulk of the pottery was found in the unconsolidated white sands in the bottom 35 cm while the remaining pottery was found in the bottom 10-15 cm of the overlying partially concreted level. Although two major stratigraphic units are associated with the cultural material (white unconsolidated sand and partially concreted sand) it was decided to divide the bottom layer into four finer divisions (A, B, C, D) based on depth to ascertain the temporal nature of the pottery distribution (decoration, fabric, shape etc.):

i. Units A, B, C and D – the fine white unconsolidated sand layer free of concreted lumps. Unit A covers the pottery sitting on coral while unit D underlies the partially concreted level.

ii. Unit E on the other hand covers pottery above this major deposition and correlates with the lower third of the partially concreted sand layer discussed above.

Conjoining was undertaken to assess the degree site disturbance and whether the material was in situ. Conjoining was successful on 131 sherds which make up 21 vessels. Of these, 91% of conjoins came from units A, B and C (n=119). Only three sherds found from unit E conjoined with others in underlying units (with unit C) and only nine sherds from six vessels (four sherds came from one vessel) in unit D joined with other sherds in underlying levels (Table 3.1). The results confirm that little disturbance has occurred since deposition.

Unfortunately only one radiocarbon determination in association with cultural material is available for this important excavation. Marine shell from square D1 spit
Stratigraphy

Gosden and Webb (1994) identify six stratigraphic units for the Apalo area:

1. Underlying limestone and reef coral. Gosden has dated basal coral at a depth of 1.5 m from square O3 to 4840±100 bp or 5286(5086)4938 cal BP (Beta 29242). Gosden and Webb note that assuming a 1 m deposit is from charcoal: 2640+90 bp or 2930-2480 cal BP (Beta 54164) (Specht and Gosden 1997: appendix 1).

**FOJ – Apalo, Kumbun Island**

**Location**

Apalo, site FOJ, is a beach front deposit, located on the eastern end of Kumbun Island. Apalo is a small breakaway hamlet from the main Kumbun village (Fig. 3.5).

**Excavations**

In 1987/88 Gosden excavated eighteen 1 m X 1 m test pits, and one 2 m X 4 m pit, while in 1989/90 he and his team further excavated four 1 m X 1 m test pits and a staggered 2 m X 7 m test pit (Fig. 3.7).

The objective in 1987/88 was to define the extent of the site. Five test pits were dug in a transect running from the high water mark to the base of the cliff line (TP4, TP2, TP1, TP3 and TP5). Two sets of deposits were identified, beach sands near the beach, and clay near the cliff line. A rich lens of cultural material was found in the beach sands leading Gosden to put in a second series of test pits in a transect perpendicular to the first and parallel to the beach line. Here the objective was to identify the spatial extent of the cultural deposit. TP7 and TP8 were excavated on either side of TP4, close to the beach, while TP6 was excavated to the south side of TP2. TP9 was excavated a further 50 m to the north of TP2, and revealed little artefactual material, but plenty of plant remains and wood (Gosden 1989:56; Gosden 1990:38).

To ascertain the nature of the material distribution, TP2 was opened up into a 2 m X 4 m excavation (O/Z 1, 2, 3, 4).

In 1989/90 Gosden opened up a 14 m² area (squares L, T and U) just to the north of TP9. It was from TP9 that little artefactual material but plenty of plant material and wood was found. Gosden wanted to ascertain whether these materials defined an activity area. He also opened a further three test pits (TP11, TP12 and TP13) linking this area to the major excavations further south (Gosden 1990:39). He found that the concentration of pottery and obsidian ‘continued to within twenty metres of the area with plant remains’ (Gosden 1990:39).

**Depositional history**

The depositional history of the Apalo area is one influenced by the actions of humans. The build up of the beach is interpreted as resulting from the build up of sands around stilt houses in shallow waters, and later the build up of clays behind these sand beaches. The clays originated from the island’s raised surface, and eroded down due to forest clearance. The eventual creation of the Apalo area is thus an artificial one. Further details are provided in Gosden and Webb (1994).

**Stratigraphy**

Gosden and Webb (1994) identify six stratigraphic units for the Apalo area:

1. Underlying limestone and reef coral. Gosden has dated basal coral at a depth of 1.5 m from square O3 to 4840±100 bp or 5286(5086)4938 cal BP (Beta 29242). Gosden and Webb note that assuming a 1 m
higher sea level, there was active coral growth in 2.5 m of water at this time.

2. Basal sand layer – made up of shell, limestone and coral fragments. As Gosden and Webb note, this layer has built up in shallow water at the foot of the cliff line, and thins towards the beach.

3. Artefact rich layer. This is the same as unit 2 but with high concentration of artefactual material. This artefactual layer thins out towards the cliff line, and is deepest towards the beach. Ages for this deposit indicate a rapid increase in deposition over a short time span. Gosden obtained two radiocarbon estimates on charcoal in layers with wooden structures from the 1989/90 extensions:
   i. Square U1, spit 20 dated to 3580±60 bp or 4070-3700 cal BP (Beta 37560);
   ii. U4 spit 22 to 3800±60 bp or 4410-3980 cal BP (Beta 54170) (Specht and Gosden 1997: appendix 1).

Note, however, that these dates are not associated with the rich finds found less than 50 m away which is dated later. Here *Tridacna* sp. shell in this rich artefact layer are dated to 3230±50 bp or 2960-2760 cal BP (Beta 29245) (Specht and Gosden 1997: appendix 3; Gosden et al. 1989: Table 1; Gosden and Webb 1994: Fig. 4; Gosden 1989:56; Gosden 1991a: Table 1).

4. Upper sand. This layer is only found on the beach ridge, and has less cultural material than the layer below. It also contains coarser material. It is within this layer that occupation occurred on dry land, with the build up of deposit above the high tide mark. One radiocarbon determination from *Tridacna* sp. shell (square O3 spit 13) gave an estimate of 2960±80 bp or 2760-2350 cal BP (Beta 29244) (Specht and Gosden 1997: appendix 3; Gosden et al. 1989: Table 1; Gosden and Webb 1994: Fig. 4; Gosden 1989:56; Gosden 1991a: Table 1).

5. Brown clay layer. This layer only occurs between the beach ridge and the cliff line, and is the result of erosion from higher up on the island. As Gosden and Webb note, once the sand bank became a beach ridge (see above) this area between the ridge and cliff line became a freshwater swamp. Pottery was found in this clay and is interpreted by Gosden and Webb to indicate that the clays built up during the Lapita period.

6. Black sand layer. This layer is the top layer on the beach ridge, and is the result of present village activity. It is a black humic sand (Gosden and Webb 1994).

**Apalo: Squares O1, O2, O3 and O4**

To ascertain the nature of the pottery assemblage, and its change over time, pottery from the 2 m X 4 m extension of TP2 was examined in detail: Squares O1, O2, O3 and O4.

A finer discrimination within layers, particularly the artefact bearing unit, was defined for this analysis. Unit D corresponds to the basal sand layer. This is a white sand with high coral content. Few artefacts were recovered, and these correspond to one spit (19) from all squares.

Units C and B correspond to Gosden’s artefact rich layer. Unit C is composed of a white soft sand; Unit B is distinguished by a high coral content.

Unit A corresponds to the upper sand layer – a coarse white sand, gritty in nature, and deposited, according to Gosden and Webb, on dry land, unlike the previous layers.

The only difference between these units and the layers defined by Gosden, is the break-up of his artefact rich layer into two: a bottom unit (C) and an upper unit (B).
**FNY – Paligmete, Pililo Island**

**Location**

FNY is located in Paligmete village, on the north-west side of Pililo Island (Fig. 3.5, and Gosden and Webb 1994:44-45). The present village is situated between the raised limestone cliff line and the sea, on sloping ground about 70 m wide.

**Excavations and depositional history**

In 1986/87 five test pits were excavated by Gosden along a transect from the cliff line to the sea (TP1=Pililo 2; TP2; TP3; TP4 and Pililo 1) – see Figure 3.8. Deposits vary across the site. Closer to the raised coral cliff (TP1 or Pililo 2), the excavations showed two distinct layers:

1. The first is a black midden, up to 1 m thick with post-Lapita pottery. A radiocarbon determination on charcoal from the top of this layer is 900±140 bp or 950(790)690 cal BP (ANU 4982) (Gosden and Webb 1994:47).

2. The second, a red/brown clay, is up to 2 m in depth and underlays the black midden layer and overlays the limestone base. Lapita pottery is found within the clay layer. Three radiocarbon determinations have been obtained from the clay by Gosden. From the top of the layer two determinations on charcoal are 1110±130 bp or 1050(1048)997 cal BP (ANU 4989) and 1150±200 bp or 1290(1061)920 cal BP (ANU 4990). From 1.3 m below the surface and about two thirds of the way through the red/brown clay layer one radiocarbon determination on oyster shell has given an estimate of 2870±70 bp or 2750-2340 cal BP (Beta 27941) (Specht and Gosden 1997: appendix 3). Within this clay layer a lens of sterile white sand is present, the result of storm action.

Away from the limestone cliff four test pits (TP2, TP3, Pililo 1 and TP4) revealed three layers:

1. Black sand. This is the top layer and is the result of recent village activity. It is up to 50 cm thick (Gosden and Webb 1994:47).

2. White sand. Underlying the top humic soil is an artefact rich white sand up to 1 m thick (Gosden and Webb 1994:45).

3. White sand and coral rubble. This layer underlies the artefact rich layer, and is quite deep. Gosden excavated up to 3 m from the surface and did not hit the limestone base (Gosden and Webb 1994:44). The layer is culturally sterile except for a human burial with a Tridacna shell covering a mandible excavated in Pililo 1. A date of 4410±70 bp or 4691(4532)4416 cal BP (Beta 27941) was obtained from the Tridacna. Gosden and Webb (1994:45) interpreted the depositional history of the site as follows. Away from the cliff line the basal sands ‘accumulated in the same manner as the deposits at Apalo, i.e. as a beach and sand bank on the lee side of the island’. The overlying artefact rich sands subsequently accumulated under a stilt village built on the underlying sands and coral rubble, with a high sand bank forming. The red clay layer developed as the result of erosion from the top of the island, which subsequently dammed up behind the sand bank in a shallow lagoon.

**Test pit 1 – Pililo 2. Squares M4, M5, N4 and N5**

Pililo 2 is a 2 m X 2 m test pit located close to base of the limestone cliff (Fig. 3.8). Originally called TP1, a 1 m X 1 m pit, it was renamed Pililo 2 when extended to a 2 m X 2 m excavation, squares M5, N4 and N5, with TP1 becoming square M4 (Goulding 1987:68). It was selected for analysis as it contained a denser concentration of sherds than other test pits. The site was dug by 15-20 cm spits (Goulding 1987:69).

Stratigraphically Pililo 2 contains a top black midden layer (1.2 m) incorporating post Lapita and Lapita remains. Layer 2 is a sticky brown clay extending to the limestone base. Fifty centimetres into this layer a lens of sterile sand intrudes into the clay. To be consistent with the analysis of Goulding (1987:70) and Kulhman (1987:37) layer 2 was divided into two analytical units to assess differences over time (Table 3.2). Unit 3 encapsulated the deposits below the sterile white sand, unit 2 those above. Unit 1 equates with layer 1, the top black midden layer.

**Kandrian Area**

**FFS – Auraruo, Apugi Island**

Specht located FFS in 1979 and subsequently made a surface collection of pottery (Fig. 3.4). A test pit was excavated in 1981, while a second was dug in 1985. In 1992 further excavations were undertaken by Neville Baker. It is from these latter excavations that pottery was selected for analysis. One test pit, TP35/40, was selected for fabric analysis as it contained the highest number of pot sherds. It was hoped that this would represent the most variety of fabrics in the Apugi assemblage.
FLF - Alanglongromo

FLF is a rockshelter located near Iumiello village (Fig. 3.4). Both obsidian and pottery were selected for chemical analysis from this site.

Details of the stratigraphy have not been published although Specht mentions in the 1992 field season report that the test pits ‘show that the Lapita use of the area was on top of the old beach that is now covered with clay on loam. Sherd from the sand are much fresher than those in the overlying clay and loam’ (Specht et al. 1992).

FLF (Alanglongromo) at Iumiello village excavated in 1991, [is] where a late phase of Lapita pottery was found above a layer with obsidian but no pottery.

The last reference describes three radiocarbon determinations for the site. One on *anadara antiquata* in association with pottery dates to 3170±70 bp or 3060-2750 cal BP (Beta 57767) (Specht and Gosden 1997:179). Another, also on *anadara antiquata* dates to 3430±80 or 3390-2960 cal BP (Beta 57767). This was thought to refer to ‘pre-Lapita use of the shelter’ (Specht and Gosden 1997:179). The third date, on *Spondylus sp.*, was thought to be post-Lapita: 2470±50 bp or 2140-1890 cal BP (Beta 79348) (Specht and Gosden 1997:179).

**Table 3.2** Spit attributions to units – FNY (after Goulding 1987; Kuhlman 1987).

<table>
<thead>
<tr>
<th>Unit</th>
<th>M4</th>
<th>M5</th>
<th>N4</th>
<th>N5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2-5</td>
<td>2-5</td>
<td>2-6</td>
<td>2-5</td>
</tr>
<tr>
<td>3</td>
<td>6-10</td>
<td>6-10</td>
<td>7-10</td>
<td>6-10</td>
</tr>
</tbody>
</table>

**Talasea**

**FSZ – Garua Island**

Garua Island is situated in Garua Harbour, near Talasea (Fig. 3.3). It is volcanic in nature with two extinct volcanoes associated with two obsidian sources: Baki and Hamilton. It first received archaeological attention in 1973 and 1974, with source obsidian exposures and pottery found at a number of sites (Specht 1973b, 1974a, 1974b). In 1988 Specht and Fullagar undertook further survey identifying potential sites for excavation (Specht and Fullagar 1988).

In 1989 a team comprising Specht, Wadra and Summerhayes returned to Garua to excavate a pottery site, FEL. Torrence, Fullagar and Baker also undertook work mapping obsidian source exposures. During the course of walking to site FEL, site FAO was found after pottery was seen eroding from the cuttings of a coconut track near the top of a hill.

The major excavated site on Garua is FSZ, a hilltop site located above a scoria pit 30 m above sea level overlooking Garua Harbour. Pottery from this site is analysed in this report. The site was first identified by Summerhayes and Fullagar (Fullagar et al. 1990) during a brief trip to the island in 1990. Bulldozing activities, which removed the top soil and Dakatau ash layer, had revealed pottery and obsidian.

Torrence and Summerhayes returned to Garua Island in 1992 to excavate FSZ. The major aim was to provide information on the nature of the Lapita settlement, particularly because of its hilltop location, and to attempt to obtain spatial data on the size and layout of the settlement. Surface collections of pottery were also made from the coconut track near FAO.

**Excavation**

A 4 m X 4 m excavation was opened after a 1 m grid system was laid out for the site. The top soil and Dakatau tephra, comprising 50 cm. of deposit, were removed in quadrants (2 m X 2 m). The Dakatau eruption is dated to c.1200 BP (Torrence 1992:112). Pottery was found immediately below the Dakatau ash in a hard compacted red clay deposit. The site was subsequently excavated in sixteen 1 m X 1 m units. One square was initially from the high water mark, extending 25 m towards the passage in the reef, and 250 m long (Specht 1991c:190). Specht (1991c:190-201) posits three scenarios to explain the site context:

1. settlement was on dry land with a subsequent lowering of the land due to tectonic activity. He sees this as unlikely due to the uplift of the south coast of New Britain;
2. a tsunami could have destroyed the archaeological deposit. Again this seems unlikely as other sites in Kandrian and the Arawe Islands have not been similarly destroyed; and
3. settlement was on pile buildings. This scenario seems more likely and Specht (1991c:200) points to reef or waterlogged sites from the Arawe Islands, Eloaua and North Solomons.

**FNT – Kreslo**

Kreslo is situated on a coral platform which lies half way between Kandrian and the Arawe Islands (2 km east of the Anu river) (Specht 1991c:190; and Fig. 3.2). Specht located the site in 1985 as part of the Lapita Homeland Project. Scatters of pottery and obsidian were found beneath water on a coral platform. Behind the rock platform on the landward side vertical limestone cliffs rise 20-30 m, although an embayment is located to the west of the site. Specht noted that the reef bifurcates parallel to the coast, with a lagoon created by the outer extension of the reef protecting the Kreslo area from the ocean swell. The scatter of artefacts began 15 m seaward.
excavated to a depth of 1.7 m below ground surface to provide information on the nature and depth of deposit. It revealed pottery and obsidian down to spit 3 (i.e. the third spit below the Dakatau ash). Only a small amount of worked obsidian was found below this depth. All other squares were accordingly taken down 30 cm in three 10 cm spits. Another 1 m X 1 m square was excavated 3 m south of the main excavation. This revealed a similar sequence.

**FEA – Boduna Island**

Boduna Island is a small, low lying island, just to the north of Garua Island, in Garua Harbour (Fig. 3.3). It is only 100 m long and 60 m wide (Ambrose and Gosden 1991:182). Lapita pottery was found on Boduna Island, at site FEA, in 1974 (Specht 1974a). Ten years later the site was targeted for future excavations by Specht, Allen and Ambrose on their preliminary survey of potential areas for investigation under the Lapita Homeland Project (Allen et al. 1984). The site was subsequently excavated in 1985 by Ambrose and Gosden, and again in 1989 by Specht, Summerhayes, Fullagar, Torrence, Baker and Wadra. My analysis is on the material from the 1985 excavations.

Ambrose and Gosden surveyed the island and made surface collections of pottery and obsidian from 1 m squares at 10 m intervals across the island. From excavations of two shovel pits and two 1 m squares, they recorded the densest surface finds near the centre of island at the highest point (Ambrose and Gosden 1991:196). The stratigraphy comprised reworked ashes to a depth of c.70 cm. Beneath this are beach sands which are geothermally heated (Ambrose and Gosden 1991:186). Pottery in the reworked ashes was noted to be worn and rounded, while that below was said to be ‘less heavily rolled’. The pottery was stylistically Western Lapita in nature (Ambrose and Gosden 1991:187). Three radiocarbon determinations on marine shell were obtained from square 1 yielding estimates of 2050±90 bp or 1730-1340 cal BP (ANU 5071); 3090±80 bp or 2950-2720 cal BP (ANU 5072), and 3130±90 bp or 3060-2730 cal BP (ANU 5073) (Specht and Gosden 1997: appendix 3). The first two determinations came from 60-70 cm below the surface, while the third came from 50-60 cm below the surface.

**Site summary**

The sites selected for analysis and described above cover the major areas where research has been undertaken in West New Britain: Arawe Islands, Kandrian region, and Talasea region.

Prior to my analyses, only two pottery assemblages from West New Britain had been fully described in terms of form and decoration. The first, from FCR/FCS (Talasea), was described as part of Anson’s PhD research. Anson defined Far Western Lapita from this site along with Eloua and Ambitle. The second assemblage, FNT (Kreslo), is included in my analyses. On the basis of decoration, Specht (1991c:197) describes the assemblage as Western rather than Far Western Lapita. Pottery from FEA has also been examined, although cursorily, and are also said to be stylistically Western Lapita in nature (Ambrose and Gosden 1991:187). From the Arawe area limited analyses has been performed on the pottery assemblages from FOJ and FNY, mostly in terms of counts and weights (Gosden et al. 1989:570; Gosden 1991a:211). Kuhlmann analysed the FNY pottery assemblage, however the results are incomplete and are not used in this study. Both FOJ and FNY sites had long pottery sequences and contained dentate stamped and incised wares, with the FNY assemblage showing stylistic change from Far Western Lapita dentate stamped sherds in the lower part of the deposit to predominantly incised at the top (Gosden et al. 1989:584). The limited analysis of pottery from the Arawe region showed promise for an extensive analysis of stylistic change over time. The rest of the sites selected for analysis have not been previously analysed. These include assemblages from FOH square D, E and F, and FOH square G/H, from the Arawe Islands; FLF and FFS from the Kandrian area; and FSZ/FAO from Garua Island in the Talasea area.

Placing these sites into a chronological framework is difficult due to the limited number of published radiocarbon determinations. No radiocarbon determinations are available from FNT, and none have been published from FSZ.

Determinations associated with Lapita pottery from the Arawe Island sites range from c.3100 BP to 2300 BP:

i. FOH squares D, E and F (Adwe Island) – no reliable age estimate

ii. FOH squares G/H (Adwe Island) – 2900-2300 BP

iii. FOJ (Apalo, Kumbun Island) – 2950-2350 BP

iv. FNY (Paligmete, Pililo Island) – 2800-2400 BP

FNY also has more recent age determinations from the top of layer 2 (red brown clay layer) (1110-1000 BP) and layer 1 (upper black midden layer) (950-700 BP).

Relating these radiocarbon determinations to changes in the pottery record is far from satisfactory as only one determination is available from FOH squares D, E and F. From the other three sites only five more radiocarbon determinations are available in association with Lapita pottery. Fine grained dating of each unit is thus not possible. This places greater emphasis on the pottery analysis in terms of stylistic changes throughout the Arawe sequence, and the regional picture that emerges from this study. The following chapter outlines the methodology used in examining the pottery, and the results are presented in chapters 5-9.

_Lapita Interaction_ 27
IDENTIFYING THE PRODUCTION AND DISTRIBUTION OF POTTERY – METHODOLOGICAL ISSUES

As outlined in Chapter 2, models concerning Lapita and the frameworks for interpretation are based on stylistic similarities and changes to vessel shape, and the role that exchange played in maintaining these similarities. Yet exchange or the movement of pottery to account for stylistic similarity must be demonstrated, rather than assumed. The identification of production and exchange will be addressed by a detailed analysis of those pottery assemblages from West New Britain outlined in the previous chapter. This chapter outlines the methodologies used and their rationale. It is structured into three parts:

The first section addresses the identification of production and consumption patterns and modelling change in the archaeological record. It provides a background to how a physico-chemical analysis of pottery can identify the movement of pots or their raw materials, and their application to West New Britain assemblages.

The second section outlines the basic methodology for pottery analysis in respect of form, decoration and fabric. This analysis forms the building blocks to create a pottery assemblage profile. It is from this profile that correlations between vessel shape, decoration and fabric are made, and inter-site comparisons are drawn. It is also used to select the pottery sample for chemical analysis.

The third section provides details on:

a. the type of chemical analysis used – the electron microprobe, and
b. the statistics used in identifying meaningful chemical groupings.

It is from these chemical groups that the movement of clay or the pottery will be identified, and issues such as exchange addressed.

PRODUCTION AND CONSUMPTION PATTERNING: MODELLING CHANGE IN THE ARCHAEOLOGICAL RECORD

Stylistic similarity and model building

It was shown in Chapter 2 how stylistic similarities in the Pacific have been incorporated into regionalised models. Such models equate stylistic similarities with either ethnicity or exchange. In other parts of the world stylistic similarity over large areas has been used by archaeologists to develop models of social interaction (Bishop et al. 1988). In a review of the use of style in pottery analyses, Plog notes that most ceramic research has been directed to the ‘discovery and description of stylistic change through time in order to date sites’ (Plog 1980:1). The other major line of research has been directed towards stylistic variation through space which attempts ‘to infer characteristics of prehistoric social organisation or interaction by measuring different aspects of stylistic variation’ (Plog 1980:1-2). The basic assumption that underlies these studies is that the degree to which designs are shared by or diffuse between individuals, social segments, or villages is directly proportional to the amount of interaction between units’ (Plog 1980:2).

Plog further notes that as a corollary of this, the greater the interaction between sites, the higher the stylistic similarity. However, iconoclastic studies are found to throw doubt on the relationship between style and interaction. Ian Hodder, in a review of the interpretations placed on material remains, used various examples ranging from studies on Andean Aymare ware to Iron Age pottery from Zambia to demonstrate the
Chapter 4  Identifying the production and distribution of pottery – methodological issues

above point (Hodder 1978). Hodder notes the difficulty in identifying ‘migrations’ in the archaeological record by citing references such as Tschopik (1950) to show the continuity of the Aymare ware over a five hundred year old period which when taken by itself would not indicate the Inca era or Spanish contact; or Blackman’s comment (1973) about the difficulty in identifying Slavic migrations into Greece by the material remains alone (Hodder 1978:4-5).

Ethnographic studies have also been iconoclastic in showing that stylistic similarities do not equate with interaction intensities (Plog 1980:5). Works on the Hopi by M. Stanislawski (1969, 1973), M. and B. Stanislawski (1978), and Allen and Richardson (1971), or with the Fulani by David (1971), and in Mexico by Friedrich (1970), have been regularly cited to caution against equating the level of social interaction with stylistic similarity.

Such ‘social interaction theory’ according to Hill also views style as sometimes non-adaptive – i.e. passive. It is taught from one to another, and similarity is based on proximity (see Hill 1985:364). Sackett (1985) calls this ‘isochrestic’. Hill suggests that stylistic change is thus either due to random error or the interaction network is disrupted (Hill 1985:364). Yet according to the proponents of ‘information exchange’ style is socially active not passive. Style here is functional and adaptive. It conveys information, fosters group identity, and maintains social boundaries (see Hill 1985:367; Wobst 1977). In this scenario pottery style remains stable providing the social environment remains stable.

Of interest here is Michael Graves’ work on the Kalinga, as outlined by Hill (1985). Hill notes that Graves has reconciled the two schools, and regards some aspects of style as adaptive and functional. Two points are of importance here. First is Graves’ notion that ‘the relative degree of function/adaptive value of stylistic entities is a function of their visibility and level within a design hierarchy’ (Hill 1985:373). Hill quotes from Graves:

The functional value of ceramic design may vary by the level of the design. The larger, more obtrusive and visible the design, the greater the likelihood that it will carry information that may be easily deciphered by other individuals (Graves 1981:315). As the level of design is reduced, and the visibility of particular designs decreased, and as the context of both production and observation becomes particularly mundane, we may expect the functional value of design to be correspondingly reduced. (Graves 1981:316 cited in Hill 1985:373)

The second important point is Graves’ explanation of stylistic change. The more functional/adaptive designs change slowly, while the less functional designs change rapidly (Hill 1985:373).

More could be said of style and indeed books have been written on it (see Conkey and Hastorf 1990). For instance distinctions exist between those who see differences or similarities in material culture as symbolic approaches deriving from social forces (see Hodder 1986; Miller 1985, 1982; Appadurai 1986) as opposed to those who see it in terms of functional/ecological explanations. The point to be made here is that regardless of how style is interpreted, archaeologists have devised models based on observations made on the physical characteristics of pottery: rim shape, profile, decoration etc. The interpretations used, however, are often a legacy of the classificatory techniques employed to describe the pottery.

For instance the two points raised by Graves above will be useful in assessing the nature of changes in the form and style of Lapita pottery in West New Britain (see Chapter 12). A formal analysis outlined below is performed for this purpose. However, such an analysis must be integrated with production and distribution data and to do this other techniques must be used. Exchange or the movement of pottery to account for stylistic similarities must be demonstrated, rather than assumed. If local production is demonstrated, models other than exchange can be developed to account for stylistic similarity. To test this a physico-chemical analysis is needed.

The need for physico-chemical analyses

Rice advocates complementing the more traditional attributes of pottery classification with physico-chemical data. She cites earlier calls by Shepard and Peacock for this, but notes that little has been done to integrate technological data into a classificatory scheme (Rice 1982:51; Shepard 1980:320; Peacock 1970:375). A similar call has been made for the Pacific. Rye and Allen have argued that typologies based on morphology and decoration may not be enough to ‘provide the basis to support models and reconstructions being offered for the prehistory of the region’ (1980:305; see also Rye 1981).

Although petrographic work on Pacific pottery assemblages is now commonplace, the use of chemical characterisation analyses in Island Melanesia is limited, with Ambrose’s work on Manus (Ambrose 1992, 1993), Hunt’s work on Mussau (Ambrose 1990, 1993), Anson’s work on Lapita assemblages (1983, 1986), and Summerhayes’ work on Buka (1987, 1997). Its potential is enormous. A physico-chemical analysis can contribute greatly to looking at the nature of interaction between communities within West New Britain by yielding a clear discrimination between foreign and local clay sources. If pastes are of a local origin, and yet there is regional similarity in pottery design, then processes other than exchange in pottery must account for the similarity. The same would apply to technology. Changes in the types of mineral inclusions and clays in producing similar vessels or decoration is significant.

I take as a fundamental question – what was the nature of the form and style of the pottery under investigation at each site and was it produced at either:

a. a small number of centres and exchanged to other centres, or
b. locally at each centre (Specht 1983)?

The next step is to assess the mechanisms which enable pot similarity over time and space to be discerned. The major aim of my work is to group sherds on the basis of clays and fillers and to compare the results of the chemical analysis with variability in form and decoration.
The extensive collection of pottery from both the north and south coast of West New Britain allows the conditions of production and exchange to be defined by:
1. An extensive regional analysis of temporal and spatial stylistic change.
2. A comprehensive analysis of pot form in order to build up a profile of a pottery assemblage.
3. A detailed fabric analysis in order to obtain a representative sample of pottery for electron microprobe analysis on the ceramic matrix and mineral inclusions. This will allow the documentation of the physical movement of pottery. It will also allow the identification of discrete chemical groupings and their relationships to pottery form and decoration. Such an approach will tease out any structural relationships in the pottery assemblage between form, decoration and exchange.

Setting the parameters of production

The production and consumption of pottery is a social process (see Gosden 1989). Production is ‘woven into broader social and political contexts’ and strategies of production are encoded into the pottery (Rice 1987:168). Changes in production and consumption strategies may reflect changes in the social strategies of the makers and users of pottery. Therefore the spatial and temporal patterning of pottery production and consumption are crucial in evaluating models current in the archaeological literature of Western Melanesia. Variables that will be considered when considering production and consumption are:

Context of production

The identification of a production centre is not easy. The use of a ‘criterion of relative abundance’ has been used, that is, most pottery from a production centre is to be found locally. Yet if pottery was produced for exchange only, then it might also be assumed that little would be consumed locally. Despite this, the concept when used with provenance studies is useful. Using physico-chemical analysis for provenance studies, pottery from a site can be related back to the source origins of their constituent materials. Raw materials in this case comprise both non-plastic inclusions (minerals, sands, etc.) and clay.

Mineral fillers can be related to local geology and both river and beach sands while the ‘elemental concentrations in pottery do reflect the elemental concentration in source materials’ (Arnold et al. 1991:87). Although local clays were not analysed in this study, pottery samples with similar chemical profiles will be deemed to have come from the same source material. That is ‘vessels manufactured from a given clay source will be more similar to one another than to vessels manufactured from a different source’ (Bishop et al. 1982:301). The chemical analysis of clays is complex. Bishop, Rands and Holley (1982) note that clay minerals not only depend on their parent material, but are affected by weathering or hydrothermal activity, climate and geomorphology. They state that ‘even if a region is considered to be homogeneous in its gross geologic characteristics, significant mineralogical and chemical differences may be discerned between clay deposits’ (Bishop et al. 1982:294).

The exact spot where the firing took place is not crucial here, only whether the pottery is of local origin or not. The use of a ‘resource zone concept of source’ is applicable here (Clark et al. 1992:265; see also Arnold et al. 1991:84). For my purposes attributing a sherd to a general regional zone (or procurement zone) is more applicable than trying to identify a precise spot for manufacture. Trying to grapple with a ‘source’ is difficult (Knapp and Cherry 1994:2). As pointed out, a source may be a single clay pit, a drainage pattern or a community of potters (Arnold et al. 1991:71; Bishop et al. 1988:318). For the West New Britain assemblages just distinguishing north coast from south coast regional zones would be an achievement. Identifying north coast as opposed to south coast production contributes to modelling the nature of interaction taking place. A few words of warning from Harbottle are in order though: archaeologists love the term sourcing, with its upbeat, positive thrust – that you analyze or examine an artefact and, by comparison with the material of known origin, ‘source’ it. In point of fact, with very few exceptions, you cannot unequivocally source anything. What you can do is characterize the object, or better, groups of similar objects found in a site or archaeological zone by mineralogical … chemical and other tests, and also characterize the equivalent source materials, if they are available, and look for the similarities to generate attributions. A careful job of chemical characterization, plus a little numerical taxonomy and some auxiliary archaeological and/or stylistic information, will often do something as useful: It will produce groupings of artefacts that make archaeological sense. This, rather than absolute proof of origin, will often necessarily be the goal. (Harbottle 1982:15)

Change in production

Of importance to this monograph is the nature of interaction between communities within West New Britain. A primary aim is to ascertain if different technologies were utilised to produce similar wares at different production centres within the West New Britain Lapita assemblages. Potters are often seen as conservative in their selection of raw materials and technologies. Over two decades ago Peacock pointed out that ‘it is reasonable to suppose … that the way in which the paste was mixed would be dictated by tradition … (and therefore) a rather more drastic influence may be needed to change basic technological processes such as clay preparation or firing …’ (Peacock 1970:375). Rye has noted that ‘changes in materials can be made relatively easily if the properties are similar, but substituting materials with distinct behaviours will require altering the entire manufacturing process’ (Rye 1981:5). Rye’s (1976) experiments on Motu cooking pots are a case in point. He shows that with the addition of salt water the use of calcareous non-plastics in Motu cooking pots could have given better thermal shock resistance thus preventing cracking with repeated cooking over an open fire (Rye 1976).
Further to this the same fabric was produced for water pots, despite its high porosity. The fabric was then treated with 'mangrove dye' to reduce its porosity (J. Allen pers. comm.).

Arnold also argues that the addition of minerals, (i.e. paste preparation) is an adaptive behaviour – 'potters thus will select raw materials that will respond favourably to forming technology' (Arnold 1992:159). If a raw material does not respond favourably with technology, new raw materials may be searched for.

But what if a number of mineral fillers and clay sources were utilised together to produce similar styles within one assemblage? Production here would be more complex. The identification of where pottery resources came from and where they were used in manufacturing can provide information on either local availability and mobility. If production was from local resources only, some uniformity in both fabric and clay would be expected. Exchange of this ware should be evident outside the resource procurement zone. Multiple sources with multiple fabrics, however, could indicate either differences in exchange or differences in the 'constraints and choices in the production process' (Bishop et al. 1988:325).

Arnold argues that the settlement pattern is important to the nature of production. That is, the 'nature of production unit can be inferred from settlement pattern data and the compositional data once they have been related to the local geology and the variability of the pottery materials in an area' (Arnold 1992:161). He posits the view that dispersed settlements with local clay sources will 'reveal a highly variable pottery no matter how specialised they are' while on the other hand settlements in one location with a superior clay source will produce a highly uniform paste 'no matter how specialised they are' (Arnold 1992:163).

Mobility among settlements may also be an issue. In a study on Late Woodland pottery from the Lake Superior Basin, Clark et al. postulate that variability in style and clay source will be evident in mobile societies (Clark et al. 1992:265). They view localised pottery specialisation in terms of 'regularity in clay and temper procurement, regular use of the same location as a site of pottery production, and subsequent dispersal, use, and discard of the finished pots via the avenues of systematic trade/exchange' (Clark et al. 1992:265). They note the Algonkian speaking groups who moved across the landscape 'in a seasonal pattern of subsistence and/or socially motivated transhumance' who would produce pots in a more diffuse patterning (Clark et al. 1992:265), that is, with no regularity in clay and temper procurement.

The identification of regularity, or lack of it, in the production of pottery from West New Britain will be attempted. If pots do not move, people may. If pots, uniform in shape and decoration, from a single site were produced with clays from one resource zone yet mixed with a variety of sands from a number of resource zones then either the clay or minerals, or both, are moving as raw materials. Either a complex exchange of resources is involved, or the potters are moving taking the clays and fillers with them. Either way the simple model involving conservatism in production would need to be assessed.

This is in contrast to the forecasts by Arnold who notes that 'most pottery communities obtain their primary resources of clay and temper within 1 km of their residence and may go as far as 6-9 km beyond this distance, the procurement of these raw materials is generally too costly to make pottery' (Arnold 1985:232). Unfortunately such forecasts should not be taken as a hard and fast rule. Within Melanesia, potters near the coast may travel beyond 9 km. In the village of Manumanu on the south coast of Papua clay was collected from 24 km away (Groves 1960:11) and sometimes from Hanuabada and Porebada, the former being close to 56 km distant (Groves 1960:14). Also the traditional clay for pots made on the Amphlett comes from Fergusson Island, one day canoe travel (Lauer 1970:167, 1971:71, 1973:44). There is no one to one relationship between travelling and the need to travel. There are no adequate clay sources located near Manumanu. In the Amphletts on the other hand local clay sources are found, yet the potters prefer the clay from Fergusson Island as it produces better results with the technology at hand (Lauer 1973:44). When the Amphlett potters were over charged for this clay source, alternatives were used. Yet the boycott lasted only one year as the new clay sources proved unsatisfactory with their technology (Lauer 1971:71).

The conservatism shown in the last example reflects a general view of many archaeologists. Clay sources do vary and do dry up. Variability is expected, but how much from one site producing its own ware?

In light of the discussion above on work by Arnold and Peacock, changes in production such as the use of clays and mineral inclusions as filler, will be important when assessing the nature of pottery production and settlement patterns. Were the makers of Lapita pottery dictated to by tradition? Were fabrics uniform across different decorative techniques or were different technologies used to produce similar wares? Change in clay sources do not indicate a change in technology. Change in the mineral inclusions do.

Scale of production and consumption

Production and consumption are social activities dependent on the function of the pottery in society. Identifying the function of pottery is not an easy matter. The energy put into producing pottery is a useful indicator of purpose. Labour intensive production equates with high social value while lower labour costs equate with low social value.

Other measures to identify the function of pottery although sounding useful, have had less success. Little published material exists for residue analysis on Melanesian pottery to date (see Hill et al. 1985; Hill and Evans 1989). Other variables that are used in ascertaining function, such as thickness of a sherd, resistance to mechanical stress, thermal behaviour and permeability, porosity, and density, although appealing have yet to give unambiguous results in functional identification. Shape can help. For instance, a flat bottomed dish is unlikely to have been used for cooking. Carnations or
sharp edges on a vessel induce thermal damage, and angles build up moisture. Rounded globular unrestricted vessels with evidence of sooting or blackening seems to indicate boiling on an open fire, (see Rice 1987 for a detailed discussion on the variables discussed above) and water pots have small apertures to reduce surface area and attendant evaporation in hot climates (J. Allen pers. comm.). Lapita pottery has a variety of shapes, including carinated vessels, jars, flat dishes, and round bottomed vessels – can a variety of functions be deduced?

In this study the relationship of the pottery to the society that produced it and consumed it will be inferred from a combination of vessel shape and decoration found in a number of sites across the Western Pacific. Combined with provenance data and any evidence, or lack of it, for movement of pottery, models for stylistic similarity across the region can be assessed and the nature of social interaction can be identified. The changing nature of production and consumption, however, and any exchange if evident, will need to be assessed over a number of points in time.

The rest of this chapter will outline the methodologies used to identify production and consumption patterns. The next section outlines the analysis used to identify form, decoration and fabric, while the last section outlines the physico-chemical analysis.

### METHODOLOGY FOR POTTERY ANALYSIS – FORM AND DECORATION

This section deals with identifying and measuring form, decoration and fabric in the pottery assemblages under study. First, it outlines the basic objective of such an analysis and defines the vessel forms utilised in this study. Secondly, it describes the pottery database into which details of every sherd were entered.

#### Formal descriptive methodology of pottery

The aim of the formal analysis is to allow a description of, and a comparison between, the pottery assemblages in terms of

i. form/shape,
   ii. decoration and
   iii. fabric.

To do this, low level pottery attributes (data variables) have been defined and entered into a computer database.

Ideally low level attributes describing variables of form would not be necessary, with assemblages described in terms of prior defined vessel shapes only. Unfortunately the analysis of archaeological pottery assemblages is not as easy. The identification of vessel shapes from thousands of small sherds is not readily evident and is the result of intense analysis using low level attributes that describe individual sherds. Even then, in many assemblages shape is difficult to define. For instance assemblages from the Arawe Islands are found in unique preservation contexts which allow a more comprehensive look at vessel shape. The size, particular shape, or decoration of some sherds, for instance, allowed easy conjoining of sherds. Yet most sherd conjoining was achieved by the pottery database in which sherds sharing similar features, such as dentate decoration, fabric, orifice diameter etc., were isolated for subsequent examination.

The Arawe assemblage, however, is the exception rather than the rule. The assemblage from FSZ on Garua Island is found deposited in compacted clay on a hilltop village environment. Unlike the Arawe assemblages, sherds were not deposited into a low energy water environment. Post depositional processes are different in the two sites, resulting in the different preservation of pottery. At FSZ the pottery is smaller and more fragmented making the identification of vessel form difficult.

Despite these limitations, every attempt was made to describe the assemblages in terms of vessel forms using the pottery database. A set of vessel forms was identified after the analysis of thousands of sherds, and this category was entered onto the database for each sherd belonging to a vessel class. The most important category of sherd in determining vessel form is the rim and its orientation (see Poulsen 1987:870). Rims were combined with various rim/necks, carinated and body sherds to define a range in vessel shapes. The forms are wide ranging and are heuristic devices to identify changes between sites and the relationship between form, decoration and fabric. As such, these groups are used to structure the vessels into manageable units for comparison. Minimum numbers of each vessel form are calculated for each site mainly on rim data. In some cases minimum numbers are based on other classes of sherd (carination and base, or neck) where they could not have been associated with any of the rims (see Chapter 6 for instance). Attributes used in this calculation include rim direction, rim profile, lip profile, sherd thickness, orifice diameter, type of decoration, and fabric. The basic question asked is which rims come from the same vessel? The forms are:

A. Unrestricted vessels (Fig. 4.1)

   I. Open bowl/cup – outward rim/wall orientation
   II. Open pot/bowl – vertical rim/wall orientation
   III. Possible open bowl with horizontal rim.

B. Restricted vessels (Figs 4.1, 4.2 and 4.3)

   IV. Jar with horizontal rim, restricted neck.
   V. Jar with outcurving rim and restricted neck with carination and rounded base.
   VI. Pot with everted rim and rounded globular body
   VII. Inward restricted upper vessel form – making up both flasks and narrow restricted necked vessels, or incurving bowls.

C. Other Vessel forms (Fig. 4.3)

   VIII. Vessel stands. Bases or vessel legs are discussed separately.

Every rim was allocated a vessel form except:

i. Direct rims where it was not possible to ascertain if they were broken everted rims (Form VI) or parts of an unrestricted outward oriented vessel (Form I).
ii. Rims where it was not possible to identify orientation at all.
Chapter 4  Identifying the production and distribution of pottery – methodological issues

Within these forms variation exists. Form I, for instance, correlates with open bowls, dishes and cups, and Forms V and VI mostly with outcurving carinated jars and everted round bodied pots respectively. Yet within Form V the upper vessel form of spouts are also included. Where they are found they are dealt with separately.

Form III and IV vessels share identical rim features, their difference being lower body form. Form IV vessels are restricted at the neck and are part of a jar assemblage. Form III vessels, on the other hand, are lacking any lower body form and are either open bowls, or could be broken parts of a restricted neck jar. As they make up varying percentages of different assemblages, it was decided to make them a single vessel class rather than jettison them all together.

For each site a discussion on the variation within each vessel form is given so that the full range of shapes is presented. These categories are gross identifications of form. They are used to avoid the confusion of vessel typologies/classification in which every variation of shape is attributed a new vessel type.

Pottery database

Each sherd was given a unique catalogue number. Sherds exhibiting form, decoration, method of manufacture, or unusual attributes were examined and entered onto the pottery database.

The structure of the pottery analysis and subsequent database is similar to Irwin’s attribute analysis (Irwin 1985). That is, variables (attributes) have been defined to describe the form (size and shape), decoration (placement of decoration, technique used, motifs) and technology (paste) of the pottery. The attributes chosen for form are for classificatory purposes, and supposedly represent the ‘smallest units to which component parts of an artefact may be reduced’ (Specht 1969). They should also be independent of value judgements (see Egloff 1979). Their purpose is to:

1. Build a pottery spectrum made up of particular attributes and frequency (Poulsen 1987). Identify patternning of attribute distributions (Specht 1969) – or groups defined by clusters of attributes (Egloff 1979).

2. Compare such attributes with other regions.

When describing the Arawe sites, basic sherd counts per decorative type are outlined, followed by a description of the vessel distribution. Minimum vessel numbers are calculated on rims, and, in some cases, other parts of the vessel. Attributes used in this calculation include decoration, orifice diameter, rim type and thickness, plus fabric. The basic question asked is do the rims come from the same vessel?

Unlike the model approach of Egloff, and the hierarchical nature of Irwin’s classification, this analysis follows Specht’s polythetic approach in variable analysis. Yet unlike Specht’s analysis, the major aim is not the

---

**Figure 4.1** Vessel forms.

**Figure 4.2** Vessel forms.
definition of separate styles, but the identification of similarity/variation within and between assemblages. It is the nature of assemblages that is important, including their spatial and temporal variability. The database is also used to draw a sample of sherds for electron microscopy.

**Formal data**

*a) Type of sherd*

Formal data cover those attributes that describe the sherds' placement on a vessel. Sherds are identified as either rim, neck, carination, body, handle/lug/cut-out, base, or pot stand.

*b) Vessel/Rim/Body data*

To classify the almost unlimited variations in rim shape, four variables are addressed: rim direction, rim profile, extra rim features, and lip profile. The orifice diameter, rim thickness and length plus vessel percentage are also recorded.

**Rim direction:**

Five rim directions are defined (Fig. 4.4).

