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SPATIAL DYNAMICS IN OCEANIA

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Siège social : 22, rue Saint-Ambroise, 75011 Paris
Tél. : 01 43 57 16 97 – Fax : 01 43 57 73 95 – Mél. : spf@prehistoire.org
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Adresse de gestion et de correspondance

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Pôle éditorial, boîte 41, 21 allée de l'Université, F-92023 Nanterre cedex
Tél. : 01 46 69 24 44
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Ancestors for the Present ?

Exploring Later Prehistory on New Britain, Papua New Guinea

Jim Specht

Abstract: The cultural diversity of the western Pacific islands is well known, but surprisingly little archaeological attention has been directed to its history and causes. New Britain in Papua New Guinea is no exception. New Britain is the largest island to the east of New Guinea and is home to over thirty ethnolinguistic groups. Its prehistory after Lapita pottery up to the time of European colonial settlement in the late 19th century is an under-researched period, and the paper offers a review of the limited data for the last 2,000 or so years. There are several issues confronting researchers of this period regarding the units of study and the use of historical and ethnographic records. Surveys of the post-Lapita period have suggested that the cultural diversity encountered by Europeans in the 19th century was the end product of processes that began with the demise of Lapita pottery about 2,500–2,000 years ago. The paper examines the archaeological record of four areas for continuities and discontinuities in conjunction with records of volcanic events and oral history. The picture that emerges is probably a gradualist development for the south coast, but punctuated and discontinuous around the north coast volcanic centres and in the Passismanua area in the centre of the island. The current evidence offers no obvious insights into the emergence of the cultural diversity of the region encountered in the 19th century.

Keywords: Papua New Guinea, New Britain, cultural diversity, archaeology, Lapita, post-Lapita.

Des ancêtres pour le présent ? La fin de la Préhistoire sur l'île de la Nouvelle-Bretagne, Papouasie-Nouvelle-Guinée

Résumé : La diversité culturelle du Pacifique insulaire occidental est bien documentée mais, étonnamment, peu de travaux archéologiques ont été consacrés à l'histoire et aux causes de ce phénomène. La Papouasie Nouvelle-Guinée et la Nouvelle-Bretagne n'y font pas exception. La Nouvelle-Bretagne est l'île la plus vaste à l'est de la Nouvelle-Guinée et abrite trente groupes ethnolinguistiques. Sa Préhistoire, de la fin de la production des poteries Lapita jusqu'au contact européen, constitue une période sous étudiée, et c'est pourquoi cet article propose un examen des données disponibles pour les deux derniers millénaires. L'étude de la période post-Lapita semble montrer que la diversité culturelle rencontrée par les Européens au xixe siècle est l'aboutissement d'un processus qui a débuté après l'arrêt de la production de la poterie Lapita, il y a 2 500-2 000 ans. Des indices de continuité ou discontinuité culturelle ont été recherchés parmi les données archéologiques disponibles pour quatre régions de l'île, et mis en relation avec les données sur les évènements volcaniques et l'histoire orale. La vue d'ensemble qui en ressort est celle d'un développement graduel sur la côte sud de l'île et d'un développement discontinue dans les centres volcaniques de la côte nord et la région de Passismanua au centre de l'île. Les connaissances actuelles sont en définitive insuffisantes pour discuter de l'émergence de cette diversité culturelle rencontrée dans la région au xixe siècle.

Mots-clés : Papouasie Nouvelle-Guinée, diversité culturelle, archéologie, Lapita, Post-Lapita.

The cultural diversity of the Western Pacific islands is well known, but surprisingly little archaeological attention has been directed to its history and causes. Much of the diversity reflects the hundreds of languages spoken throughout the region, which contrast with the situation in island groups further east where single languages prevail (Pawley, 1981), though there are marked differences in human phenotypes, material culture and social practices throughout the western islands. Archaeological reviews of the region by Matthew Spriggs (Spriggs, 1997, chapter 6) and Patrick Kirch (Kirch, 2000, p. 117–64) have identified the period following the end of the dentate-stamped phase of Lapita pottery (c. 2750 cal. BP) as the likely time when this

diversity started to develop, with M. Spriggs discussing at length the possible processes that led to the break-up of the Lapita cultural complex and the rise of diversity (see Garling, 2007). Central to this view of diversity emerging in the post-Lapita period are two premises. The first is that the sites yielding Lapita pottery belonged to related communities within a dialect chain of early Oceanic Austronesian languages who were in communication with each other and shared many aspects of culture. The second premise sees the end of the dentate-stamped phase of pottery decoration as marking the severing of ties between these communities and their gradual divergence from the common cultural complex, as expressed through both languages and material culture. These premises, however, deny the possibility that cultural diversity was already a feature of the New Guinea Islands' communities before the appearance of Lapita pottery, and omits from consideration those groups that were contemporary with Lapita pottery but did not use pottery or adopt its production, such as those in the interior of New Britain (Pavlides, 2006) and on north Guadalcanal in Solomon Islands (Roe, 2000). There is also the significant issue of defining which aspects of cultural diversity may be amenable to archaeological investigation or, to reverse the question, which aspects of the archaeological record can be interpreted as the products of cultural diversity. This paper looks at these issues through a review of the archaeological record for the island of New Britain in Papua New Guinea (fig. 1) to see what we might learn about the rise of the cultural diversity encountered by Europeans from the seventeenth century onwards.

NEW BRITAIN: THE CONTEXT

At about 36,000 km² in area, New Britain is the largest island east of New Guinea in the equatorial tropics, comparable in size to Taiwan. The three main mountain ranges (Baining, Nakanai and Whiteman) consist primarily of limestone with intrusive volcanic formations in the Whiteman Range, and create a 'spine' that separates volcanic land forms in the north from uplifted marine formations on the south side (fig. 1). Large areas of karst in the three ranges are uninhabited, and most of the population is located on the coasts. There are thirty-seven Austronesian and Papuan languages spoken on the island (Ross, 1996, p. ix), though up to fifty languages or dialects have also been proposed (Lewis et al., 2014; Papua New Guinea map 12).

