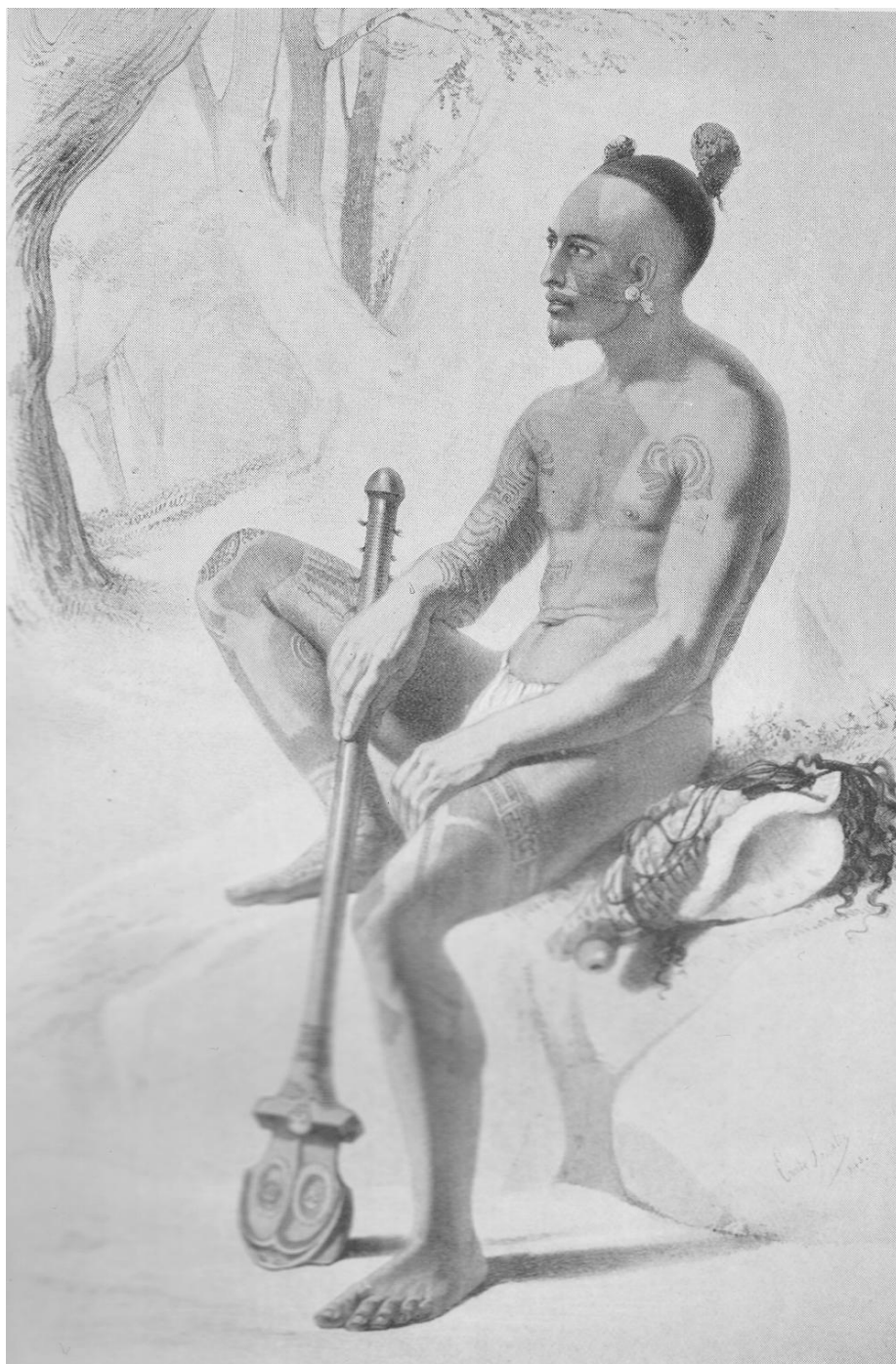


Music, Lapita, and the Problem of Polynesian Origins

by Mervyn McLean



*To Bruce Biggs (1921 - 2000) whose Pollex files
revolutionised linguistic research in Polynesia*

Title page illustration: Tattooed Marquesan warrior with Cassis shell conch.
Ref.: Andersen 1934:opp.70, from Dumont d'Urville, 1846, *Atlas pittoresque*,
Voyage au Pole Sud, vol.1, Plate 58

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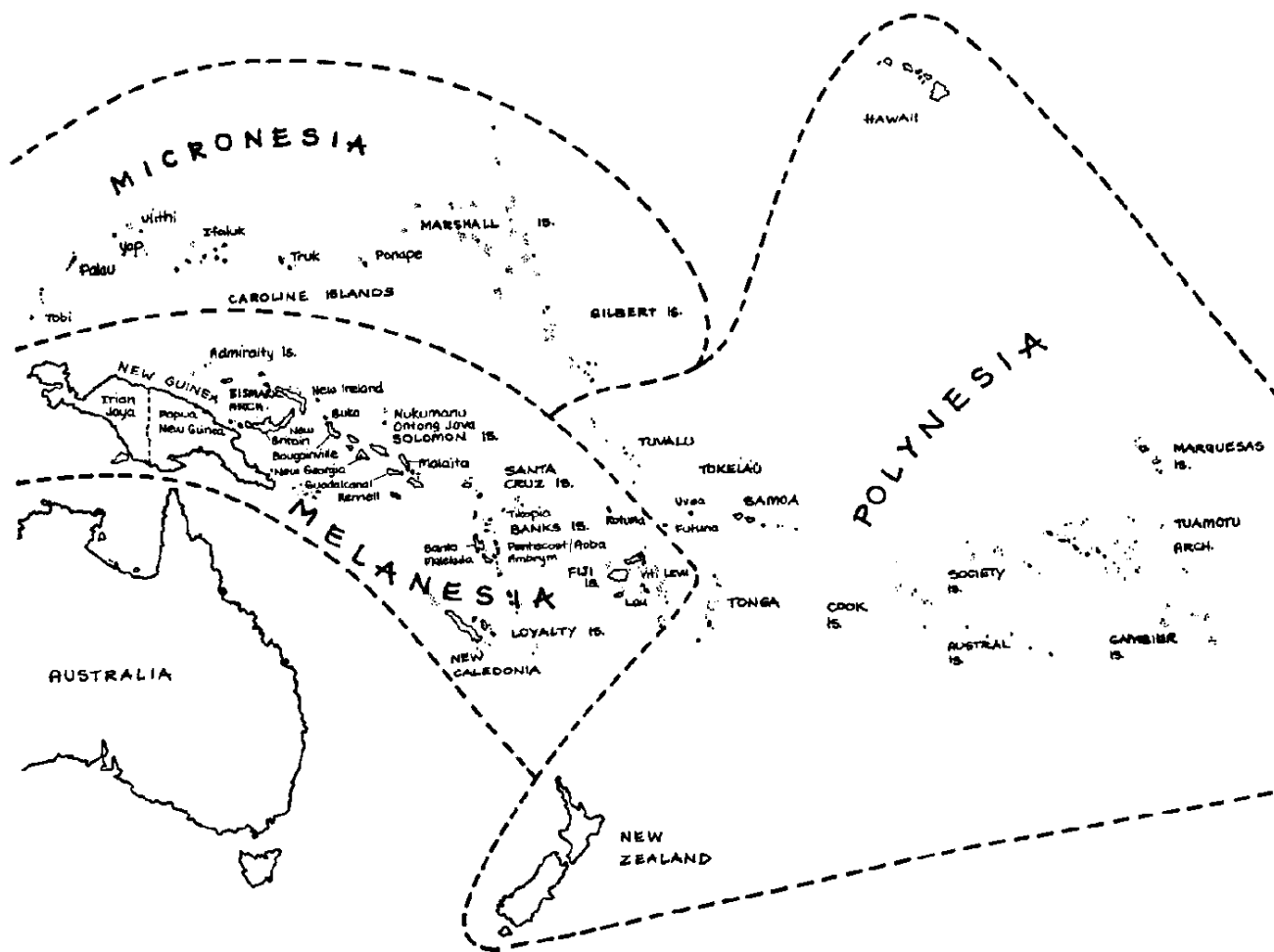
Auckland
The author

Contents

Chapter 1. Introduction	5
Chapter 2. Early ideas of origin	9
Chapter 3. The ethnographic divisions	15
Chapter 4. Archaeology and the Lapita cultural complex	19
Chapter 5. Linguistics	25
Chapter 6. Music	30
Chapter 7. Physical anthropology and genetics	79
Chapter 8. Canoes	84
Chapter 9. Voyaging	92
Chapter 10. Ethnography	95
Chapter 11. Food plants	105
Chapter 12. Domestic animals	146
Chapter 13. Betel, kava, and toddy	156
Chapter 14. Sea levels	165
Chapter 15. Discussion and conclusions	176
References	199
Appendix 1 Chronology of scholarly events	222
Appendix 2 Pollex area codes	226
Appendix 3 Glossary of name changes.....	228
Appendix 4 Abbreviations for linguistic subgroups	229
Acknowledgements.....	230
About the author	231

Illustrations

Map Oceania	4
Map Diffusion in Island Melanesia	34
Linguistic subgroups referred to in the text	41
Bismarck Archipelago showing language map codes	42
NZ Maori conch	74
Hawai'i drum	74
Mangaia drum	75
Tahiti nose flute	75
Tonga nose flute.....	76
Bahinemo, PNG slit gong	76
Tonga slit gong.....	77
Atiu slit gong	77
Samoa dance	78
Tonga dance with stamping tubes	78



Map of Oceania showing conventional culture areas

Chapter 1 Introduction

When the present writer began field work on traditional Maori music in 1958, the diverse fields of Music and Anthropology were only just beginning to converge. Unknown to me as I made my very first recordings in the Bay of Plenty area of New Zealand, the ethnomusicologist Alan P. Merriam was working on his epoch-making book, *The Anthropology of Music* (1964) in the United States. This book later became my bible as I undertook more research and worked on a PhD, only the third, I was told to be awarded on the subject of Music in New Zealand. These were pioneer days for the discipline of Ethnomusicology, and everything about it at the time was new, especially as it related to Anthropology. But it soon became apparent to me that it could make a significant contribution on issues that had occupied Pacific scholars for at least a hundred years, including the vexed question of "The Coming of the Maori" as articulated at this time by the ethnologist Sir Peter Buck (Te Rangi Hiroa), and further back still the origins of the peoples of Polynesia, whose remarkable history was equally the subject of debate.

European discovery of the Pacific did not begin until at least half a millennium after Polynesians had conquered the last frontier of this vast ocean expanse by reaching New Zealand. More impressive still is an even greater time depth of at least three thousand years since pre-Polynesians are believed to have ventured out of SE Asia to begin their journeys into what is now known as Remote Oceania. Their story has been the subject of numerous books and articles, and theories about where they came from have proliferated since the first encounters with Polynesians by European navigators in the eighteenth century. Some of the theories are mere flights of fancy and can readily be dismissed; some which once seemed credible have now been disproved; some can best be regarded as half true; and others are still the subject of debate. Prominent among them is a deeply embedded current view, which has gained currency over the past thirty or so years and is now subscribed to by most anthropologists. According to this view, Polynesians evolved from a group of pre-Polynesian settlers known as Lapita people whose characteristically dentate stamped pottery has been found in numerous archaeological sites stretching from the Bismarck Archipelago on the eastern fringe of Papua New Guinea south-eastwards through Island Melanesia to Fiji, and from there to nearby Tonga and Samoa in Western Polynesia.

Why another book?

The literature on Polynesian origins and information bearing upon it is so vast it may well be asked why burden the reader with yet another book about it, and, from the author's point of view, why bother to write one? The answer quite simply is that among the numerous attempts to solve the problem there are many loose ends, and it is time for review. The current orthodoxy, while

standing the test of time in most respects, is now in need of adjustment; musical evidence has not so far been taken into account; and some past ideas are worth re-visiting. The present book takes an historical view of the issues, summarising and evaluating theories of Polynesian origin from the eighteenth century onwards, providing some account of methodologies used by scholarly disciplines which have been brought to bear on the subject, and data so gained, including evidence from music and dance, which forms the core of the book. The results, as will be seen, call to question the orthodox theory of Polynesian origin from Lapita potters.

Setting the scene

Two main considerations underlie the discussions to follow. The first is that the peoples spoken of were maritime members of the Austronesian language family, dependent for all but local communication upon sea-going canoes. As a result they were constrained by barriers such as sea gaps, and cultural complexes of a regional nature emerged in consequence. For subsistence they were dependant primarily on the produce of the sea, upon near and off-shore fishing, and upon shell fish and other coastal resources. Horticulture and domestic animals were fully exploitable only on high islands, and were meagre or in some cases absent altogether in atolls which were the predominant environment in Micronesia and in the Polynesian Outliers. Second to be considered is exactly what happened when people ventured beyond the boundaries of their own local regions. It is inaccurate to label these excursions as migrations except cumulatively over a period of time. Captain Cook saw flotillas of canoes in Tahiti, on one occasion in 1778 of war canoes (Bellwood 1978a:298), and on another bearing 'Arioi entertainers to adjacent nearby islands, and Maori oral tradition speaks of a "Fleet" of seven canoes that were once thought to have brought the Maori people to New Zealand. But the flotillas seen by Cook were a local development of the Society Islands with no precedents in Western Polynesia, and the idea of a Maori Fleet has long since been discredited. The reality is that only one or two canoes at most would have gone on voyages of exploration or discovery at any one time, and generations could elapse before another might follow. Finally one must consider the most likely result when such a canoe reached landfall. Much would depend upon whether or not the arrival place was already occupied and whether the inhabitants were willing to accept newcomers. Some idea of ensuing interactions can be gained from the reception given to European explorers when first contact was made with Polynesians. Bougainville spoke of willing women in Tahiti who were "quick to caress"; Tasman was attacked at what is now called Golden Bay in New Zealand and sailed away in disgust after naming it Murderers' Bay. Polynesian visitors to far shores would have experienced a similar range of reaction, repeated over and over again through thousands of years of encounters in many places. The end result, which scholars have tried to unravel, is a vast mosaic of criss-crossing lines of influence and communication, some old and some new, which together have

led to current distributions of peoples and items of cultural inventory. As the following chapters will show, to solve the problem of Polynesian origins, some account needs to be taken of them all.

A note on place names

Since the Pacific islands were first visited by Europeans there have been many changes of name. Some of the earlier names are so long obsolete as to be barely remembered. No one, for example, refers any more to Hawai'i as the Sandwich Islands or to Samoa as the Navigators Islands. The most recent changes, however, are more problematic for readers. Some affecting the more familiar tourist destinations are better known than others. Among these are Vanuatu, which used to be called the New Hebrides, and Tuvalu, formerly known as the Ellis Islands. Name changes in Micronesia, however, have had less publicity and will be unfamiliar as yet to many readers. This poses a problem for the book because most of the literature refers to these places by their old names. It would be confusing to keep changing from one to the other, so I have reluctantly decided to keep to the former names in most of the writing. Older province names in Papua New Guinea have also been retained, again to avoid conflict with older literature. There have been a number of recent changes to the name for the large Indonesian-administered western half of New Guinea. Formerly Dutch New Guinea, then Irian Jaya, it is now most often referred to as West Papua, and I have adopted this usage. It should be noted, however, that the term Papuan does not refer exclusively to the inhabitants of West Papua but applies also to speakers of non-Austronesian languages in Papua New Guinea and some areas of Island Melanesia.

A glossary of island name changes has been provided as Appendix 3.

Other naming conventions

The terms 'Melanesian' and 'Papuan', which appear in the literature in numerous contexts, are especially problematic. 'Papuan' is the term commonly used for the longest-established occupants of New Guinea who speak non-Austronesian languages. It is enshrined within the names for both western and eastern halves of New Guinea, the Indonesian-administered area of West Papua, and the independent nation of Papua New Guinea. The term 'Melanesian' is sometimes loosely used to distinguish Austronesian speakers from Papuans, but in its original sense of 'black-skinned peoples' it is an umbrella term for both groups of languages. But it is the Austronesian-speaking occupants of Island Melanesia who became Lapita potters, and it is they who receive most attention in the book.

Dating of events

Difficulties of dating and problems arising from them are discussed later in the book. At the outset, however, it needs to be noted that no date estimate, however derived, can be regarded as absolute, and radiocarbon dates, in particular, are constantly under review. The dates cited throughout most of the book are those most generally accepted in literature published up to about 2003. A then standard benchmark date of about 2000 BP has in consequence been retained for first settlement of Eastern Polynesia, but with no expectation that this will endure. In early January 2011, a flurry of media announcements appeared about newly calculated radiocarbon dates which called the old date to question and set the colonisation of Eastern Polynesia a thousand or more years later than previous estimates. The paper concerned (Wilmshurst et al. 2011) has obvious relevance for the present book, and discussion of it has accordingly been introduced at appropriate points.

Chapter 2 Early ideas of origin

When the co-founder of the Polynesian Society, S. Percy Smith (1840 - 1922), was young, bibles familiar to him would have been the old-fashioned kind. In the centre of each page was a column containing dates, beginning in the Book of Genesis with the creation of the world. Smith may not have believed the date worked out for this event by Archbishop Ussher of Ireland who was responsible for the chronology, but the method Smith himself used to calculate the dates for Maori migration canoes was similar. Ussher, who was a considerable scholar of his time would have been constrained by belief in the literal truth of the bible. Smith placed too much reliance on the accuracy of oral tradition. Ussher set the creation of the world at precisely 4004 BC, calculating back from a date for the Temple of Solomon. Smith, who worked from Maori and Rarotongan, genealogies, had the legendary navigator Kupe arrive in New Zealand in AD 925, Toi in 1150, and the Great Fleet of seven settlement canoes: Tainui, Te Arawa, Matatua, Kurahaupo, Tokomaru, Aotea, and Takitimu in 1350. It was a list generations of New Zealand schoolchildren committed to memory, like the books of the bible at Sunday School, and it remained standard for a surprisingly long time. It was still given credence as late as 1950 by Sir Peter Buck (Te Rangi Hiroa) in the second edition of his influential book *The Coming of the Maori* (Buck 1950), and finally lost ground only with the publication of Simmons *The Great New Zealand Myth* in 1976.

After 1950, infant sciences of archaeology and anthropological linguistics in Oceania began to emerge, and their predecessors held sway until about this time, with considerable overlap between the two.

The present chapter will sketch in some of the more critical early events, with no attempt at a complete history, drawing principally on Howard (1967) and Sorrenson (1977, 1979). For further details of these and other developments, the reader is referred to Howard, who provides a comprehensive survey with copious excerpts from key publications, and Sorrenson, who focuses on Pakeha misconceptions of Maori origins which, as Sorrenson demonstrates, were by no means limited to the ideas of Percy Smith. But first it is necessary to give some account of voyages of discovery which first raised the problems of Polynesian origin the theorists later sought to solve.

Some readers may recall the following:

In fourteen hundred and ninety-two
Columbus sailed the ocean blue

So ran a schooldays rhyme we were taught as a reminder about the European discovery of America. It seems incongruous that at this time nothing was known of the Pacific until Balboa saw it from Darien in 1513, though Marco

Polo had gone overland as far as China and returned with tales of his adventures as early as 1295. In 1565, the Spanish opened up Micronesia by establishing the galleon route from Mexico to the Philippines through Guam, but Polynesia did not become known to Europeans until the exploring expeditions by Cook, Bougainville and others late in the eighteenth century. World view by then had expanded sufficiently for much to be known about Hindus, Malays, and others, but the peoples of Polynesia were new on the horizon. Cook's voyages had been commissioned as scientific expeditions, with botanists and others on board who would gather information about the places visited. Invaluable first impressions were meticulously recorded, including observations about Polynesians, comparing them with already known peoples, and plants and objects were collected for study. The plants were deposited in herbaria, and the objects became prized exhibits in museums of ethnology when these were established throughout Europe from about half way through the following century. Cook's officer, Johann Forster, who spoke from personal experience, allied New Zealanders with Malays (Sorrenson 1977:451). Later theorists, driven in the first instance by religious conviction, less credibly, thought differently.

Designated as the "Semitic Maori" and the "Aryan Maori" respectively, two early ideas of Maori origin discussed by Sorrenson are relevant also for Polynesians at large.

The Semitic Maori

A fundamental thrust of Sorrenson's book, together with the journal article and a series of Macmillan Brown lectures which gave it birth, is the manner in which early theorists on the subject of Maori origins were blinded by their own deeply rooted preconceptions and cultural beliefs. As Sorrenson expresses it:

More often than not the European theorists read into Maori origins and culture what they wanted and expected to find, on the basis of theories derived from their own cultural and philosophical traditions (Sorrenson 1979:7).

Nowhere is this more clearly demonstrated than with the concept Sorrenson calls the Semitic Maori, promulgated by missionaries whose belief system was rooted in Old Testament scripture. For them the bible was more than the collected oral tradition of a tribal desert people. As an article of faith they were committed to what they believed to be the inspired word of God, revealed for the instruction of all mankind. So if the bible said Adam was the first man, then everyone was descended from him, including Polynesians. Thus, the missionary Samuel Marsden (1765 - 1838) classified Maori as descended from the biblical sons of Shem and therefore of Semitic origin (Sorrenson 1977:454), and the later missionary Richard Taylor (1805 - 1873) saw Maori as a lost tribe of Israel, living in a degenerated state after casting aside the word of the true

God, and migrating from the biblical homeland ultimately to New Zealand (Sorrenson 1977:457).

The Aryan Maori

The term Aryan is now irrevocably associated with Nazi atrocities and delusions of a pure race, but in the nineteenth century was the name of a group of cattle-herders thought by philologists to have lived about 3-4000 years ago between the Hindu-Kush mountains and the Caspian Sea, who gave their name to a branch of the Indo-European language family.

Richard Taylor's book *Te Ika a Maui*, in which he published his views of a Semitic origin for Maori, was published in 1855. Thirty years were to elapse before the appearance of another book by a New Zealander that addressed the problem. Considerable developments had meantime taken place in scholarship, not least, the publication in 1859 of Charles Darwin's revolutionary book, *Origin of Species*, which for educated people finally put paid to the biblical account of creation and the rationale for a Semitic origin of the Maori. Essential also for the next stage of theorising were advances in comparative philology, built upon work on Indo-European languages by the famed British orientalist Sir William Jones, and continued by scholars such as the brothers Grimm in Germany (Sorrenson 1979:18).

Edward Tregear (1846 - 1931) was an ardent proponent of the method who viewed comparative philology and comparative mythology as "the two youngest and fairest daughters of Knowledge" (cited by Sorrenson 1979:19). There was nothing wrong with the concept, or even Tregear's enthusiasm for it, but in Tregear's hands it lacked the rigour which was to revolutionise linguistics in the twentieth century. Tregear relied on mere superficial resemblances of words, coupled with fanciful connections from mythology, and these led him astray. His *Maori-Polynesian Comparative Dictionary* (1891) remains useful even today, but it is his less fortunate earlier book *The Aryan Maori* (1885) for which he is principally remembered.

In this Tregear claimed to have proved that the Maori was descended from the warlike, pastoral Aryans; that the Maori language preserved 'in an almost inconceivable purity' the speech of his Aryan forefathers and had even 'embalmed' the memory of animals and implements, the sight of which had been lost for centuries. Tregear assumed that parallel words, or paronyms, had a common ancestor, usually a Sanscrit root. His book lists some eighty samples. But he also claimed to find a resemblance between Maori and Sanscrit grammars; he ignored the fact that the missionaries had applied rules of grammar from the English language to Maori. Strangest of all, was Tregear's claim to have found in Maori an embalmed memory of Aryan animals and customs. Take, for instance, the embalmed knowledge of the cow, for the Aryans but not

the Maoris were cattle-keepers. The Sanscrit word for cow was gau; Tregear found it surviving in the Maori kahui, herds, flocks; kahurangi, unsettled (in the sense of 'sky-cow or moving clouds'); kauruki, smoke (the Aryans burnt dung); and so on. Nor was Tregear content to rely on Sanscrit; Greek and Latin were equally suitable for providing paronyms. Thus he takes from the Latin taurus, bull, the Maori taro, courage. He then concluded that the Maori had once known the cow and the bull (Sorrenson 1979:19-20).

According to the Dictionary of New Zealand Biography (DNZB vol.2) Tregear's book was in general favourably received overseas. Tregear was admitted to fellowships of the Royal Geographical Society and Royal Historical Society, corresponded with luminaries of the scholarly world, and continued to write about the Aryan origin of the Maori in numerous publications over the next twenty years. At home, however, the reception of Tregear's idea was not as favourable and, if notice had been taken of a review by Atkinson in the following year it would have been rejected at once. Atkinson's review (Atkinson 1886) took the form of a parody of Tregear's method, cleverly piling up seeming coincidences of animal and other terms until concluding that they amounted to a 'cock and bull' story. But Tregear's notion of the Aryan Maori did not go away. Other prominent advocates included J. Macmillan-Brown (1845 - 1935), a professor at Canterbury University College whose contribution ranged far beyond linguistic argument. In his book, *Maori and Polynesian* (1907) and subsequent publications he not only espoused an Aryan origin for Maori but allowed his enthusiasms to run away with him to the point of rejection even by other advocates such as Tregear and Smith (Sorrenson 1979:26), whose own ideas were far from acceptable for other reasons. Of the three, however, it was Smith who was eventually to prevail as a result of his book *Hawaiki* (1910) in which he traced the origin of Polynesians to an alleged homeland in India, and began the long reign of his Fleet chronology. Meanwhile, in the scholarly world at large, views of Polynesian origins continued to be coloured at any given time by the prevailing orthodoxies of the day. Foremost among these for a long time were ideas emerging from attempts to classify the various peoples of the earth, and an entire field of anthropology which grew out of Charles Darwin's theory of evolution by natural selection, and especially his second book on the subject, *Descent of Man* (1871).

Classification of race

The very idea of race is now so unpopular as to be commonly avoided in scholarly writing, with the term 'phenotype', referring to outward appearance, generally substituted, and another term, 'genotype', coined to include less visible inherited traits such as blood groups. The older and more direct approach was to distinguish peoples of different cultural and linguistic affiliation according to their shared characteristics, usually once again on the

basis of physical appearance. Just as botanists have devised ways of classifying plants, so too, ways were sought of classifying people. The starting point was the observations of travellers and mariners as unfamiliar parts of the world were opened up by exploration and discovery.

Linnaeus, in 1740, recognized four variants of man: European, American Indian, Asiatic and African. The first detailed scientific study of human races, however, was made by J. F. Blumenbach in 1775 (Cole 1963:10).

In the 1775 first edition of his *Natural Varieties of Mankind*, Blumenbach divided humans into four races: Caucasian, Asiatic, American, and Ethiopian, adding Malays and Polynesians to successive editions at the behest of Joseph Banks after Cook's circumnavigations of the world (Sorrenson 1979:13).

Anthropologists were later to simplify these into three primary divisions of Caucasoid, Mongoloid, and Negroid (Cole 1963:9), with numerous not always coherent secondary divisions, creating problems when anthropologists tried to explain these in terms of various mixtures of the primary groups. Some consequences of this will become apparent in chapters to follow.

Evolution

One outcome of Darwin's second book, *Descent of Man* (1872), was the impetus it gave to archaeology, and attempts to find fossil remains that would demonstrate the various stages of human evolution. Another was a movement that bore Darwin's name, but for which he himself was not, in fact, responsible. Known as "social Darwinism", it was a development of ideas first promoted by Darwin's contemporary, Herbert Spenser (1820 - 1903), who coined the phrase "survival of the fittest" and whose own ideas were in turn pushed to extremes by others. It was a movement that eventually fell into deep disrepute, along with a sister development known as "diffusionism", whose ramifications were at least as far-reaching.

Fundamental to social Darwinism or evolutionism was a belief in cultural strata, progressing from simple to complex from savagery to civilisation through barbarism, with tribal cultures of today representative of higher cultures as they once were. To this already highly flawed set of concepts, diffusionism or kulturkreis (cultural circles) as it was also known, added an implication that humans were essentially uninventive, and clusters of traits, or even single traits, moved from a few only centres to areas of less complexity, with migration assumed as the sole means of doing so (Suggs 1960:54). As will be seen in later chapters, no such assumption is justified, and other processes, especially borrowing from culture to culture, must also be taken into account.

Wave theories

In this category are numerous rival theories involving various combinations of racial or cultural strata which emanated from a variety of disciplines, especially in the first decades of the twentieth century. Dependent, as most of these were, on now discredited evolutionary or diffusionist ideas, there is no need to provide details here. A good account of them can be found in chapter 11 of Bellwood's book, *Man's Conquest of the Pacific* (Bellwood 1978a).

Remaining events relevant to origins, including all those after about 1950, will be discussed in chapters to follow, and are listed in date order in Appendix 1.

Chapter 3 The Ethnographic Divisions

Jules Sebastian Cesar Dumont d'Urville (1790 - 1842) was a French navigator with extensive experience of the South Seas, first on an exploratory voyage with Louis Duperrey from 1822-25, when he was second in command, followed by two expeditions of his own in the ship *Astrolabe*, all under the orders of the king of France. His brief from the king was to "explore the principal groups of islands in the Grand Ocean" to augment information gathered by previous expeditions. On the first of these voyages from 1826-29 he visited New Zealand, Tonga, Fiji, New Britain, New Guinea, Australia, the Santa Cruz Islands, Guam, and the Ile de France or Mauritius in the Indian Ocean as well as calling in at Amboyna and Batavia in Indonesia. From 1837-40 he was back in the Pacific with his second expedition, this time visiting Mangareva, the Marquesas Islands, Tahiti and most of the other islands of the Societies group, as well as Samoa, Tonga, Fiji, Guam, Palau, the Philippines and Indonesia (Buck 1953; 83-84, 87-88).

It was on the basis of observations during his earlier voyages, however, that he felt able to classify the peoples he had observed into broad regional groups, namely, as set out in numerous geography books and world atlases ever since, into Polynesians, Melanesians, and Micronesians or inhabitants of the many, small, and black islands respectively, with Malaysia, incorporating the modern nations of the Philippines and Indonesia as a further category (Dumont d'Urville 1832).

D'Urville was well qualified to make such a judgement, not only on the basis of his personal experience of the peoples concerned, but also as a highly educated man with knowledge of languages and sciences, and undoubtedly familiar with the journals of all of his predecessors into the Pacific. Significantly, too, he was a member of the Linnean Society (DNZB Vol.1), so would have had knowledge of current conventions for classifying race, and doubtless took account of them.

The importance of d'Urville's divisions of the Pacific into Polynesia, Melanesia, and Micronesia can hardly be over-estimated. They formed the basis of museum catalogues of Pacific artefacts when these began to be compiled, and they later underpinned an entire science of Pacific ethnology when study began of the collections. As such the system he devised has endured until the present day, coming under scrutiny only after the lapse of well over a century. When criticism was finally voiced, it was not on the basis of the geographical boundaries, which after all can be readily adjusted, but because of d'Urville's race-based division of Oceania into two peoples, the one black and occupying Melanesia, and the other of lighter-skinned peoples who lived everywhere else.

One of the earliest to voice dissatisfaction was Douglas Oliver in his 1961 book *The Pacific Islands* (Oliver 1961:23-5). As a result of the most recent research at the time, Oliver concluded that the regions of Polynesia, Melanesia, and Micronesia should now be regarded as no more than geographical, mainly, it would seem, on evidence from linguistics which has replaced the three former areas with a larger number of smaller ones which are inter-related, with Eastern Micronesia, parts of Island Melanesia, Fiji, and Polynesia all of common origin. Oliver noted also that although most Melanesians are darker than non-Melanesians, there is a range of phenotype in all areas.

In mitigation of Oliver's last point, which refers to Melanesians of the present day, it could well be that there is more intermixing now than there was when Dumont d'Urville made his observations over 180 years ago. Though noting some degree of variation within the broad racial categories, the early European navigators did not report a mix of racial types in their various ports of call, and had no theoretical axe to grind, so it seems reasonable to conclude that they reported exactly what they saw, and their first-hand observations should be taken at face value.

In fairness to earlier scholars, as well, it needs to be recognised that a range of phenotype was always assumed in the various racial categories, so these were never regarded as rigid, and absence of absolute uniformity did not invalidate the concept. Thus, in a textbook on the subject of race, written at about the same time as Oliver published his book, it is noted

Everywhere we find that human races and sub-races grade into one another, that there are 'clines' between neighbouring populations. The tremendous variations in members of any race or sub-race must also be stressed. So, although we may define the characteristics of a race as a whole, there will always be individuals of that race who do not conform to the general pattern (Cole 1963:10).

In other words, all that matters in terms of classification is that members of any one group should be more like each other than members of another group, and despite the diversity of Melanesia compared with the other divisions, it contrasts sufficiently on ethnographic and other grounds to qualify as a region in its own right. As a demonstration of traits found predominantly in Melanesia but only seldom or not at all in other areas one need only cite Papuan complexes such as men's houses, men's cults and graded societies, moieties, pig husbandry and ceremonial killing of pigs, initiation, ancestral ghosts, spirit voices to frighten women and uninitiated boys, masks and other ritual paraphernalia, sorcery, trading and purchase of song and dance complexes etc., along with associated traits of many kinds. There is a gradient of these traits from a Papuan core with attenuation west to east into Island Melanesia, with bullroarers, for example, losing their significance as esoteric voices and eventually becoming no more than toys for children. All of this is far too

significant for the area to be dismissed as a category error, or regarded as gaining such traits recently enough to be considered irrelevant. This, nevertheless, has been the fate of Melanesia because of an alliance between archaeology and linguistics which has seen the three traditional areas of Melanesia, Polynesia, and Micronesia replaced by only two, which have been adopted in recent decades by most scholars and are known as Near and Remote Oceania.

Disestablishing Melanesia?

The new terms were first proposed in a paper jointly written by the linguist Andrew Pawley and the archaeologist Roger Green in 1973 (Pawley and Green 1973), and were reaffirmed by Green in 1991 in a paper entitled "Near and Remote Oceania: Disestablishing 'Melanesia' in Culture History." (Green 1991a). In the first of these papers the areas were essentially as foreshadowed by Oliver, with the boundary between them defined as a stretch of 350km of open sea between San Cristobal at the end of the Solomons chain and the Santa Cruz group to the east, with Vanuatu and New Caledonia further to the south, separated by still further water gaps of 200km and 250km respectively, with another 850km separating Vanuatu from Fiji. These water gaps were later to prove crucial for Lapita studies, as natural barriers to both plants and people, and forming the boundaries of both stylistic areas for Lapita pottery and associated linguistic subgroups.

From the 1960s onwards, Pacific archaeology was dominated by exciting new finds of Lapita pottery, on an astonishing number of sites, with Roger Green taking a prominent part in ensuing discussion, so it is not surprising that his preferred terminology caught on. Soon few scholars were even referring to Polynesia, Melanesia, and Micronesia as units for discussion but fell into Near and Remote Oceania as less troublesome alternatives. Even a seeming possibility that Micronesia was peopled from Vanuatu (Grace 1955 & 1964; Marck 1975) was accepted as if proven, and allowed Micronesia to be sidelined as a member of the Remote community that required no further attention in terms of peopling Polynesia.

Green's 1991 assault on the concept of Melanesia takes the form of a comprehensive survey of the area named as Near Oceania, with attention to its bio-geographical boundaries and population movements through time. Only towards the end of the article, however, does he turn to Remote Oceania, doing so only briefly, and offering no arguments beyond statements that Near Oceania does not tie in with Remote Oceania, and Melanesia as an area is unnecessary for an understanding of Lapita expansion. Elsewhere, Green made it clear that his objection to Melanesia was not only archaeological and historical but also biological on grounds of phenotype, and linguistic on the basis that there is no Melanesian subgroup, but only subgroups within Oceanic (Comments by Green in Terrell et al. 2001). The linguistic argument is

conclusive, however, only if the areas so identified are truly lineal homelands. But, as will be seen in Chapter 5, linguists themselves do not agree on subgroups, so it would be fair to say that in this respect the jury is still out. Moreover, regardless of the outcome of any future debate there may be on this matter, it makes no difference to the arguments central to the present book which puts the case for a Micronesian as well as Melanesian connection to Polynesia. If Micronesians turn out to be more closely involved with Polynesians than currently thought, linguists will doubtless make appropriate adjustments to subgroups. Meanwhile, if there is to be any debate at all on the paths taken by pre-Polynesians, all three of Dumont d'Urville's regions of Polynesia, Melanesia, and Micronesia remain essential, and will feature in all chapters of the present book.

Chapter 4 Archaeology and the Lapita culture complex

In these days of radio, television, and urban archaeology, which has recently come to the fore, most people's image of archaeologists is probably of dedicated professionals patiently working their way layer by layer at marked-off sites known as "digs", labouring for hour upon hour with trowels and little brushes, and making meticulous records of everything they find, with little expectation, if the site is pre-European, of discovering anything much more than fish bones, pottery shards, and postholes. In earlier decades, the image might have been of expeditions to discover the contents of ancient tombs such as that of King Tutankhamen in Egypt, or the ruins of lost cities. The transformation came after the end of World War II, when modern techniques of stratigraphic archaeology replaced former emphasis on surface finds, and work began on formerly neglected islands of the Pacific. The yield from such digs may seem unexciting to the non-professional, but the results have been nothing short of spectacular.

The post-war period of archaeology

Archaeology in the Pacific was initially the province of museums, where the subject essentially developed as a handmaiden of ethnology, most notably at the B.P. Bishop Museum in Honolulu, Hawai'i. Later, with the cessation of hostilities at the end of World War II, they were joined by departments of anthropology and archaeology at universities.

When the war ended, the present writer was a 15-year old schoolboy. The first week of every year both before and after this event was devoted to "barracks week", when much of the time was spent trudging around the school grounds bearing a .303 rifle and learning how to slope, order, or present arms on command. These events were orchestrated by ex-army members of the teaching staff. The return of soldiers from overseas, however, had at least two powerful impacts on universities. The first was recruitment of staff whose wartime activities included on-the-spot experience of Pacific islands that could be brought to bear on academic studies. Another was a post-war "birth bulge" that required resources to be ploughed into education, initially at pre-school level, then progressively through the education system until reaching the universities in the 1960s. Archaeology was one of the disciplines that benefited, not least, as well, by undisturbed access to sites in former war zones.

Besides careful attention to stratigraphy and site discipline, twin hallmarks of the new post-war archaeology were use of radiocarbon dating, first demonstrated By L.F. Libby in 1950, and objectives that included the establishment of chronological sequences of artefacts and identification of cultural periods (Suggs 1960:56).

In New Zealand, the first major archaeological event of the 1950s was publication by Roger Duff of the Canterbury Museum of his book *The Moa-Hunter Period of Maori Culture* (Duff 1950). Based on work undertaken in the 1940s and too early to take advantage of the new radiocarbon dating technique, it nevertheless established kinship of the first New Zealanders with Eastern Polynesia on the basis of adze types (Duff 1956:139), negating earlier ideas that moa-hunters belonged to a non-Maori stratum from Melanesia (Sorrenson 1979:40).

Meanwhile, in the very year that Duff's book was first published, a Department of Anthropology was in process of being set up at the University of Auckland under the leadership of Cambridge-trained Ralph Piddington (1906 - 1974), its first professor. Another Cambridge graduate, Jack Golson (1926 -), was appointed to a lectureship in archaeology in 1954, and was succeeded in 1961 by American-trained Roger C. Green (1932 - 2009) after Golson moved to Australia. Both men were on the vanguard of the new archaeology, with Green, especially, as already indicated in the last chapter, taking a leading role.¹

The Lapita complex

A perennial problem for archaeologists has been the perishable nature of most of the items they would like to study, forcing recourse to linguistics when supplementary information is required, and frustrating efforts to document the full range of artefacts that might have been in use at any one time. The outstanding exception is pottery, which lasts in the ground indefinitely, and can be radiocarbon dated from associated organic materials such as charcoal, bone, or food residues. During the whole of the early period of archaeological studies in Oceania, the only such finds were in Melanesia and in Western Micronesia, distinguishing these areas from Polynesia, which was believed to be aceramic. Two notable finds were to challenge this belief. One was the discovery by Sinoto in 1968 of potsherds with Fijian tempers and dated to about AD 300-600 in the Marquesas Islands, confirming an earlier find by Suggs in the same area (Bellwood 1978a:321, 323), still the only such finds in Eastern Polynesia. The other was discovery by Gifford and Shutler in 1952 of the famous Lapita form of pottery. Taking its name from its area of discovery in New Caledonia, it was subsequently found in over 200 sites stretching from the Bismarck Archipelago all the way through Island Melanesia as far as Tonga and Samoa in Western Polynesia, providing apparent continuity between the two areas and giving rise to the Lapita hypothesis of Polynesian origin.

The pottery and the people

The characteristic and highly conspicuous feature that distinguished Lapita pottery from all others when it was first found was a type of decoration called

¹ See Davidson 2009 for an obituary outlining Green's contribution.

dentate stamping, made up of tooth-like patterns pricked into the clay. It is important to understand, however, that not all of the pottery on Lapita sites was so decorated, and in all of the areas where dentate-stamped pottery has been found it fell out of use after a time and was replaced by plainware of similar form which has also been designated as Lapita.

Besides earthenware jars, bowls, and dishes, with and without decoration, a range of artefacts from Lapita sites include stone and shell adzes, flaked tools of obsidian and chert, shell food scrapers, shell arm rings and necklaces, drilled shark teeth, and sling stones (Green 1974:7); occupation sites are typically found on small offshore islands or close to reefs or beaches on larger islands that would provide good launching sites for canoes; middens are full of reef fish and turtle bones, and houses were frequently built on stilts across tidal reef flats (Pawley 2007:19), all collectively attesting to exploitation of marine resources and dependence on the marine environment, as might be expected of sea-going people. Who they were and where they came from will be touched upon in the next chapter. What they did and what they brought with them however, is the province of archaeology.

Regional differentiation of Lapita

Comparison of radiocarbon dates for the sites in which the characteristic dentate-stamped Lapita form of pottery has been found reveals a west to east progression from 3500-3400 BP in the Bismarck Archipelago to 3000-2500 BP in Samoa, with a pause in the home area of the Bismarcks before breaching the first of the large sea gaps to the south of the Solomons around 3200 BP (Kirch 2000:93).

In archaeological terms this time span of only a few centuries from first to last is remarkably short, testifying to a rapid expansion of the pottery bearers along the Island Melanesia chain, and possibly occupying not more than a dozen or so generations. During this time, however, as contact with the home area was progressively lost, changes inevitably took place in both pottery forms and styles of decoration. Green distinguishes two zones, designated as West and East Lapita, though with succeeding styles in the several areas evidently included as Lapita.

. . . the western Lapita ceramics retain their array of shoulder jars, bowls, and flat-bottomed dishes, with their highly complex decorative designs throughout the sequence. In the New Hebrides [Vanuatu] there are fewer vessel forms, and incising becomes the main decorative technique. By contrast, in the eastern Lapita sequences of Fiji, Tonga, and Samoa, the more elaborate and highly decorated vessel forms disappear during the second half of the sequence (Green 1979:73-4).

The Lapita hypothesis

None of the above would be controversial were it not for the interpretation that has been placed upon it. As will be seen in the next chapter, dialects spoken by the Lapita potters during the greater part of their voyaging belonged to a group of languages known collectively until recently as Eastern Oceanic which is shared by all of the inhabitants of the area now called Remote Oceania, which includes both Polynesians and Eastern Micronesians as well as Melanesians in the areas closest to Polynesia. From this it has been inferred that all of these peoples were of common stock, and Lapita potters were the sole ancestors of Polynesians.

Having reached as far as Fiji, the Lapita colonists moved on to Tonga, Samoa, and adjacent areas, where they are believed to have remained in relative isolation for a period, known as "the pause", of perhaps a thousand or more years, during which voyages beyond the immediate area ceased, and the characteristic features of Polynesian language and culture are thought to have emerged. After this, during the first centuries AD, voyaging over longer distances resumed, Polynesian Outliers in Melanesia were settled, and a final push occurred into Eastern Polynesia as a result of which the whole of this area was ultimately occupied. Referred to henceforth in this book as the Lapita hypothesis, the credibility of this scenario will be tested.

Duration of The Pause

The most recent work on radiocarbon dating in Eastern Polynesia (Wilmshurst et al., 2011) has relevance for the present book primarily in terms of the so-called "Pause" when, according to the Lapita model of Polynesian origins, both Fijians and Polynesians evolved from a shared ancestry with Lapita potters.

The length of the Pause has long been a bone of contention among anthropologists. The linguist Andrew Pawley argued very early that at least a thousand years is required for the Proto Polynesian subgroup to have developed from Proto Central Pacific (Pawley 1981:283), clashing in this respect with the archaeologist Geoffrey Irwin who favoured a model of continuous settlement and a correspondingly earlier date for Eastern Polynesia (Irwin 1992, Pawley 1996).

The difference between the two points of view was of the order of 800 years, with Irwin (1992:73) suggesting a date of 500 BC as a not outlandish possibility for the settlement of Eastern Polynesia, and Pawley pointing to archaeological dates not earlier than the 4th century AD (Pawley 1996:403).

Subsequent debate has split into two camps, labelled as "long chronology" and "short chronology" respectively, with both Irwin and Pawley's assessments of twenty years ago now on the long side of the ledger.

Allen and Kahn (2010:49) report as follows:

Since the inception of a scientific archaeology in the 1950s, the timing and origins of East Polynesian settlement have been dominant research themes. Current debates trace to Kirch's (1986) paper, "Rethinking East Polynesian Prehistory", where he identified crucial geographic gaps, problems related to radiocarbon dating, and key questions about material culture relationships. Spriggs and Anderson (1993) followed with a call for critical assessment of the regional radiocarbon database, and provided protocols for evaluating the accuracy of individual determinations. From these seminal papers and related research, two distinct views emerged as to what constitutes valid evidence of human presence in Pacific Island settings. "Long chronology" models were built largely on palaeoenvironmental evidence (proxy measures of human activities), arguments about the quality and intensity of sampling, and ideas about initial population sizes and rates of dispersal. In contrast, "short chronology" models relied more strictly on radiocarbon dates that were directly associated with cultural activities and met a rigorous set of criteria.

Initially, long chronology advocates placed human arrival between 2400 and 1500 BP, while short chronology supporters posited arrival between 1350 and 1000 BP (e.g. Kirch and Ellison 1994; Spriggs and Anderson 1993). In recent years the gap between these two positions has narrowed . . . There is now near-consensus that settlement took place within the last 1500 years or less, but those using the most restrictive protocols place human arrival no earlier than the 11th to 13th centuries AD . . . Overall, the distance between the two positions on regional settlement has been reduced to only a few centuries, with nearly all agreeing that regional settlement was much later than envisioned two decades ago.

The paper referred to at the beginning of this section (Wilmshurst et al., 2011) is very much at the extreme end of the short chronology spectrum. The method used is a radical statistically-based reinterpretation of already published radiocarbon dates for Eastern Polynesia, coupled with a body of recently determined results contributed by the authors.

The authors first grouped the dated materials into six categories: short-lived plants, long-lived plants, unidentified charcoal, terrestrial bird eggshell, bone, and marine shell. These were then found to fall into three reliability classes. In Class 1 were short-lived materials such as twigs, leaves, and seeds, characterised by dates that clustered tightly together. The other two classes had

dates that spread further apart and contained materials rated unreliable on a variety of grounds including in-built age for carbon content which compromised the true age of the samples. The conclusion reached, though not so baldly stated, was that only dates from short-lived materials could be trusted in contexts such as Eastern Polynesia, and all other carbon dates must be discarded.

No judgements are made concerning dates for Western Polynesia which are of equal relevance for issues such as determining the length of the Western Polynesian Pause. The rationale is presumably that in the Lapita and pre-Lapita context of thousands of years, small sampling errors can be tolerated, but become crucial when the object is to plot sequences of events that occupy only hundreds of years as in Eastern Polynesia. The authors have retained a date of 800 BC for first settlement of Samoa, but now place first settlement of Eastern Polynesia at AD 1025 - 1120 in the Society Islands, and all the remainder of Eastern Polynesia in a single pulse occupying little more than a century between AD 1190 and 1293. It can be expected that these figures will be disputed by the proponents of the long chronology view, but meanwhile they make little difference to the arguments advanced in the present book. Some further comment will be offered in later pages.

Modern models of origin

Before moving on to the language affiliations of the potters themselves, some mention is needed of rival theories of Lapita origin which have received publicity in recent years. The most influential of these are named Entangled Bank (Terrell 1988), Express or Fast Train (Diamond 1988), Slow Boat (Kayser et al. 2000), and Triple I (Green 1991b, 2000).

The Fast Train model brings together theories of an origin in Taiwan, followed by transit through the Philippines or Indonesia, then, as indicated above, a swift expansion of Lapita colonists into Remote Oceania from the Bismarck Archipelago through Island Melanesia. Terrell's Entangled Bank, which has had little support, proposes an origin exclusively within Melanesia. The Slow Boat emerged as a result of genetic research on Y chromosomes which identified components of male DNA requiring a more protracted transit than previously thought. Finally, the Triple I model amalgamates elements of the others in a process of intrusion, innovation, and integration.

Chapter 5 Linguistics

During the past several decades, linguists have worked closely with archaeologists in Oceania to provide context for the dating of Lapita sites, the probable origin of Lapita peoples, and for working out the nature of Lapita society.

Dempwolff and the comparative method

The comparative method is a technique used by linguists to examine systematic sound changes in languages in order to infer relationships among them. Thus, to provide a simple example, the Tahitian song type *pehe*, is "reflected" as *pe'e* in Rarotonga but *pese* in Samoa. This is shown not to be a chance resemblance when it is found that other words containing an "h" in Tahitian, also have an "s" in Samoan, and a glottal in Rarotongan. But to trace the origin of the term it is not sufficient to judge from only three examples of it. In this case, the word is found in numerous other Polynesian languages as well, but not in Tonga or Niue, possibly excluding them from the ancestral language common to most of Polynesia, and suggesting an origin a step closer to the present.

The Austronesian subgroups

The comparative technique was used most famously in the 1920s and 30s by the German linguist Otto Dempwolff whose contribution to Oceanic linguistics was profound.

Already known when Dempwolff began his work was the over-arching existence of a vast language family, now known as Austronesian, containing nearly all the languages of Island Melanesia, Eastern Micronesia, and Polynesia, together with others in SE Asia and as far afield as Madagascar. Dempwolff's great achievement was to prove the existence within Austronesian of a large subgroup of languages now called Oceanic, made up of all of Near and Remote Oceania, and subject to investigation and refinement by linguists ever since it was first proposed by Dempwolff.

Successive subgroups from oldest to youngest within the larger Austronesian family with which the present book is mostly concerned are:

- Proto Austronesian
- Proto Malayo Polynesian
- Proto Oceanic
- Proto Eastern Oceanic
- Proto Central Pacific
- Proto Polynesian

Within Oceanic, a minimum of three subgroups, Admiralties, Western Oceanic, and Eastern Oceanic has until recently been recognised for purposes of reconstructing proto Oceanic terms.

Eastern Oceanic Subgroup

For the best part of 40 years since a detailed discussion of the Eastern Oceanic subgroup by Pawley (1972), this term has been standard in linguistic tree diagrams as a label for all of the languages spoken in what is now known as Remote Oceania. Although evidently still in use as late as 2004 by the Australian National University Oceanic Lexicon Project (ANU 2004), it has since been discarded, and is now replaced by separate high order subgroups for most of its former components (Pawley 2007, Fig. 3). This leaves no steps at all relevant to Polynesian between Oceanic at the beginning of the tree and the Central Pacific subgroup at the end of it which contains Fijian, Rotuman, and Polynesian. As Lapita potters demonstrably did not traverse this distance in a single hop, and would have spoken related dialects on their way, it seems justifiable to retain the older designation of Eastern Oceanic as an umbrella term in the present book, especially as it cannot be avoided when quoting from earlier literature, but with the proviso that it may have been no more than a transitory dialect chain in most of the areas where it was once spoken.

Western Oceanic is a complex of loosely related dialects that developed after initial Lapita colonists had left the area (Bowden 1993); and Admiralties is of special importance because of indications that it shared a period of development with St Matthias (ANU 2004), and the presence in these places of Lapita sites of Manus and Mussau (Specht 2007:Table 2).

Also of obvious importance is the later history of the rump group of the Western Oceanic dialect chain as this extended its range beyond the Bismarck Archipelago. This broke up into three subgroups named Meso Melanesian, reaching as far as the NW Solomons; Northern New Guinea, along the north coast of New Guinea; and Papuan Tip, in the Northern, Milne Bay, and Central provinces of Papua New Guinea (Pawley 2007:22). These are frequently referred to in cognate sets cited in later chapters of the present book, abbreviated MM, NNG, and PT respectively. Other abbreviations in the cognate sets refer to subgroups of Eastern Oceanic occupying the remainder of the Solomon Islands, Vanuatu, New Caledonia and the Loyalty Islands, and Fiji. For a full list of subgroup abbreviations see Appendix 4.