1. Everted – has an interior corner point (C.P.).
2. Outcurving – has an inflection point (no C.P.).
3. Direct – follows the outline of the vessel with no change in direction or contour. It can be difficult at times to distinguish between an inverted, everted, incurving or outcurving rim and a direct rim on outcurving vessels. Such cases are not assigned a vessel form.
4. Inverted – has a corner point on the exterior of the edge (see Joukowsky 1980:352).
5. Incurving – has a convex profile and an inflection point (no C.P.).

By using this initial break-up, the general relationship between the rim and body shape can be identified. Note that other Pacific archaeologists have used the terms inverted as inward, everted as outward, and direct as straight, but as defined above, the terms inverted and everted have specific meanings. Furthermore, a rim may be oriented outwards or inwards but be direct.

The stance of a rim is needed to define its direction. To ascertain rim stance, I followed Joukowsky who recommended turning the rim upside down on a horizontal surface and moving it back and forward until no light escapes between the rim edge and surface (Joukowsky 1980:422). A similar usage is found in Shepard (1980:253), and Glover (1986:39).

The definition of rim direction was also aided by Poulsen's definition of a rim orientation. This is the angle 'between the perpendicular centre line of the original pot standing upright and the central axis of the rim as it sat on the pot'. The 'central axis of the rim' is 'an imaginary line through the middle of a rim and following the general
straight or curved course of this (Poulsen 1987:29). The actual angle was not measured, but sherds were assigned to the above classes.

**Rim profile:**
1. Parallel
2. Convergent – gradual
3. Convergent – abrupt
4. Divergent – gradual
5. Divergent – abrupt

I have used a similar rim profile break-up as Irwin (1983:105), Poulsen (1987:57) and Ward (1979: Chapter 7). The rim profile refers to the relationship between the inner and outer vessel wall in their course towards the lip. It can be parallel, divergent (thicken towards the lip), or convergent (thin towards the lip). Irwin adds an extra distinction to convergent and divergent profiles, that is, whether they are abrupt or gradual (Fig. 4.4).

**Lip profile:**
1. Flat with sharp edge
2. Flat with round edge
3. Rounded
4. Pointed
5. Grooved

The lip is defined here as the end point of the rim (Fig. 4.4).

**Extra rim features:**
1. Pendant
2. Horizontal
3. Symmetrically thickened
4. Asymmetrical thickened – interior
5. Asymmetrical thickened – exterior

This category includes some added features of rim shape and rim thickening (Fig. 4.5).

Admittedly, these latter three classes of rim thickening are limited, but in combination with the rim profile category they will describe the profile of the rim adequately for my purpose. The form of thickening is difficult to identify and is omitted in this analysis (i.e. folding over, extra clay added, clay squeezed etc.).

**Sherd thickness:**
1. Rim. Specht's and Irwin's methodology is applied here in which two measurements A and B are used (Specht 1969:78; Irwin 1983:107). Rim measurement A is 'at the point of maximum or minimum thickness on expanded and reduced rims, and at the lip of those of constant thickness' (Specht 1969:79). Rim measurement B is taken 'just below the points of origin of abrupt expansion or reduction; at least one cm below the lip on direct rims of constant thickness, (or) ... on differentiated rims ... just below the point of differentiation' (Specht 1969:79).

2. Body/Neck/Carination. On a body, carination or neck sherd, this measurement is taken at:
   a) the widest point
   b) narrowest point.

Both are used to assess the variation not only within an assemblage, but within the sherd itself.

**Orifice diameter:**
This is a measurement obtained by placing the lip of the rim sherd (with its correct rim stance) on a piece of paper which has series of 1 cm spaced concentric circles drawn on it. The diameter of the circle that matched the curvature of the rim is used. This method has been used by Glover (1986:39), Egloff (1979:42), Specht (1969), Irwin (1983) and Joukowsky (1980:422).

**Decoration data**
Following Irwin, this study on decoration used variables that:
1. identify the part of the vessel decorated,
2. the technique used, and
3. the type of decoration.

**Location of decoration**
Locations include lip, outside or inside rim, neck, carination, body and any combination thereof.

**Technique of decoration**
The following decorative techniques, and their combinations, are recorded:

1. **Impression:**
   a) Stick impression
   b) Dentate stamping
3. Fingernail impressed
4. Shell impressed
5. Single tool impressed
6. Stamped impressed

Notching (mostly lip notching):
1. Notched
2. Cut
3. Scalloped

Incision:
1. Linear incised
2. Miscellaneous incised (mostly incised lines on fragmented sherds. This category could include other forms of incision in which identification is difficult.)
3. Incised (with motifs normally associated with dentate decoration)
4. Comb incised

Other:
1. Appliqué
2. Nubbins
3. Grooved/channelled
4. Gouge, cut out triangles, excision.

Motive type
All identified dentate motifs in this analysis are recorded using Anson’s inventory listing. Anson defined 516 motifs from 16 sites and recorded these in his PhD dissertation (Anson 1983: Table 12). Motifs not found in Anson’s inventory are recorded separately. Heeding Green’s warnings (1990) no attempt was made to add to his inventory listing and give these new motifs separate numbering. That is left to another work. The presence of motifs recorded in this analysis are compared with other sites in the Western Pacific (see Chapter 10).

Fabric analysis
Fabric analysis was made on all sherds using a low powered binocular microscope at 17X. Sherds are initially grouped by the nature of their inclusions. The resultant fabric groups are the product of many hours of constantly re-analysing the sherds – it is an iterative procedure with groups refined over time. Six major fabrics groups were defined:
1. ferromagnesium – magnetite (M)
2. ferromagnesium – pyroxene (P)
3. ferromagnesium – pyroxene/magnetite (PM)
4. calcareous (CA)
5. light inclusion – quartz, plagioclase feldspars etc. (L)
6. inclusion free – no inclusions seen at 17x (N)

Variation is found within each of these groups, and nineteen sub-groups are defined. However, for the analytical purposes only the six major ones are used.

METHODOLOGY FOR POTTERY ANALYSIS – CHEMICAL CHARACTERISATION AND THE ELECTRON MICROPROBE

This section outlines the procedures used in the chemical analysis of the pottery assemblage. It is structured in two parts. The first outlines the need for electron microscopy, what it involves, and the parameters used in this analysis, including the preparation of samples. The second part describes the statistics used in this study to define meaningful chemical pottery groups. It is from these chemical groups that the movement of clay or the pots will be identified, and issues such as exchange addressed.

The electron microprobe
A chemical characterisation analysis is needed to assess production, exchange and consumption patterns. Chemical analyses are performed using the electron microprobe on both the pot matrix and mineral inclusions. The overall question was what is the nature of the pottery assemblages over time and space and how do they relate to sites further afield for which comparable data exists, such as Hunt’s (1989) work on Mussau, or Anson’s (1983, 1986) on Talasea, Ambite, Eloua or Watom?

Why use the electron microprobe? A major problem in the use of pottery chemical characterisation concerns the effect of manually added mineral inclusions on elemental concentrations. Mineral inclusions either occur naturally in the clays or are artificially added to counteract shrinkage during the pot’s drying process. Their manual addition to the clay will effect the chemical profile of a pot and if not compensated for, will result in erroneous data used for modelling production, exchange and consumption. For instance, pots made from the same clay source could have different chemical elemental concentrations due to the addition of either varying amounts of similar minerals or different mineral inclusions. This in turn could result in the pottery being attributed to different loci of production with misleading exchange and consumption patterning resulting.

To get around this problem many studies have advocated the use of a petrological analysis to complement a physico-chemical one. On the other hand others have tried to get around the problem using alternative methods, for example by:

i. separating the mineral grains from the pottery paste by ultrasonic disaggregation (Ambrose 1992, 1993; Elam et al. 1992) or,
ii. making a number of combinations of varying proportions of both clay and filler with the aim to obtain a chemical characterisation of the combinations (Rye 1981; Rye and Duerden 1982; Allen and Duerden 1982).

Another method is the electron microprobe. By positioning the specimen (usually a flat polished section) under the electron beam the microprobe can discriminate between non-plastics and the clay matrix (Freestone 1982; Summerhayes and Walker 1982; Anson 1983; Hunt 1989, 1993; Ambrose 1992; Tite 1992) (See Summerhayes 1987, 1996, 1997 for a detailed discussion on this topic).

Machine conditions
A negative potential of 15 K eV accelerating voltage was used for the analysis of both the clay matrix and mineral inclusions. Sections from the rim of the selected sherds are sliced using a diamond tipped circular saw, and set
in an epoxy resin pellet, from which thick sections are taken for analysis. Four sherds could be set into each pellet and thick section. The section is clamped into a specimen holder within the sample chamber. The sample can be viewed on both a cathode ray tube or attached video camera and points can be selected for analysis by moving the specimen holder, which is on a movable stage, using a X and Y axis precision control mechanism until the point for analysis is under the beam. Selected specimens can also be visualised in the specimen chamber by use of an optical microscope attached to the probe (see Reed 1975:191).

On the microprobe, vacuum is kept with internal pressures less than \(10^{-5}\) torr. Astigmatism is controlled by adjusting the amplitude and orientation of the beam while the drift of the filament can be monitored by a Faraday cup (Reed 1975:43 and 49). Beam current is set at 25nA on the standard magnesium oxide and was controlled by the Faraday cup digital display and current meter.

Both a wavelength dispersive spectrometer (WDS) and energy dispersive spectrometer (EDS) were used in this analysis. The former was used in obtaining a spectrum to ascertain whether the spot for analysis was part of a mineral inclusion or part of the pot matrix, the latter for the quantitative analyses. Seven to ten analyses was conducted on different parts of the pot matrix and then averaged in order to ascertain the variability within the matrix and to discount any mineral inclusions.

Both WDS and EDS separate and measure the intensity of the X-ray. To allow corrections to be made and to ensure compatibility of analyses, standards are employed. The count rate from a standard, usually of a pure element or in this case an alloy where the composition is accurately known, is taken to compare the rate of counts in the sample (see Bowen and Hall 1975:91). This allows corrections in atomic number \((Z)\), absorption \((A)\) and fluorescence \((F)\), known as ZAF corrections. Geological standards were standardised at the beginning of each session of analyses. That is, the correct peak position is found after a peak search from the high angle of the theoretical position. After determining the intensity of the peak, the background intensity is subtracted by measuring backgrounds at 500 units either side of the peak. After each session of analyses the standards were re-analysed.

**Preparation of samples**

Preparation is also a lengthy procedure but necessary for the correct results. Firstly, sherds were washed with distilled water prior to having a 2 cm slice cut using a 14" diamond edge saw. Each slice was cut perpendicular to the sherds surface and rim. Cut surfaces were then ground down using abrasive paper.

Secondly, samples were left to dry overnight in an oven at 38 degrees centigrade to ensure that no water remained in the sample.

Thirdly, samples were impregnated with epoxy (araldite) resin by placing three to four samples in a 4 cm diameter plastic mould which was filled with resin.

Fourthly, the moulds were placed overnight in a polymerising oven at 38 degrees centigrade for the resin to polymerise to form pellets. They were then left to sit for a minimum of seven days to counteract tensile stresses.

Fifthly, the surface of the pellet was ground down to expose the surface of the sample sherds, and then again impregnated with epoxy resin. This was repeated until no more epoxy could be absorbed by the surface of the sherd. The pellet was left to dry again overnight.

Sixthly, the exposed surface of the pellet was glued to a glass slide, and after drying overnight, the pellet was cut from the slide using a diamond saw leaving a thin section. Thin sections were left to dry overnight, and then the new surfaces impregnated with epoxy resin (see Reed 1977:177). The surfaces of all specimens must be highly polished as surface irregularities affect the matrix corrections (Reed 1977:175). For instance, the take off angles of X-rays from rough surfaces will affect their detection and absorption rates. All thin sections were polished using rotating nylon laps with 6, 3 and 1 micron diamond paper and paste to achieve a polished flat surface.

Lastly, all samples were cleaned with ethanol and freon in an ultrasonic cleaner and coated with carbon under vacuum. A conductive coating is needed to 'provide a path for the probe current to flow to earth' (Reed 1977:178). Carbon is selected because of its low atomic number 'which ensures that the coating does not significantly absorb the energy X-rays' (Reed 1977:179).

**Choice of elements**

In this study the following elements (as oxides) were measured in the analysis: Mg, Al, Si, K, Ca, Ti and Fe. In previous research, these elements were found more useful than the trace elements in discriminating not only prehistoric pottery groupings but also pots made from a single production centre on Buka Island, Papua New Guinea (see Summerhayes 1987 for further discussion).

In this analysis local clays were not collected for analysis as the relative concentrations of the chemical constituents may have been affected by post depositional factors or in preparation, such as removing coarse materials from the clay, firing various clays at different temperatures, and 'tempering' the materials with organic material, rocks or old pottery (grog) (Wideman et al. 1975:46-7; Michel et al. 1976:85; Poole and Finch 1972:80; Perlman and Asaro 1971:192; Arnold et al. 1978:566-7; see also Fish et al. 1992:244). Bishop explains it thus:

> The ceramic production phase is replete with opportunities during the production stage to alter the composition of the pottery beyond that derived from the original raw material resource. The treatment of the predominantly clay fraction... the firing... all contribute... to make a ceramic composition 'dissimilar' from a sample taken from the original clay source. (Bishop 1992:167)

The term 'filler' or 'non-plastic' will be used here for any inclusion in the basic clay constituent (see Arnold 1975 for a discussion on the various terms used).

**Statistics and definition of pottery chemical groupings**

A primary aim in the quantitative elemental characterisation of pottery is to define groupings. The grouping should
not only make chemical sense, but also archaeological sense. The elemental distribution has been compared with traditional archaeological classifications. Harbottle for instance cites David Clarke:

The main work of an archaeologist hinges on his ability to compare numbers of artefacts or numbers of assemblages and to assess their relative degree of similarity one with another... when comparing one artefact with another the archaeologist is intuitively comparing their respective attribute assemblages. (Clarke 1968:140-1; see also Harbottle 1982:18)

Harbottle views the chemical elements as attributes. Within such a classification, however, there are problems which are analogous to the classic type debate initiated in the 1950s by Spaulding and Ford which refer to whether the classification is one favoured by the maker (Spaulding 1953) or one made by the archaeologist (Ford 1954). Potters do not look at the chemical composition of a clay to decide its usefulness although the chemical distribution does have a geological base (Hammond et al. (Spaulding 1953) or one made by the archaeologist (Ford 1954). Potters do not look at the chemical composition of a clay to decide its usefulness although the chemical distribution does have a geological base (Hammond et al. 1976:147). Potters do rely on factors such as closeness of the clay source, its workability, the proximity of mineral non-plastics and so on. As such, when looking at the elemental characteristics of the classification, behavioural influences such as the effects of mineral inclusions, or firing and leaching should be evaluated (see Summerhayes 1987).

A useful concept is the grouping of pottery into Chemical Paste Compositional Reference Units – CPCRU (Bishop and Rands 1982; Bishop et al. 1982: 302). This simply equates with a level of chemical data integration. As noted by Bishop, Rands and Holley, ‘when complexities are introduced by the use of temper, guidance for the interpretation of chemical data is necessary’ (Bishop et al. 1982:302). They coined the term CPCRU to equate with the groups resulting from the manipulation of elemental data. The CPCRU concept will be used here for grouping elemental compositions – see below.

If the elemental composition of sherds from well separated sites can be differentiated then simple statistics can be used successfully. The problem lies with the number of variables, i.e. elements being examined. With a large number of elements under consideration, chemical profiles are not so clearly distinguished and groups are hard to discern. As Bieber et al. points out:

the researcher is faced with the problem of comparing and grouping the samples according to composition in such a way that the final groups make both archaeological and chemical sense. (Bieber et al. 1976:60)

Multivariate techniques are useful here as they are able to handle large numbers of attributes and organise them in a relatively short period of time. As stressed by De Bruin et al., in many cases the differentiation of groups can not be made visually and elaborate statistical procedures are needed (De Bruin et al. 1976:78).

In this study, Principal Component Analysis (PCA) using Wright’s MVARCH (1991) and hierarchical clustering analysis using the Group Average method are used. A rotated PCA is used initially (Chatfield and Collins 1980:229) to identify major clusters and group structure. Object scores from the PCA are then used for subsequent hierarchical clustering analysis. Groupings are defined here subjectively and not by some cut off similarity measure. They should be compact, and for simplistic purposes only, groups displayed by PCA will be compared with the dendrograms produced using the Group Average technique to assess if such groupings are universal or a product of the technique. The Group Average technique is selected after proving the best in discriminating between pottery chemical groupings (see Summerhayes 1987).

The remainder of this section will outline in more detail firstly, the principles of Principal Components Analysis, secondly, the principles of hierarchical clustering techniques, and lastly, the definition of chemical groupings – CPCRUs.

**Principal components analysis**

Principal component analysis involves the orthogonal transformation of the original variables into a new set of uncorrelated variables, principal components (Chatfield and Collins 1980:57; see also Shennan 1988: Chapter 13). The first component should account for the greatest amount of variation in the data, the second component the second greatest, and so on with the components decreasing in order (Chatfield and Collins 1980:57). The major aim of PCA is to reduce the number of attributes to a few dimensions so that firstly, the data can be plotted and clusters can be identified visually, and secondly, an element’s contribution to the hierarchical clustering methods outlined below can be assessed. The technique has proved successful in pottery chemical characterisation techniques elsewhere (Summerhayes 1987, 1997; Jones 1986; Glasscock 1992; Elam et al. 1992; Bishop and Neff 1989; Neff et al. 1988, 1989; Clark et al. 1992:259; Fish et al. 1992:239).

Why plot the data? The choice of clustering method will impose a structure on the data. Chatfield and Collins argue that hierarchical clustering techniques are good at defining spherical shaped clusters but not any other (Chatfield and Collins 1980:218). They point out that if one plots the data on a two dimensional scatter diagram a cluster should be internally consistent and isolated from others. Two curved clusters, while easily identifiable visually, would be difficult to detect using an ‘automated algorithmic approach’ (Chatfield and Collins 1980:218).

As such the application of PCA and the plots of the first two to three components will be useful in assessing the appropriateness of some of the hierarchical techniques, provided that these first few components account for a large proportion of the total variance. In this study the program ACROSPIN was used which allowed 3-dimensional plotting of the three components.

The component scores from the PCA were subsequently used on hierarchical clustering techniques to observe data structure on a micro level. In this study it was decided to use the Group Averages method (see below). By comparing these methods on the same data set it is hoped to not only identify structure in the data,
but also to evaluate these techniques and their application to archaeometric studies.

All data was standardised using MVARCH which provides for 'log contrast principal component analysis using a centred logratio covariance matrix' (Wright 1991:39).

**Hierarchical clustering analysis**

In this study the Group Average hierarchical clustering technique is used with Euclidean distance (Summerhayes 1987, 1997; see also Baxter 1994:159). Using a hierarchical clustering technique one needs a quantification of the compositional similarity between samples, an important step in making the groups objective (Attas et al. 1977:38). It is based on the premise that each sample is regarded as a point in hyperspace (multidimensional space) with the number of dimensions being the number of elements determined (Bieber et al. 1976:63). In hyperspace samples from objects with the same origin will form clusters for which a multidimensional probability distribution can be calculated (De Bruin et al. 1976:81). The allocation of an unknown sample to a group of reference samples can be based on the distance between the position of the unknown sample and the various clusters (De Bruin et al. 1976:81). In some studies comparatively simple similarity coefficients were used to quantify the differences between archaeological samples, such as the Jaccard Coefficient or Robinson's Index. In the analyses the following similarity form is used:

Euclidean Distance where

\[ ED_{ij} = \sqrt{\sum_{m=1}^{n} (X_{im} - X_{jm})^2} \]

where \( n \) = total number of elements

\( X_{im} \) = concentration of element \( m \) in sample \( i \).

\( ED_{ij} \) = interpoint distance between samples \( i \) and \( j \).

(see Clayton 1982:92; Bieber et al. 1976:63; Op de Beeck and Ghijswx 1979:158)

**The definition of CPCRUS**

Principal Component Analysis and Group Average hierarchical clustering technique will be examined with the major aim of defining discrete groupings or clusters of sherd samples based on elemental similarity/pastes. A cluster or group is defined as "a group of contiguous elements of a statistical population; for example, a group of people living in a single house, a consecutive run of observations in an order series, or a set of adjacent plots in a field" (Kendall and Buckland quoted by Everitt 1977:4).

Within a two dimensional plot of clusters such groupings will either be in the form of

a. a compact or homostat shape, or

b. a connected shape. (see Everitt 1977:44)

The former type of grouping will be self evident from a PCA analysis, however the latter may be in the form of a series of groupings in which there may be no similarity between the end members (see Everitt 1977:44). The use of hierarchical clustering techniques will help identify discrete groupings within a larger continuous cluster, if they exist.

It should be noted that hierarchical clustering techniques are 'tools in exploratory data analysis and pattern recognition studies' (Dubes and Jain 1979:235). The determination of a successful clustering is a subjective process. Dubes and Jain have argued that if prior knowledge of the data being clustered is known, 'interpreting the results of clustering algorithms becomes a general matter in which intuition and insight are dominant' (Dubes and Jain 1979:239). They coin a term called 'cluster validity' which incorporates the separation of the sample from the structure, i.e. the form of the results of a clustering method (Dubes and Jain 1979:239). They argue that statistical tests of significance do not provide a quantitative meaning of cluster validity, a clustering algorithm creates a cluster whether one exists or not (Dubes and Jain 1979:239). Their reasoning is that:

Even if you assume Gaussian distributions for each cluster and equality of scatter in all clusters, the standard 't' and 'F' test are, at best, useless and, at worst, misleading. The 't' and 'F' statistics themselves can be computed but their distributions under "randomness" null hypotheses are unknown in a clustering situation. That is, cluster labels were placed on the patterns to optimise the very criterion that these statistics were supposed to test. This seemingly obvious fact has been repeatedly ignored in the literature. (Dubes and Jain 1979:252)

Dubes and Jain have outlined four criteria to take into account when assessing a clustering method:

1. compactness – i.e. the inner strength or concentration or cohesion of an individual cluster.
2. isolation – it measures the distinctiveness or gaps between clusters and its environment
3. global fit – i.e. the accuracy with which the structure describes relationships between a structure, and
4. intrinsic dimensionability – i.e. shape of clusters. (Dubes and Jain 1979:240).

The global fit and especially the intrinsic dimensionability criterion are of special interest since some techniques expect clusters to be of a certain shape. Of importance is the observation that 'pottery and clay compositional groups tend to be elongated, or hyperellipsoidal, rather than hyperspherical' (Hodge et al. 1992:208; Fish et al. 1992:239).

The probability that a particular specimen belongs to a particular group depends not just on its proximity in Euclidean terms to the group centroid, but also on the rate at which the density points drops off from the centroid out to the data point of interest. (Fish et al. 1992:239)

If two groups are close, hierarchical clustering techniques will not separate them. Also techniques using the squared error 'criterion' will often produce small compact, well separated clusters (Dubes and Jain 1979:247, 1976: 248). As such, one can take these factors into account when assessing grouping of sample sherds. The shapes of these clusters will be discerned by using the two dimensional plots produced by PCA, and the three dimensional plot of samples produced by ACROSPIN.

How then can a comparison be made to ascertain the best clustering method? Dubes and Jain argue that
choosing the best clustering technique is contrary to the nature of clustering. To check clustering they advocate ‘concentrating on the techniques themselves and compare them according to their intrinsic characteristics, such as the types of clusters they are likely to find’ (Dubes and Jain 1976:253). They note that there are no realistic criteria to compare a ‘cluster containing 5 clusters that misclassifies 10 patterns to one that contains 8 clusters and misclassifies 6 patterns’ (Dubes and Jain 1976:256). Misclassification is defined by Dubes and Jain as placing a pattern from one category into a cluster dominated by another (Dubes and Jain 1976:256). They argue that it is best to apply ‘several clustering techniques and check for common clusters instead of searching for a technical measure of validity for an individual clustering’ (Dubes and Jain 1979:252; see also 1976:258). This approach has been also endorsed by others (Clayton 1982:98) and was the one taken in a previous analysis in which Group Average proved more satisfactory in handling chemical data (Summerhayes 1987, 1997).

As mentioned earlier, a rotated PCA is used initially (Chatfield and Collins 1980:229). Object scores from the PCA are used for subsequent hierarchical clustering analysis. Groupings are defined subjectively and not by some cut off similarity measure. Yet they should be compact, and for simplistic purposes only, groups displayed by PCA will be compared with the dendrogram produced using the Group Average technique.

The chemical results and identification of CPCRUs using the methods outlined above are found in Chapter 11.
This chapter describes the pottery assemblage from Adwe, FOH squares D, E and F. The other assemblages are described in the following four chapters. As outlined in Chapter 4, pottery interpretations are largely based on counting and weighing different decorative types, and noting their change over time where possible. Due to their state of preservation the Arawe assemblages allow a more detailed and comprehensive look at vessel decoration and fabric. More importantly it offers a unique view into the role of dentate pots in relation to those with other forms of decoration, and allows for a study of decorative types over space and time. This will be explored more in Chapter 10 which reviews and draws together the formal, stylistic and fabric analyses from all the assemblages.

The structure of this and the following three chapters describing the Arawe sites is the same, being divided into three sections. The first section outlines basic sherd counts per decorative type, while the second section describes the vessel distribution. Vessel forms are discussed separately in terms of both decoration and fabric. Conjoined sherds were grouped together prior to the detailed analysis, although many sherds were attributed to the same vessel after the analysis was conducted. The last section provides a brief chapter summary.

SHERD DISTRIBUTION

Introduction

A total of 10,169 sherds were excavated from squares D, E and F. The top metre of deposit was disturbed and yielded little pottery (Table 5.1). They are not included in this analysis. Also, due to time restraints squares E2 and E3 were not included in the analysis, making the total population of sherds analysed 8291 (Table 5.2). Despite this, for simplicity sake this assemblage is still referred to as FOH squares D, E and F. Only sherds exhibiting decoration, form or evidence of manufacture were included for further analysis including fabric categorisation. As such 844 sherds were entered onto the database. The basic breakdown of sherds is seen in Table 5.3.

Decoration

Changes in decoration can be seen in the following three tables. Table 5.4 shows the distribution of all decorated sherds and their associations. Each sherd is counted only once. Tables 5.5 and 5.6 are a summary of shared occurrences of each decorative type. Thus a dentate rim with a notched lip is counted in both the dentate and notched categories.

On the basis of counts and percentages of decoration on sherds alone (Tables 5.5 and 5.6), the following observations are made:

1. Dentate decoration is the dominant decoration in all units except unit E. Despite this there is a proportional
Chapter 5  

The nature of the pottery assemblages from West New Britain - Adwe - FOH squares D, E and F

<table>
<thead>
<tr>
<th>Unit</th>
<th>No.</th>
<th>%</th>
<th>wgt (gm)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>101</td>
<td>1</td>
<td>493</td>
<td>1</td>
</tr>
<tr>
<td>Unit E</td>
<td>829</td>
<td>8</td>
<td>2148</td>
<td>5</td>
</tr>
<tr>
<td>Unit D</td>
<td>1109</td>
<td>11</td>
<td>4460</td>
<td>10</td>
</tr>
<tr>
<td>Unit C</td>
<td>4090</td>
<td>40</td>
<td>19464</td>
<td>42</td>
</tr>
<tr>
<td>Unit B</td>
<td>2121</td>
<td>21</td>
<td>11239</td>
<td>24</td>
</tr>
<tr>
<td>Unit A</td>
<td>1919</td>
<td>19</td>
<td>8031</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>10169</td>
<td></td>
<td>45835</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.1 Distribution of sherds per unit. FOH squares D, E and F.

<table>
<thead>
<tr>
<th>Sherd type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rims</td>
<td>57</td>
<td>102</td>
<td>105</td>
<td>33</td>
<td>18</td>
<td>315</td>
</tr>
<tr>
<td>Neck</td>
<td>33</td>
<td>53</td>
<td>65</td>
<td>17</td>
<td>13</td>
<td>181</td>
</tr>
<tr>
<td>Carination</td>
<td>14</td>
<td>21</td>
<td>40</td>
<td>15</td>
<td>6</td>
<td>96</td>
</tr>
<tr>
<td>Body</td>
<td>42</td>
<td>58</td>
<td>66</td>
<td>17</td>
<td>6</td>
<td>189</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Base</td>
<td>1</td>
<td>8</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>Pot stand</td>
<td>6</td>
<td>8</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>155</td>
<td>254</td>
<td>302</td>
<td>84</td>
<td>49</td>
<td>844</td>
</tr>
</tbody>
</table>

Table 5.2 Total population of sherds analysed per unit. FOH squares D, E and F.

Table 5.3 Sherd type A B C D E Total

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>44</td>
<td>80</td>
<td>83</td>
<td>16</td>
<td>5</td>
<td>228</td>
</tr>
<tr>
<td>Incised</td>
<td>6</td>
<td>0</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>23</td>
</tr>
<tr>
<td>Impressed</td>
<td>6</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Other decoration</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>83</td>
<td>83</td>
<td>16</td>
<td>5</td>
<td>228</td>
</tr>
</tbody>
</table>

Table 5.4 Distribution of sherds by number per decoration and unit. FOH squares D, E and F.

The decline of decorated sherds with dentate decoration from unit B to E. In unit B, 83% of all decorated sherds has dentate decoration, while in unit E this declines to 33%. Even here 33% is a large proportion of sherds, although in number it comprises only six. The number of decorated sherds drops substantially from unit C (n=154) to D (n=49) to E (n=18).

Although the number of sherds with linear incised decoration declines in proportion to the overall decrease in sherds from units C to E (n=11, n=8, n=7 respectively), the percentage of linear incisions within each unit increases, doubling from 7% in unit C to 16% in unit D to 39% in unit E.

The percentages of sherds having grooved/channelling decoration also increases from 4% in unit D to 17% in unit E.

Fingernail impressed decoration increases in unit D to form 10% of all decorated sherds.

Notched rims as a percentage of all decoration increase from units A/B to C to D to E (7%, 3%, 9%, 14%, 17%). The relationship between notched rims and other rim decoration will be addressed below.

Based on the number of decorated sherds, the assemblage from squares D, E and F of FOH is dominated by dentate decoration. Changes occur with the proportion of dentate decoration declining gradually over time, until unit E where linear incised decoration dominates. This is in conjunction with a dramatic decline in sherds, and possible depositional changes. Other forms of decoration also increase in proportion to others such as grooved/channelling, and notching. Of note is fingernail impression, which increases in percentage of decoration up to unit...
The nature of the pottery assemblages from West New Britain

Chapter 5

The distribution of vessel forms in each unit can be seen in Tables 5.7 and 5.8.

Major points
1. Plain and dentate wares combined make up three quarters of the assemblage.
2. Plain ware forms 50% of this assemblage. It is dominant in form II, III, IV and VI vessels, and common in the rest, forming a third of vessels in form I, V and VII vessels.
3. Dentate vessels can be characterised as a vessel form I and VIII assemblage (Table 5.10).

The comparison with sherd counts is interesting as 5% of the total sherd population is decorated. Of that 5%, dentate decoration is dominant. It forms 65%, 83%, 67%, 43% and 33% of decorated ware per unit (A to E – Table 5.6). As mentioned above, on the basis of decoration alone, FOH squares D, E and F is typified by dentate decoration. Yet when complemented with vessel form data a different picture emerges.

The distribution of dentate decoration per vessel form is seen in Table 5.10. Although dentate decoration is found on 24% of all vessels and forms the dominant decoration, it is primarily found (79%) on both vessel forms I and VIII - open unrestricted vessels (primarily bowls) and vessel stands (Figs 5.1-5.6, 5.31-5.33). Dentate decoration is associated with other vessel forms, but is never common. It is not found on any form VI and II vessels. Only three dentate vessels are associated with form III and IV, and only five form V vessels (Figs 5.11-5.12, 5.16, 5.18-5.20). Dentate is also found on three form VII vessels of which one is a flask and another is a possible spout (Fig. 5.30).

Three quarters of all vessels are non-dentate. Just over half of all vessels are plain. Table 5.11 outlines the structure of the plain ware component of the assemblage.

Plain vessels are never a minor component. Nearly half of the plain component of the assemblage comes from vessel forms V and VI. Within these forms, 83% of VI and only 33% of V are plain. These vessels will be discussed in more detail below.
Chapter 5  The nature of the pottery assemblages from West New Britain

- Adwe - FOH squares D, E and F

<table>
<thead>
<tr>
<th>Decoration</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>30</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>3</td>
<td>11</td>
<td>52</td>
<td>24.0</td>
</tr>
<tr>
<td>Plain stamped</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Linear incised</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Linear/ notched rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>3.0</td>
</tr>
<tr>
<td>Linear/ scalloped rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Notched rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>7.0</td>
</tr>
<tr>
<td>Scalloped rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>Cut lip</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>20</td>
<td>9.0</td>
</tr>
<tr>
<td>Grooved/ channelled</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Fingernail/ notched rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>Fingernail/ scalloped rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>Notched rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>7.0</td>
</tr>
<tr>
<td>Scallop rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>Cut lip</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>20</td>
<td>9.0</td>
</tr>
<tr>
<td>Grooved/ channelled</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Fingernail/ notched rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>Fingernail/ scalloped rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>Incised/ notched rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>7.0</td>
</tr>
<tr>
<td>Plain</td>
<td>14</td>
<td>17</td>
<td>11</td>
<td>8</td>
<td>24</td>
<td>25</td>
<td>3</td>
<td>7</td>
<td>109</td>
<td>50.0</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>17</td>
<td>12</td>
<td>10</td>
<td>73</td>
<td>30</td>
<td>11</td>
<td>18</td>
<td>218</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.9  Distribution of decoration per vessel form. FOH squares D, E and F.

<table>
<thead>
<tr>
<th>Vessel form</th>
<th>Total no. of all vessels</th>
<th>Total number of dentate vessels</th>
<th>% dentate in each vessel form</th>
<th>% of total dentate vessels</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>47</td>
<td>30</td>
<td>64</td>
<td>58</td>
</tr>
<tr>
<td>II</td>
<td>17</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>III</td>
<td>12</td>
<td>1</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>IV</td>
<td>10</td>
<td>2</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>V</td>
<td>73</td>
<td>5</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>VI</td>
<td>30</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>VII</td>
<td>11</td>
<td>3</td>
<td>27</td>
<td>6</td>
</tr>
<tr>
<td>VIII</td>
<td>18</td>
<td>11</td>
<td>61</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>218</td>
<td>52</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.10  Distribution of dentate vessel forms. FOH squares D, E and F.

<table>
<thead>
<tr>
<th>Vessel form</th>
<th>Total no. of all vessels</th>
<th>Total number of plain vessels</th>
<th>% plain in each vessel form</th>
<th>% of total plain vessels</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>47</td>
<td>14</td>
<td>30</td>
<td>13</td>
</tr>
<tr>
<td>II</td>
<td>17</td>
<td>17</td>
<td>100</td>
<td>15</td>
</tr>
<tr>
<td>III</td>
<td>12</td>
<td>11</td>
<td>92</td>
<td>10</td>
</tr>
<tr>
<td>IV</td>
<td>10</td>
<td>8</td>
<td>80</td>
<td>7</td>
</tr>
<tr>
<td>V</td>
<td>73</td>
<td>24</td>
<td>33</td>
<td>22</td>
</tr>
<tr>
<td>VI</td>
<td>30</td>
<td>25</td>
<td>83</td>
<td>23</td>
</tr>
<tr>
<td>VII</td>
<td>11</td>
<td>3</td>
<td>27</td>
<td>3</td>
</tr>
<tr>
<td>VIII</td>
<td>18</td>
<td>7</td>
<td>39</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>218</td>
<td>109</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.11  Distribution of plain vessel forms. FOH squares D, E and F.

Vessel form I – bowls

A total of 47 form I vessels were identified of which 30 have dentate decoration, two have plain stamping, one has a cut lip, and 14 are plain. The following description of this vessel class is divided into two: dentate and non-dentate vessels.

Dentate bowls

Introduction

Dentate bowls are primarily found in units A to C with only one found in unit D and none found in E. Just over 65% of these vessels have dentate decoration: 30 of the 47 bowls. The only other decoration associated with this vessel form is plain stamped motifs and a cut lip. Another interesting feature is the presence of grooving running around the rim of the dentate bowls. It is not associated with plain bowls. Grooving is found on 60% of all dentate bowls (18 of the 30) and is not associated with any other type of decoration. Only one example exists on another type of vessel form – vessel form II. Most vessels seem to be round based, although three flat based vessels are identified (Fig. 5.3; catalogue no. 6203; Fig. 5.4; catalogue no. 6945; and Fig. 5.6; catalogue no. 247). The first two vessels are complete from the rim to the base. The first is identical to one illustrated from Eloaua (Kirch 1987: Fig. 4b).

Fabric

Table 5.12 shows the distribution of fabrics across these vessels. Of the dentate bowls nearly three quarters (72% n=22) are made from ferromagnesium fabrics, 17% (n=5) from calcareous fabrics, and 10% (n=3) from light fabrics. Magnetite makes up just under a half of the ferromagnesium fabrics, and in fact makes up a third of all dentate bowls. Ferromagnesium and calcareous fabrics are found in units A to C, although the light fabric dentate bowls are restricted to unit C only. Of those with grooved lips, 78% (n=14) have ferromagnesium fabrics, while calcareous and light fabrics have 11% each (n=2 each).

Size

Table 5.13 shows the distribution of the orifice diameter of this vessel form.

Orifice diameter ranges from 12 cm to 38 cm at the lip. This included small cups to large unrestricted bowls, and including one shouldered pot. The wall thickness also varies as can be seen in Table 5.14.

As can be seen, wall thickness varies greatly between vessels, from 4 mm at the lip to 18 mm. Within vessel variation differs, and with the exception of those pots which have divergent rim profiles and thus great variance...
The nature of the pottery assemblages from West New Britain
- Adwe - FOH squares D, E and F

Chapter 5

Figure 5.1 Vessel form I - dentate with grooved lip. FOH squares D, E and F - Adwe.
Chapter 5

The nature of the pottery assemblages from West New Britain

- Adwe – FOH squares D, E and F

Figure 5.2  Vessel form I – dentate. FOH squares D, E and F – Adwe.
The nature of the pottery assemblages from West New Britain – Adwe – FOH squares D, E and F

Figure 5.3  Vessel form I – dentate. FOH squares D, E and F – Adwe.
Figure 5.4  Vessel form I – dentate. FOH squares D, E and F – Adwe.
The nature of the pottery assemblages from West New Britain
– Adwe – FOH squares D, E and F

Chapter 5

Figure 5.5  Vessel form I – dentate. FOH squares D, E and F – Adwe.
Chapter 5  The nature of the pottery assemblages from West New Britain  
  – Adwe – FOH squares D, E and F

Figure 5.6  Vessel form I – dentate. FOH squares D, E and F – Adwe.
The nature of the pottery assemblages from West New Britain
- Adwe – FOH squares D, E and F

Chapter 5

<table>
<thead>
<tr>
<th>Decoration type per unit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>total dentate</td>
<td>10</td>
<td>8</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Plain bowls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>A</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>total</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Plain stamped</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Cut lip</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total form I</td>
<td>12</td>
<td>9</td>
<td>6</td>
<td>14</td>
<td>4</td>
<td>2</td>
<td>47</td>
</tr>
</tbody>
</table>

Table 5.12 Vessel form I – distribution of fabrics and decoration per unit. FOH squares D, E and F.

<table>
<thead>
<tr>
<th>Orifice Diameter (cm)</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>22</td>
<td>5</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>3</td>
</tr>
<tr>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
</tr>
<tr>
<td>34</td>
<td>0</td>
</tr>
<tr>
<td>36</td>
<td>1</td>
</tr>
<tr>
<td>38</td>
<td>1</td>
</tr>
<tr>
<td>?</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 5.13 Vessel form I – distribution of the orifice diameters of dentate vessels. FOH squares D, E and F.

in wall thickness (collared rims, or those with horizontally flattened rims with carved/dentate decoration on the lip), the rest of the bowls have a uniform vessel wall thickness varying by no more than 2 mm (most vary by 1 mm) per pot.

Non-dentate bowls

Introduction

These non-dentate vessels comprise one with lip modification (cuts), two with plain stamped motifs, and the rest (n=14) plain (Figs 5.7-5.8). Like the dentate vessels these ones are found predominantly in the bottom three units (12 of the 14 - 86%).

Fabric

The distribution/proportion of fabrics differs from those of dentate decorated bowls. Of the 14 plain bowls, over half (57%, n=8) are made from a calcareous fabric. Only 28% are made from ferromagnesium fabrics (magnetite=2, pyroxene=1, pyroxene/magnetite=1), and 14% are made from a light and inclusion free fabric (one each). Of the two bowls with plain stamped motifs on the lip, one is made from a calcareous fabric, the other is inclusion free. The other decorated vessel (cut lip) has a pyroxene/magnetite fabric.

Lip form

No grooved lips were found on these rims, making this form of lip modification a characteristic of dentate vessels only. Most of the rims from the plain vessels (n=9) are horizontal and flat, while five have a form described by Golson (1971:69) as: ‘the flat surface of the lip is seated asymmetrical to the exterior with reference to the central axis of the rim’. This is unlike the decorated vessels where only two have asymmetrical oriented lips. One vessel has a collared rim.

Size

Orifice diameters vary from 14 cm to 30 cm, with 20 cm forming the mode (Table 5.15).

As seen in Table 5.16 all 14 rims have a wall variation of 1 mm and less from measurements taken at the lip and below the lip. The rims are more uniform in thickness than the decorated vessels.

Of the horizontal rims with calcareous fabrics (n=6), one is asymmetrical thickened to the interior and one is slightly thickened to the exterior. The rest including the asymmetrical stanced rims (n=2) have a flat sharp lip, except one which has a slightly bevelled exterior edge (Table 5.16).
The nature of the pottery assemblages from West New Britain – Adwe – FOH squares D, E and F

Figure 5.7  Vessel form I – plain. FOH squares D, E and F – Adwe.
Figure 5.8 Vessel form I. FOH squares D, E and F - Adwe.
The nature of the pottery assemblages from West New Britain - Adwe - FOH squares D, E and F

<table>
<thead>
<tr>
<th>Orifice diameter (cm)</th>
<th>No.</th>
<th>Rim feature</th>
<th>Fabric</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>1</td>
<td>collared/ horizontal</td>
<td>M</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>horizontal</td>
<td>CA &amp; N</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>horizontal</td>
<td>asymmetrical M</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>horizontal (n=2) and asymmetrical CA (n=1)</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>horizontal</td>
<td>CA</td>
</tr>
<tr>
<td>26</td>
<td>2</td>
<td>asymmetrical</td>
<td>CA and L</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>horizontal</td>
<td>CA</td>
</tr>
</tbody>
</table>

Table 5.15 Vessel form I - distribution of orifice diameters, rim feature and fabric on plain vessels. FOH squares D, E and F.

<table>
<thead>
<tr>
<th>mm</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 5.16 Vessel form I - cross tabulation of rim thickness at and below the lip. FOH squares D, E and F. (Rows - thickness below lip; columns - thickness at lip).

<table>
<thead>
<tr>
<th>Fabric</th>
<th>Horizontal</th>
<th>Asymmetrical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>P</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>PM</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>CA</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>L</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>5</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 5.17 Vessel form I - distribution of rim features on plain vessels per fabric. FOH squares D, E and F.

Vessel form II - vertical walled vessel (upper body) (deep spherical vessels to small bowls)

Introduction
Seventeen vessels are found in the assemblage, all plain (Figs 5.9-5.10). These vessels are not a homogeneous group with their only common feature being a vertical upper body shape with possible deep spherical bodies, although a couple are small cups.

Distribution
As seen in Table 5.18 few vessels are found in the top two units with 15 of the 17 vessels (88%) found in units A, B and C.

Fabric
This vessel form is predominantly made up of ferromagnesium fabrics (83%) (Table 5.18). Only one light and two calcareous vessels were identified.

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.18 Vessel form II - distribution of fabrics per unit. FOH squares D, E and F.

Size
Most of these vessels are either deep spherical based pots or small cups, with orifice diameters ranging from 8 cm to 32 cm. Rims are thin walled with little variation in wall thickness: between 3-6 mm. All have horizontal flat lips with sharp edges.

Vessel form III

Introduction
These vessels are identified primarily by their rim form. They are everted horizontal rims, being thickened and bent to the exterior with an internal corner point. Twelve are identified in this assemblage, of which 11 are plain and one has dentate decoration (Fig. 5.11).

The lower form of this vessel is unknown. All could be part of vessel form IV with the neck missing. One exception stands out. One rim, the only one with decoration, has dentate designs on both the inside and outside surfaces of the rim. The rim could be part of a handle or an added fixture to a pot (Fig. 5.11; catalogue no. 6671).

Each rim is unique and represents a different vessel.

Fabric
These vessels are made up of either ferromagnesium (75%) or calcareous fabrics (Table 5.19). They are distributed throughout the units. The dentate vessel is made from a magnetite fabric.

Size
Orifice diameters range from 14 cm (n=1), 18 cm (n=4), 24 cm (n=1) and 30 cm (n=1). The orifice diameters of five vessels could not be determined (Table 5.20).

Davidson et al. (1990) use this rim form to designate flat bottomed dishes from the Natunuku assemblage, Fiji. No flat dished bases have been associated with this rim type in this assemblage.