The main thrust of archaeological research on New Britain over the last fifty years has addressed a limited range of topics, primarily the colonisation of the island in the Late Pleistocene, sites with Lapita pottery, the obsidian industries of Willaumez peninsula in the Early-Middle Holocene, and the management of risk in this tectonically unstable region. The period following Lapita pottery through to the 17th century, on the other hand, has received

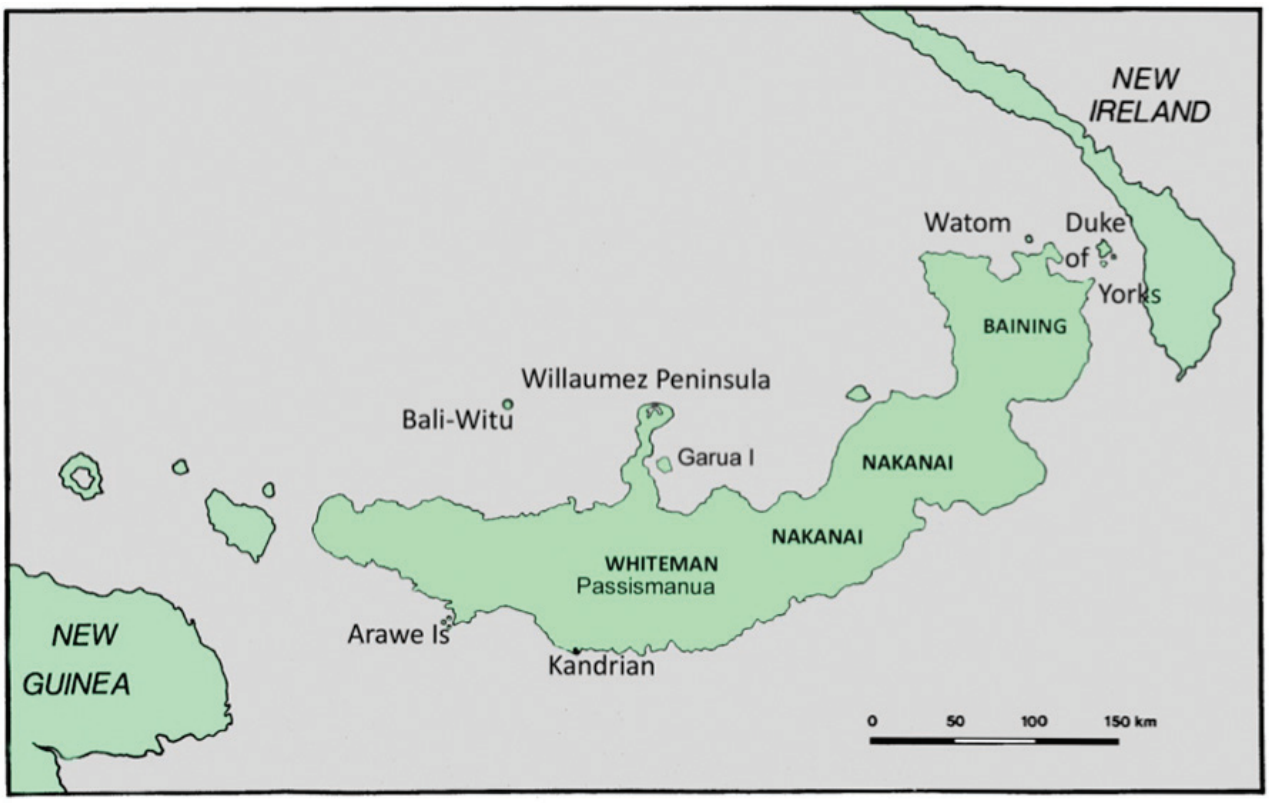

Fig. 1 – Map of New Britain showing the locations of the four case-study areas.
***Fig. 1** – Carte de la Nouvelle-Bretagne avec la localisation des quatre zones étudiées.*

less attention. This contrasts with extensive research further east in the Pacific islands, where the recent past is often prominently visible in the landscape as significant stone and earthen monuments that have been extensively studied (Kirch, 2000). Few comparable monuments have been reported on New Britain, and only two have been investigated: a field system in the Kove area of northern New Britain (Swadling, 1991), and complexes of stone arrangements and rock art on Uneapa Island, northwest of Willaumez peninsula (Riebe, 1967; Byrne, 2005, 2008 and 2013). With these exceptions, there have been no field projects specifically addressing the last 2,000-2,500 years comparable to those conducted in Solomon Islands (e.g., Sheppard et al., 2000 and 2004; Thomas, 2009; Blake and Gibbs, 2013), and the Tanga Islands of New Ireland (Garling, 2003 and 2007).

ON THE LIMITATIONS OF ARCHAEOLOGY

The human settlement of Polynesia has a short time depth that makes the region an ideal context for an 'historical anthropology' that combines evidence from linguistics, archaeology, human biology and anthropology, and this approach has become a major methodological framework for interpreting the region's archaeological record (e.g., Green, 1997; Kirch, 2010; Kirch and Green, 2001). The success of this strategy has been largely due to what P. Kirch calls the 'phyletic unity' of Polynesia, compared with the 'multi-phyletic' situation in Melanesia (Kirch, 2000, p. 211). The Polynesian islands that are P. Kirch's main focus are inhabited by single ethnolinguistic groups, and in many cases have rich descriptions of cultural practices from the time of initial European intrusion into those islands. In contrast, the islands of the Western Pacific have multiple ethnolinguistic groups, many islands have much greater time depth of settlement than those of Polynesia, and there are comparatively few accounts of their societies dating to the initial and early stages of European intrusion; indeed, for many, none exists even today. While acknowledging the cultural complexity of the Melanesian islands, of which New Britain is a part, P. Kirch (Kirch, 2000, p. 307) nevertheless supports the application of historical anthropology in the region (Kirch, 2000, p. 345, footnote 10).