The languages of Micronesia fall into three groups. On the southern fringe there are two Polynesian Outliers: Nukuoro and Kapingamarangi which, in common with other Outliers, have languages that are Samoic in origin and were settled by back-migration out of Western Polynesia. In Western Micronesia, the Mariana Islands, Yap, and Palau have language affinities with

Malayo Polynesian languages of the Philippines and Indonesia, and are thought to have been settled directly from these places. All of the other languages of both Western and Eastern Micronesia form a single large language family called Nuclear Micronesian.

It is probably true to say that no one really knows where Eastern Micronesians came from, with both the Solomon Islands and Vanuatu nominated in the past, and no consensus reached on either, despite the revision of subgroups referred to above. One may speculate that this issue will not be resolved until difficulties with the Lapita hypothesis have been settled and the exact relationship of Micronesia with Polynesia has been determined.

Although speakers of Austronesian languages form a majority in Oceania they are not quite exclusive to it. In New Guinea they are outnumbered by non-Austronesians, with speakers collectively known as Papuan occupying most of the western half of New Guinea as well as the Highlands of Papua New Guinea, and are present in enclaves as far east as the Solomon Islands. They have been in New Guinea for millennia longer than the Austronesian peoples and have interacted with them in important ways.

Quantitative Methods

Lexicostatistics is a method of language comparison devised in the 1950s by the linguist Morris Swadesh. It makes use of a list of 200 word meanings, such as father, mother, ear, eye, sit, stand etc., for which terms are believed to exist in all languages. For each pair of languages under scrutiny, a count is made of the number of words for which terms of similar form are found, such as father in English and vater in German. The percentage of such hits provides a measure of cognacy between the two languages. Glottochronology is a later application of Swadesh lists which has the more ambitious objective of calculating the time lapse between pairs of related languages. Both methods have been controversial since their inception because of assumptions that do not always hold true, and results that may be at odds with other approaches. For such reasons the method has now largely been abandoned in favour of more rigorous dates that are now available from radiocarbon dating of archaeological sites.

Reconstructing the past

The current state of knowledge has been reached by linguists essentially through a process of moving from the known to the unknown, both geographically and through time, working back from the most familiar and best-studied languages, which by and large were Polynesian, and adding others as knowledge of interrelationships increased. Emphasis to begin with was mostly on Proto Polynesian, with a homeland somewhere in Western Polynesia, with interest shifting progressively back through the tree of

language affiliations and linguistic subgroups, first to Proto Oceanic, where the homeland was probably in the Bismarck Archipelago, and most recently to Proto Austronesian and an origin most likely in Taiwan. In all of this effort it has been reconstruction of proto terms that has proved crucial, as will be seen, especially, in chapters 6, 11, 12, and 13.

At each stage in the process, the object has been to find shared innovations whose origin could be pinpointed to particular levels of the family tree. Thus, in the domain of music, did the speakers of Proto Polynesian possess the Eastern Polynesian word for skin drum, and if so did it mean the same thing, or was it a general term that meant something different to which the new meaning was later assigned? As will be seen, the last possibility has turned out to be the case, and similar transformations have occurred for other terms, illustrating just one of the pitfalls of the reconstruction process.

A step further back still the difficulties multiply when an effort is made to determine the cultural inventory of the Lapita potters. Thanks to a mammoth Oceanic Lexicon Project at the Australian National University we now know a great deal about the material culture of the potters as well as their food plants and much else, with more to come. But the musical and other evidence in the present book again suggests unresolved problems with some of the subgroups that are crucial to the Lapita hypothesis.

Limitations of subgrouping

It has to be accepted that all of the languages of the Austronesian language family spoken throughout Island Melanesia, Polynesia, and Eastern Micronesia belong ultimately to the single subgroup of Oceanic, whose initial location was somewhere in the region of the Bismarck Archipelago. The internal relationships of the Oceanic languages, however, are another matter. The huge number and diversity of Melanesian languages and cultures compared with the smaller number and equally striking homogeneity of Polynesian languages and cultures has been the subject of much debate and speculation since Otto Dempwolff first advanced his famous Oceanic linguistic hypothesis in the 1930s (see Pawley 1981 for a discussion). It is a debate that has become closely associated with the problem of Polynesian origins insofar as this relates to members of the hypothetical Eastern Oceanic subgroup which emerged from the breakup of Oceanic. Multiple interactions undoubtedly occurred, both between Papuan prior occupants of the area and Austronesian languages, and among Austronesian languages themselves, all contributing to the present diversity. Representing all of these languages as members of a single branching "tree", however, has probably unduly contributed to acceptance of the standard Lapita hypothesis, by providing a false sense of progressive stops or stations along the path taken by the putative "fast train" or even "slow boat" proposed for the Lapita dispersal.

Pawley (1981:274) has suggested that the linguistic homogeneity now characteristic of Polynesia represents a situation that must once have been the case in the homeland of the Oceanic subgroup. As will be seen, the same is true of music. Pawley and other linguists, however, have repeatedly warned that the branching tree diagrams conventionally used for the representation of subgroups are not necessarily representative of migrations of peoples, a matter known to linguists for more than 40 years, when a prescient warning was issued by the linguist Bruce Biggs:

It should be emphasized that linguistic subgrouping is concerned with internal relationships of languages in a language family. Inferences as to migrations, first settlements, homelands, cultural affiliation and so on should be drawn from such data with caution, and a full awareness of the limited application of linguistic conclusions to such problems (Biggs 1972:143-4).

Biggs (1972:146) was of the opinion that such inferences "would be justified only if we had prior knowledge of the homeland of each linguistic subgroup in advance, and knew for sure that each island had been settled only once." But no such certainty exists.

It is unfortunate that the tree diagrams commonly used by linguists to represent linguistic subgroups invariably carry implications of the kind warned against by Biggs. The matter is put into perspective by Lynch et al. (2002:92-4) who eschew tree diagrams and represent subgroups in prose for this very reason.

Although the tree format implies successive splits and breakups of proto languages from a common ancestor, this is necessarily true only of trees compiled using subgrouping data now referred to as "innovation defined". An alternative, called "innovation linked", which refers to dialect chains, carries no such implication, and all but SE Solomonic of the Central Eastern Oceanic subgroups leading to Proto Polynesian are innovation linked (Lynch et al. 2002:119), complicating interpretation of the internal subgroups. This explains why no homeland can be identified for the Eastern Oceanic and Central Pacific subgroups from which Proto Polynesian is shown in the linguistic tree to derive. Importantly also, it explains conflicts which have emerged between the linguistic subgroups and attempts to match them with archaeological and other evidence.

Chapter 6 Music

Sources of information on this topic include three earlier McLean publications (McLean 1979, 1994, 1999), and two later ones (McLean 2008, 2010). Also drawn upon as required are extensive data files of music structure traits in New Guinea and Island Melanesia, compiled from sources listed in McLean 1995, and from listening to and analysis of available audio recordings from these areas.

Music areas

The first of the above studies successfully distinguished music areas in Oceania using a statistical clustering method to identify co-occurring traits on a matrix of about 40 geographical areas and 40 selected musical traits including both musical instruments and structural elements of vocal music. Western and Eastern Polynesia emerged as strongly differentiated musically, confirming results reached on a variety of ethnographic grounds, including some musical ones, by Edwin Burrows (1938).

Specifically, with exceptions in some areas, these differences included the following (McLean 1999:453):

Western Instruments	Eastern Instruments
Large canoe-shaped slit gongs	Small bamboo-derived slit gongs
Nose flutes with both ends closed	Nose flutes with one end closed
Struck tubes	
Rolled mats	
Sounding boards	
Western Structure	Eastern Structure
Litany	Engmelodik and quavering cadences
Isometre	Heterometre
Polyplane and drone polyphony	Unison

Also of relevance to the present topic are pan-Polynesian traits characteristic both of the initial migrants into Eastern Polynesia and those left behind in the home area of Western Polynesia. In the musical instruments category or in lieu of them are body percussion, handclapping, jews harps, shell trumpets, leaf oboes, and sticks. Structural elements include spoken recitation (*parlando*), one-note melody (*recto tono*), responsorial and strophic forms, and spoken, shouted, and trailing cadences.

The differences between the two areas of Western and Eastern Polynesia, and uniformities within each could only have happened as a result of isolation and separate development of the two after the initial settlement of Eastern Polynesia from Western Polynesia about 2,000 years ago. Longevity of music traits and corresponding usefulness for analysis is proven by still extant shared music systems in the Marginal Eastern Polynesian cultures of Hawai'i, the Marquesas Islands, Mangareva, and NZ Maori that on archaeological and linguistic evidence have been separated for at least a thousand years. The uniformities of music in Marginal Eastern Polynesia, differing as they do from the kinds of music in central Eastern Polynesia, are a perfect illustration of the "stone in the pond" model of diffusion, with ripples spreading from the centre of origin to far-flung communities on the edge of the pond, which retain traits once characteristic of the centre. The package of marginal Polynesian musical traits is evidence of the kind of music practised by the original settlers of Eastern Polynesia. Also of relevance is a cluster of traits identified as Core Melanesian which can be shown to have influenced the music styles of Western Polynesia subsequent to the departure of the Eastern Polynesian settlers.

Finally, when the instrumental and structural associations in the 1979 paper were amalgamated, patterns of combined associations emerged, with some unexpected results. New Caledonia, for example, is almost universally regarded as part of Melanesia. The clustering study, however, showed its strongest musical links – especially for music structure – to be with Fiji and, through Fiji, ultimately with Western Polynesia. Thus, for music, New Caledonia and Fiji belong with Polynesia rather than with Melanesia, in evident conformity with the Central Pacific linguistic subgroup, and most probably reflecting known late historical associations within the area.

Chained associations involving several areas also emerged, including the following:

E. Futuna — E. Uvea — Tonga — Samoa — Society Is. — Marquesas Is.

The direction of influence is not indicated, but it will be noticed that in the centre of this distribution is Samoa which almost certainly ranks as the area of origin for the entire chain. In one direction the chain extends through Tonga as far as E. Futuna, where it probably reflects late Tongan occupation of Uvea, and in the other Samoa becomes the probable homeland and fabled "Hawaiki" for all of Eastern Polynesia.

The above chain illustrates an important distinction between borrowing relationships and longer-term ones resulting from migrations, which are as significant for music as they are for language. The leap from Samoa to the Society Islands is self-evidently an example of migration, and the E. Uvea connection with Tonga of borrowing. As might be expected, there is extensive evidence of long-term and protracted borrowing relationships between all

islands and island groups that are adjacent to each other. Tonga and Samoa provide a prime example, with numerous song and dance forms known to have been borrowed each from the other (q.v. McLean 1999 Ch.28).

McLean 1994 is a monograph entitled *Diffusion of Musical Instruments and Their Relation to Language Migrations in New Guinea*. On the basis of the earlier study, it was expected when work on the monograph began that most of the associations to be found would be of the borrowing kind. It was a surprise to discover that not all of the relationships could be explained in this way and there was extraordinarily close fit with language migrations worked out by linguists (reported by Wurm et al. 1975).

Musical instruments in 518 tribal areas of New Guinea, were plotted and compared, and six distributional areas of associated instruments were identified as follows:

Distribution A: Hourglass drums.

Distribution B: Jews harps, mouth bows, zithers, rattles, panpipes, tubular flutes, and wooden trumpets.

Distribution C: Bullroarers, ocarinas, bamboo trumpets, bamboo megaphones, and sacred or paired flutes.

Distribution D: Shell trumpets, leaf oboes, stamping tubes, and struck tubes.

Distribution E: Slit gongs.

Distribution F: Instruments of local distribution: Rubbing blocks, water drums, gourd trumpets, piston flutes, and struck and rubbed lime pots.

Distribution G: Rare instruments: Concussion sticks, nose flutes, and leaf whizzers.

Few of these have much to do with Polynesia. Distribution F is wholly unique to New Guinea. Distribution G has reached New Guinea from adjacent areas of Micronesia, where nose flutes take a different form from those of Polynesia. Distribution C is a coast-to-coast area centred on the Highlands of Papua New Guinea, and adjacent to Australia whence bullroarers would have come, as shown also by the presence in the area of Australian loan words (Wurm et al. 1975:921), and by recent discovery of genetic markers shared with Australia (Friedlaender et al. 2007:65).

The remaining music areas, however, extend beyond New Guinea, throwing light, as will be seen, on otherwise insoluble problems of distribution:

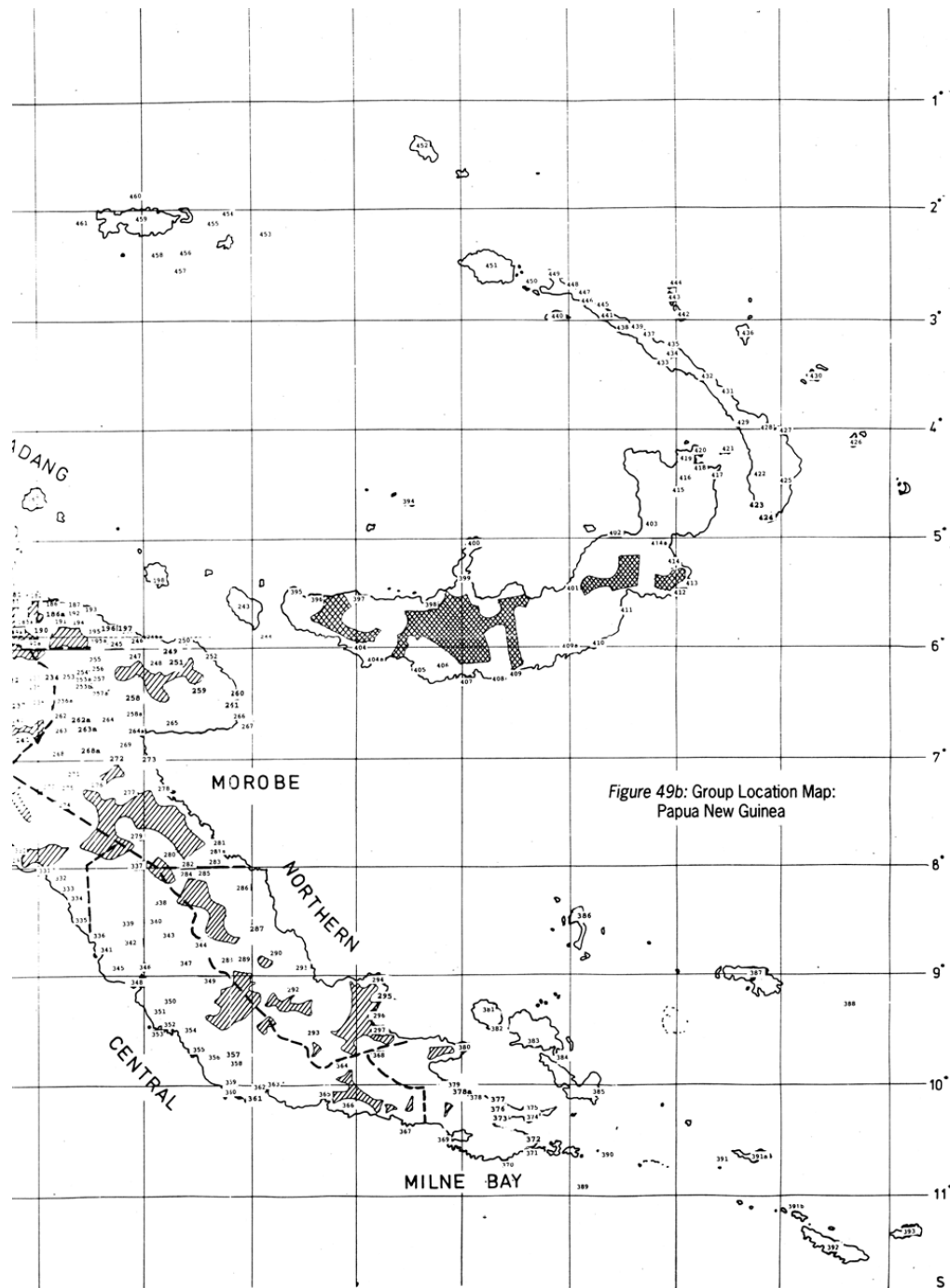
- Distribution A, consisting entirely of hourglass-shaped drums, is almost universal in New Guinea except for areas of absence most prominently in interior regions of southern Gulf province in Papua New Guinea and in southern West Papua. These drums are hand-held instruments used for

dance accompaniment, and have no resemblance to Polynesian instruments, which take a different cylindrical form and are not carried. From New Guinea, however, they have diffused throughout Eastern Micronesia, where they provide material proof of linguistic subgrouping into Nuclear Micronesian, and perhaps offer some clue as to where the linguistic uniformities came from.

- Distribution B contains a full range of instruments for every purpose and is unquestionably Papuan rather than Austronesian in origin, with Austronesian speakers gaining it only late in the distributional sequence.
- The full Distribution D complex of shell trumpets, leaf oboes, stamping tubes, and struck tubes has a coastal distribution in sporadic pockets on both northern and southern coasts of New Guinea. The component instruments, however, do not always belong together. Shell trumpets occur world-wide in coastal regions, and in Oceania have no areas of conspicuous absence except far from the sea in the interiors of the largest landmasses. The leaf oboe occurs not only in Papua New Guinea but extensively in Island Melanesia and throughout both Polynesia and central and western Micronesia. In the Indonesian-administered area of West Papua it is rare. In the same area, Marind is the sole reported example of struck tubes. Stamping tubes are not reported in West Papua at all, and they are absent as well in most of the Highlands of Papua New Guinea. By and large the instruments of Distribution D are characteristic less of New Guinea than of Island Melanesia and Western Polynesia. Struck tubes, for example, are instruments of Western but not Eastern Polynesia, and stamping tubes are reported in Eastern Polynesia only for the Society Islands and Hawai'i, where they may have been independently invented. When work on the present enquiry began, it was tempting to attribute the origins of the Polynesians to the Distribution D people, who at first sight appear to qualify on account of a proposed migration of Eastern Oceanic speakers into the south coast of Papua New Guinea around 4000 BP (Wurm et al. 1975:955, 956) -- now identifiable as a much later subgroup called Papuan Tip --, and the presence there of the Distribution D complex. But this prospect soon evaporated. The areas concerned all have music systems exhibiting core Melanesian traits, and stamping tubes are almost everywhere associated with polyphony, which is another Melanesian trait, absent in Eastern Polynesia except as a missionary introduction (McLean 1999:33ff) and evidently introduced into Western Polynesia only as a late borrowing from Melanesians. On balance, therefore, Distribution D has to be regarded as Melanesian.
- Distribution E is made up exclusively of wooden slit gongs. Characteristically, the instruments are large and hollowed out in the shape of a canoe. They occupy a broad northern coastal belt extending from the Lapita homeland of the Bismarck Archipelago westwards to the Indonesian

side of the Sepik border of Papua New Guinea through the Madang and Sepik regions, where the instruments are found predominantly among maritime and riverine speakers of Austronesian languages. In the opposite direction from the Bismarcks, distribution extends southwards through Island Melanesia to Western Polynesia and Fiji. In Micronesia, slit gongs are mostly absent and they are conspicuously absent as well in most of mainland New Guinea except for the north coast.

Diffusion beyond New Guinea



Diffusion in Island Melanesia

An important finding from the New Guinea study concerns instruments typical of New Guinea which diffused in successive waves southwards into Island Melanesia following the path of slit gongs. Some, along with elements of music structure belonging to the core Melanesian complex, reached as far as Western Polynesia but are not present in Eastern Polynesia, showing that they were acquired by Western Polynesians from Melanesians subsequent to the departure of Eastern Polynesian settlers around 2000 BP, and accounting for most of the musical differences now distinguishing Western Polynesia. Distinct boundaries mark the limits of each successive wave of diffusion.

The Distribution D and E instruments have penetrated furthest with some Distribution B instruments hard on their heels. Of the latter, mouth bows and rattles have gone furthest unless independently invented in Eastern Polynesia. Panpipes managed to reach only as far as Samoa and Tonga where they are now long obsolete. Of the remaining Distribution B instruments, end-blown flutes and the typical New Guinea idioglot jews harp have reached only as far as New Caledonia and Rotuma. Non-meaningful song texts which are associated with both Distribution B instruments and borrowing in New Guinea remain associated in Island Melanesia. None of the Distribution C instruments (bullroarers, bamboo trumpets and ocarinas) has gone further than central Vanuatu (McLean 1994:98).

The hourglass drum (Distribution A) does not extend beyond Buka and Bougainville in northern Island Melanesia, where it is present with wooden trumpets (Distribution B). As already indicated, this typically New Guinea form of drum has also diffused throughout Eastern Micronesia where one would expect it to have been introduced from the Bismarck Archipelago. Except for drums (Distribution A) and some elements of Distribution D (shell trumpets and leaf oboes), Micronesian instruments are essentially complementary to those of New Guinea. Bullroarers (Distribution C) have penetrated only the southern fringes of Micronesia, where they co-occur with leaf oboes (Distribution D) and leaf whizzers (Distribution F).

Jews harps in Micronesia are in complementary distribution to drums, occurring in the west but not in the east. They are different in shape from the idioglot jews harps of New Guinea and it is questionable whether the two belong together. The most likely explanation for the Micronesian distribution is that Micronesian jews harps entered the area from the Philippines, independently of New Guinea jews harps.

The remaining Micronesian instruments are sticks and nose flutes, both of which are rare in New Guinea (Distribution F). It has already been suggested that these instruments entered New Guinea from Micronesia. Nose flutes co-occur in Micronesia with jews harps. Again it seems likely that they reached the area from the Philippines. Sticks are shared

with Polynesia but are universal in Micronesia, qualifying on this account as Micronesia's most characteristic instrument (McLean 1994:loc.cit.).

Vocal music areas

Of particular use for present purposes are contrasting packages of traits referred to above as Marginal Eastern Polynesian and Core Melanesian. A feature of Marginal Polynesia is vocal styles of small melodic range, with few notes (Engmelodik), in contrast with Core Melanesia which is characterised by music of large melodic range and a five-note scale without semitones (anhemitonic pentatonic). Also prevalent in Island Melanesia is singing in parts (polyphony), shared with Western Polynesia, but contrasting with lack of polyphony (unison) in Marginal Eastern Polynesia. Within Island Melanesia, Vanuatu stands alone in this respect with absence of polyphony there except in Malekula. It is possible that the lack of polyphony in Vanuatu results from a greater degree of Papuan admixture there than in other areas, which has also been suggested genetically (Hill et al. 1985:572-3), but would need to have taken place before the rise of polyphony among ancestral populations further north.

Fiji and New Caledonia possess polyphony but In this and other respects, as earlier indicated, they are closer to Polynesia than to other areas of Melanesia.

The Core Melanesian traits of wide range and anhemitonic pentatonic scales, are characteristic throughout the Bismarck Archipelago, the Solomon Islands and Vanuatu, but again are rare further south.

Additionally, in a sample of 104 tribal areas of mainland New Guinea, whether Austronesian or non-Austronesian speaking, where information on scales is available in McLean files, anhemitonic pentatonic scales and/or segments of them are present in 95.2 percent, together with a similar 93.9 percent in 33 further areas from the Bismarck Archipelago. Higher and lower order scales commonly co-occur, with tetratonic scales perhaps most prevalent, and fully pentatonic scales present in about half of all areas, with ranges extending to an octave or higher, bringing the Core Melanesian complex to the whole of New Guinea.

Three forms of Engmelodik can be distinguished, with separate areas of distribution. Those of Marginal Eastern Polynesia have 2-4 notes within the interval range of a perfect 4th, with or without semitones. A second type occurs in the Core Melanesian areas described above, in this case as subsets of the anhemitonic pentatonic scale (anhemitonic ditonic, tritonic and tetratonic). Again there are 2-4 notes but there are no semitones, and ranges can extend to an octave or more, qualifying as Engmelodik when they are within a fourth or fifth. Finally, among available music notations from New Caledonia, the

Loyalty Islands, Fiji, and Rotuma, a handful of anhemitonic scales like those of the Bismarck Archipelago are found. Most scales in the area, however, are of 3 to 5 notes with semitones and a melodic range most commonly of a perfect 5th, identical, as a rule with the first few notes of the European major or minor scale which, to judge from notations published by Wilkes (1845(3)189-90, 245-6), were already exerting influence in Fiji by the early nineteenth century. This, on the other hand would need to have taken place remarkably quickly, and the explanation may rather be development of small range scales brought by Tongans in the period immediately preceding European contact. Thus it may be that the Anhemitonic scales are the oldest and representative of the first Lapita settlers with the others a more recent overlay.

In Micronesia there is convincing evidence of a Polynesian connection in work reported by the pioneer American ethnomusicologist, George Herzog (1901 - 1983) in a study of wax cylinder recordings made during a German South Sea Expedition of 1908–10.

Herzog transcribed into musical notation and analysed recordings from Palau, Yap, Satawal, Tobi, Pur, Sorol, Mogemog, Faraulip, Ifaluk, Elato, and Puluwat in the Central and Western Carolines, and from Truk in the Eastern Carolines (Herzog 1932, 1936). Two styles emerged from the analysis: a Central/Western style, and a contrasting Eastern one as follows:

	Central/Western	Eastern
Melody and scales	Limited tonal material including 2-note melodies, and recited or parlando styles	Built on extended tetrachords Song-like legato More tuneful No wholly recited songs
Rhythm	Often follows text Dotted rhythms Few durational values Often without strong metre Frequent paired rhythms	Flowing regular rhythm Portamento slurs Triple metres preferred
Tempo	Change of tempo unusual	
Form	Repetition of short motifs Introductions	Binary forms usual, Codas
Polyphony	Bordun Parallel seconds and thirds	Little or no polyphony
Manner of performance	Uncertain intonation Gliding notes	Tendency to constant intonation

	Transitional notes Grace notes Terminal glissando	Shouted endings
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Today, more than a hundred years after the recordings analysed by Herzog were made, most of the styles exemplified in them have long since yielded to the influence of western hymnody and popular music, and are now either modified or extinct. Enough work has been done, however, to confirm some of Herzog's observations, and to add one further area to his Central and Western Carolines style zone.

Thus, music of Ifaluk is described as having only a very small range of notes, often only two or three, together with a narrow range of a second or at most a third, and polyphony is mostly in parallel movement usually at the interval of a fourth, but with parallel seconds still in evidence in some genres (Smith 1980, Burrows 1958).

Similarly, in Ponape songs in traditional style have a limited number of notes, often only two or three, and are characterized by conjunct melodic movement. Part singing is usually in two parts with polyphonic intervals approximating to the seconds and thirds familiar from European music (Kennedy 1980).

The salient traits here are few notes and small range (Engmelodik) on the one hand and parallel polyphony with intervals of a second on the other, both critical to an understanding of where such traits may have originated.

Obvious to anyone familiar with Oceanic music, as to Herzog himself, is a clear-cut affinity with Polynesia for the Central/Western Micronesian style, and more in common with Melanesia for the Eastern one. The Central/Western area could readily have received influence from the geographically adjacent Bismarck Archipelago, and the Eastern Micronesian area either from the Bismarcks or from further afield within Island Melanesia.

In almost every respect except one, the traits noted for the Central/Western Carolines are either found in Marginal Eastern Polynesia, or are present in both Marginal and Western Polynesia. But the entries in the above table for polyphony seem at first to be the wrong way round. Polyphony, as already noted, is prevalent throughout Island Melanesia except in most of Vanuatu, and drone-based polyphony is one of the core features of Western Polynesia, where, like other traits not present in Marginal Polynesia, it is assumed to have been gained from Melanesians after the departure of East Polynesians. Parallel seconds have no association with Polynesia, and most frequently occur as a result of simultaneous performance of adjacent degrees of the anhemitonic pentatonic scale which again is Melanesian and appears in Western Polynesia only as a likely result of borrowing from Melanesia.

A possible explanation for polyphony, if not parallel seconds, in Herzog's samples might seem to be influence either from Tuvalu or from one or both of the Polynesian Outliers, Kapingamarangi and Nukuoro. The latter two cannot be directly ruled out because not enough is known of their music, but polyphony reached the Carolines as a package which included parallel seconds. Tuvalu does not have the latter, and if the Outliers had them they would be unique in Polynesia. On this account, therefore, this form of polyphony could not have reached the Carolines from any of these places, and alternatives must be sought from elsewhere.

In the Solomon Islands there are elaborate polyphonic panpipe ensembles as well as multi-part vocal music. Polyphony could have diffused to other areas from there: southwards into Western Polynesia; westwards into the south coast of Papua New Guinea; and northwards into western and central

Micronesia, as a late development from the Admiralty Islands, where two-part dissonant polyphony is famously present (Messner 1981), and intermittent drones are not unknown. Nor is this form of polyphony limited to the Admiralties. At the opposite end of the Melanesian island chain, a common form of Fijian meke has a harmonic structure of note clusters consisting of major or minor seconds doubled at the fifth and octave (Saumaiwai 1980: 84); and in the Solomons sporadic parallel seconds appear in transcriptions of polyphonic music from Santa Cruz (e.g. Haase 1977:293, 296, 299).

In Micronesia, the entire package of traits would have been spread and maintained as a result of the well known *sawei* tribute system of the Yap empire and similar systems of exchange that continued to operate until modern times.

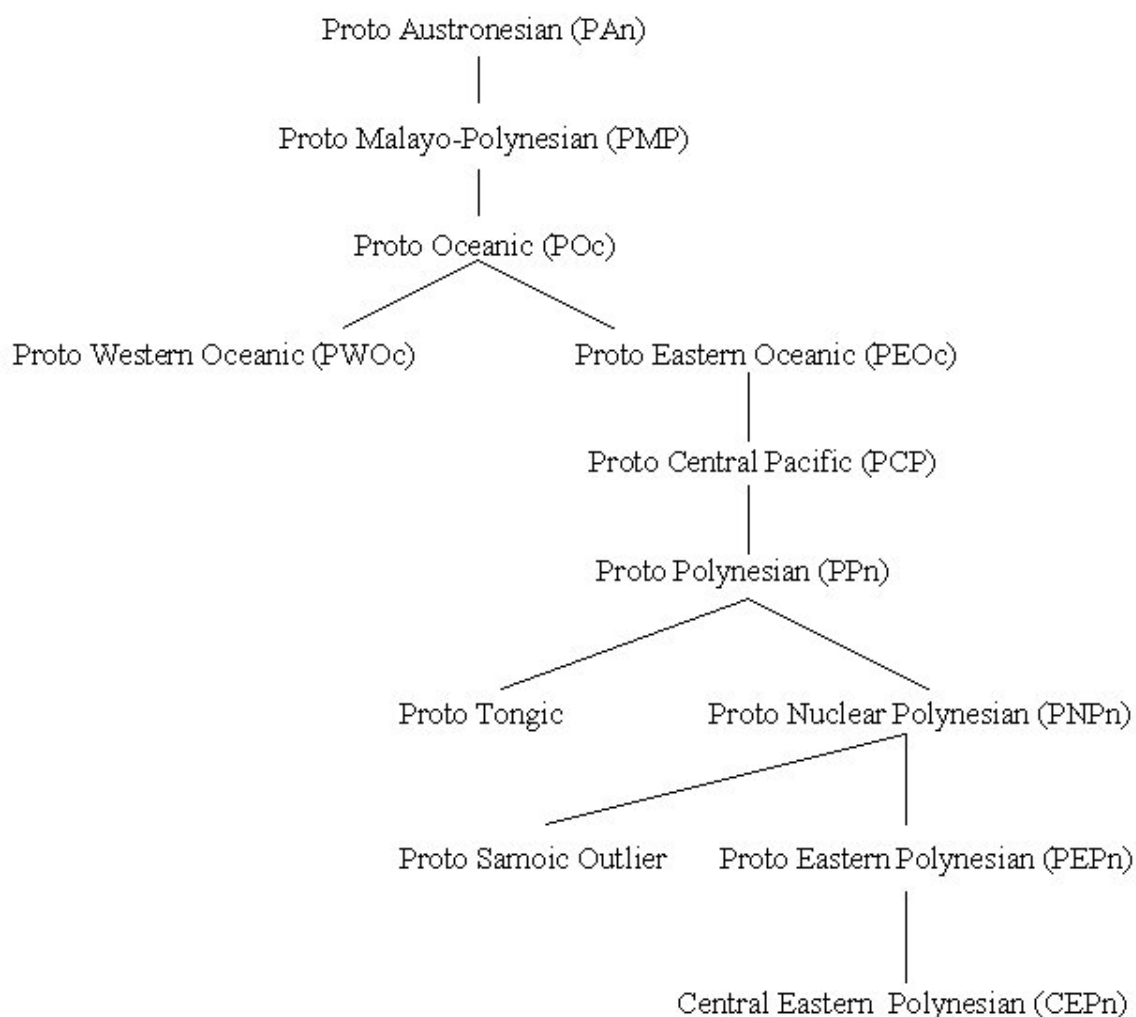
Finally, lack of polyphony in the eastern Carolines could be a remnant of pre-Polynesian practice before the introduction of polyphony from the Admiralties. In every respect, therefore, Herzog's results are consistent with an early group of Oceanic speakers who spent some time in Micronesia before venturing further into Remote Oceania, with Marginal Polynesian traits including Engmelodik first to arrive into the Carolines, and polyphony later after the departure of Polynesian ancestors.

Reconstruction of music terms

A ground-breaking effort on the part of Pacific linguists over the past few decades has been the reconstruction of lexical items in languages ancestral to present-day Polynesians. Best known among them is the Pollex or Proto Polynesian Lexicon pioneered by the late Professor Bruce Biggs at the University of Auckland (Biggs & Clark 1996-98), and another, already alluded to briefly in the last chapter, is an Oceanic Lexicon project, dedicated to the reconstruction of Proto Oceanic (POc) and initiated by Professors Malcolm Ross and Andrew Pawley at the Australian National University (Ross et al.

1998 and subsequent volumes), providing opportunity for the comparison of reconstructions to Proto Polynesian (PPn) with those from its predecessor Proto Oceanic (POc). Some resulting subgroups are set out in the accompanying figure, and cognate sets from the two projects are incorporated into 35 tables of musical terms abstracted in following pages, and published in full in 2010 (McLean 2010). For present purposes, the table information from this publication is compressed under uniform area codes with remaining information mostly omitted. Standard three-letter Pollex codes have been used for Polynesia (for a list see Appendix 2), and the following similar codes have been adopted for Melanesia and Micronesia: NGM (New Guinea mainland inclusive of the Lexicon categories NNG and PT), BIS (Bismarck Archipelago inclusive of Lexicon categories Adm and most of MM), SOL (Solomon Islands), VAN (Vanuatu), NCal (New Caledonia and Loyalty Islands), FIJ (Fiji), and MIC (Micronesia), with the number of languages in each added in brackets. Complete information including language names, vernacular names, glosses, and references can be obtained free on line in Mclean 2010 from <http://www.library.auckland.ac.nz/ampm/ethnomusicology.htm>

Even to the layman, it is apparent that the further one moves back in time through a tree of linguistic subgroups the less chance there is of finding terms that are still in use. No one expects to find many terms surviving from Proto Austronesian (PAN) to Proto Malayo Polynesian (PMP) or from Proto Malayo Polynesian to Proto Oceanic (POc). Nearer to the present in the tree, however, the odds increase, and it is at these levels that distributional evidence will be found, if any exists, of relationships of music and dance terms among the languages spoken by Lapita potters and/or the Polynesian ancestors who gave rise to the subgroup of Proto Polynesian (PPn). It is apparent also that to determine the status of a particular term, it is necessary to find out at what level in the tree the term was coined or borrowed as the case may be. In the published tables, therefore, strict distributional criteria were applied, with the object of pinpointing the exact areas within which the various terms are found. POc should be less important in this respect than the next subgroup, Proto Eastern Oceanic (PEOc), where one can expect a reasonable spread of daughter languages through Island Melanesia, some terms from which could potentially end up also in PPn. Consistent with the doubtful status of the Eastern Oceanic subgroup, however, this expectation has mostly not been met, and comparisons between POc and PPn must therefore suffice. It is important also to distinguish between genuine POc terms in the area of POc origin before differentiation into PEOc, and terms which belong rather to the more recent subgroup of Proto Western Oceanic (PWOC), which developed in the area after the departure of Lapita potters. Attention is drawn to such distinctions in the notes to the tables.



Linguistic subgroups referred to in the text

I have assumed that if a reconstruction is made from only a few terms it may or may not represent the term as actually spoken in the proto language, but only as it might have been spoken if the term were actually present. Such terms have accordingly been excluded as a basis for analysis.

Among the benefits of this approach is identification of the probable area of origin of Lapita potters who are believed to have been ancestral to Polynesians, as well as inventories of music and dance terms they may or may not have introduced.

The tables from which the following is abstracted compare items from published POc and PPn cognate sets (Pollex and Lexicon) with entries from McLean area files (McLean MS. n.d.), together with entries from published dictionaries of Oceanic languages. Of these, only the former have been formally tested for linguistic cognacy, so to distinguish any that are not corroborated from Pollex or Lexicon, these are marked (McL) as subject to

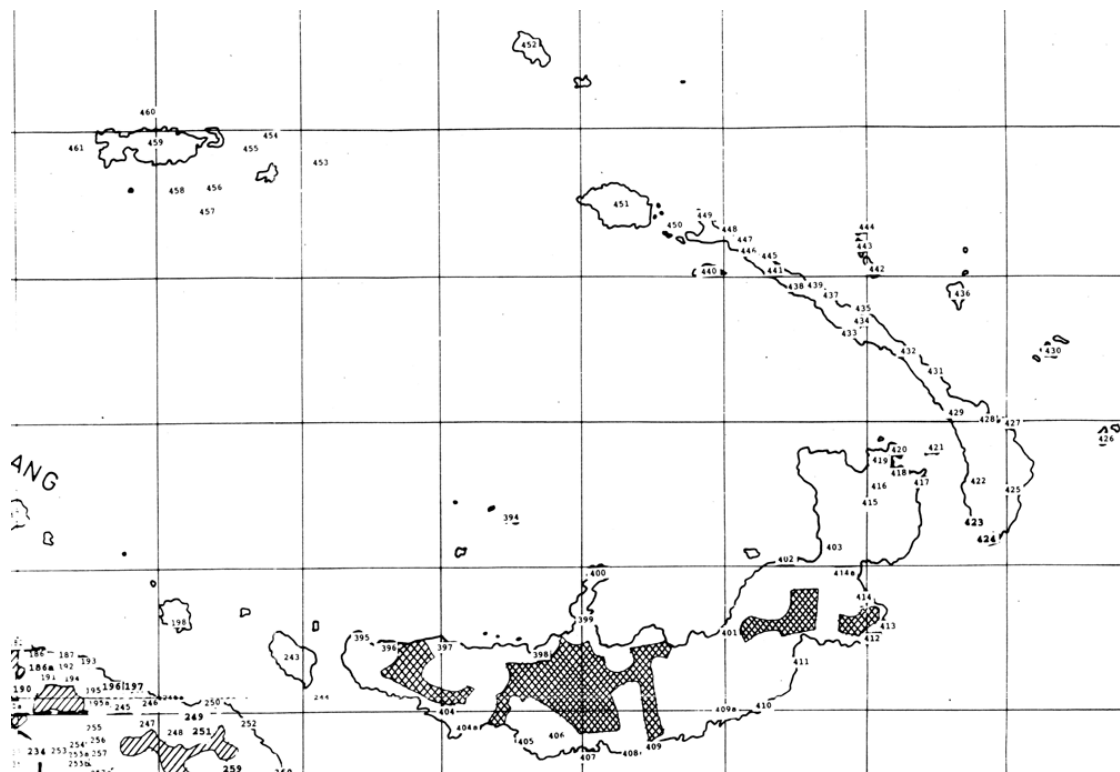
further scrutiny in case some are borrowings or unacceptable for other reasons. It can be assumed, however, that most are indicative of a connection of some kind.

The tables are arranged in alphabetical order of commonly occurring musical instruments (conch, drum, flute, jews harp, and slit gong), followed by tables relating to dance and song.

Map codes in comments on the tables and elsewhere in the book refer to New Guinea maps published with McLean 1994. Most of those relating to the tables are in the Bismarck Archipelago (see accompanying map portion).

For background on musical instruments of Oceania see McLean entries in Sadie 1984 where there is extensive information including references. Further information about the spread of music and dance in Polynesia can be found in Chapter 28 of the writer's book *Weavers of Song* (McLean 1999).

Cognate sets



Bismarck Archipelago showing language map codes

Conch (Tables 1-3)

TABLE 1

PMP *tambuRi(q) 'conch shell trumpet' and
POc *tapuRi(q) 'triton shell: *Charonia tritonis*, used as trumpet' (Lexicon)

NGM (3), NGM (9 (McL)), BIS (3), BIS (12 (McL)), SOL (2), SOL (5 (McL)),
VAN (2), VAN (4 (McL)), FIJ (2), FIJ (1 (McL)), MIC (2), MIC (3 (McL))

The conch trumpet is of very early distribution, possibly preceding all others. In McLean 1994 and McLean 2008 it is referred to as part of Distribution D and is found there to be associated with leaf oboes, together with stamping tubes and struck tubes in areas where bamboo is grown. Placing available map codes for New Guinea into sequence yields the following from west to east: West Papua 055; North coast PNG 152, 153, 167, 265, 266, 267; South coast PNG 367; Papuan tip 378; Massim 382, 386; New Britain North coast 396, 399, 401, 417, 419, 421; New Ireland 428; Admiralty Is 452. The core area is the New Britain north coast Lapita homeland, with excursions northwards into Micronesia, and southward through the Solomon Islands and Vanuatu as far as Fiji, except for New Caledonia, where the name for the conch is different. There can be little doubt that a term similar to this would have been the one used by Lapita potters. It is highly significant, however, that the Polynesian name for shell trumpet (see next table) differs from the POc one which appears everywhere else. Why, then, did Polynesians not retain the earlier term? This question will be taken up later.

TABLE 2

PNPn Pu(‘)u :Trumpet (Pollex)

NGM (3 (McL)), BIS (1 (McL)), VAN (2 (McL)), ANI (McL), AUS (McL),
EAS, ECE, HAW, KAP, MAO (McL), MFA, MKI (McL), MQA, MVA, NIU,
NKO, OJA, PEN, PUK (McL), RAR, REN (McL), SAM, SIK, TAH, TAK,
TIK, TOK, TUA, WFU

The word *pu* or *puu* is generally accepted to be an onomatopoeic imitation of the sound made by a trumpet and, except for a scattering of similar and related terms, is overwhelmingly Polynesian (except for absence most notably in Tonga, where the term is different), qualifying *puu* on this account as at least PNPn. Co-occurrence in most areas, with the obviously related term *puhi* or *pusi* 'to blow' (see next table) confirms the term as almost exclusively Polynesian. Elsewhere it is probably either a borrowing from Polynesia or results from an independent use of onomatopoeia.

TABLE 3

PMP *pusi :To blow air from the mouth (Pollex)

BIS (2 (McL)), SOL (2 (McL)), VAN (1 (McL)), FIJ (1), MIC (2 (McL)), ANU (McL), EAS, EFU, EUV, HAW, KAP, MAE, MAO, MFA, MQA, MVA, NIU, NKR, PUK, RAR, REN, TAH, TIK, TOK, TON, TUA, WFU (McL)

A comparison of Tables 2 and 3 shows that the term *pusi* 'to blow' co-occurs throughout most of Polynesia with the term *pu* for 'shell trumpet'. The few appearances of the word elsewhere, though including some within Polynesia itself, mostly lack this association and carry the different though related meaning 'to spurt, explode, or burst out', suggesting that this was its original or general meaning. Presence of the meaning 'to squirt' in far-away Saipan and of the meaning 'to blow' in both New Britain and in Truk in Micronesia, where the term is truncated to *pu*, suggests presence in POc, with the Caroline Islands as a possible vector for introduction into Polynesia.

Drum (Tables 4-5)

TABLE 4

POc *kude 'hourglass drum'

BIS (7), all from Lexicon vol.1

Kudu/kunndu in this table is the Pidgin English term for the New Guinea hourglass drum. Besides the Bismarck references provided above, scores more, including examples from the New Guinea mainland, could probably be added from McLean files, but there would be no point in doing so. The instrument is almost universal in Papua New Guinea and the pidgin English name for it is similarly ubiquitous. There is no reason to suppose, however, that this term or one resembling it was in general use in proto times. At best it would have been just one of a multitude of local names for the instrument, adopted most likely from one of the languages used by traders and missionaries as a lingua franca at the time of first European contact, and disseminated only from this time onwards. The seven Lexicon terms in the table are in adjacent areas within the PWOC language area as follows: 394, 395, 398, 400, 401, 419, 429.

TABLE 5

PNPn *pasu :Drum n; PNPn *pasu :To pound, thump v. (Pollex)

PCP *(v,b)asu 'a drum; to drum, thump' (Lexicon)

FIJ (1), MIC (2 (McL)), EAS (McL), EUV (McL), HAW, MAN (McL), MAO, MQA, MVA, NIU, PEN, RAR, TAH, TOK (McL), TON, TUA,

For both PNPn and PCP, 'thump' can be accepted as a gloss but not 'drum'. The *pahu* is a drum in Eastern Polynesia, where the term plainly derives from 'thump', because this is the kind of sound these drums produce. Western Polynesia, however, does not have the drum as an instrument, except as a late European borrowing. It follows that if the term was present in proto times it meant simply 'thump' and not 'drum'. This raises an important point of principle. There are numerous examples throughout Oceania of terms from general vocabulary applied either metaphorically or otherwise to an aspect of music, usually – unlike *pahu* – with little or no indication of when the new use may have arisen. It is obviously inadmissible to assign such terms to an earlier period than the one in which they originated. The reconstruction method clearly works only if there are a number of instances in daughter languages with no possibility of borrowing among them, and disregard of this principle may lead to error.

Except for the New Guinea *kundu* (see Table 4), drums are absent in Melanesia. Cognates of the *pahu* term do, however, occur in Mokil and Ponape (Pohnpei) in Micronesia, albeit applied to drums of PNG hourglass design, different from the cylindrical drums characteristic of Eastern Polynesia. A relationship of some kind must exist, and will be taken up in discussion later in the book.

Flute (Tables 6-12)

TABLE 6

POc *kopi 'bamboo; bamboo flute' (Lexicon)

PPn *kofe :bamboo sp (Pollex)

NGM (1), AIT (1 (McL)), EUV (McL), HAW (McL), MIA (McL), NIU, RAR (McL), REN (McL), SAM (McL), TIK (McL), TOK (McL), TUA (McL)

See also Pollex for numerous further entries grouped under Kofe.A bamboo sp. and Kofe.B bamboo knife. Only those relating to musical instruments are included in the present table.

Apart from a single New Guinea entry in Lexicon vol.1 there is no evidence here for a reconstruction to POc, much less either the term as reconstructed or its gloss as 'flute' at the proto level. If the New Guinea entry is ignored the Pollex reconstruction of the remaining entries to PPn *kofe* and limitation of meaning to bamboo is seen to be entirely realistic. The application of the term to 'flute' or 'nose flute' in Polynesia is another example of a general term extended to a specific use. Other objects made from bamboo such as stamping tubes in some areas and the small slit gong of Mangaia, which would have been

made from bamboo in the first instance, are examples of the same process at work.

TABLE 7

PAn *qauR 'bamboo sp'

POc *kauR 'bamboo; bamboo wind instrument' (Lexicon)

NGM (2), BIS (1), BIS (7 (McL)), SOL (3), SOL (5 (McL)), VAN (3)

On the above evidence, this term for bamboo is prevalent only in the Bismarck Archipelago, Solomon Islands, and Vanuatu. In Fijian the term is *bitu*, which appears to be related to neither POc nor PPn. If *kaur* is POc, then, as in the case of shell trumpets, here is yet another prevalent item for which the term is completely different in POc and PPn. It is doubtful whether the term can be glossed as 'musical instrument' in POc as well as 'bamboo'. Again 'bamboo' is the general meaning but the extension of meaning to objects made of bamboo is not universal and is not limited to musical instruments. The best known application of the word to musical instruments is by the 'Are'are of Malaita in the Solomon Islands whose bamboo panpipe ensembles are extensively reported by Hugo Zemp (See McLean entry on Panpipes in Sadie 1984 for a summary).

TABLE 8

POc *upi/*ipu 'blow; native flute' (Lexicon)

PPn *ifi 'Blow' (Pollex)

NGM (2), NGM (2 (McL)), BIS (2 (McL)), SOL (4), SOL (13 (McL)), VAN (1 (McL)), NCal (2 (McL)), FIJ (2 (McL)), MIC (1 (McL)), EFU, EUV, KAP (McL), MAO, NIU, SAM, TON, WFU

This is another example of specific use of a general term, in this case the term 'to blow' transferring to blown musical instruments, including flutes, trumpets, and panpipes, in a number of areas, but not flutes in general as suggested in the Lexicon gloss, though this is plausible in terms of contrast with *pusi* (Table 3), if this was the term for to blow as a trumpet. The distribution seems convincingly POc, but the preponderance of terms in the Solomons suggests an origin there, with diffusion into Western Polynesia south to Fiji and New Caledonia through the Outliers rather than via Vanuatu. If, as seems likely, Maori *ihi* 'Blow, of wind' is unrelated, the term cannot be PPn.

TABLE 9

*?? *fag(o,u) :blow nose, snort (Pollex)

MIC (2 (McL)), ANI (McL), EAS, ECE, EFU (McL), EUV (McL), HAW, MAE, MAO (McL), MFA, MVA, NIU (McL), PEN, ROT, SAM, TIK (McL), TOK (McL), TON, WFU

In its primary sense of 'blow with the nose', albeit diluted to 'nasal sound' by the time it reached New Zealand, this term is PPn, and provenience much further back to POc or even PAn is conferred by the associated term *fafagu* in Table 10 (next). In reduplicated form as *fangofango* or *fangufangu* it becomes a nose flute. The distribution is markedly similar to that of the complementary term *pusi* 'to blow from the mouth' in Table 3, with the two terms appearing together in no fewer than 14 places, stretching from Western Micronesia through the Polynesian Outliers, deep into the remainder of Western Polynesia.

The Rotuma entry has been identified as a borrowing by Andrew Pawley as follows:

ROT fag-fagu 'nose flute' must be a borrowing from Polynesian. The directly inherited Rotuman form would be hag-hagu, with h. Compare Rotuman hagu 'waken' in Table 10, which is a regular reflex (AP).

TABLE 10

PAn *bangun (Dpf)
POc *pang(ou)(n) (Gce.)
PPn *fafago "awaken someone" (Pollex)

MIC (3 (McL)), ECE, EFU, EUV, KAP, MFA, MOT, NIU, NKR, ROT, SAM, SIK, TIK, TOK, TON

Except for occurrence in Saipan, Truk, and Woleai in Micronesia, this distribution is exclusively Western Polynesian. The table, however, is probably far from complete, and should be considered in association with the primary term *fango* in the previous table which has a broader distribution. When the two tables are merged it is found that the *fango* terms for nose flute and the *fafango* one for 'to awaken' occur together in numerous places, just as also happens with *pu* 'conch' and *pusi* 'to blow with the mouth', in the *fangu* case with duplication of the first syllable of the base word conferring the separate meaning. The connection between the two becomes explicit in Tonga, where the nose flute (*fangufangu*) is used traditionally to gently awaken royalty and nobility (Moyle 1987:83). It may be that *fangu* 'to blow with the nose' is the original general term, with *fafangu* 'to awaken' and *fangufangu* 'nose flute' deriving from it. On the other hand, this status may belong also with the

'awaken' term which, if Dempwolff's reconstruction of PAn *bangun 'arouse' is correct (Dempwolff 1971:(3)20), suggests association with nose flute terms reported for Puluwat and Truk in the Caroline Islands as follows:

Puluwat yangin 'nose flute'
Puluwat yangin 'nose flute' (Elbert 1972:332)
Truk aangyn, angin, anin, angun 'nose flute'
Truk aangun 'nose flute' (Goodenough & Sugita 1990:255)

TABLE 11

PAn *tulani 'bamboo flute' (Blust 1995:496)
PMP *tulali 'nose flute' (Blust 1995:496)

These reconstructions are of particular importance because of their implications for Lapita, and for this reason the following information relevant to them, which features entries that are in neither Pollex nor Lexicon, is cited here in full.

Papua New Guinea Western Province

Gogodala Map code 314 tutuli conch shell trumpet

Papua New Guinea Milne Bay province

Dobu Map code 384 yoguli conch shell

Bismarck Archipelago

Duke of York Is Map code 421 talal 'music' (Lanyon-Orgill 1960:576)

Londip, New Britain, Map code 417 dulall long flute

Matupit, New Britain, map code 420 dulall notched mouth flute

Mengen Map code 412 tulala 'notched mouth flute', 'raft panpipe', and also 'the Maenge name for all bamboo' (Laade 1999:152-4)

Mioko, Duke of York Is, Map code 421 ntulall long flute

Pala, New Ireland, Map code 431 tulal bamboo mouth flute

Raluana Map code 419 tulal 'music, musical pipe, to make music' (Lanyon-Orgill 1960:424)

Siar, New Ireland, Map code 425 tulall long flute

Siar, New Ireland, Map code 425 tull triton horn

Unidentified. Between Muliama (map code 427) and King/Lamasa (422) tullal bamboo mouth flute

Solomon Islands

Ysabel duduli 'a bass drum of bamboo; to drum'; duulali 'to sound, resound, a sound' (Ivens 1940:9)

FIJI

dulali 'the Fijian nose-flute' (Capell 1983:63)

Micronesia

Marshall Islands jilel 'conch, conch trumpet' (Abo et al. 1976:329)

Reconstruction of the *tulali* term to PAn and PMP, coupled with subsequent appearance in the Bismarck Archipelago, together with extensions north to Micronesia and south to the Solomons and Fiji, is evidence also of inheritance in POc.