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 5.19 Vessel form III - distribution of fabrics per unit. FOH squares D, E and F.
The nature of the pottery assemblages from West New Britain

- Adwe – FOH squares D, E and F

Figure 5.9  Vessel form II. FOH squares D, E and F – Adwe.
Chapter 5

The nature of the pottery assemblages from West New Britain
– Adwe – FOH squares D, E and F

Figure 5.10 Vessel form II. FOH squares D, E and F – Adwe.
The nature of the pottery assemblages from West New Britain - Adwe - FOH squares D, E and F

Figure 5.11 Vessel form III, FOH squares D, E and F - Adwe.
Chapter 5

The nature of the pottery assemblages from West New Britain
- Adwe - FOH squares D, E and F

<table>
<thead>
<tr>
<th>Fabric</th>
<th>0</th>
<th>12</th>
<th>14</th>
<th>18</th>
<th>24</th>
<th>30</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>P</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>CA</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>L</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 5.20 Vessel form III - distribution of orifice diameters (cm) per fabric. FOH squares D, E and F.

Vessel form IV - restricted neck jars with flat horizontal rim

Introduction

Ten vessels were found in this assemblage, eight are plain and two have dentate decoration (Figs 5.12 and 5.13).

Fabric

Like form III vessels, a high percentage (70%) are made of ferromagnesium fabrics (Table 5.21). The two dentate vessels are made of a pyroxene and calcareous fabric respectively.

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>A</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 5.21 Vessel form IV - distribution of fabrics per unit. FOH squares D, E and F.

Size

Most of these vessels, including the two with dentate decoration, are small with orifice diameters less than 16 cm (Table 5.22).

<table>
<thead>
<tr>
<th>Fabric</th>
<th>0</th>
<th>12</th>
<th>14</th>
<th>18</th>
<th>24</th>
<th>26</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>PM</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>CA</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>L</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 5.22 Vessel form IV - distribution of orifice diameters (cm) per fabric. FOH squares D, E and F. (d) denotes dentate decoration.

Vessel form V - carinated jars with outcurving neck

Introduction

Seventy-three vessels were identified in this assemblage of which roughly one third are plain (Figs 5.14 to 5.25). Table 5.23 shows the distribution of decoration for this form of vessel while Table 5.24 shows the distribution of fabrics per unit.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Linear/ notched rim</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Linear/ scalloped rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Incised/ notched rim</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Fingernail/ notched rim</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Fingernail/ scalloped rim</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 5.23 Vessel form V - distribution of decoration per unit. FOH squares D, E and F.

Distribution

As can be seen in Table 5.23 notched vessels (including linear incised decoration) are predominantly found in the upper three units (C to E) while the cut lipped and plain vessels are found in the lower three units (A to C), with the distribution overlapping in unit C. Fingernail impressed vessels with either notched or scalloped rims are widely distributed being found in units A, C and D.
The nature of the pottery assemblages from West New Britain
- Adwe – FOH squares D, E and F

Chapter 5

Figure 5.12 Vessel form IV. FOH squares D, E and F – Adwe.
Chapter 5

The nature of the pottery assemblages from West New Britain
- Adwe – FOH squares D, E and F

Figure 5.13 Vessel form IV. FOH squares D, E and F – Adwe.
The nature of the pottery assemblages from West New Britain
- Adwe - FOH squares D, E and F

Chapter 5

Size

As can be seen in Table 5.25 the sizes of these jars are wide ranging and not standard. This is also seen in the distribution of vessel wall thickness (Table 5.26). Only 45% of all vessels have rim thickness of 5 mm or less at and below the lip. This is in contrast to 92% for similar vessels in FOJ’s assemblage (see Chapter 7).

<table>
<thead>
<tr>
<th>Orifice diameter (cm.)</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>?</td>
<td>19</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>18</td>
<td>4</td>
</tr>
<tr>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td>24</td>
<td>9</td>
</tr>
<tr>
<td>26</td>
<td>3</td>
</tr>
<tr>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>30</td>
<td>6</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
</tr>
<tr>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td>36</td>
<td>2</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
</tr>
</tbody>
</table>

Table 5.25 Vessel form V - distribution of orifice diameters. FOH squares D, E and F.

<table>
<thead>
<tr>
<th>mm</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>3</td>
<td>8</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>9</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>26</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>14</td>
<td>17</td>
<td>12</td>
<td>7</td>
<td>9</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>73</td>
</tr>
</tbody>
</table>

Table 5.26 Vessel form V - cross tabulation of rim thickness at and below the lip. FOH squares D, E and F. (Rows – thickness at lip; columns – thickness below lip).

Fingernail impressed

Six fingernail impressed decorated vessels were identified, two with notched rims, and four with a scalloped rim. The six were made from a variety of fabrics: the two notched rim vessels all from inclusion free and light fabrics respectively, and the four scalloped rim vessels from pyroxene, calcareous, light and inclusion free fabrics respectively.

Cut lip

Cut lipped vessels are not associated with any other form of decoration. The 15 vessels are made from the following fabrics: six calcareous, one light, three magnetite, one pyroxene, three pyroxene/magnetite, and one inclusion free fabric. Calcareous and magnetite fabrics thus make up nine of the 15 vessels (60%). Ferromagnesium fabrics (including magnetite) make up 47% of vessels. This is unlike vessels with linear incised and fingernail impressed decoration where ferromagnesium fabrics make up a small proportion.

Plain notched

Of the 12 plain notched vessels just over half are made from ferromagnesium fabrics: magnetite (n=2), pyroxene (n=4), pyroxene/magnetite (n=1). Calcareous fabrics make up the rest (n=5). This is similar to vessels with lips cut.

Plain scalloped

The two plain scalloped vessels are made from a light and inclusion free fabric respectively.

Plain vessels

All fabrics were used in the manufacture of plain outcurving carinated jars. Of the 24 vessels, seven were made from light, two from inclusion free, three from pyroxene, three from pyroxene/magnetite, four from magnetite and five from calcareous fabrics. As such calcareous and magnetite make up 44%, while ferromagnesium fabrics (including magnetite) make up 40%. Light fabrics make up 28%.

Vessel form VI – everted round bodied pots

Introduction

Thirty-vessels were identified. Twenty-five are plain, the rest have lip modifications – three have notched rims, and two have cut lips (Figs 5.26 to 5.28).

Distribution

Although found in all units, 27 of the 30 pots are found in the bottom three units (Table 5.28). This is similar to the plain and cut lipped form V vessels, but unlike the notched and linear incised vessels.
Figure 5.14 Vessel form V. FOH squares D, E and F – Adwe.
The nature of the pottery assemblages from West New Britain - Adwe - FOH squares D, E and F

Figure 5.15 Vessel form V - plain. FOH squares D, E and F - Adwe.
Chapter 5

The nature of the pottery assemblages from West New Britain
- Adwe – FOH squares D, E and F

Figure 5.18 Vessel form V – undated FOH squares D, E and F – Adwe
The nature of the pottery assemblages from West New Britain
- Adwe – FOH squares D, E and F

Figure 5.17 Dentate sherds. FOH squares D, E and F – Adwe.
Figure 5.18 Vessel form V - dentate. FOH squares D, E and F - Adwe.
The nature of the pottery assemblages from West New Britain
— Adwe — FOH squares D, E and F

Figure 5.19 Dentate vessel. FOH squares D, E and F – Adwe.

Chapter 5

Lapita Interaction

69
The nature of the pottery assemblages from West New Britain
- Adwe – FOH squares D, E and F

Figure 5.20 Vessel form V - dentate. FOH squares D, E and F – Adwe.
Figure 5.21 Vessel form V – fingernail impressed. FOH squares D, E and F – Adwe.
Figure 5.22 Vessel form V – notched rim. FOH squares D, E and F – Adwe.
Figure 5.23 Vessel form V – notched rim. FOH squares D, E and F – Adwe.
Figure 5.24 Vessel form V - linear incised. FOH squares D, E and F – Adwe.
Figure 5.25 Grooved decoration. FOH squares D, E and F – Adwe.
Like the carinated jars, the orifice size of these vessels is wide ranging, between 10 cm to 36 cm (Table 5.27).

**Fabric**

Just over half the vessels are made with a ferromagnesium fabric (57%), while 60% are made with either a calcareous or magnetite fabric (Table 5.28). This is roughly similar to the plain form V vessels and those with notched or cut lip modifications (see above).

A breakdown of vessel VI forms follows:

**Notched**

Only three notched vessels were identified, each having a different fabric: magnetite, calcareous, and pyroxene.

**Cut**

Two cut lipped vessels were identified made from a magnetite and pyroxene fabric respectively.

**Plain**

By far the majority of this vessel form is plain. Magnetite is the single largest group of fabric with eight vessels, followed by seven with calcareous, four with light, three with pyroxene, two with pyroxene/magnetite, and one with inclusion free fabrics.

<table>
<thead>
<tr>
<th>Orifice diameter (cm)</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>?</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td>22</td>
<td>4</td>
</tr>
<tr>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
</tr>
<tr>
<td>36</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

Table 5.27 Vessel form VI - distribution of orifice diameters. FOH squares D, E and F.

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>A</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
<td><strong>5</strong></td>
<td><strong>2</strong></td>
<td><strong>8</strong></td>
<td><strong>4</strong></td>
<td><strong>1</strong></td>
<td><strong>30</strong></td>
</tr>
<tr>
<td>%</td>
<td>33</td>
<td>17</td>
<td>7</td>
<td>27</td>
<td>4</td>
<td>13</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 5.28 Vessel form VI - distribution of fabrics per unit. FOH squares D, E and F.

**Vessel form VII - conical restricted upper vessel form**

**Introduction**

As discussed in Chapter 4 these vessel forms are heuristic devices to structure the vessels into manageable units of comparison. This particular vessel form, unlike the others, covers a range of shapes from possible spouts to restricted pots with their only similarity being the course of the upper vessel profile - conical restricted. Eleven vessels were identified in the assemblage, of which three are plain, three are dentate, four have lip modifications (two cut, two scalloped) and one linear incised. As their number is small it is possible to describe each one individually under the heading decorative technique.

**Dentate**

1. Dentate is found on the neck of a large vessel (orifice diameter 30 cm) from unit D (catalogue no. 121). The dentate motif is incomplete. It is made from a pyroxene fabric and has external thickening to the rim giving it an everted effect. The lip is rounded.

2. A dentate flask from unit C with a small orifice diameter of 12 cm fits into this vessel form (Fig. 5.30; catalogue no. 1373). It is made from a magnetite fabric. The vessel is slightly incurving, with a direct rim, leading to a rounded lip. A complex banding of dentate motifs covers the upper vessel. It is not possible to reconstruct the lower vessel form.

3. The third dentate vessel from unit D could be a spout (Fig. 5.30; catalogue no. 1268). It is made from a calcareous fabric and has a narrow orifice diameter - 6 cm. One identifiable motif (Anson 496) is associated with Western Lapita decoration (to be discussed in detail in Chapter 10).

**Cut lip**

Both vessels with cut lips have raised rims. One from unit B is a large vessel (orifice diameter 36 cm) made from a pyroxene fabric. The rim has a flat lip with sharp edges with the cuts extending to the outside of the vessel (Fig. 5.29; catalogue no. 8706).

The other vessel is smaller (orifice diameter 12 cm) with cuts on the inside lip only. It is made from a calcareous fabric (Fig. 5.30; catalogue no. 447).

**Scalloped Rim**

Both vessels with scalloped rims are from unit A. One is a double rim with modifications on both, the other is a single rim (Fig. 5.29; catalogue nos. 8423 and 6673).

The double rim vessel is made from a light fabric, has a pronounced shoulder and has an orifice diameter of 24 cm. The single rim vessel is made from an inclusion free fabric and has a raised rim. It is smaller than the other vessel with an orifice diameter of 14 cm and is thin walled with a thickness of only 20-3 mm.

**Linear incised**

This vessel is unusual being the only linear incised vessel outside the vessel form V group. It is a thin walled vessel (wall thickness of 4 mm) from unit E and made from a calcareous fabric.

**Plain**

Of the three plain rims one is raised while the other two are direct. The raised rim from unit A has a horizontal flat rim with sharp edges. It is made from a light fabric and has an orifice diameter of 16 cm (Fig. 5.30; catalogue no. 6691).
The nature of the pottery assemblages from West New Britain
- Adwe - FOH squares D, E and F

Figure 5.26 Vessel form VI – plain. FOH squares D, E and F – Adwe.
Chapter 5

The nature of the pottery assemblages from West New Britain
Adwe – FOH squares D, E and F

Figure 5.27 Vessel form VI – plain. FOH squares D, E and F – Adwe.
Figure 5.28 Vessel form VI – plain. FOH squares D, E and F – Adwe.
Chapter 5

The nature of the pottery assemblages from West New Britain
- Adwe - FOH squares D, E and F
Figure 5.30 Vessel form VII. FOH squares D, E and F – Adwe.
Of the two direct rims, both are from unit B. One is made from a light fabric with an orifice diameter of 16 cm with a rounded lip (catalogue no. 7882). The other is made from an inclusion free fabric (catalogue no. 17082 unit B) and has external thickening to the lip. The orifice diameter is not determined.

**Vessel form VIII — stands**

**Introduction**

Eighteen pedestal stands were identified in the assemblage. Eleven have dentate decoration, one has lip notching, one has cut outs, and the rest are plain. Only one stand came from the top unit, the rest are from the bottom three units (Table 5.29). Dentate stamping is always located on the outside of the lip (Figs 5.31 to 5.33).

**Dentate fabric**

Over half of these dentate stands are made from ferromagnesium fabrics, while just over a third are made from calcareous fabrics. None are made from light or inclusion free fabrics (Table 5.29).

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>A</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

**Non-dentate fabrics**

All fabrics except light are used in the production of plain vessels. The notched stand is made from a pyroxene fabric, and the stand with cut-outs only is made from an inclusion free fabric.

**Size**

Dentate stands range in size from 10 cm to 28 cm in diameter (Table 5.30). All have horizontal flattened lips. Non-dentate stands range from 12 cm - 16 cm in diameter. All have horizontal placed lips except two of the plain stands that are asymmetrically placed.

**Bases**

Although not a defined vessel form, a number of flat bases were identified in the assemblage and a discussion is warranted.

Of note is the identification of a base with a base ring identical to one from Ambitle (see Anson 1983: Fig. 3). It is made from a magnetite fabric and has a diameter of 14 cm (Fig. 5.33; catalogue no. 4286/3366/4287). Apart from the base ring, 21 sherds from flat bases were identified. Three of these sherds conjoin with two open orifice form I vessels.

The remaining 18 sherds could not be associated with any other rim or body sherd which could give an indication of upper vessel form. Four of these conjoin together, yielding a total of 15 possible separate bases. Together with the two mentioned above gives a total of 17 possible vessels (excluding the base ring).

Ferromagnesium fabrics make up 15 of the 17 vessel bases (Table 5.31). The one calcareous vessel is from a flat based dish, and is identical in decoration to one illustrated by Kirch (1987: Fig. 4b). Of the bases not associated with rims, only six diameters were ascertained suggesting medium to large sized flat based vessels: 24 cm, 28 cm, 32 cm and 36 cm (X3). This is borne by the thickness of the join between the base and the wall of the side of the vessel. Fourteen of the 17 vessel bases have a join thickness over 12 mm (eight were between 15-19 mm, two were over 22 mm, and four between 12-14 mm), while the remaining three have a join thickness of 9 mm.

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>A</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>17</td>
</tr>
</tbody>
</table>
The nature of the pottery assemblages from West New Britain

Chapter 5

Figure 5.31 Vessel form VIII – dentate. FOH squares D, E and F – Adwe.
Chapter 5
The nature of the pottery assemblages from West New Britain
- Adwe – FOH squares D, E and F

Figure 5.32 Vessel form VIII. FOH squares D, E and F – Adwe.
Figure 5.33 Vessel form VIII and bases. FOH squares D, E and F – Adwe.
Chapter 5  The nature of the pottery assemblages from West New Britain
– Adwe – FOH squares D, E and F

Figure 5.34 Dentate sherds. FOH squares D, E and F – Adwe.
The nature of the pottery assemblages from West New Britain
– Adwe – FOH squares D, E and F

Figure 5.35 Dentate sherds. FOH squares D, E and F – Adwe.
Figure 5.36 Dentate sherds. FOH squares D, E and F – Adwe.
CHAPTER SUMMARY

On the basis of sherd counts alone, dentate stamping is the dominant type of decoration in this assemblage. It declines proportionally from the lowest to the upper units where incised decoration dominates. Fingernail impressed and grooved/channelled decorated sherds, although found in the lower units, increase in number in the top units. When vessel form is examined it is seen that form I bowls and form V jars make up over half of the assemblage. A correlation between decoration and vessel form is identified with dentate decoration predominantly found on vessel form I bowls and VIII stands. It is found on other vessel forms, but in low proportions. Dentate stamping is a specialised component of a larger assemblage in which half of all vessels are plain. Plain ware dominates on all other vessel forms except form V jars. In this vessel form plain ware comprises only a third of these vessels. The rest of the form V jars are decorated with linear incised, fingernail impressed, lip modification and dentate decoration.

An examination of fabric, vessel form and decoration shows some relationships, such as the correlation between ferromagnesium fabrics and dentate vessels. Nearly three quarters of dentate bowls are, for instance, made from ferromagnesium fabrics. This is in contrast to plain bowls where over half were made from calcareous fabrics. Ferromagnesium fabrics make up a substantial proportion of other vessel forms except those form V vessels with either linear incised or fingernail impressed decoration or scalloped lip modifications. In these vessels inclusion free, light and calcareous fabrics are found with the occasional pyroxene fabric. Whether these distinctions are the product of different production centres will be addressed in Chapter 11 after the results of the chemical analysis of ceramic filler and fabrics are presented.

In conclusion, FOH squares D, E and F can be characterised as a form I bowl and form V jar assemblage with plain ware and dentate decoration found on nearly three quarters of all vessels. The relationship between this and the other Arawe assemblages is presented in Chapter 10.
THE NATURE OF THE POTTERY ASSEMBLAGES FROM WEST NEW BRITAIN – ADWE – FOH SQUARES G1 AND G2

SHERD DISTRIBUTION

Introduction
A total of 2883 sherds were excavated from squares G1 and G2. Pottery from layer 1 and 2 came from square G2 only.

The top two layers of deposit yielded little pottery and no decorated sherds. As can be seen in Table 6.1, the bulk of the sherds were in layer 4 – the white unconsolidated sands, deposited under water. Only sherds exhibiting decoration, form or evidence of manufacture were included for further analysis including fabric categorisation. One hundred and fifty-six sherds were entered onto the database. This distribution is shown in Table 6.2.

Decoration
The distribution of decoration on sherds can be seen in Tables 6.3 and 6.4. Based on count and the percentages of decoration on sherds alone, the following observations are made. Layer 3 contained few sherds and fewer decorated pieces. Of the eight decorated sherds found, two have grooved/channelled decoration, while only one sherd each had stamped impressed, linear incised, notching on the rim, and appliqué decoration. No dentate was found.

In layer 4 dentate and linear incision are the most abundant forms of decoration. Fingernail impression was found on one sherd, while grooved/channelled was found on four. Twelve rim sherds had notching. It is interesting to note that the percentage of decorated sherds in layer 4 is 3%. This is similar to unit E from nearby squares D, E and F (units A, B, C and D were between 6% and 5%). Unit E from squares D, E and F is later than the other units. It will be argued in Chapter 10 that the assemblage from squares G is also later than units A, B, C and D from squares D, E and F.

To get away from pure sherd counts, a closer look at the relationship between vessel form and decoration will be given. Layer 3 and 4 will be grouped together in the following analyses.

VESSEL FORM

This section describes firstly, the overall distribution of vessels and their decoration, and secondly, each vessel

<table>
<thead>
<tr>
<th>Layer</th>
<th>G1 No.</th>
<th>G1 Wgt (gm)</th>
<th>G2 No.</th>
<th>G2 Wgt (gm)</th>
<th>Total No.</th>
<th>Total Wgt (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>38</td>
<td>18</td>
<td>38</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>49</td>
<td>25</td>
<td>49</td>
</tr>
<tr>
<td>3</td>
<td>95</td>
<td>147</td>
<td>66</td>
<td>165</td>
<td>161</td>
<td>312</td>
</tr>
<tr>
<td>4</td>
<td>1362</td>
<td>5779</td>
<td>1317</td>
<td>5353</td>
<td>2679</td>
<td>11132</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sherd type</th>
<th>Layer 1</th>
<th>Layer 3</th>
<th>Layer 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rims</td>
<td>0</td>
<td>1</td>
<td>54</td>
<td>55</td>
</tr>
<tr>
<td>Neck</td>
<td>0</td>
<td>2</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>Carination/shoulder</td>
<td>0</td>
<td>0</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Body</td>
<td>1</td>
<td>6</td>
<td>41</td>
<td>48</td>
</tr>
<tr>
<td>Base</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Pol stand/legs</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>10</td>
<td>145</td>
<td>156</td>
</tr>
</tbody>
</table>
Chapter 6  The nature of the pottery assemblages from West New Britain

- Adwe – FOH squares G1 and G2

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>Layer 3</th>
<th>Layer 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dentate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dentate</td>
<td>0</td>
<td>24(27%)</td>
<td>24</td>
</tr>
<tr>
<td>Dentate stamped/ incised</td>
<td>0</td>
<td>3(3%)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Incised</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear incised</td>
<td>1(12%)</td>
<td>21(24%)</td>
<td>22</td>
</tr>
<tr>
<td>Linear incised with notched rim</td>
<td>0</td>
<td>2(2%)</td>
<td>2</td>
</tr>
<tr>
<td>Incised – miscellaneous</td>
<td>2(25%)</td>
<td>14(16%)</td>
<td>16</td>
</tr>
<tr>
<td>Incised with cut or notched lip</td>
<td>1(12%)</td>
<td>10(11%)</td>
<td>11</td>
</tr>
<tr>
<td><strong>Impressed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fingernail impressed</td>
<td>0</td>
<td>1(1%)</td>
<td>1</td>
</tr>
<tr>
<td>Stamped impressed and incised</td>
<td>1(12%)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Other decoration</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appliqué with notching</td>
<td>1(12%)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Grooved/ channelled</td>
<td>2(25%)</td>
<td>3(3%)</td>
<td>5</td>
</tr>
<tr>
<td>Grooved/ channelled/notched rim</td>
<td>0</td>
<td>1(1%)</td>
<td>1</td>
</tr>
<tr>
<td>Excised</td>
<td>0</td>
<td>3(3%)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Lip modification only</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notched rim</td>
<td>0</td>
<td>7(8%)</td>
<td>7</td>
</tr>
<tr>
<td>Total decorated</td>
<td>8</td>
<td>89</td>
<td>97</td>
</tr>
<tr>
<td>Total plain</td>
<td>153</td>
<td>2590</td>
<td>2743</td>
</tr>
<tr>
<td>Total square G1 and G2</td>
<td>161</td>
<td>2679</td>
<td>2840</td>
</tr>
<tr>
<td>% Decorated</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>% Plain</td>
<td>95</td>
<td>97</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.3  Distribution of sherds by number per decoration and layer. FOH squares G1/G2. (% of decorated sherds per decorative type is in brackets).

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>Layer 3</th>
<th>Layer 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Dentate stamped/ incised</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Linear incision</td>
<td>12</td>
<td>26</td>
</tr>
<tr>
<td>Notched rim</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Cut lip</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Grooved/ channelled</td>
<td>25</td>
<td>4</td>
</tr>
<tr>
<td>Fingernail impressed</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Appliqué</td>
<td>12</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 6.4  Summary of the distribution of decoration per layer – % of decorated sherds per decoration type. FOH squares G1/G2.

<table>
<thead>
<tr>
<th>Vessel form</th>
<th>Rim</th>
<th>Neck</th>
<th>Carination</th>
<th>Body</th>
<th>Base</th>
<th>Stand/legs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>II</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>III</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>IV</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>V</td>
<td>33</td>
<td>20</td>
<td>14</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>71</td>
</tr>
<tr>
<td>VI</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>VII</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>VIII</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Legs</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Vessel ?</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>46</td>
<td>0</td>
<td>0</td>
<td>63</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
<td>26</td>
<td>17</td>
<td>47</td>
<td>5</td>
<td>5</td>
<td>155</td>
</tr>
</tbody>
</table>

Table 6.5  Distribution of vessels per class of sherd. FOH squares G1/G2.

form in more detail. Vessel legs were identified in the assemblage and these are categorised separately.

Only sherds from layer 3 and 4 are discussed in the following section \((n=155)\). Eighty-two percent of all rims were attributable to an upper vessel form. Vessel V formed 63% of all rims (Table 6.5).

Table 6.6 outlines the distribution of vessel forms. Vessel form V has been divided in two groups. One is made up of carinated jars, the other \((n=1)\) is probably a narrow spout vessel with its lower form unknown (see discussion of this vessel form below).

Major Points

This is a jar and pot assemblage. Over 60% \((32\) of the \(51\) vessels) are form V vessels. All except one of these vessels are carinated jars with outcurving rims. Form VI vessels make up 18% \((9\) vessels). Only three stands \((form VIII)\) and three open bowls \((form I)\) are found, with one a piece of the other vessel forms. The only other site which has such a large proportion of carinated jars in their assemblage is Apalo layer B, and unit D of FOH squares D, E and F, both late in the sequence (see Chapter 7).

Lip modification is only found on form V vessels. Grooved/channelled decoration is found on two vessels, one a form II, the other a spout (Table 6.7).

The assemblage from squares G1/G2 has less variation, and correlates with the upper units from squares D, E and F. Inter-site comparisons will be discussed in full in Chapter 10, however, suffice to say that the dentate motifs in squares G1/G2 are Western in nature and the primary fabrics are pyroxene followed by light and calcareous. Compared with the assemblage from squares D, E and F, there are few dentate vessels. Only one dentate form I vessel, two form V vessels, one form VIII, and one form III vessel, were identified from rims alone. The base of a flat dish was found, boosting the number of dentate form I vessels to two, while dentate decoration was also found on a neck/body sherd from a form VI vessel, something not found in the assemblage from squares D, E and F. Plain ware, on the other hand, makes up 37% of all vessels, being made up mostly of form V and VI vessels. The rest of this section deals with vessel form, decoration and fabric in more detail.
The nature of the pottery assemblages from West New Britain
- Adwe – FOH squares G1 and G2

Chapter 6

<table>
<thead>
<tr>
<th>Vessel form</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>II</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>III</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>IV</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>V</td>
<td>32</td>
<td>63</td>
</tr>
<tr>
<td>VI</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>VII</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>VIII</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.6 Distribution of vessel form. FOH squares G1/G2.

<table>
<thead>
<tr>
<th>Vessel form</th>
<th>Dentate</th>
<th>Plain</th>
<th>Notched</th>
<th>Notched/ incised</th>
<th>Cut lip</th>
<th>Grooved lip</th>
<th>Cut out</th>
<th>Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>II</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>III</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IV</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>V</td>
<td>2</td>
<td>9</td>
<td>7</td>
<td>5</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>VI</td>
<td>1</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>VII</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>VIII</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>19</td>
<td>7</td>
<td>5</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>%</td>
<td>16</td>
<td>37</td>
<td>14</td>
<td>10</td>
<td>14</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 6.7 Distribution of decoration per vessel form. FOH squares G1/G2.

Vessel form I – bowls

Only three sherds are attributable to this vessel form, two rims and one base. Both rims are part of rounded vessels, while the base is part of a flat dish. One vessel is dentate decorated and made from a light fabric (Fig. 6.1; catalogue no. 11914). Unlike similar vessels from FOH squares D, E and F, it had no grooved lip and has an asymmetric positioning of the lip. The orifice diameter of 12 cm and rim profile suggests a small shallow cup. The other vessel (catalogue no. 11915) is plain and is made from a magnetite fabric. It has a horizontally positioned lip. From the rim profile it is deeper than the decorated piece, but no orifice diameter is available. Both rims are 10 mm thick at the lip, and 8 mm thick 2 cm below the lip.

The base sherd is part of a flat dish and has dentate decoration on the walls. It is made from a pyroxene fabric (Fig. 6.1; catalogue no. 10274).

Vessel form II – vertical walled vessel (upper body)

Only one vessel was identified. It is a deep unrestricted vessel with grooved/channelled decoration (Fig. 6.2; catalogue no. 11730) with an orifice diameter of 24 cm. It is made from a magnetite fabric.

The decoration consists of thin horizontal bands of deep 'U' shape incision or excision that has created what looks like banded decoration. This type of decoration is not seen in the other assemblages.

Vessel form III

Only one vessel was identified. The profile of the rim is pendant in shape and is probably from an open orifice bowl with either a flat or rounded base. It has an orifice diameter of 18 cm and is made from a light fabric. Dentate motifs are found on both the exterior of the vessel just below the rim (motif 336) and on the rim itself (496) (Fig. 6.1; catalogue no. 10271).

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>N</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rims</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dentate</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Linear/ notched</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Incised/ notched</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Notched</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>23</td>
</tr>
<tr>
<td>Cut lip</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>26</td>
</tr>
<tr>
<td>Grooved lip</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total dec</td>
<td>8</td>
<td>6</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>23</td>
<td>74</td>
</tr>
<tr>
<td>Plain</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>8</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>8</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>31</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Neck sherd nos.</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Incised</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Plain</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.8 Vessel form V (jars) – distribution of fabrics per decoration type. FOH squares G1/G2.
Chapter 6

The nature of the pottery assemblages from West New Britain
- Adwe - FOH squares G1 and G2

Figure 6.1 Vessel forms I, III, IV and VII. FOH square G - Adwe.
The nature of the pottery assemblages from West New Britain
- Adwe – FOH squares G1 and G2

Chapter 6
Vessel form IV - restricted neck jas
with flat horizontal rim

Only one vessel was identified. It is a plain restricted orifice jar with an orifice diameter of only 12 cm. It is a thin sherd (the body is 3 mm thick) and is made from an inclusion free fabric (Fig. 6.1; catalogue no. 10970).

Vessel form V - carinated jas with outcurving neck

Thirty-two vessels were identified, 31 are carinated jars, two sets of rims belonging to the same vessel. Of the 31 vessels, 8 (26%) are plain.

Lip modification is the primary form of decoration making up 68% of all vessels. Lip modification is in the form of notching (n=12), cutting (n=8) and grooving (n=1). The only vessels without lip modification are either totally plain (n=8) or are from dentate sherds (n=2). Five vessels have incision, two have linear incision, and three have miscellaneous incision. Examples of linear incised sherds from this assemblage are illustrated in Figures 6.3 and 6.4. Examples of notched and plain form V vessels are illustrated in Figures 6.4 and 6.5.

All except one vessel have asymmetrically positioned lips, the remainder having a horizontal flat lip. Both dentate vessels belong to the former category. The first vessel has dentate decoration on the outside of the rim in the form of three bands of motif (Fig. 6.6; catalogue no. 10981). It is made from a pyroxene fabric and has an orifice diameter of 16 cm. The second is decorated on the inside of the rim with a band of motif 496 (Fig. 6.6; catalogue no. 10981). It is made from a light fabric and has a narrow orifice of 14 cm. It will be argued in Chapter 10 that this motif is only associated with Western Lapita decorated pottery.

Size

The orifice diameters of 15 vessels were obtainable and only three diameters were available from outcurving necks (Table 6.9):

<table>
<thead>
<tr>
<th>Orifice Diameter (cm)</th>
<th>Rims</th>
<th>No.</th>
<th>Decoration type</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1</td>
<td>notched</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>cut lip</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>4</td>
<td>grooved (n=1), dentate (n=1), plain (n=2)</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>3</td>
<td>cut lip (n=1), dentate (n=1), plain (n=2)</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>cut lip</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>plain</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>4</td>
<td>notched (n=1), notched/ incised (n=1), notched/ linear (n=1), plain (n=1).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Orifice Diameter (cm)</th>
<th>Necks</th>
<th>No.</th>
<th>Decoration type</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>1</td>
<td>plain</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>1</td>
<td>linear</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>1</td>
<td>linear</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.9 Vessel form V (jars) – distribution of orifice diameters and decoration. FOH squares G1/G2.

Table 6.10 Vessel form V (jars) – rim thickness. FOH squares G1/G2

<table>
<thead>
<tr>
<th>Thickness at lip (mm)</th>
<th>Thickness below lip (mm)</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

This form of vessel exhibits size variation from small mouthed jars to larger restricted necked jars. The few linear incised vessels are associated with wide mouthed jars (Fig. 6.4). Both dentate rims are from smaller vessels.

Despite such size variation, vessel wall thickness is uniform with 25 of the 31 vessels (81%) having a thickness of between 6 mm and 4 mm at the lip, and only two vessels having more than a 2 mm difference between the wall thickness at the lip and below the lip (Table 6.10). No vessels are thinner than 4 mm at the lip, unlike one third of similar vessels from FOJ which are 3 mm or less thick at the lip (see Chapter 7).

Necks and carinations

Twenty necks were identified as coming from this vessel form. Fifteen are incised, 14 with linear incision and one with a thick line of incision. (See Table 6.8 for a break-up of fabrics).

Of the 17 carinated sherds in the assemblage, 14 could be attributed to this vessel form. Seven have linear incised decoration, two have dentate and five are plain. All carinations form the widest part of the lower vessel. One of the carinated sherds has cross hachuring linear incision similar to that found by Poulsen from Tonga (his D22 motif) (Poulsen 1987: Fig. 49; Fig. 6.3; catalogue no.11933). All seven linear incised carinated sherds are made from pyroxene fabrics. Variation in vessel size is seen in the diameter measurements that range from 40 cm to 22 cm. The two dentate carinations are made from pyroxene and magnetite fabrics.

Possible spouts

One possible spout was identified (Fig. 6.2; catalogue no. 10132). It has a narrow orifice at 6 cm and is made from a light fabric. It has grooved/channelled decoration similar to the one form II vessel.

Vessel form VI - everted round bodied pots

Nine vessels were identified, two from neck/body sherds. Only one vessel was decorated. It has
The nature of the pottery assemblages from West New Britain
- Adwe – FOH squares G1 and G2

Figure 6.3 Linear incised sherds. FOH square G – Adwe.
Chapter 6

The nature of the pottery assemblages from West New Britain – Adwe – FOH squares G1 and G2

Figure 6.4 Vessel form V. FOH square G – Adwe.
The nature of the pottery assemblages from West New Britain
-Awae - FOH squares G1 and G2

Figure 6.5  Vessel form V. FOH square G - Awae.
The nature of the pottery assemblages from West New Britain
- Adwe - FOH squares G1 and G2

Figure 6.6  Vessel form V. FOH square G – Adwe.
The nature of the pottery assemblages from West New Britain
- Adwe - FOH squares G1 and G2

Chapter 6

plain stamped and dentate motifs (Fig. 6.7; catalogue no. 11726).

A number of fabrics were used to produce these vessels (Table 6.11).

The size of these vessels vary with orifice diameters between 12 cm to 30 cm (Table 6.12).

This variation is also exhibited by the variety in the thickness of the vessel walls (Table 6.13).

Table 6.11 Vessel form VI - distribution of fabrics. FOH squares G1/G2.

<table>
<thead>
<tr>
<th>Fabric</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 6.12 Vessel form VI - distribution of orifice diameters per fabric. FOH squares G1/G2.

<table>
<thead>
<tr>
<th>Orifice Diameter (cm)</th>
<th>M</th>
<th>P</th>
<th>CA</th>
<th>L</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>?</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>30</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 6.13 Vessel form VI - distribution of rim thickness. FOH squares G1/G2.

<table>
<thead>
<tr>
<th>Thickness at rim (mm)</th>
<th>Thickness at c.p. (mm)</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

Vessel form VII - conical restricted upper vessel form

Only one vessel was identified. It is a shoulder/carinated sherd made from a light fabric. It is an unusual sherd in that the carination is not the widest part of the lower vessel, but rather forms the shoulder of what could be a large flask (Fig. 6.1; catalogue no. 11739). The diameter at the carination is 24 cm, and at the neck it is 22 cm. It has loosely open structured dentate decoration reminiscent of decoration on sherds from Kreslo (see Chapters 9 and 10). Similar sherds from Watom and Ambitle are described by Anson as beakers or lids (Anson 1983: Fig. II/13; Fig. III/8). A similar sherd is known from Boduna Island (now housed at Walindi plantation).

Vessel form VIII - stands

Three stands were identified from the assemblage. One stand has a row of dentate motif 496 along the exterior of the rim. It is a small stand with an orifice diameter of only 10 cm and is made from a calcareous fabric (Fig. 6.8; catalogue no. 11656).

The other two stands have cut-outs above the rim. One is made from a light fabric (catalogue no. 10595) the other from a calcareous fabric (Fig. 6.8; catalogue no. 11911).

Two legs were also identified in the assemblage (Fig. 6.8; catalogue nos 10131 and 10591). Both are made from a magnetite fabric, and are hollow. They are similar in form to legs excavated from Leang Buidane, Talaul (Bellwood 1985:306) and also with legs recovered from Futuna (FU-11 Kirch 1976: Fig. 6).

CHAPTER SUMMARY

On the basis of sherd counts alone, dentate and linear incised are the most abundant types of decoration found in this assemblage. Fingernail impressed, grooved/channelled and appliqué decoration are also found, albeit in small numbers. When vessel form is examined it is seen that form V jars make up over 60% of all vessels. Form VI globular pots make up the next most numerous vessel form comprising 18% of all vessels. Only three form I bowls and three form VIII stands are identified. A correlation between vessel form and decoration is identified with incision and lip modification found only on the form V jars. Dentate, on the other hand, is found on all but two of the vessel forms, albeit in small numbers. Plain ware comprises 37% of all vessels.

An examination of fabrics shows a variety were used to produce all vessel forms. Fifty percent were made from ferromagnesium fabrics, 16% from calcareous, 22% from light and 12% from inclusion free fabrics. No one fabric dominates in the dentate vessels, with four made from light fabrics, one from a calcareous fabric and three from ferromagnesium fabrics. All three form VIII stands, however, were made from non-ferromagnesium fabrics. Of the form V jars, ferromagnesium fabrics are found in 59% of vessels, with the rest made up of either calcareous, light or inclusion free fabrics.

In conclusion, FOH square G can be characterised as predominantly a vessel form V jar assemblage. The relationship between this and the other Arawe assemblages is presented in Chapter 10.
The nature of the pottery assemblages from West New Britain – Adwe – FOH squares G1 and G2

Figure 6.7 Vessel form VI. FOH square G – Adwe.
Figure 6.8  Vessel form VIII and legs. FOH square G – Adwe.
SHERD DISTRIBUTION

Introduction
A total of 6998 sherds weighing 13,938.8 g were excavated from Squares 01, 02, 03 and 04 (Table 7.1).

<table>
<thead>
<tr>
<th>Unit</th>
<th>No.</th>
<th>%</th>
<th>Wgt (gm)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>827</td>
<td>12</td>
<td>1444</td>
<td>10</td>
</tr>
<tr>
<td>B</td>
<td>1828</td>
<td>28</td>
<td>2685</td>
<td>24</td>
</tr>
<tr>
<td>C</td>
<td>3961</td>
<td>57</td>
<td>8664</td>
<td>62</td>
</tr>
<tr>
<td>D</td>
<td>382</td>
<td>6</td>
<td>546</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>6998</td>
<td></td>
<td>13939</td>
<td></td>
</tr>
</tbody>
</table>

Table 7.1 Distribution of sherds per unit. FOJ.

Only sherds exhibiting decoration, form or evidence of manufacture are included for further analysis including fabric categorisation. As such 638 sherds were entered onto the database. Table 7.2 shows their distribution.

<table>
<thead>
<tr>
<th>Unit</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>37</td>
<td>157</td>
<td>122</td>
<td>12</td>
<td>328</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Pot stand</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>263</td>
<td>264</td>
<td>26</td>
<td>638</td>
</tr>
</tbody>
</table>

Table 7.2 Sherds on the database per unit. FOJ.

Of note is the decrease of sherds from units C to B, 3961 to 1828 (8664 g to 3284.8 g). Such a decrease is also seen in the weight of sherds on the database, i.e. those primarily having decoration or showing form (1947.2 g to 1491 g). Yet the number of these latter sherds remains roughly the same, from 264 to 263, suggesting size differences. This could be suggestive of vessel (including size and shape) differences between the two units that will be explored below. But first some general observations on decoration.

Decoration
Changes in decoration can be seen in the following three tables. Table 7.3 shows the distribution of all decorated sherds and their associations. Each sherd is counted only once. Tables 7.4 and 7.5 are a summary of shared occurrences of each decorative type. Thus a dentate rim with a notched lip is counted in both the dentate and notched categories.

Based on count and the percentages of decoration on sherds alone, the following observations are made.

First, incision (both linear and undiagnostic incision) forms the dominant decorative technique, with rim notching.

Secondly, dentate forms over 20% of decoration within each unit except unit A where it is 9%.

Thirdly, appliqué and fingernail impression are absent in the basal unit, and increase in percentage to unit A. Shell impression and grooving are only found in unit A.

In short, unlike Adwe (FOH squares D, E and F) and Paligmete (to be discussed in the next chapter), Apalo’s assemblage is dominated by incision and rim notching.
Chapter 7

The nature of the pottery assemblages from West New Britain - Apalo - FOJ squares 01-04

Table 7.3 Distribution of sherds by number per decoration and unit. FOJ.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>3</td>
<td>32</td>
<td>27</td>
<td>5</td>
<td>67</td>
</tr>
<tr>
<td>Dentate with incised</td>
<td>2</td>
<td>10</td>
<td>3</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Dentate with cut lip</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Dentate with cut lip and incised</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Dentate with cut outs</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Dentate with incised and cut outs</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Dentate with single tooth impressed</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Dentate with single tooth impressed and incised</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Dentate with incised and cut outs</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Dentate with single tooth impressed and incised</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Incised

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear incised</td>
<td>9</td>
<td>88</td>
<td>49</td>
<td>4</td>
<td>150</td>
</tr>
<tr>
<td>Linear incised with applique</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Linear incised with notched rim</td>
<td>1</td>
<td>13</td>
<td>6</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Linear incised with scalloped rim</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Miscellaneous incised</td>
<td>13</td>
<td>52</td>
<td>41</td>
<td>2</td>
<td>108</td>
</tr>
<tr>
<td>Incised with notched rim</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Incised with fingernail impressed</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Incised with single tooth impressed</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Impressed

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stamped impressed</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Single tooth impressed</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Shell impressed</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Fingernail impressed</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Fingernail impressed with cut lip</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Other decoration

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applique</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Applique with notching</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Applique with scalloped rim</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Cut outs</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Grooved</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Lip modification only

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notched</td>
<td>9</td>
<td>14</td>
<td>30</td>
<td>2</td>
<td>55</td>
</tr>
<tr>
<td>Cut</td>
<td>0</td>
<td>3</td>
<td>11</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Scalloped</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

Total decorated

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Of total assemblage</td>
<td>54</td>
<td>221</td>
<td>193</td>
<td>14</td>
<td>482</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>12</td>
<td>5</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>% Of total assemblage</td>
<td>773</td>
<td>1607</td>
<td>3768</td>
<td>368</td>
<td>6516</td>
</tr>
<tr>
<td>Total</td>
<td>93</td>
<td>88</td>
<td>95</td>
<td>96</td>
<td>93</td>
</tr>
<tr>
<td>Total</td>
<td>827</td>
<td>1828</td>
<td>3961</td>
<td>382</td>
<td>6998</td>
</tr>
</tbody>
</table>

Table 7.4 Summary of the distribution of decoration per unit - number of times a type of decoration occurs. FOJ.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>5</td>
<td>45</td>
<td>50</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Linear incised</td>
<td>11</td>
<td>102</td>
<td>55</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Misc. Incised</td>
<td>13</td>
<td>53</td>
<td>43</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Notched rim</td>
<td>11</td>
<td>28</td>
<td>37</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Scalloped rim</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Cut lip</td>
<td>1</td>
<td>3</td>
<td>15</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Grooved</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Fingernail impressed</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Applique</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Shell impressed</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 7.5 Summary of the distribution of decoration per unit - % of decorated sherds per decoration type. FOJ.

The distribution of vessel forms in each unit can be seen in Tables 7.6 and 7.7.

Major points

1. Vessel form V make up half the recognisable vessel forms. Of the 51 form V vessels all except three are from jars. The exceptions are probably parts of spouts (see below).

2. Vessel form II make up 19% of all vessels. These comprise open orifice vertical walled vessels. Seventeen of these vessels are found in unit C. The other units have only one each.

3. Vessel form I comprise only 14% of all vessels, and decrease in number from units C to A.

4. Only two vessel form VIII stands were identified.

5. Of note is the presence of incurving bowls. As they are incurving, they have been classified as vessel form VII upper body form. Only five were identified. They are not found in the other sites and are described in detail below.

5. Of importance is the near absence of vessel form VI. Only one vessel was tentatively identified.

Decoration per vessel form is seen in Table 7.8.

VESSSEL FORM

This section describes first, the overall distribution of vessels and their decoration, and secondly, each vessel form in more detail.
Introduction

Fourteen form I vessels were identified in the assemblage of which five have dentate decoration, one with cuts on the lip (Fig. 7.1). Lip modification is also found on six other vessels, and incision on another. Two vessels are plain.

Tables 7.6 and 7.7 show the distribution of this vessel form per unit. Although there is a decrease in bowls from units C (n=9) to B (n=3) to A (n=2), their relative proportion to the other vessel classes suggests a decrease in bowls (70%), with 21 (41%) having linear incision. Linear incision is not associated with any other vessel form here. Finger-nail impression is also found only on this vessel form.

Vessel form I – bowls

Table 7.6 shows the distribution of vessel form (%). One of the five form I dentate vessels is collared, three from unit B, one from unit A. Notching occurs on five vessels.

Size

Only six of the vessels were large enough to ascertain orifice diameter. Table 7.9 presents the distribution of orifice diameters.

Thickness

Table 7.10 presents the distribution of rim thickness of form I vessels. The lack of uniformity in vessel thickness is a reflection of the diversity of bowl forms here, from collared vessels to double scalloped rims.