Languages play a major role in the perception of cultural diversity in the Western Pacific islands. Languages, however, do not constitute meaningful units for archaeological analysis, nor do the ethnolinguistic groups known in the literature as the 'Tolai', the 'Bakovi', the 'Baining', and so on. To use these units as a framework for investigating prehistory of New Britain over the last 2,500–2,000 years would require tracking the ancestors of these people through distinctive and unique markers for each group that are likely to survive in the archaeological record. In rare instances this may be feasible, particularly in the latest stages of pre-contact history, but is highly unlikely the further back in time that we explore.

Since language and ethnolinguistic boundaries do not necessarily mark exclusive distributions of material culture, what should be the unit of analysis? On the south side of New Britain, communities from Gasmata to the Arawe Islands speak different but related languages and share several artefact categories in common. These communities, known among themselves and by others as 'Arawe' (Chowning, 1978, p. 296), extend for about 200 km along the coast, and inland to varying distances. While this grouping could be treated as comparable to P. Kirch's phyletic units, table 1 shows that many of the features that people use to identify the 'Arawe' are either not unique to this group or do not have a recognisable archaeological expression under normal survival conditions. Of the categories likely to be recovered archaeologically, several are not exclusive to the 'Arawe' area. Stone bark cloth beaters are also used in the Kilenge area at the western tip of New Britain (Adrian Gerbrands, personal communication, 1967). Waisted and lugged ground stone axe heads are said by present-day people to have been imported from unnamed places on the north side of the island, where identical forms are widespread. Similarly, male adornments of paired, full-circle boars' tusks may have been produced on New Britain, but it is not clear whether their production was exclusive to the 'Arawe' (cf. Harding, 1967; Beran, 2014). Other items that could have an archaeological presence are the stone discs and rings with a central perforation that the 'Arawe' identify as *mokmok* or *singa* stones, items of power and status worn in ceremonial regalia by senior men or used in sorcery (Gosden and Knowles, 2001, p. 28; Knowles and Gosden, 2002, fig. 4). They occur in two forms: the first is a rounded stone with a perforation of irregular form that is said to be of natural origin; the second is clearly of human manufacture and is similar to club-heads of mainland New Guinea, though people in the 'Arawe' area deny that their ancestors used stone-headed clubs (Specht, 2005). The first form seems restricted to their area, but the second form is found widely throughout western New Britain. Neither has been recovered from dated archaeological contexts, probably because, together with shell valuables, they are curated over many generations.

The 'Arawe' case leads us to the problem of defining the nature of New Britain's societies just prior to or at contact. Detailed ethnographic, linguistic and historical studies are lacking for many parts of the island and those available present pictures that reflect decades of interaction with European and others, and are unreliable guides to the situation prior to European incursion into the Pacific Islands (cf. Spriggs, 2008). The New Guinea islands' region, of which New Britain is a part, experienced various forms of contact with European visitors from AD 1700 onwards, but particularly during the 19th century with regular visits by whalers, who engaged in trade with local people and introduced exotic goods into the material culture repertoire (Gray, 1999). As early as the 1820s, people produced artefacts for sale to these

visitors (Specht, 2000, p. 26). Towards the end of the century trading stations and Christian missions were established, and Germany assumed colonial control of the region. Both the missions and the German administration actively sought to change cultural practices and lifestyles on the island (e.g., Brown, 1908; Salisbury, 1970; Firth, 1982). Some communities became involved in the labour trade to work on plantations in Samoa and elsewhere, leading to the removal of men for several years and in some cases permanently (Panoff, 1979; Meleisea, 1980). How these removals and other actions of the European intruders impacted upon the indigenous societies is not known. The first accounts of the societies after such impacts were recorded decades later and should be treated with caution as potentially misleading.

Few studies of particular communities by anthropologists and amateurs cover aspects of material culture in a manner that would facilitate their recognition in the archaeological record. The most comprehensive early description of New Britain societies is a broad-scale review with extensive spatial gaps in its coverage (Parkinson, 1907 and 1999). Two of the few volumes specifically about New Britain focus on art forms drawing extensively on museum and private collections of artefacts (Heermann, 2002 and 2013). These collections are often of limited assistance. Many were made during the German colonial era (e.g., Welsch, 1998; Specht, 2000; Buschmann, 2009), long after the arrival of European traders and settlers and carry little information about the peoples' histories before that time. Furthermore, they were a biased representation of material culture at the time of their acquisition, few are well provenanced and most are of organic materials that are unlikely to leave a recognisable archaeological expression.

APPROACH AND FOUR CASE STUDIES

In light of the above critique an alternative approach is needed, one that is not tied specifically to tracing the ancestry of contemporary ethnolinguistic groups that constitute the perceived cultural diversity of the island and its region. The approach adopted here is to examine the archaeological record of New Britain to determine whether we can reasonably infer continuities and discontinuities reflecting cultural persistence or the emergence of diversity. Within this approach there is an added complication for many parts of the island of natural extreme events, particularly volcanic eruptions that have caused local or more widespread disruption or destruction of settlements. These extreme events must be factored into interpretations of the archaeological record in relevant areas (Torrence et al., 2000; Torrence and Doelman, 2007). In this approach the past is treated as a sequence of stable times and extreme events mediated by cultural responses.