Putting map codes from the table into consecutive order yields the following: 314, 384, 412, 417, 419, 420, 421, 422, 425, 427, 431. Most of these are concentrated along the north coast of New Britain, inclusive of known Lapita sites. This is a highly local distribution, suggesting on the one hand that it may be relatively recent, but on the other, because of the proximity of so many Lapita sites and a probable origin in POc, that the prevalence of the term here may be a survival from Lapita times.

Questions must be raised, however, about Blust's gloss of 'nose flute' for his reconstructions to PMP and PAn.

In 1995 Blust provided a reconstruction of PAN *tulani, PMP *tulali "flute" (F, P, WIN, OC) which he said "almost certainly referred to a bamboo nose flute, as it still does in several descendant communities" (Blust 1995:496), and a decade and a half later he more positively glossed the term to 'bamboo nose flute', "based on Fijian /dulali/ and cognates in Taiwan, the Philippines and Indonesia." (Blust 2000:187) In neither paper, however, did he offer evidence in support of the claim. The present writer has no information for Taiwan but the following cognates have been found from elsewhere, with mouth and nose-blowing about equally represented, suggesting that 'flute' rather than 'nose flute' would be a more appropriate gloss for the PMP and PAn terms:

Central Asia tulak 'duct flute' (Sadie 1984:(3)674)

Dusun, Borneo turali 'nose flute' (Marcuse 1964:551)

Sabah, Malaysia turali 'transverse nose flute' (Sadie 1984:(3)681)

Celebes [Sulawesi], Indonesia tulali, tujali 'exterior duct ring flute' (Marcuse 1964:549)

Kalinga, northern Philippines tongali 'nose flute' (Sadie 1984:(3)606)

Ilonggot, Philippines, tulani or tulale 'external duct fipple mouth flute' (Roger Blench (pers.comm.)

Sulod, Panay Island, Philippines, *tulali* 'external duct fipple mouth flute'
(Roger Blench (pers.comm.)

Also probably related is Javanese *tulup* 'to shoot with a blow-pipe' (Dempwolff 1971:(3)168)

Next to be considered is the question of the Fijian *dulali*, which Blust took into account in his gloss of 'nose flute' for the *tulali*.

A recent paper by Ammann (2007) has disproved the existence of nose flutes in New Caledonia and, with the exception of Fiji, has thrown doubt on their presence anywhere else in Island Melanesia except possibly Manus. The term *dulali* and its cognates is applied to nose flute only in Fiji and is a mouth flute in its presumed area of origin in New Britain, with no credible presence, following Ammann, of nose flutes anywhere along the migration path from the Bismarcks to Fiji. This requires explanation and will be referred to again later.

Finally, it will be noticed that the *tulali* term is not exclusive to flutes. Among the Dobu and in the Marshall Islands it is applied to the conch, and the same is true of one of the New Britain areas where the term is used for both flute and conch.

TABLE 12

CEPn *wiwo :Flute (Pollex)

AUS (McL), EAS (McL), MAO (McL), MQA, MVA (McL), PEN, RAR,
TAH, TUA

As indicated in the Pollex reconstruction, this term for flute is exclusive to Eastern Polynesia. Andrew Pawley notes as problematic the inclusion of Maori *whio* 'whistle' and Easter Islands *hio* 'bamboo flute': "These two forms would have to come from PEPn *fio, not *wiwo" (AP).

Tables 13-14 Jews harp

TABLE 13

No published Lexicon or Pollex reconstructions are available for this table, so the McLean entries are again cited in full. On distributional grounds it is suggested that the terms found may be reconstructable to PWOC.

Bismarck Archipelago

Gazelle Pen. Map code 415 gap, nap jews harp

Gazelle Pen. Map code 415 ngap jews harp

King Map code 422 ngab jews harp
 Kuanua Map code 419 aqapa jews harp
 Kuanua Map code 419 gap 'jews harp' (Mannering n.d.:49)
 Lamassa Map code 423 ngab jews harp
 Londip Map code 417 ngab, ngap jews harp
 Namatanai, Pala Map code 431 ngap jews harp
 New Britain mangap jews harp
 New Britain ngap jews harp
 New Ireland ngab jews harp
 Raluana Map code 419 gap, guap 'jews harp' (Lanyon-Orgill 1960:565)

Polynesian Outliers

REN hapa metal jews harp believed to be from the Solomon Islands. (Elbert 1975:(2)48)

Placing known area codes in order yields the following: 415, 417, 419, 421, 422, 423, 431. These are all consecutive, indicative of a highly local distribution in the same general area as *dulali* flute cognates in Table 11, with five of the specific languages coinciding. Merging the two together yields a string with hardly any gaps and nothing else on either side of it: 314, 384, 412, 415, 417, 419, 420, 421 422, 423, 425, 427, 431, stretching from the Gazelle Peninsula in New Britain north eastwards in a string of coastal locations around the easternmost tip of New Ireland. The overlap between the two tables is not absolute, however, as the jews harp terms are limited to the Bismarcks portion of the distribution, consistent with attribution of Table 11 to POc, with forerunners even as far back as Taiwan, and attribution of the jews harp terms to the post-Lapita subgroup now known as Proto Western Oceanic (PWOc). Search of the McLean files has revealed only a handful of cognates outside of the Bismarcks, suggesting that the Table 13 terms may indeed belong to PWOc. There are plenty of jews harps south of this area, all the way to Fiji, but they have different names with no noticeable uniformities. Note, however, the Rennell borrowing of *hapa* from the Solomon Islands which, if the term is cognate with *gap*, suggests that the latter is a transliteration of the English word 'harp'.

TABLE 14

This table is very short so has again been cited in full.

PPn *Tete :Shiver, tremble

See Pollex for numerous entries with this general meaning to which the jews harp and mouth bow term seems to be related.

Information from McLean files

EFU utete coconut leaflet midrib jews harp
 EUV utete coconut leaf jews harp
 HAW ukeke mouth bow (23 refs)
 MQA utete mouth bow (6 refs)
 SAM utete coconut leaflet midrib jews harp (4 refs)
 TOK utete jews harp
 TON utete coconut leaf jews harp (5 refs)

With two different applications in Eastern and Western Polynesia respectively this term does not qualify for reconstruction to PPn as a musical instrument. It would seem that the primary term for 'to shiver' was applied independently to the jews harp in Western Polynesia and to the musical bow, which operates on a similar principle, in Hawai'i and the Marquesas Islands. The table 13 and 14 sets for jews harp are nevertheless another clear case of an instrument the terms for which are complementary within POc and PPn respectively.

Slit gong Tables 15-19

TABLE 15

POc *garamut 'slit gong' (Lexicon)

The table entries are exclusively from Lexicon, but are again short and cited in full with map codes added where relevant.

Northern New Guinea and Bismarck Archipelago

Adm Emira galamutu 'slit gong' Map code 452
 MM Nakanai galamo 'slit gong' Map code 401
 MM Tolai garamut 'native log drum' Map code 419
 NNG Bing giram 'garamut, log drum' Map code 398
 NNG Kairiru giram 'slit gong'
 NNG Kove yilamo 'slit gong'
 NNG Manam giramo 'slit gong' Map code 152

Solomon Islands

MM Halia (Haku) garamuc 'slit gong'
 MM Tinputz kamus 'drum/slit drum'

Garamut is the Pidgin English term for slit gong in New Guinea and adjacent areas. Like the Pidgin term *kundu* for hourglass drum (Table 4), its origin is unknown but all or most of the examples of it are self-evidently post-European. Again, like *kundu*, the term may have been adopted from one of the areas where European contact was first made, but there is little point in trying to find

out where this might have been. Marcuse (1964:200) lists 13 variants of the name ('angremut, dangamut, galamutu, garamudu, geramo, gerom, karamut, kolamut, naramut, ngaramut, ngilamo, qaramut, terremut'), any one or none of which could have been the originator of the Pidgin term, and there are more in McLean files, mostly in the Bismarck Archipelago, suggesting that this diversity may have taken place at PWOC level. If there was a proto term, however, it is unlikely to have taken the same form as the word in Pidgin English.

TABLE 16

POc *dali 'slit gong' (Blust 1995:496)
 POc *rali 'slit gong' (Blust 2000:187)
 PCP *lali 'slit gong' (Lexicon)

In this table the Admiralty region of the Bismarck Archipelago is of special significance and is therefore detached from the rest of the Bismarcks, with Admiralty terms from Blust (2000) added to those from elsewhere.

Adm (6), Adm (4 (McL)), FIJ (2), FIJ (3 (McL)), ECE, EFU, EUV, MAE, MFA (McL), REN, SAM, TON

There is an apparent connection here between the Admiralty Islands and Fiji, albeit with no evidence of the term in the rest of Melanesia, and appearances elsewhere limited to Western Polynesia. Presence of the *lali* in areas adjacent to Fiji does not imply PCP status for these areas as all are known to have borrowed both the instrument and the name for it from Fiji. As will be explained in a later chapter this type of slit gong would have been adopted from the use of paired *lali* as time-keepers for scullers in Fijian trading canoes, resulting in the addition of the *lali* to existing types of slit gong in the areas where trading took place. Andrew Pawley comments:

The McLean entries include forms that appear to belong to at least two different cognate sets: the *lali*, *dral*, *dran* set and the *drami* set. The latter sets seems to be confined to the Manus region (AP).

TABLE 17

PPn *nafa :A wooden drum (Pollex)
 PPn *nafa 'a wooden drum' (Lexicon)

ECE, EUV, MQA, MVA, NIU, PUK, SAM, TAH, TIK, TON

The *nafa* is the Tongan form of slit gong, and is commonly recognised as indigenous to Tonga. As a slit gong or sounding board the term is limited to Western Polynesia so cannot be PPn, and must have meant something different

at the PPn level. It would seem probable that as a general term the meaning was the same as the one still existing in Tahiti, the Marquesas Islands, and Mangareva, where it meant hollow or a hollow receptacle for liquids, and was applied to the slit gong in Tonga only after the departure of Eastern Polynesian colonists from the west.

TABLE 18

CEPn *tookere :Percussion instrument of wood (Pollex)

AIT, HAW, MAO, MVA, PUK (McL), TAH, TUA

As indicated in the Pollex reconstruction, this term is limited to Eastern Polynesia. The one apparent exception is Pukapuka which shares both Western and Eastern Polynesian traits and probably gained the term only recently. The general meaning was probably 'to tap'. In Tahiti it was historically applied to a specific size of skin drum and in New Zealand to castanets. Elsewhere it is mostly a term for a small slit gong.

TABLE 19

PNPn *paatee :Wooden gong (Pollex)

AUS (McL), ECE (McL), MAN (McL), PEN (McL), PUK, RAR, SAM, TOK, WUV

Reconstruction to PNP is wrong, based as it must be on the presence of the instrument in Western Polynesia, where it is, in fact, a borrowing from Rarotonga at the hands of LMS missionaries who took the *pate* first to Samoa for use as a church bell and then elsewhere within Western Polynesia. They also introduced Cook Islands style hymn singing into Papua New Guinea, where these hymns are known as 'prophet songs' and are still sung.

Dance Tables 20-25

TABLE 20

PNPn *kapa :Dance (Pollex)

MAN (McL), MAO, MOR (McL), MQA, MVA, NIU (McL), PEN, PUK (McL), RAR, REN, TAH, TUA

The term is predominantly Eastern Polynesian, with appearances in Western Polynesia only in Rennell and Niue. In Niue the term is *kapakapa* and means 'to flutter'. Elsewhere, as *kapa*, it is either a dance or dance related except in Mangareva, the Marquesas Islands, and Pukapuka, where it is a chant. In New

Zealand it means to stand in a row, and in Rarotonga refers to dancers seated in a row.

TABLE 21

PMP *dangkah 'stride, hop' (Dempwolff 1938)

PNPn *saka :Dance (Pollex)

In view of multiple word forms and meanings of the term, the table entries are cited in full. Unless otherwise stated they are from Pollex.

ECE haka 'Actions of dance'

EFU saka 'Dance with hand and foot action'

EUV haka 'Dance'

EUV haka gestures or movements of a dancer (McL)

FIJ caka 'Work, do'

HAW ha'a 'a dance with bent knees; dancing. Called hula after mid 1800s (PPN saka)' (Pukui & Elbert 1986:44)

KAP haka 'Stride along vigorously'

MAO haka 'dance' (Williams 1975:31)

MAO haka dance type (64 refs (McL))

MQA haka 'Danse, danser'

MQA haka sexual dance (McL)

MVA 'aka 'To dance in traditional fashion; dance accompanied by chant, usually of a warlike nature'

NIU haka o me 'the man standing on the left of the leader in the traditional dance called *me fa*' (McEwen 1970:69)

NKM haka mourning songs (McL)

NKO saga 'Glide in air'

OJA sa'a mourning song (McL)

OJA sa'a 'Song sung when someone is dying'

PEN saka dance type (McL)

PEN saka 'Kind of dance'

PUK yaka 'A style of dancing'

PUK yaka old form of dancing accompanied by singing and drumming (McL)

RAR aka 'ancient form of tribal dance' (Savage 1962:13)

RAR 'aka tribal dance (McL)

RAR 'Aka 'Dance'

REN 'saka 'Song without instruments or clapping'

REN saka tattooing songs (McL)

ROT saka 'To display vigour'

SAM sa'a 'Dance'

SAM sa'asa'a to dance (McL)

SIK saka disparaging/praise song (McL)

TIK saka 'perform rites in trad. religious system; invoke (spirits of dead ancestors)' (Firth 1985:417)

TOK haka 'Dance'
 TOK haka dance (McL)
 TON haka 'Hand action while singing'
 TUA haka 'Dance'
 TUA haka mixed standing dance (McL)

In view of only marginally related meanings in Tonga and Niue, the Pollex reconstruction to PNPn 'dance' seems reasonable. Dempwolff's PMP reconstruction (Dempwolff 1971: (3)47) is on the basis of Malay and Javanese with no terms elsewhere except Western Polynesia. It is glossed as 'stride, hop or skip', which could have given rise to dance terms, but a migration path for it is not clear, despite the presence of the very same meaning of 'stride' in Kapingamarangi, which takes the term to Micronesia. But it does not appear to be present anywhere in Melanesia, except in Fiji, where it is not associated with dance. Also to be noted is that hopping and striding are not characteristic of any Polynesian dances except in Easter Island where there was a so-called 'hopping dance', called *upaupa* (McLean 1999:283), a term which could be a variant of *hula* and in this case applied to a dance of possible phallic display. If the PMP connection to *haka* is accepted, it would seem there are distributional gaps to be filled before the term can be admitted to POc, and its meaning must have undergone radical change during its transit through Polynesia.

Andrew Pawley comments:

Table 21 *saka. If I understand you correctly you consider the genuine cognates to be confined to Polynesian, possibly to Nuclear Polynesian. I agree. Rotuman saka is clearly marked as a loan from Polynesian. A genuine cognate would have the form sa'a. Fijian caka and the reconstruction proposed by Dempwolff can be discounted (AP).

TABLE 22

PNPn *(f, s)ula :Dance (Pollex)

Because of questions raised over this reconstruction, table entries are again cited in full.

MIC Kiribati, ura = hula borrowed from Hawai'i (McL)

EAS hura modern Tahitian dance (McL)
 HAW hula dance (37 refs (McL))
 HAW hula 'Dance, throb, twitch'
 MAO hura 'Twitch'
 MFA fura 'Run'
 NIU hula 'to dance about, jump about' (McEwen 1970:97)
 OJA hula 'Dance'

PEN hura 'Dance'

RAR 'the act of dancing; to dance, to move with measured steps to music or to the accompaniment of the drum and wooden gongs' (Savage 1962:437)

RAR 'ura Act of dancing (McL)

SAM ula dance; poula 'night dance', aoula 'day dance' (McL)

SIK hula modern couple dance in European style (McL)

TAH hura dance (7 refs (McL))

TAH hura 'Dance'

TAK hula '1. n. a women's dance with guitar or ukulele accompaniment reputedly introduced from Nukumanu in the 1950s; 2. vi Dance in this style' (RMTD)

TON hula Hawaiian dancing (McL)

TON hula modern dance accompanied by European instruments; women's dance, modern, introduced from Hawai'i (McL)

TON ula women's dance (8 refs (McL))

Great care needs to be taken with this term to avoid false attributions as a result of modern borrowing from Hawai'i, where this dance genre is indigenous. Presence as a traditional dance genre in Tonga and Samoa would seem sufficient, along with presence also in Niuean, to qualify the term as PPn, but appearances in this case are deceptive. Pawley provides the following corrective which includes justification for reconstruction to PNPn:

Table 22. You cite the PNPn reconstruction *(f,s)ula 'dance' from POLLEX. I'd say the form should be *fula, because *f is unambiguously reflected in Mele-Fila, Takuu and Ontong Java. The sole problem lies in Niuean hula but as Niuean is known to have borrowed from EPn I would discount the Niuean comparison.

TABLE 23

PPn *siwa :Dance and sing (Pollex)

NCal (McL), ECE (McL), EFU, EUV, HAW, MAE, MAO, MIA (McL), MQA (McL), PEN (McL), PUK, RAR (McL), SAM, SIK0 (McL), TAH (McL), TIK, TOK, TON, TUA (McL), WFU, WUV

Presence of numerous cognates for *hiva* in both Western and Eastern Polynesia, and testimony from the earliest European observers from Cook's voyages onwards, confirms this term as PPn. In view of multiple seeming terms for dance in PPn, however, it seems likely that the original meaning of this particular term is the one still preserved in Eastern Polynesia, namely 'entertainment' which generally includes dance. At a later time, especially in Western Polynesia, it would have lost its general meaning after application to specific forms of dance. In New Caledonia it is probably a borrowing from a Polynesian neighbour.

TABLE 24

Pn *mako :Dance (Pollex)

VAN (1), ANU, ECE (McL), EFU, EUV, NKM (McL), PUK, REN, ROT (McL), SIK, TAK (McL), TIK, TOK (McL), TON, WFU, WUV

Except for an appearance in Tanna, which is probably a borrowing, this dance term is exclusively Western Polynesian. Its absence in Eastern Polynesia, as well as Samoa and Niue, throws doubt on the reconstruction to PPn. It seems more likely to have originated somewhere within Western Polynesia in post-PPn times. It is commonly attributed in the area to Uvea.

The Rotuma entry is identified by Pawley as a borrowing as follows:

Table 24. Rotuman maka 'sing, chant, etc' is marked as a borrowing by having k for expected glottal stop (AP).

TABLE 25

PCPa *se(q)a :A kind of dance (Pollex)

The table is short and is therefore cited in full.

FIJ Lau Islands seasea women's dance (McL)
 FIJ Vanua Levu seasea women's dance (McL)
 FIJ Viti Levu seasea 'a kind of meke danced with fans by the women' (Capell 1983:189)
 NKM hea young men's dance (McL)
 OJA sea young men's dance (5 refs (McL))
 ROT sea 'Native song'
 SIK sea 'A kind of dance'
 TIK sea 'a type of dance and associated song' (Firth 1985:430)
 TON he'a entertainment, obsolete dance (McL)

With distribution limited to Fiji, near neighbours to Fiji, and a few Polynesian Outliers, the Pollex reconstruction of the term to PCPa may be appropriate. The *seasea*, however, is pre-eminently a dance of Fiji, and it could be that it has been borrowed directly or indirectly from there into all of the other areas in which cognates for it are now found.

Song Tables 26-35

TABLE 26

PNPn *pese :Sing, song (Pollex)

ECE, MAN (McL), MAO, MOR (McL), MQA, MVA, NKO, PEN, RAR, REN, ROT, SAM, SIK, TAH, TAK (McL), TIK, TOK, TUA

The distribution of this term, which excludes Tonga and Niue, but extends from Samoa into the Polynesian Outliers in Western Polynesia, and from Tahiti as far as the Maori and Moriori of New Zealand, unquestionably confirms reconstruction to PNPn and to a common homeland which, on this evidence, is likely to have been Samoa.

Pawley adds:

Table 26. PNPn *pese 'sing, song'. I doubt if Rotuman fak/peje 'make a short ceremonial speech' is related to this. And I doubt if Maori pihe 'dirge, etc.' is related.

TABLE 27

PPn *langi :Sing (Pollex)

SOL (1 (McL)), FIJ (1), FIJ (1 (McL)), MIC (1 (McL)), EAS, ECE, EFU, KAP, MAO, NKO, OJA, SAM, TAH, TAK, TIK, TOK, TON

The gloss 'sing' in PPn is based on just five examples (Fiji, Tuvalu, Samoa, Tonga, and Tokelau); in six areas it is a song or dance type (Ysabel, Takuu, Ontong Java, Tonga, Futuna, Tahiti); in three areas it means to start a song (Fiji, Kapingamarangi and Nukuoro): and in four areas it means an air or tune (Saipan, Tikopia, and NZ Maori) or to pitch a tune (Fiji, where there is the greatest diversity of meaning). It is not possible to determine with any certainty which of these meanings, if any, is the primary one, but in view of the distance apart of Saipan, Tikopia and New Zealand, 'air or tune' seems most likely with change to a different term for 'tune' becoming current later in Western Polynesia (see Table 30). It is a surprise to find an apparent cognate in Saipan. If this passes linguistic tests for cognacy, it could be that the term will eventually be found in an earlier subgroup than PPn.

Pawley has doubts about the inclusion of Fiji:

Table 27. PPn *langi 'sing'. Inclusion of Fijian langa here is problematic. It has the wrong final vowel (AP).

TABLE 28

POc *dongo to hear, listen, obey (Jackson & Marck 1991:146) [In current orthography *rongo (AP)]
PPn *rongo :to hear (Pollex)

Because of the complex associations surrounding this term, the table, though lengthy, is cited in full.

See Pollex for numerous Western and Eastern Polynesian entries of longo/rongo and similar terms with the primary meaning 'hear, listen, or news', with reconstruction to PPn.

Solomon Islands

Malaita Lau ro 'hear' (Ivens 1939:293)
Malaita Lau rongo 'to hear, listen' (Fox 1974:163)
Malaita Lau rongo 'to listen to, to perceive' (Ivens 1934:90)
Malaita Sa'a rongo, rorongo, rongorongo 'to hear, to listen, to hear tidings of, to understand' (Ivens 1939:293)
San Cristobal Arosi rongo dances (McL)
San Cristobal Arosi rongo 'to hear, listen, obey'; rongogoro 'sweet, musical of sound' (Fox 1970:380)
Ysabel rorongo 'to hear, receive a report; news, tidings' (Ivens 1940:53)
Ysabel rororo 'sing in opening or closing many ballads' (White 1988:168)

Vanuatu

Banks Islands Mota rono; 'to feel, hear, smell, taste, apprehend by senses' (Codrington & Palmer 1896:(1)147)

New Caledonia

Nengone dredreng 'to listen to, hear, understand' (Tryon & Dubois 1969-71:(1)111)

Micronesia

Mariana Islands Saipan roong, rongo 'knowledge, specialty, medicine, lore, learning' (Jackson & Marck 1991:146)
Marshall Islands ron 'to hear' (Abo et al. 1976:252)
Marshall Islands roro hauling songs (McL)
Mokil rong 'to hear, to understand (what is said)'; rongda 'to find out by hearing'; rongdi 'to learn by hearing' (Harrison & Salich, 1977:79)
Puluwat rongorongo 'to hear' (Elbert 1972:159)
Truk rong 'to hear, obey, listen etc.' (Goodenough & Sugita 1980:311)

Truk ronga 'any endeavour that requires special knowledge and instruction to perform' (Goodenough & Sugita 1980:311)
 Woleai rongo (rongo) 'n. tradition knowledge that passes down from father to son, heritage in terms of wisdom'; rongorongo (rongo-rongo) 'v.i. to hear, listen to'; rongiyy (rongii-a) 'v.t. sing it, recite it, relate it, verbalize it'; rongirongi (rongi-rongi) 'v.n. to sing, recite, relate, verbalize' (Sohn & Tawerilmang 1976:124)

Polynesian Outliers

Rennell gogongo song of praise or thanks to a god (McL)
 Rennell gongo 'to hear, listen, feel, taste'; gongogongo 'to listen carefully' (Elbert 1975: (1)62)

Western Polynesia

E. Futuna lolongo chorus grouped around rolled mats (McL)
 E. Uvea lolongo chorus grouped around rolled mats (McL)
 Niue lolongo chanted songs (McL)
 Niue lolongo ancient songs (McL)
 Niue lolongo v. to sing; n. song, hymn' (McEwen 1970:164)
 Niue longo 'n. bell; drum hollowed out of wood' (McEwen 1970:165)
 Samoa logo 'large slit gong used for announcing church services' (Moyle 1988:35)
 Samoa logo 'perceive (by hearing or some other sense, other than sight); large wooden gong (used for calling people to church); bell or other device used for the same purpose'. fa'alogo 'hear; listen, pay attention, obey, feel' (Milner 1993:110)
 Samoa logo 'sound or noise' (Moyle 1988:36)
 Tuvalu longo 'perceive, feel (the stress of work etc.)'; 'learn some specialist skill' (Noricks 1981:(1)88)

Eastern Polynesia

Easter Island rongorongo class of chanters (McL)
 Mangareva rogorogo class of experts (McL)
 Mangareva rongorongo priestly caste charged with religious chants and stories (McL)
 Marquesas Islands tuhuna o'ono tribal bards and professional chanters (Métraux 1957:187–8)
 NZ Maori rongo 'apprehend by the senses, except sight; tidings, report, fame'; rarango 'repeat the commencement of a song'; rongoa 'preserve, take care of' (Williams 1975:346)
 Society Islands rongorongo used for chanting of prayers (McL)
 Tokelau logo 'bell, large wooden gong' (Office 1986:142)

Tuamotu Islands rongo formal chants about exploits of a hero; mourning chant for a deceased hero (McL)

Tuamotu Islands rorogo to sing in war (McL)

Represented in both POc and PPn, here is an almost full range of cognates, present in its primary sense of 'hear, listen, obey' in Micronesia, the Solomon Islands, Vanuatu, the Polynesian Outliers, the remainder of Western Polynesia, and extending from there to Eastern Polynesia, including the famous *rongorongo* men of Easter Island, and, even as far afield as New Zealand. It may be significant, however, that, except in the Solomon Islands, musical associations of the term do not appear in the Melanesian areas traversed by Lapita potters on their way to Fiji. Such associations become prominent only in Micronesia and the Outliers, doing so by duplication and reduplication of the primary term to add meanings relating to acquisition of knowledge. The significance for music lies in the use of song as a vehicle for the transmission of knowledge from generation to generation in societies whose only means of doing so was through oral tradition. By and large this seems to have been a Polynesian and perhaps Micronesian trait rather than a Melanesian one, accounting for the regional differences in the above table, and again suggesting a Micronesian rather than Melanesian connection to Polynesia.

TABLE 29

PAn *tangi 'weep'

POc *tangi 'weep, cry'

PPn *tangi :Cry, weep (Pollex)

BIS (2 (McL)), SOL (1), SOL (5 (McL)), VAN (2 (McL)), FIJ (2), MIC (3 (McL))

ECE (McL), EFU, HAW, KAP, MAE, MAO, MFA, MQA, MVA, NGU, NIU, NKO, OJA, PEN, PUK, RAR, REN, ROT, SAM, SIK (McL), TAH, TAK, TIK, TOK, TON, TUA, WFU, WUV

This is a huge category and in its primary meaning 'to cry' there is not the least doubt of its provenience all the way back to PAn. In its application to song, meaning 'dirge' or 'lament', performed as a rule in association with mourning or funeral ceremonies, examples are many fewer. They are limited largely to Eastern and Western Polynesia, in the latter case with extension of meaning to encompass songs within a story.

TABLE 30

The table is cited in full.

EFU fatsi tune (McL)

EUV fasi tune or air of a song (McL)

FIJ Lau Islands fasi one who starts the singing (McL)
 MAN fatifati improvisation (McL)
 NIU fati lolongo 'to compose songs, a poet' (McEwen 1970:35)
 SAM fati a tune (McL)
 TAK hati '1. n. Chorus, refrain of a song; 2. vi. Sing the chorus or refrain of a song' (RMTD)
 TOK fati 'tune, melody' (Office 1986:497)
 TON fasi 'melody or song leader' (Moyle 1987:253)
 TON fasi melody, voice part in tenor range (McL)

No published reconstruction has been found of this term. It serves principally as a Western Polynesian equivalent of the probably older term *rangi* (Table 27) as a word for 'melody or tune'.

TABLE 31

PPn *Pulotu :Composer of songs (Pollex)

Again the table is cited in full.

EFU pulotu 'Maitre de danse, de chant; pr, tendu demeure des dieux, ciel des ancien Futuniens'
 EUV pulotu dance leader (McL)
 EUV Pulotu 'Demeure des anciens dieux Polyn siens; celui qui dirige les chants et danses'
 EUV pulotu song and dance leader (McL)
 FIJ Lau Islands pulotu chorus (McL)
 MVA porutu laudatory song (McL)
 NKM puloto leading dancer (McL)
 REN pugotu 'Song composer; to sing, as to practice, or while working'
 REN hakapugotu 'song composer' (Elbert 1975:(1)237)
 SAM pulotu sounding board (6 refs (McL))
 SAM pulotu 'The native drum; residence of the gods'
 SIK pulotu 'Dance drum; beat dance drum'
 TAH purotu = hura dance (McL)
 TAK purotu 'Hymn-leader'
 TAK purotu, 'n. Hereditary performing arts specialist. (A male expert in performing and teaching a clan's entire song and dance repertoire, and also beating the slit drum on the ritual arena to accompany them' (RMTD)
 TIK porutu expert, song and dance leader, composer (McL)
 TIK purotu 'Expert, especially in song and dance, but also general'
 TOK pulotu 'Song composer'
 TON pulotu 'Composer of songs and dances'

Although the term reconstructs to PPn, the gloss of 'composer of songs' is far from uniform and is confined to Western Polynesia.

TABLE 32

PPn *sua :Commence a chant or song (Pollex)

Because of the range of meanings, the table has been cited in full.

EFU sua leader solo, introduction to a song (McL)
 EFU sua 'Sing'
 EUV hua 'Entonner; chanter'
 EUV hua leader solo, introduction to a song (McL)
 HAW hua 'Word, letter, figure, watchword, speak'
 KAP hua 'to sing, to chant' (Lieber 1974:104)
 MAO whaka/hua 'Pronounce, recite'
 MQA hua 'Le meme, renvenir, recommencer, refrain d'un cantique'
 MVA hua 'Begin a story, an account, a prayer, and continue with assistants'
 NIU huanga 'entry, entrance' (McEwen 1970:95)
 NKO hua 'sing a song' (Carroll 1973:245)
 RAR ua 'the second supporting part of a song' (Savage 1962:427)
 REN hua historical songs (McL)
 REN huaa 'to begin'; hakahu'a song, to sing a song' (Elbert 1975:(1)97)
 ROT sua 'Start, lead a song'
 SAM afua 'begin' (Milner 1993:6)
 SAM sua 'denotes a gentle movement, but suali a sudden or violent movement'
 (Milner 1993:217)
 SIK sua/mele 'Type of song'
 TAK hua 'vtr. Sing (a song); npl. Songs in general' (RMTD)
 TAK sua/mere 'A type of dance'
 TON hua 'Begin song'
 TUA hua leader solo, introduction to a song (McL)
 TUA Hua/a 'Commence to chant'

This term is unquestionably PPn with a gloss, as suggested in Pollex, of 'commence a chant or song' at the proto level and change of meaning in Western Polynesia after the separation of Eastern Polynesia.

TABLE 33

PNPn *oli-oli :A chant (Pollex)

The table is cited in full.

NGM Mailu Map code 367 oriori wife marrying spell (McL)
 ECE oli game song (McL)
 ECE olioli 'Prayer for good fishing catch'
 HAW oli(oli) 'A chant that was not danced to'

KAP oriori 'Prayer' (obs.)
 KAP oriori spells, prayers (McL)
 MAO oriori song type in the form of a lullaby (McL)
 NIU olioli 'Rejoice'
 NIU olioli 'the movement of the legs in swimming' (McEwen 1970:253)
 NKO olioli 'Put to sleep by singing lullaby'
 OJA olioli 'A type of singing and song'
 OJA olioli victory songs for winners of canoe races, mixed chorus songs devoted to the sea (McL)
 REN ogiogi 'Worship, comfort (a child)' (Ebt)
 SIK olioli 'A type of chant'
 TAK oriori '1. n. Song type, introduced from Nukumanu in the 20th century; 2. A song type performed while striking lengths of hollow bamboo tubing on the ground for accompaniment; 3. vi. Perform an oriori song; sing songs beside a corpse; 4. vi. Comprise funerary rites' (RMTD)
 TIK oriori 'recite formula of thanks; funeral dance' (Firth 1985:320)
 TUA ori 'Revive by incantation'

The apparent association between Mailu and Kapingamarangi is surprising, and no explanation can be offered. Elsewhere the term has several meanings of which those relating to types of chanting are the most common and are reconstructed in Pollex to PNPn. It will be noted that although the term *oli* relates to dance in some areas, in Hawai'i it designates absence of dance. In its reduplicated form of *olioli* in Hawaiian it refers to a quavering or shaking of the voice at the ends of song phrases, known also as *i'i*. In New Zealand, the cognate, *oriori*, of the Hawaiian term, besides referring to a song type generally glossed as 'lullaby' has a not widely known second meaning descriptive of vowel alternation at the ends of song lines in the Waikato region, the effect of which is similar to the Hawaiian *olioli*. There may be a relationship between 'shaking' in this sense and applications of the term to dance.

TABLE 34

PMP *batur 'to plait, weave (as mats, baskets)'
 POc *patu(R), *patuR-i- 'tie, plait, weave (mats, baskets)' (Lexicon)
 PPn *fatu 'to fold, bend, lash' (Elbert 1975: (1)86)
 PPn *fatu :Weave, compose (e.g. a song) (Pollex)

NGM (3), BIS (2), SOL (3), VAN (2), FIJ (1), MIC (1 (McL)), ECE (McL),
 EFU, HAW, MAO, MQA, NIU, PUK, RAR, REN, SAM, TAH, TAK, TIK,
 TOK, TON, TUA

This is the term that provides the title for the McLean book *Weavers of Song* (1999). It is one of the most consistent and striking of the musical terms present in both Western and Eastern Polynesia, and there is not the least doubt that it is of PPn provenience. Equally striking is that although the term reconstructs in

its primary sense of 'to weave' as far back as PMP, it does not pick up its connotation of 'to compose' until it reaches Polynesia, becoming a prime example of use of a general term in specialised context. There are no clues here, however, to indicate the direction taken by pre-Polynesians after leaving their POc area of origin. For a discussion of the weaving image as applied to composition see McLean 1999:384-5.

TABLE 35

CEPn *karioi : Idle, devoted to sensual amusement; such a person (Pollex)

MAO, MIA, MQA, MVA, RAR, TAH, TUA

For accounts of the famous Arioi society of entertainers of Tahiti and Ka'ioi of the Marquesas Islands see McLean 1999:21ff, 260. As indicated by the reconstruction the term is exclusive to Eastern Polynesia.

CONCLUSIONS FROM RECONSTRUCTIONS

Use of general terms

As pointed out in the notes for Table 5, where the term *pahu* 'drum' in Eastern Polynesia is found to have derived from the PPn term *pasu* 'to thump', a notable tendency throughout Oceania is the application of general terms to specific uses in some but not all of the areas in which the word occurs. Two well-known examples of this in Oceania, described by ethnomusicologists Hugo Zemp and Steven Feld, are the use of bamboo terms for musical instruments by the 'Are'are of Malaita in the Solomon Islands, and the use of waterfall terms to designate music structure by the Kaluli people of the Papua New Guinea Highlands (McLean 2006:306-7 where further examples are also given). When, as is usually the case, such extensions of term are area specific, it is inappropriate to include them in the gloss at the proto level. Some further examples from the PPn reconstructions of musical instruments in the first few tables above are:

Table 6 *kofo* bamboo but not 'flute'; Table 9 *fangufangu* 'blow through nose' but not 'nose flute'; and Table 14 *tete* 'to shiver' but not 'jews harp' or 'musical bow', which are independent applications of the general term. In the domain of song, an outstanding example of extended use is PPn 'to weave' (Table 34), with the metaphorical meaning also of 'compose a song', in this case at the PPn level along with the primary term.

Distributional evidence for reconstructions

In the tables, three principles underlie the assessments made there of putative POc and PPn reconstructions. First, an effort is made to determine the exact

geographical locations of language groups and their relation to each other. Second, before a reconstruction to POc can be accepted as significant it is considered essential for a reasonable spread of daughter languages to be present. And third, before accepting a reconstruction to PPn, it is regarded as necessary for cognates to be present in both Western and Eastern Polynesia. Absence in both Tonga and Niue relegates the reconstruction to PNPn.

Reconstruction to PNPn

Four terms have been found unequivocally in this category, two related to dance, and two to singing. The implication for these terms is that they originated in an area that became Samoic.

- PNPn *kapa :Dance (Table 20)
- PNPn *saka :Dance (Table 21)
- PNPn *pese :Sing, song (Table 26)
- PNPn *oli-oli :A chant (Table 33)

Other terms which have been reconstructed to PNPn fall on either side of a divide, belonging in some cases to Eastern Polynesia alone, or in others qualifying as fully PPn.

- PNPn Puu :Trumpet (Table 2) could be PPn
- PNPn *pasu :Drum (Table 5) should be CEPn
- PNPn *paatee :Wooden gong (Table 19) should be CEPn
- PNPn *(f, s)ula :Dance (Table 22) could be PPn

Song and dance

The indigenous music and dance terms in the tables are a fraction only of those known for Oceania at large. In Polynesia alone it is not unusual to find 30 or more named song and dance types associated with a particular culture. The McLean files include terms for numerous song use categories inclusive, as may be expected, of incantations, laments, and love songs, but ranging from birth and boasting songs through to war songs and work songs as follows:

Birth songs, boasting songs, children's songs, courting songs, divinatory songs, entertainment songs, enumeration songs, erotic songs, farewell songs, fighting songs, food-bearing songs, funeral songs, game songs, greeting songs, hauling songs, incantations, initiation songs, insulting songs, juggling songs, laments, love songs, marriage songs, narrative songs, obscene songs, paddling songs, praise songs, satirical songs, spirit songs, tattooing songs, taunting songs, teasing songs, toddy songs, top-spinning songs, topical songs, war songs, welcome songs, and work songs.

Most are local, spreading further, if at all, only to adjacent island groups as a result of borrowing relationships, and are accordingly mostly unrepresented in the present study.

Terms for singing

In Polynesia there are two forms of singing, designated in musicological terms as sung and recited respectively, and represented in the tables by PNPn *pese :Sing, song (Table 26) for the recited form, and PPn *langi :Sing (Table 27) as its sung counterpart when referring to songs that are melodically as well as rhythmically organised.

Additionally, three tables include entries with glosses 'to sing' which result from extension of different but related general terms. They are *hiva/siva* (Table 23) which involve singing and dancing but initially probably meant 'entertainment'; *pulot/purotu* 'composer or leader: (Table 31), in this sense specific to Western Polynesia; and *hua/sua* 'to lead a song' (Table 32).

Although linguistic techniques have been worked out to identify proto terms, uncertainties can surround the gloss if the term has more than one meaning in daughter languages, and again it is distributional evidence that can provide a solution. A case in point is the *rangi* term for 'to sing' which in three widely separated areas means 'air or tune', suggesting that this may be the original meaning (Table 27). In this sense it has been overtaken in Western Polynesia by an alternative term *fasi* or *fati* (Table 30). Comments on other cases can be found in the table notes.

Terms for dance

As noted for song types, there are a huge number of terms for types of dance in Oceania, including scores for Micronesia alone, but with no obvious cognates elsewhere except for adjacent areas. Some exceptions for Polynesia at large are PPn *kapa (Table 20), PPn *saka (Table 21), PNPn *hula (Table 22), PPn *siwa (Table 23), and PPn *mako (Table 24). All are PPn or PNPn and, with the possible exception of Table 21 (see Table note), have no apparent affiliations with POc.

Contrast between POc and PPn

A major finding of the present study, turning up, in fact in the very first tables, is that music terms in POc and PPn tend to be mutually exclusive. Table 1 features a set of over 30 related terms for shell trumpet, reconstructed to both PMP and POc, beginning in West Papua and along the north coast of Papua New Guinea and stretching from there through the Bismarck Archipelago, into Micronesia, and through Island Melanesia to Fiji. There, however, it stops, to be supplanted by a complementary distribution for the same instrument.

Beyond Fiji, throughout both Western and Eastern Polynesia, the conch is known by the different name *pu*, (Table 2) and reconstructs not to POc but to PPn. This could perhaps be dismissed as an oddity were it not that similar distributions occur also for other items of cultural inventory as follows:

Table 7 POc *kaur 'bamboo' but not 'musical instruments'. Contrasts with PPn *kofe 'bamboo' Table 6.

Table 13 *gab*, *bap* 'jews harp'. Contrasts with *ukeke*, *utete* and PPn *Tete 'Shiver, tremble' Table 14 for Polynesia.

Table 16 POc *dali 'slit gong' incl. Fiji *lali*. Contrasts with Polynesian terms (Tables 17-19).

A dichotomy also exists between Melanesia and Polynesia with regard to flutes, though not in this case marked by reconstructions in POc and PPn. Melanesia is characterised by mouth flutes and Polynesia by nose flutes, with Micronesia standing between as a kind of halfway house, with both forms of instrument present, and a variety of names are applied to flutes in all areas.

Terms for 'to blow'

There are three terms with the meaning 'to blow' as applied to musical instruments. Two are of primary significance in Polynesia and one in Melanesia; the first is associated with conch trumpets, the second with nose flutes, and the third with both trumpets and mouth flutes; and all have affiliations at POc level or earlier. They are *pusi* (Table 3), *fango* (Table 9), and *ifi/ufi* (Table 8), as follows:

- *Pusi* co-occurs in Polynesia with the term *pu* for shell trumpet or conch (Table 2) and because of this contrasts with the Melanesian term for the same instrument (Table 1). It reconstructs at the earliest level to PMP *pusi :To blow air from the mouth, but except in most of Polynesia has the different though related meaning of 'to squirt', suggesting that this may have been its original meaning at the proto level.
- As observed in the table notes, the distribution of *Fango* or *fangu* 'blow nose' is similar to that of the complementary term *pusi* 'to blow from the mouth', appearing in the reduplicated form of *fangofango* or *fangufangu* in Polynesia as 'nose flute', just as '*pusi*' appears in cut-down form of *pu* as shell trumpet. The distribution of the term also correlates with the related term *fafagu* 'to awaken' (Table 10), tracking back in this incarnation to POc and PAn.
- Although entering into Polynesia like the other two terms, the *ifi/ufi* term for 'to blow' is fundamentally Melanesian, appearing extensively in the Solomon Islands as a term for blowing mouth flutes, trumpets, and panpipes, and migrating from there into the Polynesian Outliers and thence

further into Western Polynesia, most likely long after Lapita times if panpipe diffusion can be taken as a guide.

Post 2000 BP distributions

After about 2000 BP, when Eastern Polynesia was colonised from a Western Polynesian homeland, each of the now separate areas continued to develop, both internally and in terms of interactions with other areas. In Micronesia, even the settlement of the eastern Nuclear Micronesian language area is believed to have taken place largely after this date, and both Western and Eastern Polynesia went their own separate ways. The inventory of terms in the respective areas reflect the process. Innovations which took place in Eastern Polynesia subsequent to settlement from Western Polynesia include development of the *pahu* form of cylindrical drum, already referred to (Table 5), the *pate* (Table 19) and *tokere* (Table 18) forms of slit gong, the name *vivo* applied to the nose flute (Table 12), and the rise of the famous 'Arioi society of Tahiti in the Society Islands (Table 35).

In its song and dance terminology, Western Polynesia is much more homogeneous than Eastern Polynesia, and some terms are exclusive or near exclusive to it. Examples include the term *fangufangu* as applied to nose flutes (Table 9); the *nafa* form of slit gong or sounding board (Table 17); *mako* 'dance, or dance type' (Table 24); the term *pulotu/purotu* as 'composer of songs' (Table 31); and numerous others not in the tables, reflecting ongoing intercommunication and exchange of items following separation of the two areas (see McLean 1999 for further examples).

Implications for Polynesian origins

Conch

As an example of areal differentiation, the two radically different and mutually exclusive terms for shell trumpet in Tables 1 and 2, representing POc and PPn respectively, is almost enough on its own to invalidate the conventional theory of Polynesian origin from Lapita potters. These early settlers must have belonged to the cognate family of Table 1, present both in Fiji and antecedent areas as far back as Proto Malayo-Polynesian. So if Polynesians originated in this group why did they not use the POc term, with which they would have been familiar, and which is without trace anywhere in Polynesia? If even some of the pre-Polynesians came from this group surely they would have retained the term used by everyone else at this time. Instead they adopted the term *puu* (Table 2), which occurs almost universally throughout both Western and Eastern Polynesia, but is all but absent elsewhere. Nor, as will be seen, is this the only apparent loss of terms from POc.

The explanation most commonly advanced for apparent attrition and replacement of lexical terms is that this results from "bottlenecking" or "founder effect" after a small group of speakers becomes separated from the parent group and subsequently develops in isolation. This self-evidently took place in Eastern Polynesia after this area was colonised by one or more canoe loads of settlers who made a one-way voyage from Western Polynesia. As a process it is more problematic as an explanation for extinction of terms in the Proto Polynesian homeland, where water gaps were not as daunting, and opportunities for intercommunication were present. The necessary isolation would more readily have occurred either if separation from Proto Oceanic took place earlier than supposed, or did so out of Micronesia rather than Island Melanesia, and also to be taken into account is the possibility that some of the terms currently attributed to POC in fact emerged after Proto Polynesian had already begun to develop and were absent from PPn at the outset.

Flute

In addition to the conch, three other complexes of instruments are mutually exclusive in POC or PWOc and PPn. They are the flute, the jews harp, and the slit gong, all present in the Lapita area of New Britain and, except for the jews harp, extending as far as Fiji, but taking a different form with different terminology in Polynesia. Of these instruments, the flute is the most contentious. As already indicated, Polynesia is characterised by nose flutes and Melanesia by flutes that are mouth blown. There is, however, a notable exception in Fiji where a nose flute, termed *dulali*, is present. Table 11 lists *dulali* cognates which are found to occur in the area of Lapita origin in New Britain, and the term has been reconstructed with antecedents as far back as Taiwan to PAn *tulani 'bamboo nose flute'. Moreover, the Fijian *dulali* turns out to be almost identical in structure, playing method and even scale of notes to the Tongan nose flute (Crowe 1984). At first sight this seems supportive of the Lapita hypothesis of Polynesian origins, with derivation of the Polynesian nose flute from the Fijian *dulali*. With closer scrutiny, however, the argument begins to unravel. First, the gloss of nose flute at the proto level turns out to be probably mistaken (see note for Table 11). Second, if nose flutes were indeed introduced into Polynesia through Fiji, one would expect a substantial presence of nose flutes in the Bismarck area of origin, as well as a trail of both nose flutes and the *tulali* term on the way to Fiji. But they are not there. Instead, flutes are mouth-blown throughout the area, including those with the *tulali* name. It would seem probable, therefore, that the nose flute was not introduced into Polynesia from Fiji but that the contact went the other way, with Fiji receiving the nose flute from Tonga, and each area continuing to use its own accustomed name for flute which would initially have been a mouth flute in Fiji.

Where, then, did Polynesian nose flutes come from if not from the *tulali* and Lapita potters? The answer lies with the most common Polynesian term for

nose flute, namely *fangufangu*, which derives from the term *fango* 'to blow with the nose' (Table 9) and is associated also with *fafango* 'to awaken' (Table 10). The two tables together form an interrelated complex with results pointing unequivocally to Micronesia as the area of origin for Polynesian nose flutes, with direct connection between Micronesia and Western Polynesia, and no cognates of any kind in Melanesia, including the area of Lapita origin in the Bismarck Archipelago. Dempwolff's reconstruction of PAn **bangun* (Dempwolff 1975:(3) 20) for the 'awaken' term is especially significant because of the plainly related terms *yangin*, *aangyn*, *angin*, *anin*, *angun* for 'nose flute' in Puluwat and Truk in the Caroline Islands of Micronesia. As earlier noted, this is the very area found by Herzog to exhibit Polynesian-type music structure. Taken together, this is compelling evidence for a Micronesian rather than Island Melanesian migration path for Polynesians, with no involvement on the part of Lapita potters, and no suggestion that the introduction of nose flutes could have been a late rather than early event or took place in the opposite direction as a borrowing from Polynesia.

Jews harp

In the same general area as *tulali* flute cognates, but in a highly local portion of it limited to New Britain and New Ireland, are terms of evidently post-Lapita origin, possibly of PWOc provenience, and, like flutes, contrasting with terms in Polynesia. In this case, however, even though the reconstruction suggests an origin later than Lapita, it may not be nearly late enough, judging from the term *hapa*, which looks plainly cognate with *gapa*, but in this case refers to a European jews harp, and is just as plainly cognate with 'harp'.

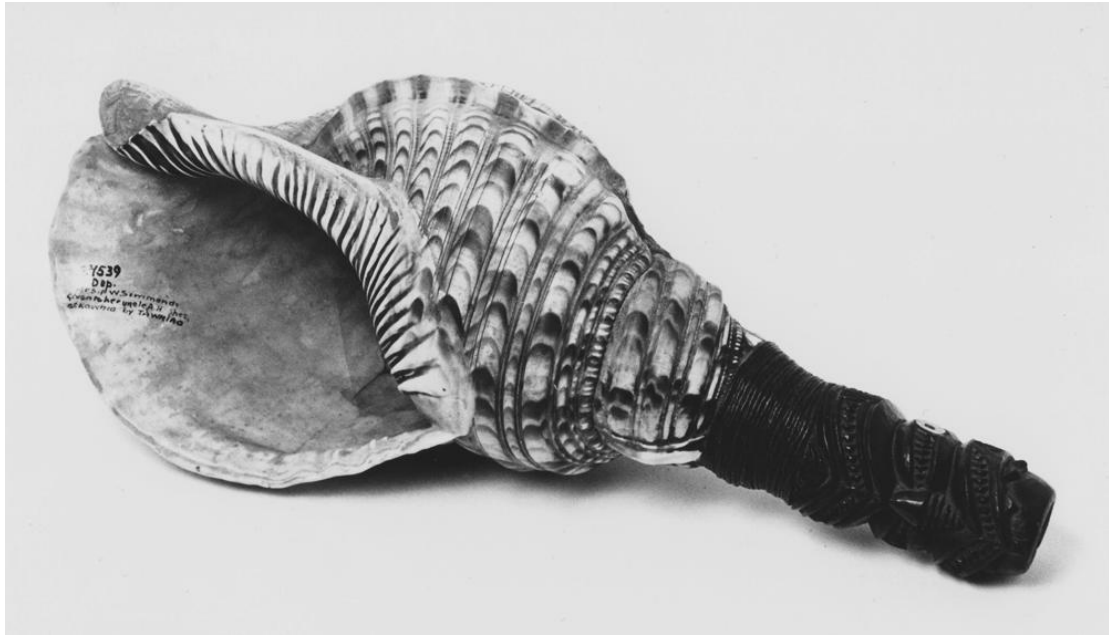
Slit gong

Special significance is attached to the slit gong. Its distribution identifies it along with the conch as one of the most widespread instruments to be associated with speakers of Austronesian languages and, as such, with the Lapita people and/or their immediate successors.

The sole credible reconstructed POc term for slit gong is POc **rali* or **dali* (Table 16) with a starting point in the Admiralty Islands, an end point with the Fijian *lali*, and intermediate cognates only in the Solomon Islands and Vanuatu. This coincides absolutely with the currently accepted route for Lapita potters which took them through central Vanuatu, where slit gongs are still to be found, bypassing southern Vanuatu and New Caledonia, where slit gongs are absent from the traditional inventory of instruments. Again, however, Fiji represents an end-point for the term, with both the Fijian form of slit gong and the Fijian name for it spreading further not by descent from lineal ancestors but by known later borrowing into Western Polynesian areas with their own forms of slit gong which thenceforth co-existed with the *lali*. Slit gongs are not in contention in Micronesia as they are absent there, and in Eastern Polynesia the

slit gong takes an independently derived form which evolved from beaten bamboo.