Fabrics

Table 7.11 presents the distribution of fabrics per unit. Differences are seen with vessels made from ferromagnesium fabrics found in unit C, and non-ferromagnesium fabrics found in the top two units.

Vessel form II – vertical walled vessel (upper body)

Twenty vessels were identified. Based on their upper vessel form they seem to be from deep vessels (Figs 7.2 and 7.3). Seventeen of the vessels are from unit C, with only one each in units A, B and D (Table 7.12).

Decoration

Table 7.12 presents the distribution of decoration by unit. This vessel form is predominantly made up of plain ware (70%). Of the six decorated sherds, two are dentate, three have notched rims, all from unit C, and one has a scalloped rim, the only vessel from unit A.

The dentate vessels are unusual being the only examples of dentate found on this vessel form in the entire Arawe assemblage. The motif on one vessel is incomplete, the other has motif 495, characterised as Western Lapita (see Chapter 10).

Size and thickness

Table 7.13 presents the distribution of orifice diameters which were determined for 15 of the vessels.

The majority of vessels are narrow mouthed, with 12 at 16 cm or less (80% of those measured) and only one of these is collared with a flat horizontal rim, while three occur on rims asymmetrically thickened to the interior. Scalloping of the rim occurs on only one example, a double rim from unit A, the topmost pottery bearing unit. Scalloping on this vessel form is unusual.
Chapter 7

The nature of the pottery assemblages from West New Britain
— Apalo — FOJ squares 01-04

Orifice diameter (cm) | No.
--- | ---
12 | 2
14 | 3
16 | 1

Table 7.9 Vessel form I - distribution of orifice diameters. FOJ.

<table>
<thead>
<tr>
<th>mm</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 7.10 Vessel form I - cross tabulation of rim thickness at and below the lip. FOJ. (Rows - thickness below the lip; columns - thickness at the lip).

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 7.11 Vessel form I - distribution of fabrics per unit. FOJ.

<table>
<thead>
<tr>
<th>Orifice diameters (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

Table 7.13 Vessel form II - distribution of orifice diameters. FOJ.

<table>
<thead>
<tr>
<th>mm</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 7.14 Vessel form II - cross tabulation of rim thickness at and below the lip. FOJ. (Rows - thickness below the lip; column - thickness at the lip).

One over 30 cm. Most vessels are thin walled (Table 7.14). Eighteen of the 20 vessels have wall thickness of 7 mm or less at the lip, and with the exception of one sherd, have 2 mm and less variation below the lip.

Fabric distribution

The majority of form II vessels were made from ferromagnesium fabrics (magnetite, pyroxene and pyroxene/magnetite), although calcareous fabrics are common and make up 50% of the plain vessel component (Table 7.15). Only one vessel was made using a light fabric. It was one of the two with dentate decoration. The other was made with a pyroxene/magnetite fabric.

Vessel form III

Six vessels were identified, all plain. It is uncertain if these vessels are from open bowls or dishes, or the rims from restricted jars. Only one vessel was made from a ferromagnesium fabric (Table 7.16).

All are narrow orifice vessels, the largest being 16 cm (Table 7.17 and Fig. 7.4).

Vessel form IV - restricted neck jars with flat horizontal rim

Only two vessels were identified, both narrow orifice jars (10 cm) from unit C and both having dentate decoration (Fig. 7.10). The dentate in both cases is found on the horizontally flattened part of the rim. One vessel (catalogue no. 7003) has motif 53, a motif associated with Western Lapita assemblages (see Chapter 10), and incised cuts on the lip. This is made from a calcareous fabric. The other vessel (catalogue no. 856), is made from a light fabric and has a band of motif 237.

Vessel form V - carinated jars with outcurving neck

Fifty-one vessels were assigned to this vessel form: 48 are carinated jars, three are probable spouts. The latter will be discussed separately.

Carinated jars

Distribution

Form V Jars make up just under half of all vessels in this assemblage. They increase from 19 in unit C to 22 in B, and then decrease to six in the top unit A (Table 7.18). By percentage of vessels within each unit, they make up 33% of all vessels in unit C, then increase to 65% of all vessels in unit B, and decrease to form just over half of all vessels in unit A (54%).

Decoration

Table 7.18 outlines the distribution of decoration in this vessel form. The majority of vessels are decorated either with linear incision and lip modification (41%) or lip
The nature of the pottery assemblages from West New Britain
- Apalo – FOJ squares 01-04

Figure 7.1 Vessel form I FOJ – Apalo.

Lapita Interaction
Figure 7.2  Vessel form II. FOJ – Apalo.
The nature of the pottery assemblages from West New Britain
– Apalo – FOJ squares 01-04

Figure 7.3  Vessel form II. FOJ - Apalo.
The nature of the pottery assemblages from West New Britain
– Apalo – FOJ squares 01-04

Figure 7.4  Vessel form III. FOJ – Apalo.
The nature of the pottery assemblages from West New Britain

Chapter 7

Modification only (35%). Only one example of dentate, fingernail impressed and miscellaneous incision is found. The rest (17%) are plain. See Figures 7.5 to 7.9 for examples of this vessel form and linear incised sherds.

The single dentate vessel is found in unit C and is decorated with motif 496. This motif is Western Lapita in nature, and is found on other Vessel V jars from FOH (Adwe) squares D, E and F, FNY (Paligmete), and FNT (Kreslo) – see Chapter 10.

Size

Orifice diameters were ascertained for 33 vessels (Table 7.19). Of these, 14 have linear incision and notching, eleven have notched rims only, one is fingernail impressed and seven are plain.

By and large these jars are small and uniform in size. Half have an orifice diameter between 14 cm and 16 cm, and 87% have an orifice diameter at 20 cm or below.

Standardisation is also evident in the thickness of vessel walls and rims. Table 7.20 presents a cross tabulation of wall thickness. These rims are uniformly thin, with 92% (44 of the 48 vessels) 5 mm or less at and below the lip. Over a third are less than 3 mm at the lip. Only four vessels have a lip thickness greater than 5 mm. This suggests a finely made thin ware.

Fabrics

Vessels made from ferromagnesium fabrics make up only about a third of the assemblage. Nearly half the vessels are made from light and inclusion free fabrics (Table 7.21). When broken down by decoration some possible distinctions can be made. First, linear incised vessels are made from mostly non-ferromagnesium fabrics. Only three of the 19 vessels were made with pyroxene fabrics. Secondly, plain vessels are made from either ferromagnesium fabrics which are only found in the bottom two units, or calcareous and inclusion free fabrics which are found only in the top two units. No vessels were made using a light fabric. Thirdly, notched rim vessels are made from all fabrics.

Plain spouts

Three spouts were identified, all from unit B. Two were made with a light fabric and one from an inclusion free fabric (Fig. 7.10; catalogue no. 4046). Vessel form VI - everted round bodied pots

One plain vessel was identified. It came from unit A and is made from an inclusion free fabric (Fig. 7.9; catalogue no. 161).

Vessel form VII - conical restricted upper vessel form

This assemblage contains five incurving bowls not found elsewhere. They have been put into this vessel form as their upper vessel form is incurving. Two flasks are also found and these will be discussed separately.

---

Table 7.16 Vessel form III - distribution of fabrics/unit. FOJ.

<table>
<thead>
<tr>
<th>Unit</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 7.17 Vessel form III - distribution of orifice diameters per unit. FOJ.

<table>
<thead>
<tr>
<th>Unit</th>
<th>12 cm</th>
<th>14 cm</th>
<th>16 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 7.18 Vessel form V (jars) - distribution of decoration per unit. FOJ.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Linear incised/n</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>0</td>
<td>19</td>
<td>39</td>
</tr>
<tr>
<td>Notched rim</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Linear incised/scalloped rim</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Incision (misc.)</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Fingernail impressed</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Notched rim</td>
<td>1</td>
<td>7</td>
<td>8</td>
<td>0</td>
<td>16</td>
<td>33</td>
</tr>
<tr>
<td>Cut lip</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Plain</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>22</td>
<td>19</td>
<td>1</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>12</td>
<td>45</td>
<td>39</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7.20 Vessel form V (jars) - cross tabulation of rim thickness at and below the lip. FOJ. (Rows - thickness at the lip; columns - thickness below the lip).

<table>
<thead>
<tr>
<th>mm</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>7</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>1</td>
<td>11</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>9</td>
<td>24</td>
<td>9</td>
<td>1</td>
<td>2</td>
<td>48</td>
</tr>
</tbody>
</table>

Table 7.19 Vessel form V (jars) - orifice diameter per decoration type. FOJ.

<table>
<thead>
<tr>
<th>Orifice Diameter (cm)</th>
<th>Notched</th>
<th>Notched and incised</th>
<th>Fingernail</th>
<th>Plain</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>14</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>16</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>9</td>
<td>27</td>
</tr>
<tr>
<td>18</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>20</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>22</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>24</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>&gt;30</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>14</td>
<td>1</td>
<td>7</td>
<td>33</td>
<td></td>
</tr>
</tbody>
</table>
Figure 7.5 Vessel form V – linear incised. FOJ – Apalo.
The nature of the pottery assemblages from West New Britain
- Apalo – FOJ squares 01-04

Figure 7.6  Vessel form V – linear incised. FOJ – Apalo.

Lapita Interaction
Chapter 7

The nature of the pottery assemblages from West New Britain
  – Apalo – FOJ squares 01-04

Figure 7.7  Linear incised sherds. FOJ – Apalo.
The nature of the pottery assemblages from West New Britain
-Apalo - FOJ squares 01-04

Figure 7.8 Vessel form V. FOJ - Apalo.

Lapita Interaction

117
Chapter 7

The nature of the pottery assemblages from West New Britain
– Apalo – FOJ squares 01-04

Figure 7.9 Vessel form V and VI. FOJ – Apalo.
The nature of the pottery assemblages from West New Britain – Apalo – FOJ squares 01-04

Chapter 7

Jars/ Decoration M P PM CA L N Total
Plain
A 0 0 0 1 0 1 2
B 0 0 0 1 0 0 1
C 3 1 0 0 0 4
D 1 0 0 0 0 1
Total 4 1 0 2 0 1 8
Notched rim
A 0 1 0 0 0 1
B 2 1 0 1 2 7
C 1 0 4 1 1 8
Total 3 2 4 2 3 16
Incision
Linear incision/ notched rim
A 0 1 0 0 0 1
B 0 1 0 2 7 12
C 0 1 0 1 2 6
Linear incision/ scalloped rim
A 0 0 0 1 0 1
Incision
B 0 0 0 0 1 1
Total 0 3 0 4 10 21
Other decoration
Cut lip
B 0 0 0 0 1 1
Dentate
C 0 0 0 0 1 1
Fingernail impressed
A 0 0 0 0 1 1
All
A 0 2 0 2 0 2 6
B 2 2 0 4 10 4 22
C 4 2 4 2 3 4 19
D 1 0 0 0 0 0 1
Total 7 6 4 8 13 10 48
% 15 12 8 17 27 21

Table 7.21 Vessel form V (jars) – distribution of fabrics per unit and decoration type. FOJ.

Incurving bowls
All five are decorated, two with cut lips, one with notched rim, one with appliqué and a scalloped rim, and the last with dentate decoration.

Distribution
Both the dentate (unit B) and appliqué (unit A) vessels are found in the upper two units, the rest are restricted to unit C (Table 7.22).

Decoration
All have lip modifications, either incised cuts (two in unit C) or notching (one in unit C), scalloped (one in unit A), or dentate (one in unit B). A row of button appliqué is found below the rim on the scalloped sherd (Fig. 7.12; catalogue no. 3761). The dentate vessel is unusual being the only one of this vessel form in the Arawe assemblage (Fig. 7.10; catalogue no. 6411).

Size
The orifice diameter could only be determined on two vessels: 12 cm and 20 cm. The latter is from the dentate vessel. All vessels, however, are thin walled, being less than 6 mm thick at the lip (Table 7.23).

Fabrics
Table 7.22 shows the distribution of fabrics. Ferromagnesium fabrics dominate. They are found on four of the five vessels, the dentate vessel being the exception made with an inclusion free fabric.

Flasks
Two possible flasks were identified, one each from units B and C. Both are plain, and are made from inclusion free and light fabrics. Only one rim was large enough to measure the orifice diameter at 4 cm (see Fig. 7.10; catalogue no. 3948).

Vessel form VIII – stands
Only two stands were identified in the assemblage. One from unit B is plain and made from a light fabric (Fig. 7.10; catalogue no. 6308). The other is from unit C, is dentate and made from a pyroxene/magnetite fabric. The stand is completely decorated with dentate and carved designs, plus carved cut outs (Enright and Gosden 1992: Fig. 7.8; Gosden and Webb 1994: Fig. 6; Gosden et al. 1989: Fig. 2).

Miscellaneous – stoppers
Seven circular shaped sherds were recovered from the assemblage (see Table 7.24). Their diameter ranged from 21 mm to 53 mm. Their function is unknown, although they could conceivably have been used for 'stoppers' or lids for jars. They are distributed in units C to A and are made from of a number of fabrics.

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
<td>1(a)</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1(d)</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 7.22 Vessel form VII – distribution of fabrics per unit. FOJ. ([a] and [d] show appliqué and dentate vessels respectively).

<table>
<thead>
<tr>
<th>mm</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 7.23 Vessel form VII – cross tabulation of rim thickness at and below the lip. FOJ. (Rows – thickness at the lip; columns – thickness below the lip).
Chapter 7

The nature of the pottery assemblages from West New Britain
– Apalo – FOJ squares 01-04

Figure 7.10 Vessel forms IV, V, VII and VIII. FOJ – Apalo.

Lapita Interaction
Figure 7.11 Dentate sherds. FOJ – Apalo.
Figure 7.12 Decorated sherds. FOJ – Apalo.
Table 7.24  Distribution of pottery stoppers. FOJ.

<table>
<thead>
<tr>
<th>Catalogue no.</th>
<th>Unit</th>
<th>Fabric</th>
<th>Diameter (mm)</th>
<th>Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5987</td>
<td>A</td>
<td>M</td>
<td>36-42</td>
<td>10-9</td>
</tr>
<tr>
<td>5986</td>
<td>A</td>
<td>N</td>
<td>44-45</td>
<td>6-4</td>
</tr>
<tr>
<td>2704</td>
<td>B</td>
<td>CA</td>
<td>44-45</td>
<td>6-6</td>
</tr>
<tr>
<td>7757</td>
<td>C</td>
<td>L</td>
<td>40-43</td>
<td>7-5</td>
</tr>
<tr>
<td>7756</td>
<td>C</td>
<td>L</td>
<td>35-36</td>
<td>5-5</td>
</tr>
<tr>
<td>6988</td>
<td>C</td>
<td>PM</td>
<td>50-53</td>
<td>7-4</td>
</tr>
<tr>
<td>4716</td>
<td>C</td>
<td>PM</td>
<td>21-22</td>
<td>10-10</td>
</tr>
</tbody>
</table>

CHAPTER SUMMARY

On the basis of sherd counts alone, incision is the dominant type of decoration in this assemblage and is found on nearly 60% of all decorated sherds. Dentate, on the other hand, is found on just over 20% of all decorated sherds. Dentate is distributed unevenly throughout the sequence. It decreases in number from 36% of all decorated sherds in the lower unit to only 9% in the upper unit. Other forms of decoration appear, such as fingernail impressed, appliqué, and shell impressed, albeit in small numbers.

When vessel form is examined it is seen that over half of all vessels are form V jars. These jars are thin walled and have a uniform size suggesting standardisation in manufacture. Form I bowls and form VIII stands, on the other hand, are relatively few in number. A correlation between vessel form and decoration is identified with linear incision found only on form V vessels. Forty-one percent of all form V jars have linear incised decoration. Dentate, on the other hand, is found on six of the eight vessel forms, although five of the twelve vessels are form I bowls. Plain ware comprises just over one third of all vessels.

An examination of the fabrics shows a variety were used to produce all vessel forms. Forty percent of vessels were made from ferromagnesium fabrics, 19% from calcareous fabrics, 25% from light fabrics, and 15% from inclusion free fabrics. No one fabric dominates the dentate vessels with five different fabrics used. Form V vessels, on the other hand, have nearly half made from either light or inclusion free fabrics. A further correlation between form, decoration and fabrics is found with the linear incised decorated form V jars. All but three of these nineteen vessels were made from non-ferromagnesium fabrics. Whether these distinctions are the product of different production centres will be addressed in Chapter 12 after the results of the chemical analysis of pottery filler and fabrics are presented.

In conclusion, FOJ can be characterised as predominantly a vessel form V jar assemblage. The relationship between this and the other Arawe assemblages is presented in Chapter 10.

SHERD DISTRIBUTION

Introduction

A total of 2420 sherds weighing 8746 grams were excavated from FNY. Their distribution is as follows:

<table>
<thead>
<tr>
<th>Unit</th>
<th>No</th>
<th>%</th>
<th>Wgt (gm)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>389</td>
<td>16</td>
<td>1307</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>1229</td>
<td>51</td>
<td>4182</td>
<td>48</td>
</tr>
<tr>
<td>3</td>
<td>802</td>
<td>33</td>
<td>3257</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
<td>2420</td>
<td></td>
<td>8746</td>
<td></td>
</tr>
</tbody>
</table>

Table 8.1 Distribution of sherds per unit. FNY.

Eighty-four percent of pottery is found in the lower red clay layer comprising units 3 and 2.

Only sherds exhibiting decoration, form or evidence of manufacture were included for further analysis including fabric categorisation. Four hundred and seventeen sherds were entered onto the database (Table 8.2).

Although only 15% of sherds are found in the top unit, it has the same recorded number of sherds on the database as unit 2. This could indicate differences in vessel size from units 3 to 1, particularly as unit 1, the top unit has a similar proportion of vessels as unit 2.

Decoration

Variation in distribution of decoration can be seen in the following three tables. Table 8.3 shows the distribution of all decorated sherds and their combinations. Tables 8.4 and 8.5 summarise the occurrences of each decorative type.

Based on count and the percentage of decoration on sherds alone, the following observations are made:

1. Dentate decoration is the dominant decorative type in all three units. It drops to 45% of decoration in unit 1, the upper black midden layer.
2. This decrease in dentate in the upper unit correlates with an increase in the number of other decorative types: notched rims, cut lips, miscellaneous incised, linear incised, stick impressed and fingernail impressed.
3. Shell impressed and comb incised decoration are only found on sherds from unit 2.

On the basis of decoration alone, FNY appears to be characterised by dentate decoration, as is FOH squares D, E and F. Yet as noted in the earlier chapters, looking at sherds is restrictive, and the decline in dentate and increase in other types of decoration is probably related to vessel form.

VESSEL FORM

This section describes first, the overall distribution of vessels and their decoration, and secondly, each vessel form in more detail.
Decoration per vessel form is seen in Table 8.8:

4. While 61% of all decorated sherds have dentate decoration, only 44% of all vessels have dentate. This is still a high number compared with the other sites (FOH squares D, E and F: 25%; FOH square G: 16%; FOJ: 12%). The high percentage of dentate decoration is explained by the dominance of form I vessels. Two thirds of dentate vessels are bowls that form the mode in this assemblage. Dentate is also found on six of the eight form VII stands.

5. Plain ware forms 35% of the assemblage and is dominant in form II, III, IV and VI vessels. This is similar to the assemblage from FOH squares D, E and F.

6. Only one form V vessel has dentate decoration. The rest are either plain or have linear incised, notched rim or cut lip, and shell impressed decoration. This is the same as in other sites. A further break up into vessel forms follows.

**Vessel form I – bowls**

Twenty-three form I vessels were identified of which 20 have dentate decoration, one is notched, and only two are plain (Table 8.9).

**Dentate bowls**

Table 8.10 presents the distribution of fabrics for dentate form I vessels. No dentate form I vessel was made from a calcareous fabric. Most were made from ferromagnesium fabrics with only two vessels made from an inclusion free fabric (unit 2), and two from a light fabric (unit 1).

Of the 20 bowls, 14 are horizontal stanced rims with flat lips, two are asymmetrically stanced, and four are horizontal collared rims. Grooving, common in the assemblage from FOH squares D, E and F is only found on three vessels, two having collared rims. (See Figures 8.1 to 8.3 for illustrations of dentate form I vessels).

Form I vessels vary in size ranging from small cups/bowls (orifice diameters between 12 cm to 14 cm) to larger bowls (orifice diameter up to 28 cm) (Table 8.11).

### Table 8.3 Distribution of sherds by number per decoration and unit. FNY.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>48</td>
<td>77</td>
<td>62</td>
<td>187</td>
</tr>
<tr>
<td>Dentate with cut lip</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Dentate with stamped impressed</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Dentate with excision</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Dentate with applique</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear incised</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Linear incised with notched rim</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Miscellaneous incised</td>
<td>15</td>
<td>10</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>Miscellaneous incised with notched rim</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Miscellaneous incised with excision</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Comb incised</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Impressed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stick impressed</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>Stick impressed with notched rim</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Fingernail impressed</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Fingernail impressed with cut lip</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Shell impressed</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Shell impressed and notched</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Stamped impressed with incision</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Other decoration</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cut out triangle</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Excision</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Applique with notching</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Nubbins</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Grooved/channeled</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Lip modification only</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notched rim</td>
<td>16</td>
<td>10</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>Cut lip</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total decoration</strong></td>
<td>122</td>
<td>127</td>
<td>92</td>
<td>341</td>
</tr>
<tr>
<td>% decorated</td>
<td>31</td>
<td>10</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>267</td>
<td>1102</td>
<td>710</td>
<td>2079</td>
</tr>
<tr>
<td>Total sherds</td>
<td>389</td>
<td>1229</td>
<td>802</td>
<td>2420</td>
</tr>
</tbody>
</table>

**Table 8.4 Summary of the distribution of decoration per unit – number of times a type of decoration occurs. FNY.**

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>55</td>
<td>85</td>
<td>69</td>
<td>209</td>
</tr>
<tr>
<td>Linear incised</td>
<td>11</td>
<td>5</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>Notched rim</td>
<td>18</td>
<td>14</td>
<td>6</td>
<td>38</td>
</tr>
<tr>
<td>Cut lip</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Miscellaneous incised</td>
<td>18</td>
<td>10</td>
<td>8</td>
<td>36</td>
</tr>
<tr>
<td>Grooved</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Shell impressed</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Stick impressed</td>
<td>8</td>
<td>4</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Fingernail impressed</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Comb incised</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 8.5 Summary of the distribution of decoration per unit – % of decorated sherds per decoration type. FNY.**

1. Form I bowls dominate.
2. Form V vessels form only 21% of recognisable vessel forms, and increase from the bottom (8%) to top unit (27%).
3. Form II, III and VII vessels are restricted to the top two units.

**Chapter 8 The nature of the pottery assemblages from West New Britain – Paligmete – FNY squares M4/M5, N4/N5**
The nature of the pottery assemblages from West New Britain – Paligmete – FNY squares M4/M5, N4/N5

Figure 8.1  Vessel form 1 – dentate vessels. FNY – Paligmete.
The nature of the pottery assemblages from West New Britain - Paligmete - FNY squares M4/M5, N4/N5

Figure 8.2 Vessel form 1 – dentate vessels. FNY – Paligmete.
The nature of the pottery assemblages from West New Britain – Paligmete – FNY squares M4/M5, N4/N5

Chapter 8

Figure 8.3 Vessel form 1 – dentate vessels. FNY – Paligmete.
Chapter 8  
The nature of the pottery assemblages from West New Britain - Paligmet - FNY squares M4/M5, N4/N5

<table>
<thead>
<tr>
<th>Unit</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>7</td>
<td>5</td>
<td>15</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>71</td>
<td></td>
</tr>
</tbody>
</table>

Table 8.6 Distribution of vessel form (no.). FNY.

<table>
<thead>
<tr>
<th>Unit</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>33</td>
<td>10</td>
<td>3</td>
<td>10</td>
<td>7</td>
<td>7</td>
<td>10</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>21</td>
<td>14</td>
<td>14</td>
<td>7</td>
<td>21</td>
<td>3</td>
<td>14</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>58</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>10</td>
<td>7</td>
<td>7</td>
<td>21</td>
<td>6</td>
<td>6</td>
<td>71</td>
<td></td>
</tr>
</tbody>
</table>

Table 8.7 Distribution of vessel form (%) per unit. FNY.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>20</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>31</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>Linear/ notched</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Notched rim</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Cut lip</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous incised</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Shell impressed</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Stick impressed</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Plain</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>25</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>7</td>
<td>5</td>
<td>15</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>71</td>
<td></td>
</tr>
</tbody>
</table>

Table 8.8 Distribution of decoration per vessel form. FNY.

Wall thickness for form I vessels also varies (Table 8.12).

Non-dentate bowls
All non-dentate form I vessels are made from a light fabric. The two plain vessels have orifice diameters of 18 cm (catalogue no. 1049) and 36 cm (catalogue no. 1076) respectively. The one with notching on the inside of the vessel has a smaller orifice diameter of 16 cm (Fig. 8.4; catalogue no.1068).

In conclusion, form I vessels are mostly associated with dentate decoration and ferromagnesium fabrics. Of the three non-dentate vessels, all are made from a light fabric.

Vessel form II - vertical walled vessel (upper body)
Seven vessels were identified, six plain and one with stick impressed decoration. All are probably from deep open orifice vessels (Fig. 8.4). These vessels are restricted to the upper two units and are made from either magnetite or calcareous fabrics (Table 8.13). The stick impressed vessel is made from a calcareous fabric.

Vessel size varies ranging from large at 30 cm at the orifice, to 16 cm.

One vessel is unusual in having a thickened interior lip. It comes from unit 1 and is made from a calcareous fabric. It is a thin ware (6 mm and 4 mm thick at and below the lip respectively) and has an orifice diameter of 18 cm. It is probably part of a deep bowl.

Vessel form III
Five vessels were identified, their lower body form undetermined. Two have dentate decoration while three are plain. Table 8.14 presents the distribution of fabrics.

The two dentate vessels are made from ferromagnesium fabrics (magnetite and pyroxene/magnetite). Only one orifice diameter was determined at 16 cm (Fig. 8.8; catalogue no. 2539).

The plain vessels vary in size. Two have orifice diameters of 30 cm and 32 cm, while the third is smaller at only 22 cm (Fig. 8.9; catalogue no. 3029).

Vessel form IV - restricted neck jars with flat horizontal rim
Five vessels were identified, four plain and only one dentate. They were made from ferromagnesium and calcareous fabrics, and are distributed across all units (Table 8.15). The dentate vessel is made from a pyroxene/magnetite fabric.

The dentate vessel is restricted with an orifice diameter of only 16 cm (Fig. 8.8; catalogue no. 889). The sizes of the plain vessels are unknown.

Vessel form V - carinated jars with outcurving neck
Fifteen vessels were identified in the assemblage. They are mostly restricted to the upper units with over half found in the top black midden layer (unit 1), and only one in the lower unit (Table 8.16).

Decoration
Thirteen of the vessels have decoration, ten with lip modification. Other forms of decoration include linear incised (n=3), incised (n=1), shell impressed (n=1) and dentate stamping (n=1). Only two vessels are plain (Table 8.16 and Fig. 8.6).

Size
There is no standardisation in vessel size, unlike similar vessel forms at FOJ (Table 8.17). Sizes range from 14 cm to 30 cm.
The nature of the pottery assemblages from West New Britain
- Paligmete - FNY squares M4/M5, N4/N5

Chapter 8

Table 8.10 Vessel form I (dentate) - distribution of fabrics per unit. FNY.

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>L</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 8.11 Vessel form I (dentate) - distribution of orifice diameters (cm) per rim shape. FNY.

<table>
<thead>
<tr>
<th>Rim shape</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
<th>22</th>
<th>24</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collared</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Asymmetrical</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Horizontal</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 8.12 Vessel form I (dentate) - distribution of rim thickness. FNY.

<table>
<thead>
<tr>
<th>Thickness at lip (mm)</th>
<th>Thickness below lip (mm)</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>13</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 8.13 Vessel form II - distribution of fabrics per unit. FNY.

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>CA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 8.14 Vessel form III - distribution of fabrics per unit. FNY.

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Table 8.15 Vessel form IV - distribution of fabrics per unit. FNY.

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>P</th>
<th>CA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 8.16 Vessel form V - distribution of decoration per unit. FNY.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Linear incision</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Linear incision with notched rim</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Incision with notched rim</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Shell impressed</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Notched rim only</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Cut lip only</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>No. Decorated</td>
<td>7</td>
<td>5</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>6</td>
<td>1</td>
<td>15</td>
</tr>
</tbody>
</table>

Unlike similar jars from FOJ, wall thickness is not standardised with only one vessel having a lip thickness of 2 mm or less, and eight having a thickness of 5 mm or less (Table 8.18). This is more in line with jars from FOH squares D, E and F.

Fabric
A number of fabrics are used to produce these vessels as seen in Table 8.19.

Vessel form VI - everted round bodied pots
Only four vessels were identified, all plain. One each were found in the bottom two units, and two from the top unit (Fig. 8.5).

Vessel size varies in this small population. Firstly, the orifice diameters vary from 15 cm to 26 cm (Table 8.20). Secondly, the wall thickness varies greatly from 8 mm to 3 mm at the lip (Table 8.21).

There is, however, some fabric uniformity as all are made from ferromagnesium fabrics (Table 8.22).

Vessel form VII - conical restricted upper vessel form
Only four vessels were identified from this assemblage: two are plain, one has dentate decoration, the other is incised (Fig. 8.5).

All come from the top two units, and except for the dentate vessel are similar in shape. The dentate vessel from unit 2 is small with an orifice diameter of 16 cm and a pointed lip. This is unlike other vessels of this form which have direct horizontal flat lips. The dentate decoration is found below the rim on the neck (Fig. 8.5; catalogue no. 425 for the vessel profile). The other decorated vessel, which comes from unit 1, has an incised line parallel to the rim (Fig. 8.5; catalogue no. 22). It is larger than the dentate vessel with an orifice diameter of 20 cm. Both the incised and dentate vessel are made with pyroxene/magnetite fabrics.

The two plain vessels are made from non-ferromagnesium fabrics. One from unit 1 is made with a light fabric, the other from unit 2 a calcareous fabric. An orifice diameter of 30 cm was obtainable for only one of these plain vessels (Fig. 8.5; catalogue no. 1725).

Vessel form VIII - stands
Eight stands were identified in the assemblage. Six have dentate decoration, one is plain, and one has triangular...
Chapter 8

The nature of the pottery assemblages from West New Britain
- Paligmete – FNY squares M4/M5, N4/N5

Figure 8.4  Vessel form I and II – plain vessels. FNY – Paligmete
The nature of the pottery assemblages from West New Britain
– Paligmete – FNY squares M4/M5, N4/N5

Chapter 8

Figure 8.5 Vessel form VI and VII. FNY – Paligmete
Figure 8.6 Vessel form V. FNY – Paligmete
The nature of the pottery assemblages from West New Britain Chapter 8

Paligmete – FNY squares M4/M5, N4/N5

The nature of the pottery assemblages from West New Britain Chapter 8

Paligmete – FNY squares M4/M5, N4/N5

Uniq. 14 16 18 20 22 24 28 30 Total

nos. 455; 2556, 1023, 32, 452, 451). Orifice diameters were ascertained for four stands. Three were 14 cm, the fourth 20 cm. This is a more restricted range in size compared with stands from FOH squares D, E and F where 11 stands were identified with orifice diameters ranging from 10 cm to 28 cm.

The plain stand from unit 3 has an orifice diameter of 20 cm (Fig. 8.7; catalogue no. 1551). The other non-dentate stand has triangular shaped excision above the lip and is unique in having a profile not seen in the other assemblages (Fig. 8.7; catalogue no.32).

Five of the stands were made from ferromagnesium fabrics. The plain stand is made from a pyroxene fabric, and the excised only stand is made from a magnetite fabric. Of the six dentate stands, one each were made from magnetite, pyroxene and pyroxene/magnetite fabrics. The rest were made with calcareous (catalogue no. 451) and light fabrics respectively (catalogue nos. 1370 and 1023). Table 8.23 outlines the distribution of fabrics.

Miscellaneous

For this site only, I have separated out a category of sherd called miscellaneous to which 22 sherds were assigned. These sherds could not be assigned to a rim, neck, carination or body class.

Two of these sherds are different. One is a handle from unit 3 (Fig. 8.9; catalogue no.887). It has cuts on its edge and is made from a pyroxene fabric. The other looks like a spout with a stem (Fig. 8.9; catalogue no.2721). It comes from unit 2 and is made from an inclusion free fabric.

As can be seen from Table 8.24, the distribution is towards the bottom 2 units, with only two sherds in the top midden unit. Sixty-eight percent of these sherds are made from a ferromagnesium fabric.
Chapter 8

The nature of the pottery assemblages from West New Britain
- Paligmete – FNY squares M4/M5, N4/N5

Figure 8.7 Vessel form VIII. FNY – Paligmete
The nature of the pottery assemblages from West New Britain
- Paligmete – FNY squares M4/M5, N4/N5

Figure 8.8  Vessel form III, IV and VIII. FNY – Paligmete
Figure 8.9 Assorted sherds. FNY – Paligmete
CHAPTER SUMMARY

On the basis of sherd counts alone, dentate is the dominant type of decoration in this assemblage. Other forms of decoration include incised, lip modification, grooved/channelled, comb incised, shell impressed, stick impressed, and fingernail impressed decoration. When vessel form is examined it is seen that form I bowls and VIII stands make up 43% of all vessels. Form I dominates in all layers. Form V jars, on the other hand, make up just over one fifth of all vessels.

Vessel form and decoration is correlated with form I bowls forming two thirds of all dentate vessels. Plain ware makes up just over one third of all vessels, and is dominant in form II, III, IV and VI vessels. Form V jars, on the other hand, are predominantly decorated with linear incision and lip modification. Only 13% of form V vessels are plain.

Although a variety of fabrics are found in the assemblage, two thirds of all vessels were made from ferromagnesium fabrics. In dentate vessels the proportion is higher at 77%. Non-ferromagnesium fabrics are found in all vessel forms, albeit in small numbers.

In conclusion, FNY can be characterised as a predominantly form I bowl and form V jar assemblage with plain ware and dentate decoration found on 79% of all vessels. The relationship between this and the other Arawe assemblages is presented in Chapter 10.
THE NATURE OF THE POTTERY ASSEMBLAGES FROM WEST NEW BRITAIN – THE NON-ARAWE ASSEMBLAGES

This chapter describes the pottery from the non-Arawe assemblages and is divided into two sections. The first section deals with three south coast assemblages of West New Britain: Apugi Island (FFS), Alanglongromo (FLF) and Kreslo (FNT). The second section deals with two north coast assemblages off the Willaumez Peninsula: Boduna Island (FEA) and the scoria pit site from Garua Island (FSZ). Each section is further divided into two: fabric and decoration.

The depositional and post-depositional contexts of these sites differ from the Arawe assemblages, leading to a different assemblage structure – see Chapters 3 and 4. As a result, the description of these assemblages differs from the Arawe assemblages in that sherd number is the primary unit for analysis rather than vessel number.

**SOUTH COAST ASSEMBLAGES**

**Apugi Island – FFS**

As outlined in Chapter 3, one test pit, TP 35/40, was selected for fabric analysis as it contained the highest number of sherds. A total of 382 sherds were excavated from the square 35/40. It was hoped that this would represent the full variety of fabrics in the Apugi total assemblage.

**Fabric**

The assemblage is predominantly made up of light fabrics. Within this assemblage 23 sherds were too small to identify fabric type. Of the remaining 359, 66% were made from light fabrics, 18% magnetite, 5% pyroxene, 7% inclusion free, 3% pyroxene/magnetite, and 2% from a calcareous fabric (Table 9.1). Only a quarter of the assemblage was made with a ferromagnesium fabric.

<table>
<thead>
<tr>
<th>Spit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>17</td>
<td>4</td>
<td>32</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>39</td>
<td>3</td>
<td>51</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>25</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>11</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>43</td>
<td>3</td>
<td>62</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>28</td>
<td>2</td>
<td>48</td>
</tr>
<tr>
<td>7</td>
<td>16</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>79</td>
<td>9</td>
<td>115</td>
</tr>
<tr>
<td>All</td>
<td>64</td>
<td>17</td>
<td>11</td>
<td>6</td>
<td>237</td>
<td>24</td>
<td>359</td>
</tr>
</tbody>
</table>

Table 9.1 Distribution of fabric per spit. FFS.

**Decoration**

The pottery showed a restricted range of decoration. Only 5.8% of sherds showed decoration (n=22). Of these, eight rims had lip modification, one was a rim with opposing fingernail impression, one was a dentate carinated piece, and the rest, 12 of them, were body sherds exhibiting dentate stamping (n=4), linear incised (n=3), incised (n=1), impressed (fingernail? n=1) and stick impressions with either applied or incised borders (n=3) (Table 9.2).

The fabrics of decorated sherds are well distributed and roughly correlate with the fabric distribution for the assemblage as a whole. For instance, of the eight rims

*Lapita Interaction*
Chapter 9

The nature of the pottery assemblages from West New Britain
- the non-Arawe assemblages

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>M</th>
<th>L</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rims</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notched</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Scalloped</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Fingernail</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Body</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dentate</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Fingernail</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Applied / stick impressed</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Linear incised</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Incised</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Carnation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dentate</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>14</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>%</td>
<td>27</td>
<td>64</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Table 9.2 Distribution of decoration per fabric. FFS.

with lip modification four are made from a light fabric, two from the inclusion free fabric, while two are made from the magnetite fabric. Of the dentate body sherds, however, three of the four are made from the magnetite fabric and the other from the light fabric. The carinated dentate sherd is also made from a light fabric. Also all sherds with linear incised and fingernail impressed decoration are made from light fabrics. Thus, 91% of all decorated sherds are made with only two fabrics: 64% from a light fabric, and 27% from a magnetite fabric.

Of the dentate stamped sherds only three exhibited motifs. All three had Anson’s motif 237, while one also had a design similar to motif 25. The 237 bands were of an open curvilinear nature and similar to the Kreslo designs (Specht 1991c).

Because of the smallness of the sherds and their lip notching, the orientation of the rim was only ascertained in three cases: vessel form V. In only one case was an orifice diameter possible: 16 cm.

Alanglongromo – FLF

A total of only 152 sherds were excavated from the three trenches (I, la and lb) at Alanglongromo (FLF) rock shelter.

**Fabric**

The fabrics represented are magnetite, pyroxene/magnetite, light and inclusion free. Magnetite is the predominant fabric making up 55% of the assemblage, followed by light fabric with 29%. There are no calcareous fabrics in this assemblage (Table 9.3).

Spatial patterning maybe evident in the distribution of fabrics. That is, of the twenty sherds excavated from trench la, not one magnetite fabric was found. It will be shown below that this patterning is related to the distribution of dentate sherds.

**Decoration**

Thirty-one sherds are decorated, making up 20% of the assemblage (Table 9.4).

The best way to describe decoration is in relation to fabric as there is a correlation between both. This is probably a result of the few vessels represented in this assemblage.

Three observations are made on this assemblage. First, ferromagnesium fabrics are restricted to dentate sherds only. None are associated with sherds having notched lips, incised or fingernail impressions. Secondly, these latter decorated sherds are all made from light fabrics (Fig. 9.1; catalogue nos. 5, 6, 15 and 19). They are identical in fabric to the Apugi assemblage and it was hoped that the probe analysis would determine if they were manufactured from the same centre. Thirdly, inclusion free fabrics are not found with decorated sherds.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>l</th>
<th>la</th>
<th>lb</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>19</td>
<td>0</td>
<td>5</td>
<td>24</td>
</tr>
<tr>
<td>Notched lip</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Incised</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Fingernail</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total decorated</td>
<td>22</td>
<td>3</td>
<td>6</td>
<td>31</td>
</tr>
<tr>
<td>Total sherds</td>
<td>88</td>
<td>20</td>
<td>44</td>
<td>152</td>
</tr>
<tr>
<td>% decorated</td>
<td>25</td>
<td>15</td>
<td>14</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 9.4 Distribution of decoration per trench. FLF.

Finer distinctions can be made within the dentate ware. The dentate sherds from this site fall into four groups and represent only four vessels:

First, from trench I, seven dentate sherds are made with a pyroxene/magnetite fabric and are all from the same vessel. The banding here (motif 35) is curvilinear and loosely structured, with the bands not parallel to each other (Fig. 9.1; catalogue no. 3). A variety of motif 206, a triangle, is found on only one of these sherds, and this is from the neck of a narrow mouth vessel (orifice diameter of the neck is 6 cm), probably a flask. No rims of this fabric are found, and with the exception of the neck sherd, the rest are from the body.

The second vessel is made from a magnetite fabric, consisting of 15 sherds, 11 from trench I and four from lb (Fig. 9.1; catalogue nos. 63, 65-67, 69, 71, 83). The dentate from this vessel is finer with two parallel bands made up of interlocking ‘rope design’, Anson’s motif.
Figure 9.1 Decorated sherds – FLF.
Both bands have an incised upper border marking the bands' top. Below the second band is found a variation of Anson’s motifs 206 and 216 (Donovan’s M 19.17b and M 19.10b; 1973), a series of triangles joined at their tips by a double circle. Below this is a series of joined double half circles which make up Anson’s motif 2.

The third vessel, from trench I, is also made with a magnetite fabric and is part of a pot stand with carved sides. The sherd shows pronounced vertical and horizontal curvature, with a thin band of what looks like appliquéd found on the interior of the sherd resulting in the original clay being folded back during the manufacturing process. It is made up of three double short rows of dentate laid vertical.

The last vessel is represented by only one sherd made from a pyroxene fabric. It comes from trench Ib and has an incomplete motif.

Kreslo – FNT

Specht collected 184 sherds from Kreslo, those he considered to yield information on vessel form or decoration (Specht 1991c:190/91). After conjoining, 177 were examined and entered onto the pottery database.

Fabric

The majority of sherds were made using a light fabric (71% n=126) followed by pyroxene (9% n=16), inclusion free (7% n=13), magnetite (6% n=11), calcareous (5% n=8) and pyroxene/magnetite (2% n=3). Half the light fabric sherds (n=63) had amounts of either calcareous or limestone inclusions (Table 9.6).

Decoration

Table 9.6 shows the break-up of decoration in this assemblage. This assemblage has a wide variety of decoration. Specht (1991c) notes the following decoration: relief; grooved; incised; fingernail impressed; incised and fingernail impressed; dentate stamped; dentate stamped and plain tool impressed; dentate stamped and fingernail impressed; lip notching; and plain tool only impressed. On the basis of Anson’s motif list alone, Specht (1991c:197) attributes the collection to Western Lapita rather than Far Western. For a detailed description of the decoration see Specht’s (1991c) discussion and illustrated drawings.

Specht notes that most sherds come from globular vessels with constricted necks – this being form V. The rims are what I have defined as outcurving, having no interior corner point that distinguish them from everted rims. From my analysis of the 33 rims in the assemblage, 18 can be attributed to this vessel class. Associated decoration includes rim notching, with or without linear incised, linear incised and dentate stamping. Only one rim could be assigned to a form I vessel.

Most incision is linear and is primarily found on form V vessels with notched rims. One is a double notched rim. Specht compares these with similar forms from Talasea and Watom. One incised sherd does not fit this pattern. It is rectilinear incised with a motif akin to rectilinear dentate, similar to those found from Watom (Specht 1968). Fingernail impressed decoration is also found, with one sherd having both fingernail impressions and dentate stamping. This is unique. This rim has a small diameter and Specht suggests it may be a spout. Also found are a variety of sherds reminiscent of spouts and stands.

Is there any correlation between decoration and fabric? As mentioned earlier light fabrics are found in 71% of all sherds. They are also found in all major decorative types except appliquéd (magnetite). Of note is the variety of fabrics used to produce similar decorated ware. For instance, dentate sherds are made from light (n=14), inclusion free (n=3), magnetite (n=1) and pyroxene fabrics (n=3). Fingernail impressed sherds are made from calcareous (n=1), light (n=4), inclusion free (n=2) and magnetite fabrics (n=1). Grooved ware is found with light (n=3), magnetite (n=1) and pyroxene (n=1) fabrics. Also linear incised is found with calcareous (n=5), light (n=22) and magnetite (n=1) fabrics. Thus, although the light fabric is the major one used in this assemblage, similar decoration is found with different fabrics, pointing towards some production diversity.

Table 9.6  Distribution of decoration per fabric. FNT.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dentate</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Dentate with cut lip</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Dentate and incised</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Dentate and fingernail impressed</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Incised</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear incised</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Linear with notched rim</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Incised</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Incised with notched rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Other decoration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appliquéd</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Grooved</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Fingernail</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Fingernail with incised</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Grooved with notched rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Lip modification only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notched rim</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total decorated</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>6</td>
<td>53</td>
<td>6</td>
<td>76</td>
</tr>
<tr>
<td>Total plain</td>
<td>4</td>
<td>12</td>
<td>3</td>
<td>2</td>
<td>73</td>
<td>7</td>
<td>101</td>
</tr>
<tr>
<td>Total sherds</td>
<td>11</td>
<td>16</td>
<td>3</td>
<td>8</td>
<td>126</td>
<td>13</td>
<td>177</td>
</tr>
<tr>
<td>% - fabrics</td>
<td>6</td>
<td>9</td>
<td>2</td>
<td>5</td>
<td>71</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

NORTH COAST ASSEMBLAGES

Garu Island – FSZ

A total of 2978 sherds were excavated from FSZ during the 1992 season. Sherds showing decoration...
or form were recorded and entered onto the database (n=253).