Stephen Shennan (Shennan, 2013) has pursued a similar strategy with regard to the occupation and abandonment of European Neolithic settlements in the context of demographic expansion and contraction relative to carrying capacity, drawing on precise and reliable dating, well established local and regional sequences together with palaeo-genetic data. His proposed approach rejects a gradualist model in favour of what he terms an 'autonomy model' within which 'boom and bust' patterns are explored on a time-scale of centuries. This approach has relevance to the New Britain situation but on a smaller scale. There are also differences between Stephen Shennan's case study and New Britain, which currently

Material culture category	Main area of distribution	Archaeological survival
Blow-pipe and darts for hunting	Gasmata to Arawe Islands	No
3-piece wooden shields	Gasmata to Arawe Islands	No
Bark cloth waist bands with painted vine leaf designs	Gasmata to Arawe Islands	No
Vine-strand looped bags	Gasmata to Arawe Islands	No
Twisted cane axe handles	Western half of island?	No
Stone club heads - discoid	New Britain generally?	Yes – but not diagnostic
Lugged/waisted ground stone axe blades	West of line from Hoskins Peninsula to Gasmata?	Yes –not diagnostic; imported, traded widely
Pairs of full-circle boars' tusks as male adornment	Gasmata to western tip of the island beyond 'Arawe'	Yes –singly or in pairs, only locally diagnostic
Stone bark cloth beaters	Western part of island?	Yes – but not diagnostic?
Gold-lip pearl shell valuables	Gasmata to Arawe Islands	Yes - diagnostic
Stone rings – mokmok/singa	Gasmata to Arawe Islands	Yes - diagnostic
Head-binding of infants	Gasmata to Arawe Islands	Yes - diagnostic

Table 1 – Selected artefact categories that characterise the 'Arawe' area on the south coast of New Britain, their likely chances of surviving in the archaeological record as diagnostic for identifying an 'Arawe' group.
***Tabl. 1** – Catégories d'artefacts sélectionnées caractéristiques de la zone « Arawe » sur la côte sud de l'île de la Nouvelle-Bretagne et leurs probabilités d'être préservées en tant qu'indicateurs typologiques dans les archives archéologiques pour identifier un groupe « Arawe ».*

has limited well-dated and detailed artefact sequences for many areas, and palaeo-genetic data are lacking.[1] The 'boom and bust' phases of the European context that Stephen Shennan considers to reflect issues of carrying capacity can be replaced by the repeated impacts of sudden-onset, extreme natural events (volcanic eruptions) that had serious implications for communities in terms of the viability of their settlements (the 'bust' element). Periods between such events (the 'boom' aspect) allowed reoccupation of the landscape after sufficient recovery to sustain the human populations (cf. Torrence and Doelman, 2007; Torrence, 2014). Rather than restrict coverage here to the period following Lapita pottery (as defined by the end of the distinctive dentate-stamped decoration: c. 2750 cal. BP) or of pottery production in general on New Britain (arguably c. 2000 cal. BP), the paper extends its scope to earlier times where information is available. It focuses on four of the better documented areas of New Britain, as follows:

– Watom Island at the eastern end of the island;

– Willaumez and Hoskins peninsulas on the central north side of New Britain;

– The Passismanua interior region between Kandrian and Willaumez peninsula, on the southern fall of the Whiteman Range;[2]

– The south coast from Kandrian to the Arawe Islands.

Selection of these four areas does not deny the significance of work conducted elsewhere, especially in the Duke of York Islands (White, 2007), Kove Islands (Lilley, 1991) and the Bali-Witu Islands (Byrne, 2013) and reference will be made to them where relevant.

The four study areas divide broadly between the north coast with a string of Quaternary volcanoes (areas 1 and 2), and limestone formations of marine origin in the centre of the island (the Whiteman Range; area 3) and along the south coast (area 4; Davies, 1973; Ryburn, 1974, 1975, and 1976). More is known of the volcanic history of the Rabaul and Willaumez peninsula – Hoskins areas (Lowder and Carmichael, 1970; Nairn et al., 1995; Machida et al., 1996; McKee et al., 2011) than about the history of the limestone areas, particularly their uplift history, which is restricted to one study on the south coast at Palmalmal (Riker-Coleman et al., 2006). Palaeo-environmental data are limited to three studies associated with archaeological sites (Lentfer and Green, 2004; Lentfer and Torrence, 2007; Lentfer et al., 2010), and one pollen study (Jago and Boyd, 2005) that does not extend back beyond the Late Holocene.

Case study 1: Watom Island

The oldest evidence for human presence in this area at the eastern end of New Britain is c. 3000–3200 cal. BP at Lapita pottery sites in the Duke of York Islands and on Watom Island (Anson et al., 2005; White, 2007). The lack of research on earlier periods reflects the enormous depths of tephra from the Rabaul volcanoes that locally blanket the area and conceal older land surfaces. These deposits derive from a series of eruptions that culminated in the formation of the Rabaul caldera. Since human occupation of the New Guinea islands began around 40,000 years ago, there have been about forty eruptive phases from the Rabaul volcanic centres (Nairn et al., 1995, table 2), continuing through to the present day. The last major eruption prior to European occupation of the area was around 1300–1100 cal. BP, when airfall tephras and a massive pyroclastic flow (the Rabaul ignimbrite) devastated the landscape up to 50 km distant from the source volcano (Nairn et al., 1995, p. 257 and p. 269; Anson et al., 2005). Deposits from this eruption covered Watom to at least one metre depth. The Duke of York islands on the eastern side of the caldera may have escaped the impact of the pyroclastic flow, but also received substantial airfall deposits of tephra (White, 2007, p. 10).

The Rabaul Ignimbrite would have obliterated all animals, vegetation and humans living on Watom Island. Based on a radiocarbon date for a small hearth on the surface of reworked tephra at the Maravot (SAD) area of the Rakival-Reber site complex, Watom was re-occupied by 730–550 cal. BP by people who did not make or use pottery (Specht, 1968, p. 124, sample ANU-72; see Anson et al., 2005, p. 34). The identity of this population is not known.