The only convincing explanation for all of the above is that for the terms under consideration PPn is not connected to POc through Island Melanesia as proposed in the now standard view of Polynesian origin, but developed independently having reached its home area by a different path which must have included Micronesia.



NZ Maori: Putatara conch trumpet which belonged to King Tawhiao. Murex shell with carved wooden mouthpiece. Auckland Institute and Museum 37539. Photo M. McLean. Ref. Weavers 362.



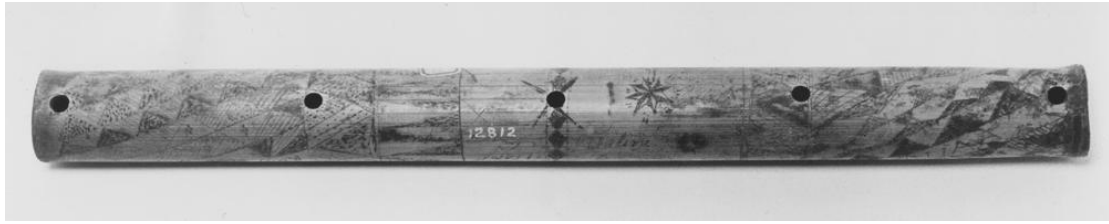
Hawai'i: Pahu hula drum with carved wooden figures. Canterbury Museum E.150.1185, ex Oldman Collection No. 30. Ref. Weavers 298.



Southern Cook Islands: Pa'u mango drum from Mangaia. Auckland Institute and Museum 8865. Photo M. McLean. Ref. Weavers 57.



Tahiti: Vivo nose flute played by the lad Taiota, servant of Tupaia, Cook's Tahitian interpreter. From Parkinson's Journal of a Voyage to the South SEAS (1773, Pl.9). Ref. Weavers 26.



Tonga: A modern nose flute, decorated with geometric designs and the names of prominent noblemen of the day. Auckland Institute and Museum AIM 12812. Accessioned by the museum in 1916. Photo. M. McLean. Ref. Weavers 127.



Bahinemo, PNG. Canoe-shaped slit gong typical of New Guinea and Island Melanesia. Drawn by Caroline Phillips after Chenoweth 1976:9. Ref. Weavers 349.



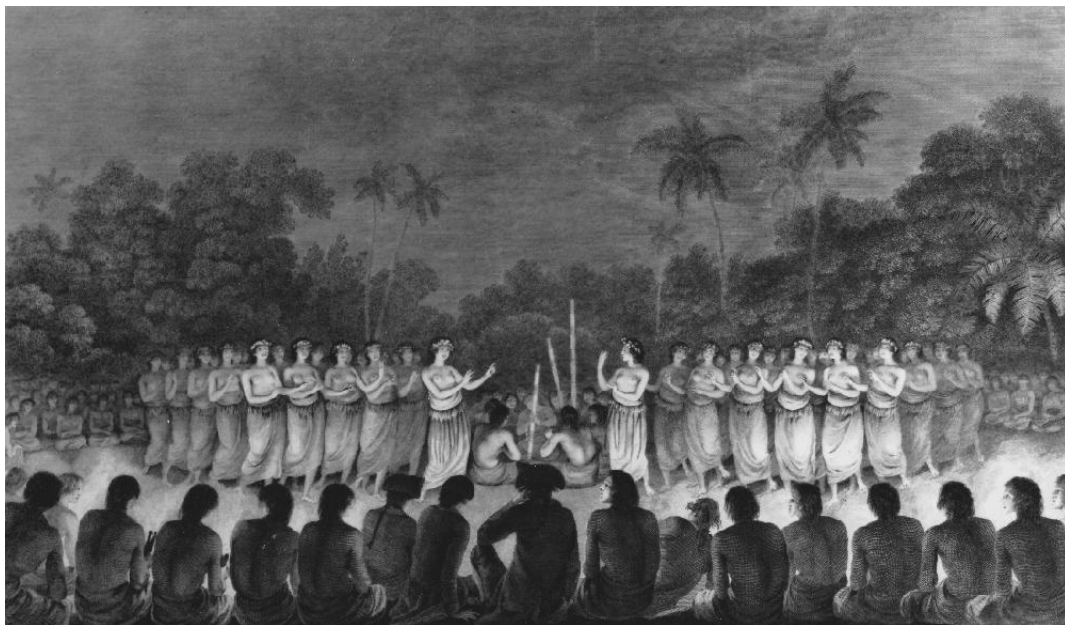
Tonga: Nafa slit gong from Dumont D'Urville Voyage de la corvette Astrolabe, drawn in 1827. REF. Weavers 123.



Southern Cook Islands: Ove Slit gong from Atiu, with beater, Auckland Institute and Museum, AIM 40971. Photo M. McLean. Ref. Weavers 58.



Samoa: Turn of the century early photograph of a possible ula dance. Turnbull Library F-137642-1/2. REF. WEAVERS 146.



Tonga: A women's night dance from Ha'apai, accompanied by part singing and a group of three men playing graduated stamping tubes, seen by Cook during his third voyage, and demonstrating traits that may well have been acquired from Lapita potters. Drawn by John Webber, 1777. Turnbull Library C-131-017. Ref. Weavers 120 from Cook and King 1784: Plate 17

Chapter 7 Physical anthropology and genetics

According to the standard view from archaeology, there is "*continuity* – genetically, culturally and linguistically" between the Lapita pottery makers and Polynesians (Kirch (1997:69). This raises the serious difficulty that if Lapita potters were the ancestors of Polynesians as affirmed, and these ancestors were Melanesian like the present-day occupants of Fiji and the other putatively ancestral areas, then there is a problem of phenotype. Since Kirch wrote the above statement there has been a highly significant Lapita find in Vanuatu which calls it to question:

In 2004, archaeologists excavated a site at Teouma near Port Vila, where they uncovered a large number of headless skeletons in association with intact Lapita pots, offering opportunity for DNA analysis of the skeletal remains (Bedford et al. 2006). Up to the time of writing, official results of the DNA analysis are still awaited but preliminary findings released to the media indicated absence of a nine-base-pair deletion which is characteristic of 94% of present-day Polynesians, suggesting that these particular potters may have been ancestors not of Polynesians but of Melanesians like those still living in Vanuatu.

The problem of phenotype

Even without the most recent research, the matter of phenotype was long ago comprehensively evaluated by the physical anthropologist William Howells in his book *The Pacific Islanders*, published in 1973 at a time when Lapita studies had already begun. In this book, Howells compared Melanesians and Polynesians, using a variety of evidence available at this time, ranging through outer differences such as colour, size and shape, to inner ones including serum proteins, enzymes, and even ear wax. Having done so and reviewed the linguistic and archaeological evidence, Howells was so convinced of the essential differences between the two groups as to suggest that Polynesians could not have reached the limits of Western Polynesia through Melanesia but must have done so through Micronesia. A Micronesian path for Polynesians has gone into limbo as a result of the currently accepted Lapita hypothesis, but not so Howells's findings from physical anthropology, which have received strong support from recent research in this subject.

Having reviewed craniometric, dental, and other evidence from all of the areas relevant to Lapita, as well as examining the implications of Green's 1991 paper about disestablishing Melanesia, the physical anthropologist Michael Pietrusewsky reports as follows:

Samples from Melanesian Remote Oceania, including Fiji, Vanuatu, Loyalty, and New Caledonia, connect with those from Melanesian Near

Oceania and are separate and distinct from Polynesia. Although Micronesian cranial series sometimes cluster with Melanesians, they, along with Polynesians, Indonesians, Southeast Asian and East Asian populations, group together to the exclusion of Australia and Melanesian populations of both Near and Remote Oceania. Melanesia thus appears to retain a cohesiveness that implies it is a useful concept for understanding the biological history of Pacific populations (Pietrusewsky 1996:351).

Pietrusewsky goes on to affirm connection between Polynesia and Indonesia but not Melanesia, in contradiction to Green's claim, and a clear indication that Melanesians cannot be the immediate ancestors of Polynesians. It will be noticed also that the Melanesian peoples cited as biologically distinct from Polynesians are all of those within Island Melanesia who are en route between Near and Remote Oceania and include the Melanesian members of the Central Eastern Oceanic linguistic subgroup which puts them in the same linguistic category as Polynesians. As well, while dissociating Polynesians from Melanesians, Pietrusewsky's analysis of the physical anthropology agrees with the musical evidence by proving their closest affinities to be with Micronesians. Again, as will be seen in the next section, the same has emerged from genetic evidence.

Genetics

Pietrusewsky's reaffirmation of Melanesia as a unit has been amply confirmed in a 2008 survey by Cox. Although there is no population group that can be termed average Melanesian, modern research is shown to have isolated numerous genetic markers, including eight blood protein alleles that Melanesians possess in greater proportion than peoples outside the area. These are seen to occur in a series of clines transcending the sea gaps that have been deemed so important for the Lapita expansion (Cox 2008:47-9).

Historically, there have been two approaches to the problem of determining the genetic origin of Lapita potters. The first and obvious one is DNA analysis of human remains found in Lapita sites, and the other is indirect evidence of past population movements from analysis of DNA samples from living populations.

Encouraged by positive finds of the nine-base-pair deletion in prehistoric non-Lapita human remains in Eastern Polynesia, Hagelberg and Clegg (1993) attempted analysis of remains found in Lapita sites from Watom Island, in the Bismarck Archipelago, as well as Fiji, Tonga, and Samoa from sites dated 2700–1600 BP. No trace was found of the deletion, leading to a conclusion that the Central Pacific was not settled by putative Polynesian ancestors but more likely from neighbouring Melanesia. This conclusion has been challenged on evidently valid grounds that the samples concerned were too late in date to be representative of early Lapita, and too fragmented and possibly contaminated

to be reliable (Merriwether 1999:250; Pietrusewsky in Terrell et al. 2001). In the absence of definitive results from human remains, indirect genetic evidence of the second kind must therefore suffice.

Most genetics literature of the indirect kind is occupied with testing one or more of the three main theories of Polynesian origins known respectively as Fast Train, Slow Boat, and Entangled Bank.

Two main complexes of genetic "markers" have proved useful for the above work. The first is the nine-base-pair deletion and a related marker known as the Polynesian Motif, both found in mitochondrial DNA which is transmitted by females and therefore useful for determining descent through mothers. The other, more recent, approach is through Y chromosome markers which are transmitted by males and therefore of complementary use for tracking family relationships through fathers.

An extremely useful paper which incorporates earlier findings from mitochondrial DNA is Merriwether et al. (1999). This includes a table, with sources, of results from a range of studies, showing percentages of the nine-base-pair and Polynesian Motif throughout Polynesia, Micronesia, and some of Melanesia. As might be expected, Polynesia scores highest with rankings of 100% in some areas, but the next highest rankings are in Eastern Micronesia and the central Carolines; even Vanuatu has a respectable rating of 39.3% according to one survey, though only 12% according to another; and a surprise to many will be an amalgamated result of 24.4% in the Madang area on the north coast of Papua New Guinea, which has no obvious affinities with Polynesia. At the bottom of the table, the very low score of 7.5% for Tolai in the Lapita homeland area of New Britain may also raise eyebrows. The Madang result may be explicable in terms of later Slow Boat findings reported below but, if Lapita potters were ancestral to Polynesians the result for Tolai should have been much higher.

A number of early papers focussing on the Polynesian Motif or nine-base-pair deletion were supportive of the Fast Train hypothesis of Lapita origin – also known as "Express Train" and "Out of Taiwan" – and mostly also demonstrated Polynesian affinities with Indonesia and/or the Philippines, as well as uniformly on this account rejecting Terrell's "Entangled Bank" or exclusive to Melanesia model. Papers supporting the Fast Train model include Melton et al. 1995, Redd et al. 1995, Sykes et al. 1995, and Trejaut et al. 2005.

The next phase of research began with identification of Y chromosome male-specific markers, giving rise to the Slow Boat hypothesis of origin proposed by Kayser et al. (2000). Whereas mitochondrial DNA had tended to minimise links with Melanesia, the Y chromosome data turned up a large number of Melanesian markers in Polynesian DNA, all much further back in the chain of descent than had been expected, implying a slow rather than fast movement of

Polynesian ancestors out of Taiwan with substantial Melanesian admixture on the way. This pattern of maternally transmitted mtDNA of Asian origin and paternally transmitted Y chromosome DNA of Melanesian origin has been interpreted by Hage and Marck (2003) as evidence of matrilineal and matrilocal descent in pre-Polynesian populations.

Finally, a very few genetics papers have dealt specifically with Micronesia. Besides the Merriwether paper already referred to, the other studies include Lum and Cann 1998, O'Shaughnessy et al. 1990, and Lum and Cann 2000. Because of the ubiquitous presence of the Polynesian Motif throughout both Polynesia and Micronesia as well as Indonesia and even Madagascar, coupled with its absence in non-Austronesian-speaking populations, Lum and Cann (2000:160) offer the suggestion that it could perhaps better be called the "Austronesian Motif". But this is far from all. In the several papers, taking account of a variety of genetic markers, relationships are also demonstrated with the north coast of New Guinea, and a complex picture emerges of lineages, some shared, and some unique to particular areas. Lum and Cann refrain from drawing firm conclusions beyond suggesting that Western Micronesia was independently settled from SE Asia, and " Central-Eastern Micronesians and Polynesians most likely shared a common origin in Island Southeast Asia, and a common route into the Pacific along the north coast of New Guinea" (Lum and Cann 2000:166). O'Shaughnessy et al. seemingly depart from the standard settlement scenario as follows:

Our study has not revealed any markers that differentiate between "mongoloid" components of Micronesians and "mongoloid" components of Polynesians: at the relatively low resolving power of these analyses they are indistinguishable. The globin gene data are not inconsistent with a Polynesia colonisation scenario that includes routes through both Melanesia and Micronesia, perhaps meeting in the melting pot of Fiji-Samoa-Tonga from which the final later migrations to the far reaches of the eastern Pacific took place (O'Shaughnessy et al. 1990:153).

As the sample used for this study includes Guam and Palau in Western Micronesia which, as Lum and Cann affirm, are believed to have been settled direct from SE Asia, the authors have probably assumed that the "Mongoloid" component both in Polynesia and the rest of Micronesia came from there. Though running into linguistic difficulties, this is a possibility that will be taken up in a later chapter.

In summary, evidence from both physical anthropology and genetics is supportive of a Micronesian rather than Melanesian route for Polynesian ancestors, with Taiwan, the Philippines and Indonesia, and the north coast of New Guinea all involved with population movements ancestral to both Polynesians and Melanesians.

The most recent genetic data for Oceania is reported in a massive study by Friedlaender et al (2008). Its author summary begins with a seemingly unequivocal statement that "Polynesians and Micronesians have almost no genetic relation to Melanesians, but instead are strongly related to East Asians, and particularly Taiwan Aborigines." But true as this may be, the results are skewed by the nature of the sampling, and it is unfortunate that opportunity was missed to test possibilities that emerge out of the earlier studies.

The area referred to as Melanesian in the above statement is limited to the Near Oceania region of the Bismarck Archipelago and the northern Solomons, where the sampling is extensive, but with no attention at all to the highly crucial remaining areas of Island Melanesia southwards through Vanuatu, New Caledonia, the Loyalties, and Fiji.

Mainland New Guinea is represented only by sampling from the Sepik lowlands, and just two areas from the Eastern Highlands (Gimi, and Goroka township). The New Guinea area most in need of sampling, however, is the entire northern coast, which on linguistic as well as genetic grounds could have been the path taken by the earliest speakers of Oceanic on their way to the Bismarck Archipelago (see Chapter 15).

Most disappointing of all is the inadequacy of sampling for Micronesia and Polynesia, which precludes comparison of these two areas with each other. The association found between Micronesia and Taiwan is to be expected as a result of the limitation of the Micronesian sample to Belau which, along with the rest of Western Micronesia is widely accepted to have been settled direct from Indonesia or the Philippines. If associations with Polynesia are to be sought, however, they will be found not in Belau but most readily in Eastern Micronesia, especially the Carolines and islands closest to Tuvalu which probably played a key role in Polynesian pre-history but again is not part of the Friedlaender sample. Instead, Samoa is the sole representative for Western Polynesia, and NZ Maori for Eastern Polynesia. It is to be hoped that having made an excellent start with the Bismarck Archipelago as a basis for enquiry, these authors will now extend their search to the other areas where answers to the vexing problem of Polynesian origins may yet be uncovered.

Chapter 8 Canoes

Haddon and Hornell's classic accounts of the *Canoes of Oceania* (1975), written as a series of three volumes in the 1930s (Hornell 1936, Haddon 1937, Haddon and Hornell 1938), provide a wealth of detail concerning the distribution of canoe types in the Pacific and their developmental history. Outmoded theories of origin which were current in the 1920s and are given credence by the authors can readily be dissociated from the data itself, which remains invaluable. For present purposes, it is large sailing canoes used for voyaging that are of most relevance. They can be distinguished as either outrigger or double, and in most of Oceania by triangular sails that are typically either sprit or lateen. Sprit sail vessels have a distinctive bow and stern, and sail uni-directionally. Lateen-rigged vessels by contrast have a bow at each end, and are enabled to sail either end forward by swinging the sail from one end of the vessel to the other.

Micronesia

When Europeans first visited the Mariana Islands in the sixteenth century, they encountered canoes of advanced design, later to become known as the "flying *proa*". These were single outrigger lateen-rigged vessels described by Hornell (1936:303), along with the Fijian *thamakau*, which itself was derived from Micronesia, as "one of the two finest types of sailing outrigger canoe ever designed." As knowledge of Micronesia increased, and islands such as those of the Carolines, Marshalls, and Gilberts (Kiribati) also became known to Europeans, canoes of lateen type similar to the flying *proa* were found to be typical throughout the region for inter-island communication, and Micronesians became as famous for their navigational skills as for their canoes. Haddon and Hornell characterise the type of sail on all of these canoes as "the true Oceanic lateen", developed in Micronesia from "the primitive lateen" which in turn originated in Indonesia as "the proto lateen" (Haddon and Hornell 1938:48). Double canoes were absent in Micronesia except for Truk in the Caroline Islands where there is an early nineteenth century report of a paddling double canoe, and a possibility that double canoes were also in former use there, and were of a kind similar to the sailing canoes of Hawai'i (Hornell 1936:340, 408, 440).

Melanesia

Melanesia is an area of greater diversity than Micronesia. Double canoes were in use for *lakatoi* and Mailu trading expeditions in the south coast Gulf area of Papua New Guinea. The best known of these are the large sailing canoes (*orau*) of the Mailu people, described by Haddon (1937:238) as "the only permanent, built-up, double sailing canoe in New Guinea, or indeed in Melanesia, with the exception of New Caledonia and Fiji." The sails were of lateen type, but were

rectangular or square, as also were sails referred to by Haddon and Hornell (1938:52) from areas further west:

The square sails of the trading canoes of western New Britain have been introduced from Siassi Islands which have cultural affinities with the neighbouring coast of New Guinea. The square sails of the western Melanesian islands – the Admiralties and other islands to the west – may be due to the same series of cultural spreads that brought the square sail to New Guinea.

Some of the complexity of canoe distribution in Melanesia is the result of influence from Micronesia, the most notable being the Santa Cruz Islands where outrigger canoes of large size are found equipped with lee platforms as in the Caroline f'lying proa' and with outrigger fittings closely related to those of certain eastern Caroline canoes (Hornell 1936:440).

Details of Santa Cruz canoe construction are given by Haddon, who identifies the sail type as crab-claw lateen (Haddon (1937:50).

The Fijian *thamakau*, was a large outrigger sailing canoe used for inter-island communication. It combined "distinctly Micronesian" structural features with an originally Melanesian design of primitive dugout with Melanesian-type stantion attachment. The sail was a typical Oceanic lateen; the mast was stepped amidships as in Micronesia; the rigging was similarly Micronesian; and the form of the ribs suggested Micronesian influence rather than Melanesian. (Hornell 1936:335-6).

Another hybrid with Micronesian affinities was the Fijian *ndrua* (*drua* in modern orthography), which displaced the *thamakau*. Unlike the *thamakau*, it was a double canoe, albeit with the windward hull shorter than the leeward, combining this with the Micronesian-derived lateen capability of sailing either end forward, and capable also of transporting large numbers of people and huge amounts of cargo. As will be seen, the influence of this form of canoe was to extend into Polynesia, and it also had impact upon nearby New Caledonia, where there were two forms of double canoe described as follows:

One of these is unequal-hulled and has certainly been introduced by Tongan settlers or castaways using the Fijian design of the *ndrua*. The other, more clumsy and equal hulled, represents an earlier and more primitive type, borrowed possibly from the proto-Polynesians (Hornell (1936:344).

In terms of Melanesia as a whole, double canoes are absent with the exceptions noted above, and outrigger canoes are distinguished from those of Polynesia by a different form of outrigger attachment. Multiboom and stantion attachment of

the outrigger are general in Melanesia except in the Solomons where outriggers are "all but absent", in contrast with Polynesia where direct attachment of the boom to the float and few or two only booms are also to be found, with the Melanesian type of attachment most strongly in evidence in islands of Western Polynesia closest to Fiji (Hornell 1936:337).

Western Polynesia

Of particular importance, both in their own right and as a result of long-standing associations with Fiji, are the two island groups of Tonga and Samoa.

Tonga had four types of voyaging sailing canoes, two indigenous and two of Fijian origin and design which displaced the indigenous forms in the latter part of the eighteenth century. An indigenous canoe of outrigger type (*vaka*) was supplanted by the more seaworthy *vaka* or *hamatafua* modelled on the Fijian *thanakau*, and a double canoe (*tongiaki*) similarly fell out of use after the introduction of the more versatile *kalia*, copied from the Fijian *drua* (Hornell 1936:253ff.).

A similar sequence of events took place in Samoa where an indigenous outrigger canoe, called *amatasi*, fell out of use and became forgotten (Hornell 1936:238), while an indigenous form of sea-going double canoe, the *va'atele*, was displaced by a new form (*'alia*), on the pattern as in Tonga of the Fijian *drua*. Though clumsy compared with its successor, the *va'a tele* served until post-European times for the long-distance transport of heavy and bulky cargo and possibly also as a war canoe. It had two equal-sized hulls, like those of the Tongan *tongiaki*, with a large deck extending over them (Hornell 1936:223).

Eastern Polynesia

As in Tonga and Samoa, both single outrigger and double sailing canoes are historically attested for Eastern Polynesia, but most famous of them all are the great voyaging canoes that first transported Polynesian ancestors into the area from Western Polynesia and made possible their settlement of the entire region. The vessels concerned were equal hull double canoes rigged with simple triangular sprit sails closely related to those seen in the Marquesas Islands by Cook in the eighteenth century, and subsequently underwent further development in Hawai'i, the Society Islands and elsewhere within the area (Haddon and Hornell 1938:55). Details for Hawai'i, the Marquesas Islands, Mangareva, Easter Island, the Austral Islands, Cook Islands, and New Zealand are included in the first 200 pages of the Haddon and Hornell volumes (Hornell 1936).

Paddling, rowing, and sculling

Significant areal differences exist between methods of canoe propulsion in sailing canoes when the vessels were becalmed or not under sail. Paddling is the method universally used for small fishing and other canoes without sails, but does not always extend to larger seagoing sailing canoes. In available descriptions from Micronesia (Hornell 1936:354, 372, 382-3; Burrows and Spiro 1957:84) and in Eastern Polynesia generally (Hornell 1936:8), sailing was supplemented by paddling. The same was true of the Samoan sailing outrigger (*amatasi*) as attested by Erskine (1853:60), who describes the canoes he saw as "capable of holding 14 paddlers," and by Wilkes (1845:2:143), who refers to paddlers sitting two abreast and paddling at a pace which Wilkes calls "very swift." (cited by Hornell 1936:240). With some notable exceptions, paddling was also usual in Melanesia. A form of rowing is reported for the Admiralty Islands (Best 1976:369) and the Mailu of New Guinea (Haddon 1937:237), and an extensive region centred on Fiji and embracing Rotuma (Hornell 1936:282), New Caledonia (Haddon 1937:8), as well as areas of Western Polynesia including Tonga (Best 1976:356) and Samoa (Best 1976:340) after adoption of canoes of Fijian design, where manual propulsion was carried out not by paddling or rowing but by sculling.

A number of early travel and missionary accounts give clear descriptions of the sculling method used in these places at the time of European contact:

In the Fijian *thanakau* predecessor to the *drua*, sculls (*sua*) with handles 11 to 12 feet in length were thrust vertically downwards through spaces between the outrigger supports. In the *thanakau* of Mbau, "four scullers were the usual complement, two at each end of the platform," standing upright and facing forward (Hornell 1936:318). A description of the sculling method by Thomson (1908:295) demonstrates the high degree of co-ordination that would have been required of the scullers:

The sculler describes short semicircular sweeps with the blade, throwing his weight against the handle in front of him as he stands upon the deck. When two are sculling they swing in time but in different directions, and there is no exercise that displays the grace of the human body in action to better advantage.

The positioning of scullers in the Fijian *drua* form of canoe was necessarily distinct from that of the *thanakau* because of its different structure and either-end sailing capability, with sculling positions matched symmetrically fore and aft. A photograph of a moderately large Samoan *alia* reproduced by Best (1976:341) shows two scullers, one at the bow and the other at the stern, sculling simply over the side of the canoe. In Fiji, however, the sculls were typically operated through holes cut fore and aft in the deck midway between the two hulls (Hornell 1936:325), and the larger, heavier sea-going vessels required a number of scullers operating in unison. The missionary Thomas

Williams, who obtained his information in the 1840s, refers to a *drua* with twelve deck holes, six forward and six aft, through which the sculls were worked (Williams 1982:74). The same author (Williams 1982:88) provides further information as follows:

In a calm, the canoe is propelled by vertical sculling. Four, six, or eight sculls, according to the size of the canoe, are used. The men who work them throw their weight on the upright oar from side to side, moving together and raising their feet alternately, so as to give at a distance, the appearance of walking on water.

Slit gongs

In his description of Fijian sculling, Williams (1982:88-9) goes on to say:

Canoe sailing is not silent work. The sail is hoisted and the canoe put about with merry shouts: a brisk interchange of jest and raillery is kept up while sailing over shoal reefs, and the heavier task of sculling is lightened by mutual encouragement to exertion, and loud thanks to the scullers as each set is relieved at intervals of five or ten minutes. . .

If there should be drums on board, their clatter is added to the general noise. The announcement to the helmsman of each approaching wave, with the order to *lavi*,—keep her away—and the accompanying "one, two, and another to come," by which the measured advance of the waves is counted with passing comments on their good or ill demeanour, keep all alive and all in good humour.

Williams's reference to "drums" is to so-called "wooden drums" or slit gongs, called *lali* in Fiji, where they take the same canoe-shaped form as in most other areas of Melanesia, and are used in a variety of contexts, but in former times pre-eminently as a signalling instrument. Thirteen named varieties of beat are listed in the entry for *lali* in Capell's Fijian dictionary (Capell 1968:111), cited mostly from Deane (1921), who provides music notations of ten of them, all but one played using two sticks, one in each hand, by a single player. The exception is the "*Lali ni tambua*", played on two instruments, and taking the form of the "ordinary Fijian *lali* beat with an accompaniment" (Deane 1921:200). This use of two instruments rather than a single one appears to have had its origin from use in the Fijian double canoe, and is shown by distributional evidence to have spread from Fiji to other areas which adopted the Fijian canoe type, with subsequent retention of use in pairs in contexts not involving canoes. In Fiji, large *lali* are commonly reported as paired, and pairing of instruments is on record also from Tokelau, Rotuma, Uvea, and Samoa, (Fischer 1983:35), to which may be added Tonga, in all cases coincident with the introduction of the Fijian slit gong, *lali* and adoption of the Fijian form of canoe.

Burrows (1937:245) is specific that in Uvea "Two *lali* were formerly part of the equipment of a double canoe."

Moyle (1988:28), who conducted field work in Samoa, reports that many Samoans recalled seeing *lali* drums in '*alia* canoes they had observed as children.

The *lali* were beaten variously to entertain the crew and passengers, and to unite the paddlers when the wind dropped.

Significantly also, there is a survival of earlier practice in present-day canoe races held annually in both Western and American Samoa where a man sits in the bow facing the stern and beats on an empty tin can to coordinate and regulate the rowers' strokes, as well as to communicate instructions from the captain (Moyle 1988:29).

Finally, Moyle (1987:65-7), who also carried out field work in Tonga, reports similarly large paired *lali* of unequal size as present there. As elsewhere, they were played one drummer per instrument, each drummer with two drum sticks, again originating from former use in canoes.

. . . there is evidence that a small *lali* was once part of the equipment carried on board the Tongan double canoe (*kalia*). Tongans from several parts of Vava'u described this use of the drum, which was beaten to announce the boat's arrival when carrying royalty; the drum was named *laliolo*.

An eye-witness observation of paired slit gongs on Fijian double canoes is provided by Erskine (1853:171). In a canoe about to sail

two fellows were beating away, each with two short knobbed sticks, on a 'lali' or wooden drum, the same as those of Tonga.

A Fijian precursor to the Tongan usage described by Moyle, in this case involving paired slit gongs, is documented by Hocart (1952:105) who reproduces a *Native Gazette* account of 1910 referring to a rhythm used solely in canoes on which a high chief travelled, beaten on "two drums", of which one was smaller than the other. One of Deane's notations (Deane 1921:201) confirms this use with a *lali* beat "played upon a high chief's canoe when approaching a village," in this case on a single *lali*.

In summary, although Haddon and Hornell make no reference to the *lali* as a canoe accessory, there is no doubt that paired slit gongs were used on the Fijian *drua* and spread from Fiji to areas such as Tonga and Samoa where this form of canoe was adopted. In all cases where a description is available, the slit gongs

were of unequal size with one consequently of higher pitch than the other. It is tempting to suppose that the rationale for this was imitation not only of canoe shape, but also of the unequal size of the two hulls of the canoe in which the slit gongs were carried. Some of the signalling uses to which the *lali* were put, such as signalling arrivals and departures are also documented. But why two slit gongs if one could suffice? The answer must surely lie with another common feature of the canoes, namely the use of sculling as a means of manual propulsion, and the need to co-ordinate the movements of the scullers. One of the slit gongs could have regulated the scullers at the bow end of the vessel, and the other, with its distinctively higher or lower pitch, their counterparts stationed at the stern.

Conclusions from canoe evidence

From the above evidence, Micronesia emerges as a primary influence upon voyaging canoes of Fiji and, indirectly, upon Tongan, Samoan, New Caledonian and other canoe types adopted from Fiji. The *thamakau* outrigger of Fiji was a combination of an originally Melanesian form of canoe, with primitive lateen sail and other Micronesian features grafted upon it, and its successor the *drua* was similarly Micronesian but more advanced, becoming in effect a double canoe as a result of enlarging the float. The *drua* and its Polynesian clones is known to have been a late eighteenth century introduction, probably as result of contact from the Marshall or Gilbert Islands (Hornell 1936:344). Its outrigger predecessor can be assumed also to have been a relatively late development, raising the question of where the earliest equal-hulled double canoes of Tonga and Samoa came from, if not from Fiji, which had no known form of double canoe other than the *drua*. Haddon and Hornell have no doubt that the whole of Melanesia can be ruled out, citing an "insuperable objection" to a Melanesian path for Proto Polynesians in

the fact that there is no trace, in the presence of double canoes or of outriggers with direct attachment of their sojourn in any of the Melanesian islands where they would have halted for lengthy periods in the course of such a migration (Hornell 1936:341).

With Melanesia out of the running the only alternative, as Haddon and Hornell also conclude, is migration from Micronesia, bringing the sprit sail to Polynesia (Haddon and Hornell 1938:55) before the invention and spread of the "flying proa" in Micronesia. Although Micronesia is currently as empty of double canoes as Island Melanesia, an exception is noted for the double canoe believed to have been formerly present in Truk, the design of which is said to have been similar to that of Hawai'i (Hornell 1936:440).

Of particular relevance for the present book would be to find antecedents of Eastern Polynesian double sailing canoes, which must have been similarly equal hulled and sprit rigged, with auxiliary use of paddles rather than oars or

sculls, but no exact match has been found in the descriptions of early observers. As has been seen, paddling is attested for the indigenous *amatasi* form of Samoan sailing outrigger canoe. But no accounts have been found either of paddling or sculling for either the Tongan *tongiaki* double canoe or its Samoan equivalent the *va'atele*. Both are on record as carrying smaller fishing canoes with them on long voyages (Hornell 1936:265-6), so perhaps this sufficed upon arriving at a destination.

Chapter 9 Voyaging

The two most enduring views of Pacific voyaging are arguably those of Sir Peter Buck on the one hand and of Thor Heyerdahl on the other. In 1938, with his evocatively titled book *Vikings of the Sunrise* Buck created the image of intrepid Polynesians roaming the Pacific in their mighty double canoes, consistent with Percy Smith's still entrenched idea of a Maori fleet which colonised New Zealand. Less than ten years later, in 1947, Thor Heyerdahl captured world attention with his voyage on the raft *Kon Tiki*, with which he sought to prove the possibility of Polynesian settlement from South America. Although winning popular support, Heyerdahl's ideas provoked a storm of academic criticism at the time and, as will be seen in Chapter 11, food plant and other evidence has shown these criticisms to be justified.

Next among nay-sayers of Buck's widely accepted view of Polynesian settlement was the New Zealand historian Andrew Sharp, with a 1956 book, *Ancient Voyagers of the Pacific*, in which he proposed a radical new theory of accidental rather than deliberate voyaging. Although accidental voyages could be shown to have taken place, and may even have been frequent, the idea was not tenable as a sole mechanism for settlement, prompting Sharp to modify his stance a few years later in a second book with the similar title of *Ancient Voyagers in Polynesia* (1963). This time Sharp put the case for one-way rather than two-way voyages, maintaining the concept of no return except for short distances. Academic debate over Sharp's ideas was intense and lasted for well over a decade with much of the argument enshrined in a volume on *Polynesian Navigation* edited by Jack Golson which ran for three editions (Golson 1962, 1963, 1972), with content focussing on topics still relevant today such as Polynesian navigational method, and sailing characteristics of Oceanic canoes. At the same time attention was turning to the practicalities of putting such matters to test by trying out traditional methods of navigation, and by building replica canoes and learning how to sail them as Heyerdahl had done for his *Kon Tiki* raft. The two persons most involved were David Lewis and Ben R. Finney. In 1965 Lewis sailed a catamaran from Tahiti to New Zealand using traditional navigational methods, and in 1972 published a book, *We the Navigators*, in which he reported the results of practical sailing experiments. Meanwhile, in 1966, Finney began sailing-trials of a replica he had commissioned of a traditional Hawaiian double canoe, and continued such experiments for the next ten years. The culmination of his efforts was in 1976 in association with Lewis, when a similar canoe was sailed from Hawai'i to Tahiti and back, using traditional navigational techniques on the outward leg of the journey. An account of these methods, along with details of the canoe's construction (which inevitably had to make use of modern materials), its sailing characteristics, and difficulties encountered along the way, are set out by Finney in an article, (Finney 1979).

Limited as they were to both double canoes and Eastern Polynesia, Finney's experiments provide no answers to questions arising from Lapita studies or the problems of first settlement of Remote Oceania. In particular, what is the explanation for the initial swift expansion of Lapita potters out of the Bismarcks? Was the same true of the almost equally rapid settlement phase of Eastern Polynesia? And why was there a pause of a thousand or more years between the two events? A reasonable supposition might have been that Lapita potters already had the double canoe. But there is no other reason to suppose so. And if this were true, why didn't the Lapita people continue their explorations immediately after reaching Western Polynesia? Moreover, linguistic reconstruction of canoe terms reveals nothing relating to double canoes during the critical period, and it would seem that Lapita potters were in possession of craft with features no more sophisticated than simple single outriggers and sprit sails.

The next question to be asked is whether Lapita canoes were able to sail into the wind. As has been seen in Chapter 8, Oceanic canoes fall ethnographically into two categories of lateen rigged and sprit rigged of which the former were late on the scene in Polynesia and made use of a sailing technique called "shunting", and the latter used the more familiar technique of "tacking" to sail into the wind. Until recently, it has been taken for granted that tacking was the method used by sprit-rigged vessels in Oceania, if only because the direction of colonisation has universally been from west to east against the prevailing wind, which for most of the year blows from the east.

In a 1992 book, Geoffrey Irwin (Irwin 1992:Chapter 4,) has provided an answer to most of the above questions by proposing a settlement strategy of initial exploration and return by Lapita potters. Rather than risk their lives by setting out with no reliable means of return, Irwin has suggested they began their journeys by sailing against the wind and then simply cruised back home downwind with news of the outcome, whether or not it proved successful. In this way knowledge would accrue of suitable islands, and properly prepared colonising voyages could follow the initial ones. The alternative for vessels incapable of tacking would be not to travel at all unless the wind happened to be blowing in the right direction. But this could not have been the method used because obsidian finds at numerous Lapita sites have shown that trading of obsidian was common throughout the Near Oceania area, requiring journeys to and fro that would not have been dependant on occasional wind changes.

Reversals of the trade winds do, however, take place from time to time and are the subject of an alternative to Irwin's theory which has recently been proposed by Anderson et al. (2006). These changes of wind direction are especially prevalent during periods known as El Nino, when such winds are less sporadic and blow for longer. In their paper, Anderson et al. have used results from climate-change research to correlate historical incidence of El Nino weather conditions in the tropics with revised radiocarbon dates for Pacific settlement,

showing apparent bursts of settlement activity at such times, when opportunities for downwind exploration would have been greater. If, as these authors argue, early Polynesian vessels were incapable of tacking, the infrequency of such episodes would account for the periodic nature of settlement. But problems with the idea are not limited to known Lapita movements in Near Oceania. They become an order of magnitude greater when applied to the huge sea gap between Western and Eastern Polynesia, where, because of subsequent separate development of the two areas, the journey must have been one-way. Rather than a suicide El Nino mission, it is more likely to have been an expedition of the kind proposed by Irwin that happened to extend beyond the point of no return. Nor does the El Nino idea account convincingly for the extremely long duration of the "pause" in Western Polynesia before settlement of Eastern Polynesia took place. A more credible explanation for the pause is that it was indeed a product of the primitive nature of the earliest canoes, but not necessarily because they were unable to tack. The greater likelihood is that they were barely capable of transcending the 850 km sea gap which was the final barrier on the way to Fiji, but could not manage the much greater distance to Eastern Polynesia and this was finally overcome as a result of development of the double canoe.

A plausible sequence of events, from pre-Lapita times through to the colonisation of Eastern Polynesia, taking all chapters of the present book into account, will be presented in Chapter 15.

Chapter 10 Ethnography

Some reference has already been made to the science of ethnology or comparative ethnography, which began with museum collections and dominated the study of Pacific cultures until the advent of modern archaeology and linguistics after the end of World War II, blurring also into cultural anthropology in the United States and social anthropology in Great Britain.

Most of the work on Pacific ethnography was carried out under the auspices of the B.P. Bishop Museum in Honolulu, Hawai'i, where Sir Peter Buck (Te Rangi Hiroa) served as director during the latter part of his career. The museum sponsored or took part in numerous field excursions, especially in Polynesia, and a number of book length ethnographies were published by the museum in a series of bulletins, with data set out systematically under headings such as subsistence, material culture, social organisation, and arts and crafts.

This wealth of material was made use of in a comparative study by the American anthropologist and ethnomusicologist Edwin G. Burrows (1891 - 1958), who was himself the author of two of the museum ethnographies, and also published books on Tuamotuan music and on the music of Uvea and Futuna in the same series (Burrows 1933, 1936, 1937, 1945).

Having joined the staff of the museum, Burrows was fortunate to have all the work of his predecessors at his disposal and was also on the forefront of advances in anthropology at the time. His contribution to the comparison of available resources was his book *Western Polynesia: A Study in Cultural Differentiation* (1938), which gained him a PhD in anthropology from Yale University in the previous year.

A deficiency of earlier ethnographers was to interpret their data in terms of now discredited wave theories emanating from evolutionism and diffusionism. Burrows made no such mistakes. His approach was to eschew racially defined "waves" and "strata" in favour of centres of innovation from which diffusion to adjacent areas could proceed, and he also adopted a much more sophisticated set of criteria to examine resemblances or absences when these were found. Thus resemblances, for example, could be a result of independent invention, and absences of rejection or abandonment.

True to the title of his monograph, Burrows was able to distinguish contrasting clusters of traits which differentiate Western and Eastern Polynesia from each other, and this achievement is well known and acknowledged by modern anthropologists. Bellwood, for example, who comes close to rejecting ethnology as a useful discipline makes honourable exception for Burrows, rating his work on Western and Eastern Polynesia as of "fundamental significance in Polynesian prehistory." (Bellwood 1978a:309).

Burrows isolated 40 traits in a broad range including physical ones such as types of fish-hook, adzes, and house construction; kinship terms; social customs such as presence or absence of brother-sister avoidance; and mythology and religion, in all cases demonstrating differentiation between Eastern and Western Polynesia. The following are some representative examples:

WESTERN	EASTERN
Rubbed barkcloth	Stamped barkcloth
Lateen sail	Sprit sail
Slit-gong and panpipes	Drum ² and mouth bow
God house	Sacred court with stonework
Pulotu home of the gods and abode of the dead	Hawaiki abode of the dead and ancestral home
Tangaloa the only primal god	Tangaroa, Tu, Tane and Rongo all primal gods

In other cases, items commonly present in Eastern Polynesia, such as tanged adzes, stone food pounders, and human figures carved in wood or stone, were found to be absent or nearly so in Western Polynesia.

Of equal significance are trait associations, identified by Burrows in the same publication which ally Eastern Polynesia with Micronesia on the one hand, and Western Polynesia with Melanesia on the other. These are important because they corroborate similar associations which have turned up in other contexts such as music.

Traits shared in Micronesia and Western Polynesia

Right-angle plaiting. Centre of diffusion Micronesia. Rare in Melanesia.

Traits shared in Melanesia and Western Polynesia

1. Coiled basketry. Centre of diffusion Melanesia, reaching Western Polynesia through Fiji, and also the Carolines from Melanesia.
2. Slit gongs. Centre of diffusion Melanesia.
3. Panpipes. Centre of diffusion Melanesia.

Traits shared in Micronesia and Eastern Polynesia

In Burrows's own words:

² Except New Zealand.

Certain traits shared by central Polynesia, Micronesia, and some intermediate islands are absent or rare in western Polynesia. They are: simple fish-hooks, Ruvettus fish-hooks, stone or wooden food pounders, tanged adzes, drums, carved human images, nights of the moon, lack of kinship terms for some of the relationships emphasized in western Polynesia. This situation suggests one immigration into central Polynesia by way of Micronesia, another into western Polynesia by a different route (on other grounds, through Fiji). But there are difficulties in the way of this interpretation. Any of the traits mentioned may be old Polynesian, retained in central-marginal Polynesia but abandoned in the west (Burrows 1938 :155).

Here Burrows points to the obvious conclusion that the specified traits in this passage, originated in Micronesia and spread from there to Eastern Polynesia, unlike others that may have reached Polynesia from Melanesia via Fiji. His caveat, however, raises the question of how each of these traits came to be absent in Western Polynesia, and for some there is a question mark also about either presence in Micronesia or absence in Melanesia. Taking each in turn:

Fish-hooks

The simple fish-hooks referred to by Burrows are one-piece hooks without barbs. Far from being absent in Melanesia, it would seem this applies only to southern Island Melanesia, with presence attested in the Solomon Islands northwards. In Micronesia they are reported for Nauru and for Ponape as well as the Marshall Islands, Kapingamarangi and Nukuoro. Absence in Western Polynesia is accounted for by presence of more advanced bonito trolling hooks which would have replaced them for surface fishing (Burrows 1938:130-1).

Ruvettus Hook is the term adopted by Burrows for larger fish-hooks used to catch bottom-dwelling fish species such as Ruvettus. It is general in Eastern Polynesia and in Polynesian Outliers such as Tikopia, Sikaiana and Ontong Java. It is also general in Eastern Micronesia where it has been reported for the Gilberts, Nauru, the Carolines, and, though less frequently, for the Marshalls, but is absent in Melanesia (Burrows 1938:132). Burrows concludes:

This distribution indicates that the Ruvettus hook was invented either in Micronesia or central-marginal Polynesia. Its absence in three of the four typical western Polynesian regions — Samoa, Uvea, Futuna — can be accounted for in either of two ways. One is that knowledge of this type of hook never reached these regions. This is unlikely, in view of the evidence of contact between them and regions where the Ruvettus hook is found. . . The more likely explanation is that the Ruvettus hook was rejected in these regions. The rejection was presumably conditioned by specialization in other fishing methods which proved adequate to local needs (Burrows 1938:132-3).

Pollex has a cognate set of the term *paa* for the bonito trolling lure, showing this name and form of hook to be present throughout both eastern and western Polynesia as follows: ANU, ECE, EFU, EUV, HAW, KAP, MAO, MQA, NIU, NKR, OJA, PUK, REN, SAM, SIK, TAK, TIK, TOK, TON, YAS. The last entry is probably a borrowing.

Burrows (1938:103-4) has a section in which he discusses occurrence of three varieties of composite bonito hooks outside of Polynesia, finding them in the Carolines, Marshall Islands, and Ocean Island in Micronesia, and in the Solomons in Melanesia. Presence of one variety in Fiji is attributed to borrowing from Tonga and the others to various degrees of local development. It will be noted, however, that, except for presence in Western Polynesia, this distribution is the same as for simple and Ruvettus hooks.

Two important later publications supplement and provide support for Burrows's findings:

Skinner (1942) compares a corpus of fish-hooks from southern New Zealand with similar hooks found elsewhere in Polynesia. His Type 1 corresponds with simple fish-hooks in Burrows's classification, and his Type 4 with the *paa* bonito hook of tropical Polynesia set out in the Pollex table above.

Type 1 is subdivided into three varieties, each with a statement of incidence outside of New Zealand. Variety A is semi-circular; in Variety B the point "is so bent as to suggest a barb"; and Variety C is U-shaped, with the shank leg and point leg approximately parallel.

- Variety A is found outside New Zealand in the Chathams, the Ellice Islands, Pukapuka, Manihiki, Tahiti, Easter Island, Uvea, the Carolines, and Santa Barbara (California).
- Variety B occurs in the Chathams, Ellice Islands, Pukapuka, Tokelaus, Tahiti, Pitcairn, Easter, Hawai'i, northern Melanesia, and Carolines.
- Variety C occurs at the Chathams, Pukapuka, Niue, Tahiti, Marquesas, Hawaii, Easter Island, northern Melanesia, Marshalls, and Carolines.

Common to all three lists are the Carolines, Chathams, Easter Island, Pukapuka, and Tahiti. There are two appearances each for the Ellice Islands, Hawaii, and northern Melanesia. And there is one only appearance each for Manihiki, the Marquesas Islands, the Marshalls, Niue, Pitcairn, Santa Barbara, Tokelaus, and Uvea. Except possibly for Santa Barbara, all must be regarded as significant, with obvious correspondences to the findings which emerged from Burrows's study, as also from Skinner himself, who concluded on the basis of mutual presence of Type 1 fish-hooks in Polynesia and northern Melanesia,

with middle ground only in Micronesia, that the home area for the entire insular Pacific was probably the Carolines (Skinner 1942:219).

But this is not Skinner's final word. In the course of his next 40 pages he moves from probability to certainty in his concluding remarks:

The comparative forms figured from overseas indicate clearly that Murihiku relationships are closest with Marginal Polynesia, in which must be included the northern Cooks. Back of Marginal Polynesia stands the Caroline group, closely related and showing many ancestral forms. All the hooks of Melanesia, from the eastern Solomons northward, are derived from the Carolinas (Skinner 1942:262).

Though not seen by the present writer, a major 1950s study of Polynesian fishing gear by the Swedish writer Bengt Anell evidently came out in support of a Micronesian origin for Polynesians on the basis, as foreshadowed by both Burrows and Skinner, that the one-piece bait hooks and the shell trolling lures of Polynesia were "well paralleled through Micronesia, but hardly paralleled at all In Melanesia." (Anell 1955 cited in Bellwood (1978a:281)

In view of the abundant evidence for a Micronesian origin of fish-hooks in Polynesia, along with comparative absence in Melanesia, a question to be settled is what relationship if any there is between this distribution and the Lapita Diaspora. As indicated in Chapter 4, Lapita subsistence was dependant primarily on marine resources, and Lapita sites typically contain large deposits of fish bones. How, then, were the fish obtained? Kirch and Green (2001:121) note that in-shore species typically dominate these assemblages, but small numbers of deep-sea species are also represented, and associated artefacts include varieties of one-piece angling hooks and one-piece trolling lures. Kirch's earlier book *The lapita Peoples* (1997) provides further information, and in view of its importance is quoted here in detail:

Fishhooks, made from several kinds of shell (especially Turbo and Trochus), are now well documented from a number of Lapita sites, ranging from Talepakemalai [Mussau, Bismarcks] to Lolokoka [Tonga]. Most of these hooks are fairly large (ca. 5 cm in shank length) and were probably designed for hand-lining from canoes, in order to catch larger benthic species such as groupers. A few hooks are smaller, however, and could have been used for taking smaller species on reefs and along coastlines. We also have evidence for deep-sea trolling, in the form of carefully crafted lures made from Trochus shell. These trolling lures . . . are streamlined for hydrodynamic lift in the water, and have finely carved grooves for attaching both the line and tackles (probably feathers or pig bristles) near the recurved point.

Fishhooks and trolling lures cannot account for the full diversity of fishes taken by Lapita people. It seems likely that a wide range of fishing strategies must have been practiced, including such methods as spearing, netting, and poisoning (Kirch 1997:200-01).

It would appear that neither the simple fish-hooks nor the Ruvettus hooks of Micronesia and Polynesia were directly represented in Lapita assemblages, but the larger so-called benthic hooks referred to by Kirch would have had similar use to the latter, and the Lapita trolling lure is too close in concept to the familiar bonito lure of Polynesia for these to be unconnected. On the other hand, Kirch's conclusion that the bulk of Lapita fishing activity would have been limited to inshore reef and lagoon fishing, using methods such as netting, spearing, and fish poisoning rings true in light of the self-same methods which remain prevalent today in all of the Melanesian areas where Lapita potters once lived. Other methods in these areas include fish drives with use of scare-lines of rope and coconut leaves, use of fish traps, and of bait lines without hooks, which are simply pulled up when the fish swallows the bait. At the time of European contact a number of Melanesian societies did not use fish-hooks, and in many places today fishing with hook and line is a post-contact phenomenon (Osmond 1998). Taking all available information into account, both fish-hooks and lures are likely to have been common to ancestral populations of both Lapita potters and Micronesians, with the latter giving rise to those of Polynesia and the former falling out of use in Melanesia where fish stocks would have been plentiful enough for the still prevalent inshore methods to suffice.

Food pounders

Burrows begins his discussion with a statement that food pounders like those of central-marginal Polynesia are not characteristic of Melanesia. Specimens available to him from Fiji, New Ireland, Vanuatu, and the Solomons differed in many ways. In eastern Micronesia, on the other hand, food pounders distinctly similar to those of central-marginal Polynesia were found to abound, and are documented by Burrows from the Gilberts, Kusae, Ponape, Ngatic, Pingelap, Nukuoro, Palau, and Yap (Burrows 1938:133-4).

As in the case of fish-hooks, the presumption is that most of the islands of western Polynesia at some time or other learned of the existence of such pounders in Micronesia or central-marginal Polynesia. Western Polynesians apparently rejected this artifact as not, for their purposes, worth the trouble of manufacture (Burrows 1938:134).

Tanged adzes

While correctly representing tanged adzes as characteristic of Eastern but not Western Polynesia, Burrows was possibly in error to represent them as shared

with Micronesia. On his own evidence they are a uniquely Eastern Polynesian adaptation of untanged adzes which are the form found everywhere else except, it would seem, for a few specimens found in Uvea, the Tokelaus, and Tuvalu which could have received them from Central Polynesia (Burrows 1938:106), but in the case of Tuvalu could perhaps also have obtained them from Kiribati if they were ever there.

Drums

If information concerning Oceanic drums had been as extensive at Burrows's time of writing as it is today, there is no doubt he would have reached different conclusions. He knew about the hourglass shape of Micronesian drums, but missed the obvious connection between these and the ubiquitous hourglass drums of New Guinea (Burrows 1938:96). He was correct to regard the Polynesian drum as limited aboriginally to Eastern Polynesia, as its presence in Western Polynesia is now known to have been post-European. In contrast with Micronesian drums, however, the drums of central Eastern Polynesia and most of Marginal Polynesia are of cylindrical form. Throughout Polynesia, as indicated in Table 5, Chapter 6, they are named *pahu*, from the Proto Polynesian word 'to thump', and are shown on distributional evidence to have originated in Eastern Polynesia. In New Zealand, which was the last area to be colonised by Polynesians, the drum is not present, and the term *pahu* is applied to a rudimentary form of slit gong, suggesting that the skin drum was not developed in the home area of Central/Marginal Polynesia until after the Maori left, ruling out any connection to Micronesia, if at all, until after this time.