**Fabric**

All sherds showing decoration or form plus a sample of 1000 plain sherds were analysed for fabric. This amounted to 42% of the total assemblage. The assemblage has a uniform fabric composition being made from a light fabric. Variation did exist with plagioclase feldspar the dominant mineral followed by small amounts of pyroxene and to a lesser extent, smaller amounts of quartz. This is similar to thin section analysis arranged by Anson (1983) on earlier Far Western Lapita pottery from FCR/FCS, Lagenda plantation, close to Talasea station.

**Decoration**

Only 5% of the assemblage was decorated which covered a variety of techniques including dentate, incised, shell impressed, fingernail impressed and appliqué (Table 9.7; and Figures 9.2 and 9.3).

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td></td>
</tr>
<tr>
<td>Dentate</td>
<td>60</td>
</tr>
<tr>
<td>Dentate with cut lip</td>
<td>4</td>
</tr>
<tr>
<td>Dentate and incised</td>
<td>2</td>
</tr>
<tr>
<td>Incised</td>
<td></td>
</tr>
<tr>
<td>Incised</td>
<td>48</td>
</tr>
<tr>
<td>Incised with body notching</td>
<td>1</td>
</tr>
<tr>
<td>Incised with scalloped lip</td>
<td>1</td>
</tr>
<tr>
<td>Incised and cut out</td>
<td>1</td>
</tr>
<tr>
<td>Impressed</td>
<td></td>
</tr>
<tr>
<td>Stick impressed</td>
<td>1</td>
</tr>
<tr>
<td>Fingernail impressed</td>
<td>1</td>
</tr>
<tr>
<td>Fingernail impressed with cut lip</td>
<td>1</td>
</tr>
<tr>
<td>Shell impressed</td>
<td>7</td>
</tr>
<tr>
<td>Other decoration</td>
<td></td>
</tr>
<tr>
<td>Appliqué</td>
<td>5</td>
</tr>
<tr>
<td>Cut outs</td>
<td>1</td>
</tr>
<tr>
<td>Cuts</td>
<td>2</td>
</tr>
<tr>
<td>Lip modification only</td>
<td></td>
</tr>
<tr>
<td>Notched lip</td>
<td>11</td>
</tr>
<tr>
<td>Cut lip</td>
<td>3</td>
</tr>
<tr>
<td>Scalloped lip</td>
<td>13</td>
</tr>
<tr>
<td>Total decorated</td>
<td>162</td>
</tr>
<tr>
<td>Total plain</td>
<td>2816</td>
</tr>
<tr>
<td>Total sherds</td>
<td>2978</td>
</tr>
<tr>
<td>% decorated</td>
<td>5.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spit</th>
<th>No.</th>
<th>Wgt (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>88</td>
<td>491.4</td>
</tr>
<tr>
<td>Pyroxene=light</td>
<td>15</td>
<td>132.0</td>
</tr>
<tr>
<td>Calcareous</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Inclusion free</td>
<td>1</td>
<td>6.0</td>
</tr>
<tr>
<td>Total</td>
<td>105</td>
<td>630.1</td>
</tr>
<tr>
<td>Light</td>
<td>142</td>
<td>1131.3</td>
</tr>
<tr>
<td>Pyroxene=light</td>
<td>51</td>
<td>472.8</td>
</tr>
<tr>
<td>Calcareous</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Inclusion free</td>
<td>9</td>
<td>46.7</td>
</tr>
<tr>
<td>Total</td>
<td>202</td>
<td>1650.8</td>
</tr>
<tr>
<td>Light</td>
<td>230</td>
<td>1622.7</td>
</tr>
<tr>
<td>Pyroxene=light</td>
<td>66</td>
<td>604.8</td>
</tr>
<tr>
<td>Calcareous</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Inclusion free</td>
<td>10</td>
<td>52.7</td>
</tr>
<tr>
<td>Total</td>
<td>307</td>
<td>2280.9</td>
</tr>
</tbody>
</table>

Table 9.8 Distribution of fabric per spit. FEA square 2 spits 2 and 7.

Four sherds with appliqué were excavated from FSZ. These included three sherds with applied knobs and one with an applied transverse bar. Also found were two sherds with fingernail impressed decoration identical to those from Watom which are 'made up of short, opposed impressions reminiscent of pinching' (Anson 1983:33, Fig. XI). Seven pieces of shell impressed ware were also excavated.

**Form**

The identification of vessel form was difficult due to the small size of the sherds with only two forms identified:

1. **Vessel form I**

Three rims sherds are attributed to this form. The vessels have simple direct rims and are shallow. Only one vessel is decorated with three parallel horizontal lines of dentate stamping below the lip on the outside of the vessel. The rim of this vessel has an asymmetric lip with thickening to the interior, and an orifice diameter of 16 cm (Fig. 9.3; catalogue no. 2511). The rims making up the other two vessels are plain, one also having an interior thickened lip (Fig. 9.4; catalogue nos 3260 and 2767). They have an orifice diameter of 14 cm and 16 cm respectively. Both vessels with interior thickened lips have pieces of obsidian as filler.

2. **Vessel form V jars**

Although 19 outcurving rims were identified, it is difficult to determine if they all belong to this vessel form. Of these rims, 68% had lip modification (notched n=5, cut n=4, scalloped n=4). Four also have dentate decoration below the rim, while another had fingernail impressions below the lip (Fig. 9.2; catalogue no. 940).

It was possible to determine the orifice diameter of only four rim sherds, each constituting a different jar as they have either a notched, incised, scalloped or plain lip. One has an orifice diameter of 20 cm (Fig. 9.4; catalogue no. 5), while the rest are 12 cm (Fig. 9.4; catalogue no. 1952).

Only 17 carinated sherds were identified of which six have dentate decoration, four are incised, one is shell impressed, one has cut marks and the rest are plain. Of note is the absence of flat dishes.

**Boduna Island – FEA**

The major objective with the Boduna assemblage was to obtain samples for electron microscopy, and these are
Figure 9.2  Decorated sherds – FSZ.
Figure 9.3  Dentate sherds – FSZ.
Figure 9.4 Vessel form – FSZ.
The nature of the pottery assemblages from West New Britain - the non-Arawe assemblages

Chapter 9

The results are due to time constraints only spits 2 and 7 from square 2 were analysed for fabric. A total of 307 were analysed. The fabric categories are similar to those identified from nearby Garua Island, with the light (feldspar) fabric dominating. However, I have set aside another group where pyroxenes are found in equal numbers with the light (feldspars). The only other fabrics found are calcareous and inclusion free (Table 9.8).
This chapter aims to first, define a regional ‘character’ for West New Britain assemblages by comparing the decoration, form, and fabric from those sites discussed in the previous five chapters. The second aim is to place these West New Britain assemblages into a regional framework. This will facilitate the comparison of the relationship between decoration and shape and the production and distribution of pottery that will be presented in the final chapter.

**DECORATION AND FORM**

Assemblages will be compared first in terms of decoration using sherd count, secondly, in terms of vessel form, and thirdly, by combining both vessel form and decoration. Lastly, closer attention is focused on the role that dentate decoration played within the total pottery assemblage.

**Changes in decoration – sherd count**

Using counts of decoration on sherds alone, the Arawe assemblages by and large agree with other Lapita assemblages which show both a decrease in dentate and an increase in linear incision over time. Early sites were seen as having a higher percentage of decoration than later sites (Lilley 1991b; Green and Anson 1991; Kirch 1991:151). These early Lapita assemblages are seen in terms of a predominance of dentate stamping and some incised decoration, with later assemblages showing ‘fewer dentate-stamped sherds, an increase in incision, and some sherds which are transitional to late industries with impressed, applied and incised decorations’ (Gosden et al. 1989:571). Thus a decrease in dentate decoration is paralleled by an increase in incision, although linear incision is never above 1% of decorated ware at Watom (Green and Anson 1991:177). Spriggs also echoes a similar change in decoration and notes that the ‘detailed pottery sequences’ from the Bismarck Archipelago show what he calls ‘Mangaasi-like’ decoration such as incision, appliqué and fingernail impressed come into prominence as dentate stamping declines (Spriggs 1993:196).

The Arawe assemblages confirm this trend, although differences can be seen between assemblages.

i. In FOH squares D, E and F dentate decoration proportionally declines from the lowest units to the upper pottery units where incision dominates. Fingernail impressed and grooved/channelled decorated sherds, although found in lower units, increase in proportion in the top units.

ii. A similar trend is found in FNY, Paligmete, with incised and fingernail impressed decoration increasing in the upper units, although here dentate decoration is always dominant. Shell impressed sherds are only found in the middle unit.

iii. At FOH square G, dentate and linear incision are equally represented, with grooved/channelled, fingernail impressed and appliqué found in low proportions.

iv. The assemblage from FOJ, Apalo, on the other hand, is different with linear incised decoration dominant in all units. Dentate declines in the top unit which corresponds with an increase in appliqué, fingernail impressed, shell impressed and grooved/channelled decoration.

Therefore at one extreme, both FOH squares D, E and F, and FNY have dentate as the dominant decoration. At the other extreme, FOJ has linear incision as the dominant decoration. In between these two is FOH square G with both dentate and linear incision equally represented.
Vessel form
All four sites show diversity in vessel form, although major differences are seen in their relative proportions. These major differences are:

First, a declining proportion of form I (bowls) and VIII vessels (stands) from both FOJ and FOH square G in comparison with both FNY and FOH squares D, E and F.

Secondly, this correlates with an increase in vessel form VI (jars). A higher proportion of this vessel form is found in FOH square G and FOJ in comparison with FNY and FOH squares D, E and F.

Thirdly, differences between sites are seen in other vessel forms, such as the near absence of form VI vessels (globular pots) in FOJ. Figure 10.1 shows the proportion of vessel forms across the sites.

![Figure 10.1 Vessel forms – Arawe.](image)

Vessel form and decoration
When looking at decoration by vessel number rather than sherd number similar trends are seen between sites. First, there is a decrease in dentate vessels in both FOJ and FOH square G, compared with FOH squares D, E and F, and FNY. Secondly, this decrease correlates with an increase in lip modification and linear incised decoration (Fig. 10.2). However, when decoration per vessel form is identified, a new dimension to the pottery analysis is added which not only allows the identification of the relationships between decoration and vessel forms but also their changes over time. The rest of this section reviews each of the vessel forms and the associated decoration that is found.

Form I
At both FNY and FOH squares D, E and F, these vessels are predominantly dentate. Of the 57 dentate form I vessels from the total Arawe assemblage, 50 come from these two sites only. Plain vessels and those with lip modifications are a minority. From FOJ, on the other hand, vessels with lip modification make up half of the form I vessels, with plain and dentate making up the rest. In FOH square G, only three vessels were found, two with incision, and one dentate (Fig. 10.3).

All fabrics were used in the production of this vessel form (Fig. 10.6). Yet major differences in fabric selection are found between dentate and plain vessels. Figure 10.7 presents the proportion of fabrics per decorative type. First, 75% of dentate vessels (n=57) are made from ferromagnesium fabrics. Secondly, plain vessels on the other hand (n=19), are made up of 74% non-ferromagnesium fabrics. Calcareous and light fabrics make up 42% and 21% of fabrics respectively. Thirdly, those vessels with lip modification or incised (n=12) were made from predominantly light, calca reous and inclusion free fabrics.

Form II
From the Arawe assemblages vessels of this form are predominantly plain, with only a small number having either stick impressed, grooved/channelled, lip modification only or dentate decoration (Fig. 10.3). All except the inclusion free fabric were used to produce these vessels (Fig. 10.6). Ferromagnesium fabrics make up 68% of all vessels, and calcareous fabrics make up 20%.

Forms III and IV
These vessels are either dentate or plain (Fig. 10.4). They are made from a variety of fabrics with calcareous and light fabrics forming the single largest fabric groups (Fig. 10.6).

Form V
These vessels are associated with a number of decorative techniques (Fig. 10.5). Plain vessels are common in all sites, although the most common decoration is lip modification only. Linear incision is also found in varying amounts. At FNY and FOH squares D, E and F, it is found on 20% and 10% of these vessels respectively, while at FOJ and FOH square G it is found on 41% and 7%. All linear incised vessels carry lip modification. Other decorative techniques are found on this vessel form including fingernail impressed, shell impressed, grooved/ channelling, and dentate. Dentate vessels form a small minority from each site.

The major difference that occurs within this vessel form between sites relates to variability in size. As argued in Chapters 5, 6, 7 and 8, in respect of both vessel size and wall thickness, only the FOJ assemblage showed standardisation or uniformity.
West New Britain assemblages – form, decoration and fabric

Chapter 10

Figure 10.3 Decoration vessel forms I, II and VIII.

Figure 10.4 Decoration on vessel forms III and IV.

Figure 10.5 Decoration on vessel forms V and VI.
All fabrics were used to produce this vessel form (Fig. 10.6) although major differences in fabric selection is noted between linear incised, fingernail impressed and other decorative techniques (Fig. 10.7).

Firstly, form V vessels with linear incision are made from mostly non-ferromagnesium fabrics, with the occasional vessel made from a pyroxene fabric. The same applies to fingernail impressed vessels.

Secondly, this is in contrast with those vessels that are either plain, dentate or have lip modification. These vessels are made from all or most fabric types in roughly equal proportions. The dentate jars are of interest as those with light or inclusion free fabrics make up nearly 50%. This is in contrast with other dentate vessel forms where light fabrics are rare.

**Form VIII**

These stands are either plain, dentate or have evidence of cut-outs (Fig. 10.3). They are made from all fabrics, with calcareous and magnetite fabrics making up 29% and 23% of all vessels respectively (Fig. 10.6).

**Summary**

A number of major points can be made from this analysis:

1. The changing proportions of sherd decoration from dentate to lip modification and linear incision is due to a change in vessel forms – from form I bowls to form V carinated jars.
2. Linear incision is predominantly associated with form V vessels (carinated jars). The same applies to fingernail impressed and shell impressed vessels.
3. Grooved/channelled decoration is found on both form V and form II vessels. The grooved vessel from Unit E, FOH square D, E and F (Fig. 5.25; catalogue no. 8537) is identical to those from the Reef/Santa Cruz assemblages (Parker 1981: Fig. 10; vessel form 14).
4. The only vessel form identified with appliqué was a form VII vessel from FOJ, an inward curving bowl.
5. Plain ware is a dominant part of the assemblage, forming the majority of form II and form VI vessels.
6. Some distinctions can be seen between decoration/form and fabric. For instance, dentate and non-dentate form I vessels (bowls) have ferromagnesium and non-ferromagnesium fabrics respectively. Linear incised plus fingernail impressed form V vessels (carinated jars) have mostly non-ferromagnesium fabrics, compared with non-linear incised jars.

The relationship between fabric, decoration and vessel form with different production centres will be explored in Chapter 12.

The next section examines decoration and vessel form by focusing on dentate and its role within the assemblage. This will allow the changing proportions
in decoration to be associated with changing vessel forms.

**Dentate decoration**

**Dentate decoration – frequency**

It was shown in the previous chapters that using decoration on sherd count alone, many of the Arawe assemblages can be characterised as dentate assemblages. Within FOH squares D, E and F and FNY, dentate accounts for 66% and 61% of all decorated sherds respectively, while at FOJ and FOH square G, it is less at 22% and 28% respectively (Table 10.1). Thus on the basis of dentate decoration alone, the sites can be grouped into two:

i. FOH squares D, E and F and FNY, and,

ii. FOH square G and FOJ.

Yet due to the state of preservation at the Arawe sites, an extra dimension in understanding pottery variability can be added: vessel form. As argued above, here a different picture emerges in which the dentate component of the total assemblage can be assessed. The grouping of the Arawe sites into two is still applicable. In FNY and FOH squares D, E and F, which have high dentate sherd counts, dentate vessels account for 44% and 24% of all vessels. This is in contrast to FOH square G and FOJ where dentate vessels comprise 16% and 12% of the assemblage respectively (Table 10.1). This decrease in the dentate vessel component from FNY and FOH squares D, E and F, to FOJ and FOH square G, is due to the changing proportions of vessel form.

**Dentate decoration – form**

Dentate decoration found in the assemblages of both FNY and FOH squares D, E and F is specialised and can be summed up as mainly a form I (bowl) and VIII (stand) vessel assemblage. From FNY and FOH squares D, E and F, 84% and 79% respectively of all dentate vessels are either form I or form VIII vessels. This contrasts with FOH square G and FOJ where dentate vessel forms comprise 16% and 12% of the assemblage respectively (Table 10.1). This decrease in the dentate vessel component from FNY and FOH squares D, E and F, to FOJ and FOH square G, is due to the changing proportions of vessel form.
Both FOJ and FOH square G have a low proportion of magnetite and ferromagnesium fabric dentate vessels as a whole, and a higher proportion of light fabric dentate vessels compared to FNY and FOH squares D, E and F. The relationship between vessel form, site, dentate motif and fabric will be explored below.

**DEFINING A REGIONAL CHARACTER**

The aim of this section is to place the dentate pottery from the West New Britain assemblages into a regional framework. It does this by first, comparing the assemblages with those examined by Anson (1983) using his extensive motif catalogue. Three methods are used to examine the relationship between sites from the Western Pacific on the basis of motif similarity. Secondly, the comparison between sites is extended to Eastern assemblages not included in Anson’s original analysis: Tonga, Naigani, Niuatoputapu, Tikopia, Futuna and Mulifanua.

**Dentate motifs – comparisons with Anson’s motif catalogue**

**Definition of motifs**

To look at the structure of dentate motifs between sites and within vessel forms, all sherd motifs from the West New Britain assemblages were recorded using Anson’s inventory listing (Anson 1983 Table XII). Problems were encountered in using the Anson system and like Specht (1988) uncertainty of motif identification where no exact equivalent occurred were found in this analysis. Specht found difficulties in ‘reconstructing the decision-making rules employed by Anson’ (1988:13). Despite this a subjective approach was taken where Anson’s motif categories were applied if the identified motif showed close similarity. Also where new motifs were found they were counted separately so that total site motif numbers could be calculated and comparisons made with other sites (Table 10.4). The FNT (Kreslo) and FSZ (Garua Island) assemblages are included in this analysis.

Anson’s motif listing was re-entered onto a PC database with the West New Britain data (FNY, FOH squares D, E and F, FOH square G, FOJ, FNT and FSZ). Only the presence or absence of a particular motif was recorded (Table 10.5). Although both Anson (1986) and Specht (1988) identified extra motifs from the Talasea assemblages, these were not illustrated and thus not added

<table>
<thead>
<tr>
<th>Site</th>
<th>No. of Anson motifs</th>
<th>No. of new motifs</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOH sq. D, E and F</td>
<td>53</td>
<td>39</td>
</tr>
<tr>
<td>FOH sq. G</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>FNY</td>
<td>51</td>
<td>10</td>
</tr>
<tr>
<td>FOJ</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>FSZ</td>
<td>15</td>
<td>-</td>
</tr>
<tr>
<td>FNT</td>
<td>8</td>
<td>-</td>
</tr>
</tbody>
</table>

**Figure 10.9** Distribution of fabrics – dentate vessels.

**Relationship to the total assemblage**

As dentate vessels in both FNY and FOH squares D, E and F are restricted to mainly form I bowls and form VIII stands it could be argued that dentate vessels are one specialised component of a larger assemblage. Take out this dentate vessel component and differences between sites are diminished, with plain form I bowls, form V carinated jars (mostly with lip modification or plain, with some having linear incised or fingernail impressed decoration), and plain form VI globular pots remaining.

Figure 10.10 presents the percentage of non-dentate vessels in the assemblage. Non-dentate form I bowls and form VIII stands are a minor assemblage component. The major vessel component are form V carinated jars followed by form VI globular pots and form II vessels.

Dentate vessels are thus seen as initially mainly a specialised component of a larger assemblage of plain and decorated jars, plain globular pots, and plain spherical pots. The decrease of dentate as a proportion of decorated ware from FNY, FOH squares D, E and F, to FOJ and FOH square G, is seen in terms of a decrease in form I (bowls) and form VIII (stands) vessels – the dropping out of this specialised component. As will be discussed below, this appears to be correlated with a change in dentate motifs from Far Western to Western Lapita styles.
### Table 10.5 Comparison of motifs found in the Arawe assemblages with sites used by Anson in his PhD thesis. E = ECA Egloff's excavation, Eiaoua; T = FCIFCS Talasea; A = EAQ Malekolon Plantation, Ambitle, both the Carson collection housed at the Australian Museum and Ambrose's excavations; W1 = SAD Watom site 6; W2 = SAC Watom site 8; W3 = Watom Meyer collection; RF2 = Reef Islands SE-RF2 site; RF6 = Reef Islands SE-RF6 site; SZ8 = Santa Cruz SE-SZ8 site; SZ45 = Santa Cruz SE-SZ45 site; NC1 = Ile des Pins, New Caledonia; NC2 = Site 13 Lapita site, New Caledonia; NH = Malo, Vanuatu; F1 = Yanuca Fiji; F2 = Natunuku, Fiji.

NOTE: Both the Carson Collection and Ambrose's excavated sherds from Ambitle have been lumped in one general Ambitle heading, as per Anson 1986. I have kept Watom 2 and 3 separate unlike Anson who regroups them (Anson 1987:127).

---

#### MOTIF \| E \| T \| A \| W1 \| W2 \| W3 \| RF2 \| RF6 \| SZ8 \| SZ45 \| NC1 \| NC2 \| NH \| F1 \| F2
---
1. | X | X | - | - | - | - | X | X | X | X | X | X | X | X | X
2. | - | X | X | - | - | X | X | X | X | X | X | X | - | X | X
3. | - | - | - | - | X | - | X | X | - | X | X | - | - | - | -
4. | X | - | - | - | - | - | - | - | - | - | - | - | - | - | -
5. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
6. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
7. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
8. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
9. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
10. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
11. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
12. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
13. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
14. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
15. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
16. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
17. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
18. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
19. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
20. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
21. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
22. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
23. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
24. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
25. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
26. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
27. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
28. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
29. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
30. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
31. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
32. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
33. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
34. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
35. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
36. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
37. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
38. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
39. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
40. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
41. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
42. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
43. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
44. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
45. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
46. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -
47. | X | - | X | - | - | - | - | - | - | - | - | - | - | - | -

**Shared Motifs**

- **6**
- **7**
- **21**
- **4**
- **0**
- **5**
- **19**
- **11**
- **18**
- **10**
- **8**
- **16**
- **15**
- **9**
- **6**

---

**Lapita Interaction**

157
## West New Britain assemblages – form, decoration and fabric

### i) FOH SquareG

<table>
<thead>
<tr>
<th>MOTIF</th>
<th>E</th>
<th>T</th>
<th>A</th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
<th>RF2</th>
<th>RF6</th>
<th>SZ8</th>
<th>SZ45</th>
<th>NC1</th>
<th>NC2</th>
<th>NH</th>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>206</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>237</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>239</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>268</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>421</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>436</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>485</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>496</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Shared Motifs: 1 2 2 1 1 1 5 3 5 2 3 4 5 4 2

### ii) FNY

<table>
<thead>
<tr>
<th>MOTIF</th>
<th>E</th>
<th>T</th>
<th>A</th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
<th>RF2</th>
<th>RF6</th>
<th>SZ8</th>
<th>SZ45</th>
<th>NC1</th>
<th>NC2</th>
<th>NH</th>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>167</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>168</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>201</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>206</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>207</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>208</td>
<td>-</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>222</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>230</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>231</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>235</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>236</td>
<td>-</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>237</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>238</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>240</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>241</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>242</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>251</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>272</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>275</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>306</td>
<td>-</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>345</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>364</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>377</td>
<td>-</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>417</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>421</td>
<td>-</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>426</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>435</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>439</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>442</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>443</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>444</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>445</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>490</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>496</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Shared Motifs: 1 2 2 1 1 1 5 3 5 2 3 4 5 4 2

### Lapita Interaction

Page 158
### iii) FNY (continued)

<table>
<thead>
<tr>
<th>MOTIF</th>
<th>E</th>
<th>T</th>
<th>A</th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
<th>RF2</th>
<th>RF6</th>
<th>SZ 8</th>
<th>SZ45</th>
<th>NC1</th>
<th>NC2</th>
<th>NH</th>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Motifs</td>
<td>7</td>
<td>7</td>
<td>22</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>13</td>
<td>9</td>
<td>15</td>
<td>8</td>
<td>9</td>
<td>18</td>
<td>13</td>
<td>13</td>
<td>7</td>
</tr>
</tbody>
</table>

### iv) FOJ

<table>
<thead>
<tr>
<th>MOTIF</th>
<th>E</th>
<th>T</th>
<th>A</th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
<th>RF2</th>
<th>RF6</th>
<th>SZ 8</th>
<th>SZ45</th>
<th>NC1</th>
<th>NC2</th>
<th>NH</th>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Motifs</td>
<td>2</td>
<td>6</td>
<td>9</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>11</td>
<td>6</td>
<td>11</td>
<td>7</td>
<td>7</td>
<td>10</td>
<td>6</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

### v) FSZ

<table>
<thead>
<tr>
<th>MOTIF</th>
<th>E</th>
<th>T</th>
<th>A</th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
<th>RF2</th>
<th>RF6</th>
<th>SZ 8</th>
<th>SZ45</th>
<th>NC1</th>
<th>NC2</th>
<th>NH</th>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Motifs</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

### vi) FNT

<table>
<thead>
<tr>
<th>MOTIF</th>
<th>E</th>
<th>T</th>
<th>A</th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
<th>RF2</th>
<th>RF6</th>
<th>SZ 8</th>
<th>SZ45</th>
<th>NC1</th>
<th>NC2</th>
<th>NH</th>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Motifs</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
to this analysis. Such an exercise would entail a separate major study in its own right.

**Methods of defining similarity**

Three different methods are used to identify and understand the degree of motif sharing between assemblages and regions. Firstly, multivariate analysis is used on the presence/absence of motifs in all sites. Secondly, a manual indication of motif sharing adapted from Anson is applied. Lastly, in order to explain the distributions obtained from the first two methods, the distribution of motifs across the already defined regional boundaries are identified.

**Multivariate analysis**

To assess similarity between sites on the basis of motif sharing a series of multivariate analyses using hierarchical clustering analysis and Principal Components Analysis was performed. Ward’s method was used for the hierarchical clustering analysis. This technique is also known as the error sum of squares method (Baxter 1994:142) and works on within group sum of square distances.

At each stage the number of groups is reduced by one, by combining the two groups which give the smallest possible increase in the total within group sum of squares... when (one) starts with n groups of one individual, the total within group sum of squares is zero. (Chatfield and Collins 1980:224)

It will ‘amalgamate clusters on the basis of similarity between groups rather than just between a pair of individuals’ (Baxter 1994:146). The drawback using Ward’s method is that it produces spherical clusters of equal size even if the data is random (Baxter 1994:158). This problem can be overcome by comparisons with the PCA plot.

In this analysis only the presence or absence of motifs was used and not the frequency of motifs. Although Anson used such qualitative data when comparing sites, he preferred quantitative data where available. Anson considers the frequency data as important, noting its absence in the Mead and Green analyses. He sees this as a serious omission because without motif frequency it is impossible to decide whether absence of a particular motif might be a function of a smaller sample size or whether it reflects differences in time or cultural divergence. (Anson 1983; Kirch et al. 1987)

In this analysis, on the other hand, frequency data is not considered important in delineating regional distinctions in motifs. Frequency is dependent on vessel shape and size, the presence or absence of a motif is not.

The only limitation in multivariate analysis is the bias inherent in comparing one assemblage such as RF2 which has 178 motifs with FCR/FCS which has only 16, although Anson argues that “the results do not appear to be affected by the size of samples’ (Anson 1986:161). Counteracting the bias inherent in sites with such large numbers is difficult, although in this case differences in size are seen on the first PCA component (see below).

**Results:** On both the dendrogram and PCA plot, three major clusters are defined (Figures 10.11 and 10.12).

1. The first separates out the four Reef/Santa Cruz sites.
2. The second cluster comprises FCR/FCS (Talasea), ECA (Eloua), FOH (Adwe) squares D, E and F, FNY (Paligmete) and EAQ (Ambitle). Anson gives an example by comparing Watom and the 19 motif types in the Ambitle sample it is theoretically possible for the two samples to share up to 26 motif types present on Watom and the 19 motif types in the Ambitle sample it is theoretically possible for the two samples to share up to 19 motif types. In reality they share only two i.e. 2/19 - 10% (Anson 1983, 1987:127). In his 1986 article Anson uses an enlarged motif listing from Eloua. As this motif

### Table 10.6

The West New Britain assemblages under study divide into two. FOH squares D, E and F, and FNY group with Anson’s Far Western Lapita assemblages, while the rest group with the Western Lapita assemblages. Note that on the PCA plots, the Bismarck Western Lapita assemblages of FNT, FSZ, FOJ and FOH square G are intermediate between the Far Western Lapita sites and Watom. The assemblages from New Caledonia and Fiji separate even further. Therefore although the Bismarck Western Lapita sites group with other Western Lapita sites, they still remain close to the Far Western Lapita assemblages from the Bismarcks.

**Site similarity as defined by Anson’s manual similarity method**

To further explore the sharing of motifs across these assemblages a similarity measure devised by Anson was used. When comparing two sites, he calculated the shared number of motifs and worked this as a percentage of the maximum number of motifs that theoretically could be shared. Anson gives an example by comparing Watom with Ambitle: ‘with 26 motif types present on Watom and the 19 motif types in the Ambitle sample it is theoretically possible for the two samples to share up to 19 motif types. In reality they share only two i.e. 2/19 - 10% (Anson 1983, 1987:127). In his 1986 article Anson uses an enlarged motif listing from Eloua. As this motif
West New Britain assemblages – form, decoration and fabric

Chapter 10

Figure 10.11 Grouping of sites based on motif similarity using Ward's hierarchical clustering analysis.

Figure 10.12 Motif sharing. PCA plot – 1st and 3rd components.
<table>
<thead>
<tr>
<th></th>
<th>FOH sq. D/E/F</th>
<th>FNY</th>
<th>FOH sq. G</th>
<th>FOJ</th>
<th>FNT</th>
<th>FSZ</th>
<th>FCR/FCS</th>
<th>ECA</th>
<th>EAQ</th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
<th>RF2</th>
<th>RF6</th>
<th>SZ8</th>
<th>SZ45</th>
<th>NC1</th>
<th>NC2</th>
<th>NH</th>
<th>F1</th>
<th>F2</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOH sq. D/E/F</td>
<td>31 50 56 38 53 44 60 30 15 0</td>
<td>11 20</td>
<td>13 20</td>
<td>17 18</td>
<td>18 17</td>
<td>13 11</td>
<td>10</td>
<td>FNY</td>
<td>31 42 41 63 47 44 70 35 15 27</td>
<td>16 21</td>
<td>15 24</td>
<td>13 20</td>
<td>29 21 21</td>
<td>2 13</td>
<td>FOH sq. G</td>
<td>50 42 33 38 33 17 10 17 8 9</td>
<td>8 42 25</td>
<td>42 17 25</td>
<td>33 42 33 17</td>
<td>17</td>
<td>FOJ</td>
<td>56 41 33 50 40 38 20 33</td>
</tr>
</tbody>
</table>

Table 10.7 Site similarity as defined by motif sharing. FCR/FCS = Talasea; ECA = Egloff's excavation, Eloaua; EAQ = Malekolon Plantation, Ambitle, both the Carson collection housed at the Australian Museum and Ambrose's excavations; W1 = SAD Watom site 6; W2 = SAC Watom site 8; W3 = Watom Meyer collection; RF2 = Reef Islands SE-RF2 site; RF6 = Reef Islands SE-RF6 site; SZ8 = Santa Cruz SE-SZ8 site; SZ45 = Santa Cruz SE-SZ45 site; NC1 = Île des Pins, New Caledonia; NC2 = Site 13 Lapita site, New Caledonia; NH = Malo, Vanuatu; F1 = Yanuca, Fiji; F2 = Natunuku, Fiji; Na = Naigani, Fiji.
listing was not available, it is not used in the following calculations. Table 10.7 presents the results of this analysis.

Results: Kay’s motif analysis from Naigani is used in this analysis (NA in Table 10.7) (Kay 1984). Table 10.7 shows that whereas sites FOH squares D, E, and F, and FNY do not. Such a distinction between the Arawe sites was noted at the beginning of this chapter in respect to both the percentage of dentate decoration and the forms of the dentate vessels. Yet despite this separateness, both sets of Arawe assemblages, including those from FNT and FSZ, have a high degree of similarity with all Bismarck sites excluding Watom sites SAD and SAC.

Therefore although more similarity is evident between the later Arawe assemblages and those further east (lack of Far Western motifs, less dentate decoration, lower percentage of dentate bowls and stands), these West New Britain assemblages also exhibit strong regional similarities remarkably absent from the Watom assemblages. Also of interest is that the Naigani assemblage does not have a high level of motif sharing with the other Eastern or Western Lapita assemblages including other Fiji sites (i.e. below 30%). In fact the highest sharing (over 30%) occurs with both FNT and FSZ.

Distribution of motifs across regions
To understand the structure of the hierarchical clustering analysis an appreciation of the regional distribution of motifs is needed. As Anson defined regional groups on the basis of motif similarity, the identification of which motifs contributed to the definition of regional styles is necessary. To do this, motifs were divided into a number of categories depending on their regional occurrence: Far Western; Western; Far Western/Western; Western/Eastern; Eastern; common to all areas; area specific (i.e. Reef/Santa Cruz or New Caledonia or Watom only); and site specific. If, for example, a motif was only found in Anson’s Far Western Lapita sites of Ecahu, Ambitite, or Talasea, then that motif is classified as a Far Western motif. If it is found across all regions then it is designated a common motif. If it is found in the Far Western Lapita sites and Vanuatu it is designated a Far Western/Eastern motif. Table 10.8 presents the results.

This distribution confirms the separation between FOH squares D, E and F plus FNY, and FOH square G, as originally defined by the percentage of dentate on sherds and vessels. Here, however, it is based on the types of motifs. FOJ on the other hand has four motifs (15% of all motifs) designated to be found only in the Bismarcks Far Western Lapita assemblages. These, how-ever, came from one vessel, a pot stand, found in unit C. FNT and FSZ group with FOJ and FOH square G.

Distribution of motifs on form and fabric
The distinction between the two groups of sites shown above is also directly correlated to:
1. the decrease of form I vessels, and
2. the declining number of ferromagnesium fabrics in dentate vessels (Fig. 10.9) from FOJ and FOH square G compared to both FNY and FOH squares D, E and F. Form I vessels account for the majority of dentate vessels.

Figures 10.13 and 10.14 show the distribution of vessel forms and fabrics per motif regional category for the Arawe assemblages combined. As can be seen, motifs associated with Eastern Lapita sites are now found on Arawe form II, form V (carinated jars) and form VII vessels, while motifs associated with Western and Eastern Lapita sites only are now found on nearly all Arawe vessel forms (Fig. 10.13). Motifs associated with the Far Western Lapita sites of ECA, EAQ and FCR/FCS are now found on form I (bowls), form III, form V (carinated jars) and form VIII (stand) vessels from the Arawe sites.

In conclusion the Arawe assemblages group into two (FOH squares D, E and F plus FNY, and FOJ plus FOH square G) on the basis of:
1. Percentages of dentate decoration
2. Different vessel proportions
3. Types of motifs
4. Decrease in ferromagnesium fabrics.

Both FNT and FSZ group with FOJ plus FOH square G on the basis of motif similarity.
Motif sharing between the West New Britain and Eastern Lapita assemblages

An attempt is made here to compare the West New Britain assemblages with those Eastern assemblages not previously compared using the Anson system.

**Tonga (see Poulsen 1987)**

Of the fifty Anson motifs identified from Poulsen’s Tonga assemblages, half are shared with the West New Britain assemblages under analysis, plus the Far Western Lapita assemblages from FCR/FCS, EAQ and ECA (Table 10.9).

Of these 25 motifs, only seven were common to all of Anson’s ‘style areas’, three were previously found in Far Western/Western Lapita assemblages, ten in Western Lapita assemblages, and two in Western/Eastern Lapita assemblages. Again the presence of the non-common motifs is not due to a wide corpus of common motifs found in all the assemblages.

**Niutatoputapu (see Kirch 1988b)**

From Kirch’s Niutatoputapu assemblage, four of the eight identifiable Anson motifs were found in either the West New Britain sites under investigation or Anson’s Far Western Lapita sites (Table 10.10).

Of these, Anson’s motif 162 was previously found in both Far Western and Western Lapita assemblages, motifs 385 and 494 in Western Lapita assemblages, and motif 448 in both Western/Eastern Lapita assemblages.

**Tikopia (see Kirch and Yen 1982)**

In Tikopia site TK-4, only five dentate sherds were found (Kirch and Yen 1982:197). Kirch described the sherd decoration using the Mead system. Anson’s motif 494 (DE1.1) and 16 (DE2.2) are found. Kirch mentions motif M15 (combination of DE5 and GZ1 – Kirch and Yen 1982: Fig. 81g). This could be accommodated by any of Anson’s motifs 441-447. Note that the positioning of an assemblage on the presence of only dentate five sherds is tenuous, although both motifs 494 and 16 are found in the West New Britain assemblages (FOH squares D, E and F and FSZ respectively).

**Futuna (see Sand 1990)**

The dentate assemblage from Asi Pani (SI-001A) on Futuna provided only a few sherds for comparison with other sites, although what is published shows the ‘exploded’ motifs expected for later sites (Sand 1990).

**Mulifanua (see Green 1974c)**

The Mulifanua dentate assemblage fits into the pattern demonstrated above. Only 38 dentate sherds are recorded for what Green calls an Early Eastern Lapita assemblage (Green 1974c). Green cautions against making chronological comparisons with either the Fijian or Tongan assemblages due to ‘the restricted range of identifiable motifs’ (Green 1974c:173). Yet from an examination of the published photographs and illustrations a minimum of eight Anson motifs are present of which five are also found in the West New Britain assemblages:

i. Anson motif 1 is found in FSZ, EAQ, FCR/FCS, FOJ, FOH squares D, E and F, and FNY. This motif is one of the ‘corpus of motifs’ common to Far Western, Western and Eastern Lapita assemblages.

ii. Anson motif 16 is found in FSZ. This motif has previously been found in Western Lapita assemblages only: Watom (Meyer Collection) and New Caledonia (Ile des Pins).

iii. Anson motif 208 is found in FOH squares D, E and F, FNY, EAQ.

iv. Anson motif 435 is found in FNY, FOJ, and FNT. This motif has also been found in the following
West New Britain assemblages - form, decoration and fabric

Chapter 10

Table 10.9 Motifs shared between Tonga and the Bismarcks.

<table>
<thead>
<tr>
<th>Anson Motif</th>
<th>FNY</th>
<th>FOH sq. D, E and F</th>
<th>FOH sq. G</th>
<th>FOJ</th>
<th>FNT</th>
<th>FSZ</th>
<th>EAQ</th>
<th>FCR/ FCS</th>
<th>ECA</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>37</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>133</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>162</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>207</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>230</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>231</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>236</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>237</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>260</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>271</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>313</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>366</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>435</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>436</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>444</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>448</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>494</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>497</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 10.10 Motifs shared between Naigani and the Bismarcks.

<table>
<thead>
<tr>
<th>Niuatoputapu Motif</th>
<th>Anson Motif</th>
<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>M99.1</td>
<td>494</td>
<td>FOH sq. D, E and F</td>
</tr>
<tr>
<td>M15</td>
<td>448</td>
<td>FOH sq. D, E and F</td>
</tr>
<tr>
<td>M1</td>
<td>385</td>
<td>FNT</td>
</tr>
<tr>
<td>M16</td>
<td>162</td>
<td>EAQ</td>
</tr>
</tbody>
</table>

Table 10.11 Motifs shared between Niuatoputapu and the Bismarcks.

Western Lapita assemblages: Reef/Santa Cruz (RF2; SZ-8); New Caledonia (Site 13).

v. Anson motif 494 is found in FOH squares D, E and F. This motif has also been found in the following Western Lapita assemblages: New Caledonia (Ile des pins and Site 13).

Of the other three motifs, two are found in the Reef Islands (Anson motif 200 – RF6, and 402 – RF2) and one in Fiji (Anson motif 2507 – Yanuca). The point to

Lapita Interaction

165
be made is that most of these shared motifs are not part of that 'substantial corpus of early motifs' across the Lapita assemblages (see Green 1979:40).

**Discussion**

With the addition of the West New Britain assemblages to the corpus of Lapita pottery, motifs once seen as contributing to the uniqueness of the easterly sites are now seen to be common in the later assemblages of West New Britain. Motifs found in Tikopia which Kirch saw as deriving from a Niuatoputapu (NT-90)/Uvea/Mulifanua complex (Kirch 1988b:187), are found in the West New Britain assemblages. With better defined sequences from West New Britain it is no longer necessary to look for Tikopia to be settled from the east as Kirch and Yen have done (Kirch and Yen 1982:337-8). Its similarity with the Eastern Lapita sites is now offset by its similarity with Western sites. Its unusualness in the Western Lapita network, and the identification of Bismarck obsidian need not be explained away by scenarios such as 'early Tikopian colonists established some intermittent contact with Lapita peoples in the Reef-Santa Cruz islands' (Kirch 1988b:189). Connectivity between sites at this period is greater and more fluid than expected.

**A REGIONAL FRAMEWORK**

Motifs in the West New Britain assemblages confirm the unique corpus of motifs found previously in the Talasea – FCR/FCS, Eloaua – ECA and Ambitle – EAQ assemblages from the Bismarcks. Yet they also confirm the greater corpus of motifs shared between all areas. Indeed, the pottery from both FOH squares D, E and F, and FNY (which group with the Far Western Lapita sites), and FOJ, FNT and FSZ assemblages, have motifs identified in the so-called Western and Eastern Lapita style provinces, yet are absent in the EAQ, ECA and FCR/FCS assemblages analysed.

Motif distribution has a direct bearing on a question posed by Kirch et al. (1987:125) on whether with the addition of more sites, the Bismarck Archipelago sites 'will remain distinct and internally homogeneous, or diverge from one another as samples become larger'. Kirch posed the question in order to throw doubt on Anson's definition of a Far Western Lapita style based on small sherd numbers from three sites. The addition of more sites and motifs has, as Kirch predicted, increased the number of motifs shared between regions, yet a more complex picture emerges. Firstly, sites such as FOH square G, FOJ, FSZ and FNT group closely with Western Lapita sites. Secondly, FOH squares D, E and F, and FNY also confirm the distinctiveness of the Far Western Lapita group of sites from others in the region which cluster with those further east. Specht has also shown that the addition of more motifs from Watom and Boduna does not reduce the differences between regions (Specht 1988:8).

The full ramification of these results and their bearing on the models presented in Chapter 2 will be presented in Chapter 12 after the results of the chemical analysis of West New Britain pottery is presented. The identification of production and distribution patterns are necessary in order to model the types of interactions necessary to explain these regional similarities.
The aim of this chapter is to present the results of the chemical analysis of samples from the West New Britain assemblages and the identification of the nature of pottery production and distribution. Pottery is made up of both minerals and clay, and both the mineral inclusions and the matrix were analysed separately.

The chapter is divided into three sections. The first deals with the chemical analysis of minerals. Local river and beach sands from West New Britain are chemically analysed in order to isolate regional mineral sand signatures. Sands from pottery samples are also chemically analysed and then compared with the mineral signatures in order to identify the origin of the grains used in the manufacture of Lapita pottery.

The second section deals with the chemical analysis of the ceramic matrix. This provides information for isolating the number of clay sources used in the manufacture of the pottery, and provides information to identify resource or procurement zones of manufacture as defined in Chapter 4. This section is further divided into three. First, the sampling strategies, results and identification of chemical paste compositional reference units (CPCRUs) of each Arawe assemblage are presented. Secondly, all Arawe assemblages are compared and contrasted in order to define common CPCRUs. Thirdly, the sampling strategies and results from the non-Arawe assemblages are presented, and compared and contrasted with the Arawe assemblages. This allows a comparison with assemblages from other parts of the south and north coast of West New Britain.

The last section brings the results together and discusses the nature of production and exchange of the West New Britain assemblages.

RESULTS OF THE ELECTRON MICROPROBE ANALYSIS ON MINERALS

River sands

Previous work
Prior to the present analysis of river and beach sands, previous studies have been conducted which can be used with my own analyses to define a mineral geographic signature from West New Britain. These studies are reviewed first.

Arawe
John Webb, a geologist from La Trobe University, examined beach sands from Paligmete village, Pililo Island, using a binocular microscope and thin section analysis. These sands have predominantly calcareous inclusions: 'shell and coral fragments, with occasional large pieces of lithified limestone' (Gosden and Webb 1994:34).

The grains of quartz, feldspar, and pyroxene are, Webb says, derived from the weathering of volcanic ash. Such beach sands are part of the calcareous fabric group.

Talasea
Petrological examination of thin sections of sherds from Talasea was made by Hollis and Lohu. Hollis examined
Chapter 11

Identifying production and exchange – the results of the chemical analysis

sherd provided by Specht, and also beach sands collected by himself and Specht (Specht 1983). The sherds examined in thin section came from Boduna Island. Lohu on the other hand examined seven thin sections provided by Anson from Specht's FCR/FCS site (Lohu 1983). Hollis noted that while there were some minor differences between sherds from different sites, their temper inclusions clearly originated from the same geological province. Beach samples of volcanic sands, sorted by wave action and rain-induced erosion of volcanic ashes back from the present beaches, suggest that they are derived from tephras of different sources and ages. The beach sands from around Talasea are predominantly of volcanic origin with mineral grains derived from dacites, andesites and basalts. Amphiboles and pyroxenes are the principal dark minerals which comprise up to 60% of the sand. Alkali feldspars and other plagioclase make up most of the remainder. Talasea Lapita sherds contain all of these mineral grain types, indicating probable local manufacture. (Specht 1983:7)

Lohu, on the other hand, noted that plagioclase feldspars make up the dominant grain type in his analysis. Also common is quartz, with clinopyroxene and hornblende absent or in minor amounts. Volcanic lithics are also common (Lohu 1983). Lohu, like Hollis, sees the source rock as probably of a dacite composition with minor andesite. No calcium carbonates were noted.