There is currently no evidence for human activity on Watom after this date until a group of twelve burials in the Vunaburigai (SAB) area of Rakival village. These were wrapped in strings of *Nassarius* shells (*tambu* in the local Tolai language and in New Guinea *Tok Pisin*) and covered with ochre. The strings of shells and use of red ochre reflect distinctly different funerary practices from those of the late Lapita cemetery at Kainapirina (SAC) of about 2,000 years earlier (Green et al., 1989). The Vunaburigai burials were identified by the Tolai villagers as their recent ancestors, and this is likely in view of a ^{14}C date on bone from burial 3, a female, which places it at 306 ± 30 BP (Wk-22346: Frédérique Valentin, personal communication). This date sits well within the time frame of widespread Tolai origin stories of their ancestors' migration into east New Britain from New Ireland. When this occurred is uncertain, but Salisbury (Salisbury, 1972) argues it was possibly about 400 or so years ago, perhaps as early as the thirteenth century AD, though Neumann (Neumann, 1992) prefers a later date.

There is a problem with Salisbury's suggestion, as oral histories recorded by the author on Watom Island in 1965 claimed that when the Tolai ancestors arrived the island was already occupied by people described as 'Baining'. This term has been applied to Papuan language-speaking groups living on the coast and in the interior mountains of the Gazelle peninsula of New Britain (cf. Rohatynskyj, 2001).[3] As there is nothing culturally distinctive about the Maravot hearth dated to 730–550 cal. BP, we cannot attribute it to either Tolai or Baining activity. What is clear, however, is that there is a strong case for the annihilation of the island's population by the Rabaul Ignimbrite event, followed by re-occupation by at least one, possibly, two different populations. Watom thus could have experienced settlement by

possibly three separate populations over the last 3,000 years, and the distinction between Tolai and Baining evident in historic times was not the result of in situ cultural diversification, but of migration.

Case study 2: the Willaumez peninsula

The deposits of obsidian in the Talasea area of central Willaumez peninsula have been the focus of a long-term archaeological study over more than thirty years (e.g., Specht, 1981; Summerhayes et al., 1998; Torrence et al., 1992 and 2009; Torrence and Stevenson, 2000; Torrence, 2002; Torrence and Doelman, 2007). This obsidian has been exploited since the Late Pleistocene (Summerhayes and Allen, 1993; Torrence et al., 2004), despite repeated severe volcanic events that caused extensive damage to the environment and affected viability of occupation of the area (Machida et al., 1996; Torrence et al., 2009).

The Early and Middle Holocene periods were marked by production of a range of stemmed obsidian tools made using prismatic blades and, in the case of the finest examples, Kombewa flakes (Araho et al., 2002; Rath and Torrence, 2003; Torrence et al., 2013). The Kombewa technique is currently known in the Western Pacific islands at only two other areas: at the Mopir obsidian source near Mount Witori (Mulrooney et al., 2016), and at the obsidian sources of Manus Province, several hundred kilometres north of New Britain across the Bismarck Sea (Torrence et al., 2013).

Production of these tools survived the impact of the W-K1 eruption of c. 6,000 years ago that occurred at Witori volcano to the south of Cape Hoskins, some 60 km southeast from Talasea, but their precise end-date is currently uncertain. Their production might have ended before the W-K2 eruption that blanketed the obsidian source areas with thick deposits of tephra and pyroclastic flow products around the modal date of 3315 cal. BP (Petrie and Torrence, 2008, tables 5 and 6), or the eruption itself caused their demise. Whatever the case, the event devastated a large portion of central New Britain (Torrence et al., 2009) locally burying the landscape under metres of tephra and affecting, but to a lesser extent, even the south coast (Machida et al., 1996, fig. 3; Boyd et al., 1999a, fig. 3). Following this, sites with Lapita pottery appeared throughout the peninsula, and pottery production continued in modified form until about 2000 cal. BP and possibly slightly later (Specht and Gosden, 1997; Torrence and Stevenson, 2000; Specht and Torrence, 2007a and 2007b). Several small stemmed obsidian tools occur in pottery contexts on Willaumez peninsula (Kononenko et al., 2010), though this does not necessarily indicate that some of the people re-settling the area were derived from the pre-eruption population. These later tools were small and simple, and were not made by the Kombewa technique.

Following the W-K2 event there was a period of relative calm until two major volcanic events again interrupted occupation around the obsidian sources. Dakataua volcano at the northern end of the peninsula erupted violently around a modal date of 1300 cal. BP (Petrie and Torrence, 2008, table 5), burying the obsidian source region under about 0.75 m of tephra (the Dk tephra: Machida et al., 1996; McKee et al., 2010). This had a 'profound effect' on settlements (Petrie and Torrence 2008, p. 742) that would have been evacuated because of severe environmental damage. Just a few decades later, another large-scale eruption of Witori volcano (W-K4) occurred. While the impact of this event on the obsidian source areas was relatively minor, its timing so soon after the Dk event could have affected recovery of the area and hindered re-establishment of settlements (Petrie and Torrence, 2008, p. 741). On Garua Island the combined effects of the two eruptions appear to have delayed reoccupation for over 200 years, suggesting that they tipped the balance against rapid re-settlement of the obsidian source areas (Petrie and Torrence, 2008, table 7). This contrasts with the isthmus area at the southern end of the peninsula, which escaped the impact of the Dk event, and was reoccupied about 100 years after the W-K4 event. The cultural deposits that formed on the W-K4 tephra are thick and widespread as a distinctive dark grey to black horizon and suggest intensive occupation, perhaps representing refugees escaping from the Dk event for the safety of the isthmus (Petrie and Torrence, 2008, p. 742).

Both the isthmus and obsidian source areas have occupation dates extending through the millennium following the Dk and W-K4 events (Petrie and Torrence, 2008, tables 2 and 3), and dates for the FAQ hilltop site on Garua island extend into the period of European visits to and colonisation of the New Guinea region (Beta-63618: 550 ± 60 BP; Beta-63619: 470 ± 60 BP; and Beta-63620: 370 ± 50 BP; all samples were marine shell). These dates suggests continuous settlement of the Willaumez peninsula obsidian source areas since the Dk/W-K4 events, perhaps with minor interruptions by the Wanguwangu series of smaller eruptions of Dakataua (Machida et al., 1996, table 1) that may have required short periods of abandonment.