Carved human figures

This is another ambivalent category. Burrows records carved human figures in Eastern Polynesia, but finds them absent in Fiji and Western Polynesia (except in Samoa and Tonga). They are found almost universally further west in ` , and are abundant in Melanesia, with examples in New Caledonia, central Vanuatu and the Banks Islands, the Solomons, New Britain, New Ireland, and New Guinea, with Lewis (1932) cited as the source of information for the latter area. Carved figures are by no means as frequent in Micronesia, with a "scattering" from the Gilberts, Kusae, Nukuoro, and the Carolines (Burrows 1938:135), to which may be added "some few carved figures" as house decorations and cult objects in Palau and the Marshall Islands as well as the Gilberts (Wingert 1946:28). A browse through photographs in a book by Buehler et al. (1962), however, amply confirms substantial presence of carved human figures in New Guinea, all the way from the Bird's Head in West Papua to the Bismarck Archipelago. Specifically, where language and locality details are both available, examples are found in map reference order as follows:

West Papua

035 Asmat. Ancestor figure; figures on ceremonial poles; canoe ornament human figures (Buehler et al.:102, 107, 110).

053 Biak. Korwar figures (ibid.:36).

083 Sentani. Wooden figures (ibid.:42).

Sepik

114 Maprik. Wooden cult figure (ibid.:87).

Madang

154 Awar, Hansa Bay. Wooden ancestral figure (ibid.:66).

Morobe

243 Umboi Is. Wooden cult figure; Male and female cult figures (ibid.:82, 98).

Massim

386 Kiriwina, Trobriand Is. Top of wooden dance staff (ibid.:88).

Bismarck

452 Mussau Island St Matthias group. Top of wooden dance staff (ibid.:111).

Admiralty Is

461 Bipi Is, Admiralty Is. Figures on wooden lime spatulas (ibid.:103).

From Morobe onwards, all entries are from Austronesian speakers, with both Austronesian and non-Austronesian groups represented further west.

Burrows had insufficient information to reach firm conclusions, but some may now be suggested. First there is doubt whether this art form came through Fiji and Western Polynesia, in which case it would not have been at the hands of Lapita potters, though this must remain a possibility. Second, it is plainly a predominately New Guinea and northern Melanesian complex, with a distribution in New Guinea taking the form of a trail along the entire north coast. As will be confirmed in Chapter 15, it cannot be without significance that this is the very route believed to have been taken by forebears of the Proto Oceanic language subgroup who ultimately gave rise to all the inhabitants of the area now called Remote Oceania. Moving progressively from Indonesia to West Papua, the Sepik, Madang, Morobe, Massim, and the Bismarck Archipelago to the Admiralties, these ancestors left their mark wherever they

went in the form of images that were also ancestral. Having reached the Bismarcks the tradition probably entered Micronesia from there at the same time as musical and other traits. In this event it could have been either an independent development in Eastern Polynesia or reached this area from Micronesia, flowering in its new environment because of the greater material resources there.

Nights of the moon

Not long before Burrows began work on his dissertation, his mentor Peter Buck, who was a co-supervisor of the dissertation, had published a monograph *Ethnology of Tongareva* (Buck 1932) in which there is a long discussion of Polynesian planting calendars, comparing names for days of the month in Tahiti, Hawai'i, and elsewhere in Polynesia. Not surprisingly, Burrows included 'nights of the moon' among the categories in his analysis, and it is fortunate that he did so. As Burrows explains:

"A rather close resemblance" is apparent between the systems of Ponape and Central Marginal Polynesia, "though it does not extend to the specific names."

The system is so like that of central-marginal Polynesia that independent invention seems unlikely. It might have been left on Ponape by some immigration into central-marginal Polynesia which did not leave the same device in western Polynesia. But since the series found in Ponape is more like the central-marginal Polynesian type than is the counting series of Ellice, Tokelau, Pukapuka, and Nukuoro, the most likely interpretation is that the Ponape system commemorates some early voyage from central-marginal Polynesia to Ponape (Burrows 1938:128-9).

Another such introduction would have been the *pahu* term for drum which, as indicated in Chapter 6 is shared with Eastern Polynesia by Ponape. And a still further such possibility, as suggested in Chapter 8, is introduction of the double canoe to the same area from Hawai'i, with both items perhaps coming at the same time, along with Nights of the moon, as suggested by existence of a different system for the latter in Tuvalu.

In summary, and contrary to the orthodox theory of Polynesian origins from Lapita potters who came through Melanesia, the latter area has contributed little to Polynesian ethnography, except as a result of what must be borrowing relationships long after the advent of the potters. Micronesia, by contrast, has had by far the greatest degree of contact with Eastern Polynesia, to the exclusion of Western Polynesia, indicative of a possibly two-way relationship on the one hand from Tahiti or Hawai'i to the Carolines, and on the other from the Carolines to Eastern Polynesia through Kiribati and Tuvalu.

It is a serious blow to the theory of Polynesian origins from Lapita potters that all of the traits shared between Micronesia and Eastern Polynesia are the classic traits usually thought of as quintessentially Polynesian, and have nothing to do with Lapita potters.

Chapter 11 Food plants

Peter Buck (Te Rangi Hiroa), who favoured a Micronesian path for Polynesian settlement, and cited ethnographic evidence in support of his theory, was unequivocal that an exception was required for introduction of the common food plants. These were mostly of Indo-Malayan origin, and dependent both on volcanic soils and humans for their propagation. Because of this, thought Buck, these plants must have been introduced by means of voyaging canoes but could not have followed an "atoll-studded route", and must therefore have come through Melanesia (Buck 1958:314-5).

Later writers have tended to follow Buck in this judgement, including Kirch and Green who take it for granted that it was Lapita potters following the Melanesian route who colonised Polynesia, bringing with them "a full roster of oceanic crops, including such staples as taro, yam, bananas, and breadfruit." (Kirch and Green 2001:121) As will be seen, however, when distributional evidence is taken into account, the matter is not as straightforward as it seems.

Besides mere presence of a cultivar in an area, its vernacular name and usage must also be considered as part of the evidence. Standard sources of such information include The University of Auckland Proto Polynesian Lexicon project (Pollex), and cognate tables of food plant terms from the ANU Proto Oceanic project (Ross 2008), together with extensive surveys of food plants by Barrau (1961), Whistler (1991), and other authors. Additionally, W. Arthur Whistler's book *Plants of the Canoe People* (2009) came to attention only after the present chapter was written, and is recommended for its detailed treatment of cultivated plants of Polynesia. All of these resources, however, depend upon published dictionaries and vocabularies for most of their linguistic information, and many of these dictionaries were not published until the 1960s or later. By this time there was potential for loss of vocabulary and changes of nomenclature from plant names as first recorded. Micronesia is especially problematic in this regard and there is a problem also of lack of attention to this area by writers who have assumed that it is irrelevant to the problem of Polynesian origins. By good fortune some of the gaps have been filled by an industrious and little known early contributor to the *Journal of the Polynesian Society*, Frederick William Christian (1867–1934). Described in an obituary (Anon 1934a) as an anthropologist and explorer, Christian was born in England, educated at Eton and at Balliol College, Oxford University, where he graduated with a BA. In later life he became a New Zealand resident, serving as City Librarian in Palmerston North for nine years, before retiring on grounds of ill health (Anon 1934b). He travelled extensively in the Pacific and was particularly interested in Micronesia, where he set himself the task of collecting plant names in the Caroline Islands at the relatively early date of 1896. Whatever one may think of some of Christian's comparisons, this is a treasure

trove of Micronesian terms themselves, collected sufficiently early in the contact period for this to be still possible.

Before considering individual food plants, some caveats are in order.

Difficulties of interpretation

In a comprehensive study of Polynesian plant introduction, Whistler (1991) enumerates over 70 species of plants he categorises as intentionally introduced by Polynesians. Of these a few, notably the bottle gourd and the sweet potato are judged to have been introduced from South America, a handful of others from Micronesia, and the remainder from Melanesia. As one might expect from the inter-regional distances involved, most of the latter appear to be confined to Western Polynesia, where they can reasonably be regarded as testament to the multiple opportunities there for contact between Melanesians and Polynesians during the several millennia that have elapsed since settlement of these areas began. Some of the introductions may date from Lapita times but there is no easy way to determine which or how many, even of those that have reached Eastern Polynesia if historically recent return contact between this area and Western Polynesia can be assumed. It is noticeable as well that a number of introductions to Eastern Polynesia are centred upon Tahiti or Hawai'i, which were hubs of maritime commerce after Europeans entered the Pacific. It would have been surprising if eighteenth and nineteenth-century Polynesian crew members of European vessels had not taken opportunity to transport useful plants back to their home territories, just as modern-day Polynesians did for quantities of Kentucky Fried Chicken in the 1970s, when this commodity first became available in New Zealand.

A similar pattern to the Polynesian one is true also of the Solomon Islands and Vanuatu where large numbers of workers were recruited in the nineteenth century to work on Australian plantations, and introduced new plant species to their home areas when they returned. Sweet potatoes and bananas are thus often found with vernacular names that are derivations of Sydney and Brisbane (Barrau 1958:64).

Barrau draws attention also to the activities of nineteenth century missionary societies, especially Samoan teachers of the London Missionary Society who introduced varieties of *Colocasia*, bananas, and breadfruit into Melanesia "all the way from Fiji to New Guinea." (Barrau loc.cit.)

A converse problem is that some plant species, such as coconuts, bananas, and, to lesser extent, breadfruit, were naturally occurring in many areas, and on this account would have been domesticated more than once.

The question of when and where specific plants may have been introduced into Polynesia involves comparison with both Melanesia and Micronesia, with

special attention to the Caroline Islands of Micronesia, and of Ponape (Pohnpei) in particular.

Finally, for the latter area, Bascom (1965) identifies numerous plant introductions as taking place in successive Spanish, German, Japanese and American colonial periods in Micronesia, thereby dating them and distinguishing them from those already present in pre-contact times. There are an astonishing number of them, serving as a salutary reminder that the same process has occurred elsewhere in Oceania, and the old must be winnowed from the new if conclusions are to be reached about plant distributions in the past.

In a nutshell, these problems are concerned mostly with the single issue of distinguishing borrowings from introductions that took place at times of first settlement. With luck, borrowings will leave evidence in the form of sound changes that linguists are highly skilled at uncovering. In many cases, however, borrowings display no such evidence of their own and are undetectable unless their history is already known or can be independently deduced.

Common food plants

The common Oceanic food plants are breadfruit, yam, taro, and sweet potato. As indicated by Buck, all -- including Polynesian breadfruit, which is mostly seedless (Ross 2008:281)-- are propagated by vegetative means and for this reason are dependant on humans both for transfer from one area to another and for their continued survival in the new locations. As such they are excellent markers of past movements of peoples.

BREADFRUIT

This is the plant that so impressed early visitors to Tahiti, helping to fuel European perceptions of a romantic tropical paradise, called New Cythera by Bougainville, where food was plentiful, life was easy, and bread literally grew on trees. A newsletter about Bougainville's voyage to Tahiti of 1766–1769, published ahead of the official account of the voyage, provides an idealised description of the place, including mention of breadfruit:

The fruit which serves as their bread is the size of a melon, weighing from two to ten pounds; it is red inside, and tastes very good; they knead it with water and make of it a dough which is as nourishing a substance as bread, and which can be kept fresh for five or six months (Hammond 1970:25).

The botanist Joseph Banks, who accompanied Cook on his voyage of discovery not long afterwards from 1768–1771 added his own gloss on the happy life of the Tahitians, claiming:

. . . scarcely can it be said that they earn their bread with the sweat of their brow when their cheifest sustenance Bread fruit is procurd with no more trouble than that of climbing a tree and pulling it down. Not that the trees grow here spontaneously but if a man should in the course of his life time plant 10 such trees, which if well done might take the labour of an hour or thereabouts, he would as compleatly fulfil his duty to his own as well as future generations as we natives of less temperate climates can do by toiling in the cold of winter to sew and in the heat of summer to reap the annual produce of our soil . . . (Beaglehole 1962:1, 341, cited by Oliver 1974:234)

Banks's view was to prove influential. Soon after his return to England he was promoting breadfruit as a possible cheap and easy way to feed slaves in the sugar plantations of Jamaica; Captain Bligh was commissioned by the Admiralty to bring breadfruit seedlings home from Tahiti; and the well-known mutiny of the *Bounty* of 1789 was an outcome.

Eventually a few seedless varieties of breadfruit were introduced from Polynesia to the Caribbean and gradually spread from there to other tropical regions (NTBG 2010). But the early reports of the breadfruit gave a false impression. Far from lasting for months, the fruit itself spoils rapidly after harvesting and must be eaten almost immediately unless means are taken to preserve it. The method of preparing the dough referred to in the New Cythera report is to bury the fresh fruit in a leaf-lined pit and leave it for months or years to ferment and mature in a process akin to ripening cheese. The result, called mahi in Tahiti and more generally ma, is extracted as required and, in a highly labour-intensive sequence of steps, is processed into paste for eating. Along with fresh breadfruit in season it was a primary carbohydrate foodstuff in the Society Islands as well as the Marquesas and Gambier Islands in Marginal Eastern Polynesia (Ragone 1991:210).

Its importance in the daily diet elsewhere in Polynesia varied with the availability of bananas, plantains, sweet potatoes, taro, and yams. Both forms of breadfruit are good sources of many essential dietary nutrients, but fermented breadfruit provides more carbohydrates, fat, protein, calcium, iron, and B vitamins than fresh fruit. Ma was never eaten directly from the pit. It was processed into a form known as popoi in the Marquesas and Society islands. Ma was taken from the pit and placed in a wooden bowl or a trough made from a hollowed log. It was kneaded or pounded and water mixed in as needed; the older the ma, the longer it took to knead it into a soft, doughy mass. It was made into small cakes, wrapped in breadfruit leaves, and cooked in an earth oven. . . After cooking, it was again put in a trough, water added, and it was beaten to the desired consistency with a stone or wooden pounder. It was eaten

warm or after it had cooled, and formed the basis of many dishes. (loc. cit.).

One wild and two main cultivated species of breadfruit are distinguished in Oceania:

The wild ancestor of breadfruit, *Artocarpus camansi* (breadnut) naturally occurs in New Guinea, the Moluccas (Indonesia), and possibly the Philippines (NTBG 2010).

The two cultivated species are as follows;

1. *Artocarpus altilis*

The breadfruit tree is indigenous to southeast Asia, but was aboriginally introduced eastward to Hawaii. Many different varieties are cultivated on the high islands and atolls of Polynesia, particularly in the Marquesas. Most of these lack seeds, and trees found in forests are mostly relicts of former cultivation. Although cultivated primarily for its large, seasonal, edible fruit, its wood is also highly esteemed for making canoes and houses.

Most of the Polynesian names for breadfruit are cognates of *kuru*, which itself is a cognate of the Malayan name for the tree, *kulur* (Whistler 1991:55).

2. *Artocarpus mariannensis* Trec

This species of breadfruit is native to the limestone forests of Guam and elsewhere in Micronesia, but was aboriginally introduced over much of Micronesia. In Polynesia, it is reported only from Tuvalu and Tokelau, apparently introduced from the former to the latter, judging by its Tokelauan name ('elihe, meaning Ellice Islands, the former name of Tuvalu).³ It may have been an aboriginal introduction to Polynesia, but this may never be known (Whistler 1991:55, 65).

More detailed information on this species is as follows:

This wild seeded relative of breadfruit (*Artocarpus altilis*) is native to Palau and the Mariana Islands. It naturally grows in limestone and ravine forests from coastal to lower mountain slopes. It prefers calcareous soils and is often found growing on boulders in volcanic areas of the islands. It is distributed through its natural range by fruit

³ Both terms are glossed in the Tokelau dictionary as *ulu*, and as varieties of *Artocarpus altilis*, but with qualifying terms of 'Elihe' and 'Samoa', signifying introduction from Tuvalu and Samoa respectively (Office of Tokelau Affairs 1986:45).

bats. Wild populations are seriously declining due to typhoon damage, predation by feral deer, and the disappearance of fruit bats. *Artocarpus mariannensis* is widely cultivated for its edible fruit and seeds throughout Micronesia (Palau, Mariana Islands, Federated States of Micronesia, Kiribati, Republic of the Marshall Islands, Tokelau, Tuvalu, Nauru, and Banaba Island). It grows primarily in coastal areas and on atolls. It has naturally hybridized with *Artocarpus altilis* and the numerous interspecific hybrid varieties are considered to be ‘breadfruit’, whether they are seeded or seedless (NTBG 2010).

Pollex files record two different Polynesian names for breadfruit, one common throughout Polynesia and the other, as will be seen, shared with Micronesia. It might be assumed that the former would be *altilis* and the latter *mariannensis*. But both are identified as *Artocarpus altilis* in Pollex, and this is confirmed by consulting the relevant dictionaries. Displayed side by side the two terms are seen to be mutually exclusive. An initial q as in qullu signifies a glottal stop:

Comparison of breadfruit terms

Kuru	Mei
	<p>ANU Mei. Breadfruit (<i>Artocarpus altilis</i>) (Yen)</p> <p>ECE Mei. Breadfruit (<i>Artocarpus altilis</i>) (Rby).</p> <p>ECE Mai. The breadfruit tree (Nks).</p> <p>EFU Mei. Breadfruit (<i>Artocarpus altilis</i>)</p> <p>EUV Mei. Breadfruit (<i>Artocarpus altilis</i>)</p>
FIJ Kulu. Breadfruit (Serua, Nadroga and Colo West) (Palmer)	
HAW qulu. Breadfruit	
KAP Gulu. Breadfruit tree, <i>artocarpus altilis</i> (Lbr)	
MAE Kuro: Breadfruit variety (Clk)	MAE Mei. Breadfruit (<i>Artocarpus altilis</i>) (Clk)
MAO Kuru: Mentioned as edible, tree-borne fruit in tradition	
	MQA Mei. Breadfruit (<i>Artocarpus altilis</i>)
MFA Kuru. Breadfruit	
MIA Kuru. Breadfruit tree (Chn)	
MQA Kuqu/vahake: Esp. d'arbre à pain (Dln)	
MQA Kuqu/vahane: Esp. d'arbre à	

<p>pain (Dln) MQA Kuqu/hua: Yellow (Bgs) MVA Kuru: Fruit à pain de petite espèce (Jnu) MVA Kuru/oe. Pâte de fruits à pain avortés qui n'est cependant pas très mauvaise (Jnu) MVA Kuru/tara. Nom des fruits à pain qui ont la peau rugeuse (Jnu)</p> <p>NKR Gulu. Breadfruit OJA qulu. Breadfruit PEN Kuru. Breadfruit RAR Kuru. Breadfruit</p> <p>ROT qulu. Breadfruit SAM qulu. Breadfruit SIK Kulu. Breadfruit TAH quru. Breadfruit TAK Kuru. Breadfruit (Hwd)</p> <p>TON Kulu. Kind of tree</p> <p>TUA Kuru. Breadfruit WFU Kuru. Breadfruit</p>	<p>MVA Mei. Breadfruit (Artocarpus altilis)</p> <p>NFU Mei. Breadfruit (Dye) NIU Mei. Breadfruit (Artocarpus altilis) B.></p> <p>REN Mei. Breadfruit, (Artocarpus altilis) (Ebt)</p> <p>TIK Mei. Breadfruit (Artocarpus altilis) (Fth) TON Mei. Breadfruit (Artocarpus altilis)</p>
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As one might expect from its SE Asian origin, *A. altilis* is not limited to Polynesia, but occurs also in Melanesia. Ross (2008:282) indicates that by far the most frequently reflected term for it is POC *kuluR (column 1 above), inherited from PMP, with reflexes in the Admiralties and Mussau, North New Guinea, Papuan Tip, Bali-Vitu (MM), the Willaumez group (MM), New Caledonia and Central Pacific. It is apparently also reflected in the Chuukic subgroup of Micronesian with a change in denotation to *Barringtonia asiatica*.

In Micronesia the dominant term for breadfruit is *mei* (as in column 2 above). Christian documents it everywhere in the Carolines:

Eastern Carolines—Ponape, Mokil, Pingelap, Ngatik—*māi*. Central and Western Carolines—Mortlock Islands, Ruk (Hogolen)—*mei*; Lamotrek, Ifalik, Satawal, and Uluthi, *mai*; Pulawat *mais*; Sonsorol and St. David's *mai*; Uleai *moai, mai* (Christian 1897:129).

It is also termed mei in Kiribati and the Marshall Islands, and the following are terms applied specifically to *Artocarpus mariannensis* (NTBG 2010), most taking the form of the mei term, followed by a qualifier.

- * chebiei, ebiei, meduuliou, mai (Palau)
- * dugdug, dokdok (Mariana Islands)
- * maiyah (Puluwat, Yap)
- * mei chocho (Chuuk)
- * mei kole (Pohnpei)
- * mejwaan (Marshall Islands)
- * mos en Kosrae (Kosrae)
- * te mai (Kiribati)

In the Mariana Islands area of origin of the wild *mariannensis* species it can be seen that the term for it is neither kuru nor mei but changes to the latter elsewhere in Micronesia. The simple explanation is that the originating area has its own terms for the species, and elsewhere in Micronesia the mei term is the commonly used one for all forms of breadfruit, whether *mariannensis* or *altilis*. As a species, *mariannensis* is probably more widespread because of its suitability for atoll environments. But on the high island of Ponape, for example, both *mariannensis* and *altilis* are present. Bascom (1965:98) identified 78 native species of breadfruit on Ponape, all of which except seeded varieties were *A. altilis*.

The information above is all reconcilable once it is realised that the two Micronesian species of breadfruit were of different origin but were called by the same name, mei, in Eastern Micronesia. *A. mariannensis* originated in Western Micronesia, spreading from there into the mostly atoll areas of Eastern Micronesia, but reaching Polynesia, only relatively recently, most likely from Kiribati through Tuvalu, and penetrating no further than Tokelau where it now exists side by side with *A. altilis*. Introduction of *altilis* into Micronesia, on the other hand was most likely from the Bismarck Archipelago into Ponape, and from there as mei into the areas of Western Polynesia where this term remains extant. Most likely this took place via Kiribati, Tuvalu, and E. Uvea before the western *mariannensis* form of breadfruit had begun to hybridise with *altilis*. Meanwhile, the same species filtered through Island Melanesia, migrating from there into the areas with kuru as the breadfruit term. The timing of these moves is a matter for speculation but linguistic evidence provides some clues.

The kuru term is of POc provenience, is present in Samoa and except for absence in Tonga would be PPn. Mei is the Micronesian term and limited largely to Western Polynesia, including the Outliers. It is of Austronesian provenience and so perhaps an even older term than kuru. Certainly the presence of two widely distributed terms for the same highly valued essential foodstuff suggests two separate migrations of peoples.

In summary, it is clear that *A. altilis* reached Polynesia through Island Melanesia, though possibly not early enough to qualify as PPn, and another stream of the same species came through Micronesia. But this is not the only evidence of a connection. The method of pit fermentation for preserving breadfruit was not only employed in both Polynesia and Micronesia but in Ponape, Pingelap, and Mokil goes by the same name, *ma* (Bascom 1965:100). In Polynesia the term is unquestionably old, appearing as PPn **ma* 'fermented food' with reflexes as far afield as New Zealand Maori in its broader sense, and more specifically as the term for pit breadfruit in areas of both Western and Eastern Polynesia where breadfruit is grown (Pollex). In Melanesia, pit breadfruit and the *ma* term are reported for Tanna, Vanuatu (Christian (1897:129), but could be a borrowing there from Polynesia.

TARO AND OTHER AROIDS

Three main cultivated species are recognised in Oceania. A fourth, *Amorphophallus paeoniifolius* Nicolson, not considered below, may once have been grown as a supplemental crop but was probably never more than a famine food (Whistler 1991:58).

1. *Colocasia esculenta*, True taro

Taro is native to southeast Asia, but was aboriginally introduced as far east as Hawaii. The plant rarely flowers in Polynesia, and is thus mostly restricted to cultivated areas, usually in running water where it thrives. Numerous varieties were recognized in each island group, with perhaps the greatest number in Hawaii. Taro is the most esteemed of the four aroids grown by Polynesians, but its growth requirements preclude its cultivation on most atolls. In addition to its edible tuber, the leaves, which must be thoroughly cooked, are eaten like spinach throughout its Polynesian range (Whistler loc.cit.).

This is the most important of the aroids, lending its name, taro, as a general term for other species listed below which resemble it. Ross 2008:266-7 has an extensive table of Melanesian cognates for taro, with the term reconstructed to PMP and POc. Cognates are provided for NNG, PT, MM, SES, NCV, SV, and Fij, together with Pn Samoan and Tongan. Pollex extends the distribution through the rest of Western Polynesia into Eastern Polynesia with reconstruction to PPn, and PAN **talo* cited as the highest order subgroup. The presence of the plant and the coincidence of name in both Polynesia and Island Melanesia convincingly suggests introduction into Polynesia from the latter area, and the same has been shown by a recent study of plant remains from Fiji.

Starch residue, pollen and phytolith analysis was carried out on coralline deposits from a c. 3050–2500 cal. yr BP Lapita site at Bourewa, Viti

Levu, Fiji. Starch grains, calcium oxalate crystals and xylem cells of introduced *Colocasia esculenta* and *Dioscorea esculenta* were identified, involving a process of elimination of possible taxa by cross-correlation of microfossil types. The data provide an eastward extension of direct evidence of Lapita horticulture in Remote Oceania previously identified in Vanuatu (Horrocks and Nunn 2007:Abstract).

True taro is nevertheless also extensively present in Micronesia, albeit known by terms which appear unrelated to its common name in Polynesia and Melanesia, suggesting either a long history of change or a diverse history of introduction. Barrau provides the following:

The Micronesian names are, for the Marshalls, kotak; for Pingelap to Ponape, saws; for Truk, ot, oni, and ori; for Ulithi, ioth; for Yap, mal ; for Palau, kukau; and for the Marianas, aba and gabi (Barrau 1961:39),

to which may be added taororororo for Kiribati (Thamon 1987:15).

Despite unsuitability of *Colocasia esculenta* for atoll environments because of intolerance to saline or shallow soils, Micronesians have devised ways to grow the plant in such conditions, doing so by means of pits within which richer soils can be built up by composting and careful husbandry. Manner (1993:93) lists over 40 atolls scattered across the length and breadth of Micronesia where rainfall is sufficient for growth of the plant, and upon which *esculenta* is currently cultivated. Though probably unexploited in Lapita times, there could have been potential even then for carrying the plant still further afield, intersecting with areas within which the plant may already have been established.

2. *Alocasia macrorrhiza*, Giant taro or Dryland taro

The giant taro is probably indigenous to tropical Asia, but was aboriginally introduced as far east as Hawaii. The plant, which does not require wet soil as taro usually does, is cultivated for its large aroid rhizome, but is usually considered inferior in taste to taro (Whistler 1991:51).

In Polynesia the most common name for the dryland taro is kape with cognates throughout both Western and Eastern Polynesia, and the term is reconstructed to PPn from the following areas (Pollex):

ANU, EAS, HAW, MAE, MFA, MQA, MVA, NIU, OJA, PUK, RAR, REN, ROT, SAM, SIK, TAH, TIK, TON, TUA, WFU, WEV.

The Giant taro is also known as kape in EFU (Burrows 1936:131; Rensch and Whistler 2009:621) and EUV (Burrows 1937:94). In a number of places,

however, the name for it is different. In Tuvalu and Tokelau it is termed tamu (Rensch and Whistler 2009:504), but this may be a recent name for it. Charles Hedley, who conducted field work on the atoll of Funafuti in 1896 names it as Brokka (Hedley 1896:61) (perhaps cognate with Palau brak for swamp taro, see later), and still other names are recorded in the Outliers for Kapingamarangi, Nukuoro, and Mele Fila (Rensch and Whistler 2009:621). Ross (2008:272) has a different set of cognates for Melanesia, reconstructed to POc *piRaq, with reflexes in Adm, PT, MM, SES, NCV, SV, NCal, and Fij, most commonly in Vanuatu, where the most frequent term is via.

In a list of terms provided by Barrau, Micronesia also stands alone, except in Truk where the term kap is cognate with Polynesia, and is the same as for the Common yam in the adjacent island of Ponape (see later):

The Micronesian names are, for the Marshalls, wot; for Ponape, oht; for Truk, ka; for Ulithi, fole; for Yap, lai; for Palau, bisech; and for the Marianas, pigs (Barrau 1961:39).

From Truk, the trail extends eastward to Kiribati where the giant taro is called kabe (Thamon 1987:7).

The plant has some advantages, especially in drier atoll environments. It grows without need of irrigation: the edible rhizome keeps for months after reaching maturity, and can grow to two or more metres in length, hence the name of Giant taro. But there are drawbacks as well. The plant is coarse in texture and, worse still, contains oxalate crystals that irritate the mucus membranes of the mouth and have to be removed by prolonged preparation and cooking. For these reasons it has only secondary significance in most areas. In Tahiti, for example, it was eaten only when more favoured foods were in short supply (Oliver 1974:249). Though widespread in Melanesia, it was seldom cultivated in gardens (Ross 2008:271). And in the Micronesian island of Ponape, though reported as grown by every family in the 1950s, it was consumed only in the period between the yam and breadfruit harvests (Bascom (1965:105).

3. *Cyrtosperma chamissonis* or *merkusii*, Swamp taro, also known as Elephant's Ear.

This giant aroid is probably indigenous to New Guinea or elsewhere in Melanesia, but was aboriginally introduced to Micronesia and Polynesia as far east, perhaps, as the Cook Islands. It is less esteemed as a root crop than taro or kape, but unlike these two, thrives on atolls in standing brackish water, in pits excavated in the sandy soil. Its aboriginal range is thought to include Tuvalu, Tokelau, and the northern Cooks, and its introduction east of there is thought to be modern. It was first noted from Tonga in Rabone's vocabulary list (1845). The apparent later introduction into French Polynesia is supported by the common names

there, which are unrelated to the Polynesian cognates of *puraka*, *pulaka*, and *pula'a*. Its aboriginal introduction to Polynesia from the atolls of Micronesia rather than through the high island route of Melanesia is suggested by its Trukese name *pura* (Barrau 1961), probably a cognate of the Polynesian names (Whistler 1991:58-9).

Barrau's *puru* term for Truk looks isolated among quite different terms elsewhere in Micronesia:

Native names in Micronesia are, for the Gilberts, *to babai*; for the Marshalls, *iaraj**: for Pingelap to Ponape, *tnuang* and *mwang*; for Truk, *pupa* and *pura* ; for Ulithi, *lok*; for Palau, *brak*; and for the Marianas, *baba* (Barrau 1961:39).

Christian (1897:127), however, reports it all over the Central Carolines as "*pulak*, *bulak*, *burak*, and *burok*, and in Pelews *p'rak*," extending also to the Solomon Islands "(p to k) as *kuraka*."

In Ponape, which may be regarded as Representative of the Carolines, Bascom (1965:104) recorded 29 species of *Cyrtosperma* of which 21 were said to date from the pre-European period. All were planted in wet places such as fresh-water marshes or muddy stream beds, and were used primarily during lean periods when breadfruit and yams were not available.

Whistler's suggestion that the plant reached Polynesia from Micronesia is supported by the evidence from Melanesia where Ross affirms a late introduction "probably from Micronesia " (Ross 2008:292). A cognate set provided by Ross for Melanesia is accompanied by complex linguistic arguments. It lists reflexes of Ponapeic **p'ulaka* 'swamp taro in Adm, MM and elsewhere, including entries for Micronesian Marshallese, Mortlockese, Chuukese, Puluwatese, Satawolese, Carolinian, Woleeain, followed by terms from Western Polynesia and the Polynesian Outliers (Ross 2008:270-1).

With the above measure of agreement that the swamp taro was introduced into Polynesia from Micronesia, it is worth citing the entire Pollex set of cognates:

ANU *Pulaka*. (*Cyrtosperma chamissonis*) (Yen)
ECE *Pulaka*. (*Cyrtosperma chamissonis*) (Rby)
EFU *Pulaka*. (*Cyrtosperma* sp.; plant sp)
EFU *Pulaka*. (*Cyrtosperma* sp.)
EUV *Pulaka*. (*Cyrtosperma* sp.)
KAP *Bulaga*. (*Cyrtosperma chamissonis*) (Lbr)
NKR *Bulaga*. (*Cyrtosperma chamissonis*) (Stn)
PUK *Pulaka*. (*Cyrtosperma merkusii*) (Bge)
RAR *Puraka*. Coarse kind of taro (Etn) (Sve)
SAM *Pula'a*. (*Cyrtosperma* sp. (Mnr)

SIK Ka/pulaka. A vegetable bigger than taro (Sps)
TAK Puraka. (*Cyrtosperma chamissonis*) (Hwd)
TIK Pulaka. (*Cyrtosperma chamissonis*) (Fth)
WOL Pulag. (*Cyrtosperma chamissonis*) (Shn)

To these may be added NUK puraka, TOK pulaka, and TUA puraka (Rensch and Whistler 2009:445, 450).

Except for Rarotonga and the Tuamotus, this cognate set does not contain terms for Eastern Polynesia. Unless these turn up elsewhere this, together with absence in Tonga and Niue, indicates that the term is not PPn and must have been introduced after settlement of Eastern Polynesia. It was probably introduced to Rarotonga from Pukapuka, but no explanation can be offered for the Tuamotus. Appearance in Tuvalu, E. Uvea, E. Futuna, Samoa, and most of the Outliers follows a path, as will be seen, which is shared by other introductions from Micronesia.

YAM

Five main species of yam are recognised in Oceania:

1. *Dioscorea alata*, Greater or Common Yam

The common yam is widespread in cultivation from tropical Africa to Hawaii, and was aboriginally introduced throughout Polynesia where numerous varieties are recognized. It is cultivated for its large edible tubers, and is the most common yam species in the region. All the Polynesian names are cognates of the Malayan name for the plant, ubi (Whistler 1991:59).

Ross (2008:260-1) provides a table from PMP *qubi 'yam' (Dempwolff 1938) and POc *qupi 'greater yam, *Dioscorea alata*; yam (generic)', with cognates in areas Adm, NNG, PT, MM, TM, SES, NCV, SV, NCal, Fij, and Pn Tongan and Samoan.

Barrau supplies vernacular names for Polynesia and Micronesia as follows:

The native names of *Dioscorea alata* L. in Polynesia are ufi, uhi, and pahui. The native names in Micronesia are, from Pingelap to Ponape, kep or kap; for Yap, duok; for the Palaus telngot; and for the Marianas, dago (Barrau 1961:44-5).

Pollex lists Polynesian cognates of ufi, uhi uvi or near equivalent, for 30 Polynesian languages, mostly in Western Polynesia and the Outliers, but extending also as far afield as Hawai'i, Mangareva, and NZ Maori in Eastern Polynesia. In view of this, coupled with the disparity of terms in Micronesia

and the similarity of those in Island Melanesia, this species of yam is likely to have entered Polynesia from the latter area.

2. *Dioscorea esculenta*, Lesser, Prickly, or Sweet Yam

Also known as *Dioscorea aculeata*, Sweet Yam

The lesser yam is probably indigenous to tropical Asia, but was aboriginally introduced as far east as western Polynesia, and more recently to Eastern Polynesia. It is cultivated for its small, edible tubers, but is not grown as frequently as the common yam, *D. alata* (Whistler 1991:59).

Barrau provides vernacular names as follows:

The Polynesian names of *D. esculents* (Loureiro) Burkill are (a) ufi lei in the Samoan group and (b) ufi lei and ofa lei farther eastward. Native Micronesian names are, for Ponape, kap-tek-tek(?) ; for Yap, dai; and for the Marianas, nika (Barrau 1961:45).

For Ponape, however, Christian (1897:126), who gathered his terms in 1896, reports the sweet yam more fully as kape-lai, similar to Samoan ufi-lei).

Pollex extends the distribution of related terms to ANU, EFU, EUV, SAM and TON in Western Polynesia but, significantly, nowhere in Eastern Polynesia.

Additionally, Rensch and Whistler (2009:693) register the plant under a variety of names in NIU, RAR, REN, TAH, TIK, TUA, and WUV.

Ross (2008:263-4) has an unrelated term of *kamisa 'lesser yam' for NNG, and MM but is unable to reconstruct it to POc. He speculates that perhaps it was not domesticated until after the breakup of POc.

If cognates do not turn up in southern Island Melanesia, it would seem possible that this was a Micronesian species initially, and was introduced from there both to Polynesia under its Micronesian name and to NW Melanesia under a different name. In this case the Greater yam would be Melanesian and the lesser yam Micronesian. In view of apparent late introduction into Polynesia, it is a surprise to find this species reported as present in Lapita-era archaeological deposits in Fiji (Horrocks and Nunn 2007:Abstract).

3. *Dioscorea bulbifera*, Potato or Bitter Yam

The bitter yam is distributed from tropical Africa to Hawaii, but was an aboriginal introduction throughout Polynesia. The tuber is edible, but because it is acrid and poisonous, much effort is required in its preparation. Consequently, it was mostly a famine food and rarely if

ever cultivated, but is now naturalized in disturbed and undisturbed habitats (Whistler 1991:59).

Barrau notes:

The native names of *D. bulbifera* L. in Polynesia are hoi, soi, and oi. Native names in Micronesia are, for Ponape, palai; for Truk, apuereka; for Yap, rok and yoi; and for Palau, belloi (Barrau 1961:45).

Pollex reconstructs the term to PPN *Soi:A wild yam (*Dioscorea bulbifera*), with cognates in 15 areas ranging from Anuta to Samoa and Tonga in Western Polynesia and the Outliers to Central and Marginal Polynesia in the east as follows: ANU, EFU, EUV, HAW, MAE, MQA, MVA, NIU, RAR, REN, SAM, TAH, TIK, TON, TUA, to which may be added a further Outlier WUV (Rensch and Whistler 2009:692).

Barrau's yoi and belloi terms for Yap and Palau have the appearance of being possibly cognate with Polynesian.

In Melanesia, Ross (2008:262-3) has a cognate set for this species with an entirely different term, POc *p"atika 'potato yam, aerial yam, *Dioscorea bulbifera*' with cognates in Adm, MM, SES, SV, and perhaps including Mic: Chuukese pereka '*Dioscorea bulbifera*'.

Evidence for the direction of introduction is inconclusive but Micronesia could have been the area of origin for both Melanesia and Polynesia, this time out of Western Micronesia which would have received it from Indonesia or the Philippines.

4. *Dioscorea nummularia*, Spiny Yam

This spiny yam is probably indigenous to southeast Asia, but was aboriginally introduced eastward to Fiji and perhaps Polynesia. *Dioscorea nummularia* may have been introduced to much of Polynesia in the nineteenth century, possibly by missionaries (Whistler 1991:59).

Massal and Barrau (1980:12) describe this species as present almost everywhere in the South Pacific from New Guinea to the eastern end of Polynesia and to Western Micronesia.

Barrau states:

The native names of *D. nummularia* Lamarck in Polynesia are, for the Society Islands and some of the Cook Islands, pirita; for Samoa and some of the Cook Islands, ufi parai, uhi parai, and ufi palai; and for the Marquesas, pahui peahi. It would appear that certain yams found at Yap

and Ponape in Micronesia can be classified within this species (Barrau 1961:45).

The latter part of Barrau's statement is borne out by Christian (1899: 334) who records the term palai in the Caroline Islands as the name of a yam variety.

Ross (2008:258) was unable to find a term for *D. nummularia*, but it is, in fact, present in Pollex, where it matches Christian's Micronesian term, reconstructed to PPN *Palai 'a yam' (*Dioscorea nummularia*) in a small cognate set of EFU, EUV, NIU, RAR, REN, SAM, TAH, and TON, all except Tahiti and Rarotonga in Western Polynesia.

Despite the possibility of nineteenth century introductions to Polynesia by missionaries, the Pollex reconstruction to PPn, coupled with presence of the Polynesian term in the Caroline Islands, is indicative of connection between these two areas.

5. *Dioscorea pentaphylla*, Five-leaved or Five-fingered Yam

The five-leaved yam is probably indigenous to tropical Asia, but was aboriginally introduced as far east as Hawaii. It is sometimes cultivated for its edible tuber, but is more of a famine food that grows semi-naturalized in disturbed areas (Whistler 1991:60).

Barrau reports *D. pentaphylla* as follows:

The Polynesian names of *D. pentaphylla* L. are, for the Marquesas, utau; for the Societies, parauara; for the Cook Islands to Samoa, pirita; and for some of the Cook Islands, pakatiro. The yam known as duol on Yap may belong to this species or to the closely related species *D. cumingii* (Barrau 1961:45).

A combination of listings from Pollex and Rensch and Whistler (2009:693) yields the following distributions:

Set 1

For the pirita term above PPN *pilita a yam in NIU, RAR, SAM, TAH, and TUA.

Set 2

Varients of the term 'lena' which more generally is applied to turmeric (q.v.): EFU, EUV, SAM, TON

Additionally, there are terms unrelated to the above in HAW, MQA, MEL, and REN.

In Melanesia, *D. pentaphylla* is not among species for which Ross (2008) was able to provide a reconstructed term.

There is insufficient information on *D. pentaphylla* to judge the direction of introduction into Polynesia. Presence of the plant as a wild species in many areas, coupled with the spotty distribution, suggests that this is an old species that has fallen progressively out of use.

In summary:

- The Greater yam (*Dioscorea alata*) is of probable Melanesian origin.
- The Lesser yam (*Dioscorea esculenta*) is of possible Micronesian origin and introduced from there both to Polynesia and Melanesia under different names.
- The Potato yam (*Dioscorea bulbifera*) is another possible introduction to both Polynesia and Melanesia from Micronesia.
- The Spiny yam (*Dioscorea nummularia*) is thought to be of late provenience in parts of Polynesia. It is present in Western Micronesia, and probably came from there.
- The Five-leaved yam (*Dioscorea pentaphylla*) is widely distributed in Polynesia but its direction of introduction is uncertain.

Of the five species, only the Greater or Common yam is of unequivocal Melanesian origin.

Region by region there are some noticeable differences in the pattern of yam use and cultivation:

Bellwood (1978a:136) observes that yams are today important mainly in Melanesia and are of less significance in Micronesia and Polynesia, and this indeed seems to be the case.

Melanesia

The most widespread yam in Melanesia, and, as has been seen, quite possibly the only one with a clear claim to have reached Polynesia from this area, is *Dioscorea alata*, the Greater or Common Yam. In Melanesia, however, it assumes distinctive extra-culinary status as a component of the well-known "big man" complex and efforts by individuals to gain renown by conspicuous consumption or display. It is this form of yam that is seen to be ceremonially significant in Melanesia, and a source of prestige for the grower (Ross 2008:258). In part this behaviour can be seen as a product of the growing requirements and storage capabilities of the tuber itself. The plant requires rich

well-drained soil which is present in abundance on the high islands of Melanesia and absent in atoll environments: it crops prolifically and tubers can grow to enormous size; and finally, unlike taro, it keeps well in storage. Because of these characteristics it can be grown in excess of food requirements and, like money, in our own economy becomes available in effect as a collectable product.

Micronesia

Barrau comments on difficulties he encountered in Ponape as a result of the mystery with which men surrounded the yam crop:

For them, yams possess a certain ritual value ; and they are reluctant to take an outsider into their yam gardens, which are usually hidden in the forest, or to supply any information on cultivation methods or the species and varieties grown (Barrau 1961:45).

Bascom reveals this behaviour to be the product of what he calls the "prestige economy", which is similar in this regard to the Melanesian "big man" complex but differs in other ways.

In Ponape a man rises in status through successful participation in prestige competitions. These take the form of giving feasts in honour of chiefs and by contributing large yams and quantities of pit breadfruit to feast given by others.

Each Section chief watches to see which men consistently bring the largest yams and chooses them to fill Section titles which are vacant or, if they already have a title, promotes them to higher rank (Bascom 1970:88).

An obvious point of difference from Melanesian big man behaviour is the role played by chiefs. Another is that a man is not allowed to show open pleasure in success but must display appropriate humility.

He must not act proudly or boast openly about his achievement. When others discuss the merits of his yam, he pretends not to listen. When they come up to tell him that his yam is the largest, he protests that it really isn't.

Finally, as Barrau found out, it pays a man to keep quiet about yams, kava plants, or pit breadfruit he has in his possession or is keeping in reserve for future occasions.

Information of this kind is concealed in the hopes that the element of surprise may enable the owner to surpass his neighbors at future feasts (Bascom 1970:89).

Polynesia

Barrau observes that in Polynesia yams are of real importance only in westernmost areas such as Tonga and Uvea (Wallis). Elsewhere in Polynesia

from the Samoan islands to the Australs and from the Society Islands to the Marquesas, the staple food-plants are, or were, taros, bananas, and breadfruit (Barrau (1961:19).

This has the appearance of a gradient, with a peak in Melanesia and a diminishing significance after transfer into Micronesia and Polynesia.

- In Tonga, yams featured in obligatory first fruit and other tribute to chiefs and the Tui Tonga (Gifford 1929:103), but evidently no more so than other foodstuffs.
- For Samoa, Mead (1961:287-8) names the primary food plants as taro, bananas, yams, sweet potato, and breadfruit, but yams are simply one food plant here among others.
- Finally, from early observations in Tahiti, Oliver (1974:251) notes yams, (*Dioscorea alata*: uhi), as occasionally cultivated but more generally collected from wild plants only when the common staple, breadfruit, was scarce.

It is something of a puzzle to understand the wide distribution of all five species of yam in Polynesia, each with its own term or terms as revealed in Pollex. An answer may be that as a foodstuff notable for its keeping quality, it could have been favoured as a food supply on long-distance canoe voyages, but happily abandoned in favour of more palatable alternatives after arrival and thenceforth retained only as a famine food.

SWEET POTATO

Controversy has surrounded the subject of the sweet potato (*Ipomoea batatas*) in the Pacific, not least because of claims by Thor Heyerdahl that it was introduced by South American Indians, and later when a theory of African origin was also floated. Consensus nowadays, largely because of comprehensive studies by Douglas Yen (1974), supports introduction from South America by means of a return Polynesian voyage. Crucial also to the several arguments is distributional evidence from Melanesia and Micronesia, and the direction of contact in these areas.

Parameters for the debate were set very early by the American anthropologist Roland B. Dixon in a 1932 paper. Having rejected post-Columbian introduction by Spaniards, Dixon suggested the sweet potato in the Pacific must have been

due either to Polynesian voyagers who, reaching American shores, brought back the plant with them on their return to their homeland, or to Peruvian or other American Indians who sailed westward and carried the sweet potato with them to Polynesia . . . (Dixon 1932:59 cited by Howard 1967:70).

In his book *Vikings of the Sunrise* (1958:321-3) Peter Buck (Te Rangi Hiroa) puts the case for the first of these alternatives, doing so partly with reference to Dixon. In summary:

1. According to traditional history, the sweet potato was in Hawai'i by A.D. 1250 and in New Zealand by A.D. 1350 at the latest, showing that it had reached central Eastern Polynesia before the settlement of these two places.
2. The Peruvian coast of South America is specified as a point of origin because the common name for sweet potato in Polynesia is kumara, and the name for the same plant in the Kechua dialect of north Peru is kumar.
3. There is no evidence that the Indians of the Peruvian coast had either the craft or the skills for long sea voyages.
4. We are forced to conclude that transfer of the plant was made by Polynesians who reached the Peruvian coast and took the plant back with them to Polynesia at some time before the 13th century.

Buck goes on to consider possible points of departure and return for this journey:

5. No expedition could have been inaugurated from Easter Island, because of lack of timbers with which to build a suitable canoe. Also, a voyage from there would most likely have reached the American coast only south of the area where kumara grew.
6. The nearest islands to South America from which a vessel might have set out are Mangareva and the Marquesas.
7. An expedition from Mangareva would most likely have encountered Easter Island and gone no further.
8. There is uninterrupted ocean between south America and the Marquesas Islands which therefore emerge as the most likely starting point.

Buck calculates that such a journey would have taken about three weeks, which would not have been beyond the range of a Polynesian canoe. On arrival the voyagers would have found themselves among a strange people, and would not have been tempted to stay for long.

Of material things the Polynesians may have passed on the seeds of the gourd, and they certainly received the sweet potato. The Polynesian commander refitted and provisioned his ship. He laid aboard a supply of the new tubers, and, when the winds were favourable, he sailed for his homeland in the west. (Buck 1958:324).

A little under a decade after Buck's book was first published in 1938, Dixon's alternative hypothesis of sweet potato introduction had been put to the test by Thor Heyerdahl's spectacular voyage from Peru on his raft *Kon Tiki*. Heyerdahl later published a substantial book, *American Indians in the Pacific* (1952) in which he attempted to gain scientific recognition for his theory of Polynesian origin, and later still he mounted an archaeological expedition to Easter Island (1955-6), publishing his initial results in a popular book *Akuaku* (1958). If the issue had been with the sweet potato alone he might have had a case, but the evidence of other food plants, all of which originated in SE Asia, as well as the linguistic evidence of language origin from the same quarter was overwhelmingly against him, and his broader contention of Polynesian settlement from America must accordingly be rejected.

The idea of African origin of the sweet potato has been attributed to E.D. Merrill (1954) in what Barrau (1961:53) calls a "daring theory". Merrill's publication, however, takes the form of a long and rambling paper in which he includes much valuable material but raises the African idea only peripherally, except as follows in an afterthought towards the end of the paper:

Concluding Remarks on the Origin of the Sweet Potato:— While in this memoir, as originally prepared, I accepted the almost universally prevalent idea that the sweet potato (*Ipomoea batatas*) was of American origin, I have reason to believe (though no satisfactory proof as yet) that this is erroneous. The plant probably originated through hybridization in Africa and was transmitted by man across the Atlantic to America a few centuries before Columbus reached the West Indies, and perhaps somewhat earlier by way of Madagascar and the Mascarene Islands to Malaysia, Papuasia and Polynesia and even to the west coast of South America. There is no definite proof of this as yet, but the hypothesis is worth further study (Merrill 1954:371).

Tentative as it is, this hardly ranks as a theory, daring or otherwise, and it is possible that Merrill himself would later have repudiated it if he had not been in the last active months of his life and had time to reflect, especially as information earlier in the paper about Portuguese contact in Africa (see next)

should have suggested a more ready explanation. Geographically, a trans-Indian Ocean transfer from Madagascar to Malaysia may have seemed no more unlikely than a trans-Atlantic one from Africa to the Americas. But, as will be seen, neither idea was to prove correct. Merrill's more important contribution was with the nature of the Portuguese/Spanish connection.

Again and again in the course of his paper, Merrill emphasised the error of earlier writers in overlooking the importance of Portuguese and Spanish introductions of cultigens from the New World to SE Asia and Micronesia from the 16th century onwards. Specifically, after the discovery of Brazil by the Portuguese:

For somewhat more than 160 years there was a direct and, for certain seasons at least, a very much travelled commercial route, actually initiated in 1500, from Lisbon to eastern Brazil and thence via the Cape of Good Hope direct to Goa, on the Malabar coast of India (Merrill 1954:192).

Merrill goes on to point out that the Portuguese also established colonies in South Africa, "(and, here and there, on the east and west coasts of Africa) and explored a part of Madagascar."

In a surprisingly few years they had established themselves at Cochin, Goa, and elsewhere in India, Ceylon, Malacca (1511), the Moluccas (1512-1514) and Siam, explored the Red Sea and the Gulf of Persia, reached Canton (1517), founded Macao (1557) . . . and, from this as a centre, they operated extensively in Formosa and Japan (*loc.cit.*).

The other major early influence out of the Americas to be emphasised by Merrill was that of the Spanish:

The Spaniards initiated the galleon route from Mexico to the Philippines and return, in 1565, both the eastward and westward trips being by way of Guam. Normally only one ship was dispatched in each direction, each year, sometimes two, rarely three. We know the approximate number of tropical American species (115) introduced into Guam, before the galleon line was discontinued in 1815, as well as the corresponding figures for the Philippines (200). This Spanish-sponsored shipping line lasted for 250 years (Merrill 1954:193).

In 1963, the topic of the putative Oceanian-African hypotheses was taken up in a paper by Harold C. Conklin, in a thorough study of the vernacular names of sweet potato in the areas under contention, showing strong evidence of European loan words in all of them. No support was found for the idea of African origin, but unsurprisingly to anyone familiar with Merrill's other suggestions, the evidence uncovered by Conklin

strongly suggests that late sixteenth and seventeenth-century Portuguese ships were the first to carry sweet potatoes to Africa, Goa, and parts of Indonesia, from the Atlantic coastal regions of mid-latitude America; and that sixteenth-century Spanish vessels sailing from the Pacific coast of Mexico first introduced sweet potatoes to western Pacific regions including Micronesia, as well as the Philippines and other parts of Malaysia (Conklin 1963:133).

The debate about introduction of the sweet potato to America and SE Asia respectively, is important primarily for the light it throws on introduction into Polynesia. The fundamental starting point for all areas is South America, and in particular Peru, as the area of origin of the sweet potato, with introductions elsewhere, whether Africa, SE Asia or Polynesia all proceeding out of this area.