Kandrian

From site FLX near Kandrian several Lapita sherds were examined by hand inspection by Hollis. These were provided by Specht (Specht 1983). Hollis notes that the sherds contained minerals similar to a beach sample collected from Alimbit, a river to the west of Kandrian. The beach sand according to Hollis is different from those on the north coast, having heavy mineral grains such as colourless zircon, olivine euhedral tourmaline and glassy quartz, some occurring as doubly terminating crystals. Hollis points out that these are rare or absent on the north coast and hints at a granitic source in the centre of New Britain, and washed down by the Alimbit River (Specht 1983).

Electron microprobe analysis

To complement the above studies, beach and river sand samples were collected from a number of localities from West New Britain and a chemical analysis using the electron microprobe was performed. The aim was to identify regional mineral signatures and to use this as a baseline to compare mineral grains found in the excavated pottery.

Sands were collected from the following locations (Figs 11.1 and 11.2):

South west coast of West New Britain –
1. Pulie River, 16 km east of the Arawe Islands.
2. Alimbit River, near river mouth, north west of Kandrian.
3. Anu River, near the village of Wasum and Kreslo.
4. Adi River next to Sauren village.

North coast of West New Britain –
1. Beach at Walindi Plantation, Willaumez Peninsula.
2. Garua Island, beach next to the wharf.
3. Garua Island, beach near site FXN. Locality GI.

Eighty-eight analyses were performed on mineral grains from these locations:

<table>
<thead>
<tr>
<th>Location</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulie River</td>
<td>25</td>
</tr>
<tr>
<td>Alimbit River</td>
<td>11</td>
</tr>
<tr>
<td>Anu River, Wasum</td>
<td>19</td>
</tr>
<tr>
<td>Adi River, Sauren</td>
<td>12</td>
</tr>
<tr>
<td>Walindi</td>
<td>7</td>
</tr>
<tr>
<td>Garua Wharf</td>
<td>9</td>
</tr>
<tr>
<td>GI</td>
<td>5</td>
</tr>
</tbody>
</table>

The selection of which grains to analyse was qualitative. The aim was to select as wide a variety of different grains as possible. Minerals that were rare in a sample have (R) after their presence: e.g. X (R) (Table 11.1).

Major points

South Coast

i) Adi River

The sands are pyroxenes (chromian augite) with magnetite. These sands equate with the pyroxene and pyroxene/magnetite fabric groups defined macroscopically (see Chapter 4). No other minerals are found. Visually the sands around the Adi River are black. Under a low powered microscope (X18) the pyroxenes are greenish to black, and well rounded.

ii) Pulie River

Major sands include pyroxenes (chromian augite) and amphiboles, with magnetite and quartz. A little labradorite was also found. This would equate with the pyroxene/magnetite fabric group. Visually the sands are black with the pyroxenes showing a greenish to black colour.

iii) Anu River

Major sands are plagioclase feldspars, quartz, apatite and glass. Magnetite was found in small quantities. This equates with the light fabric group. Visually the sands are white or crystal clear.

iv) Alimbit River

The major mineral is magnetite. Amphiboles and hornblende was also identified, as was quartz. This sand equates with the magnetite fabric. Of note is the absence of pyroxenes. Visually the sands are jet black with a few white specks, while under a low powered microscope the hornblende is seen as long brown clear crystals.

North Coast

i) Garua Wharf

The sands comprise plagioclase feldspars, pyroxenes and amphiboles. No magnetite is found. This would equate with a light fabric. Visually the sands are white and black.

ii) Garua Locality GI beach

These sands comprise quartz and plagioclase feldspars. They equate with a light fabric. Macroscopical rain induced grooves are seen on the minerals, and dull grey obsidian is visible.

iii) Walindi Beach

Walindi sands are similar to the Garua Wharf sands except for the presence of quartz and the lack of glass inclusions and hornblende. Macroscopically it is a light fabric with both clear and cloudy inclusions.
Chapter 11

Identifying production and exchange – the results of the chemical analysis

Figure 11.1 Sands collected for chemical analysis from West New Britain.

Figure 11.2 Sands collected for chemical analysis from the Talasea area.
Chapter 11  Identifying production and exchange — the results of the chemical analysis

<table>
<thead>
<tr>
<th></th>
<th>Alimbit</th>
<th>Pulie</th>
<th>Adi</th>
<th>Anu</th>
<th>Garua</th>
<th>Walindi</th>
<th>G1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartz</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Glass</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Plagioclase feldspar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Andesine</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Labradorite</td>
<td>X(r)</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Andesine/labradorite</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Bytownite</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Pyroxene</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Amphibole</td>
<td>Cummingtonite</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Hornblende</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Oxides spinel</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X(r)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Phosphates</td>
<td>Apatite</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Table 11.1 Chemical analysis of river sands from West New Britain.

In summary then, the north coast sands are characterised by light minerals, and to a lesser extent ferromagnesium sands. Of the four major rivers tested on the south coast, two are characterised by pyroxene to magnetite sands (Pulie, Adi Rivers), one is characterised by magnetite sands (Alimbit River), and only one is characterised by light sands (Anu River).

Analysis of filler

As part of the larger analysis of the chemical characterisation of pottery from West New Britain, a number of sherds from each site had their inclusions analysed chemically using the electron microprobe (Table 11.2). The analysis was intended to be qualitative, covering the diversity of inclusions in the sherd sample, rather than quantitative. These sherds were chosen from a larger sample selected for probe analysis of the pot matrix. The sampling strategy for the larger sample is discussed later in this chapter. The following discussion is centred on minerals found per fabric group.

North coast — Talasea area

Boduna — FEA

Nine samples — Table 11.3.

These nine samples are made up of predominantly plagioclase feldspars, covering a range of chemical compositions, and quartz. Not one pyroxene was identified although ferromagnesium minerals (amphiboles) were found in four of the nine samples. Obsidian was found in the Boduna sherds. One sherd, from Specht’s 1989 excavations, had a piece of obsidian large enough to be extracted and analysed using PIXE-PIGME (Summerhayes et al. 1993:63). It is sourced to the nearby Gulu obsidian flows (Fig. 11.2 for the location of Mt Gulu).

Garua — FSZ

Four samples — Table 11.4.

The four samples are from light fabric sherds, made up of predominantly plagioclase feldspars, quartz, with a smaller amount of ferromagnesium inclusions. Magnetite was only found in one sample. Obsidian is also present.

Garua — FAO

Two samples — Table 11.4.

The two samples are from a light fabric, with ferromagnesium minerals found in both. Pyroxenes are found in one sample while both have amphiboles. Magnetite is also present in both samples, as is obsidian. One piece of the latter was large enough to be extracted and analysed using PIXE-PIGME. Like the sample from FEA it has a nearby source in the Gulu obsidian flows.

Talasea sherds fit well with Lohu’s (1983) assessment for the FCR/FCS sherd samples (see above), and the chemical analyses of sands from the Willaumez Peninsula (see above). The analysis of obsidian also confirms local origin.

South coast

Kreslo — FNT

Fifteen samples — Table 11.5.

Eight of the 15 samples analysed had light fabrics which could be accommodated for by the only south west coast river with predominantly light inclusions: the Anu River. Only one pyroxene was found from fifty-two analyses on the nine light fabric samples.

Of the four pyroxene fabric samples, plagioclase feldspars were found in two (andesine — labradorite), and quartz in one. The other two pyroxene fabrics had ferromagnesium minerals only.

Two sherds with calcareous fabrics were analysed. Both had plagioclase feldspars and quartz inclusions.

Table 11.1 Chemical analysis of river sands from West New Britain.

Table 11.2 Chemical analysis of sherd filler — number of samples and number of analyses.

<table>
<thead>
<tr>
<th>Area/site</th>
<th>No. of samples</th>
<th>No. of analyses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talasea area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garua — FSZ</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Garua — FAO</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Boduna — FEA</td>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td>South coast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kreslo — FNT</td>
<td>15</td>
<td>72</td>
</tr>
<tr>
<td>Apugi — FFS</td>
<td>16</td>
<td>94</td>
</tr>
<tr>
<td>Alanglongromo - FLF</td>
<td>11</td>
<td>57</td>
</tr>
<tr>
<td>Arawe islands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apalo — FOJ</td>
<td>25</td>
<td>114</td>
</tr>
<tr>
<td>Adwe — FOH sq. D, E and F</td>
<td>19</td>
<td>92</td>
</tr>
<tr>
<td>Adwe — FOH sq. G</td>
<td>13</td>
<td>91</td>
</tr>
<tr>
<td>Paligmete — FNY</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Total 115 586
Identifying production and exchange – the results of the chemical analysis

Table 11.3  FEA – Boduna. Chemical analysis of mineral filler.

<table>
<thead>
<tr>
<th>SAMPLE NO.</th>
<th>PLAGIOCLASE FELDSPARS:</th>
<th>Plagioclase</th>
<th>Anorthite</th>
<th>Labradorite</th>
<th>Amphiboles</th>
<th>Cummingtonite</th>
<th>Oxides</th>
<th>Magnette</th>
<th>Other:</th>
<th>Quartz</th>
<th>Glass</th>
<th>NUMBER OF ANALYSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEA 6</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=5</td>
</tr>
<tr>
<td>FEA 4</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=6</td>
</tr>
<tr>
<td>FEA 5</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>N=3</td>
</tr>
<tr>
<td>FEA 3</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=2</td>
</tr>
<tr>
<td>FEA 14</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=5</td>
</tr>
<tr>
<td>FEA 15</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=1</td>
</tr>
<tr>
<td>BOD 2</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=3</td>
</tr>
<tr>
<td>BOD 36</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=3</td>
</tr>
<tr>
<td>BOD 4</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=5</td>
</tr>
</tbody>
</table>

In short, the calcareous and light fabric sherds have sands which fit well with the local Anu River sands. The four pyroxene fabric sherds, on the other hand, have sands suggestive of a source further west (Pulie or Adi Rivers). Seventy-one percent of the sherds from Kreslo have light fabrics, while 4.5% have calcareous fabrics. The remaining 24.5% have pyroxene (9%), inclusion free (7%), magnetite (6%) and pyroxene/magnetite (1.7%). This suggests that well over 75% of all sherds could have local sands.

Apugi - FFS

Sixteen samples – Table 11.6.

Three inclusion free fabric (defined macroscopically) sherds were analysed. All have plagioclase feldspars, one having quartz plus epidote. None have ferromagnesium inclusions. These minerals were only identified under high magnification.

Five sherds with light fabrics were analysed. Two were macroscopically classified as also having pyroxenes – both had ferro-augites unlike the chromian augite that is found elsewhere. Both also had quartz grains unlike the other lights. The other light fabric sherds did not have pyroxenes, but all five have magnetite. One light fabric sherd had calcareous inclusions, and epidote was identified.

Two sherds with calcareous fabrics were analysed – both have quartz, while one also has plagioclase feldspars.

The inclusion free, light and calcareous fabric sherds have inclusions that fit well with the light sands of the Anu River near Kreslo. The two sherds with light fabric and pyroxenes also have sands similar to those from the Pulie or Adi Rivers. The total Apugi assemblage has 65.9% light fabric sherds, 6.7% inclusion free, and 1.7%
Chapter 11

Identifying production and exchange – the results of the chemical analysis

calcareous, making 74.3% of sherds having sands similar to that found in the Anu River.

Three sherds with pyroxene fabrics were also analysed. Two have an eclectic variety of inclusions with plagioclase feldspars, all three have magnetite and amphiboles. Ilmenite, possibly apatite and quartz was found in one sherd each.

One sherd having a pyroxene/magnetite fabric was also analysed. It contained the same inclusion variety as those sherds with pyroxene fabrics except amphiboles and quartz. These sherd have sands similar to those from the Pulie and Adi Rivers. Only 4.8% and 3% of sherds had pyroxene and pyroxene/magnetite fabrics respectively in the assemblage.

Only two sherds with magnetite fillers were analysed. They also contained little quartz, glass, and plagioclase feldspars. One possibly has apatite. Sherds with a high magnetite content and plagioclase feldspars plus quartz could have come from the Alimbit River. Eighteen percent of all sherds from the assemblage have magnetite fabrics, and thus have sands possibly deriving from the Alimbit River.

**Arawe Islands**

**Adwe** – FOH square G
Thirteen samples – Table 11.8.

Two sherds with calcareous fabrics were analysed. Apart from carbonates, the sands from these sherds include plagioclase feldspars, magnetite, quartz, glass and amphiboles which are similar to local Arawe beach sands. The other fabrics have predominantly ferromagnesium inclusions. Four magnetite, three pyroxene, and one pyroxene/magnetite fabric samples were analysed. All sherds with ferromagnesium fabrics have similar sands (pyroxene, magnetite), but in different proportions.

Two inclusion free sherds were analysed. Both contained microscopic pyroxene and magnetite, and apatite was found in one sample. One sherd with spinel was analysed. It contained pyroxenes and plagioclase feldspars. The pyroxene and pyroxene/magnetite sherds have sands commensurate with those from the Adi River, and perhaps the Pulie River. The magnetite fabrics have sands similar to those from Alimbit River.

**Adwe** – FOH squares D, E and F
Nineteen samples – Table 11.9.

All ferromagnesium fabrics were similar having mostly just magnetite and pyroxenes. Only a couple of samples had other sands such as plagioclase feldspar,
Identifying production and exchange – the results of the chemical analysis

<table>
<thead>
<tr>
<th>SAMPLE NO.</th>
<th>FABRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Plagioclase Feldspars:

- Andesine
- Bytownite
- Labradorite
- Andesine-Labradorite
- Glassy Olig/Andesine
- Anorthite

### Pyroxenes:

- Chromian Augite
- Chromian/Ferro Augite

### Amphiboles:

- Cummingtonite

### Oxides Spinel:

- Magnetite

### Oxides-Haematite:

- Ilmenite

### Other:

- Quartz
- Glass
- Epidote
- CA or Apatite
- Garnet?

---

Table 11.8: FFS – Augi. Chemical analysis of mineral filler.
Table 11.7: FTIR-Alangongomo. Chemical analysis of mineral filler.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Fabric</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Plagioclase Feldspars:**
- Biotite
- Labradorite
- Andesine-Labradorite
- Anorthite

**Pyroxenes:**
- Chromian Augite

**Amphiboles:**
- Cummingtonite
- Actinolite

**Oxides Spinel:**
- Magnetite

**Oxides-Haematite:**
- Limonite

**Other:**
- Quartz
- Glass
- Garnet
- Epidote

| Number of Analyses | 174 |
Identifying production and exchange – the results of the chemical analysis

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11657</td>
<td>M</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=15</td>
</tr>
<tr>
<td>11918</td>
<td>M</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=10</td>
</tr>
<tr>
<td>11915</td>
<td>M</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=10</td>
</tr>
<tr>
<td>10594</td>
<td>M</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=3</td>
</tr>
<tr>
<td>12489</td>
<td>P</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=11</td>
</tr>
<tr>
<td>11728</td>
<td>P</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=4</td>
</tr>
<tr>
<td>10969</td>
<td>P</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=4</td>
</tr>
<tr>
<td>10966</td>
<td>PM</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=5</td>
</tr>
<tr>
<td>11656</td>
<td>CA</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=7</td>
</tr>
<tr>
<td>11911</td>
<td>CA</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=7</td>
</tr>
<tr>
<td>10970</td>
<td>N</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=7</td>
</tr>
<tr>
<td>11922</td>
<td>N</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=5</td>
</tr>
<tr>
<td>12494</td>
<td>SP</td>
<td>Anorthite</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=3</td>
</tr>
</tbody>
</table>

Table 11.8 FOH square G – Adwe. Chemical analysis of mineral filler.

quartz and amphiboles. The magnetite fabrics have sands similar to those from the Alimbit River, while the pyroxene fabrics are similar to the Adi River sands, and possibly the Pulie River.

Sherds with calcareous fabrics have an eclectic variety of mineral inclusions including plagioclase feldspars, quartz, magnetite and pyroxenes. Again these sands are similar to those found locally on Adwe beaches.

Only three sherds with light fabrics were analysed. Two sherds which are unlike the rest in form and lip morphology (catalogue nos. 2392 and 2393) have quartz, amphiboles and pyroxenes, with no plagioclase feldspars. Such sands are not commensurate with those from south or north coast sand samples. The other sherd has plagioclase feldspars, pyroxenes and amphiboles. Similar sands are found in the Anu River.

Two sherds with inclusion free fabrics were analysed. Both have amphiboles, one has pyroxenes, the other quartz and plagioclase feldspar. These were only identified using high magnification.

One Type X sherd was analysed. It contained microscopic quartz and alkali feldspars. The latter have not been identified from the south coast of West New Britain.

**Apale – FOJ**

Twenty-five samples – Table 11.10.

Seven sherds from ferromagnesium fabrics were analysed. Four magnetite and three pyroxene. All four magnetite fabric sherds as expected had magnetite with pyroxene, while two had quartz, and one plagioclase. Of the three sherds with pyroxene fabrics, two had quartz in addition to pyroxene and magnetite, while one had an amphibole. The magnetite fabric have sands similar to those from the Alimbit River, while the pyroxene fabrics have sands similar to those from the Pulie River.

Four sherds with light fabrics were analysed. Two were uniform with quartz, amphiboles and magnetite; one had quartz, pyroxene and also an amphibole; while one had a number of different plagioclase feldspars in addition to amphiboles, pyroxene and quartz. These sands are not out of place in the Anu River sands.

Eight sherds with calcareous fabrics were analysed, none of which contained plagioclase feldspars, unlike the Adwe samples. All except one contained pyroxene and magnetite. Two had in addition amphiboles, one of which also had olivine, and one sample had quartz. Only one sample was ferromagnesium free, containing quartz along with its calcareous inclusions. The absence of plagioclase in these calcareous sands is unusual.

Six sherds with inclusion free fabrics were analysed. All contained minerals seen at higher magnification, including plagioclase feldspar, quartz, magnetite, pyroxene and amphibole.

**Paligmete – FNY**

Only one sherd was analysed from FNY – Type X. Four analyses were made on microscopic inclusions – the only ones visible. All were quartz.

**Discussion**

The analysis of the mineral grains will be discussed in full after the chemical results of the pot matrix are outlined below. Enough has been reported, however, to suggest that all north coast assemblages contain grains found in sands from the Willaumez Peninsula, while all...
Table 11.9  FOH squares D, E and F – Adae. Chemical analysis of mine fill

<table>
<thead>
<tr>
<th>SAMPLE NO.</th>
<th>FABRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PLAGIOCLASE FELDSPARS:
- Bytownite
- Labradorite
- Andesine-Labradorite
- Anorthite

### ALKALI FELDSPARS:

### PYROXENES:
- Chromian Augite
- ChromianFerro Augite

### AMPHIBOLES:
- Cummingtonite

### OXIDES SPINEL:
- Magnetite

### OTHER:
- Quartz
- Glass
- Zeolite

<table>
<thead>
<tr>
<th>NUMBER OF ANALYSES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
### Table 11.10 FOU - Apollo. Chemical analysis of mineral fill.

<table>
<thead>
<tr>
<th>SAMPLE NO.</th>
<th>FABRIC</th>
<th>PLAGIOCLASE</th>
<th>FELDSPARS:</th>
<th>PYROXENES:</th>
<th>AMPHIBOLES:</th>
<th>OXIDES SPINEL:</th>
<th>OTHER:</th>
<th>NUMBER OF ANALYSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>6411</td>
<td></td>
<td></td>
<td>Labradorite</td>
<td>Chromian Augite</td>
<td>Actinolite</td>
<td>Magnetite</td>
<td>Quartz</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Andesine-Labradorite</td>
<td>Cummingtonite</td>
<td></td>
<td>Titaniferous Magnetite</td>
<td>Glass</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Glassy Oligoclase</td>
<td></td>
<td></td>
<td></td>
<td>LEPINE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Anorthite/Biotite</td>
<td></td>
<td></td>
<td></td>
<td>OLIVINE</td>
<td></td>
</tr>
</tbody>
</table>

Note: The table lists various mineral components and their presence in different samples. The number of analyses for each sample is also provided.
south coast assemblages, with the exception of the two Type X samples and two anomalous samples (catalogue nos. 2392 and 2393), contain grains found in sands from south coast rivers. The south coast rivers, however, are spread along a greater coastline suggesting a movement of the grains from localised river sources. Whether they were moved as raw materials or as parts of the pots themselves will be addressed after the analysis of the pot matrix is presented below.

**CHEMICAL ANALYSES OF POTTERY FROM ADWE: FOH SQUARES D, E AND F**

**The sample**
Initially a total of 40 sherds were sought for analysis, however, because of increased probe access, that number was later expanded to 61.

**Initial sampling**
To achieve the initial sampling, one square was selected to form a population: square D1. Forty-one sample rim sherds were in fact chosen at random. As the rim and pot stand sherd population of square D1 was only 53, a more than adequate coverage of that population (77%) was selected (Table 11.11 and 11.12). Sherds sampled were also selected from those rims in which vessel form was not identified - here categorised under the heading 'X'. Also a single Type X fabric sherd was selected from the upper unit.

**Extra samples**
Due to increased access to the microprobe a further 11 rim sherd samples were chosen, eight from square D2, one from F1 and two from F3. Also nine miscellaneous sherds were selected due to their unique features, making an extra 21 samples.

**Table 11.11** Rim and pot stand sherd distribution per unit/fabric. FOH – square D1. Numbers in brackets = sampled for electron microscopy.

<table>
<thead>
<tr>
<th>Fabric</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>7(2)</td>
<td>4(4)</td>
<td>0</td>
<td>0</td>
<td>1(0)</td>
<td>3(2)</td>
<td>0</td>
<td>1(1)</td>
<td>1(1)</td>
</tr>
<tr>
<td>P</td>
<td>2(2)</td>
<td>0</td>
<td>1(1)</td>
<td>2(2)</td>
<td>6(5)</td>
<td>1(1)</td>
<td>1(1)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PM</td>
<td>0</td>
<td>1(1)</td>
<td>0</td>
<td>0</td>
<td>1(1)</td>
<td>1(1)</td>
<td>0</td>
<td>1(1)</td>
<td>1(1)</td>
</tr>
<tr>
<td>CA</td>
<td>3(2)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1(0)</td>
<td>1(1)</td>
<td>1(1)</td>
<td>1(1)</td>
<td>0</td>
</tr>
<tr>
<td>L</td>
<td>1(1)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2(1)</td>
<td>1(1)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>N</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4(4)</td>
<td>0</td>
<td>0</td>
<td>1(1)</td>
<td>0</td>
</tr>
<tr>
<td>Type X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2(1)</td>
<td>1(1)</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>15</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Total sampled</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>11</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>% Sampled</td>
<td>54</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>73</td>
<td>86</td>
<td>100</td>
<td>100</td>
<td>75</td>
</tr>
</tbody>
</table>

**Table 11.12** Rim and pot stand sherd distribution per vessel form/fabric. FOH – square D1. Numbers in brackets = sampled for electron microscopy.

The sampling strategies and results of the chemical analysis for each site are presented separately. As outlined in Chapter 4, to help exploratory data analysis and pattern recognition of the chemical results the following approach was taken. First, the complete sample set from each site was analysed using Rotated Principal Components Analysis. The Component scores were used to produce a two dimensional plot, and also a three dimensional plot. The latter plot was produced using acrospin.

Secondly, a hierarchical clustering technique was used on the component scores produced from the PCA. Euclidean distance was used to quantify compositional similarity, and the Group Average method of clustering was used to produce dendrograms.

After comparing the data patterning produced by the PCA plots and dendrograms produced by the Group Average method, Chemical Paste Compositional Reference Units (CPCRUs) were defined. Quite often the partitioning between CPCRUs can only be identified in three dimensions. To show this in two dimensional plots, the first and second, first and third, and in some cases where necessary the second and third components are presented, along with the resultant dendrogram.
a total of 61 samples for analysis. The reasons for selecting these samples are discussed below:

i. Square D2 rims

The eight D2 rims were chosen for the following reasons:

Two are examples of vessel form VI - everted rims from globular bodied pots (catalogue nos. 1363 and 1370, both from unit C). Both have grooving on the outside of the vessel at the junction of the rim and neck (opposite the inside corner point). Both are from magnetite fabrics and are probably from the same vessel (Fig. 5.28). If so they would be useful in assessing the validity of the chemical groupings - i.e. they should be allocated to the same CPCRU.

One was selected to add to the form V vessels with linear incised decoration from the upper units. The selected sherd (catalogue no. 1262) is from unit D and is an outcurving rim with linear incised decoration on the neck and a notched rim. It has a calcareous fabric.

Two vessel form V sherds were selected because of their unusual fabrics. Both have light fabrics, although the inclusions are coarse (catalogue nos. 2392 and 2393, Fig. 5.14). Both are from unit A.

One sample was selected to increase the number of form IV vessels. It has a calcareous fabric and comes from unit C.

One sample was selected to increase the form I population. It comes from unit D, is made from a calcareous fabric and has dentate decoration (catalogue no. 1264).

The last sample was selected to increase the form VIII vessels. It is part of a stand and is made from an inclusion free fabric (catalogue no. 1384).

Although square D1 still constitutes the population for sampling with extra samples added, if both D1 and D2 are taken together as a new sample population, the addition of eight sherds reduces the sampled population to 50% which is still more than an adequate sample for analysis (Table 11.13).

ii. Non-D1 or D2 rim samples

Three further rim sherds were selected for analysis. They are discussed separately as they were not from either square D1 or D2. One rim was selected from square F1 as it came from a flat bottomed form I vessel identical to one published by Kirch (Fig. 5.3; catalogue no. 6409). It was important to ascertain if its production was local or not.

Two others were selected, both from square F3 unit E, to bolster the form IV (catalogue no. 8540; Fig. 5.13) and V (catalogue no. 9006) numbers. The latter sample has its lip cut.

As mentioned above D1 is viewed as constituting the population for sampling with extra samples added. Yet even if the population for sampling constituted all squares (rim and pot stand sherds), a respectable sample is still represented (Table 11.14).

iii. Miscellaneous samples

Nine non-rim sherds were also selected for microprobe analysis. The reason for selection was either based on their unusual form or decoration.

Form: Two sherds, both from unit C, were selected in this category. One made from a magnetite fabric could be part of a handle, while the other made from a pyroxene fabric is part of a flat base (catalogue no. 241).

Decoration: The rest were selected because of their decoration. The first (catalogue no. 4279) was selected to represent grooved/channelled decorated ware. It is a neck sherd with wide channelled/banded decoration and is made from a pyroxene fabric (Fig. 5.25 for similar ware). The remaining six have dentate decoration. Five of these are made from a magnetite fabric characteristic of many of the dentate sherds from FOH squares D, E and F. As such an examination of their relationship with other pottery groups is important.

### Table 11.13 Rim and pot stand distribution per unit/fabric. FOH squares D1 and D2. Numbers in brackets = sampled for electron microscopy.

<table>
<thead>
<tr>
<th>Fabric</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Top</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>3(2)</td>
<td>18(4)</td>
<td>13(7)</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>36(13)</td>
<td>36</td>
</tr>
<tr>
<td>P</td>
<td>4(4)</td>
<td>4(3)</td>
<td>5(2)</td>
<td>2(2)</td>
<td>1(1)</td>
<td>0</td>
<td>16(12)</td>
<td>75</td>
</tr>
<tr>
<td>PM</td>
<td>3(2)</td>
<td>3(1)</td>
<td>2(1)</td>
<td>0</td>
<td>0</td>
<td>8(4)</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>CA</td>
<td>3(2)</td>
<td>6(2)</td>
<td>8(2)</td>
<td>3(2)</td>
<td>0</td>
<td>0</td>
<td>20(8)</td>
<td>40</td>
</tr>
<tr>
<td>L</td>
<td>4(3)</td>
<td>3(1)</td>
<td>2(1)</td>
<td>0</td>
<td>0</td>
<td>9(5)</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>3(3)</td>
<td>1(1)</td>
<td>2(2)</td>
<td>0</td>
<td>0</td>
<td>6(6)</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Type x</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2(1)</td>
<td>2(1)</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>35</td>
<td>32</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>Total sampled</td>
<td>16</td>
<td>12</td>
<td>15</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>% Sampled</td>
<td>80</td>
<td>34</td>
<td>47</td>
<td>67</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

### Table 11.14 Rim and pot stand distribution per unit/fabric. FOH - squares D, E and F. Numbers in brackets = sampled for electron microscopy.

<table>
<thead>
<tr>
<th>Fabric</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>TOP</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>10(2)</td>
<td>35(4)</td>
<td>35(7)</td>
<td>5</td>
<td>4(1)</td>
<td>2(1)</td>
<td>91(15)</td>
<td>16</td>
</tr>
<tr>
<td>P</td>
<td>6(4)</td>
<td>20(3)</td>
<td>17(2)</td>
<td>11(2)</td>
<td>2(1)</td>
<td>1</td>
<td>57(12)</td>
<td>21</td>
</tr>
<tr>
<td>PM</td>
<td>8(2)</td>
<td>17(1)</td>
<td>15(1)</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>44(4)</td>
<td>11</td>
</tr>
<tr>
<td>CA</td>
<td>18(2)</td>
<td>25(3)</td>
<td>29(2)</td>
<td>6(2)</td>
<td>5</td>
<td>0</td>
<td>83(9)</td>
<td>11</td>
</tr>
<tr>
<td>L</td>
<td>12(3)</td>
<td>10(1)</td>
<td>13(1)</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>45(5)</td>
<td>11</td>
</tr>
<tr>
<td>N</td>
<td>9(3)</td>
<td>3(1)</td>
<td>7(2)</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>22(6)</td>
<td>27</td>
</tr>
<tr>
<td>Type x</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2(1)</td>
<td>2(1)</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>110</td>
<td>116</td>
<td>34</td>
<td>16</td>
<td>5</td>
<td>344</td>
<td></td>
</tr>
<tr>
<td>Total sampled</td>
<td>16</td>
<td>13</td>
<td>15</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>% Sampled</td>
<td>25</td>
<td>12</td>
<td>13</td>
<td>12</td>
<td>12</td>
<td>40</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>
Two sherds, from unit C, are from the same vessel (catalogue nos 1355 and 1364) and have a complex dentate decoration including a four-leaf clover design (see Fig. 5.17). Although not listed by Anson, such a motif is found in the Reef Islands, site RF-2 (Donovan, 1973: Fig. 6) and Site 13 in New Caledonia (Thorne and Raymond 1989:256). As they are from the same vessel they were selected to see if they chemically grouped together. This would be a good test to check the validity of the chemical analyses. The other three sherds came from units A (catalogue no. 718), B (catalogue no. 2609) and C (catalogue no. 2992). They have very fine Far Western motifs (Anson motif 275). The last dentate sherd (catalogue no. 2012), from unit B and made from a pyroxene fabric, was selected because of its unusual motif (Fig. 5.34).

Sample summary
The final sample per vessel form compared to the total number of vessels can be seen in the following two tables. Table 11.15 presents the total number of vessels by fabric, while Table 11.16 presents the number of vessels sampled by fabric.

Results
Five chemical compositional paste reference units, here labelled CPCRUs 1-5, are defined after PCA and hierarchical cluster analysis were conducted (see Table 11.17). CPCRUs 1, 2 and 4 separate out on both the first and second axis of the PCA plot, while CPCRUs 3 and 5 separate out only on the first axis. Fe and Mg load heavily on both axes. Figures 11.3 a-d show the PCA plots and dendrogram with clusters. Tables 11.18 and 11.19 show the distribution of vessel form and decoration respectively per CPCRU.

CPCRU summary
CPCRU 1
This chemical grouping comprises a number of vessel shapes and decorative techniques. It is distributed across units A to E and includes 11 of the 15 dentate samples analysed. All have Far Western motifs (bowls, stands, and jars). Other vessel forms include plain form I, plain form II, form V with either notched or scalloped lips, and plain or linear incised upper bodies, and lastly plain form VI vessels. No one fabric is exclusive, although calcareous and magnetite fabrics account for 14 of the 23 samples.

CPCRU 2
This CPCRU is defined from nine samples. It is not a coherent group, and on comparisons with other sites (see below) it fragments in two, called for convenience 2i and 2ii. Like CPCRU 5 which is composed of outliers (samples which do not group with CPCRUs 1, 3 and 4), it is defined by dissimilarity, not similarity.

If taken as one group CPCRU 2 consists of nine vessel samples. Calcereous and pyroxene/magnetite fabrics are absent from this CPCRU. Lights make up the major fabric group here, and indeed of the five light fabric samples analysed from this site, four are grouped into this CPCRU. The Type X sample is also found here.

A number of vessel forms are found in this CPCRU, although form V vessels are dominant making up four of the nine samples. These four, however, are made using three different fabrics. Other forms include a dentate form I vessel, two unusual rimmed vessels (Fig. 5.14; catalogue no. 2393), two form VI vessels and a single plain form VIII stand. The single dentate vessel made from a light fabric has Far Western motifs (417, 167), although they are crudely executed compared to those made from the magnetite fabrics and found in CPCRU 1.

CPCRU 3
CPCRU 3 consists of 17 samples, all from the bottom three units. This comprises 16 vessels, one sample being a possible handle.

This CPCRU represents mostly a plain ware covering a range of vessel forms and a restricted suite of fabrics. Only four of the vessels are decorated. This includes lip modification (n=2), fingernail impressed (n=1) and grooved/channelled (n=1). Light or pyroxene/magnetite fabrics samples are absent in this CPCRU. Fourteen of the 17 samples (82%) are made from magnetite or pyroxene fabrics. A single calcereous fabric and two inclusion free fabric samples make up the rest.
A number of vessel forms are found, although over half of these are either form V or form VI vessels. The other forms include form I, form II, form III, form IV, and form VIII vessels.

**CPCRU 4**

This CPCRU is made up of eight samples comprising a number of fabrics and vessel forms found in units A, B, C and D. Only the light fabric is absent from this CPCRU. Vessel forms comprise form IV and V, form VI, and form VIII. Form I vessels are absent.

Decoration is found on three vessels. Notching is on the lip of a form V vessel, excision is found on form VIII stands, and dentate is found on two body sherds from the same vessel. The dentate body sherd catalogue no. 2012 joins with catalogue nos. 2012a and 2015. They have a variant of the motif 422 with a band of motif 345 above (Fig. 5.34). This motif has only been found in the Reef/Santa Cruz sites.

**CPCRU 5**

CPCRU 5 represents outliers to the other clusters – the only thing they have in common is their remoteness to the other groups, rather than any similarity with each other. It is comprised of sherds from four vessels. Two dentate form I, one shouldered pot and one form V with fingernail impressions.

Dentate is also found in CPCRU 4 (n=1) and both outlier groups: CPCRU 2 (n=1) and 5 (n=2). The ubiquitous pyroxene fabric is found in all CPCRUs containing samples with dentate decoration.

**Linear incised**

Only one linear incised sherd was analysed – being allocated to CPCRU 1, the dominant dentate group. It is made from a calcareous fabric similar to the dentate sherds.

**Fingernail impressed**

Of the two fingernail impressed vessels included in the analysis both group with different CPCRUs: non-dentate CPCRU 3 and outlier CPCRU 5.

**Grooved/channelled**

Only one grooved/channelled sample was analysed. This was allocated to CPCRU 3 (non-dentate CPCRU).

**Fabric summary**

There are three definite chemical groupings (CPCRU) based on similarity which can be equated to three clay resource zones: CPCRU 1, 3 and 4. CPCRUs 2 and 5, on the other hand, are heterogeneous groups where each sample could have come from a different resource zone. This includes the Type X sherd which contains K feldspar, a mineral not associated with south coast sands. CPCRU 2 also lacks calcareous fabrics made from beach sands. On this basis, samples from CPCRU 2 could be non-local to the south coast. The same applies to CPCRU 5, whose samples form outliers and separate from the other groups.

A wide variety of vessels were produced from each of the CPCRU clay resource zones suggesting no simple correlation between resource zone and fabric with vessel form. All of the three local CPCRUs (1, 3 and 4) produced a wide variety of vessels, except that those carrying dentate decoration are only found in CPCRU 1 and 4. CPCRU 3 is mostly plain except for two examples of lip modification and the unusual channelled vessel and the fingernail impressed carinated jar.

No single fabric is found exclusive to a CPCRU (Table 11.20). Pyroxene, magnetite and inclusion free fabrics are found in all chemical groupings, although ferromagnesium fabrics dominate in CPCRU 1 and 4. Light fabrics are mostly found in the heterogeneous (non-local?) CPCRU 2, although one is found in CPCRU 1. Calcereous fabrics are only absent in CPCRU 2.

If fabric is simply associated with one of the major river systems from the south coast, then clays from the CPCRUs 1, 3 and 4 resource zones are used in association with minerals from nearly every major river system on the south coast.

**CHEMICAL ANALYSIS OF POTTERY**

**FROM ADWE: FOH SQUARE G**

**The sample**

Fifty-two samples were selected for analysis: 50 of the 55 rims, and two of the three pot stands. This is a more...
than adequate sample. The eight not selected for analysis included one stand (catalogue no. 10595); both pot legs; two rims from form V vessels including one of the two dentate vessels made from a light fabric (catalogue no.10981) and a plain vessel made from magnetite fabric (catalogue no. 11917); both sherds with grooved/channelled decoration (catalogue nos. 11730 and 10132); and lastly a rim whose vessel form was not determined (catalogue no. 11734). These were not selected due to either their friability or small size.

The results
Five chemical groups here labelled CPCRUs 1-5 were defined (Figs 11.4a-b, Table 11.21). CPCRUs 1, 2, 3/4 and 5 separate out on the first axis of the PCA plot on which Ca loads heavily, while CPCRUs 3 and 4 separate out on the second axis on which K loads heavily. All five CPCRUs are well defined and compact. Tables 11.22 and 11.23 show the distribution of vessel form and decoration respectively per CPCRU.
Identifying production and exchange – the results of the chemical analysis

Chapter 11

Fabric 1 2 3 4 5 All River system
M 9 2 8 1 1 21 Adilbit
P 5 1 6 2 1 15 Adi
PM 2 - - 2 - 4 Puli, Adi
CA 5 - 1 2 1 9 Local
L 1 4 - - - 5 Anu
N 1 1 2 1 1 6 Local
X - 1 - - - 1 Non-local
All 23 9 17 8 4 61

Table 11.20 Distribution of fabrics per CPCRU. FOH sq. D, E and F.

CPCRU summary

CPCRU 1
CPCRU 1 incorporates 17 samples comprising three vessel forms and all fabrics except inclusion free.

Of the three vessel forms, form V make up the majority (n=12; 75%), while form I and form VI are represented by two vessels each. Only one vessel has dentate decoration (form I), and three have incision (form V). Lip modification is found on nine form V vessels including three with incision. The rest are plain. A number of different fabrics were used to make this vessel form.

CPCRU 2
CPCRU 2 includes seven samples comprising mostly form V vessels (n=5), and one each of vessel form VI and form IV.

Dentate decoration is found on one vessel (form IV), and notching is found on only two of the five form V vessels. The rest are plain. The fabrics are predominantly ferromagnesiuin. Only one vessel was made from a non-ferromagnesium fabric: the dentate form IV vessel was made from a light fabric. Calcareous and inclusion free fabrics are absent in this CPCRU.

CPCRU 3
CPCRU 3 is defined by five samples, made up mostly from the same suite of fabrics as found in CPCRU 2 with inclusion free and calcareous fabrics absent. Two vessel forms are represented – form V (n=1) and VI (n=2). Two rims with an undetermined rim stance are also allocated to this group. Only one vessel has any form of decoration – notching on the lip of a form V vessel.

Figure 11.3c  FOH squares D, E and F. PCA plot components 2 and 3.

Figure 11.3d  FOH squares D, E and F. PCA plot components 1 and 3.
Identifying production and exchange – the results of the chemical analysis

Figure 11.4a CPCRU - FOH square G - Adwe.

Figure 11.4b FOH square G. PCA plot components 1 and 2.

Table 11.21 No. of samples per CPCRU. FOH square G.

<table>
<thead>
<tr>
<th>CPCRU</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
</tr>
</tbody>
</table>

CPCRU 4 consists of seven samples. Five form V (carinated jar with outcurving neck) vessels and one spout are identified, while one rim is from an indeterminable vessel stance. Decoration is found on four of the form V vessels: two have cut lips, one has notched rim only, and one has a notched rim with linear incision. The spout has cuts on the lip. Three fabrics are found in this CPCRU: calcareous (n=2), inclusion free (n=2), and pyroxene (n=3).
Table 11.22 Distribution of vessel form per CPCRU. FOH square G.

<table>
<thead>
<tr>
<th>Vessel form</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form I</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Form III</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Form IV</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Form V</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>Form VI</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Form VIII</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>All</td>
<td>17</td>
<td>7</td>
<td>5</td>
<td>7</td>
<td>16</td>
<td>52</td>
</tr>
</tbody>
</table>

Table 11.23 Distribution of decoration per CPCRU. FOH square G.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Linear/ notched</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Impressed</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Notched lip only</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Cut lip</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Cut out/ grooved</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Plain</td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>9</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>7</td>
<td>5</td>
<td>7</td>
<td>16</td>
<td>52</td>
</tr>
</tbody>
</table>

Table 11.24 Distribution of dentate vessel form per CPCRU. FOH square G.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Linear incised/ notched</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Notched</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Grooved lip</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Plain</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>All</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>8</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 11.25 Distribution of form V vessel decoration per CPCRU. FOH square G.

<table>
<thead>
<tr>
<th>Fabric</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>5</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>P</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>PM</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>CA</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>L</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>All</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>8</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 11.26 Distribution of form V vessel fabric per CPCRU. FOH square G.

CPCRU 5

CPCRU 5 comprises 16 samples. These make up a number of vessel forms: form V (n=8), form VI (n=3), form III (n=1), and form VIII (stands n=2). Two rims come from unknown upper vessel forms.

Dentate is found on a form V jar and a form VIII stand. The other form V vessels have either a notched lip with or without incision, are plain or have a grooved lip. The other form VIII stand has triangular cut-outs. All form VI pots are plain. All fabrics are found in this CPCRU.

Vessel form and decoration summary

Dentate summary

Four dentate vessels are found in three of the five CPCRU (Table 11.23 and 11.24). Three vessels are made from a light fabric (CPCRU 1, 2 and 5) and one is made from a calcareous fabric (CPCRU 5). Two of the vessels analysed (form V and VIII) have motif 496.

Form V vessels – carinated jar with outcurving neck

The major vessel form is form V (Table 11.22).

As seen in Tables 11.25 and 11.26 the production of this vessel form was not restricted to one CPCRU or fabric. Form VI vessels in CPCRU 1 and CPCRU 5 were made from a variety of fabrics.

Form VI vessels – everted round bodied pot

Round bodied pots with everted rims are found in all CPCRU except 4, and are made from a variety of fabrics except inclusion free and pyroxene/magnetite (Table 11.27).

Other vessel forms

Form I vessels: Both are allocated to CPCRU 1. Note that these represent two of the three form I (bowls) found in squares G1 and G2.

Form III and IV vessels: Only two vessels were analysed and grouped with CPCRU 5 and 2 respectively.

Form VIII: Both stands analysed grouped with CPCRU 5. Note that these represent two of the three form VIII stands found in squares G1 and G2.

Miscellaneous: Of the six miscellaneous rims analysed, one grouped with CPCRU 1, two grouped with CPCRU 3, one with CPCRU 4 and two with CPCRU 5.

Fabric summary

The chemical analysis shows an eclectic grouping of form V and form VI vessels, with only a limited number of fabrics.
other forms analysed. This reflects the preponderance of form V vessels in this assemblage. They are found in all CPCRU while form VI vessels are found in all except CPCRU 4. Form I vessels are restricted to CPCRU 1 and form VIII to CPCRU 5.

No one fabric is wholly associated with a particular CPCRU or with form V jars. As with the results from FOH squares D, E and F, sands from a number of river systems are used with each clay source (Table 11.28).

**CHEMICAL ANALYSIS OF POTTERY FROM APALO: FOJ**

**The sample**

**Rim samples**

It was decided to sample 30% of all rims and capture the full variety of form, decoration and fabric from the assemblage. As extra time on the microprobe was available, a sample of 66 rims forming 38% of all rims was finally selected (Table 11.29).

**Extra non-rim samples**

Although the major decorative elements are covered in the sample (Table 11.30), extra samples were selected to increase coverage of decorative types. Three sherds were chosen to increase the sample of linear incised decoration. Two samples are made from pyroxene fabric, one each from unit B and C, the other from an inclusion free fabric from unit B. All three are identical in decoration it was intended to see if they could be chemically differentiated, as suggested by their different fabrics.

One sherd was selected to increase the sample of fingernail impressed decoration. The sherd from unit A is from a collared vessel made from an inclusion free fabric (Fig. 7.12; catalogue no. 3713).

Another sherd from unit A was selected because of its unusual decoration. It has a shell impressed row of triangular patterns below its carination. This unusual sherd which, was not assigned a vessel form, is made from a magnetite fabric (Fig. 7.12; catalogue no. 3712).

Three sherds, from unit B were selected to increase the dentate sample. Two have decoration similar to that found from Kreslo (see Chapter 9). One is made from a light fabric, the other an inclusion free fabric (Fig. 7.11; catalogue nos. 4016 and 336). The third dentate sherd is made from a calcareous fabric.