The reoccupation of the obsidian source areas after the volcanic events may be reflected in oral traditions of the Talasea area that record the movement of the ancestors of the present-day Bakovi people northwards from the area of the peninsula known as their origin place (Specht, 1980 and 1981). The obsidian source areas might have been uninhabited at the time, as the oral histories do not record conflicts with other people occupying them. There is, however, no archaeological evidence to indicate when this movement might have occurred.

The oral histories attribute the population movement to reoccupation following a volcanic event, and this is plausible, if the areas around the sources had been abandoned. Equally possible is the smallpox epidemic that swept through west New Britain in 1895–1896 and "tore enormous gaps [in the populations] in the western part" of New Britain (Parkinson, 1999, p. 90). This epidemic was introduced from the New Guinea mainland and spread eastwards as far as Cape Hoskins.[4] It is not mentioned in the Bakovi oral histories, but it may have contributed to the abandonment of Garua Island, which

was unoccupied in 1923 when Dyson Hore-Lacy leased the island to develop a coconut plantation (Hore-Lacy, 1992, p. 13).

The situation on the isthmus is somewhat less clear. According to oral accounts recorded in 2002 at Patanga village on Willaumez peninsula, the smallpox epidemic caused many deaths and the abandonment of a substantial part of the isthmus, which remained uninhabited until it was taken over by expatriate interests for development as Numundo plantation.(5) Again, volcanic events might have played a role. Over the last 500 years the isthmus has received W-H series of tephras from the Witori complex (Machida et al., 1996, figs. 4 and 5E and F). Although individually they were less severe than the W-K series (Machida et al., 1996, table 1), their collective impacts may have caused moderate to severe landscape damage and contributed to the abandonment of the isthmus.

There were thus at least two major changes in the artefact inventory around the obsidian source areas either just before or after the W-K2 eruption, with the loss of the main stemmed tool forms and the introduction of pottery production. It is debatable whether they were purely local developments, were caused by volcanic events resulting in population discontinuities and replacements or, according to the standard interpretation of Lapita pottery, to the arrival of new people(s) in the New Guinea islands' region (Spriggs, 1997; Kirch, 1997; Green, 2003), or some combination of these explanations. While there has been an emphasis on similarity between Lapita pottery sites, we can also view them as an expression of diversification, for not all areas adopted the pottery. The loss of pottery production, therefore, along with the demise of obsidian stemmed tools can be seen as the opposite of diversification by making material culture suites more uniform across parts of the island.

Case study 3: the inland Passismanua area

This is the only area studied here that is not coastal, though the two languages spoken in the area (Kaulong and Sengseng) extend to the south coast and belong to the north New Guinea cluster of the Austronesian family (Ross, 1996, p. ix). Both fall into the 'aberrant' group of Austronesian languages in island Melanesia, with Kaulong regarded as the most innovative Oceanic language as it retains only 5% of the two hundred word list (Pawley, 2006).

The inland Sengseng and Kaulong people live between 250–500 m above sea level on the foothills of the Whiteman Range (Goodale, 1995). The population is scattered in small family hamlets and men's houses separated by several kilometres from each other, with data for the late 20th century indicating very low population densities of two to four persons per square kilometre (Chowning, 1980; Bourke et al., 1996, p. 33 and 37).

The limestone of the Whiteman Range contains many nodules and seams of white-orange-brown chert that has been exploited since the Late Pleistocene, and during the middle Holocene was used to make a range of stemmed and waisted tools (Pavlides, 2004 and 2006; Bulmer, 2005; Specht, 2011). Although these do not include prismatic blades and Kombewa flakes such as were made in the obsidian source areas of the north coast, their origin is arguably related in some way to that of the obsidian industries, though this possible relationship remains to be investigated.

The Passismanua area lies within the zone of 'moderate impact' of the W-K2 event (Boyd et al., 1999a, fig. 3), with about 30–50 cm of tephra being deposited (Pavlides, 2004, fig. 2). As with the Willaumez peninsula, production of the stemmed and waisted chert tools ceased before or at that time, after which only a few examples of different design and much smaller than the earlier examples entered the archaeological record (Kononenko et al., 2010).

The W-K2 tephra probably had a significant effect on the landscape and populations causing abandonment of the area. The three oldest charcoal dates for occupation of the Auwa (FGT) and Airstrip (FIF) sites following the tephra fall have a pooled mean of 2557 ± 48 cal. BP (Specht, 2011, p. 57). This may indicate a longer gap before reoccupation than on either Garua Island or the isthmus of Willaumez peninsula, presumably reflecting the initial low population density. The assemblages associated with these dates include a few sherds of plain pottery that was almost certainly imported from locations on the south coast around Kandrian where several Lapita and post-Lapita pottery sites have been reported (Boyd et al., 1999b; Summerhayes, 2000). The presence of the stemmed chert tools in post-W-K2 contexts may indicate some form of continuity with the population that produced the earlier stemmed and waisted chert tools, though the long gap in time between the W-K2 tephra and re-occupation may indicate otherwise. Traces of later tephras at the Passismanua sites were not sufficiently deep to have required further abandonment of the area. The sites thus share several aspects in common with those on Willaumez peninsula, but there are similar uncertainties in interpretation.(6)

Case study 4: Kandrian and the Arawe Islands

The south coast of New Britain is formed primarily of Pleistocene age, uplifted coral reefs with swamps in low-lying areas. The Kandrian sector consists of the coastal plain and three small islands, though local oral history records that a phase of tectonic activity uplifted the coast line and joined a fourth island to the mainland; this hill is known locally as the 'fourth island' (Boyd et al., 1999b). The Arawe Islands consist of about twenty small islands, of which six are inhabited today, and appear not to have experienced this recent uplift. Both areas lie south of the main impacts of the north coast volcanic events, though thin layers of several tephras were deposited around Kandrian (Lentfer et al., 2010, table 4) and as far away as Lolmo cave in the Arawe Islands (Gosden et al., 1994; Boyd et al., 1999a, fig. 3). These tephra falls, however, were probably little more than irritants and inconveniences, and did not have

the same scale of landscape impacts as was experienced in the previous two case studies.