A west to east movement of the sweet potato into Polynesia is ruled out because of the evidence of introduction to SE Asia by Portuguese and Spanish seafarers in the 16th and 17th centuries A.D. Earlier east to west introduction by Polynesians is well supported by linguistic and other evidence across regions:

Polynesia

The Pollex cognate set for sweet potato, kumala (*Ipomoea*) has entries for most of Eastern and Western Polynesia, but is preceded by a note "It is possible that all apparent cognates outside of Eastern Polynesia are borrowings as there are no early references to the plant in Western Polynesia." This is plainly to be expected if plant introduction was from the Americas.

Melanesia

Regarded for many years as "one of the greatest enigmas of Pacific prehistory" was the discovery in the 1930s of large numbers of people in the Highlands of New Guinea who cultivated sweet potatoes. How could this be if the plant originated in South America? And what about the situation in Island Melanesia? The answer in this case was evidently introduction into New Guinea via Indonesia after Spanish colonisation of the Philippines (Brookfield and Hart 1971:83-4), followed by arrival much later still in the Bismarck Archipelago and Solomon Islands only with European traders and Settlers (Ross 2008:55).

Micronesia

In Micronesia, where the sweet potato was introduced into Guam by the Spanish, names given to it reflect its foreign origin. In Poanape:

The potato is called Kap-en-uai or the Foreign Yam; and the Sweet Potato Kap-en-Tomara, or the Yam of Tomara, from a village near the Palang River on the west coast where it was first introduced. Similarly . . . In the Pelews the potato and the sweet potato are styled Tuingutal-Barath, i.e. the Yam from the Westward (Christian 1899:334).

Conclusions

The best known and most exhaustive study of the sweet potato to date was carried out by Douglas Yen and published as a B.P. Bishop Museum Bulletin in 1974. Yen examined sweet potato distribution in both SE Asia and the Pacific, doing so from the standpoint of an ethno-botanist, with conclusions mirroring those foreshadowed by Buck, Merrill, Conklin, and others whose work is outlined above.

Taken together, the several strands of sweet potato introduction into Oceania are encapsulated into a single statement named by Yen as his "tripartite hypothesis":

The sweet potato was transferred from South America to Polynesia between AD 400 and 700, possibly by Polynesian voyagers. The 16th-century voyagers of Portugal and Spain were to transfer the plant from America to Indonesia and the Philippines, respectively. The Portuguese introduction was indirect, from the West Indies through Africa and India; the Spanish route was more direct from western Mexico and Peru on what was to be the Manila Galleon route through Micronesia (Yen 1974:329).

In the simplest terms, taking all evidence into account we end up with a grand circle of sweet potato introductions around the world. From an origin in Peru or nearby, the plant was taken into Europe after European discovery of the Americas, and from Europe via the Portuguese and Spanish trading empires to SE Asia and from there to New Guinea and parts of Island Melanesia. Meanwhile, perhaps half a millennium earlier, Polynesians had found South America and had begun to spread the sweet potato from there throughout Eastern Polynesia.

Although this general course of events is now the standard view, details are still elusive, despite an entire conference on the subject in 2002, reported upon in Ballard et al. 2005, and with the especial benefit, in this volume, of a detailed island by island survey from Roger Green.

Although no certainty can be claimed for its results, Green's (2005) survey departs from earlier estimates principally in terms of the timing for the Polynesian excursion to South America, now placing the date in the 11th or 12th centuries AD, rather than the 5th or 6th centuries nominated by Yen.

Green additionally makes a significant contribution by tracking the spread of the sweet potato much beyond the confines of Yen's tripartite model into historical times at the hands of Polynesians themselves on European vessels and introductions by European explorers and missionaries in the 18th and 19th centuries, a conclusion which must also be appropriate for other food plants.

COCONUT

The coconut palm is unquestionably one of the most versatile of Pacific plants, with the tree itself, its leaves, and the nuts, from their juvenile state through maturity and even beyond, all made use of. As observed by Bellwood:

. . . it provides a solid food and a drinkable liquid, together with fibre for cordage, leaves for roofing and basketry, shells for containers, and trunks for house posts and bridges. . . Its cultivated origins are unknown, but seem to lie in South-East Asia or Melanesia (Bellwood 1978b:34).

Detailed accounts of the culinary and other uses of the coconut, together with information about modern copra production, are available elsewhere (e.g. Massal and Barrau 1980:28-30) and need not be reproduced here. For background on Bellwood's statement it is worth stepping back a further 20 years once again to the time of Peter Buck.

When the 1958 edition appeared of Buck's book, *Vikings of the Sunrise*, botanists were in disagreement on two issues concerning the coconut, the first on where it came from, and the other on whether it was able to spread from place to place by natural means. On the latter issue, it is easy to imagine that whenever Polynesians found a new island, a palm-fringed beach would be awaiting them. But was this really true?

Buck knew that mature coconuts will float until water-logged, and must have been carried to islands by currents and storms, but there was doubt about how long they would remain viable. Buck thought they might have survived long enough to root on nearby islands but not on remote ones, so the spread of the coconut throughout Polynesia "must be attributed to man " (Buck 1958:314). Modern experiments have nevertheless shown that sea-borne coconuts can remain capable of sprouting for upwards of 18 months (Nunn 2008:110), so the extent of pre-human spread may have been greater than Buck supposed.

One of the ideas still current in the 1950s was an assumption that the coconut originated in tropical America. Merrill's investigations, however, showed that there was no evidence of pre-Columbian presence of the coconut in the Americas except on the Pacific coast of Panama and Ecuador. From this limited area it would have been spread elsewhere in the Americas, as in the case of the sweet potato, by the Portuguese and Spanish (Merrill 1954:266-7).

Today, a South American origin for the coconut is no longer even contemplated, as a result of overwhelming linguistic evidence to the contrary across all three ethnographic areas of Oceania:

Micronesia

Christian (1897:130) lists the following terms for coconut, almost all akin to the common Polynesian form *niu*:

Ponape *nî*, Kusaie *nû*. Yap *niu*, Ngatik, Mokil, Pingelap, and Nauru *nî*, Nukuoro *nûi*. Uluthi *lû*, Gilbert Islands and Marshalls *nî*, *ngi* and *niu*, Lamotrek *nû*, Satawal *lû*, Uleai *lû*, Sonsorol *riu*, *rû*.

The remarkably full distribution, encompassing both Western and Eastern Micronesia, together with the unusual degree of uniformity for the name, points to this term and the presence of the plant itself as indigenous to the area and unlikely to be a Polynesian borrowing.

Melanesia

Ross (2008:356) has a cognate set for PMP **niuR* coconut, *Cocos nucifera*; (Dempwolff 1938) and POc **niuR* coconut palm and/or fruit with Melanesian terms in areas Adm, NNG, PT, MM, TM, SES, NCV, NCal, together with Mic (8 entries East and West), Fij, and Pn (2 entries). Remaining Polynesian cognates are in Pollex (see next).

Polynesia

Pollex lists the following, again reconstructed to PMP as the highest order subgroup. As can be seen, there is an almost complete sweep of languages with the term in both Eastern and Western Polynesia, including the Outliers, and almost complete uniformity for both the term itself and its meaning.

ANU	Niu. Coconut Palm (<i>Cocos nucifera</i>)
EAS	Niu. Coconut Palm (<i>Cocos nucifera</i>)
ECE	Niu. Coconut Palm (<i>Cocos nucifera</i>)
EFU	Niu. Coconut palm
EUV	Niu. Coconut Palm (<i>Cocos nucifera</i>)
FIJ	Niu. Coconut palm
HAW	Niu. Coconut palm, coconut meat
KAP	Niu. Coconut tree
MAE	Niu. Coconut Palm (<i>Cocos nucifera</i>)
MAO	Niu. Divining stick
MFA	Niu. Coconut Palm (<i>Cocos nucifera</i>)
MKI	Ni. Coconut (Sve)
MQA	Niu. Prefixed to several Coconut varieties (Dln)

MVA	Niu. Coconut Palm (<i>Cocos nucifera</i>)
NGG	Niu. Coconut Palm (<i>Cocos nucifera</i>)
NGU	Na-niu. Coconut Palm (<i>Cocos nucifera</i>)
NIU	Niu. Coconut palm
NUK	Nui. Coconut palm
OJA	Niu. Coconut Palm (<i>Cocos nucifera</i>)
PEN	Niu. Coconut Palm (<i>Cocos nucifera</i>)
RAR	Nuu. Coconut palm
REN	Niu. Coconut palm (Ebt)
ROT	Niu. Coconut Palm (<i>Cocos nucifera</i>)
SAA	Niu. Coconut Palm (<i>Cocos nucifera</i>)
SAM	Niu. Coconut palm
SIK	Niu. Coconut Palm (<i>Cocos nucifera</i>)
TAH	Niu. Coconut palm (Obs.)
TAK	Nui. Coconut Palm (<i>Cocos nucifera</i>) (Hwd)
TIK	Niu. Coconut palm and nut (Fth)
TON	Niu. Coconut (tree or fruit)
TUA	Niu. Coconut palm
WFU	Niu. Coconut Palm (<i>Cocos nucifera</i>)
WUV	Niu. Coconut Palm (<i>Cocos nucifera</i>)
YAS	Niu. Coconut Palm (<i>Cocos nucifera</i>)

Two conclusions can be drawn:

1. The direction of introduction of the coconut palm into Polynesia was from west to east, with nothing to choose between Micronesia and Melanesia as vectors. Both could well have been involved.
2. Polynesians were in possession of the coconut palm from Proto Polynesian times onwards and coconuts would have been well integrated into their food plant inventory by the time sweet potatoes were imported from South America. It is probable that Polynesians did not at this time possess the bottle gourd, and there is indeed a suggestion that this plant was South American (Whistler 1991:48-9) in which case it could have been brought back at the same time as the sweet potato.

Lacking gourds for storage of drinking water, the Polynesians would have laid in a good supply of green drinking nuts for their outward exploratory journey, and probably a supply of sprouting coconuts as well in order to make use of the highly nutritious spongy contents (uto) as a foodstuff. On arrival in Peru, these nuts would have been still viable if planted.

An intriguing suggestion has been made by Whistler (1991:61) that Polynesians, having obtained the sweet potato from Peru may have reciprocated by leaving the coconut. Merrill's suggestion above that the coconut was present aboriginally in South America only in the Pacific coastal

environs of Panama and Ecuador is consistent with this as Ecuador is the next-door neighbour of Peru,⁴ and Merrill, in fact came close to making the same suggestion by surmising that the plant could have arrived "either through natural means (floating), or by the Polynesians themselves" (Merrill 1954:267). With floating now known to be ruled out by the northwesterly set of the Peru or Humboldt Current (Nunn 2008:110), an introduction by Polynesians is confirmed.

Finally, unless the Polynesians had a lengthy stay in Peru they would have lacked drinking coconuts for the return journey, making up for this by their acquisition of the bottle gourd, and the luxury of water to drink on their way home.

BANANA

Problems surrounding the botanical classification and geographical distribution of the banana (*Musa* sp.) have seemed so complex as almost to defy description. There are numerous species, subspecies, and varieties, including hybrids, (Ross 2008:276); the area of first domestication is still uncertain, with both New Guinea and SE Asia suggested as candidates; and there is a lengthy subsequent history of new introductions and of commercial exploitation that has brought the banana to the world. The banana purchased today in an Auckland supermarket could quite well have been imported from Ecuador or other South American country. In South America, if Merrill is correct, the banana was introduced from west Africa in the 16th century AD as a consequence of the Portuguese slave trade, and was afterwards spread to other parts of tropical America by the Spanish (Merrill (1954:278). Thus far the story is familiar as this was just one of several plant species introduced into America in the same way. But how did the banana get to Africa? Was it indigenous there or did it come from somewhere else?

The accepted view has been that it came across the Indian Ocean from SE Asia, probably entering Madagaska within about 2000 years ago. A recent discovery, however, has thrown doubt on both the destination and the date. In 2001 a small group of archaeologists conducted a study of sediment cores from a swamp site in Uganda, East Africa. This yielded from its lowest level a quantity of microscopic plant stones known as phytoliths which are diagnostic of banana plant material, more than doubling the presumed age of bananas in Africa to some 5000 years ago. Peter Robertshaw, who reported the find, makes no extravagant claims about it:

All of a sudden, we were not only challenging the assumption that bananas only reached Africa in the last 2,000 years, but that African

⁴ Merrill points out as well that in pre-colonial times boundaries were different and the term Peru applied to part of what is now Ecuador (Merrill 184:94).

connections to the Indian Ocean world may be more ancient than we previously supposed (Robertshaw 2006).

The next step back is to find out where the SE Asian migrants to Madagascar came from. The clue to this is not bananas but language. The language spoken in most of Madagascar is Malagasy, and Malagasy is the most geographically distant member of the Austronesian language family from which Proto Malayo-Polynesian, Proto Oceanic, and Proto Polynesian are ultimately derived.

Linguistically, the Malagasi language of Madagascar belongs to the Southeast Barito subgroup of Borneo but has undergone considerable influence from Malay and Javanese. Adelaar (1995) has speculated that Malagasy, rather than having sailed to Madagascar of their own accord, may have been transported there as slaves, ship crew, and labourers by Malays who, unlike South Barito speakers were seafarers who sailed all over Southeast Asia and along the Indian Ocean coast. In evidence, Adelaar offers numerous Malay and Javanese loan words in the Malagasi language. These would have entered the lexicon after the transfer of Southeast Barito speakers to Madagascar, possibly post-dating this event to a couple of centuries later than the currently estimated 5th century AD. If this is correct, then Robertshaw's banana date of 5000 years ago would have had nothing to do with Madagascar. The likelihood, however, is that such an introduction would have been by people from the same general area as those who later went to Madagascar, namely from somewhere in the environs of Indonesia. But there are arguments against this as well. First, the emergence of Malayo-Polynesian out of Taiwan took place on current estimates at around 4000 BP or later (Spriggs 2010) which is a thousand years after the event if Malayo-Polynesians were involved. Also, Uganda is landlocked, with the entire country of Kenya between it and the sea, so the prospect of any maritime visitors to Uganda is small, and the apparent early presence of banana there must therefore remain a mystery.

A 5000 BP date for banana, however, is not a problem in itself to judge from recent results by plant geneticists on materials from the Wahgi Valley of New Guinea. In an area known as the Kuk swamp site, banana phytoliths has been found in the earliest layers, dating to 9000 BP, with very high quantities indicating active exploitation in the second phase of the site, dated 6900-6400 BP (Allaby 2007:190).

Terms for banana

Melanesia and Polynesia

Despite uncertainty about the exact history of banana introductions at the Proto Malayo-Polynesian level, there is nevertheless a well-attested PMP reconstruction, *punti, for the plant, with a Proto Oceanic (POc) continuation of *pudi with reflexes so widespread as to make it certain that this was the

generic term (Ross 2008:277). Ross continues with a cognate set ranging from Adm to Fij, and Pollex extends the distribution, mostly as fusi or futi to more than 20 Polynesian languages, with renditions in this case of PMP *futi and POc *punti as highest order subgroups:

Set 1

ANU, BGO, ECE, EFU, EUV, FIJ, KAP, KWR, MAE, MAO, MFA, NGG, NIU, NUK, PUK, REN, ROT, SAA, SAM, SIK, TAK, TIK, TON, WFU, WUV.

To these may be added MEL (Rensch and Whistler 2009:697).

Unexplained is the presence in Polynesia of two almost completely separate cognate sets for banana, the above which, as can be seen, is exclusively Western Polynesian except for New Zealand Maori, and a second smaller set limited to Central Eastern and Marginal Polynesia as follows:

Set 2

EAS	Meika. Banana
MQA	Meika. Banana
MVA	Meika. Banana
RAR	Meika. Banana
TAH	Mei'a. Banana
TUA	Meika. Banana

Cognates are also in Hawai'i as mai'a and side by side with the futi term in Tuvalu as maika (Rensch and Whistler 2009:251).

In New Zealand, banana did not grow and the Set 1 term above was applied to a variety of sweet potato.

It cannot be the case that the primary Set 1 term was lost in Proto Polynesian as in this event the term would not have been remembered by the New Zealand Maori, albeit applied to a different plant which itself was a post-PPn introduction. The only explanation that comes to mind is that perhaps the punti term became subject to word tabuing in Central Eastern Polynesia at some time before dispersal to Marginal Polynesia took place, and the new term became a permanent replacement.

Micronesia

Christian (1897:130) supplies the following:

Banana or Plantain.—Following practice common amongst Caroline islanders of dropping initial v or f: Ponape 'ut, Kusaie and Mortlock, 'us, Mokil and Pingelap, 'us, 'uts, Ngatik uth, Ruk (Hogohu) us, Pulawat, Uleai, Lamotrek, and Satawal uis, Nuku-oro huti, Sonsorol and Tobi vathogl, Uluthi ut=banana. . .

Compare also Mariannes chotda, Solomon Islands vudi, pusso, and Tahitian fei, fehi, Timor hudi, German New Guinea pundi, pun, hundi, fut, Bismarck Archipelago bundu, Fijian vundi, Pangasinan (Philippines ponti (id.), Samoan (Savai'i dialect) and Futuna futi.

It will be noticed that both high islands and atolls are on Christian's list, and the same is true of the Pollex listings for Polynesia above, although in this case high islands predominate. The reason, as Fisher observes for the Caroline Islands is that bananas "grow better on the high islands than on the low, although they are found everywhere." Fisher (1956:84). Also worth pointing out is that banana shoots from which new plants are propagated can last for a long time. The LMS missionary John Williams successfully transferred Chinese banana to Samoa from London after a trip of nine months (Massal and Barrau 1980:16), so the much shorter voyages undertaken by pre-Polynesians would have been no barrier to introductions of the plant.

Malcolm Ross's confidence in his POC reconstruction is vindicated by recent evidence of banana phytoliths in three Vanuatu archaeological sites ranging in date from 500 BP to the Lapita period of c.3000-2700 BP (Horrocks et al. 2009). The distributional complexities referred to earlier, however, have also been the subject of recent genetic research with conclusions which in this case challenge the prevailing Lapita orthodoxy:

Although bananas are widely assumed to have been part of the set of crops transported to Polynesia at first settlement, the linguistic evidence on which this is based underestimates the diversity of bananas in the New Guinea region and is suspect. Archaeological evidence of bananas is so far very tenuous. Recent genetic evidence of the parentage of most groups of cultivated bananas shows that the primary step toward edibility occurred in the Philippines New Guinea region. Early movements westward across Island Southeast Asia must have occurred, and the complexity of hybrids makes regionally dispersed development likely. There is no demonstrable link with Taiwan or the adjacent coast of China. There is no evidence that the genetically distinct lineages of bananas found in Polynesia were brought together in the putatively ancestral Lapita crop assemblage of the northern New Guinea region. The complex phylogeny of the cultivated Pacific bananas may thus suggest multiple prehistoric introductions of bananas to Polynesia. If bananas were part of the founding set of crops of Remote Oceania, the

question "which bananas" is currently unanswered (Kennedy 2008:Abstract).

The answer, however, lies with the linguistic information which the above passage calls to question. Presence of the Set 1 term for banana in all three ethnographic areas of Melanesia, Polynesia, and Micronesia speaks of interactions over time among them all.

Other food plants

The foregoing sections on breadfruit, taro, yam, sweet potato, coconut and banana account for the most frequently consumed food plants common to the three ethnographic areas of Melanesia, Polynesia, and Micronesia. Some remaining plants of interest will be considered next, but in less detail.

PANDANUS

Contrary to the case on high islands where most food plants thrive, pandanus is a mainstay of atolls, so much so that the Kiribati islanders of Micronesia have been dubbed "pandanus people." (Grimble 1933-4).

For Micronesia, Christian reports as follows:

Pandanus, or Screw-Pine.—Used all over the islands for mat-making and thatching, and in manufacturing hats and sails. In the Marshall Islands the fruit (called pop) is eaten, and forms an important part of the island dietary. Ngatik, Ponape, and Pingelap ki-pár, Mortlocks fas far and fat, Nauru par, Nuku-oro hara and fara, Uluthi fat, Ruk fat (flower, li-fát), Pulawat fas, Mamotrek and Satawal fas, Sonsorol fas, St. Davids vat, Pampanga e-bus (Christian 1897:13).

The bulk of these terms are plainly cognate with the following extensive set of Polynesian terms from Pollex, where they are reconstructed to PAn *fara and POc *panda (Pandanus) as highest order subgroups:

ANU Para, ANU Paa, ECE Fala, EFU Fala, FIJ Vadra, HAW Hala, KAP Hala, MAE Fara, MFA Rau/fara, MQA Fa'a, MVA 'Ara, NIU Faa, NKR Hala, OJA Hala, PEN Hara, PUK Wala, RAR 'Ara, REN Haga, ROT Hata, SAM Fala, SIK Hala, TAH Fara, TAK Fara, TIK Fara, TOK Fala, TON Faa, TUA Fara, TUA Hara, WFU Fara, WUV Fala

Although most of these are Western Polynesian, the term is plainly PPn, and it would be surprising if it had not reached Polynesia from the mostly atoll environment of Micronesia.

SUGARCANE

The sugar cane is indigenous to the Old World tropics, but was an aboriginal introduction throughout Polynesia where it was cultivated for its sugar-laden stems and its leaves were used for house thatch (Whistler 1991:60).

Pollex has two closely related sets of terms for sugarcane (*Saccharum officinarum*):

Set 1

Reconstructed to PPN *to, with POc *topu and PAn *tebu “Sugarcane” as highest order subgroups.

ANU Too, EAS To/a, EUV too, FIJ Dovu, HAW Koo, MAE Too, MVA Too, NIU Too, PUK Too, RAR Too, ROT Foqu, TAH To, TON Too.

To which may be added MQA (Rensch and Whistler 2009:514).

Set 2

Reconstructed to PNP tolo 'sugarcane'

EFU Tolo, MFA Toro, NIU Too, NKR Dolo, OJA Kolo, REN Togo, SAM Tolo, SIK Tolo, TAK Tolo, TIK Toro, TON Too,

with addition of ECE (TUV) and, TOK tolo (Rensch and Whistler 2009:551).

Christian has some Micronesian cognates among the following:

Sugar-cane.—Polynesian tô, tolo, Fijian ndovu, Ponape cheu (t to ch, a common Micronesian change; in Paliker district on the west coast it is called nan-tap), Kusaie tô, Ngatik tho, Mokil tâu, Pingelap tsô, sô, Nuku-oro tolo, Marshall Island tô (Christian 1897:133).

Ross 2008:390 lists numerous NW Melanesian cognates in Adm, NNG, PT, MM, TM, SES, and NCV of the reconstructed POc term *topu 'sugarcane', pointing out that in Polynesia this appears as *to* rather than the expected *tofu*.

As in so much else, the close matching of terms between Micronesia and geographically adjacent areas of both Melanesia and Polynesia, points to Micronesia as middle ground and no less likely than Melanesia as a source for the Polynesian term.

ARROWROOT

The Polynesian arrowroot is distributed from India eastward to Hawaii, but was probably an aboriginal introduction to Polynesia. It is naturalized in littoral areas, and was probably mostly harvested rather than cultivated. The starch extracted from the tuber is bitter and poisonous, and must be washed thoroughly before being baked and eaten. It is also used as an additive to other foods, and as a glue in making tapa cloth (Whistler 1991:62).

To judge from its common name alone, Polynesian arrowroot has very little to do with Melanesia, and, although it is eaten in both Vanuatu (Massal and Barrau 1980:12), and on the small islands of the SE Solomons, it apparently had only limited use in the Bismarcks, and no Proto Oceanic term has been found for it (Ross 2008:273). In Vanuatu it is evidently not cultivated but is gathered from wild plants in the forest and used only in times of hunger (Olsson 2010).

Vernacular names for the plant in Polynesia and Micronesia are provided by Barrau:

Tacca leontopetaloides (L.) Kuntze (*T. pinnatifida* Forster) is the Polynesian arrowroot. Except in Samoa, the Polynesian name is pia. In Samoa it is called masoa, though it was evidently once called pia there also. Native names in Micronesia are, for the Gilberts, to makamaka; for the Marshalls, inokmok; for Pingelap, muganiuk; for Ponape and Truk, inokmok; for Ulithi, moginog, for Yap, sobosob; and for the Marianas, gabgab (Barrau 1961:43).

For the central and western Carolines, Christian provides a similar range of names, saposep, toptop, saposop, tapatap, (Christian 1897:136), and for the Carolines in general gives mokomok as a generic term (Christian 1899:339).

Barrau's Gilberts term, makamaka, also rendered as mokemoke and makemake, together with Nauruan damagmag, and Marshalls mokmok (Themon 1987:7) is plainly cognate with Christian's term from the Carolines, and some of the other terms may also be related.

For Polynesia, Pollex has two terms, Set 1 glossed as the plant, and Set 2 referring both to the plant and the starch prepared from it. The two sets are mutually exclusive except for Tuvalu (ECE) and Samoa (SAM), which have both terms.

Set 1

Glossed as 'Polynesian arrowroot' (*Tacca* sp.);

ANU Maa'a, ECE Maasoa, EFU Maaso'aa, EUV Mahoa'a, SAM Maasooa,
TIK Masooa, TOK Mahooa, TON Maahoa'a

Set 2

Glossed mostly to pia 'Arrowroot, starch'

EAS, ECE, FIJ, HAW, KAP, MAE, MQA, MVA, NIU, OJA, PEN, PUK,
RAR, REN, SAM, SIK, TAH, TAK, TUA.

To these may be added NUK bie, pie (Rensch and Whistler 2009:619).

The Set 2 term appears in both Eastern and Western triangle Polynesia and is of presumed PPn status. In view of the widespread presence and use of arrowroot in Micronesia, coupled with its comparative absence in Melanesia, and particular suitability for atoll environments, a Micronesian rather than Melanesian introduction to Polynesia can be assumed, with change of name to the current terms occurring at the point of transfer. The Set 1 distribution is limited to Western Polynesia including Outliers, and on this account must be more recent. It would seem not improbable that this term originated somewhere in the region of Tuvalu, East Uvea, or Samoa at some time after the settlement of Eastern Polynesia.

TURMERIC

The turmeric probably originated somewhere in southeast Asia, but does not occur today in the wild state. It was aboriginally introduced throughout Polynesia where it was cultivated for the yellow powder extracted from its rhizome; this was used as a dye for tapa and mats, and as body paint in ceremonial and medicinal practices (Whistler 1991:62).

Although used principally as a dye, turmeric is also a minor foodstuff. On Ponape, for example, there are four varieties, all dating from the pre-contact period, of which one, known as 'little turmeric' is used for food (Bascom 1965:110).

Polynesia

Pollex has two separate terms for turmeric in Polynesia. In the lists following, only entries referring specifically to turmeric or its botanical name, *Curcuma* sp. have been included. The full listings in Pollex include entries where the terms, mean, yellow or something yellow, and these are noted separately below.

Set 1

Reconstructed to POc renga Turmeric as highest order subgroup.

ANU Renga, EFU Lega, EUV Lega FIJ Re/regā, HAW 'oo/lēna, MQA 'Ena, MVA Rega, NGU Na/tetega, NKR Lēna, RAR Rēna, REN Gēna, SAM Lega, TAH Re'a, TAK Rēna, TIK Rega, TON Enga, TUA Rēna

In Tuvalu (ECE) the term renga is applied to yellow ointment from Samoa or Rotuma (Ranby 1980) and, as singa, means yellow (Noricks 1981); it refers to yellow alone in MAO, PEN, and PUK, and does double duty for 'yellow' and 'turmeric' in HAW and TAH.

Though glossed as a rule in Pollex simply as 'turmeric', a sampling of dictionaries shows this term to refer to the prepared product, in contrast with the plant itself which is designated by the Set 2 term.

Set 2

Reconstructed to PAn Ango A plant (*Curcuma* sp.) as highest order subgroup.

ANU Ango, EFU Ago, EUV 'Ago, FIJ Cago, NIU Ango, REN Ango, ROV Ango, SAM Ago, TAK Ano, TIK Ango, TON Ango

As can be seen, there is overlap between the two sets in the case of ANU, EFU, EUV, FIJ, REN, SAM, TAK, TIK and TON, all in Western Polynesia, with terms in both sets, and HAW, MQA and other Eastern Polynesian languages all in Set 1 alone.

Micronesia

An obvious cognate of the Set 1 Polynesian term is reported by Christian in two seemingly separate applications:

For ginger, we find in Ponape ong and au-long, in Kusaie, Mort-locks, Yap, Ruk, Pulawat and Pelew Islands reng, in Nuku-oro renga or lenga.

Significantly, after some discussion of terms elsewhere for 'yellow', Christian adds:

It must be remembered that reng in the Carolines generally is used for the prepared turmeric done up into neat little cones, and extensively used throughout the group, and indeed all over Polynesia and Micronesia, for a cosmetic (Christian 1896:126, 127).

Of equal significance is appearance of the term on the Western Micronesian island of Yap, famed for its pre-contact stone money, where the reng packages of prepared turmeric (called mabuul on Yap) were used as money (Jensen 1977:174), and the reng term served also as the name for the smallest denomination of Yapese stone money (New World Encyclopedia 2008). This is a uniquely Micronesian usage, providing strong evidence of Western Micronesia as a probable area of origin of the reng term and, by extension, its introduction into Polynesia.

A common denominator of the above descriptions is the colour 'yellow', which ginger and turmeric share. It would seem, however, that in Micronesia as in Polynesia the name for the prepared plant as reported by Christian is different from names for the plant itself, supplied as follows by Barrau:

Micronesian names are, for Ponape, ong; for Yap, guchol; for Ulithi, ochol; for Palau, kcsol; for the Marianas, mango (Barrau 1961:60).

Barrau's Ponape and Marianas names for turmeric have the appearance of cognacy with the Set 2 Polynesian terms, placing Micronesia in the same category as Western Polynesia as possessing both names.

Finally, in the Marianas, the Set 2 term, mango, means 'a yellow colour', and there are also colour associations for this term in the Carolines, again as in Polynesia:

Yellow in Ponape is ongong, in Pingelap and Mokil ongeonge, and in, the Pampanga ma-ange-ange (Christian 1897:126-7).

Melanesia.

Ross (2008:412-3) provides three cognate sets inclusive of Melanesia, the first of the Set 2 term above and the others of the Set 2 and Set 1 terms respectively.

Set 2

Reconstructed to POc *yango 'turmeric, *Curcuma longa*'
NNG, MM, NCV, Mic: Ponapean, Mokilese, Woleaian, Fij: Bauan, Pn: Tongan, Samoan.

The terms in this table are applied almost as frequently to ginger as to turmeric.

In a number of languages the term is reconstructed not to 'turmeric' but to POc *yango-yango 'yellow'
NNG, PT, MM, SES, NCV, Mic: Woleaian, Fij

Set 1

Reconstructed to PEOc *[re]rengwa 'yellow material, prepared turmeric (?)'
SES, NCV, Mic: Kiribati, Fij, Pn: 7 entries.

Glossed variously as 'turmeric', 'prepared turmeric', or 'yellow'

As can be seen, there is a considerable range of meanings for the two terms in Melanesia, with no hint of the clear-cut distinctions between them that characterise Polynesia. More significantly still, of more than 30 languages represented in the cognate sets, only one in Melanesia, NCV Mota, apart from Fiji, has both cognate terms.

Discussion

In judging the direction of introduction of turmeric into Polynesia, it is difficult to reconcile all of the above information. A key consideration, however, must be the distinction between plant and product which characterises the Set 1 and 2 terms respectively in Western and Central Micronesia together with Western Polynesia, but not in Melanesia except in Fiji.

Another matter to be taken into account is the differing highest order subgroup status of the two terms as POc and PAn respectively. It will be assumed in the discussion to follow that these terms were introduced into Polynesia together rather than separately.

If turmeric entered Polynesia from Micronesia, one might expect it to have done so through Tuvalu, with Fiji the most likely point of origin if entry came from Island Melanesia. Were it not for the fragmented nature of incidence in the latter area, Fiji would be the more likely of the two, with both terms spreading from there to Tonga and the other areas in Western Polynesia which have both Set 1 and Set 2 terms. In this case, however, no explanation is available for the match between Western Polynesian usage and the identical distinction between plant and product in Micronesia. Tuvalu, on the other hand, would be the nearest point of entry if the transfer of plant and product had followed an easterly Micronesian route into Polynesia. But no evidence has been found of the plant in Tuvalu except as a borrowed product and as a term for yellow. Hedley, who conducted research in the area in 1896, apologises in his report for not having sufficient time to study plant evidence in detail. He says only that turmeric was present as a yellow dye, but does not reveal whether or not it was grown locally, and recourse to dictionaries has yielded only an entry from Ranby's Nanumea Lexicon of renga as an ointment from Rotuma or Samoa, which was presumably a borrowed import. Evidence of the plant in Tuvalu could yet be found, but absence need not be a surprise as turmeric evidently does best in rich soils and, from the distributional evidence was probably absent or rare in other atolls as well.

With Melanesian evidence taken into account, just one possibility remains. It seems clear that the original meaning of the Set 2 term in Melanesia, as also indicated by Christian for the Marianas and Carolines, was 'yellow', but an innovation occurred in Micronesia distinguishing the Set 1 term as the prepared product and the Set 2 term as the plant name, and these distinctions were carried from Micronesia into Polynesia. If not through Tuvalu or direct from Kiribati, this would need to have taken place through the Outliers, possibly from Ponape to Nukuoro, and then west to east through Anuta, Tikopia, or other high islands which currently have both terms until Western Polynesia and ultimately Fiji was reached. The spread of the terms throughout Western Polynesia would have taken an unknown time to complete, possibly extending even beyond the date of settlement of Eastern Polynesia which must have been by a group who dropped the Set 2 term in favour of Set 1 for both plant and product.

INDIAN MULBERRY (*Morinda citrifolia*)

The Indian mulberry is distributed from India to Hawaii, but was probably aboriginally introduced over the eastern part of its range, as it was in Hawaii. It is casually cultivated in villages and plantations, often as a weed of disturbed places, but is also naturalized in coastal forests. The bark and roots were used to make red and yellow dyes, and the fruit is a famine food. Various parts of the plant are also widely employed in native Polynesian medicine (Whistler 1991:56).

Barrau (1961:64-5) observes that the fruit contributed to the diet of both Polynesians and Micronesians in very early times, particularly on atolls, but was used mainly for its red and yellow dyes which were extracted from the leaves and root respectively.

Polynesia

Pollex has a huge cognate set of Polynesian terms for *Morinda citrifolia*, extending over almost the entire area, with reconstruction to PPn *noni and to POc *nonu as highest level subgroup.

AIT Nano, ANU Nonu, ECE Nonu, EFU Nonu, FIJ Noni, EUV Nonu, HAW Noni, KAP Nonu, MAE Nonu, MFA Nunu, MIA Nonu, MKI Nenu, MQA Noni, MQA Nono, MVA Noni, MVA Nonu, NFU Nonu, NIU Nonu, NUK Nonu, PEN Noni, PUK Nonu, RAR Noni, RAR Nono, SAM Nonu, TAH Nono, TIK Nonu, TOK Nonu, TON Nonu, TUA Nono, WUV Nonu.

The term is also present in New Zealand Maori but applies there to a different plant, and in Fiji may be a borrowing from Polynesia as Capell's Fijian

dictionary (Capell 1968:106, 156) shows it coexistent there with kura, which is Melanesian (see later).

Micronesia

Barrau (loc.cit.) provides vernacular names from East to West as follows:

Native names in Micronesia are, for the Gilbert Islands, to non; for the Marshall Islands, nin; for Pingelap, obul; for Ponape, weipul; for Truk, nen and nobur; for Yap, ngel and mangalueg ; for Ulithi, lol; and for Palau, nel. In the Tagalog dialects of the Philippines the vernacular names of *Morinda* are nino and lino.

Christian (1899:340 and 1897:134) gives the Gilberts term as nonu, confirms the Marshalls term as nin and the Uliti one as lol, and additionally offers, Mortlock nin, and the Polynesian Outlier Nukuoro nonu. As well he draws attention to Malay, nona.

Finally, in a table of cognates for nonu, Ross (2008:408) includes non for Kiribati (Gilberts), nen for the Marshalls, and nen for Puluwat.

Christian's Malay term is plainly cognate with Gilberts nonu, as also with its Polynesian equivalents, and the nin, nan, nen, non terms can also be accepted as cognate on the authority of Ross.

Melanesia

In light of the following statement from Malcolm Ross, there is no need to cite Melanesian cognate sets in detail. Two proto Oceanic terms of especial significance for present purposes are distinguished:

*kurat is reflected solidly through Melanesia from New Ireland (Lihir, Tangga) through NW Solomonic (Nehan, Roviana), SE Solomonic, North/Central and Southern Vanuatu, New Caledonia and Fiji, while *nonu occurs in the Admiralties, North New Guinea, Papuan Tip, Micronesian and Polynesian. These distributions suggest that POc *nonu was in some sense the default term for *M. citrifolia* and that it was then replaced by *kurat in a solid Melanesian block from New Ireland to New Caledonia and Fiji. However, the reflexes of *kurat are generally regular, suggesting that replacement took place very early in the history of Oceanic (Ross 2008:408).

The implications of this could hardly be more apparent. The nonu term came first, reaching the Admiralties and Micronesia from the Philippines, and thence from the Admiralties to northern Papua New Guinea, and from Micronesia through the Gilbert Islands (Kiribati) to Polynesia, with presence of the

alternative term throughout Island Melanesia ruling out entry to Polynesia from this quarter.

Chapter summary and conclusion

This chapter has provided information on the common Polynesian food plants, considering each in terms of use, vernacular name, and distribution within both Polynesia and the adjacent areas of Melanesia, and Micronesia. The object has been to identify possible paths for introduction of the plants into Polynesia from the latter two areas. From an ultimate origin in SE Asia, just two routes are possible for such introductions, one out of Micronesia, involving the mostly atoll islands en route, and the other out of Island Melanesia, most likely via Fiji. The first of these alternatives was long ago rejected by Buck because of unfavourable atoll environments for most of the plants; and the other has subsequently been espoused by Kirch and Green as a key component of their theory of Lapita origins for Polynesians. Neither theory is fully supported by the data set out above. Atoll dwellers have found ways to ameliorate the disadvantages of their poor soils, and only a limited range of plants in fact are found to have come exclusively from Melanesia, with both Melanesia and Micronesia contributing their most important plants. Thus, breadfruit, for example, came from both directions; true taro came from Melanesia, but swamp taro from Micronesia; pandanus, arrowroot, and turmeric were probably introduced from Micronesia; Indian mulberry was unequivocally in this category; and other plants such as banana, coconut, and sugarcane are so ubiquitous, as to have come, once again, from no single source.

The "full roster" of Lapita food plants referred to by Kirch and Green has accordingly dwindled to a handful, and Micronesia has emerged as an area of no less significance than Melanesia.

Chapter 12 Domestic Animals

Just as most of the food plants of Polynesia and Micronesia were dependant on humans for introduction from place to place, so too the common domestic animals, pig, dog, chicken, and rat, were transported in the canoes of the first settlers. The rats were probably stowaways among the food supplies, like the European rats that followed them in vessels of a later era. The others would not only be brought by choice, but would also be subject to the vagaries of the voyage or rigours of the new environment after arrival, and would not always survive. In such cases animals were sometimes gained or reintroduced later, explaining lack of evidence for them in the archaeological record of some of the places where they are now present, and inflating incidence of them in Pollex files.

A key requirement for animal husbandry is a sufficient surplus of food for both humans and animals. In consequence, as observed by Buck(1958:318-9) it is significant that pig, dog, and chicken were absent on Polynesian atolls when these were first visited by Europeans, and gained them only later when food supplies became more plentiful. Buck concludes that atolls thus formed a barrier to animal introductions which, like the common food plants, must therefore have reached Polynesia through Island Melanesia.

PIG

For Polynesia, Pollex records the following with reconstruction to PPn *puaka 'pig':

ECE, EFU, EUV, FIJ, HAW, KAP, MAE, MQA, MVA, NIU, PEN, PUK, RAR, SAM, TAH, TOK, TON, TUA

Despite the resemblance of the term puaka to the English word 'pork', which suggests that puaka may be a borrowing from English, there can be no doubt of its PPn status. The word was first noted in a short vocabulary compiled in Tahiti by Cook's botanist Joseph Banks (Beaglehole 1962:372), only two years after the discovery of the island by Wallaace in 1767. Banks evidently had some trouble with the unfamiliar sounds of the Tahitian language, as did the Tahitians with English. Try as he might, Banks was unable to teach Tahitians the pronunciation of his own name, so he might have known that a 'b' and a 'k' where not among phonemes in the Tahitian language, but he nevertheless heard Tahitian 'p' as a 'b' and added to his difficulties further by failing to hear a glottal which appears in Tahitian instead of 'k'. Thus, he transcribed pua'a as bua, wrote moa 'fowl' correctly, and again missed a glottal for 'uri 'dog'.

Melanesia

Unlike Polynesia, where domestic animals were initially limited largely to high islands, pig especially was widespread both physically and culturally in New Guinea and most of Island Melanesia except New Caledonia.

Ross et al. (2011:238-9) offer cognates of PAn *beRek 'domesticated pig' and POc *boRok 'pig, *Sus scrota*' in the following areas:
Adm, NNG (3), PT (5), MM (5), SES (2), PNCV, NCV (4), Fij.

At this point, a clear connection with the Polynesian term for pig emerges, relating it to antecedent areas of Papuan Tip and Vanuatu:

POc *boRok is not retained in Polynesian languages, being replaced by PPn *puaka. This appears to continue POc *b(o,u)kas(i), which has reflexes in PT, NCV and SV. Reflexes of both *boRok and *b(o,u)kas(i) persist in PT and NCV. It is not clear whether there was a meaning difference between the two terms (Ross et al. loc.cit.).

The cognate set of POc *b(o,u)kas(i) 'pig' is next given, with areas as follows:
PT (2), NCV (3), SV (3), HAW, SAM, TIK (archaic), TON

Additionally, the puaka term is found to be present as Polynesian loans in three languages of Papuan tip, three from New Caledonia, and one from Fiji.

In the approved cognate set, inclusion of puaka for Tikopia is doubtful as its meaning in Pollex is not 'pig'. Perhaps Tikopia is seen as a conduit for pig out of Melanesia into Polynesia. Exclusion of all other puaka entries from Pollex except Tonga, Samoa and Hawai'i may be because the latter are among the few places in Polynesia where pig bones in archaeological context have been found (Kirch and Green 2001:129, Emory 1959:39).

Micronesia

To judge from a comprehensive survey by Wickler (2004), it would seem there are no reports of pig anywhere in Micronesia at the time of first European contact, and confirmed archaeological evidence of pre-contact pig is limited to Western Micronesia.

Christian (1899:366) provides vernacular names for pig in the Carolines which bear no resemblance to the Polynesian term puaka, but reveals that puk was formerly in use but had been replaced as a result of word tabuing when a chief died who had the same name. It would seem probable that, as also must have happened in areas of Polynesia where pig was a late post-European introduction, the animal was adopted in the Carolines complete with the puaka name, and all such instances are examples of borrowing. Revealingly, again as

in some areas of Polynesia, the pig was introduced in the Gilbert Islands with a transliteration of its English name 'pig' as 'beki (peki)' (Sabatier 1971:62).

DOG

Polynesian cognates are recorded in Pollex as follows, with reconstruction to PPn *kuli 'dog':

ANU, EAS, ECE, EFU, EUV, FIJ, HAW, MAE, MAO, MFA, MVA, NIU, PEN, RAR, REN, SAM, SIK, TAH, TIK, TON, TUA.

Genetic research on Polynesian dogs reported as part of a recent survey by Matisoo-Smith (2007) is inconclusive but provides no evidence of dog introduction associated with the Lapita complex. A genetic marker known as Haplotype A75 is identified for three archaeological populations of Eastern Polynesian dogs and is found to be shared only with Indonesia.

Melanesia and Micronesia

After listing numerous Melanesian terms for dog in several cognate sets, Ross et al. (2011:242) note:

PPn *kuli 'dog' is well-attested but has no secure non-Polynesian cognates. All apparent cognates in languages of Melanesia and Micronesia are almost certainly borrowings from Polynesian sources.

A sample of such borrowed forms, all glossed 'dog', and all cognate with kuli, is listed in the following areas:

NCV (4), SV (2), Mic Kiribati, Mic Marshalls, Mic Ponape

But, if both Melanesian and Micronesian apparent cognates of kuli 'dog' are borrowings, where did the Polynesian term come from? Is it assumed to have been an innovation there? If not the possibility remains that one or other of either Melanesia or Micronesia is the originating area, with the latter at least not out of contention.

Attested radiocarbon dates for dog in Micronesia are all late, as are dates for occupation itself, but all are confirmed as pre-European with finds so far documented for Ponape, Kosrae, the Marshall Islands, and possibly Kiribati (Wickler 2004:32). On this evidence, Wickler concludes:

The widespread distribution of prehistoric dog in central-eastern Micronesia and its presence during the earliest phase of settlement on several islands demonstrates that colonising populations purposefully

included dogs as a component of their transported landscapes on long-distance inter-island voyages (Wickler 2004:34).

It is worth noting, as well, an opinion of Sabatier (1971:153, 194), who gives the plainly cognate term *kiri* as the word for dog in the Gilbert Islands but twice emphasises that this is the "ancient term" and "the true Gilbertese word", and a synonym is *kamea*, which is the Gilbertese rendering of the English phrase "come 'ere".

CHICKEN

Polynesia

Pollex records cognates in the following areas, with reconstruction to PPn **moa* 'fowl'.

EAS, EFU, EUV, FIJ, HAW, MAE, MFA, MIA, MQA, MVA, NIU, OJA, PEN, PUK, RAR, ROT, SAM, SIK, TAK, TON, TUA, WFU

Additionally, for NZ Maori who did not possess chicken, the term *moa* refers to extinct large flightless birds (*Dinornis* spp.) which substituted for chicken during the settlement period.

Melanesia and Micronesia

The situation for chicken turns out to be much the same as for dog in Melanesia, though not so in Micronesia.

Despite identifying cognate sets specific to chicken in Melanesia, Ross et al. (2011:286-7) find no certain external cognates for the common Polynesian word *moa* for fowl, though attributing a few appearances elsewhere, including Kiribati (Gilberts) *moa*, to borrowing.

Archaeological evidence for chicken in Micronesia, however, seems to be in short supply. Wickler (2004:34) was able to find only two confirmed examples from prehistoric sites. They were from Fais atoll in the Western Carolines and from Ponape, with less secure indications from Lamotrek atoll in the central Carolines and Kapinamarangi.

These are mostly in the Caroline Islands which is the logical starting point for migrations that might have taken place into Eastern Micronesia, but unlike other cultural items that may have followed this route, the domestic fowl was almost certainly not among them but is a known post-European missionary introduction in the Gilberts (Morning Star 2009), which evidently came both physically and bearing a Polynesian name. Sabatier (1971:193) gives the Gilbertese name for it as *kiokio*, which must derive from PPn **kio*: 'to chirp,

cheep', with cognates in the following areas of both Western and Eastern Polynesia of EFU, FIJ, HAW, MAO, MQA, RAR, SAM, TAH, TIK, TON, and TUA and, if there were any doubt at all, a meaning in Samoa of 'chicken'.

Meanwhile, back in the Carolines not many years after the missionary introduction of chicken into the Gilberts, Christian (1899:368) collected the terms for chicken that were in use there:

The domestic fowl Malek (cf. central Caroline Maluk, Pelews Malk, Mariannes Manok, Malay Man. . . , a chicken)

Where, then, did the Carolines terms come from? This, too, is now known. One of the Melanesian cognate sets in volume four of the Oceanic lexicon series is as follows (Ross et al. 2011:284):

PMP *manuk 'bird, fowl'

POc *manuk 'Red Jungle-fowl, Gallus gallus'

Yap: Yapese ni-men

NNG: Manam may bird, chicken

NNG: Mangap man

SV: Kwamera menu 'bird, prototypically fowl'

SV: Lenakel menuk

Mic: Carolinian malix (loan from Palauan)

Mic: Namoluk malok (loan from Palauan) Mic: Ponapean
malek(enwel) (loan from Palauan)

Note that Bender et al. (2003:327) consider the Micronesian forms to be loans from Chamorro, mannok 'chicken' (Ross et al. 284).

Notwithstanding a possible connection with Fiji (Ross et al. 2011:loc cit.), origin of the Polynesian term remains a mystery, but the Carolines one most likely came from Western Micronesia, moving from there into northern Island Melanesia.

RAT

First to be considered is the extent to which rat was, in fact, eaten in the various areas of Oceania. A sampling shows that it was certainly a widespread culinary item, but by no means universal, and not among foods that can be regarded as staples. In Tahiti, for example, Oliver (1974(1):278) says that unlike some Polynesians, Maohis are said to have abhorred the very idea of eating rats, but no specific reason for this could be advanced except perhaps for their belief that the animals were the shadows of ghosts. In New Zealand, by contrast, where neither pig nor fowl was present, rat was esteemed. Interestingly, both the Maori of New Zealand (Buck 1950:103), at the end of a migration chain that spanned the Pacific over a period of more than three thousand years, and

Ponapeans in the Caroline Islands of Micronesia (Fischer 1956:78), who could have been at the beginning of the chain, used pit traps to catch rats.

Five rodent species of relevance for Oceania are identified by Ross et al. (2011:230): the European black rat, *R. rattus*, the European mouse, and three indigenous species. Of the latter:

1. *R. exulans*, the Pacific rat, is a commensal animal whose original range was in Asia, probably from Bangladesh to Vietnam. It was carried to Oceania by humans several millennia ago and today is found widely in Melanesia, Polynesia and Micronesia.

2. *Rattus praetor*, the spiny rat, considerably larger than *exulans*, is native to New Guinea, where it is widespread. It is found in archaeological assemblages in the Bismarck Archipelago and in the Solomons as well as Vanuatu and Fiji, but not Polynesia or Micronesia [except archaeologically, it seems, in Tikopia (Matisoo-Smith and Robins 2004), where it would have been gained from the Solomons.]

3. *Rattus tanezumi*, the Asian house rat, has a narrow distribution in Oceania, being securely attested only in archaeological sites of Micronesia in the Caroline Islands and the northern Marianas, dated to within the last 1,000 years. *R. tanezumi* is native to South Asia and Southeast Asia and its Oceanic distribution is consistent with transport direct from Island Southeast Asia to the Carolinas, rather than via Melanesia (Ross et al. op.cit.:230-1).

After pointing out that terms for rat in Melanesia are seldom species specific, the authors go on to list numerous cognate sets none of which prove to be relevant for Polynesia.

Polynesia

Three terms are distinguished in Pollex:

Set 1

Samoic Outlier SO Kimoa: Rat

EFU Kimoa: Rat

KAP Gimoo: Mouse

MAE Kimoa: Rat

MFA Kimoa: Rat

NKR Gimoo: Mouse

REN Kimoa: (*Rattus exulans rennelli*) (Ebt)

SAM 'Imoa: Rat

TOK Kimoa: Rat

WFU Kimoa: Rat

Set 2

PNP Kiore: Rat

EAS Kio'e: Rat (Fts)

HAW 'Iole: Rat

MAO Kiore: Rat

MQA Kio'e: Rat

MVA Kiore: Rat, souris (Rch)

PEN Kire: Polynesian Rat (*Rattus exulans*) (Cbl)

PUK Kiore: Rat (Mta)

RAR Kiore: Rat

REN Kioge: Rat

SAM 'Iole: Rat

TAH 'Iore: Rat, mouse

TIK Kiore: Rat (Arch.) (Fth)

TUA Kiore: Rat

Set 3

PPn Kuma: Rat

ANU Kumaa: Rat (Fbg)

EUV Kuma: Rat

MQA Kumakuma: Rat (Dln)

NIU Kumaa: Rat

ROT Kumaa: Baby rat

TIK Kumari: Rat (one informant only) (Fth)

TON Kumaa: Rat, mouse

It is hard to interpret these distributions. The oldest term seems to have been kuma which originated at the PPn level and was replaced in the PNP subgroup by kioli, and later, after reaching as far as Eastern Polynesia, entered the Outliers as kimoa.

Except for presence of both 1 and 2 terms in Samoa, and Rennell, and both 2 and 3 in Tikopia and the Marquesas, the terms are mutually exclusive, with explanations for the overlaps probably varying case by case.

Melanesia

Ross et al. (2011:236) reproduce the Set 1 and Set 3 cognate sets above from Pollex, but offer no explanation for them beyond mentioning presence of terms

for 'rat' in various PT languages from Milne Bay Province "that do not correspond regularly to *kimoa but show more than a passing resemblance".

Micronesia

An early view expressed by Tate (1935) is that rats followed a Micronesian rather than Melanesian route into Polynesia, but evidence is lacking from his own data which was limited to physical measurements of rat skulls and bones from various collections. In making his judgement, Tate took advice from the American anthropologist H.L. Shapiro, who provided a choice of two then currently proposed migration routes for Polynesians, the first by way of the Caroline, Marshall, and Gilbert Islands to Samoa, Tonga, and Fiji, which Tate accepted, and the other to Fiji via New Guinea and the Solomons (Tate 1935:147, 169).