This brings the probe sample number to 74 (Table 11.31).

**Results**

Six CPCRUs (1-6) are defined (Table 11.33). Using PCA, CPCRUs 1, 2 and 4 separate on the first axis where Fe loads heavily. On the second axis on which K loads heavily, CPCRUs 3, 4 and 5 separate out. CPCRU 1 also separates on the third axis (Figs 11.5a-c). Tables 11.34 and 11.35 show the distribution of vessel form and decoration respectively per CPCRU.

**CPCRU summary**

**CPCRU 1**

This chemical grouping is characterised by vessels made from a light fabric and a limited range of vessel forms. Vessel form III (n=2), form IV (n=1) and form V (n=2) are identified here. Dentate is found on both one vessel (form IV), and a body sherd. Linear incision with notched lip is found on both form V vessels. The rest are plain.

Only one sample is made from a non-light fabric: a form V vessel with lip notching and linear incision made from a calcareous fabric.

Samples come from the three bottom units – none are from the top unit A.

**CPCRU 2**

This chemical grouping comprises a number of vessel forms including form I (n=2), form II (n=1), form III (n=1), and form V (n=4).
Identifying production and exchange – the results of the chemical analysis

Chapter 11

Table 11.31 Total number of samples for electron microscopy – distribution of fabrics per unit. FOJ.

<table>
<thead>
<tr>
<th>Fabric</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>P</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>PM</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>CA</td>
<td>1</td>
<td>8</td>
<td>11</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>L</td>
<td>0</td>
<td>7</td>
<td>6</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>N</td>
<td>5</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>27</td>
<td>31</td>
<td>6</td>
<td>74</td>
</tr>
</tbody>
</table>

Table 11.32 Distribution of the total number of vessels and the number of samples selected for electron microscopy per vessel form. FOJ.

<table>
<thead>
<tr>
<th>CPCRU No.</th>
<th>Sample population</th>
<th>Total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>2 1 0 0 6 1 1 0 0</td>
<td>14 20 6 2 51 1 7 2</td>
</tr>
<tr>
<td>II</td>
<td>3 1 2 0 25 0 2 1 0</td>
<td>9 17 4 2 19 0 4 1</td>
</tr>
<tr>
<td>III</td>
<td>9 17 4 2 19 0 4 1 0</td>
<td>0 1 0 0 1 0 0 0 0</td>
</tr>
<tr>
<td>IV</td>
<td>0 1 0 0 1 0 0 0 5</td>
<td>0 1 0 0 1 0 0 0 0</td>
</tr>
<tr>
<td>V</td>
<td>2 1 2 0 12 0 2 0 3</td>
<td>12 22 4 2 20 0 4 2</td>
</tr>
<tr>
<td>VI</td>
<td>4 5 2 2 9 0 1 0 7</td>
<td>0 1 0 0 1 0 0 0 0</td>
</tr>
<tr>
<td>VII</td>
<td>0 1 0 0 1 0 0 0 5</td>
<td>0 1 0 0 1 0 0 0 0</td>
</tr>
<tr>
<td>VIII</td>
<td>6 7 4 2 26 1 4 0 16</td>
<td>6 7 4 2 26 1 4 0 16</td>
</tr>
<tr>
<td>Other</td>
<td>0 0 0 0 83 100 100 0 0</td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>66 100 100 0 48 0 100 0 0</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>44 29 50 100 47 0 25 0 0</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>0 100 0 0 0 0 0 0 0</td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>43 35 66 100 51 100 57 0 0</td>
<td></td>
</tr>
</tbody>
</table>

Table 11.33 Number of samples per CPCRU. FOJ.

<table>
<thead>
<tr>
<th>CPCRU</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
</tr>
</tbody>
</table>

Dentate is found on both form I and V vessels. Although a number of fabrics have been used to produce vessel forms with dentate and linear incised decoration, this CPCRU is primarily made up of calcareous and ferromagnesium fabrics. Of the ten samples only two are from other fabrics.

Five vessels are from unit C, with three from unit B. No samples from unit A are found in this CPCRU. The three vessels from unit B include two form V vessels with notched lips and linear incision, and one form III vessel.

CPCRU 3
This CPCRU is defined by 12 samples from which eight vessels are identified. It comprises mostly form V vessels (n=6) with modified lips and either linear incised or plain bodies. They are made from either inclusion free or calcareous fabrics and are found mainly in the top two units. The other two vessels include a form I with collared rim and a form VI vessel with an unknown lower body form. Dentate is found only on a body sherd.

This is an inclusion free and calcareous fabric CPCRU. No light or ferromagnesium fabrics are found.

CPCRU 4
This CPCRU is more eclectic than those above and contains a diverse range of vessel form and decoration. It comprises 19 sherds making up 11 vessels including form V (n=5), form I (n=2), form VII (n=1), and form II.
Chapter 11

Identifying production and exchange – the results of the chemical analysis

Figure 11.5a CPCRU1s – FOJ – Apalo.

Figure 11.5b FOJ. PCA plot components 1 and 2.
Identifying production and exchange – the results of the chemical analysis

Figure 11.5c FOJ. PCA plot components 2 and 3.

Table 11.34 Distribution of vessel form per CPCRU. FOJ.

<table>
<thead>
<tr>
<th>Vessel form</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form I</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Form II</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Form III</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Form IV</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Form V</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>Form VI</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Form VII</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>Non-rims</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>All</td>
<td>7</td>
<td>10</td>
<td>12</td>
<td>19</td>
<td>19</td>
<td>7</td>
<td>74</td>
</tr>
</tbody>
</table>

Table 11.35 Distribution of decoration for per CPCRU. FOJ.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Linear incised</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Linear/scalloped</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Notched/linear incised</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>Incised</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Fingernail impressed</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Shell impressed</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Appliqué/scalloped</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Notched</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Cut lip</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Scalloped</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Plain</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>All</td>
<td>7</td>
<td>10</td>
<td>12</td>
<td>19</td>
<td>19</td>
<td>7</td>
<td>74</td>
</tr>
</tbody>
</table>

(n=3) vessels. It also includes seven rims from vessels where the body form is unknown.

Decoration includes dentate (both form I vessels), appliqué (form V), linear incised (form V), notched lips (form V) and shell impression (body sherd).

The samples in this CPCRU come from all units and were made from four fabrics: calcareous, lights, magnetite and pyroxene. Inclusion free fabrics are absent.

CPCRU 5
This is a predominantly non-ferromagnesium CPCRU with an eclectic array of vessel forms, although form V make up the majority as they do in this assemblage as a whole. This chemical grouping comprises 19 samples from which 13 vessels are identified: form V (n=7), form III and IV vessels (one each), form VII (flasks n=2 and incurving pot n=1), and a form II (n=1). Form I vessels are absent from this CPCRU.

This CPCRU also includes two linear incised sherds selected to compare with an identical sherd yet made with a different fabric (see CPCRU 3), a shoulder sherd with a band of dentate above the shoulder, and a fingernail impressed neck sherd selected to increase the sample of that decorative category. Decoration includes linear incised (form V), notched lips (form V), dentate (form IV), and fingernail impressed (form V).

This CPCRU (like CPCRUs 1 and 3) is predominantly a non-ferromagnesium fabric grouping. Only two of the samples are not from this fabric type, while the rest are made up calcareous, light and inclusion free fabrics. The bulk (n=17) are from units B and C.

CPCRU 6
This CPCRU is not a coherent chemical group, but is made up of outliers. It is made up of seven samples, five of which are from ferromagnesium fabrics and two from a calcareous fabric. Vessel forms include form I (with dentate n=1), form V (n=2), form II (n=2), and two rims from unknown vessel forms, one of which has dentate decoration.

Vessel form and decoration summary
Dentate
Twelve dentate sherds from a number of vessel forms were analysed from FOJ and are found in all CPCRUs.

Of the 12 samples analysed only three were from ferromagnesium fabrics, restricted to CPCRUs 4 and 6. There is good separation between fabrics and CPCRUs. Inclusion free is the only dentate fabric in CPCRU 3,
light the only one in CPCRU 1, inclusion free and calcareous in CPCRU 5, and light and magnetite in CPCRU 4. Only pyroxene or pyroxene/magnetite are non-ferromagnesium fabrics, their sources being a combination of those from CPCRU 1a and 3—the Anu River. CPCRU 6 contains mostly non-ferromagnesium fabrics, their sources being a combination of those from CPCRUs 1 and 2—the Anu and local. CPCRU 4 is the only eclectic chemical grouping. It is also the only group with such a diverse array of decoration including appliqué and shell impression, including the majority of samples with a magnetite fabric from this site.

Put another way, CPCRUs 1, 3 and 5 have mostly non-ferromagnesium fabrics, while CPCRUs 2 and 6 have mostly ferromagnesium and calcareous fabrics. This is more structured than the relationship between fabrics and clay sources in the CPCRUs from FOH, although it still necessitates a number of production centres producing identical wares.

If CPCRU s are ordered temporally, it can be seen that the sands from most river systems are used in the bottom three units, while the sands from the Anu dominated in the top unit. This could indicate a reduction in production centres over time. This will be further explored when comparing the chemical results with other sites including those from the north coast.

**Fabric summary**

Unlike the results from FOH there seems to be more structure in the temporal variability of CPCRUs and fabrics, and the relationship between fabrics and chemical groupings in FOJ.

CPCRUs 1, 2 and 5 are mostly found in units B and C, while CPCRU 3 is mostly found in the top two units. CPCRU 4 on the other hand is found in abundance in all units (Table 11.36).

Table 11.37 sets out fabrics per CPCRU. CPCRU 1 is characterised by mostly light fabrics—their nearest source being the Anu River. CPCRU 3 on the other hand contains calcareous and inclusion free fabrics that could be local to the Arawe area. CPCRU 5 contains mostly non-ferromagnesium fabrics, their sources being a combination of those from CPCRUs 1 and 3—the Anu and local. CPCRU 2 and 6, on the other hand, contain both calcareous and ferromagnesium fabrics coming from a number of river systems, while CPCRU 4 is the only eclectic chemical grouping. It is also the only group with such a diverse array of decoration including appliqué and shell impression, including the majority of samples with a magnetite fabric from this site.

**CHEMICAL ANALYSIS OF POTTERY FROM PALIGMETE: FNY**

**The sample**

Thirty-seven sherds were analysed using the microprobe. Samples were selected from the clay deposit (units 2 and 3) underlying the black midden material (unit 1). As the total rim population (including rims from Vessel form VIII stands) from these two deposits is only 69, a sample of 50% was aimed for (i.e. 35). So that fabric variation would be covered, samples were randomly selected from each of the fabric categories. Unfortunately some rims from the pyroxene and pyroxene/magnetite fabrics were too small for analysis with a sample of 40% and 21% selected respectively. Table 11.38 presents the distribution of rims (including those from stands) sampled for analysis per fabric group.

The following two tables (Tables 11.39 and 11.40) show the population of vessels and the number sampled. As can be seen in Table 11.40, 59% of all vessel forms from units 2 and 3 were sampled.

**Extra Samples.**

Two extra samples were selected for analysis. To include a sample of the Type X fabric, sample 1048 from unit 1 was selected.

**Results**

Five CPCRUs were defined (Table 11.41). Using PCA, CPCRUs 1, 2 and 4 separate on the first
Identifying production and exchange – the results of the chemical analysis

<table>
<thead>
<tr>
<th>Unit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 2</td>
<td>Total</td>
<td>13</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>No. Sampled</td>
<td>9</td>
<td>2</td>
<td>0</td>
<td>8</td>
<td>3</td>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td>% Sampled</td>
<td>69</td>
<td>25</td>
<td>0</td>
<td>67</td>
<td>60</td>
<td>33</td>
<td>45</td>
</tr>
</tbody>
</table>

| Unit 3 | Total | 6 | 2 | 4 | 2 | 2 | 0 | 18 |
| No. Sampled | 4 | 2 | 3 | 2 | 2 | 0 | 13 |
| % Sampled | 67 | 10 | 0 | 67 | 60 | 33 | 45 |

| All | Total | 19 | 10 | 14 | 16 | 7 | 3 | 51 |
| No. Sampled | 13 | 4 | 3 | 10 | 5 | 1 | 36 |
| % Sampled | 69 | 40 | 21 | 67 | 71 | 33 | 52 |

Table 11.38 Distribution of rims/stands and samples taken for electron microscopy per fabric/unit. FNY.

<table>
<thead>
<tr>
<th>Unit</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>4</td>
<td>4</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>41</td>
<td></td>
</tr>
</tbody>
</table>

Table 11.39 Distribution of the number of vessel form per unit. FNY.

<table>
<thead>
<tr>
<th>CPCRU</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
</tr>
</tbody>
</table>

Table 11.40 Sample number per CPCRU. FNY.

<table>
<thead>
<tr>
<th>Vessel form</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form I</td>
<td>3</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Form II</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Form III</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Form IV</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Form V</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Form VI</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Form VII</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Form VIII</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Unknown</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>All</td>
<td>16</td>
<td>5</td>
<td>5</td>
<td>9</td>
<td>2</td>
<td>37</td>
</tr>
</tbody>
</table>

Table 11.42 Distribution of vessel form per CPCRU. FNY.

<table>
<thead>
<tr>
<th>Decoration type</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentate</td>
<td>4</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Stamped impressed</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Incised/ notched</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Single tooth</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Shell</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Recent</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Notched lip</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Excised</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Plain</td>
<td>10</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>16</td>
<td>5</td>
<td>5</td>
<td>9</td>
<td>2</td>
<td>37</td>
</tr>
</tbody>
</table>

Table 11.43 Distribution of decoration per CPCRU. FNY.

axis where Mg and K loads heavily, while CPCRU 3 separates primarily from 1, 2 and 4 on the second axis where K loads heavily. CPCRU 5 is an outlier group, separated from the rest on the second axis (Figs 11.6a-b).

Tables 11.42 and 11.43 show the distribution of vessel form and decoration respectively per CPCRU.

CPCRU 1 summary

This CPCRU consists of 16 samples making up 11 vessels. These vessels represent a number of forms: form I (n=3), form II (n=1), form III (n=1), form IV (n=3), form VI (n=1), form VII (n=1), and form VIII stands (n=1). The other five samples are rims from unknown lower body forms.

Eight of the 11 vessels are plain with dentate found on all three form I vessels. Other decoration is found on the rims of unknown vessel form: dentate, shell impressions, and stick impression.

The sherds are from units 2 and 3 (n=6 and n=10 respectively) with a number of fabrics represented, although ferromagnesium and calcareous fabrics make up all but two of the samples.

CPCRU 2

CPCRU 2 contains five samples comprising four vessels: a plain form II vessel, a plain form III vessel, a shell impressed form V vessel, and a form VIII stand with excision. No dentate vessels are found.

The fabrics are mostly magnetite (n=3), with one calcareous and one light fabric represented. All five samples come from unit 2.

CPCRU 3

This CPCRU consists of five samples comprising four vessels representing two forms only: form V (n=2) and form I (n=2). Dentate is found on both form I and one of the form V vessels. Both form I vessels also have a grooved lip. The non-dentate form V vessel has a notched lip.

This CPCRU is characterised by ferromagnesium fabrics, with magnetite making up four samples and pyroxene the other. The sherds are predominantly from unit 3 with only one from unit 2.

CPCRU 4

CPCRU 4 is not a tight group and is well spread on the plot of the first two axis of the PCA. They seem to be the refugees from the other three CPCRU and unlike those from a Lapita assemblage. It contains nine samples comprising four vessels, four rims of unknown vessel form, and one
body sherd. Vessel forms include one form I, two form II, and one form V vessel. Decoration is restricted with notching found on the form I vessel, and two of the rims with undetermined body form. One of these rims has short incised marks found below the rim, while another has incised wavy decoration below the rim. The single body sherd was selected because of its fabric: Type X.

The sherds from this CPCRU seem unusual compared with the others.

CPCRU 5
This CPCRU contains only two rim samples and forms the outliers. One is from a form I vessel with dentate decoration, the other from an undetermined vessel form.
with a notched lip. The former vessel is made from a magnetite fabric, the latter from a light fabric.

**Vessel form and decoration summary**

**Dentate**
The eight dentate samples analysed were found in CPCRU 1, 3 and the outlier 5 (Table 11.43). They represent six form I vessels, one form V vessel, and one vessel with undetermined form. Fabrics used were magnetite, light and inclusion free.

**Other decoration**
Two sherds with shell impressed decoration were analysed and assigned to CPCRU 1 and 2 respectively. Only one sherd with stick impression was analysed. It was allocated to CPCRU 1. Notching of the lip is found in all CPCRUs except CPCRU 1 and 2 (Table 11.43).

**Fabric summary**
The distribution of fabric and CPCRU is similar to that from FOH squares D, E, and F and G: an eclectic variety of fabrics per CPCRU, with similar vessel forms made from a number of fabrics and chemical groupings (Table 11.44). Three of the CPCRUs (1, 2, and 3) form coherent chemical groupings, while two (4 and 5) do not. CPCRU 4 is made up of possible non-Lapita pottery, including Type X, incised, and an unusual rolled rim form. Decoration such as shell impressed, notched lips on form V vessels, on the other hand are made from the same CPCRU as dentate forms.

<table>
<thead>
<tr>
<th>Fabric</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>All</th>
<th>River systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>13</td>
<td>Alimit</td>
</tr>
<tr>
<td>P</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>Adi</td>
</tr>
<tr>
<td>PM</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>8</td>
<td>Adi, Pulie</td>
</tr>
<tr>
<td>CA</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>8</td>
<td>Local</td>
</tr>
<tr>
<td>L</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>Anu</td>
</tr>
<tr>
<td>N</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>Local</td>
</tr>
<tr>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>Non-local</td>
</tr>
<tr>
<td>All</td>
<td>16</td>
<td>5</td>
<td>5</td>
<td>9</td>
<td>2</td>
<td>37</td>
<td></td>
</tr>
</tbody>
</table>

**RESULTS OF THE ELECTRON MICROPROBE ANALYSIS ON THE POT MATRIX: ARAWE INTER-SITE COMPARISONS**

Comparison between the chemical groupings (CPCRUs) of different assemblages was made employing PCA and hierarchical clustering analysis using the Group Average method. Acrospin was also used to obtain a third dimension to the PCA plots. For CPCRUs from two sites to be considered the same, they must overlap in all three components.

Comparisons between sites are also useful in testing the integrity of the defined CPCRUs. Samples that regrouped or separated from their allocated CPCRU were noted. The results are as follows:

**Adwe FOH squares D, E and F and Apalo FOJ**

Three of the chemical paste compositional reference units from Adwe FOH squares D, E and F group with four from Apalo FOJ (Table 11.45 and Fig. 11.7).

<table>
<thead>
<tr>
<th>FOJ</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOH sq. D, E and F</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2i</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>2ii</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Apalo FOJ CPCRU 3**

CPCRU 3 from FOH squares D, E and F comprises mostly plain ware from a variety of vessel forms made from ferromagnesium fabrics. FOJ’s CPCRU 2 also contains a range of vessel forms made from ferromagnesium and calcareous fabrics.

**Adwe squares D, E and F CPCRU 2 and Apalo FOJ CPCRU 3**

As argued above, CPCRU 2 from FOH squares D, E and F is not a coherent group, and on comparisons with FOJ splits into two main clusters, 2i and 2ii, each fragmenting into further groups. That is, this group is defined by dissimilarity, not similarity. Samples from CPCRU 2i group with two of FOJ’s CPCRU 4 and 5. The one sample grouping with FOJ CPCRU 4 is from a form VI vessel made with a light fabric. The two samples grouping with FOJ CPCRU 5 are from a form V vessel made from a magnetite fabric and a form VIII stand made from an inclusion free fabric.

**Paligmete FNY and Apalo FOJ**

With the exception of one sample, the CPCRUs of FNY and FOJ do not overlap (Table 11.46 and Fig. 11.8). Sherd 428, allocated to FNY CPCRU 4, a calcareous fabric from an unknown rim stance, consistently overlaps with samples from FOJ CPCRU 5. FNY CPCRU 4 is a loose group. The group is defined as refugees from the other CPCRUs in FNY – they are not a coherent group. Other sherds from this group although clustering away from the other FNY CPCRUs and close with FOJ’s do not cluster when viewed using the three components.
Figure 11.7 CPCRU comparison between FOH squares D, E and F, and FOJ – overlapping CPCRUs.

Figure 11.8 CPCRU comparison between FNY and FOJ.
Identifying production and exchange – the results of the chemical analysis

Chapter 11

Table 11.46 Comparison between FNY and FOJ.

Table 11.49 Comparison between FOH squares G and FOJ.

Paligmete FNY and Adwe FOH squares D, E and F

Only one CPCRU from each site overlap: FOH CPCRU 2ii and FNY CPCRU 4 (Table 11.47 and Figs 11.9 a-b). Both these CPCRUs are not coherent groups and are made up of outlier samples. Their grouping has more to do with their dissimilarity with other groups than a common chemical similarity. Of interest is the grouping of both Type X sherds analysed from these sites.

Paligmete FNY and ADWE FOH square G

The bulk of samples from these two sites do not overlap on either the first and second axes of the PCA (Table 11.48 and Figs 11.10 a-b). Ca loads heavily on the first axis, while Mg loads on the second. While FNY’s CPCRU 4 and FOH square G’s CPCRU 5 at first seem to overlap on the PCA plot (Fig. 11.10b), on closer inspection only two samples from FOH’s CPCRU 5 group with two samples from FNY’s CPCRU 4 on the dendrogram (Fig. 11.10a). CPCRU 4 from FNY is not as a tight group, and is interpreted as made up of refugees other clusters.

Adwe FOH square G and Apalo FOJ

There is no overlap between the CPCRUs from these two sites (Table 11.49 and Figs 11.11 a-b). On the PCA plot three of FOH square G’s CPCRUs (3, 4 and 5) seem to cluster close to FOJ while two (1 and 2) are totally separated. Using acrospin the CPCRUs from both sites did not overlap.

Adwe FOH squares D, E, F and G

Only one CPCRU from each site overlap: CPCRU 4 from squares D, E and F and CPCRU 4 from square G (Table 11.50 and Figs 11.12 a-b). Although CPCRU 3 from squares D, E and F and CPCRU 5 from square G cluster close together on both the PCA plot and dendrograms, on closer inspection there is no overlap. For a finer discrimination, a second PCA was performed on an abridged data set excluding the other CPCRUs. This confirms the lack of overlap between squares D, E and F’s CPCRU 3 and square G’s CPCRU 5 (Fig. 11.12c).

Both the overlapping CPCRUs lack light inclusions. While CPCRU 4 from squares D, E and F comprises a variety of vessel forms, CPCRU 4 from square G is made up mostly of form V vessels.

Summary of Arawe inter-site comparisons

A minimum of 17 CPCRUs are identified from the Arawe assemblages (Table 11.51). More could be identified if extra samples were analysed. For instance CPCRU 2 from FOH squares D, E and F, and CPCRU 4 from FNY are loosely structured CPCRU and each sample could have come from different resource zones. The Type X samples analysed contain mineral grains not local to the south coast. Indeed their only clustering criteria are their dissimilarity from the other CPCRU. Also, although a couple of samples from FOH squares D, E and F’s CPCRU 2 group with FOJ’s CPCRU’s 4 and 5, this does not mean they all came from a similar source.

Three major points can be made based on the preceding analysis. First, the production of pottery is complex. Of the 17 defined CPCRU only one equates with one fabric. The rest have multiple fabrics. This means...
that a number of separate clay sources were selected with most utilising a similar suite of fabrics found along the coast of south west New Britain. This has implications for identifying the nature of interaction and mobility of the producers and users of this pottery and will be detailed in Chapter 12.

Secondly, a range of vessel forms were produced from a number CPCRUs using a number of fabrics suggesting no simple correlation between resource zone or fabric with vessel form. The use of a different range of fillers with similar clays would necessitate changes to the production process in some cases. Potters here are not conservative in their selection of minerals as is the case in Arnold’s or Peacock’s scenario (see Chapter 4).

Thirdly, although the same mineral sources were used in the production of the majority of pottery, three of the sites did not share clay sources. FOJ, FOH square G, and FNY, do not share CPCRUs with each other. FOH squares D, E and F on the other hand does. Four of the five CPCRUs from FOH squares D, E and F are shared with the other Arawe sites. That is, pottery from FOH square D, E and F, with the exception of one CPCRU,
Identifying production and exchange – the results of the chemical analysis

Figure 11.10a CPCRU comparison between FNY and FOH square G.

Figure 11.10b CPCRU comparison between FNY and FOH square G. PCA plot components 1 and 2.

are produced from clay sources found in all three other sites. This has implications for the nature of interaction although temporal factors must be at play. FOJ and FOH square G assemblages have been characterised as Western in nature, and later than the bulk of the assemblage from FOH square D, E and F. Similar clay sources could have been utilised over time, with differing proportions of mineral grains selected from different sources. This could provide information on the reduction of mineral selection and changes in resource exploitation.

The significance deriving from these three points in relation to the nature of production and distribution of pottery is presented at the end of this chapter after comparisons with the other sites are made.
Chapter 11  Identifying production and exchange – the results of the chemical analysis

Figure 11.11a CPCRU comparison between FOH square G and FOJ.

Figure 11.11b CPCRU comparison between FOH square G and FOJ. PCA plot components 1 and 2.
Figure 11.12a CPCRU comparison between FOH squares D, E and F, and square G.

Figure 11.12b CPCRU comparison between FOH square D, E and F, and square G. PCA plot components 1 and 2.
Chapter 11

Identifying production and exchange – the results of the chemical analysis

Figure 11.12c Comparison between FOH squares D, E and F's CPCRU 3 and square G's CPCRU 5. PCA plot components 1 and 2.

<table>
<thead>
<tr>
<th>Site CPCRU</th>
<th>Site CPCRU</th>
<th>River systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOH sq. D, E and F 1</td>
<td>FOJ 3</td>
<td>Alimbit, Adi, Pulie, Anu, Local</td>
</tr>
<tr>
<td>FOH sq. D, E and F 2</td>
<td>FNY 4</td>
<td>Alimbit, Adi, Anu, Local, Foreign</td>
</tr>
<tr>
<td>FOH sq. D, E and F 3</td>
<td>FOJ 2</td>
<td>Alimbit, Adi, Pulie, Local</td>
</tr>
<tr>
<td>FOH sq. D, E and F 4</td>
<td>FOH sq. G 4</td>
<td>Alimbit, Adi, Pulie, Local</td>
</tr>
<tr>
<td>FOH sq. D, E and F 5</td>
<td></td>
<td>Alimbit, Adi, Local</td>
</tr>
<tr>
<td>FOH sq. G 1</td>
<td></td>
<td>Alimbit, Adi, Pulie, Anu, Local</td>
</tr>
<tr>
<td>FOH sq. G 2</td>
<td></td>
<td>Alimbit, Adi, Pulie, Anu</td>
</tr>
<tr>
<td>FOH sq. G 3</td>
<td></td>
<td>Alimbit, Adi, Anu</td>
</tr>
<tr>
<td>FOH sq. G 4</td>
<td></td>
<td>Alimbit, Adi, Pulie, Anu, Local</td>
</tr>
<tr>
<td>FOJ 1</td>
<td></td>
<td>Anu</td>
</tr>
<tr>
<td>FOJ 4</td>
<td>FOH sq. D, E and F 2?</td>
<td>Alimbit, Adi, Anu</td>
</tr>
<tr>
<td>FOJ 5</td>
<td>FOH sq. D, E and F 2?</td>
<td>Anu, Local</td>
</tr>
<tr>
<td>FOJ 6</td>
<td></td>
<td>Alimbit, Adi, Pulie</td>
</tr>
<tr>
<td>FNY 1</td>
<td></td>
<td>Alimbit, Adi, Pulie, Anu, Local</td>
</tr>
<tr>
<td>FNY 2</td>
<td></td>
<td>Alimbit, Anu, Local</td>
</tr>
<tr>
<td>FNY 3</td>
<td></td>
<td>Alimbit, Pulie/Adi</td>
</tr>
<tr>
<td>FNY 5</td>
<td></td>
<td>Alimbit, Pulie, Adi</td>
</tr>
</tbody>
</table>

Table 11.51 Total number of CPCRUs in the Arawe assemblages.

RESULTS OF THE ELECTRON MICROPROBE ANALYSIS ON THE POT MATRIX: NON-ARAWE ASSEMBLAGES

Pottery from the non-Arawe sites is less varied in shape, decoration and fabric, and fewer samples were taken for electron microprobe analysis. Discussion of the results is not as detailed as above. Rather than look at single sites, as a first step assemblages within the southern (Kandrian) and northern (Talasea) regions are looked at separately. Within each region the sampling procedures are outlined first, followed by the results. This is followed by comparisons between the regions. The relationship of Kreslo to the other sites is looked at in the broader comparisons.

Kandrian area – FLF and FFS

The sample

FFS

Table 11.52 shows the distribution of samples selected for chemical analysis. As an analytical unit, Spit 7 was chosen to draw the sample. The initial sample was set at 24 which amounts to four samples per fabric group, except for the calcareous fabric group which contained only two samples, and the pyroxene/magnetite fabric group which contained three samples. Both calcareous fabric pieces were selected, while only one pyroxene/magnetite piece was chosen as all three were identical. Four samples were chosen from each of the light, magnetite, pyroxene and inclusion free fabric groups. Furthermore three extra samples were drawn from the light fabric group to represent variability within the fabric including one from spit 1 which contained unusual orange inclusions.

FLF

To cover the range of fabrics, fifteen sherd samples were selected from Trench 1 for chemical analysis. The following fabrics are represented: magnetite – five samples; light – seven samples; pyroxene/magnetite – one sample; and inclusion free – two samples. An additional inclusion free sample was selected from trench 1a to bring this...
Identifying production and exchange – the results of the chemical analysis

Chapter 11

<table>
<thead>
<tr>
<th>Spit</th>
<th>M</th>
<th>P</th>
<th>PM</th>
<th>CA</th>
<th>L</th>
<th>N</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>17(1)</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>39</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>11</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>43</td>
<td>3</td>
<td>62</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>28</td>
<td>2</td>
<td>48</td>
</tr>
<tr>
<td>7</td>
<td>15(4)</td>
<td>6(4)</td>
<td>3(1)</td>
<td>2(2)</td>
<td>79(6)</td>
<td>9(4)</td>
<td>115</td>
</tr>
<tr>
<td>All</td>
<td>64(4)</td>
<td>17(4)</td>
<td>11(1)</td>
<td>6(2)</td>
<td>237(7)</td>
<td>24(4)</td>
<td>359</td>
</tr>
</tbody>
</table>

% fabric in site | 18 | 5 |
% sampled from spit 7 | 25 | 67 | 33 | 100

Table 11.52 Distribution of fabric per spit. FFS. Samples for electron microscopy are in brackets.

Fabric total to three. No sample of the pyroxene fabric was selected due to its small number.

Results

Three CPCRU's are formed (Figs 11.13a-b).

CPCRU 1 contains the bulk of FLF samples including the magnetite fabrics with fine dentate decoration (n=5), and the pyroxene/magnetite samples with loosely structured dentate (n=1), with two light fabric sherds, and one inclusion free fabric sample.

CPCRU 2 contains the bulk of the FFS samples including light fabric (n=5), inclusion free (n=3), magnetite (n=2), pyroxene (n=2), and calcareous fabrics (n=2).

CPCRU 3 contains 12 samples. It is composed of a combination of FLF and FFS samples. Five of the seven light fabric sherd samples from FLF are grouped here, along with one FFS inclusion free sample. The rest are from FFS. This group is not as compact as the other two. It will be shown when comparing these sites with others that the bulk of this CPCRU groups with those from other areas.

Although three groups are formed using the dendrogram (Fig. 11.13a), from the PCA (Fig. 11.13b), groups 2 and 3 cluster away from group 1 on primarily the second axis in which Fe loads heavily, and to a lesser extent the first axis in which Mg loads heavily.

In describing the FLF assemblage in Chapter 9 it was noted that a correlation existed between fabric and decoration, in part due to the few vessels represented. Dentate sherds were associated with either a magnetite or pyroxene/magnetite fabric. Representatives of these sherds fall into CPCRU 1. Sherds with either linear incised, notched lips and fingernail impressions on the other hand were made from light fabrics. With the exception of two notched inclusion free rims, this is also the case with the FFS assemblage. Fingernail impressed and linear incised sherds were all made from a light fabric. It is these light fabric samples from FLF (n=5), with one inclusion free fabric, that group with the FFS sherds in CPCRU 3.

At FLF the dentate vessels, although made from different ferromagnesium fabrics, were produced at a different centre to the linear incised, fingernail impressed and notched decorated sherds. These latter vessels were produced at the same location as those from FFS on Apugi. As such, non-dentate vessels used at FFS and FLF were produced at the same place and distributed, albeit close by, while the dentate vessels from FLF were produced in different centres.

Were the pots made locally? The major river system close to the area is the Alimbit to the west, which is characterised by magnetite fabrics. This could have provided the magnetite for filler in the dentate sherds. The pyroxene/magnetite fabrics with dentate could also have come from further west (Pulie River). Both these types of pottery are found in the same CPCRU. Calcite fabrics are locally available while the closest source to provide the light fabric would be the Anu River near Wasum. It will be shown below that the bulk of samples from FLF (CPCRU 1) and FFS (CPCRU 2) do not group with other sites while most of those defined in CPCRU 3 do.

Talasea sites – FEA (Boduna) and Garua sites FSZ and FAO

The sample

FEA

The FEA samples were selected to cover fabric diversity (light, pyroxene, calcareous and inclusion free) from two different spits (Spits 2 and 7). Fifteen sherd samples were selected for this purpose (Table 11.53).

<table>
<thead>
<tr>
<th>Fabric</th>
<th>Spit 2</th>
<th>Spit 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pyroxene=Light</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Calcareous</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Inclusion free</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 11.53 Samples selected for electron microscopy. FEA.

FSZ

Nineteen samples were selected for chemical analysis, plus a further two samples from FAO. The assemblage from FAO was made up of mostly surface samples and these have not been subject to a detailed analysis. The samples from FSZ included 16 sherds with a diversity of decoration: one with notching, two with cuts, three incised, one with excision, two with appliqué, two with stick impressions, four dentate, and four plain. One sample from FAO had fingernail impressions while the other was from a form V jar with a scalloped lip.

Lapita Interaction 201
Chapter 11  
Identifying production and exchange – the results of the chemical analysis

1. FLF

2. FFS

3. FLF & FFS

Figure 11.13a CPCRU's - FLF and FFS - Kandrian area.

Figure 11.13b FLF and FFS. PCA components 1 and 2.

were produced from one fabric, dominated by plagioclase feldspar, varying amounts of pyroxene, and a little quartz.

Results

Three chemical groupings, CPCRUs, are present in the Talasea sites (Figs 11.14a-c). These include:

CPCRU 1: Contains FEA only.

CPCRU 2: Contains the bulk of the FSZ/FAO, along with two samples from FEA (FEA3, FEA13).

CPCRU 3: Contains three FEA samples (FEA2, FEA28, FEA36) and two FSZ samples (FSZ1957, FSZ2168).

CPCRU 3 separates from CPCRUs 1 and 2 on the first axis on which K loads heavily, while CPCRUs 1 and 2 separate from each other on the second axis on which Ca loads heavily. Although the FEA samples have a higher concentration of Ca which could be argued to be a result of Ca uptake in a marine environment, FEA and the Garua sites also separate on the third axis on which Mg loads heavily.

Thus the bulk of FEA (CPCRU 1) and FSZ/FAO (CPCRU 2) samples separate from each other, with two FEA samples grouping with FSZ. Both these sherds have light fabrics. A third group composed of five samples...
Identifying production and exchange – the results of the chemical analysis

Chapter 11

1. FEA  2. FSZ  3. FEA/FSZ

Figure 11.14a CPCRU - FEA, FAO and FSZ - Talasea area.

(CPCRU 3) separates from the rest. It will be shown when comparing these CPCRU with sites from the south coast that the samples from FEA (CPCRU 1) and FSZ/ FAO (CPCRU 2) do not cluster outside their region. Those from CPCRU 3, however, do so.

Taken in conjunction with the PIXE-PIGME analysis of obsidian extracted from pottery, and the chemical analysis of mineral filler outlined earlier in the chapter, a local Talasea area origin is posited for CPCRU 1 and 2. Thus a wide variety of decorated ware including dentate, fingernail impressed, linear incised and appliqué was locally produced.

North versus South: FSZ and FAO (Garua Island), FEA (Boduna), FLF (Alanglongromo), FFS (Apugi Island), and FNT (Kreslo)

Prior to outlining the results the sampling strategy used for Kreslo (FNT) is outlined. Thirty samples were selected for electron microprobe analysis. To cover the range of fabrics the following number of samples were selected from each fabric:

- Lights n=14 (11% of total light sample)
- Magnetite n=1 (9% of total magnetite sample)
- Pyroxene n=6 (37.5% of total pyroxene sample)
- Inclusion free n=3 (23% of total fabric sample)

Lapita Interaction 203
Chapter 11 Identifying production and exchange – the results of the chemical analysis

Pyroxene/magnetite n=3 (100% of this fabric group)
Calcareous n=3 (37.5% of this fabric group)

Results
When compared as a whole the PCA plot separates out FNT from the other assemblages on the first and to a lesser extent on the third axis (Fig. 11.15b). Mg loads heavily on the first axis, while both Ca and K load on the third. Hierarchical clustering analysis separates out the general areas: FLF and FFS; FEA; FSZ; and FNT (Fig. 11.15a).

There is some overlap between the north and south coast assemblages:

1. Three samples from FEA (FEA2, FEA28 and FEA36) group with FNT on both the PCA plot and dendrogram. Two samples from FSZ (FSZ1957, FSZ2168) group away from the other samples and close to FNT, but do not overlap. Both, however, cluster with Adwe FOH squares D, E and F (see below).
2. Samples from FEA group with FLF (FEA15) and FFS (FEA8, FEA12).
3. Samples from FFS group with FEA (FFS377) and FSZ (FFS4, FFS333).

It is of note that the FNT samples form a tight cluster considering that a variety of fabrics were used to produce pottery with a variety of decoration from dentate, linear incised, appliqué, and fingernail impression.

Summary of inter-site comparisons between the Non-Arawe assemblages
There is evidence of limited movement of pottery between the north and south coasts. First, three samples from FEA cluster with the FNT samples, and have a south coast origin. Secondly, three samples from FFS cluster with north coast CPCRUs, two with FSZ and one with FEA, and have a north coast origin. By and large, however, CPCRUs are site specific containing a range of decoration including dentate, fingernail impressed, linear incised, and appliqué.

COMPARISON BETWEEN THE CPCRUs
FROM WEST NEW BRITAIN:
ARAWE AND NON-ARAWE

To compare the Arawe sites with these other assemblages, each Arawe site will be dealt with in turn.

FOH squares D, E and F

South coast sites

FLF
All 16 samples from FLF form a tight cluster and totally separate from any samples from FOH squares D, E and F. They separate on the first axis of the PCA in which Mg loads heavily (Figs 11.16a-b).

FFS
Three sherds from FFS group with CPCRU 1 from FOH squares D, E and F: FFS374 (inclusion free), FFS288 (light with pyroxene), and FFS336 (calcareous). Both sites separate on both the first and second axis on which Mg and Fe load heavily (Figs 11.17a-b).

FNT
The samples from both sites separate on the second axis of the PCA on which K loads heavily. Although a few samples from each site overlap using hierarchical cluster analysis, no overlap is seen on the PCA plot (Figs 11.18a-b).

North coast sites

FEA
Two sherds from FEA, both with pyroxene fabrics, group with CPCRU 1 from FOH squares D, E and F: FEA8 and FEA12. The CPCRUs from FOH separate from the bulk of FEA on the first axis of the PCA on which Fe loads heavily (Figs 11.19a-b).

FSZ and FAO
Two samples from FSZ group with CPCRU 2 from FOH squares D, E and F: FSZ1957 and FSZ2168. These two
Identifying production and exchange – the results of the chemical analysis

Chapter 11

Figure 11.15a CPCRU comparison between north and south coasts. FLF, FFS, FNT, FEA, FSZ and FAO.

Figure 11.15b CPCRU comparison between non-Arawe sites. PCA components 1 and 3.

samples grouped away from the other FSZ samples when compared to other north and south coast sites (see above). The bulk of Adwe and Garua samples separate on both the first and second axis on which Mg and Fe load heavily respectively (Figs 11.20a-b).

Summary
The CPCRUs defined in Alanglongromo FLF and Kreslo FNT do not overlap with any from Adwe FOH squares D, E and F. Evidence for the movement of pottery along the south coast and from the south to north coasts comes from Boduna FEA and Garua FSZ on the north coast, and Apugi FFS on the south coast. Three sherds from FFS and two from FEA group with FOH square D, E and F’s CPCRU 1. The origin of these sherds is south coast. Two sherds from FSZ group with FOH D, E and F’s CPCRU 2. The origin of these sherds is unknown. As argued earlier, CPCRU 2 from FOH squares D, E and F, is a loosely structured CPCRU.

FOH square G
South coast sites

FLF
There is no overlap between the CPCRUs defined from FLF and FOH square G. They are separated primarily
Identifying production and exchange – the results of the chemical analysis

Figure 11.16a CPCRU comparison – FOH squares D, E and F, and FLF.

Figure 11.16b CPCRU comparison – FOH squares D, E and F, and FLF. PCA components 1 and 2.
Identifying production and exchange – the results of the chemical analysis

Figure 11.17a CPCRU comparison – FOH squares D, E and F, and FFS.

Figure 11.17b CPCRU comparison – FOH squares D, E and F, and FFS. PCA components 1 and 2.
Chapter 11

Identifying production and exchange – the results of the chemical analysis

Figure 11.18a CPCRU comparison – FOH squares D, E and F, and FNT.

Figure 11.18b CPCRU comparison – FOH squares D, E and F, and FNT. PCA components 1 and 2.
Identifying production and exchange – the results of the chemical analysis

Chapter 11

Figure 11.19a CPCRU comparison – FOH squares D, E and F, and FEA.

Figure 11.19b CPCRU comparison – FOH squares D, E and F, and FEA. PCA components 1 and 3.
Chapter 11

Identifying production and exchange – the results of the chemical analysis

Figure 11.20a CPCRU comparison – FOH squares D, E and F, and FSZ.

Figure 11.20b CPCRU comparison – FOH squares D, E and F, and FSZ/FAO. PCA components 1 and 2.
on the PCA’s second axis on which magnesium loads heavily, and to a lesser extent the second axis where Ca loads heavily (Figs 11.21a-b).

**FFS**

Although samples from FFS group close to CPCRUs 3 and 5 from FOH square G, and two samples from FOH overlap with FFS, both sites separate and form a compact cluster with no overlap on the PCA plot using Acrospin. Using hierarchical clustering analysis CPCRUs 3 and 5 from FOH square G partially groups with samples from FFS. This is a by-product of the clustering criteria (Figs 11.22a-b).

**FSZ and FAO**

The bulk of the Garua samples easily separate from FOH square G’s (Figs 11.25 a-b). There are a few exceptions. Two samples from FSZ group away from the others: FSZ1957 and FSZ2168. These group with CPCRU 2 from FOH squares D, E and F (see above). A third FSZ sample overlaps with FOH, but separates out on the third axis.

**Summary**

There is limited evidence for the movement of vessels with one sample from Adwe FOH square G grouping with FEA, having a probable north coast origin.

**FOJ squares O1-O4**

**South coast sites**

**FLF**

On the PCA plot FLF and FOJ totally separate on first axis on which Mg loads heavily. No overlapping occurs between CPCRUs (Figs 11.26 a-b).

**FFS**

With the exception of three samples, FFS separates from FOJ on the first axis of the PCA plot on which Mg loads heavily (Fig. 11.27). The three exceptions are FFS336 (calcareous fabric), FFS288 (light) and FFS374 (inclusion free), which group with FOJ’s CPCRU 3. This CPCRU is made up of calcareous and inclusion free fabrics. These three samples also group with FOH square D, E and F’s CPCRU 1 which in turn groups with FOJ’s CPCRU 3.

**FNT**

CPCRU 1 from FOJ and the bulk of the FNT samples group together. The bulk of samples from FNT and CPCRU 1 from FOJ separate from the rest of FOJ on the second PCA axis on which Mg loads heavily (Figs 11.28 a-b). Also two samples from FNT (FNT4 and FNT110) group with CPCRU 4 from FOJ. Three other FNT samples group close to FOJ, however, they separate on the third axis of the PCA plot on which K loads heavily.

Like the Kreslo assemblage of which it is a part, CPCRU 1 from FOJ is characterised by vessels made from a light fabric. Vessels include mainly form V, both with lip notching and linear incised. Of note is the absence of form I vessels, along with both form II and VII vessels which are also lacking in the Kreslo assemblage. Dentate here and in Kreslo is only found on form V jars or spouts. Of note is the presence of Anson’s dentate motif 496 in CPCRU 1, a motif also common in the Kreslo assemblage. It is a Western motif (see Chapter 10). In short, this light fabric CPCRU from FOJ produced both linear incised and late open dentate jars, and would not be out of place in the Kreslo assemblage. It is argued above that the Kreslo assemblage is locally produced, and as such CPCRU 1 in FOJ represents the movement of pottery over a 42.5 km straight line distance from FNT.

The two samples that group with CPCRU 4 from FOJ are made from light and pyroxene fabrics which are common in this CPCRU. Also of interest is the presence of shell impressed decoration in both samples.