The oldest recorded evidence for human presence on the south coast dates to about 6500 cal. BP in Lolmo cave, with use of the cave extending down to the time of Lapita pottery (Gosden et al., 1994). This pottery has been found at a dozen or more localities around Kandrian and on the Arawe Islands, and on Adwe and Kumbun Islands in the Arawe group the Lapita deposits extend down below the water table and have remains of stilt structures built over the intertidal reef (Gosden et al., 1989 and 1994; Gosden and Webb, 1994; Specht and Gosden, 1997). The later Arawe islands' sites of Maklo and Winkapiplo, dated to approximately 1560 to 740 cal. BP, also have waterlogged deposits with plant remains and artefacts in contexts similar to those on Adwe and Kumbun islands, though no stilt structures have been formally recognised (cf. Matthews and Gosden, 1997).

Following the end of Lapita pottery there was a gap of possibly 1500 years before pottery was again used around Kandrian area and in the Arawe islands, but this time it was imported from the New Guinea mainland (Gosden and Webb, 1994). This pottery was initially type X (Lilley, 1988 and 2002; Specht et al., 2006), later followed by pottery mainly from the Sio-Gitua and Madang industries (May and Tuckson, 1982), as well as a few sherds of pottery of unknown age and origin. On the south coast type X occurs as far as Kandrian, and on the north coast on Willaumez peninsula, in both cases in very small quantities (Specht et al., 2006; Specht and Torrence, 2007b). Sio-Gitua and Madang pottery occurs at several sites in the Arawe islands, but not the Kandrian area, and on the north coast it is reported from the Kove islands (Lilley, 1991) and on Willaumez peninsula (Specht and Torrence, 2007a). This evidence for contacts with the New Guinea mainland represents a break from Lapita times, when contacts were primarily with other New Guinea islands and island groups to the south (cf. White, 1996 for obsidian distributions). It also reflects the earlier, pre-Lapita contacts of the producers of obsidian stemmed tools with the New Guinea mainland (Torrence et al., 2013).

A possible sign of cultural continuity of practices, and arguably population, in the Arawe islands is the presence at Maklo and Winkapiplo of evidence for the production of *Tectus niloticus* (formerly *Trochus niloticus*) shell arm rings and other shell artefact categories that were also produced in the Lapita pottery period and are still made in the area today (Smith, 2001). In contrast, there is little evidence for such production at the Kandrian sites. It is tempting to see the continuity of production in the Arawe Islands as consistent with continuity of population there since the appearance of Lapita pottery in this region, though the widespread production of *Tectus niloticus* arm rings in both time and space shows it is not necessarily distinctive of any particular ethnolinguistic group. The lack of evidence for their production in the Kandrian Lapita pottery sites contrasts with the Arawe Islands, but perhaps reflects differentiation of production rather than cultural difference or divergence.

DISCUSSION

Cultural diversity

The cessation of pottery production or use in the study areas, the contrast in burial practices noted between those of the Kainapirina and Vunaburigai areas on Watom Island, and the shift in lithic technologies in the Passismanua and Willaumez peninsula study areas may be signs of discontinuities in cultural practices indicative of cultural diversification in the post-Lapita period. With the exception of the Vunaburigai burials, however, none of the evidence specifically indicates the emergence of the cultural diversity encountered by European visitors and settlers. Given the problems of identifying ethnolinguistic groups in the archaeological record discussed at the start of the paper and the generally poor quality of archaeological data currently available, this is not surprising. Within any ethnolinguistic group, at whatever scale, there is likely to be some form of differentiation of practices and specialised production, with distribution both within and beyond the group. A further complication is that many items of the material culture that is distinctive about particular ethnolinguistic groups of New Britain, such as shield forms and ritual accoutrements, comprise organic materials that have little or no likelihood of survival in the archaeological record except in special circumstances, as with an incised piece of wood preserved in waterlogged conditions in a pre-Lapita context at the Apalo site in the Arawe Islands (Specht et al., 2015).

'Boom' and 'bust'?

The two study areas located in northern New Britain share histories punctuated by volcanic disasters that occasioned landscape destruction, population disruption, abandonment of large areas and possibly local extinction of communities. The abandonment periods differed in length depending on the severity of the impacts of the volcanic events. On Willaumez peninsula reoccupation probably resulted from the attraction of the obsidian sources, but the situation elsewhere is less clear. The long gap in occupation on Watom Island was longer than on Willaumez peninsula, perhaps reflecting the extreme severity of the Rabaul Ignimbrite event. In the Passismanua area the long gap after the W-K2 event might indicate that the chert sources lacked the 'pull' of the obsidian sources, on account of their dispersed nature and lack of predictable quality. It could also reflect an extremely low population level prior to the W-K2 eruption, similar to or lower than those of recent times, though the limited data should make us cautious. The reoccupation chronology developed for Willaumez peninsula is based on a large number of dates, whereas for the Passismanua area there are only three dates for this event, two of which come from the same locality, Auwa.

On the south coast neither Kandrian nor the Arawe islands shows signs of abandonment due to the impacts

of tephra falls, and the evidence could be interpreted as one of cultural continuity from the Lapita pottery period onwards. In common with every other area of New Britain where Lapita pottery has been found, the main change over the last 2500 years was abandonment of pottery production for whatever reason, though production of *Tectus niloticus* shell arm bands continued. Whether there was continuity of occupation by the same population over the last 2500 years is simply not known. Stephen Shennan (Shennan, 2013, p. 301) emphasises that gradualist assumptions often have proved erroneous when a substantial corpus of reliable dates, detailed local and regional sequences and evidence from other disciplines can be brought into consideration. In time, this may well prove to be the case for parts of New Britain.