Tate's Micronesian route is at least supported as a possibility by recently confirmed prehistoric presence of *R. exulans* in archaeological sites on the Mariana Islands of Western Micronesia, and Pohnpei, the Marshalls and the Polynesian Outliers of Nukuoro and Kapingimarangi in central-eastern Micronesia (Wickler 2004:35). Except for the two Polynesian Outliers, however (see Pollex above), linguistic evidence is not as reassuring. Perusal of available Micronesian dictionaries reveals present-day terms for rat as follows:

Terms for rat in Micronesia

Mariana Islands	geerh	rat	Jackson and Marck 1991:68
Woleai	gesh	rat, mouse	Sohn and Tawerilmang c.1976:58
Yap	boroq	mouse, rat	Jensen 1977:6
Truk	naakkich (nu)	rat, mouse	Goodenough and Sugita 1980:304
Puluwat	kereker	rat	Elbert 1972:47
Ponape	kitik	rat, mouse	Rehg and Sohl 1979:41
Mokil	kijesik winan	rat	Harrison and Salich 1977:41
Kusaie	kihsrihk	cat, rat, mouse	Lee 1976:45
Marshall Islands	kijdik	rat, mouse	Abo et al. 1976:142
Gilbert Islands	kimoa	mouse, rat	Sabatier 1971:191

It is a pity F.W. Christian did not make a comprehensive collection of animal names for Micronesia as he did for plants, as this would provide a check on

whether old terms have been replaced by new ones as so often appears to have happened with plants, and as he himself found out to be the case for 'pig'.

Except for Western Micronesia, most of the terms in the above table look enough alike to be related to each other. A clear external link is apparent, however, only in the Gilbert Islands, which has the Set 1 Polynesian term intact, and may well have borrowed it from Tuvalu where both the Set 1 and Set 2 terms are reported (Panapa and Lopati 1968:35).

The genetic evidence

Matisoo-Smith and Robins (2004) identify two lineages of *Rattus exulans* in Oceania, one in Near Oceania named Haplotype 2, and the other in Remote Oceania named Haplotype 3. Rather than accept two different paths for introduction of these two populations, the authors suggest that an identical route was followed in both cases, but Haplotype 3 failed to establish itself in Near Oceania because of competition from the earlier group. The authors believe that a search for *R. exulans* on offshore islands in Near Oceania where Haplotype 3 might have survived, could help settle whether this explanation is indeed correct, and further sampling in Micronesia itself could determine whether this was an alternative route despite Holocene sealevels which are assumed to rule it out except as a secondary introduction.

Summary conclusion

Pig

As one might expect from the large-scale presence of pig throughout Melanesia, it is no surprise to find linguistic support as well for the introduction of pig from this area into Polynesia. A Samoan legend, related by Buck (1958:318-9), that pig was smuggled into Samoa from Fiji seems credible.

Dog

The firmly expressed linguistic view is that the widely distributed Polynesian term for dog, PPn *kuli, has no secure cognates outside of Polynesia, and all appearances of it in both Melanesia and Micronesia are borrowings from Polynesia. This, however, leaves no apparent route by which dog could have reached Polynesia, so both Melanesia and Micronesia must remain in contention, with insufficient evidence as yet for either.

Chicken

Like dog there is a single reconstructable term for chicken in Polynesia, in this case PPn *moa. Like dog, also, it has no external cognates except loan words in either Melanesia or Micronesia, leaving its exact origin obscure.

Rat

Ultimately, it may be expected that Genetics is the discipline best equipped to solve the riddle of the rat in Oceania. As rats probably accompanied humans on most of their voyages of discovery and exploration, not to mention numerous later voyaging as well, and in consequence are now well represented in archaeological sites throughout the insular Pacific, this seems incontestable. But the very suitability of rats as a proxy carries corresponding disadvantages. In particular, as rats have been converging on Polynesia from all directions for longer than any other domestic animal, and have doubtless interbred, a highly complex web of interrelationships can be expected, and evidence for the proximate origin of Polynesians could be obscured. The study by Matisoo-Smith and Robins cited above, like so many genetic studies of late, focussed on the ultimate rather than immediate origins of Polynesians, so a change of focus is needed to address this problem which, especially, should set aside any preconceived ideas that this necessarily involved Lapita potters. In particular for rat as well as other animal species, a much extended sampling for analysis is needed for the whole of Micronesia as well as the north coast of New Guinea.

In brief, of the four Polynesian domestic animals considered in the present chapter, only pig can be confidently assigned to a Melanesian route into Polynesia, and even in this case, if the Samoan origin legend is accepted, was a result of relatively late borrowing out of Fiji.

Chapter 13 Betel, Kava, and Toddy

In 1914, the British anthropologist W.H.R. Rivers set the scene for future controversy on this topic with the publication of his ambitiously conceived book *The History of Melanesian Society*. In volume 2 of this work he proposed three groups of migrants into Island Melanesia named by him in order of arrival as dual people, kava people, and betel people of whom the first is characterised as matrilineal and all three as Austronesian. But the book was written at a time when very little was known about mainland New Guinea so there is no mention at all of Papuans who may have been involved, and the book is additionally highly flawed with its attribution of every trait to yet another migration of one or other of his primary groups, probably on the basis of diffusionist theory, though this is nowhere indicated except by constant talk of "influences" and cultural strata. Shorn of these unwelcome encumbrances, however, Rivers's basic concept remains sound. The problem he had set himself was how to explain apparently different distributions of the two narcotic plants, kava and betel. In his own words, though he went on immediately to discuss exceptions:

There is nothing more striking in the distribution of objects throughout Melanesia than the respective ranges of the two substances, kava and betel. Kava is found in the southern and eastern islands of Melanesia, as well as in Polynesia, while betel is used in the north-western part of Melanesia (Rivers 1914 (2):243).

BETEL

Reminiscent of London's problem with chewing gum, a common sight in towns where betel is used is pools of red expectorant on the pavements. Betel is a product of the betel-nut palm, *Areca catechu*, which provides a nut that is chewed as a stimulant together with a pepper (*Piper betel*) and crushed lime (Bellwood 1978a:139). Chewing induces salivation, and the presence of lime turns the chewed mass bright red (Ross 2008:392).

Some people swallow all but the initial burst of saliva, whilst others spit out the red masticate. Initially, chewing leads to a very short-lived dizziness, followed by a sense of renewed wakefulness (Ross 2008:loc.cit.).

Distribution

Betel is grown from India, through Southeast Asia, to as far east as western Micronesia and the Santa Cruz Islands (Bellwood 1978a:139). It is common in western Micronesia: the Palaus, the western Carolinas, and some islands in the

Marianas, (Barrau 1961:66), but is altogether absent in Polynesia and areas of Island Melanesia from Vanuatu southwards. Its primary area of incidence is New Guinea and the Solomons.

Christian contrasts use of betel in the Philippines and Western Micronesia with preference for kava in Pohnpei:

The habit of Betel-nut chewing practised so universally in the Philippines, the Mariannes, the Pelews and in Yap, somehow has not taken root firmly amongst the Ponapeans, who appear to find the stimulus of Kava-drinking sufficient for their needs (Christian 1899:334).

For Melanesia, Malcolm Ross cites a lengthy cognate set of POc *buaq 'betelnut, areca nut, palm, Areca catechu' in Adm, NNG, PT, MM, TM, SES, and SV (two only terms from this area), together with another set for the betel pepper vine POc *[pu-lpulu 'betel pepper, Piper belle' for Adm, NNG, MM and SES (Ross 2008:393-5). This provides evidence of betel in present-day Austronesian-speaking areas of northern Melanesia, but not necessarily in POc times as the terms are not exclusive to betel but have a huge range of other meanings. Self-evidently also, as Ross's lexicon project is concerned only with speakers of Austronesian languages, it is necessary to look elsewhere for any indication of betel among Papuans. This can be found, as it happens, by turning once again to musical evidence.

Just as a smoker may carry a pack of cigarettes or a box of matches, an essential accoutrement for betel users is a portable container for the lime used with the plant. At a sing-sing, if the dancer is not carrying a kundu hand-drum his lime pot may be pressed into service as a percussion instrument, either by tapping it or by rubbing it across the opening with the associated licking stick.

The only West Papua reports for lime pots as a musical instrument are from Kamoro and Marind at opposite ends of the south coast. There is a small concentration in the Sepik, another on the Highlands/Morobe border, and more extending into the Central province and Milne Bay, with one only in the Solomon Islands, and none at all reported for the Bismarck Archipelago, though this could result from lack of information rather than true absence. There is nevertheless a gradient of incidence along the entire length of New Guinea, with Papuan-speaking areas dominating in the west, and Austronesian-speaking ones more significant in the coastal areas of the east. In detail:

Lime pots as musical instrument

In order of map reference

AN = Austronesian

NAN = Non-Austronesian

WEST PAPUA

Kamoro	029	NAN
Marind	042	NAN

SEPIK

Tumleo	106	AN
Ulau-suain	108	AN
Maprik	114	NAN
Iatmul	138	NAN
Bahinemo	139	NAN
Kaningara	140	NAN

HIGHLANDS

Agarabi	233	NAN
Binumarien	234	NAN
Gadup	235	NAN
Tairora	236	NAN

MOROBE

Adzera	253	AN
Waffa	262	NAN

CENTRAL

Mekeo	339	AN
Humene	355	NAN
Sinagoro	358	AN
Keakalo	361	AN
Keagolo	362	Uncertain

MILNE BAY

Mailu	367	NAN
Iduna	381	AN
Bwaidoka	382	AN
Duau	385	AN

SOLOMON ISLANDS

Ulawa	AN
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The direction of introduction cannot be judged from the above information alone, but the extent of Papuan involvement makes it unlikely to have originated either from AN speakers or to have moved from east to west. In view both of this and the absence of either betel or a term for it south of Vanuatu, it may be that reconstruction to POc is wrong, and this reconstruction can more appropriately be assigned to the post-Lapita subgroup of PWOC, and the plant would have been a borrowing in the first instance from Papuans.

KAVA

Unlike betel, which is prepared and used by individuals who carry the dry ingredients with them, kava is a drink, prepared and consumed in social context.

The kava plant, *Piper methysticum*, is a many branching plant with rounded green leaves. The plant is grown, usually near houses, exclusively from cuttings, and a narcotic is made from it in parts of Remote Oceania. Traditionally kava is consumed as a drink. The root is first reduced to small fragments by chewing, grinding or pounding. The fragments are deposited in a bowl, mixed with water and strained through the cloth-like fibre of a coconut spathe to give a cloudy grey liquid. In Fiji, Tonga and Samoa the liquid is made from mature roots, is of low strength and plays a part in various ceremonies. In Vanuatu it is made from the roots of green plants and often has a much greater narcotic effect. Initially it causes the blood vessels in the lips and tongue to contract with a certain numbing effect. The drinker then senses some degree of euphoria, followed by a sense of calm well-being and clear thinking and a general relaxation of the muscles (Ross 2008:395-6).

When kava first came to the attention of Europeans in the journals of eighteenth century navigators such as Captains Cook and Bligh, the most probable reaction would have been horror and disgust because of the then common method of preparing the drink from collected saliva resulting from group chewing rather than pounding of the root, and because of the consequences of excessive use which included a skin condition similar in appearance to leprosy. Thus, as reported by Bligh for Tahiti: "It is drank four or five times a day, and the operation of making it, is as filthy as the Use of it is punicious." (Bligh 1789:1, 382 cited by Oliver 1974:256). In modern Polynesia, kava use is now restricted to Samoa and Tonga, and more recently Hawaii (Allaby 2007:186), where preparation does not involve chewing.

Distribution

Like many Oceanic food plants, the kava plant is sterile and consequently dependent on humans for propagation, making it a useful indicator for migration studies.

Polynesia

Pollex has the following full range of cognates for Polynesia, reconstructed to PPn *kawa A plant sp. (*Piper methysticum*) and drink made from it

ANU, EAS, ECE, EFU, EUV, HAW, MAE, MAO, MFA, MQA, MVA, NIU, PEN, PUK, RAR, REN, ROT, SAM, TAH, TIK, TON, TUA, WFU, WEV

The list includes a term from NZ Maori who did not have the narcotic kava plant, but applied the term to the similar 'kawa (Kawa): A shrub (*macropiper excelsum*)'. Maori did, however, have a memory of kava, demonstrated by the text of an ancient incantation which begins with the otherwise meaningless phrase 'Beat the kawa, water the kawa' (Biggs 1964:46).

Micronesia

In Micronesia, kava appears to be limited to the Caroline Islands, and is known there by the different name, sakau. This word, however, is not unique to kava but, as Christian makes clear, is applied both in the Carolines and elsewhere in Micronesia to coconut toddy and to strong drink of all kinds:

Ponapean chakau, choko, (1) the kava, (2) strong drink in general, chika-lewi, taka-rui, coco-nut toddy; Kusaie seka, (1) the kava, (2) strong drink of all sorts, saka, coco-nut toddy; Mortlocks sakau, soko (id.); Mokil and Pengelap sakau, coco-nut toddy, saka-maimai, (1) the sweet unfermented toddy, (2) molasses; Ngatik thakau, thakarui, strong drink, toddy; Gilbert Islands taka-maimai, sweet toddy, taka-ruoruo, sour, fermented toddy; Marshall Islands saka-maimai, sweet toddy; Malay tûak, tuâk klâpa, coco-nut toddy. In Philippines the vinegar prepared from sour toddy is called suka, tuka, suko, tuko. Cf. Japanese sake, saka, rice-spirit, wine, strong drink in general (Christian 1897:139).

Christian continues with an alternative set of terms for toddy used in the central and western Carolines. (considered in the next section under the heading of Toddy). It would appear that the sakau term has overtaken both the original one for coconut toddy and the one for kava, whatever that may have been.

Christian's suggestion that sakau was a loan word from Japanese seems unlikely at first sight but merits serious consideration. Christian claims the presence of numerous such loan words in Micronesia which he attributes to

early Japanese trading voyages (Christian 1897:123-4). If any such voyages occurred, it would seem not improbable they would come equipped with saki as a trade item.

Melanesia

Malcolm Ross notes that besides presence in Remote Oceania, kava is also consumed in scattered areas of New Guinea and the Bismarcks where introduction is believed to have been recent, and reconstruction of a term for it to Proto Oceanic is not to be expected. The term is, in fact, present, but only in the broad, general sense of "potent root" as deduced in a paper of this name by Lynch (2002). In this paper, Lynch has effectively solved the problem of the origins of kava. In his own words:

Botanical evidence suggests that kava, *Piper methysticum*, may have first been domesticated in northern Vanuatu, and this implies that no Proto-Oceanic term can be reconstructed with this meaning. The dissimilarities between widespread terms for 'kava' like *maloku* in northern Vanuatu, *yaqona* in Fiji, and kava in Polynesia have complicated the issue, making it unclear what the earliest reconstruction might be. I show in this paper, however, that the term kava apparently derives from a Proto-Oceanic term **kawaRi*, which referred to a root with special psychoactive and/or ritual properties: probably a species of ginger (*Zingiber zerumbet*), and possibly also to "wild" kava (*Piper wichmannii*) and to plants used in stupefying fish. This form apparently underwent a semantic and formal change, and was applied to kava when it was first domesticated. Later lexical changes in Vanuatu and Fiji are investigated, and a chronological sequence for the spread of kava--including spread from some Polynesian source to New Guinea--is proposed (Lynch 2002: Abstract).

The Rivers dilemma

The question now to be answered is whether Lynch's contribution to solving the problem of the origin of kava has thrown light on the basic question posed by Rivers so many years ago. To recap: betel is prominent from Vanuatu north-westwards, and kava from Vanuatu south-eastwards, but although kava is also present in the Bismarck Archipelago, mainland New Guinea, and Micronesia, all north of Vanuatu, it is absent in the intermediate area of the Solomons, so how did it get to these northerly areas? It is a problem that has seemed impenetrable but largely, perhaps, because the woods have been obscured by the many trees. In addition to Rivers 1914, Lynch 2002 and Ross 2008, already considered, contributors to the debate have included Brunton 1989, Lebot 1991, Kirch 2000, Geraghty 2004, and Allaby 2007. Lebot calls the Melanesian evidence "puzzling", and an aspect of the problem, which he does not mention in his conclusions, is how to account for kava in Ponape. To judge from the

small degree of consensus that can be gleaned from these authors, Samoa must have received kava from Northern Vanuatu, Ponape from Samoa, and New Britain from Ponape, after which it moved into mainland New Guinea. Proposal of this roundabout route becomes necessary because of apparent absence of kava in the Solomons, which lie on the direct route between Vanuatu and the Bismarcks. But it cannot be assumed that kava was never in the Solomons. Lebot has shown that the kava plant, which is dependant on humans for propagation, quickly becomes extinct in an area if kava ceases to be used there, as has happened most recently in the Marquesas Islands and Hawai'i in Eastern Polynesia. In the latter case the practice of kava drinking died out because of missionary intervention, and was doubtless replaced by alcohol. If the Solomon Islands once had kava, it could have become extinct at any time within the past 3000 years, leaving no trace of former use. A likely trigger for abandonment of kava would have been adoption of betel as a preferred intoxicant, as proposed by Rivers, accounting for the current almost mutually exclusive distribution of the two, betel in PNG, Western Micronesia, and the Solomons, and kava predominantly in remaining areas. This also makes explicable the presence of kava in the Solomon Islands Outliers of Tikopia and Anuta, which have been profoundly influenced from the Solomons in other ways as well. Another outcome of this scenario is to remove necessity for kava to have either reached Ponape from Samoa or the other way round. Lebot rules out the latter because the kava plant would not have survived in the atoll environment of most of the Polynesian Outliers, but this would apply equally to introduction from Samoa. The likelihood, then, is that kava reached all areas from an initial base in northern Vanuatu or the Solomons, with Vanuatu as the favoured location because of the presence there of related species of *Piper* from which the kava cultivar could have been developed. A corollary of this scenario is a route for kava into Samoa and Tonga, not necessarily from Fiji, where the name for it is different, but via Solomon or Vanuatu Outliers, either following an established route or creating one. It may never be known what kava was called in the Solomons before it dropped out of use there. Possibly it was already known as kava, or this term was adopted some time after the kava complex reached the Solomon outliers. Later, after establishment in Tonga it went by retro movement from there into the southern areas of Vanuatu which currently still know it by the kava name.

Toddy

Barrau provides essential information as follows:

In Micronesia the sweet sap, or toddy, which runs from the young, broken inflorescence of the palm is an important item of diet. The inflorescence, while still in the spathe, is shaped into a long cylinder by a binding of plaited coconut fibers. The end is cut off daily to allow the sap to drip from the cut surface into a coconut shell or bottle suspended from the extremity. The yield is approximately two pints in 24 hours.

The fresh toddy, which contains 15 to 16 percent sugar, is diluted with water for a beverage. If allowed to stand, toddy ferments rapidly, and within about 15 hours contains 6 percent alcohol. The yeasts responsible are rich in vitamins of the B group. The use of fermented toddy has been introduced by Europeans into certain Polynesian islands, notably the Marquesas, where it was quite unknown in early times. When concentrated over a low flame, toddy becomes a type of molasses, known as kanwimai in the Gilbert Islands. This is used in a number of dishes (Barrau 1961:38-9).

Comparison of cognatic terms shows toddy to be a predominantly Micronesian drink which has spread from there into Polynesia, but not exclusively at the hands of Europeans as Barrau seems to suggest. Pollex has a set of terms as follows:

- ECE Kaleve. :Fresh juice from coconut spathe (Rby)
- GIL Kareve. :Toddy; juice from coconut spathe; palm wine; sweet
- NKO Galeve. :Sap taken from inflorescence of coconut tree
- OJA `Aleve. :Fermented coconut juice
- PUK Kalewe. :Juice from young Coconut flower shoot (Mta)
- SIK Kaleve. :Sap from coconut tree collected for various uses including molasses (Donner)
- TAK Kareve. :Coconut toddy
- TOK Kaleve. :Sap extracted from bud of coconut tree

All except the Gilbert Islands (Kiribati) are Western Polynesian, including Outliers. Samoa, Tonga and Eastern Polynesia are notably absent, ruling this distribution out as potentially PPn and confirming it as most likely relatively recent.

For Micronesia, in the section on kava (above), in information supplied by Christian, the presence of coconut toddy has already been noted for the Gilbert Islands (Kiribati), Marshall Islands, Ponape, Kusaie, Mokil and Pengelap in Micronesia, where toddy is given the same name, sakau and cognates, as used for kava and strong drink generally. Thus far there is no resemblance to the Pollex terms. Christian, however, has more to say:

Another set of words occur idiomatically in the Central and Western Carolines: Mortlocks ati, Yap atchif, Uluthi kati, Ruk ati, Lamotrek and Ifalik kárri, kásri, Satawal and Pulawat kási, kásri, Uleai kárri, kúrri, Sonsorol gasi, St. Davids gati (Christian 1897:139).

Unequivocal connections between the two areas are Pollex aleve OJA, Galeve NKO, Kaleve ECE, Kaleve SIK, Kaleve TOK, Kalewe PUK, Kareve GIL, Kareve TAK, and Christian's kárri, kási, kásri, kásri, kati, kúrri, from the Carolines. With the remaining Pollex terms added, this establishes a clear line

of connections from the Carolines to the Marshalls, Kiribati and Tuvalu, together with a string of Outliers from Nukuoro, to Ontong Java, Takuu and Sikaiana, as well as Tokelau and Pukapuka in Western Polynesia, all connected on account of this quintessential Micronesian beverage.

Chapter 14 Sea levels

If Micronesians contributed to the peopling of Polynesia, the path they took must have included atolls. The major obstacle for believing that this may indeed have happened, lies with sea levels and associated radiocarbon dates for Micronesian settlement. Kirch (2000:174) refers to Sea levels 1 to 1.5 m higher than at present between 2000 BC and AD 1 when atolls are assumed to have been unoccupied. This was followed by emergence of atolls when the present low sea level was reached by about AD 1 and the atolls became available for occupation. These dates of about 4000 BP and 2000 BP respectively have been accepted by most anthropologists, ruling out Polynesian contact from Micronesians until after the latter date. Review of the scholarly literature relating to sea levels, however, throws doubt on both of these estimates as well as assumptions underlying much of the research.

Geological ages and the "ring of fire"

The coming of humans to Oceania has occupied only a tiny blip on the vast panorama of forces that shaped the environment they would ultimately occupy. Beginning with a single super-continent that joined present-day Antarctica with South America, New Zealand and Australia, the process of continental drift separated them and created the Pacific Ocean with its tectonic plates and under-sea mountain ridges and deep-sea trenches that are still on the move, creating areas of subsidence and uplift that at times are sufficiently violent to generate tsunamis powerful enough to wipe out coastal communities and island habitats. Other movements are so slow as not to be readily observable, as demonstrated by the little island of Niue in Western Polynesia, which has undergone a rollercoaster ride since its creation:

Around 600,000 years ago, Niue was an atoll, barely rising above the ocean surface. Then, as it was carried westward on the moving Pacific Plate toward the Tonga-Kermadec Trench, it began ascending the eastern side of the associated bulge. It has now been uplifted about 70 meters and is about halfway up the bulge. After the island has passed over the crest, it will begin to subside, eventually being drowned and perhaps ending up wedged against the western wall of the Tonga-Kermadec Trench just as Capricorn Seamount is today (Nunn 2008:22-3).

Meanwhile, around the outer fringes of the Pacific, occupied by the so-called "ring of fire" with its active volcanoes and earthquake zones, more dramatic

events have occurred, including, at times, the appearance or disappearance of entire islands.⁵

The process of island formation encompasses the entire spectrum of geological time in Oceania, beginning essentially with the creation of the world and ending with the present day.

Types of island

Three broad categories of island can be distinguished, known respectively as volcanic, atoll, and makatea. Taking climate and vegetation into account, Oliver (1961:10-13) subdivides these into seven basic types, two volcanic, three coral atoll, and two makatea. The term "volcanic" does not in this sense refer necessarily to volcanoes but rather to volcanic processes of island formation.

- Weathered volcanic islands are arguably the most attractive on which to live. They are mountainous high islands with a variety of plant environments and resources. Typical examples include Hawai'i, the Society Islands, and Samoa, and the Micronesian island of Pohnpei (Ponape) is also in this category.
- Unweathered volcanic islands include the Northern Marianas of Micronesia. They have less soil and vegetation than the weathered islands but are still capable of supporting moderate numbers of people.
- Treeless atolls or coral islands lack good soil and drinking water, and support only sparse vegetation, making them unsuitable for permanent occupation. Canton Island in the Phoenix group of Eastern Micronesia is an example.
- Dry forest atolls or coral islands. In this category are most of the Marshall Islands of Micronesia, along with Tuvalu in Western Polynesia, and many of the Tuamotus and Northern Cook Islands in Eastern Polynesia. Strand flora, arable soil and fresh water, coupled with plentiful marine resources, provide support for limited numbers of people.
- Luxuriant moist atolls or coral islands. Typical examples are Kiribati and Ulithi in Micronesia, and the Tokelau Islands in Western Polynesia. These are the idyllic coral islands of Hollywood and romantic fiction. They have sufficient soil to support both dry and wet land crops.

⁵ Considered at length by Nunn 2008.

- Raised coral islands. These islands grew as a result of successive upthrusts of old coral reefs, resulting typically in the formation of a limestone plateau bounded by steep cliffs on the seaward side. This plateau, known as makatea in Polynesian languages, has thin pockets of soil with dryland vegetation, and few sources of fresh water. Coconuts and other food plants can grow fairly well in the available pockets of soil but droughts are a frequent limitation on agriculture. Examples of makatea islands are Niue in Western Polynesia and Nauru in Micronesia, both valuable for their deposits of phosphate.
- Also ranking as makatea is a category Oliver calls Mixed islands, combining the characteristics of volcanic islands with makatea. Examples are Guam, Saipan, and Rota in the Mariana Islands of Western Micronesia, and Mangaia in the southern Cook Islands of Eastern Polynesia.

Atoll formation

Common to most atolls is a circular coral reef enclosing a lagoon which may or may not be occupied by a small island or islets whose height does not, as a rule exceed three or four metres above sea level. On the seaward side of the enclosing reef, however, the sea plunges to great depths. The earliest explanation of this, to be refuted by Charles Darwin, was a seemingly plausible idea that the reef must surround the crater of a sunken volcano. Darwin realised, on the contrary, that the commonly present islet in the centre of the lagoon was a remnant of a sinking mountain upon the flanks of which the coral reef was embedded. As the central structure continues to sink, the corals keep pace by building upward and outwards. All that is now known about coral islands supports this hypothesis, which remains a tribute to Darwin. In the Pacific, especially, it neatly explains the various forms that atolls take, demonstrated as follows by Fischer (1956:4) for the Eastern Caroline Islands:

- Stage 1 is a fringing reef. Kusaie is the closest to this stage.

It is a high island with only a narrow reef around it and no large deep lagoons between the reef and the shore.

- Stage 2 is a barrier reef, demonstrated by Ponape which is further along in the process.

As the island has subsided the sea has drowned the lower parts of the river valleys. Around most of the island the reef is separated from the mainland by a deep lagoon, although the lagoon is lacking on parts of the southeast coast.

- Stage 3 is disappearance altogether of the central island, exemplified by Truk, which is sometimes described as a complex atoll. The land has sunk

so much that the land mass has been broken up and only the tops of the highest mountains show above the water. The encircling reef is five to twenty miles distant from the main islands. The numerous atolls among the low islands illustrate the completion of the development.

Readers may have noticed that although Fischer is speaking of atoll development in the above descriptions, he has chosen high rather than typically low islands to exemplify the first two stages. This serves to illustrate two important elements of Darwin's theory which could be otherwise overlooked. First, as Darwin himself took pains to emphasise in his writing, his theory of atoll development, unlike the volcanic crater theory it superseded, accounts for barrier reefs in all situations, including continental ones such as the Great Barrier Reef of Australia. And secondly there is no suggestion that all such events took place at the same time. To the essential element of subsidence in Darwin's theory, however, must be added the complication of sea level rise and fall, considered next.

The tides of time

Every one familiar with the sea is aware of the daily rise and fall of the tides, and perhaps also of longer-term highs and lows known as spring and neap tides. On a scale of centuries and even millennia, however, are the accumulated results of tiny increments of not more than a millimetre or two a year, though closer scrutiny may show the effect to be taking place not uniformly but in unpredictable jumps. Scientists have long known that these fluctuations result from changes in the volume of sea water, caused principally by formation and later melting of polar ice in an eons-long cycle of successive Ice Ages and Interglacials. From the perspective of human history, just two of these eras are relevant: the closing years of the last Ice Age or Pleistocene, and the most recent and still current interglacial period or Holocene, defined as beginning 10,000 years ago.

A note on method

A term to be found in most of the scientific literature on sea levels is "eustatic", referring to world-wide processes affecting sea levels, in contrast with local or regional ones. An unspoken assumption behind the term is the common sense belief that water finds its own level, and consequently, as the oceans of the world are interconnected, a change of level in one ocean will sooner or later flow through to the others. On the other hand, mariners have known for generations that sea levels are not the same everywhere, and anyone who has been through the Panama canal since its opening more than a century ago will probably be aware that the mean sea level at the Pacific end of the canal is eight inches or twenty centimetres higher than at the Atlantic end, leading to evidently erroneous speculation that the Pacific would somehow drain into the Atlantic if the canal had been at sea level.

As a debate this is not unconnected with problems confronting the scientists whose work until the 1970s centred upon the measurement of old shore-lines in order to chart eustatic sea levels. It was not until the following decades that attempts were made to come to grips with the many non-eustatic variables that were affecting results.

Sea level chronology

The following are dates and events as accepted currently by most writers, and reported principally by Nunn (2008). All dates are approximate.

- 30,000-17,000 BP. Last Ice Age (Nunn 2008:20). Sea levels were substantially lower than today, allowing movement of peoples along now submerged coastal areas, or across land bridges that no longer exist. During this period Papuans may have reached as far as the Bismarck Archipelago and the northern Solomons.
- 18,000 BP. Coldest period of last Ice Age. Sea level c.120m lower than today (Nunn 2008:30).
- 15,000 BP. End of last Ice Age (Nunn 2008:30). As ice sheets melt, sea levels begin to rise, doing so non-uniformly in a series of steps, punctuated by periods of slower rise. Atoll building keeps pace within reach of sunlight in the "photic zone" (Nunn 2008:28), a short distance below the surface.
- 14,200 BP. CRE-1, first of three Catastrophic Rise Events. Sea level rises 13.5m in 290 years (Blanchon and Shaw 1995).
- 11,500 BP. CRE-2, second of three Catastrophic Rise Events. Sea level rises 7.5m in 160 years (Blanchon and Shaw 1995).
- 7600 BP. CRE-3, last of three Catastrophic Rise Events. Sea level rises by as much as 6.5m in 140 years (Blanchon and Shaw 1995; Nunn 2008:76). According to Nunn (2008:78) this provoked movements by coastal-dwelling peoples of SE Asia that resulted ultimately in the Lapita expansion.⁶
- 4000 BP. Sea levels risen to about 1.5-2.1m above current levels. At this point coral reefs are exposed at low tide forming a base for atoll formation as sea levels subsequently fall (Nunn 2008:30-1, note 62). Cites Grossman et al. 1998 for this date and elevation. The fall after 4000 BP results

⁶ CRE 3, together with the previous two CRE events is deduced from changes in Atlantic corals of the West Indies but is evidently deemed to have affected the Pacific equally.

principally from a process known as equatorial ocean siphoning, which redistributes equatorial water back towards the poles (Mitrovica and Peltier 1991; cited by Dickinson 2003:489). In Fiji sea level has fallen a net 1.5-2.1 meters in the past 4,200 years (Nunn and Peltier 2001, cited by Nunn 2008:Ch.3, note 62,63. Dickinson 2003).

- 2000 BP. Atolls believed now sufficiently developed for occupation (Nunn 2008:33, note 63). Cites Dickinson 2003.

Although widely quoted in sea level literature, there are huge margins around most of these dates, both chronologically and geographically, and results for individual islands are especially open to question as will be seen in the next section. Terms frequently to be met with in it are "highstand", referring to sea level elevations above present, and "crossover", which is a term used by Dickinson for the date at which atolls are said to have become available for occupation, calculated as the date "at which declining high-tide level fell below mid-Holocene low-tide level". (Dickinson 2003:489).

Surveys of sea level literature

Three major surveys have been published. Pirazzoli and Pluet (1991) reports upon a database of 77 regions from around the world, including islands of Oceania. Grossman et al. (1998) updates and refines results from the same database, and Dickinson (2003) reaches radically different conclusions about dates after reinterpretation of earlier studies, including a comprehensive survey of his own, published just two years previously (Dickinson 2001).

It can safely be assumed that the starting points for potential migrations into Polynesia, whether from Micronesia or from Melanesia, would have been high islands, and for these sea level data is irrelevant as occupation of these islands would have been possible at any time, even if present-day strand areas were absent. In this category are the Fiji Islands as the most likely portal out of Melanesia, and the Marianas, Yap, Palau, and Ponape in Western and Central Micronesia, along with the raised coral island of Nauru, halfway between Western and Eastern Micronesia, which could have acted as a way station between these two areas. It is instructive, nevertheless, to begin with them for the light they can shed on past sea levels generally.

Fiji

From research carried out in 1988, Pirazzoli and Pluet (1991:145-7) document a gradual rise from c. +1 m to +2 m in Vanua Levu between 6000 and 4000 BP, followed by a sudden sea-level drop which occurred some time later than 3400 BP.

On the southern coast of Viti Levu a gradual rise is calculated to have taken place from 8000 to 4000 yr BP, when sea level reached a peak at about +1 m, followed by a fall to the present situation probably before 3000 yr BP and an almost stable state since that time.

On the face of it, this is a highly important departure from the prevailing view that sea levels were a metre or more above present 4000 years ago and did not decline to present levels until 2000 BP when atolls are said to have emerged. If the above information is correct, in the critical Fiji area reached by Lapita potters, the peak of the sea level rise is confirmed at 4000 BP, but reached and maintained present levels at least a thousand years earlier than the 2000 BP estimate, at the very time the Lapita people were moving on to Tonga and Samoa.

Two further sets of results are reported by Grossman et al. (1998), the one in agreement with the above and the other conflicting with it. One or other, therefore, must be wrong. The contrary results, all dated in the 1990s, suggest Fiji underwent a sea-level highstand 1.5 m higher than present between 3000 and 1000 BP. On this reckoning, sea levels could still have been higher than present a thousand years later rather than earlier than 2000 BP, which might therefore be regarded as a reasonable average.

Even greater non-convergence of results, however, emerges from work by Dickinson 2003:494 who places the inferred end of highstand in Fiji at 1200 BC and "crossover date" when atolls would have emerged at AD 500 or 3200 BP and 1500 BP respectively, both much later than earlier estimates. With such disparity of results, some explanation is in order before proceeding further:

Problems of interpretation

In view of all that is known about vulcanism, plate tectonics, and a host of other variables that can affect apparent sea levels, it is surprising that little or no account was taken of these in earlier work on sea levels. Instead, it seems that elevations of former shore lines were interpreted solely on a model of world-wide eustatic change taking place uniformly and at similar rates everywhere.

Pirazzoli and Pluet begin their world survey with the observation that if all of the 1960s and earlier results were accepted

sea level would have had to be, at one and the same time, higher, equal, and lower than at present and remain stable, though at the same time fluctuating (Pirazzoli and Pluet 1991:4).

Nor was this all. Subsequent efforts to make sense of disparate results have run into similar difficulties, largely, it would seem, because of neglect of local and regional variables. Thus, in their summing up, Pirazzoli and Pluet observe:

The average of all curves since 10,000 yr BP is a relative sea-level drop of about 8 m. This value, which reflects the predominance of glacio-isostatically uplifted areas in the sample of curves available, is obviously no more representative of the global eustatic situation than would be, for the last century, the average of all tide-gauge records . . . The high variability from place to place confirms indubitably that it is impossible to estimate directly, from field data alone, the amount of the eustatic change since 10,000 yr BP (or since any other time) (Pirazzoli and Pluet 1991:231).

Also to be noted are some useful observations about the role of models in the interpretation of sea level data. The authors warn:

. . . when predictions are compared to field data, discrepancies usually exist and it is difficult to ascertain whether they are due to non isostatic causes (tectonics, ocean dynamics changes, etc.) or to insufficiently accurate assumptions used by the models (Pirazzoli and Pluet 1991:34).

Using an augmented version of the same database, Grossman et al. (1998) reach similar conclusions. The need for a regional approach even to so basic a concept as mean sea level is apparent from one of their findings that because of gravitational anomalies relative to the earth's centre, sea level can vary by up to 180 m from place to place, with the result that "mean sea level (msl) in the world's oceans more closely resembles the pitted surface of a golf ball rather than a smooth sphere." Inclusive of this effect:

The dominant forces that influence Holocene sea-level movements are: (1) climatic and oceanographic variation; (2) glacio- and hydroiostatic redistribution of Earth's mass in response to ice-sheet advance and retreat; (3) paleogravitational variation in the geoid; and (4) changes in the morphology of ocean basins and margins due to tectonism.

Only the second of these is relevant to eustatic change.

Additional to the above, examination of the database led the authors to the fairly pessimistic conclusion that:

Errors including those from measurements of elevation, age, tides, tectonics, wind and wave set-up, storm deposition, and environmental interpretation, make the uncertainty of the paleosea-level estimates comparable in magnitude to the marginal changes we want to understand.

Finally, taking account of variables such as those alluded to by the above authors, Dickinson 2003 is an attempt to reconcile both field data and theoretical predictions of sea levels with radiocarbon dates not only of emergent reefs but also of island occupations as recorded by archaeologists. Adjustments were made both to the occupation dates and to dating from reef samples to take account of differing proportions of radiocarbon in sea water compared with terrestrial carbon. Other adjustments to data were also made, including elimination from the sample of materials judged uncertain or unacceptable for other reasons (Dickinson 2003:490).

The Micronesian connection

A. WESTERN MICRONESIA

As elsewhere in remote Oceania, the probable direction of settlement in Micronesia is from west to east. The oldest known settlement dates are in the Western Micronesian areas of the Mariana Islands, Yap, and Palau at about the same time as Lapita settlement in the Bismarcks, but these dates are pushed back more than a millennium earlier than Lapita by paleoenvironmental evidence suggesting colonisation of the Marianas by 4800 BP, and Palau by 4500 BP (Wickler 2004:29). It will be noted that this is considerably before sea levels are thought to have begun their decline to modern levels.

Mariana Islands

There are two reasons for highstand not to have operated as a barrier to settlement in the Marianas. First, Guam and Rota are high islands which would have been ready for occupation at any time, and, second, they were subject to tectonic uplift, cancelling out any sea rise there might have been.

At Rota, Pirazzoli and Pluet (1991:143) report a 3-4.5m highstand at 4000-3000 BP and a lesser one at 2500 BP. " In Guam, a standstill at +1.8 m lasted from 5100 to 2900 yr BP." Grossman et al. (1998) report 1.8m between 6000 and 4200 BP but attributed entirely to tectonic uplift. Dickinson (2003:493) places the end of highstand at 3200 BP and crossover at 2100 BP, with human occupation occurring perhaps 300 yrs after sea level began to fall, long before the so-called crossover date which is irrelevant in the Marianas because of its combination of high island status and presence of uplift during the critical period that preceded occupation.

Yap and Palau

Comparative information is not available for Yap and Palau, but they occupy the same island chain as the Marianas and their history may not have been much different.

B. CENTRAL CAROLINE ISLANDS

As a homeland habitat for future excursions into Eastern Micronesia, the central Caroline Islands are a mix of high and low islands. Primary among them is the high island of Ponape (now Pohnpei) which would almost certainly have been the first to be occupied. Another high island of significance is Kusaie (now Kosrae), mentioned earlier, the furthest east island of the group which would have been a convenient springboard into Eastern Micronesia when settlement of this area began. Also to be noted is presence of atolls in the group, which would have ensured thorough familiarity with atoll environments as soon as these became available for exploitation.

Ponape

This is the garden island which has emerged in every chapter of the present book as the most likely starting point for migrations into Eastern Micronesia. It is mountainous and fertile, with plentiful water and abundant natural resources. Pirazzoli and Pluet (1991:143) report a sea level rise of about 0.8m at 5500 BP but provide no further detail. Grossman et al. (1998) were able to find only inconclusive sea level evidence for this area, and Dickinson (2003) makes no mention of it at all. As a high island, however, crossover points have no relevance for Ponape and, like other such islands, it could have been occupied at any time.

C. THE EASTERN ATOLLS

East of the Carolines lie the Eastern Micronesian atoll chains of the Marshall Islands and Kiribati (formerly Gilbert Islands), together with Tuvalu (formerly Ellice Islands) in Western Polynesia, though long associated under colonial administration with Kiribati as the Gilbert and Ellice Islands Crown Colony, leading to much intermingling of cultural traits between the two. But this is not the only connection.

In this area, referred to generally in sea level literature as the central equatorial Pacific, Grossman et al. (1998) calculate a middle to late Holocene sea level highstand peaking at 1 to 2 m above present between 5000 and 1500 BP.

By contrast, for the Marshalls, Kiribati, and Tuvalu collectively, Dickinson (2003:494 Table 1) assesses the end of highstand at 2200 BP, and crossover not until AD 1100. Later in the paper, however (Dickinson 2003:498), he sites occupation dates for the Marshall Islands of AD 100-400, a full 1000 years earlier than his newly calculated crossover date that, by definition, is meant to mark the earliest date by which occupation would be possible. Dickinson does not acknowledge this as a conflict but concedes:

Evidence for human occupation well before the crossover date implies that habitable islets had begun to grow on atoll reefs while mid-Holocene paleoreef flats were still intertidal.

In explanation, Dickinson attributes this anomaly to higher tides in the central Pacific than elsewhere which would favour greater deposition of reef materials.

Important to note is that both this example of pre-crossover settlement and Dickinson's explanation of it is particular to the very area that would have been a path for Micronesians if they contributed to the settlement of Polynesia, blowing a hole in the entire concept of crossover as a necessary precondition for settlement, which anthropologists have believed for years, primarily on the authority of Dickinson.

Taking all of the information in the present chapter into account, it is now clear that global estimates of past sea levels cannot be trusted, and local conditions frequently over-ride any such trends. Dickinson's revelation that higher tides in the region of Kiribati and Tuvalu favour increased deposition of reef materials is one such case, and has been confirmed by some remarkable recent research which can readily be extrapolated into the past.

The commonly held assumption of atoll erosion during periods of sea rise has been overturned by the findings of a paper published in 2010 by Webb and Kench. These authors examined aerial photographs and satellite images of central Pacific islands taken over the last 20 to 60 years when sea levels have been rising at a rate of about 2 mm a year. Contrary to the idea that these islands are slowly disappearing under the sea, the results revealed that 43 percent of the islands actually increased in land area, and only 14 percent underwent reduction.

Other studies say little of what happened to atolls during the long period of sea level rise after about 4000 BP. In light of the Webb and Kench results, however, it is not unreasonable to suppose that this too may have been a time of island building. Erosion by wind and tide of newly formed coral would be replaced by further coral growth, and the debris would be washed up somewhere else, adding to the volume of land and creating areas that would be exposed as extensive tidal flats as soon as sea rise ceased. Floating coconuts would sprout and root, and other vegetation would follow, and it would seem probable that such an area would become suitable as a way-station, if not for permanent occupation, well within the following 2000 years.

Chapter 15 Discussion and conclusions

The quest for Polynesian origins has generated a huge literature of theory and counter-theory since Polynesians were first brought to the attention of the rest of the world by eighteenth century explorers such as Bougainville after his return from Tahiti in 1769, and Cook during his circumnavigations of 1768 - 1780. A great deal of chaff can be separated from the wheat, such as early notions of Semitic or Aryan origin, and later ones ranging from lost continents to visitors from outer space (not considered in the present book). Shorn of evolutionary implications, and of later attribution to Melanesia alone (Terrell), Darwin's image of an "entangled bank" is apt for the whole of Oceania. Over a period of at least several thousand years, interaction among peoples has been continuous. Islands and island groups have been discovered and re-discovered, settled and re-settled, visited and re-visited, in a vast complex of intercommunication which the tools of scholarship are not always equipped to reveal. If a lesson can be learnt from efforts to date it is that no one theory is likely to be wholly correct, and none should necessarily be treated as superseding the others.

At its most basic, the question posed in this book (Chapter 1) is where did Polynesians come from? The answer lies not with whom they most resemble, whether Malays (Forster), ancient Hebrews (Marsden), Indians (Smith), Peruvians (Heyerdahl) (Chapter 2), or even Indonesians or Filipinos as modern theories may imply (Chapters 4 and 5), but hard evidence of language (relevant to most chapters), canoe types (Chapter 8), ethnography (Chapter 10), and food plants (Chapter 11) etc. which document where they went and how they got there.

A point of departure for the book is to test the currently most widely accepted theory of Polynesian origins which has gone almost unchallenged in recent decades and has become so entrenched as to seem unassailable (Chapter 4). According to this theory, Polynesians are descended from Lapita potters who entered Oceania more than 3000 years ago, leaving traces of themselves in the form of characteristically dentate-stamped pottery. These relics have been found in numerous archaeological sites, the oldest of which are in the Bismarck Archipelago, with others occurring throughout Island Melanesia to Fiji, and extending from there as far as Tonga and Samoa in Western Polynesia. From this point onwards, both temporally and geographically, the dentate form of pottery ceases to be found but continuity both with later forms of pottery and with Polynesians is assumed by the orthodox theory.

After reaching Fiji from the Bismarck Archipelago, a small group of Lapita potters is said to have entered a "bottleneck" somewhere in Western Polynesia, where they remained in relative isolation for a period of about 1000 years,

during which they became Polynesian, diverging culturally and in other ways from those who were left behind. This view of Pacific settlement history is challenged on musical and other grounds in the present book. Focus is on distribution of traits within broad geographic areas, with the object of determining migration paths that could have been traversed by pre-Polynesians. This approach has resulted in the re-emergence of Melanesia as a still useful ethnographic unit along with Polynesia and Micronesia, contrary to a now prevalent linguistic perception of Melanesia as a "category error" (AP), after adoption by most scholars of the terms Near and Remote Oceania as a substitute for the older terms. This concept is an outcome of ideas advanced most vigorously by the archaeologist Roger Green (1991a), and rejection by Green and his colleague Patrick Vinton Kirch of the terms Melanesia and Micronesia as "outdated" and "fatally flawed" (Kirch & Green 2001:63). For present purposes however, the Near and Remote Oceania terms have proved far too broad and imprecise, obscuring both differences and uniformities that are present in the data but are beyond description if the Kirch and Green terms are adopted. It is these terms that could be more profitably abandoned as useful than the still viable ethnographic divisions that distinguish Polynesia, Melanesia, and Micronesia (Chapter 3).

Problems with the Lapita hypothesis

Two fundamental problems in particular demand attention:

Pottery

A well-known feature of Lapita expansion, thoroughly documented by Kirch in his two books (Kirch 1997, 2000), is the emergence of stylistic areas of pottery, beginning with a trading network in the Bismarck Archipelago area of origin, and followed by local networks as voyaging proceeded and contact with the home area first diminished and then ceased as distances and sea-gaps became too great for return voyages to be maintained. In the home area, pottery-making continued unabated into historical times, as demonstrated most notably by the well-known trading system of the Vitiaz Straits (Harding 1967). In the far away Fiji-Tonga-Samoa area, during the period of "pause" when Polynesian culture is said to have emerged, pottery-making was maintained longest in Fiji but dwindled in the Polynesian areas and ceased altogether during the first centuries AD. Bellwood (1978a:53) refers to this as "a rather inexplicable circumstance", while Kirch calls it "the most puzzling aspect of Lapita ceramics" and provides comment as follows:

Rather than a gradual improvement and refinement in the ceramic art, Lapita pottery starts out in the earliest sites being the most elaborate and complex, and gradually undergoes local sequences of reduction in the range of vessel forms and simplification in the design system. Finally, after a thousand years or so, production of pottery in many

islands settled by Lapita people ceases altogether, as it did in Mussau, the Reef-Santa Cruz Islands, and in Tonga and Samoa.

In other areas such as Vanuatu and New Caledonia, pottery-making continued and arguably developed out of the Lapita traditions (Kirch 1997:160).

Mussau and Reef-Santa Cruz aside, which are on the northern and southern fringes of the initial Lapita area and could have become disassociated from it after a time, this alone should have set alarm bells ringing about the viability of the hypothesis of Polynesian origins from Lapita potters. It cannot be a coincidence that pottery survived and progressed only in Melanesian areas in contrast most notably with Polynesian ones where it dwindled and declined. The obvious inference to be drawn is that pottery is a Melanesian rather than Polynesian craft; the Lapita potters were Melanesians; and Polynesians were a different people who borrowed pottery-making from their nearest Melanesian neighbours in Fiji.

Phenotype

A related problem is the physical difference between present-day Melanesians and Polynesians which physical anthropology and genetics (Chapter 7) affirm and the Lapita hypothesis denies.

According to the now standard hypothesis, Polynesian culture, and the Polynesian people themselves, developed within the broad area of Fiji, Tonga and Samoa together with adjacent areas of Uvea, and Niuatoputapu, beginning with initial settlement by Lapita potters, first in Fiji, followed by the Lau Islands and Tonga, then, in quick succession, Samoa, and the other areas (Kirch 2000:210-11). But what did the Lapita potters look like? If the above scenario is to be accepted, they were the lineal ancestors of both present-day Fijians and present-day Polynesians who, as any visitor to Fiji will attest, do not resemble each other. How could this happen?

Kirch's account of the process of becoming Polynesian does not provide a satisfactory answer. Evidently on the basis of settlement dates and site contents, continuous communication is proposed between all the islands within the Fiji-Tonga-Samoa triangle during the period 1200-1000 BC but for unspecified reasons partially broke down thereafter, "first between Fiji and Tonga, and later between Tonga and Samoa." Kirch goes on to say:

Such breaks were not final or absolute, for interaction between the peoples of the Fiji-Tonga-Samoa region continued throughout prehistory. But sufficient isolation developed during the first millennium B.C. that we can detect localized variation, especially in ceramics. Out of such partial isolation, combined with adaptation to new

environmental and social conditions, a distinctively Polynesian culture emerged (Kirch 2000:210).

Phenotype is not mentioned, but such a combination of continuing interaction and "sufficient isolation" is a contradiction in terms and plainly inadequate as an explanation for the changes which would need to have taken place.

Bellwood is up-front in identifying the physical differences as both real and in need of explanation, but does not attempt a solution. On the assumption that the potters were ancestral to Polynesians he begins by surmising that they must have been close to Polynesian in phenotype, but then goes on to observe

This raises the fundamental problem of why the eastern Melanesians and the Polynesians, who together form a linguistic continuum and to a lesser extent a cultural continuum, should be physically so different. It is of course easy to overemphasize the physical differences, but it is impossible to assume that the eastern Melanesians and the Polynesians are both direct and totally isolated descendants of a single founder population. The physical differences are definite and significant . . .

One may suggest that small founder populations of Indonesian or Philippine origin adopted or borrowed from the languages of neighboring Melanesian groups (and this need only have happened once), but beyond that one is forced to conclude that the original relations between Polynesians and Melanesians are obscure, to say the least (Bellwood 1979:19-20).

There are just two possibilities for a solution to the problem of putatively ancestral Lapita potters becoming Polynesian. Either the Lapita potters were Melanesian in phenotype to start with and turned into Polynesians after reaching Fiji, or they were Polynesian in phenotype to begin with as surmised by Bellwood, and turned into Melanesians in all of the areas traversed on their way to Fiji. The first of these alternatives is so manifestly implausible that most writers, if they have considered the problem at all, have opted for the almost equally improbable second of the two alternatives. The proposal here is that the potters were Polynesian in phenotype when they began their migrations out of New Britain but those who remained behind in New Britain were absorbed into the more numerous Melanesian population already in the area. Later, by a process of "secondary migration", members of this by now integrated group followed the potters into Island Melanesia and similarly overwhelmed them there (Spriggs 1984:158-9). The demographics of such a situation, let alone repeating it in so many locations and so many islands in each of the archipelagos involved, rules it out. It is feasible that a small founder group of people, as the original intrusive group of potters may have been in New Britain, would be absorbed into the numerically greater population among whom they found themselves. There is also no question that migration out of the Bismarck

Archipelago was an ongoing process, as shown by the musical evidence (see map in Chapter 6), and multiple movements of peoples took place. Except for the assumption that Lapita potters were ancestral to Polynesians, there is no reason to suppose, however, that they set off immediately into Island Melanesia and established themselves there before the process of integration with Melanesians had taken place. The greater likelihood is that they were already Melanesian when they did so. Suppose, however, that the standard scenario is correct. There would need to be hordes of later Melanesian migrants if they were to displace already established populations of Lapita potters who had been in residence for however long it took for secondary migration to begin. By this time it is the potters who would be the dominant population in the new areas, especially in Fiji at the end of the chain, and it would be the latest newcomers who would be the more likely to be absorbed. It makes more sense to accept that all the areas where Melanesians now live, including Fiji, have been Melanesian from the outset, albeit reinforced by secondary migration, and another solution must be sought for the Polynesian phenotype.