**North coast sites**

**FEA**

On the PCA plot, samples from FEA and FOH square G separate on the first and third axis where Mg loads heavily (Figs 11.24 a-b). There are a couple of exceptions. First, one sample from FOH square G’s CPCRU 5 (10969) groups with FEA. It has a north coast origin. Secondly, Boduna samples FEA2, FEA28 and FEA36 totally separate from the main group as they group with FNT (see above), while samples FEA8 and FEA12 also separate though not as far. These latter two samples group with FOH squares D, E and F’s CPCRU 1 (see above).

The distinctiveness between the two sites is also seen in the dendrograms produced from the hierarchical clustering analysis (Fig. 11.24a).

**FSZ and FAO**

The bulk of the Garua samples easily separate from FOH square G’s (Figs 11.25 a-b). There are a few exceptions. Two samples from FSZ group away from the others: FSZ1957 and FSZ2168. These group with CPCRU 2 from FOH squares D, E and F (see above). A third FSZ sample overlaps with FOH, but separates out on the third axis.

**Summary**

There is limited evidence for the movement of vessels with one sample from Adwe FOH square G grouping with FEA, having a probable north coast origin.

**FOJ squares O1-O4**

**South coast sites**

**FLF**

On the PCA plot FLF and FOJ totally separate on first axis on which Mg loads heavily. No overlapping occurs between CPCRUs (Figs 11.26 a-b).

**FEA**

With the exception of four samples, both assemblages separate on the first axis of the PCA plot on which Mg loads heavily, and to a lesser extent on the second axis where K loads heavily (Figs 11.29 a-b). One sample (FEA 12) from FEA groups with CPCRU 3. Three samples (FEA2, 28 and 36) group near CPCRU 1. These samples also group with FNT (see above).

**FSZ and FAO**

Two samples from FSZ group with FOJ. Sample FSZ1957 and FSZ2168 group with CPCRU 4 from FOJ. Note that these two samples from FSZ also group with CPCRU 2 from FOH squares D, E and F which in turn overlaps with FOJ’s CPCRU 4. These CPCRU are not coherent groups, but represent outliers to the other more compactly defined CPCRU. The bulk of the FSZ samples and the two FAO samples separate from FOJ on the first axis of the PCA plot on which Mg loads heavily, and to a lesser
Figure 11.21a CPCRU comparison – FOH square G and FLF.

Figure 11.21b CPCRU comparison – FOH square G and FLF. PCA components 1 and 2.
Identifying production and exchange – the results of the chemical analysis

Figure 11.22a CPCRU comparison – FOH square G and FFS.

Figure 11.22b CPCRU comparison – FOH square G and FFS. PCA components 1 and 2.
Chapter 11

Identifying production and exchange – the results of the chemical analysis

Figure 11.23a CPCRU comparison – FOH square G and FNT.

Figure 11.23b CPCRU comparison – FOH square G and FNT. PCA components 1 and 2.

Figure 11.23c CPCRU comparison – FOH square G and FNT. PCA components 1 and 3.
Identifying production and exchange – the results of the chemical analysis

Figure 11.24a CPCRU comparison – FOH square G and FEA.

Figure 11.24b CPCRU comparison – FOH square G and FEA. PCA components 1 and 3.
Chapter 11  Identifying production and exchange – the results of the chemical analysis

Figure 11.25a CPCRU comparison – FOH square G and FSZ/FAO.

Figure 11.25b CPCRU comparison – FOH square G and FSZ/FAO. PCA components 1 and 2.
Identifying production and exchange – the results of the chemical analysis

Figure 11.26a CPCRU comparison – FOJ and FLF.

Figure 11.26b CPCRU comparison – FOJ and FLF. PCA components 1 and 2.
Chapter 11

Identifying production and exchange – the results of the chemical analysis

**Extent the second axis on which K loads heavily (Fig. 11.30).**

**Summary**

There is evidence of the movement of pottery between the north and south coasts. One sample from FEA, and perhaps two from FSZ, originated from the south coast. There is also evidence of the movement of pottery along the south coast with first, three samples from FFS grouping with CPCRUs from FOJ, and secondly, a whole CPCRU from FOJ grouping with the FNT material indicating its transfer from the Kreslo area. Attached to this large grouping are three samples from FEA.

**FNY**

**South coast sites**

**FLF**

With the exception of two samples from FLF, samples from the two sites do not overlap on the PCA plot using Acrospin. They separate on the first and third axis of the PCA plot on which Mg loads heavily (Figs 11.31a-b). Samples F10 and F20 group with CPCRU 1 and 2 from FNY respectively.

**FFS**

The bulk of samples from these two sites separate on the second axis of the PCA plot on which K loads heavily (Fig. 11.32). There is some evidence for overlap. First, both samples FNY 1341 and 955 from CPCRU 4 group with FFS. Secondly, six FFS samples group with CPCRUs from FNY. Samples FFS317 (magnetite) and FFS377 (pyroxene) group with CPCRU 1; FFS292 (light), FFS364 (light) and FFS347 (inclusion free) with CPCRU 2 from FNY; and lastly FFS355 (inclusion free) groups with FNY, although with no specific group.

**FNT**

There is no overlap between these two sites. Both separate on the PCA first axis on which Mg loads heavily (Fig. 11.33).

**North coast sites**

**FEA**

With the exception of a couple of samples, the two sites separate on the third axis of the PCA on which Ti and Ca load heavily (Fig. 11.34). One sample from FEA (FEA8) groups away from the other FEA samples and close to those from FNY, although it does not overlap with any particular CPCRU. It previously grouped with CPCRU 1 from FOH squares D, E and F.

**FSZ and FAO**

Both sites separate completely on the PCA third axis on which Ca loads heavily. The bulk of each site also separates on the PCA first axis on which K loads heavily (Fig. 11.35).

**Summary**

There is no evidence for north coast sherds in the FNY assemblage. There is evidence of the movement of pottery on the south coast between FNY and both FFS and FLF.

**Production and Distribution of Pottery from West New Britain**

This last section uses the results presented above to identify the nature of production and exchange of the West New Britain assemblages. It is divided into two. First, the context of production is defined, and the implications for ascertaining the nature of interaction between areas discussed. Secondly, changes in production over time are reviewed and the implications for the changing nature of interaction between areas ascertained.

**Context of production**

As discussed in Chapter 4, the identification of a production centre is not easy. The exact spot where the firing took place is not crucial here, only whether the pot is of
Identifying production and exchange – the results of the chemical analysis

Figure 11.28a CPCRU comparison – FOJ and FNT.

Figure 11.28b CPCRU comparison – FOJ and FNT. PCA components 2 and 3.
Chapter 11

Identifying production and exchange – the results of the chemical analysis

Figure 11.29a CPCRU comparison – FOJ and FEA.

Figure 11.29b CPCRU comparison – FOJ and FEA. PCA components 1 and 2.
Identifying production and exchange – the results of the chemical analysis

Chapter 11

Zj W1  

local origin or not. Attributing a sherd to a general regional or procurement zone is more applicable than trying to identify a precise spot for manufacture. Just distinguishing north coast from south coast West New Britain procurement zones would be an achievement. In this study, the identification of north or south West New Britain resource procurement zones was possible by first, relating the mineral fillers found in the pottery with regional mineral sand signatures, and secondly by identifying and isolating the CPCRUs (different clays) used to produce the wares.

Chemical compositional paste reference units

Table 11.54 extends the number of CPCRUs to include all West New Britain sites under analysis.

Twenty-one CPCRUs are identified in this study of which most are site specific. As seen in Table 11.54, 12 CPCRUs are found in more than one site. Within the Arawe assemblage, only CPCRUs from FOH square D, E and F are shared with other Arawe assemblages. CPCRUs from FOH square G, FOJ and FNY are not shared with each other.

Each of the Arawe assemblages have an outlier group composed of samples which cluster together because of their dissimilarity with the other CPCRUs. These outlier samples have an unknown provenance. Each sample could belong to a unique CPCRU. Outside the Arawe area, most CPCRUs are site specific although a small proportion of samples belong to non-local CPCRUs. Based on the sharing of clay sources and the mineral differences between the north and south coasts, only a small proportion of pots are moving between the north and south coasts, and along the south coast. The exception is CPCRU 1 from FOJ (no. X in Table 11.54) that originated from FNT. Figure 11.36 shows the movement of pots within West New Britain.

<table>
<thead>
<tr>
<th>Site CPCRU</th>
<th>Site CPCRU</th>
<th>Site CPCRU</th>
<th>Site CPCRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>I FOH D, E and F 1</td>
<td>II FOH D, E and F 2</td>
<td>III FOH D, E and F 3</td>
<td>IV FOH D, E and F 4</td>
</tr>
<tr>
<td>V FOH D, E and F 5</td>
<td>VI FOH G 1</td>
<td>VII FOH G 2</td>
<td>VIII FOH G 3</td>
</tr>
<tr>
<td>IX FOH G 5</td>
<td>X FNT</td>
<td>XI FOJ 4</td>
<td>XII FOJ 5</td>
</tr>
<tr>
<td>XIII FOJ 6</td>
<td>XIV FNY 1</td>
<td>XV FNY 2</td>
<td>XVI FNY 3</td>
</tr>
<tr>
<td>XVII FNY 5</td>
<td>XVIII FLF 1</td>
<td>XIX FFS 2</td>
<td>XX FEA 1</td>
</tr>
<tr>
<td>XXI FSZ 2</td>
<td>XXII FSS 3</td>
<td>XXIII FOH 3</td>
<td>XXIV FNT 2</td>
</tr>
<tr>
<td>XXV FSS 4</td>
<td>XXVI FSS 5</td>
<td>XXVII FSS 6</td>
<td>XXVIII FSS 7</td>
</tr>
<tr>
<td>XXIX FSS 8</td>
<td>XXX FSS 9</td>
<td>XXXI FSS 10</td>
<td>XXXII FSS 11</td>
</tr>
<tr>
<td>XXXIII FSS 12</td>
<td>XXXIV FSS 13</td>
<td>XXXV FSS 14</td>
<td>XXXVI FSS 15</td>
</tr>
<tr>
<td>XXXVII FSS 16</td>
<td>XXXVIII FSS 17</td>
<td>XXXIX FSS 18</td>
<td>XXXX FSS 19</td>
</tr>
<tr>
<td>XXXXI FSS 20</td>
<td>XXXXII FSS 21</td>
<td>XXXXIII FSS 22</td>
<td>XXXXIV FSS 23</td>
</tr>
</tbody>
</table>

Table 11.54 Total number of CPCRUs in the West New Britain assemblages.
Chapter 11

Identifying production and exchange – the results of the chemical analysis

Figure 11.31a CPCRU comparison – FNY and FLF.

Figure 11.31b CPCRU comparison – FNY and FLF. PCA components 1 and 3.
Identifying production and exchange – the results of the chemical analysis

Figure 11.32 CPCRU comparison – FNY and FFS. PCA components 1 and 2.

Figure 11.33 CPCRU comparison – FNY and FNT. PCA components 1 and 2.

Figure 11.34 CPCRU comparison – FNY and FEA. PCA components 2 and 3.
Chapter 11

Identifying production and exchange – the results of the chemical analysis

Figure 11.35 CPCRU comparison – FNY and FSZ/FAO. PCA components 1 and 3.

Figure 11.36 The movement of clays/pots in West New Britain.
Identifying production and exchange – the results of the chemical analysis

Chapter 11

Figure 11.37 Specialist production – 1 CPCRU and 1 fabric.

CPCRU and fabrics
It is argued in Chapter 4 that potters are often seen as conservative in their selection of raw materials and technologies. Arnold (1992:159) argued that the addition of mineral to a clay is an adaptive behaviour – ‘potters thus will select raw materials that will respond favourably to forming technology’. If a raw material does not respond favourably with technology, new raw materials may be searched for (Arnold 1992:159). Changes in production, such as the use of clays and mineral inclusions as filler, is thus important. Different fillers behave differently with clays and firing technologies. Production from a single centre to a number of sites can be expected to result in a single CPCRU associated with a single fabric being found in a number of assemblages. Figure 11.37 diagrammatically represents such a pattern expected from specialist production. If a number of production centres are evident then a number of separate CPCRUs, each associated with a single fabric, would be expected to be found in the assemblage from a number of sites. Figure 11.38 represents such a pattern. If, however, each site produced its own wares, then a single CPCRU and fabric would be found in each assemblage. Figure 11.39 represents such a pattern of local production. This would conform to the ‘conservative’ nature of potters as argued by Arnold or Peacock.

The results from the Talasea area sites of FSZ and FEA conform to this pattern of local production. These indicate the use of one clay, one filler, both locally extracted. The results from the South Coast sites however do not conform to this pattern.

In the Arawe assemblages few CPCRUs have only one fabric. Most of the CPCRUs identified are found in association with a number of fabrics each from a different river system found along the south coast of West New Britain. Only a couple of CPCRUs have only one or two fabrics suggesting more standardised selection of raw material. Thus the results produce a complex scenario where each site has a number of CPCRUs, each with many fabrics.

If each fabric per CPCRU is seen as coming from a unique production area then countless separate production areas are defined. Yet the minerals found along the south coast are geographically restricted. Identical pottery was produced from a number of clay sources each one mixing sands from a number of different rivers or beaches. Either a. the minerals and/or clays are moving, or b. the potters themselves are moving along the coast collecting raw materials.

What is certain is that potters were not conservative here in their selection and mixture of fillers and clays. A
number of combinations were used to produce identical wares. This also necessitates a changing technology. Inclusions are added to the clay to counteract shrinkage in the firing stage of pottery production. Quartz, magnetite, pyroxene, plagioclase feldspars, and calcareous inclusions all react differently in this firing stage necessitating different firing strategies.

A possible exception to the eclectic choice of minerals is the high association between ferromagnesium fabrics, in particular magnetite, and form I and VIII vessels from FOH squares D, E and F with Far Western dentate decoration. Here they are associated with only two CPCRUUs. Yet within these two chemical groupings other decorated (non-dentate) forms appear. The situation is more complex than envisaged as there is no simple correlation between form, fabric and CPCRU. Figure 11.40 diagrammatically represents the selection of fabric and forms in the Arawe assemblages. If as Arnold (1992:159) has argued ‘potters thus will select raw materials that respond favourably with technology’ then it can be inferred that the producers of these assemblages had an adaptable technology not seen in the ethnographic literature.

**Mobility of the producers**

The production patterns could be the results of either the mobility of pot makers or the exchange of clays and/or
sands. This is important in identifying the nature of interaction between communities within West New Britain.

As argued in Chapter 4, settlement pattern is an important consideration to the nature of production. Arnold (1992:163) posits the view that dispersed settlements with local clay sources will ‘reveal a highly variable pottery no matter how specialised they are’ while on the other hand settlements in one location with a superior clay source will produce a highly uniform paste ‘no matter how unspecialised they are’. Dispersed settlements using local different clays and fillers will produce highly variable pottery. Yet in New Britain this is not the case with uniformity of production. This has more to do with the level of communication between settlements.

Mobility between settlements is an issue. Clark and others (1992:265) argued that variability in style and clay source will be evident in mobile societies. They view localised pottery specialisation in terms of ‘regularity in clay and temper procurement, regular use of the same location as a site of pottery production, and subsequent dispersal, use and discard of the finished pots via avenues of systematic trade/exchange’ (Clark et al. 1992:265). If pots or the raw materials do not move – people may. Either a complex exchange of resources is involved, or the potters are moving, taking the clays and fillers with them. Either way the simple model involving conservatism in production does not apply here.

How does one separate the movement of raw materials, finished products and the movement of the producers? If clays were being exchanged from one source to different specialist production centres, variability between producers would be expected. That is, variability between assemblages would be expected to be greater. This is not the case in the West New Britain assemblages with uniformity in style and decoration. Different production centres are not producing their own specialised ware. Furthermore, it can be argued that clays are not being
exchanged. Most of the CPCRUs are site specific. With the exception of the few pots moving between sites and the single CPCRU from FOJ that originated from the Kreslo area, most CPCRUs are probably local. Minerals used as fillers on the other hand are not specific to a site. They are moving from their source areas and mixed with the same clays that are used with other different mineral fillers. If one mineral was associated with one pot form or a particular decoration then perhaps the selection of minerals could be seen in terms of resource specialisation. Yet this is not the case. The implication is that rather than a specialised exchange system moving minerals, the producers themselves are moving which is indicative of a mobile society.

Change in production

One dimension not yet addressed is time. Using the stylistic analysis presented in Chapter 10, the West New Britain sites can be characterised as two: Far Western and Western. FOH squares D, E and F plus FNY belong to the former, while the rest belong to the latter.

The non-Arawe Western sites of FEA, FSZ, FLF, FFS and FNT conform to a more standardised conservative model of production, with either one of two CPCRUs associated with the majority of pottery in each site. Within the Arawe assemblages only the Western site of FOJ is standardised in terms of fabric, form and CPCRUs. Firstly, within FOJ, the CPCRUs from the top two units have a smaller number of fabrics compared with those below. Secondly, FOJ is characterised as a jar assemblage with these vessels showing uniformity in size and thickness (see Chapter 7). There is thus a correlation between standardisation in vessel form and resource selection indicating a different production strategy to those used to produce wares from the other Arawe sites. This uniformity in the nature of mineral selection could be indicative of different movement patterns of the producers. The following examples reinforce these points.

First, differences in production can be seen in comparing shared CPCRUs between FOH squares D, E and F and FOJ. Both share clay sources (number 1 in Table 11.54) although there are fewer fabrics in the pottery from FOJ. CPCRU 1 from FOH squares D, E and F is found in all units and has a wide range of fillers from all the major river systems analysed: Adi, Pulie, Anu, Alimbit, plus calcareous and inclusion free (local?) fabrics. CPCRU 3 from FOJ on the other hand is only found in the upper two units of that site and is mixed with only calcareous and inclusion free fabrics. This suggests that while the clay source remains the same over time, the later producers were selecting only local resources. This may again indicate a restriction of mobility or a conservatism in the production of these pots. Whatever is the case a change in production strategies towards a more uniform resource selection is evident over time.

Another CPCRU from FOJ, this time found in the middle units, shows a similar pattern of fabric reduction, yet here it was probably imported from a common production area with the pottery from FNT. CPCRU 1 from FOJ and FNT's CPCRU are one and the same. From FOJ this CPCRU contains both calcareous and light inclusions which are identical to those found in the CPCRU from FNT. Indeed light inclusions are found only from the Anu River near FNT. This example is more in line with

Figure 11.40 Selection of fabrics and forms in the Arawe CPCRUs.
what is expected from the specialist production represented in Figure 11.37. The first example on the other hand could be more in line with local production as evident in Figure 11.39. This change in production represents a reduction in the movement of either the raw materials or the potters themselves.

Only one CPCRU from FOH square G (CPCRU 4) shows a similar reduction in the range of fabrics in comparison with squares D, E and F (CPCRU 4) (see number IV in Table 11.54). CPCRU 4 from squares D, E and F is mixed with fabrics from all major river systems along the south coast. CPCRU 4 from square G on the other hand is mixed with only the sands from the Adi and local sources.

As noted earlier similar changes in production can be seen in other Western sites such as FEA and FSZ from the north coast which are predominantly of a single local fabric. The others in the assemblage have been imported from the south coast. FNT, FFS and FLF from the south coast show a similar pattern.

**SUMMARY**

The aim of this chapter was to present the results of the chemical analysis of selected samples from the West New Britain assemblages and the identification of the nature of pottery production and distribution. Production here is mostly local in terms of a 'general regional zone' or 'procurement zone'. The majority of pots found from the north coast were made on the north coast while those from the south coast were made on the south coast. There is evidence, however, of a small number of pots moving between the south coast sites and between the north and south coasts. Of importance is the use of mineral filler in yielding clues to the nature of interaction between these pottery producers. Within the Arawe assemblages the complex use of minerals from nearly all the main river systems along the south coast to produce a variety of vessel forms and decoration has been interpreted here to indicate a mobile group of producers who had an adaptable technology in pottery production. This interpretation is in preference to a scenario of a specialised exchange network in which a few pottery centres were producing wares for distribution. The situation is more complex than envisaged as there is no simple correlation between form, fabric and CPCRU. Any simple correlation between fabric and CPCRU is found in a couple of CPCRUs from FOJ and the non-Arawe sites. This indicates a change in production and perhaps a restriction in the nature of interaction between producers and a lessening of mobility.

The next chapter will combine the results of the chemical and fabric analysis presented above, with those on the form and decoration of the West New Britain assemblages to build a profile on these pottery assemblages and their relationship to the general Western Pacific as a whole. It is now possible to assess the implications of this analysis for the models concerning interaction and regionalisation presented in Chapter 2, and put a new light on the role that these pots played in the societies that produced and used them.
CONCLUSIONS

This monograph attempted to examine the nature of interaction between prehistoric Western Pacific communities in the late 4th and early 3rd millennium BP by examining the nature of production, exchange and use of pottery from one region, West New Britain in Papua New Guinea. As set out in Chapter 1, three major issues in understanding the social and economic processes of interaction are to be addressed:

1. the nature of the Lapita pottery assemblage;
2. the placement of West New Britain pottery assemblages into the wider Western Pacific context; and
3. the role of production and distribution in explaining regional similarities of pottery.

This last chapter reviews the results presented in this report pertaining to these three issues, and examines the nature of interaction between the societies that produced and used the pottery type known as Lapita.

THE NATURE OF THE POTTERY ASSEMBLAGE

One of the major objectives of this analysis was to identify the structure of the pottery assemblage and the relationship between decorative technique and form. In particular the role of dentate decoration within the assemblage was to be examined. As dentate-stamped motifs are used to identify stylistic differences between Lapita assemblages, insight into the function of dentate vessels is needed. The special preservation conditions of the Arawe pottery assemblages allowed such a rare insight into the relationship between form and decoration to be made. It was found that decoration and vessel form are highly correlated, with the proportions of each changing over time.

It is argued that dentate vessels were initially a specialised component, being added onto an assemblage of plain and decorated jars, plain globular pots and plain spherical pots. Removing the dentate vessel component from the Arawe assemblages diminishes differences between sites, with plain form I bowls, form V carinated jars (mostly with lip modification or plain, some having linear incision or fingernail impressions), and plain form VI globular pots remaining in roughly equal proportions. Non-dentate form I bowls and VIII stands are a minor component. The major vessel components are form V jars followed by form VI globular pots and form II vessels. Thus, the non-dentate assemblage in terms of vessel form does not change.

Yet when the dentate vessel component is added to the pottery assemblages important differences are seen between sites. The dentate component does not remain static, changing over time. This is best illustrated by examining the structure of the pottery assemblage in two sets of Arawe sites. On the basis of both decoration and vessel form the Arawe pottery assemblages group into two:

i. FOH squares D, E and F, and FNY
ii. FOJ, and FOH square G.

From dentate decoration alone other West New Britain assemblages such as FNT and FSZ group with the latter sites.

Both FOH squares D, E and F, and FNY group with Far Western Lapita sites from the Bismarck Archipelago, while the rest group with Western Lapita sites. These distinctions are highly correlated with changes in vessel form between sites. For instance, in FOH squares D, E and F, and FNY, dentate is predominantly found on form I bowls and form VIII stands. Other dentate vessel forms, such as form V jars, are found but in low proportion. From FOJ, and FOH square G, on the other hand, form I bowls are few in number, and the proportion of dentate vessels decline in comparison with other vessel forms and decoration.

The decline in dentate vessels correlates with an increase in form V jars in FOH square G and FOJ (Fig. 10.1). Form V jars are associated with a number of decorative types with plain vessels common in all sites. The most common type of decoration is lip modification only,
followed by linear incision. All linear incised vessels carry lip modification. Other decorative types are found on this vessel form including fingernail impression, shell impression, and grooved/channelling. Thus an increase in linear incision merely represents an increase in form V jars at the expense of dentate form I bowls.

Relationships between form and decoration are seen in the non-dentate pottery. Linear incision is only found on form V jars, as are fingernail impressed and shell impressed decoration. Only one example of appliqué was associated with a vessel form, an incurring bowl. These types of decoration are part and parcel of the pottery assemblage, and are as specialised as the dentate vessels. As the dentate vessels decline (in particular the form I vessels), these other decorative types increase in proportion. Although form V jars are found in all sites in different proportions, a major difference is found in FOJ, where these vessels are more standardised in respect of both vessel form and wall thickness.

Other vessel forms are important in these assemblages, including form VI globular pots and form II spherical pots. The majority of these vessel forms are plain. Plain ware is found in all vessel forms and is always a significant component, making up one third of all vessels in three of the assemblages, and half in the fourth. Dentate decoration is thus only one component of a larger assemblage, as are the other decorative types.

How does this patterning relate with other assemblages? Specht made a similar distinction between decoration and vessel shape nearly 30 years ago. Based on the Watom assemblage Specht (1968:127) associated dentate decoration with a number of vessel shapes including ‘flat based bowls’; ‘straight walled, vertical sided beakers with undifferentiated rims and flat lips’; and ‘pots with sharply carinated or gambrelled shoulders’. Plain sherds on the other hand are restricted to ‘spherical narrow-mouthed pots with everted rims’ and round bases. Specht also notes that the majority of rim sherds have lip modification – ‘crenellation’. These sherds are restricted to either nail impressed or plain vessels (Specht 1968:128). This is similar to the Arawe assemblage.

Anson also described vessel form. Unfortunately on the basis of carinated sherds, he identifies most of his vessel forms as open ‘bowls’, restricted at the neck. These he associates with dentate, incised, applied and fingernail impressed ware. He sees the plain vessel forms as similarly restricted at the neck, yet with globular bodies. He does make a few distinctions. Straight sided dishes with flat bases, pedestal bases with cut outs, and beakers are associated with dentate pottery. He also notes that plain pottery is thinner walled than decorated pottery (Anson 1983).

The only other assemblage that has been described in enough detail for comparisons to be made in both form and decoration is ECA. Three observations can be drawn.

First, Kirch found a correlation between vessel form and decoration. From ECA he describes a range of forms in both decorated and plain wares. As he states:

Among the dentate-stamped vessels are flat-bottomed dishes with flaring sides, round-bottomed bowls with collar rims, and small simple bowls with incurved rims. Large carinated jars with restricted mouths and flaring rims are decorated only with geometric incisions. Also present are large globular jars with everted rims and decoration limited to simple rim notching. Plain-ware vessels include jars and simple bowls. (Kirch 1988c:335)

Secondly, like the Arawe assemblages, the proportions of decorative techniques and vessel forms change over time. Kirch identifies a change from complex intricate dentate found in the lower units to coarser open dentate stamping that dominates in the upper zones (Kirch et al. 1991:151). I interpret this as a shift from a Far Western to Western Lapita dentate motif repertoire. Also, as in the Arawe assemblages, linear incision increases in the upper zones although it does not replace dentate stamping (Kirch 1988c:335; Kirch 1990: Fig. 2; Kirch et al. 1991:151). Kirch identifies a similar transition in EKQ – Epakapa Shelter. Here, he notes a decrease in dentate and an increase in incision over time, with appliqué found in the upper units (Kirch et al. 1991:151).

In respect of vessel forms found at ECA, both bowls and pedestal stands (what Kirch calls pedestal foot) decline proportionally over time while jars increase (Kirch 1990: Fig. 2). Such a change is consistent with that found in the Arawe assemblages.

Thus the relationship between form and decoration, and the changes in both over time identified in the Arawe assemblages, can be argued to also occur in the Mussau assemblages excavated by Kirch.

Such similarities within the Bismarck Archipelago are no doubt connected to socially related groups with strong communication ties. Similar changes in form and decoration equate with similar uses of the pottery. As argued in Chapter 4, style can convey information, foster group identity, and maintain social boundaries (Hill 1985:367; Wobst 1977). Yet rather than being passive, it is socially active (see Chapter 4). If we take Grave’s notion that ‘the relative degree of functional/adaptive value of stylistic entities is a function of their visibility and level within a design hierarchy’ (Hill 1985:373), then the change in dentate denotes a lessening of dentate’s role within that society in maintaining social paths of access leading to social boundaries (Graves 1981:316 cited in Hill 1985:372).

This is not what could be expected from a socially passive design that is the result of exchange and the result of contact between socially unrelated groups who produce similar types of pottery. Mussau, the Arawes and other Bismarck Archipelago sites are part of a social network in which changes in decoration occur at the same pace. Such changes in decoration reflect changes in that network and indicate continuing interaction between these communities. The next section places the West New Britain assemblages into a wider regional perspective.

THE REGIONAL PERSPECTIVE

The second issue concerns the placement of the West New Britain assemblages into the wider Western Pacific
context. By comparing dentate motifs found on sherds from West New Britain, an assessment of stylistic change and development within one region was possible. This assessment has direct implications for three major issues:

1. The break-up of the Western Pacific into stylistic provinces.
2. The notion that any similarities in pottery, and any subsequent change within these stylistic provinces, have their origins in the initial dispersal — not from regular two way contact (Green 1978; Kirch 1988a).
3. The notion that the Bismarck assemblages unique motifs may 'signal little more than local stylistic divergence after the initial Lapita dispersal through eastern Melanesia' (Kirch et al. 1987:126). This is tied to questions concerning origins and whether the development of a pottery style within the Bismarcks occurred before people colonised Remote Oceania.

**Stylistic provinces**

As Anson had hoped (1983:163), the excavation of more sites from West New Britain has shed new light on the definition of stylistic boundaries. Two major points are made. First, with the addition of new sites the number of motifs defining the division between Far Western, Western and Eastern, diminish. In the Arawe assemblages many motifs are shared within the Western Pacific, as seen by the percentage of common motifs, and motifs crossing regional divides (Far Western/Western; Western/ Eastern). Indeed, two assemblages, FOH squares D, E and F, and FNY, designated as Far Western, contain motifs designated Western/Eastern and Eastern, not to mention Western. This is in contrast with the original Far Western Lapita assemblages of Eloaua, Talasea and Ambitle. Also of interest is the Naigani assemblage that does not have a high level of motif sharing with other Eastern or Western Lapita assemblages (i.e. below 30%). In fact the highest sharing (over 30%) occurs with both FNT and FSZ. Thus with the addition of the West New Britain assemblages under study to the corpus of Lapita pottery, motifs once seen as contributing to the uniqueness of the easterly sites (e.g. Tikopia, Niuatoputapu, Mulifanua, Tonga) are now seen to be common in the later assemblages of West New Britain. These longer defined sequences from West New Britain are bridging the spatial gap between the sphere of east and west Lapita interaction. The Eastern Lapita style is thus partially temporal in nature having similarities with late Bismarck Archipelago assemblages.

Secondly, and following on from the first point, the simplification of Lapita dentate design decoration (or as others have argued the declining intensity of labour or energy put into producing a dentate pot) and the appearance of incised, applied and relief, and shell impressed ware, occurs across both space and time — from west to east (see Green’s distance decay model: 1978; 1979) and from Far Western and Western Lapita to late Western Lapita in the Bismarcks. To use Green’s words, the change ‘from the rather ornate curvilinear and fairly elaborate rectilinear design patterns of the western Lapita to the more simplified and generally rectilinear forms of the eastern Lapita’ (Green 1979:42) could be just as appropriate to describe the change within assemblages in West New Britain or those from Mussau.

**Contact between east and west**

It follows from the above that contact between east and west was not an isolated occurrence restricted to the initial colonisation of the eastern area (Kirch 1988a:106). The sharing of similar dentate motifs, once seen as restricted only to the east, and other decorative elements such as shell incision that are not found in the early Far Western Lapita assemblages, points to continued two way interaction between these areas.

It is not argued here that regional differences did not exist; they did. As argued in Chapter 10, although the Arawe sites fall into two groups, the West New Britain sites as a whole still cluster close to each other. Equally, sites defined in the Eastern Lapita network are more similar to each other, although differences exist. Distinctions between the simplified design elements and motifs of the northern Eastern Lapita network (Mulifanua, ‘Uvea, Niuatoputapu and Sigatoka), as opposed to the ‘wider array of design elements and motifs, indicating more elaborate decorative styles’ found in the southern Eastern Lapita network (Tongatapu and other Fijian sites such as Natunuku, Yanuca, Naigani) (Kirch 1988b:187) could also be seen as temporal.

Two dimensions, temporal and regional, are at play. The decorative changes occurring in both the west and east Lapita regions, in particular the simplification of the motif repertoire, suggests similar socio-economic changes occurring in those societies that produced and consumed the pottery. The idea that the water gap between Vanuatu and Fiji inhibited two way voyaging has been thrown into doubt by Irwin (1992) — two way voyages were possible. This does not necessarily mean that the frequency of contact was high. The nature of the data allows the identification of continued interaction, not its frequency. Similar changes in the Lapita decorative system occur in the west and east. These similarities were not the product of pottery exchange. They were the product of information exchange which necessitates the movement of people. Communication was ongoing indicating a more socially interactive network.

**An earlier assemblage in the west?**

The results presented here confirm Anson’s argument that there existed earlier assemblages in the Bismarck’s. It throws doubt on the view that the Bismarck assemblages unique motifs may ‘signal little more than local stylistic divergence after the initial Lapita dispersal through eastern Melanesia’ (Kirch et al. 1987:126).

Kirch et al. (1987) argue that Eloaua, FCR/FCS and Ambitle’s separateness as defined by Anson is due to ‘sampling’. Yet the Arawe samples, on the basis of motifs alone, have motifs only found in this region. Watom, FSZ, FNT and Adwe square G on the other hand, while still in the Bismarck region do not have Far Western motifs. The only Far Western motifs in Apalo are earlier than the bulk of the assemblage. This lays credence to
Chapter 12

POTTERY PRODUCTION IN WEST NEW BRITAIN

An extensive chemical analysis of pottery from sites from West New Britain demonstrates that stylistic similarities between them are not the product of pottery exchange. The results from Chapter 11 show that the major component of all assemblages were produced locally with a small imported component. Local here refers to a ‘general regional zone’ or ‘procurement zone’. At only one site, FOJ, was a total CPCRU ‘imported’ into the site. Here pots were probably produced near FNT and transported to FOJ. Yet these ‘imported’ pots are found with locally produced pottery as well. The small component of ‘imported’ pottery found in the other sites involved transfers along the south coast of West New Britain, and between the north and south coasts. Although not confirming the identification of pot trade networks in which pottery was produced at small number of centres and thence distributed, it does confirm continued interaction between widely spaced communities. The importation of pottery to sites where it was also produced locally could be epiphenomenal to social processes, being the by-product of continued interaction between closely related groups.

The distribution of obsidian is an interesting corollary. An extensive analysis of obsidian from the West New Britain assemblages demonstrates that obsidian came mostly from one source, Kutau-Bao, on the Willaumez peninsula (Summerhayes and Hotchkiss 1992; Summerhayes et al. 1993; Summerhayes et al. 1998). Obsidian from this one source is dominant in FNY, FOH square D, E and F, and square G, and FOJ, in association with Lapita pottery. Also found in association with Lapita pottery from FNY, FOH and FOJ are three solitary obsidian pieces from an Admiralty source indicative of wider contacts. These three pieces do not demonstrate a specialised exchange network out of the Admiralties any more than the presence of a small number of imported pottery vessels does. They do indicate that interactions and processes other than economic ones are at play.

Clues to the nature of interaction can be found in the pottery production processes found within the Arawe assemblages. Here a more complex scenario exists. It was shown that while the clays used to manufacture the vessels were probably local (there were more than one), many of the sands were not, and were probably transported from their sources located in the major river systems along the south coast of New Britain to the Arawe region for production. It is argued in Chapter 11 that this is indicative of a mobile group of producers who had an adaptable technology in pottery production. Sands from different river systems and beaches ranging from pyroxenes, magnetite, pyroxenes mixed with magnetite, light minerals, few if any inclusions and calcareous sands, were mixed separately with identical clays to produce similar wares. This case does not conform to arguments for conservatism in pottery production as espoused in the archaeological literature (see Arnold 1992). Although production in decoration and shape is conservative, there is technological variation. The nature of mobility is unknown and does not necessarily equate with the wholesale movement of settlements across the landscape. Indeed, if this were the case, then pottery manufacture would still involve the selection of local resources. Combined with the similarities of pottery design it does equate with an interactive community in which some members were moving between settlements, or sands were brought in from voyaging forays.

Changes in resource procurement and perhaps mobility are also evident with a reduction in the number of production centres in the Arawe Island assemblages. Within FOJ, Apalo, there is a reduction in the number of fabrics with pottery made with mineral filler from one river system, the Anu, dominating in the later stratigraphic unit. This is unlike those fabrics from the bottom three stratigraphic units where pots are made using sands from several river systems along the south coast of New Britain. The majority of pottery from FSZ and FEA were also made from one fabric, with only one CPCRU, suggesting a single production centre. Both FOJ and FSZ are classified as Western Lapita on the basis of dentate motifs (see Chapter 10 and below), and are later compared to the bulk of pottery from FNY and FOH squares D, E and F. This possible reduction in production centres is argued to be related to a restriction in the mobility of the producers and could indicate a more sedentary settlement pattern. Furthermore, such a change in production strategies also correlates with the production of more uniform and standardised form V jars in Apalo. This indicates different production processes to those used to produce wares from the other Arawe sites of FNY, and FOH squares D, E and F. Such changes in production strategies, as argued in Chapter 4, could indicate changes in the social strategies of the makers of pottery.

How does this contrast with other Bismarck Archipelago assemblages?

First, a number of different fabrics are associated with the Mussau/Eloaua, Ambitle, Talasea and Watom assemblages, indicating diversity in selection of mineral/sand filler. This is similar to the Arawe pot assemblage.

Secondly, all of the pottery analysed from Mussau/Eloaua, Talasea, Ambitle and Watom do not share a similar clay source. This also fits well with the results from the Arawe assemblages.

Thirdly, there is no simple one to one correlation between decoration, fabric and CPCRU in the Mussau/Eloaua pottery assemblages. This also fits the Arawe pattern.

Fourthly, unlike the Arawe pottery, those from Mussau/Eloaua were deemed to be imported. The major difference...
between the Mussau/Eloaua and West New Britain assemblages is in production location.

Lastly, there is evidence of a restriction in pottery making in both areas over time. In the Mussau assemblages Kirch argues that this is tied to a decline in the importation of pottery (Kirch 1990:123). He interprets this decline in the number of source localities as running parallel to the stylistic sequence 'suggesting a reduction in the complexity of the ceramic exchange network over time' (Kirch 1990:123). The possible reduction in the number of production centres in the Arawe Islands, however, is due to processes other than exchange. Such changes in production strategies, as argued in Chapter 4, could indicate changes in the social strategies of the makers of pottery. Such changes occurred hand in hand with changes in the type of dentate motifs and vessel form in which dentate decoration became more simplified and less labour intensive. Kirch also ties this change in decoration, from a highly labour intensive decoration to one less labour intense, with a change in the socio-economic role of pots over time (Kirch 1988c:335; Kirch 1990:123).

Similarities between assemblages in West New Britain sites are not due to the exchange of pots. Other factors are at play. Green's (1982, 1987) earlier ideas about the social dimension of Lapita societies are of importance here. If we take out the role of pottery exchange in modelling Lapita interaction then social processes are relevant. The mobility of producers reflects on the production strategies of the makers of Lapita pottery. But perhaps the links between site/pottery assemblages might reflect more than simply exchange/trade or the movement of a mobile population. Similarity between sites at the stylistic level may indicate a common history or ancestry of several populations. Processes such as spouse exchange with a limited quantity of pottery moving as a result may explain the small number of pots moving between sites. Kirch's innovative use of Friedman's (1982) hypotheses concerning social structures in the Pacific are of importance here, in particular the relationship between social reproduction and generalised exchange (MBD marriage) (Kirch 1988a:112-13; 1988c:339; 1990:129; 1991:160). Testing such hypotheses though is fraught with problems, and like Kirch I think it 'foolish to imply that we are as yet in a position to be able to test definitively such hypotheses regarding the social formations of early Melanesia' (Kirch 1990:130). Yet, it can be argued that changes in pottery production strategies, as evident by the specialised production of form V jars with local sands and the decline in the limited transfer of pottery and raw material which is evident in the later assemblage from FOJ, could reflect changes in these social formations and may indicate the beginning of changes in the nature of social interaction between communities.

CONCLUDING COMMENTS AND FUTURE DIRECTIONS

An analysis of the production, distribution and use of pottery from West New Britain assemblages has allowed some insights into the nature of interaction between prehistoric societies that produced and used Lapita pottery. The results from this report also have implications for the process of mid-Holocene colonisation in the Pacific.

It is argued on stylistic grounds that a development from a Far Western to Western Lapita style is evident from assemblages in West New Britain. This adds credence to an earlier pause in the Bismarck Archipelago. These earliest assemblages show that the makers of this pottery was by people with no specialist production centres, as the pottery making was predominantly local, but who have an elaborate and cohesive social interaction which can be measured by pottery homogeneity.

The later assemblages that are found further afield in the Western Pacific are evidence of the rapid expansion of settlements and colonisation of areas not previously occupied. These settlements, like contemporary ones to the west, also exhibit pottery homogeneity indicating production by people with elaborate and cohesive social interaction networks. Yet is argued here that there is no geographic divide and therefore terms such as Western and Eastern are misleading and should be abandoned and replaced. The fundamental nature of interaction has not changed at the end of this colonisation process with the pottery in the Eastern Lapita region showing little fundamental differences to those later assemblages from West New Britain. It is argued here that differences between these style provinces are primarily due to temporal factors and that the terms 'Far Western', 'Western' and 'Eastern' should be replaced by Early, Middle and Late Lapita.

Where the fundamental nature of interaction does change is with the end of Lapita. Few would disagree with the notion that Lapita ends with a retraction of a long distance network into regionalised ones as espoused by Kirch (1990:128). This regionalisation is seen in part with the disappearance of dentate vessels. If dentate vessels were social markers, then their change over time and their disappearance reflects a greater social breakdown.

It would be surprising if societies in the region did not change. What is surprising though is the total disappearance of pottery, including the non-dentate vessels, in many parts of Melanesia, including New Ireland and New Britain. These non-dentate vessels, including plain wares, include the utilitarian component of the pottery assemblage. Pottery production in the Bismarck Archipelago does continue in a few areas, such as Manus and Buka. Yet the distribution of pottery from these production centres to areas further afield occurs some time after the disappearance of Lapita ware. Only Type X ware is found in deposits overlying the earlier locally produced Lapita pottery in West New Britain contexts. It is not locally made and was probably produced some distance away on the Huon peninsula (Lilley 1988a). This scenario of limited production centres and subsequent pottery distribution fits the trader/exchange model often used to explain the homogeneity of Lapita pottery. Yet this pattern occurs after Lapita pottery disappears in West New Britain and not before.
Further research along the lines presented in this monograph is needed to assess patterns of Lapita interaction. Sites with long pottery sequences from other parts of the Bismarck Archipelago are needed for comparisons. Of special importance is an assessment of the changing nature of socio-economic interactions between prehistoric communities after the disappearance of Lapita pottery. Attention should be focussed on those areas that will provide important data towards identifying elements in the development of present day exchange configurations that are so often used by archaeologists in modelling the past.
BIBLIOGRAPHY


Bibliography


The Prehistory of a Polynesian Chiefdom, Appendix B. Seattle: Thomas Burke Memorial Washington State Museum Monograph 5.


Gosden, C. 1985 An archaeological survey of the Arawe Islands, West New Britain. Ms.


*Bibliography*
Bibliography


Huntley, D.J., Dickinson, W. and Shuttler R. 1983 Petrographic studies and thermoluminescence dating of some pot
sherd from Mare and Ouvea, Loyalty Islands. *Archaeology in Oceania* 18:106-08.


Bibliography


Op de Beek, J. and Ghijselss, J. 1979 Similarity analysis of pottery from the mining area of Thorkos (Greece) based on trace constituent concentrations, determined by neutron activation analysis. Miscellanea Graeca fasciculus 2:113-83.


Bibliography


Specht, J. 1983 Settlement and economic contact across the Vitiaz Strait. Ms.


Specht, J. 1988 A Far Western Lapita? Paper presented to the Lapita Design Conference, Department of Prehistory, Research School of Pacific Studies, The Australian National University, Ms.


Bibliography


THE AUTHOR

Glenn Summerhayes is an ARC Fellow in the Department of Archaeology and Anthropology, The Faculties, The Australian National University. He has been involved in Papua New Guinea archaeology for nearly twenty years, the past ten as an archaeologist working in the Bismarck Archipelago. In 1989 Summerhayes began fieldwork for his PhD dissertation in West New Britain, Papua New Guinea. His PhD work forms the basis of the monograph. Over ten months was spent in field with his colleagues Chris Gosden, Robin Torrence, Jim Specht and Richard Fullagar. Excavations and survey work was undertaken in the Arawe Islands, the Willaumez Peninsula, Kandrian, Sauren and Mopir.

His research concentrated on the nature of interaction between Lapita communities in the Western Pacific in the late fourth and early third millennium BP. Dentate-stamped pottery found in Lapita settlements has played an important role in modelling the nature of social and economic interaction between these communities. This pottery is the archaeological signature of Austronesian peoples leaving Near Oceania and entering Remote Oceania for the first time. By examining the nature of production, exchange and use of pottery from West New Britain, Papua New Guinea, Summerhayes re-assesses and re-evaluates the degree of interaction between Lapita communities in the western Pacific.

LAPITA INTERACTION publishes for the first time the results of an intensive examination of the Lapita pottery assemblages from the sites of Adwe, Apalo and Paligmete from the Arawe Islands, New Britain, Papua New Guinea. The research complements his work into obsidian production and distribution, and argues for greater interaction among Lapita communities from Papua New Guinea to Samoa. It will be an important reference work for any archaeologist working in the western Pacific.

TERRA AUSTRALIS is a monograph series, which aims to bring detailed archaeological site data to publication in a format accessible to general and academic readers alike.