Some demographic issues

A key element of S. Shennan's study was palaeo-demographic data, but such data for past population sizes are notoriously difficult to reconstruct (Kirch and Rallu, 2007, p. 5–9; Crombé and Robinson, 2014). Preferred methods have been through proxy measures from osteological and palaeo-genetic studies, settlement size and frequency, dating curves and carrying capacity estimates. S. Shennan benefitted from palaeo-genetic studies that indicated probable population changes during the European Neolithic, and a major database of radiocarbon dates (Shennan, 2013, fig. 2 and fig. 3). There are no comparable palaeo-genetic data for New Britain, and only one area (Willaumez peninsula) has a substantial body of dates (Petrie and Torrence, 2008). For her study of Garua Island, adjacent to Willaumez peninsula, Robin Torrence (Torrence, 2002) used changes in the distribution and frequency of discard of obsidian across the landscape as a proxy for changes in land use, arguing for a shift through time from widely dispersed to more clustered distributions, though this does not necessarily reflect changes in population size or density, but could reflect changes in settlement patterns that were unrelated to these factors. With regards to carrying capacity, the abandonment-reoccupation sequences were caused by volcanic events, and not by population growth exceeding the local carrying capacity. The volcanic impacts would have affected subsistence resources of all kinds, and would have constrained population sizes and distributions for some after the eruptions until the terrestrial and in-shore marine biotas recovered.

The lack of palaeo-genetic data for New Britain is not necessarily a major disadvantage. A study of contemporary human genetics of northern island Melanesia, particularly New Britain (Friedlaender, 2007; Hunley et al., 2008) did not include any samples from the four study areas covered by this paper, but it offers some insights into some of the difficulties of using such data. One of the main conclusions of the study was that "Genes have tended to move freely between nearby populations, regardless of the languages they speak" (Hunley et al., 2008, p. 10). The authors discount as "most unlikely" the possibility that "Oceanic languages have simply been adopted by formerly Papuan-speaking groups" as there has been clear gene flow between neighbouring groups speaking Oceanic and Papuan languages. These conclusions have obvious implications for the interpretation of palaeo-genetic data in general.

CONCLUSION

While there are major gaps in data for the last 3,000 years, there have been changes in the material culture repertoires of all four study areas, though these do not necessarily reflect the appearance or emergence of different ethnolinguistic groups. That process may lie beyond the scope of archaeology to identify. In his review of what might have happened in the post-Lapita pottery period, Matthew Spriggs (Spriggs, 1997, p. 185) suggested that "Lapita culture was never a completely homogeneous entity", but "by about 2500–2000 BP the region [island Melanesia] was as homogeneous as it was ever going to get." This apparent near-homogeneity across a wide area was the result of the rapid dispersal of the Lapita cultural complex, but it lasted only for several centuries. This emphasis on homogeneity, however, implies a lack of it prior to the appearance of Lapita pottery—in other words, some degree of diversity. Perhaps rather than view the cultural diversity of the entire region as a product only of the last two millennia or so, it would be more useful to see it as a longer-standing condition that was briefly interrupted by the appearance and dispersal of the Lapita cultural complex.

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NOTES

(1) Friedlaender (Friedlaender, 2007) provides extensive data on genetic studies of contemporary people on New Britain, though not covering all the areas discussed in this paper.

(2) The Passismanua area is allegedly named after the visit of a German man-of-war ship to Kandrian, probably the *Möwe-hafen*, which anchored near Kandrian. The name is New Guinea *Tok Pisin*, and is a corruption of 'passage' (*passis*, i.e. anchorage) 'of the man-of-war' *(manua)*.

(3) Other speakers referred to Tolai raids on the mainland to seize Baining people as slaves, a practice that was eventually stopped by the Christian missions and German adminis-

tration. In the 1890s Governor Hahl (Sack and Clark, 1979, p. 26–27) sought to restrict Tolai raids on Baining mainland communities in which Watom islanders of Tolai origin were involved. The Watom-Baining link was early recognised by missionary Danks, who proposed in 1884 that the Wesleyans should establish themselves on the island in the hope that a friendly relationship with the islanders would facilitate the mission's expansion among the mainland Baining people (Deane, 1933, p. 219).

(4) The Annual Reports of the German administration of German New Guinea and the Bismarck Archipelago place the epidemic in the 1895–1896 year (Sack and Clark 1979, p. 122). According to Parkinson (Parkinson, 1999, p. 90), it was introduced to the Bali-Witu islands by visitors from Willaumez peninsula. In 2002, on a visit to the Bali-Witu group with Robin Torrence, I was told that at least one island was so badly affected that the islanders abandoned it. The German administration vaccinated not only "coloured labourers on the plantations but also many natives in the surrounding area" [today's Rabaul-Kokopo area], clearly focusing on protecting the economic viability of the colony, rather than addressing the needs of all its inhabitants. The Annual Report for 1899–1900 recorded a chicken pox epidemic in the Rabaul-Kokopo area, but noted that "smallpox proper has not been observed in the Archipelago" during this period (Sack and Clark 1979, p. 187).

(5) The severity of the smallpox epidemic is difficult to calculate as there are no reliable data. J.-L. Rallu (Rallu, 2007, p. 25–26) cites mortality rates of 300 per 1000 persons among non-immunised populations, but it is difficult to estimate this impact on New Britain communities as there are no demographic data. The abandonment of a large part of the isthmus, however, suggests it was severe.

(6) There appears to be no specific memory of the smallpox epidemic in the Sengseng or Kaulong areas, though Parkinson (Parkinson, 1999, p. 91) recorded that it extended along the south coast to the east of Kandrian. It is possibly reflected in comments made to me in 1979–1981 by inland Sengseng people that they avoided travelling to the south coast if possible as this would take them through an area known for sorcery that caused severe illness. An alternative explanation for this attitude is that the inland Sengseng were avoiding malaria, as their own territory appeared to be comparatively free of malaria vectors in 1979–1981.

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Jim Specht
Australian Museum, Sydney
and
School of Philosophical and Historical Inquiry
University of Sydney, Australia
jspecht@bigpond.com