Bottlenecking

The solution to the phenotype problem, offered routinely though usually uncritically, by scholars of all persuasions, is a process known as founder effect or bottlenecking, referred to briefly in the conclusions to Chapter 6,

It is worth considering the nature of the image. It has nothing to do with evolution, which involves selection and an advantage conferred upon the species. The homeland area is likened to a bottle full of people. Only a few can pass through the neck of the bottle into the unconfined space beyond. In practical terms, the person or persons doing so could be spouses moving from one linguistic or cultural area to another, or could be an entire canoe-load of migrants who happened to differ in some significant way from the larger sample of people left behind. As an explanation of differential distribution, bottlenecking makes sense in the context of migration from Western to Eastern Polynesia as boatloads of migrants on this route would not have been large, would not have returned, and their arrival would be followed by rapid population expansion within new and unoccupied territory. It makes much less sense, however, as an explanation for emergence of the Polynesian phenotype within Western Polynesia before migration to Eastern Polynesia began, as the necessary criteria of isolation after separation are less likely to have been met. As suggested in Chapter 6, because water gaps were less daunting in Western Polynesia than in Melanesia, and opportunities for intercommunication were greater, the necessary isolation is more likely to have taken place before reaching Western Polynesia, as would have been the case if pre-Polynesians had come from Micronesia, where phenotype is similar and incidence of the nine-base-pair deletion or Polynesian motif is secondary only to Polynesia itself (Chapter 7).

It need hardly be emphasised that the problems both of cessation of pottery in Polynesia and the problem of phenotype set out above are a product of the Lapita hypothesis, and disappear if the linguistic conundrum alluded to by Bellwood can be resolved. The solution to this, as explained in Chapter 5 has been revealed by linguists themselves when it is understood that only innovation defined subgroups are identifiable as homelands and, as most of the languages in the group closest to Polynesian are innovation linked, the sole shared ancestor of them all could be Proto Oceanic itself.

With the albatross around ones neck removed it becomes possible to consider alternatives for Polynesian origins, with Micronesia emerging once again as a candidate. To assist the process, having contributed to the problem in the first place, linguistics now comes to the rescue.

One of the most powerful techniques for working out past movements of peoples has been the reconstruction of proto terms by linguists, relied upon in the present book especially in the chapters on music (Chapter 6), Food plants (Chapter 11), Domestic animals (Chapter 12), and distribution of betel, kava, and toddy (Chapter 13), supplementing other approaches such as those of ethnology (Chapter 10) and providing evidence of possible paths along which cultural items could have been introduced into Polynesia. Combined evidence from these chapters shows all possible paths to have been followed at one time or another with Micronesia as much or more involved as the Melanesian route taken by Lapita potters.

From Island Melanesia, Fiji is confirmed as the most likely means of entry into Western Polynesia, but *kava* was probably introduced from Vanuatu or the Solomon Islands through one or more of the Polynesian Outliers (chapter 13). The Outliers are also a possible path from Micronesia for some food plants, but for others the more likely transit point would have been via the Gilbert Islands (Kiribati), possibly through Tuvalu (Chapter 11), albeit, at first, at a time when they were suitable for no more than temporary occupation.

Besides acting as a conduit from Micronesia into Western Polynesia, Tuvalu could also have been a way station to or from Eastern Polynesia, but for the latter possibility, as suggested for ethnographic items isolated by Burrows (Chapter 10), a downwind one-way journey from Hawai'i to Pohnpei is a possibility to be considered.

In brief, beginning in Chapter 6 with items such as nose flutes, and in chapter after chapter thereafter, Micronesia has proven to be as much or more a donor area for Polynesia than anything that could have been brought by Lapita potters.

PATHS TO POLYNESIA

Where did the migrations start?

The discovery by geneticists of the nine-base-pair deletion and Polynesian Motif has confirmed a long-standing consensus from archaeologists and linguists pointing to Taiwan as an area of origin for Austronesian speakers, with Indonesia and the Philippines both likely candidates for the next stage of dispersal through various branches of Malayo-Polynesian until reaching New Guinea and the ultimate emergence of an Oceanic subgroup. While sufficient for most purposes, it is a model that neglects other possible influences on the immediate point of entry into Oceania, and for this, evidence from music needs to be taken into account.

Music systems

Among the many music systems of the world are two of special importance for Oceania, known to ethnomusicologists as Engmelodik and anhemitonic pentatonic respectively, both of worldwide distribution, both transcending national, cultural, and linguistic boundaries, and both essential for a full understanding of music diffusion in Oceania.

The first of these is shown in Chapter 6 as characteristic of Marginal Eastern Polynesia and the Caroline Islands of Micronesia, and the other as dominant throughout New Guinea and Island Melanesia.

Nettl (1956:142) identifies them as occupying the second and third of three broad areas of world music of which the first is characterised by the familiar seven note European scale and the others as follows:

The second area extends in a long strip across North Africa, includes the Islamic world, India and Indonesia, and stretches into Oceania. The use of small intervals in scales, melodies, and polyphony is the outstanding feature of this area.

The third and largest area is that inhabited primarily by Mongoloids; it includes the American Indians, the advanced cultures of the Far East, the peoples of eastern and northern Siberia, and even extends into European Russia with the Finno-Ugric peoples. The main characteristic here is the use of long steps in pentatonic and tetratonic scales.

Collaer (1968:4) provides the following detail for this area:

The pentatonic scale reigns supreme in Mongolia, Tibet, China, parts of Japan, Indochina, Indonesia, and the Philippines, Malaya, and the

Polynesian Islands, and is heard in the music of the American Indians, the Bantus, and those Celts who inhabited the Atlantic coast.

The two systems meet in the region of the Philippines and Indonesia which must be the likely area of origin for both into Oceania.

Before proceeding further, some explanation may be necessary to avoid misunderstanding. Nettl's reference to Oceania refers to the Caroline Islands of Micronesia for which Herzog's findings were well known to ethnomusicologists at Nettl's time of writing. And references by both authors to North American Indians refers to their transit from Siberia across the Bering Strait to North America which has been dated at perhaps 40,000 years ago, well before anything comparable in Oceania. Finally, Collaer's attribution of pentatonic scales to Polynesia refers to Western but not Eastern Polynesia.

The criteria for Nettl's second group are too broad to apply to most music in Oceania, with the modal systems of the Middle East, Indonesia, and India, for example, wholly out of the running. Engmelodik scales, however, are evidently included in this group and some could be a potential source for Micronesia. An outstanding example of such a scale, though not a candidate for Micronesia or Polynesia, is the Rig Vedic system of chanting practised by Hindu Brahmin priests of India. There is a scale of just three notes with a range of a minor third. In the middle is an intoning note which also starts and finishes each phrase; below is the second note at the interval of a major second or full tone; and above is the third note at the smaller interval of a minor second or semitone. The texts are recited with meticulous accuracy in the belief that a single error would threaten the stability of the universe, in consequence of which the system has endured for an estimated 3,500 years, qualifying it according to some, as the oldest living music in the world (Bake 1957:199-204), but also, as will be seen, originating at the very time Malao-Polynesians had reached New Guinea on their way to becoming Lapita potters. It seems not impossible to suppose that out of a tribal area somewhere to the East of India, perhaps among the many who must have lived at this time in the Philippines or Indonesia, a group bearing Engmelodic scales and speaking a language not too far removed from Oceanic, could have entered the Carolines.

Some such movement must indeed have taken place, as shown by Herzog's transcriptions and analysis of the 1908-10 cylinder recordings reported upon in Chapter 6. Small range scales were characteristic at this time across the entire stretch of the Caroline Islands, from west to east, including not only Ponape and other islands belonging to the Nuclear Micronesian subgroup, but also Yap and Palau, which are linguistically affiliated with Western Malayo-Polynesian languages of Indonesia or the Philippines. No conclusion, however, can be reached about the point of contact within the Carolines, which could have been anywhere, with small range scales spreading thereafter as a result of later borrowing.

Where did Island Melanesians come from?

So far, a linguistic sequence has been recounted which has taken pre-Oceanic speakers from Taiwan, through the Philippines and Indonesia to New Guinea. There, the point of arrival has been identified by linguists as the Bird's Head region of present-day West Papua by speakers of Central Eastern Malayo-Polynesian, who have established themselves there in numbers now exceeding those of the earlier-resident Papuans.

A question now arises as to what happened next. Did these immigrants all simply stay *in situ*, or, as recently proposed by Pawley (2007:22), did some of them migrate eastwards along the north coast of New Guinea towards the Bismarck Archipelago where, after some centuries in transit, they became originators of the Oceanic linguistic subgroup and the immediate ancestors of the Lapita potters? Pawley can offer no linguistic evidence of their passage beyond "tantalising traces in the form of loanwords to Papuan languages." Nor has evidence such as pottery precursors to Lapita been turned up by archaeologists (Spriggs 2010:45-6).

Geneticists are more forthcoming with several reports of the nine-base-pair in the mtDNA of north coast residents, with male Y-chromosome markers also originating in the same way. An example is from Herzberg et al. (1989), which found 14% of the nine-base-pair deletion in 28 individuals from Madang in the north coast of Papua New Guinea, seemingly consistent with the idea that Austronesians underwent a period of intermingling and exchange of genes with Papuans during transit along the north coast. Some caution, however, is in order. Most of the reports are limited in their sampling from Papua New Guinea; none seen to date includes samples from West Papua; and Madang is well within range of known linguistic and cultural "backwash" from the Bismarck Archipelago which most probably took place in post-Lapita times. Further sampling, however, particularly closer to the Bird's Head is likely to provide more conclusive evidence. Fortunately, there is no need to wait this long for confirmation. Pawley identifies the area of origin of these speakers to be among dialects on the north side of the Bird's Head, and probably located around Cenderawasih Bay at the neck of the Bird's Head (Pawley 2007:21). By good fortune the Serui-laut people of Cenderawasih Bay are among groups for which some musical evidence is available. The presence in their music system of wide range and anhemitonic scales which define the Core Melanesian complex of musical traits, proves a connection beyond doubt. These traits could not have reached the Bird's Head from the Bismarck Archipelago without leaving a trail of slit gongs beyond the Papua New Guinea slit gong belt, so must have gone the other way. But more conclusive evidence than this is at hand. First, the path taken by the Bird's Head immigrants from Taiwan through the Philippines and Indonesia coincides at every step with Nettl and Collaer's music area of anhemitonic pentatonic scales. Second, it delivered the Bird's

Head people into another huge area where the same scale was likewise dominant. Wherever they went, familiar-sounding music would have greeted them, facilitating contact with Papuans, and very likely initiating a system of song and dance exchange which, despite their language differences, remains extant between the two peoples to this very day.

Here, then, is an answer to the question of Melanesian origin, with evidence from linguistics, genetics, music, and ethnography (see Chapter 10) all converging. During their journey from the Bird's Head, mixing with Papuans en route, these migrants would have begun to lose their SE Asian phenotype, while retaining their language and music. Within a few centuries there were now two resulting groups of peoples on the move in the Bismarck Archipelago and northern Island Melanesia: the so-called bush people or Papuans who spoke non-Austronesian languages, and settled in the area perhaps 20,000 or more years ago, and the newly arrived Island Melanesians, who spoke Austronesian languages, and exploited coastal environments. By now Papuans were living in parts of the northern Solomon Islands, but the Austronesian-speaking Melanesians soon followed.

At this point, some attention is needed to problems relating to the spread of polyphony. So far it has been noted that polyphony is prevalent in Island Melanesia except in most of Vanuatu, with the Solomon Islands as a probable centre of diffusion in Near Oceania, and Polynesians gaining polyphony only at a late date from Melanesians. But how did it get to the Solomons, and where did it originate in Melanesia? The answer lies once again with distributional data, this time by examining known incidence throughout all areas of New Guinea.

Musical evidence is sparse for West Papua but in the critical portion of the north coast traversed by the Bird's Head people on their way to the Bismarcks the tribal soundscape is empty of polyphony. Instead, this trait is present only among a large interior group of non-Austronesian speakers, all belonging to the Trans New Guinea phylum of languages, and far enough removed from the north coast to have had no influence on the Bird's Head pre-Melanesians. In map code order they are:

23 Moni NAN, 26 Ndani NAN, 27 Nipsan NAN, 32 Uhuduni NAN, 35 Asmat NAN, 45 Kanum NAN, 90 Waina NAN.

It needs to be understood that the Trans New Guinea Phylum is not a unified group of languages with shared features like those which are commonly displayed in linguistic trees. Instead they are languages which are so different from each other as to defy subgrouping. As such they are among the oldest languages and made up of many strands.

Next on the north coast transit after West Papua came today's Sepik province of PNG. This time polyphony is present but only among non-Austronesian

language groups. In map code order with a variety of subgroups, they are as follows:

091 Amanab	TNGP
092 Yuri	TNGP
103a Wiaki	TRCP
112 Arapesh	TRCP
132 Kwoma	SERP
133 Manambu	SERP
140 Kapriman	SERP

SERP Sepik- Ramu Phylum N=3

TRCP Torricelli Phylum N=2

TNGP Trans -New Guinea Phylum N=2

Last on the pre-Lapita trail along the north coast are Madang and Morobe provinces, with Austronesian and non-Austronesian examples now equal as follows, perhaps because of backwash from the Austronesian areas further east.

157 Rao SERP
174 Gedaged AN
244 Tuam AN
252 Sialum TNGP
255 Wantoat TNGP
257 Urie TNGP
269 Buang AN
278 Laukanu AN

To avoid overloading the book with detail, statistics only will suffice for the remaining mainland areas:

AN: Central 1, Milne Bay Massim 6, Northern 2 N=9

SERP: Northern 1 N=1

TNGP: Highlands 2, Western 5, Gulf 3, Central 1, Northern 3 N=14

The Bismarck Archipelago and Island Melanesia have already been reported upon earlier in the book, with polyphony most often associated with the Core Melanesian complex of large range and anhemitonic scales. The latter is shown to have been brought by the Bird's Head people who were ancestral to the Lapita potters, and polyphony is shown by the survey above to have been unequivocally Papuan. It began with some but not all Trans New Guinea Phylum speakers in West Papua, and made little or no impact on Austronesian speakers until after the latter had reached the Bismarck Archipelago. There, some but not all Austronesian speakers acquired it from some but not all Papuans, resulting in the famous Admiralty and Caroline Islands styles of

dissonant polyphony when the two systems interacted. The results also provide a solution to the problem of lack of polyphony in Vanuatu which must have come about from occupation by one or more groups of either Papuans or Lapita potters who predated acquisition of polyphony by the others.

The route through Island Melanesia

To account for pre-Polynesians in Micronesia and at the same time satisfy linguistic requirements, it was thought necessary in an earlier version of parts of this book (McLean 2008) to propose a group of migrants to Micronesia who would have entered the area via the Bismarcks, independent of the Bird's Head people. A more feasible alternative has instead been substituted and will be taken up in the next section, with the newly arrived Bird's Head Melanesians now recognised as sole progenitors of the Lapita potters. These now emerge and begin their celebrated migrations through Island Melanesia, leaving colonies in their wake, and eventually reaching as far south as Fiji, where they become ancestral to present-day Fijians. The long series of journeys required the crossing of two significant water gaps, one of 450 km at the outset and the other of 850 km closest to Fiji, which are believed not to have been traversed until Lapita times (Kirch 2000:95-6). Because of the water gaps, a view sometimes expressed is that the form of transport used by the Lapita people must have been double canoes similar to those used much later by Polynesians. As has been seen, however, this is not supported by Haddon and Hornell's distributional data (Chapter 8), and recent reconstructions by linguists of canoe terms is also contrary to the idea. Although careful to point out that absence of a reconstruction does not necessarily indicate absence of the referent sought, Pawley and Pawley (1998:209) conclude that a term for double canoe can be attributed to Proto Polynesian but not to Proto Oceanic. On the other hand there is not the least doubt about the provenience of sailing outrigger canoes with decks and indirect attachment of the float dating back at least to Proto Oceanic (Pawley and Pawley 1998:193, 209), vindicating Haddon and Hornell's findings. The combined evidence would appear to indicate that the ocean-going double canoe was an innovation not at the Oceanic subgroup level but some time later, with Proto Polynesian as the only so far affirmed subgroup. An assessment by Irwin of the Lapita canoe form using some of the same sources as those examined in the present study

suggests that a likely Lapita type was a single-outrigger canoe with a hull made from dugout log, and its freeboard raised with lashed-on strakes. The sail was a simple two-spar rig of a kind usually described as an "oceanic spritsail," and the canoe may have changed direction relative to the wind by some mode of tacking rather than shunting (Irwin 2008:15).

Besides providing distributional evidence of canoe type, the trail of the Lapita potters through Island Melanesia is revealing also of the kind of music they

probably practised. Foremost for consideration is the extremely widespread presence of canoe-shaped slit gongs as seen in the slit gong belt of northern coastal Papua New Guinea and spreading down the entire Island Melanesian chain as far as Fiji. It would seem reasonable to suppose that it was the Lapita potters who made slit gongs in the shape of their canoes and spread them to these places. Some doubt is cast on the idea, however, by gaps in the distributional data. The sole such gaps or probable gaps are in southern Vanuatu, the Loyalty Islands and New Caledonia, consistent with the known history of Lapita settlement in these areas, but not necessarily of possession of slit gongs by the first settlers.

In present-day New Caledonia, wooden slit gongs are in widespread use as an accompaniment to dance. They are small, portable instruments, only 40-50 cm long, with no resemblance to the large canoe-shaped slit gongs typical elsewhere in Melanesia. One possibility is that the smaller type of slit gong was brought by Polynesians who migrated to New Caledonia in the eighteenth century. Most current instruments, however, both resemble and are named after the Cook Islands *pate*, which was brought first to Samoa by Rarotongan teachers of the London Missionary Society for use as a church bell, and put to the same use in New Caledonia by Samoan teachers of the LMS in the early 1840s (Ammann 1997:20-4, 50).

Whether the large canoe shaped form of wooden slit gong was ever present in New Caledonia is an open question. Speiser (1934:129) states categorically that slit drums are not to be found. Sarasin (1929:229-32) at first describes slit drums as absent except as church bells, then seems to contradict this by referring to the accompaniment of dance by the beating of wood on pieces of hollow trees. But the statement is ambiguous, as also is one by the nineteenth century writer Glaumont (1888-9:98), the earliest source so far found, who makes similar reference to a sort of tamtam or hollowed out tree like those of the New Hebrides on which the player beats with a stick. Either statement could refer to a slit gong, but equally to an actual hollow tree, as implied by Glaumont's likening of the instrument to those of the New Hebrides, which he goes on to describe as larger, and more beautiful with faces sculptured upon them. The reference here is evidently to standing slit gongs of central Vanuatu, which are ethnographically well known, and indeed resemble hollow trees. Use of a hollow tree as an idiophone would be unusual and seems unlikely, in which case the possibility exists that large slit gongs were once present but have fallen out of use in favour of the more portable and convenient *pate* introduced by the LMS. If on the other hand the instrument was genuinely not present then the disparity between New Caledonia and other areas of Melanesia including Fiji lies with the known differing settlement history of the two areas.

Lapita settlement of Fiji is believed to have taken place from either the Santa Cruz or northern Vanuatu islands at about 3100 BP. New Caledonia was meanwhile settled by a different group which moved through the main Vanuatu

archipelago to reach La Grande Terre through the Loyalty Islands at about the same time (Kirch 2000:95). The difference in starting point between northern and southern Vanuatu could have been crucial in terms of slit gong diffusion. The island of Efate (where the Teouma Lapita site is coincidentally located) marks the southerly limit of large slit gongs in Vanuatu (Crowe 1995:24 cited by Ammann 1997:23). North of Efate is the area from which Fiji was colonised; and in the south are the islands from which the New Caledonia settlers would have departed.

There are two possibilities for slit gongs. Either they were brought by the initial Lapita settlers and lost for unknown reasons in southern Vanuatu, or they were brought not by the first settlers but by their immediate successors, who followed their ancestors along the more northerly route to Fiji, but did not reach New Caledonia.

Besides possible slit gongs, Lapita potters had stamping tubes and drone-based polyphony, and were purveyors also of the common Melanesian tonal system of anhemitonic pentatonic scales.

In the home Lapita area of the Bismarck Archipelago, polyphony co-occurs with the Core Melanesian traits of wide range and anhemitonic scales, but has a more restricted distribution and probably therefore developed later in the region.

Polyphony is present in only about a quarter of the areas in the Bismarck Archipelago for which musical information is available. Specifically, it is reported for Manus (Admiralty Islands); Kove, Bola, Nakanai, Cape Beechey, Uvol, all in New Britain; and on offshore islands of Vitu, Ablingi, Mussau, Baluan and Bipi. All are in the homeland of the Lapita people; offshore islands were favoured Lapita locations; and Manus, Kove, Mussau and Baluan are known Lapita sites (Specht 2007:Table 2). The observed association is remarkable for three reasons: first it demonstrates survival of music traits in the area of Lapita origin for upwards of 3,000 years; second it proves Lapita potters to have been unequivocally Melanesian; and third it is indicative of association with Micronesia. Of special significance is the primary Lapita site of Mussau, together with Manus and Bipi, all with dissonant polyphony as reported in both Fiji and the Caroline Islands of Micronesia. As all of the sites concerned are strung along the northern seaboard of New Britain within easy sailing distance of the Caroline Islands, and the Lapita people living on this coast ultimately reached as far as Fiji, it is inconceivable that they would not also have visited Micronesia.

The route through Micronesia

The question may now be answered as to how much or how little Micronesians might have contributed to the settlement of Polynesia.

In view of Herzog's discovery of Polynesian music traits in Micronesia (Chapter 6), combined with evidence from both physical anthropology and genetics (Chapter 7) affirming closer connection between these two areas than others, the suggestion by Buck and by Howells of Polynesian settlement through Micronesia is again in contention.

Three main arguments have been advanced against the idea of a Micronesian path for Polynesians, one relating to radiocarbon dates and the others to food plants and sea levels. The latter two topics have been comprehensively covered in Chapters 11 and 14, leaving only radiocarbon dates to be considered here.

Radiocarbon dates

When Kirch and Green formulated their Lapita hypothesis, known radiocarbon dates for Micronesia were mostly post-2000 BP (Kirch 2000:74), seemingly ruling out Micronesian involvement with the settlement of Polynesia which, as then accepted, entered into its final East Polynesian phase around this very time, and began upwards of a thousand years earlier with the settlement of Fiji by Lapita potters.

First to be considered are the new dates for Eastern Polynesia proposed by Wilmshurst et al. (2011), alluded to in Chapter 4 under the heading "Duration of the Pause". This is the period of transition between the settlement of Western and Eastern Polynesia respectively during which Polynesians are said to have evolved.

If the new Eastern Polynesian occupation dates are accepted, and Western Polynesian dates remain the same, the length of the Pause will be extended by another thousand years leaving twice as much time as before for Lapita potters to morph into Polynesians, and/or, if sea levels or radiocarbon dates precluded Micronesian settlement until after 2000 BP, for the same period of a thousand years to be available thereafter for Micronesians to exert influence on Polynesia. But, as seen in Chapter 14, Dickinson has advanced the sea level dates to match the new dates for Eastern Polynesia. Only one small step is required to entirely restore the pre-2011 archaeological status quo. There is no reason to suppose that Eastern Polynesia is different from Western Polynesia in the nature of its carbon dates. If dates from charcoal and shell are unreliable for the one area they must also be unreliable for the other and it should be safe to elevate the Western dates as well as the Eastern ones, leaving boundaries and the sequence of events the same as before.

On this basis, the fundamental problem posed by lack of conventional early radiocarbon dates for Micronesia remains and will now be considered.

Despite these lack of dates, computer simulations reported by Irwin indicate that the high islands of the Carolines and Marshall Islands were available for contact from the Solomons in Lapita times (Irwin 1992:125-6), and a number of radiocarbon dates earlier than those given by Kirch have since been published.

Colonisation of Western Micronesia is now set at 3500-3300 BP for site occupation or 4800-4500 BP on indirect evidence, and Central and Eastern Micronesia have settlement dates of 2200-2000 BP at the same time as the Polynesian Outliers (Anderson et al. 2006:2).

From these results it would seem that Western Micronesia could have received its first settlers a thousand or more years before the Lapita era began in the Bismarck Archipelago but although reaching this area all the way from the Philippines or Indonesia did not venture further. It would be surprising if, in the course of the next two millennia they had not done so, if only as visitors to the adjacent islands of the Eastern Carolines, or been followed by others into the area. Earlier dates for the Eastern Carolines may yet be found; and an existing date for Bikini in the Marshall Islands of no less than 3450 ± 60 BP (Streck 1987) is without current explanation.

If the radiocarbon date for Bikini Atoll is accepted then, despite higher sea levels in the Holocene period, occupation of Micronesian atolls must have been possible earlier than currently supposed, if only, as suggested in chapter 14, as staging posts for further voyaging. As Bikini is located on the far north-east extremity of Micronesia, it also follows that the voyaging distance involved was not beyond the capability of the type of canoe then in use. If Haddon and Hornell's report of early double canoes in Truk is correct, it may be that this was the canoe type used, and could represent an early venture by people who could have been the pre-Polynesians.

Howells proposed that from 2500 BC or after there was a parent colony of Polynesian-like people on one of the high islands of the Carolines. Around 1500 BC some of them, speaking Proto Eastern Oceanic, filtered south through the Gilberts (Kiribati) to Fiji and Tonga, later acquiring pigs, chickens and dogs from their Melanesian neighbours (Howells 1973:255, 260).

Howells's dates now seem too early, but his proposal fits absolutely with the mix of Marginal Eastern and Western Polynesian music traits found by Herzog in the very area proposed by Howells as the Polynesian homeland.

For pre-Polynesians to reach Micronesia, a number of conditions would need to have been met. First, they would need to be speakers of Oceanic or its immediate predecessor of Malayo-Polynesian; second, they would have brought the small range form of music found by Herzog; and third they would have been physically of Mongoloid phenotype. The second and third of these

criteria would be satisfied if they came direct from Nettl's area of small range scales in SE Asia, with Indonesia qualifying specifically. But this would locate them outside the homeland Oceanic language area which linguists have placed in the Bismarck Archipelago. On the other hand, there may be some room for flexibility in this regard, if later incursions from the Oceanic area to the Carolines were to occur and become dominant.

In the first instance, a foundation group of settlers, different from those of the Bismarcks, was most certainly present in the Western and Central Carolines. They are shown by the known early occupation dates of Yap and Palau to have potentially pre-dated the Lapita potters, and by the widespread incidence of small range scales to have ultimately spread these over the whole area. Ponape is a likely early recipient, centrally placed to receive influence from any direction, and poised for occupation at any time as Ponape is a high island without the sea level problems that beset atolls. Moreover, it has a number of river valleys, drowned in their lower reaches by incursion from the sea, so the earliest occupation sites could now be submerged.

Suppose next that a further settlement now occurred, this time from the Bird's Head people in the Bismarcks, soon enough after their arrival there for their Mongoloid phenotype still to be intact. Such a group would most likely have come through the Admiralty Islands, conferring an early form of the Oceanic linguistic subgroup or a predecessor of it on Micronesia. But what about their anhemitonic pentatonic scales? These too are not necessarily a problem. Many of the areas throughout Mainland New Guinea and Island Melanesia with these scales as their tonal system have songs exhibiting the full pentatonic scale alongside others with Engmelodic sections of the same scale. It is not hard to imagine such a group switching exclusively to the latter, especially if they found themselves among another group who already practised them. From this, also, it is not too much of a stretch to imagine eventual integration of semitones (half tones) into the full tone system, resulting in Engmelodik scales of the kind now found in Marginal Polynesia.

Another matter bearing upon entry of peoples from the Bismarcks to Ponape relates to pottery. It can be taken for granted that despite absence in the archaeological record of Bird's Head people in northern New Guinea, it must have been these people who brought the necessary pottery-making technology to the Bismarcks. It follows that if they or their successors also went to Ponape, they would most likely have taken pottery with them, and there is indeed evidence that this was so. Kirch (1997:75) notes presence of plainware pottery in Truk, Pohnpei and Kosrae, which he likens to late Lapita plainware, but also observes (p.77) that as Micronesians moved from the high islands to atolls within the area they were forced to stop making pottery because of lack of clay. All of this is highly relevant to the present topic. If the Ponapeans had pottery later, they may also have had it earlier, and the reference to cessation in the

atolls shows why they would have been aceramic if they then moved on to Polynesia.

Some time after the establishment of the initial group in the Carolines, a further significant event would have occurred in the form of visits from Lapita people, again most probably from the Lapita areas of the Admiralty Islands or Mussau, bringing polyphony and the other musical traits reported by Herzog, and perhaps at the same time introducing the late Lapita pottery reported by Kirch. A substantial period of integration would in any case have been required for the original settlers, allowing plenty of time for the new Engmelodik tonal system with its semitones to be firmly bedded in, thereby rendering it incompatible with the full pentatonic scale which otherwise might have been reintroduced by the latest newcomers.

Between the two events, and possibly triggered by the latter one, movement of pre-Polynesians would now have taken place out of Micronesia, taking with it Marginal Polynesian music traits but not polyphony.

Final evidence of Melanesian contact with Ponape comes with the entry of the typical New Guinea hourglass drum to Eastern and Central Micronesia, shown to be a late development by the limitation of its spread in Melanesia to Buka/Bougainville. In Micronesia it is best documented for Ponape and the Marshall Islands. For details of its presence there and elsewhere in the area, including vernacular names, see Fisher (1986:57).

Howells's idea of Polynesian settlement from Micronesia can be accepted, but a more likely point of arrival for the pre-Polynesians would be not Fiji, but Samoa, possibly through Tuvalu. Even without benefit of sophisticated canoes, pre-Polynesians could have reached this far by making use of the return voyaging strategy documented by Irwin (1992), sailing upwind initially, and downwind to return home if land was not found.

In Samoa, if they came early enough, the new arrivals could have had an entire archipelago to themselves until the arrival of Lapita potters, if indeed potters and not just their pots came this far. Alternatively, they could have reached the Samoan Archipelago at about the same time as the Lapita people or could have post-dated them, but occupied a different part of the archipelago, with the two groups coming together and intermingling only after the lapse of sufficient time for Polynesian culture to develop.

Coming as they did from a predominantly atoll environment in Micronesia where clay is lacking, they would have lost pottery as already suggested, and would have regained it only later from Fijians, accounting for lack of archaeological sites attesting their presence. Because Samoa has a history of land subsidence, another reason for lack of visibility in the archaeological record may be that, like the Samoan Lapita site found by Green (1979:31),

which was under a metre and a half of water, the relevant sites would have been as close as possible to the sea and as suggested for Ponape may now be submerged.

As Micronesians, however, the seafaring abilities of these migrants would have at least equalled those of the Lapita people, culminating with development of double canoes capable of venturing as far as Eastern Polynesia. First, using possibly less advanced craft than at their disposal, they would have explored every corner of their own archipelago. Next they would have extended their seagoing to embrace Tonga and Fiji, very likely colonising Tonga at about the same time as Lapita potters, but reaching Fiji only to find it fully occupied by Melanesians. The historically attested trade relationship within the Fiji-Tonga-Samoa triangle could have been an early development. But exploration did not end there. Settlement of the Polynesian Outliers along the entire Island Melanesian chain, as far north as their own former home territory of Micronesia, was to follow, as well as the ultimate final push into Eastern Polynesia, shown by the musical evidence as likely to have taken place from Samoa.

Before attempting a chronology of the foregoing events, a final observation needs to be made which bears upon both dating and phenotype. In a paper subtitled "Why the dates keep changing", the archaeologist Matthew Spriggs (2010) has documented a trend towards ever-younger rather than older date estimates in recent years which applies not only to Eastern Polynesia but to the entire spectrum of dates relevant to Lapita. I have adopted his dates in the chronology which follows, but in so doing have created a problem of timing. Under earlier date estimates there was time enough for Austronesian speakers to gain Papuan phenotype by mixing with Papuans before Lapita potters began their journeys out of Near Oceania. Spriggs has them reaching the Bismarcks from the Bird's Head in two centuries at most, and entering Vanuatu, New Caledonia and Fiji all within another 250 years.

Five hundred years may not be considered enough for the potters to have lost their Mongoloid phenotype and become fully Melanesian by the time they left the Bismarcks. But consideration also needs to be given to what happened to them on route, and what kept them on the move. As seafarers they would have had no inclination to abandon coastal resources for inland areas, and could have been regularly displaced by newcomers from the north. If so, it may be appropriate to think of Spriggs's concept of secondary migration rather as one of continuous migration, operating from the very beginning and resulting in continuous reinforcement of phenotype from Papuans who themselves did not move from their own accustomed areas. Meanwhile, in Central Western Polynesia, Mongoloid phenotype would likewise be receiving regular reinforcement from Micronesians, maintaining the distinction between Polynesia and Melanesia that is still in evidence today.

CHRONOLOGY

Dates relevant to the present book tend to be on a continuum with linguistic dates sometimes older than the radiocarbon ones for the same events (Pawley 1996:403-4), and genetic dates by and large older still. Radiocarbon dates have generally been preferred in recent years, but are currently subject to radical review. Unless otherwise stated, the dates following are all from Spriggs 2010 which offers a conservative current view.

It should be noted, however, that the date for settlement of Eastern Polynesia, which for decades has been accepted as 2000 BP, has been advanced to 1500 BP in the chronology but, if recent revisions are confirmed, it may be necessary to extend this date by another 500 years or more, lengthening the period preceding this date during which influence from Micronesia might have taken place. Once again, as well, it needs to be emphasised that dating issues are far from resolved, with no secure dates at any point in the spectrum.

On the understanding therefore that the dates are tentative and subject to further review, the following is offered by way of summary and additional comment:

4000-3800 BP. First movement of speakers of Malayo-Polynesian out of Taiwan into the Philippines.

3500 BP. Settlement of northern Maluku in Eastern Indonesia and the Cenderawasih Bay area of western New Guinea by speakers of Central Eastern Malayo-Polynesian. At about the same time or earlier (Anderson et al. 2006:2), speakers of Malayo-Polynesian occupy Western Micronesia from the Philippines or Indonesia. They are the likely bearers of a music system of small range scales which ultimately diffuse throughout the Caroline Islands, but do not yet possess polyphony.

3300 BP. Migrants from the Bird's Head reach the Bismarck Archipelago, where they become ancestors of present-day Melanesians and the progenitors of the Oceanic subgroup. During their journey along the north coast of New Guinea they have interacted with Papuans and in so doing have begun the process of becoming Melanesian. They bring the Core Melanesian traits of wide range and anhemitonic scales but not polyphony. The Serui-laut people in the home area near the Bird's Head have retained the same traits until the present day.

Not long after the arrival of Melanesians in the Bismarcks, the Lapita potters emerge and begin their migrations through Island Melanesia. Before change of phenotype has gone too far, some of the new arrivals have possibly moved to the Caroline Islands in Micronesia, where they merge with the already resident people, adapting to their small range music system and ultimately becoming

ancestral to Polynesians. They have shell trumpets and leaf oboes but not slit gongs, stamping tubes, or polyphony.

Of uncertain date but coincident with the breakup of Proto Oceanic, a group identifiable with the Papuan Tip subgroup moves into southern Papua New Guinea. They have Distribution D instruments and polyphony but not slit gongs.

Another group joins the pre-Polynesians in Micronesia, most likely from the Admiralty Islands or Mussau, bringing polyphony and possibly triggering movement of the pre-Polynesians out of the area to find new territories.

Lapita people or their descendants develop slit gongs in the shape of their canoes and diffuse them throughout Island Melanesia as far as Fiji.

3000 BP. There are Lapita sites in Fiji and Tonga by this date, and Samoa has perhaps been settled by 2800 BP. Meanwhile, sea levels permitting, pre-Polynesians emigrate from Micronesia, taking distinctive styles of small range to Samoa. They remain relatively isolated there from Melanesians, gaining pottery from Fiji but neither slit gongs nor polyphony until after the colonisation of Eastern Polynesia. Quite possibly some such transfers did not occur until Samoans came more extensively into contact with Melanesians as a result of Samoan settlement of the Polynesian Outliers, which now begins.

1700-1500 BP. Members of the Northern New Guinea subgroup migrate out of the Bismarcks, taking slit gongs in retro movement from east to west along the north coast of New Guinea.

1500 BP (Allen and Kahn 2010:49). Colonisation begins of Eastern Polynesia from Samoa, and the two areas of Western and Eastern Polynesia subsequently develop in isolation. In Eastern Polynesia, vocal styles of small range and few notes brought by the first settlers are retained in the Marginal Eastern Polynesian areas of Hawai'i, the Marquesas Islands, Mangareva, and New Zealand until modern times.

In Western Polynesia rolled mats as a percussion device come into use and diffuse throughout the area, and Western Polynesians interact increasingly both among themselves and with Melanesians. Tongans, for example, who are closest geographically to Fiji, most probably gain stamping tubes and polyphony as well as the slit gong from the Fijians. Polyphony does not initially reach as far as Samoa, and Samoans do not adopt the slit gong until later, gaining separate forms of it, including the *lali* from Fiji and the *nafa* from Tonga, retaining the names of each from the donor areas.

Eastern Micronesians gain hour-glass drums either from the Bismarck Archipelago or from Buka/Bougainville in the Solomon Islands, most probably, as suggested for polyphony, through Ponape.

CONCLUSIONS

An essential starting point for the present study is the discovery of marked differentiation between music areas of Western Polynesia and Marginal Eastern Polynesia which emerged after the settlement of Eastern Polynesia around 2000 BP or later, allowing distinctions to be made between Polynesian music systems before and after this date. In Marginal Eastern Polynesia Engmelodik styles taken to the area by the first settlers are still to be found. By contrast in Western Polynesia, post-2000 BP developments were a result both of innovation and of borrowing relationships, and are relevant to Polynesian origins principally for purposes of elimination. Interactions among Polynesians, Melanesians and Micronesians have been continuous in varying degrees from pre-Lapita through to modern times, posing a problem of disentangling the more recent distributional events from the older ones. The extensive three-way contact between Fijians, Tongans and Samoans in the period immediately prior to European contact, coupled with influence from Micronesia during the same period, is especially worthy of note. Thus, although the Lapita people or their descendants can be identified as possessors of slit gongs, it was not until the latter part of the eighteenth century AD that slit gongs came to be used in Fijian and Western Polynesian double canoes, where they were coincident with sculling. Associations can also be demonstrated between other elements of music within the area (q.v. McLean 1999) that have contributed to the present mix and overlay relationships that can be counted as ancestral. Sufficient clues remain however, for a satisfactory sequence of events to be proposed which accounts for all of the known facts.

In brief, combined evidence from music, physical anthropology, genetics, canoe types and distribution, food plants, narcotic substances, and ethnology points overwhelmingly to Micronesia rather than Melanesia as a path for Polynesians, and a dual hypothesis of Polynesian origins can accordingly be proposed:

The Lapita people were Melanesians who settled all of the currently Melanesian areas of both Near and Remote Oceania. After arriving in Fiji, they may indeed have been among Polynesian ancestors, but were not primarily or exclusively so. Instead, Polynesians developed independently within Western Polynesia, most likely in Samoa, after migrating there from Micronesia, and only later began to intersect with descendants of the Lapita potters (McLean 2008:53-4).

This is the conclusion reached by the writer in the first published version of

some of the materials used for the present book. In light of the additional information now brought to bear, and the advent of new radiocarbon dates for Eastern Polynesia, little needs to be added:

The most direct descendants of Lapita settlers with whom Polynesians were later to interact would have been Fijians. Some physical admixture and sharing of phenotype would doubtless have taken place, but the primary mechanism of cultural transfer would have been borrowing, as suggested many years ago by Peter Buck, whose only mistake in this regard was to over-estimate the extent and some of the timing of the transfer. Some at least would have been at the Proto Polynesian level when contact between the two groups was first established, and the remainder would have gone on piecemeal over succeeding generations.

Much work now remains for archaeologists, linguists, geneticists and others to reconcile the most recent information now emerging from many disciplines with the findings of the present study.

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Abbreviations

AP	Pers. comm., Andrew Pawley
DNZB	Orange 1990-2003
Lexicon	Ross et al. 1998
McL	McLean MS. n.d.
NTBG	National Tropical Botanical Garden
Office	Office of Tokelau Affairs
Pollex	Biggs & Clark 1996-98
RMTD	Moyle 2011

Note: References include entries for dictionaries used to supplement cognate lists in Chapters 6 and 11.

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[Includes 185 entries by McLean (c.15,000 words) on musical instruments of Oceania including the following signed entries:
Angramut; Anin; 'Au ni mako; 'Au pasiawa; Bullroarer; Conch-shell trumpet; Culo; Fa'atete; Fangufangu; Garamut; Hinen nimbwilei; Hourglass drum; Ihara; Jew's harp; Ka'ara; Kalove; Kaur; Kio; Kiro; Koa; Ko'e; Kofe; Kooauau; Koororohuu; Kundu (i); Lali; Launut; Leaf oboe; Leaf whizzer; Logo; Nafa; Naki; Nakpea; Nama; Na-mbwe; Nguru; Ni 'au kani; Nose flute; Paakuru; Pagolo; Pahu; Pahu tupa'i rima; Pahuu; Pakau tarekareka; Panpipes; Para ni 'o'o; Pate; Pa'u; Pa'u mango; Pokakakaka; Porutu; Pu; Puhakahau; Pu ihu; Pu kohe; Putona;

Puukaaea; Puurorohuu; Puutaatara; Puutoorino; Ratahigi; Rehu; Rooria; Sacred flutes; Sosom; Sounding board; Stamping tube; Susap; Talipalau; Tangalop; Thith; Tini; Tini-tokere; Tita'a kohe; Titapu; To'ere; Tookere; Tui; 'Ukeke; Utete; Vivo (i); Whio.]

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Appendix 1: Chronology of scholarly events

Sources for the chronology include Howard (1967) and Sorrenson (1977, 1979). Entries refer successively to explorers and mariners, comparative philologists, evolutionists, missionary ethnographers, physical anthropology, and functionalist anthropology, terminating in the 1970s, followed by events up to 2003.

In New Zealand, the watershed date between what may be called old and new orthodoxies can be set at 1950 with publication of the second edition of Buck's *The Coming of the Maori* marking a transition point, and excavations by Duff at Wairau Bar the beginning of a new era of professional archaeology. The old orthodoxy lingered for a long time in the education system, and forerunners of the new were at the same time of long-standing so the division is not clear-cut but can nevertheless be accepted as a dividing point for the beginnings of a new paradigm. Like the old, this did not emerge all at once, but at first took the form simply of sidelining the old ideas as no longer relevant, with the new progressively crystallising into a set of assumptions that ceased to be challenged.

Date	Event
1654	Archbishop James Ussher of Ireland publishes a chronology for bible events beginning with the creation of the world in 4004 BC.
1769	During Cook's first voyage to the South Seas the Tahitian Tupaia is able to converse with New Zealanders. Cook concludes the two are of common origin.
	As a result of Cook's second voyage. Tongans, Tahitians and New Zealanders are considered by J. Forster as of possible Malay origin. By 1778, with Hawai'i added to the list of places visited it was apparent to Captain King that all of Polynesia was united by a single language.
1775-95	J.F. Blumenbach treatise <i>On the Natural Variety of Mankind</i> (1775) classifies the races of man. It is modified at the behest of Banks in its 2nd edition of 1781 to include Malay. Further modified in 3rd edition of 1795 dedicated to Banks and now including: Caucasian, American, Ethiopian, Mongolian.
1832	Ethnographic divisions of Melanesia, Micronesia, and Polynesia defined by Dumont D'Urville.
	The missionary Samuel Marsden classifies Maori as descended from the biblical sons of Shem and thus of Semitic origin.

1843 & 1859	In his book <i>Travels in New Zealand</i> Dieffenbach draws on the pseudo-science phrenology, and A.S. Thomson in his book <i>The Story of New Zealand</i> on craniometry.
1855	In his book <i>Te Ika a Maui</i> the missionary Richard Taylor sees Maori as a lost tribe of Israel.
1859	Charles Darwin publishes his epoch-making book <i>Origin of Species</i> .
1869	The geologist Julius von Haast introduces modern archaeology to New Zealand as a result of excavation of a moa-hunter site at the Rakaia River in the South Island.
1872	Charles Darwin publishes his book <i>Descent of Man</i> .
1877	L.H. Morgan publishes a book, <i>Ancient Society</i> , in which he attempts to classify the races of man into three divisions, advancing from savagery through barbarism to civilisation.
1878-80	Abraham Fornander draws upon Hawai'ian oral tradition in a 2-volume work, <i>An Account of the Polynesian Race</i> .
1885	Edward Tregear publishes his book <i>The Aryan Maori</i> , and A.S. Atkinson publishes a devastating parody of it, <i>The Aryo-Semitic Maori</i> , in the following year.
1892	Polynesian Society formed by S. Percy Smith and Elsdon Best.
1898	First edition of S. Percy Smith's book <i>Hawaiki</i> .
1907	In his book <i>Maori and Polynesian</i> J. Macmillan Brown supports an Aryan origin for the Maori.
1910	In his book <i>Hawaiki</i> , the Original Home of the Maori S. Percy Smith claims an origin for the Maori in India.
1914	W.H.R. Rivers distinguishes kava people and betel people in Melanesia.
1934-38	Otto Dempwolff ushers in a new era of Pacific linguistics with publication of his Oceanic hypothesis.
1936-38	A.C. Haddon and James Hornell publish a 3-volume treatise on the <i>Canoes of Oceania</i> .
1938	American ethnologist Edwin G. Burrows sets the scene for future comparison with an influential study of cultural differentiation in Eastern and Western Polynesia.
1938	Peter Buck publishes his book <i>Vikings of the Sunrise</i> in which he proposes a Micronesian origin for Polynesians.
1947	Thor Heyerdahl sails his raft <i>Kon Tiki</i> from Peru to Raroia in the Tuamotus in an attempt to prove that Polynesia could have been settled from South America. The last surviving member of the expedition, the radio operator, Knut Haugland, dies in Norway in 2009.
1949-50	First and second editions of Peter Buck's <i>The Coming of the Maori</i> add a seal of approval to S. Percy Smith's fleet chronology. It continues to be taught in schools for many

	years.
1950	W.F. Libby develops the first form of radiocarbon dating, and refinements of the method become an essential tool for archaeologists.
1950	Publication of Roger Duff's <i>The Moa-Hunter Period of Maori Culture</i> .
1952	Archaeologists Gifford and Shutler excavate a unique form of dentate-stamped pottery at Lapita, New Caledonia. The name of the place is henceforth applied to this form of pottery which is discovered in numerous other sites throughout Island Melanesia and Western Polynesia in coming decades.
1955	Bengt Anell shows fishing hooks and lures are paralleled in Micronesia and Polynesia but not Melanesia.
1956	Andrew Sharp puts the case for accidental voyaging in his book <i>Ancient Voyagers of the Pacific</i> .
1963	In a second book, <i>Ancient Voyagers in Polynesia</i> Andrew Sharp extends his argument to include deliberate voyages of no return.
1965	At the University of Auckland, Bruce Biggs begins work on a Proto Polynesian Lexicon of reconstructed terms (Pollex).
1966-76	Beginning in 1966, Ben Finney commissions a number of double canoes based on traditional Polynesian designs, and uses them to determine their sailing capabilities. From May 1 to June 4 1976 a successful voyage is made from Hawai'i to Tahiti using traditional navigational techniques.
1969	In an article, D.R. Simmons debunks Smith's Fleet chronology and follows up with a book <i>The Great New Zealand Myth</i> in 1976.
1971	Douglas Yen provides evidence for introduction of the sweet potato from South America to Eastern Polynesia.
1971	L.M. Groube introduces the idea that Polynesians emerged in a process of "becoming" in Polynesia itself. The idea is embraced by Lapita scholars and becomes a cornerstone of later orthodoxy.
1972	David Lewis publishes a book, <i>We the Navigators</i> , in which he reports the results of practical sailing experiments with Polynesian methods of navigation.
1988	Entangled bank and Fast train hypotheses of Polynesian origins.
1991	In an influential paper Roger Green attempts to disestablish Melanesia as an ethnographic division, and substitutes a now widely accepted alternative grouping called Near and Remote Oceania.

1991	Triple I hypothesis of Polynesian origin is proposed by Roger Green.
1992	Geoffrey Irwin provides evidence for use of a deliberate two-way voyaging strategy by Lapita settlers.
2000	Slow boat hypothesis of Polynesian origins.
2004	Excavation begins of the Teoma Lapita site in Vanuatu. Headless skeletons with complete Lapita pots are found.

Appendix 2: Pollex area codes

Note: This list is from Pollex 1998. Codes for languages not present there have been added as necessary and distinguished as such. The code ECE for Ellice Islands has been retained rather than change it to a more intuitive TUV for Tuvalu because in alphabetically arranged cognate tables it appears conveniently close to the geographically adjacent areas of EFU (East Futuna) and EUV (East Uvea).

AIT - Aitutaki (Cook Islands)
ANI - Aniwa (Vanuatu) [Added]
ANU - Anuta (Cherry I.)
ARS - Arosi (Solomons)
AUS - Austral Is.
BGO - Bugotu (Solomons)
EAS - Easter Island
ECE - Tuvalu (Ellice Is.)
EFU - East Futuna (Horne Is.)
EUV - East Uvea (Wallis I.)
FIJ - Fiji
GED - Gedaged (Papua-New Guinea)
HAW - Hawai'i
KAP - Kapingamarangi
KWR - Kwara'ae (Solomons)
LAU - Lau (Solomons)
LWL - Lonwolwol (Ambrym)
MAE - Emae (Vanuatu)
MAO - New Zealand Maori
MFA - Mele-Fila (Vanuatu)
MIA - Mangaia (Cook Is.)
MKI - Manihiki (Cook Is.)
MOR - Moori (Chatham Is.)
MOT/MTA - Mota (Vanuatu)
MQA - Marquesas
MQN - Northern Marquesan dialect
MQS - Southern Marquesan dialect
MRA - Manihiki/Rakahanga (Cook Islands)
MTU - Motu (Papua-New Guinea)
MVA - Mangareva
NFU - Nukufetau
NGG - Nggela (Solomons)
NGU - Nguna (Vanuatu)
NIU - Niue I.
NKM - Nukumanu [Added]
NKO - Nukuoro

NKR - Nukuria
OJA - Luangiua (Ongtong-Java, Solomons)
PEN - Penrhyn (Tongareva, Cook Is.)
PIL - Pileni (Solomons)
PMA - Paama (Vanuatu)
PUK - Pukapuka (Northern Cook Is.)
RAG - Raga (Vanuatu)
RAR - Rarotonga (Cook Is.)
REN - Rennell Is. (Solomons [including Bellona Added])
ROT - Rotuma (Fiji)
ROV - Roviana (Solomons)
RUR - Rurutu (French Polynesia)
SAA - Sa'a (Solomons)
SAM - Samoa
SIK - Sikaiana (Solomons)
TAH - Tahitian
TAK - Takuu (Solomons)
TIK - Tikopia (Solomons)
TOK - Tokelau Is.
TON - Tonga
TUA - Tuamotu
TUP - Tupuaki (French Polynesia)
VRA - Vaturaga (Solomons)
WFU - West Futuna (Vanuatu)
WUV or WEV - West Uvea (Ouvea, New Caledonia)
WYA - Waya, (Western Fiji)

Appendix 3 Glossary of name changes

The list is not complete. Numerous smaller islands within the larger Micronesian groups have also changed their names.

Former name	Present name
Ellice Islands	Tuvalu
Gilbert Islands	Kiribati
Ifaluk	Ifalik
Irian Jaya	West Papua
Kusaie	Kosrae
Luta	Rota
New Hebrides	Vanuatu
Palau	Belau
Pelew	Belau
Ponape	Pohnpei
Truk	Chuk

Appendix 4 Abbreviations for linguistic subgroups

Adm Admiralties
Fij Fijian
Mic Nuclear Micronesian
MM Meso-Melanesian
NCal New Caledonia
NCV North/Central Vanuatu
NNG North New Guinea
PAdm Proto Admiralty
PAn Proto Austronesian
PCP Proto Central Pacific
PEMP Proto Eastern Malayo-Polynesian
PEOc Proto Eastern Oceanic
PMP Proto Malayo-Polynesian
Pn Polynesian
PNCV Proto North-Central Vanuatu
PNPn Proto Nuclear Polynesian
POc Proto Oceanic
PPn Proto Polynesian
PT Papuan Tip
PWMP Proto Western Malayo-Polynesian
PWOC Proto Western Oceanic
SES Southeast Solomonian
SV South Vanuatu
WMP Western Malayo-Polynesian

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