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Late Pleistocene Complexities in the Bismarck Archipelago

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Behavioral complexity can be defined in a number of ways. It can be defined in linear terms, as a trajectory, process, or progression. In this context the zenith of complexity is the present, with decreasing degrees of complexity receding into the past. This can be regarded as the received view of long-term cultural variation. Alternatively, complexity may be considered in terms of a process of adaptation that is responsive to local conditions but is not inevitably unidirectional (Rowley-Conwy 2001). From the latter perspective, complex behavior is as likely to have occurred in the Pleistocene as in more recent times. This position is a quite radical departure from conventional social theory regarding long-term trajectories of cultural change, but one that is gaining substantial support from current research in Oceania. The obvious difficulty for archaeologists in dealing with behavioral complexity in either framework, however, is that not all aspects of human behavior have a physical manifestation. Archaeological investigation relies on material evidence and so some aspects of human complexity, such as cognitive processes, must to some degree be considered archaeologically epiphenomenal unless they have a demonstrable material connection. In an archaeological framework, complexity might thus best be considered a reflection of the number of steps or stages in a process that leads to a given material outcome: More steps produce greater complexity.

This chapter will consider the economic, technological, and social complexities of life in the Bismarck and Solomon archipelagoes during the Pleistocene (Figure 9.1), with particular emphasis on the fit between different models of Pleistocene behavior and the evidence upon which they rest. Discussion begins with a general description of the study area and an overview of regional archaeological patterns.

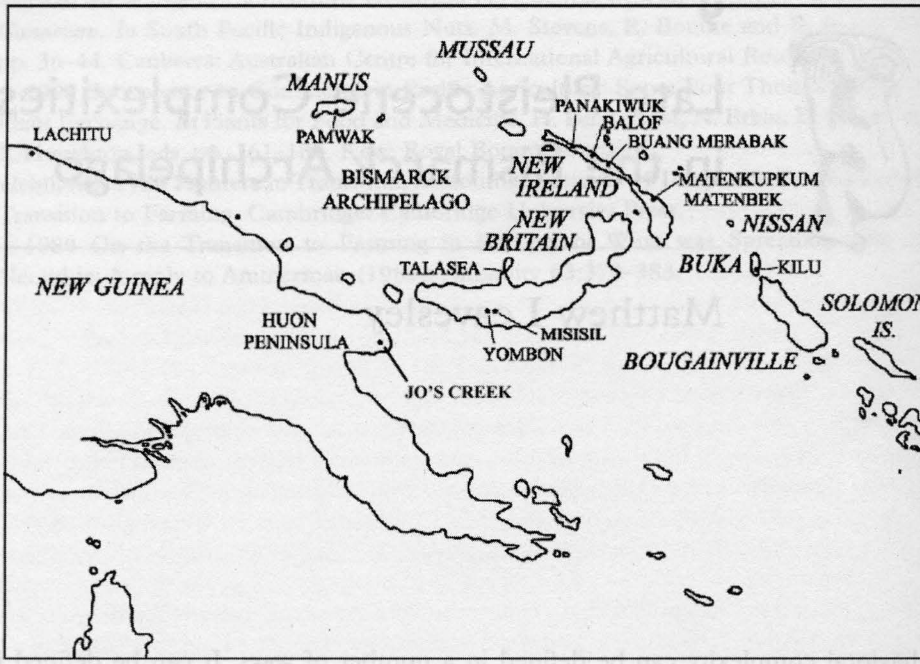

Figure 9.1 New Guinea, the Bismarck Archipelago, and the Solomon Islands, showing places mentioned in the text (derived from Allen and Gosden 1996)

Geographical Background

The Bismarck Archipelago is located off the northeastern coast of New Guinea, to which it has never been connected by land. It consists of three large islands and hundreds of smaller ones (Mayr and Diamond 2001). The three large islands, New Britain, New Ireland, and Manus, were also never joined to each other in the past. The first two consist of basal volcanic rock overlaid by limestone and sandstone. Manus consists primarily of volcanics, small quantities of limestone, and coastal alluvium. All are covered with dense tropical rain forest. Most of the Pleistocene archaeological data for the Bismarck Archipelago come from a series of caves located along the east coast of New Ireland (Allen and Gosden 1991). Two additional Pleistocene sites are located in the New Britain interior (Pavlides 1999; Specht et al. 1981).

The main Solomon Islands chain includes seven large and about 1,000 small islands. The Solomons volcanic basement is variously overlain within sandstone and limestone. The archipelago changed significantly during the late Pleistocene, with the islands of Buka, Bougainville, the Shortlands, Choiseul, Santa Isabel, and Nggela being connected at times of low sea level to form "Greater Bougainville" (Spriggs 1997:28). Like the Bismarcks, the main Solomons Archipelago is covered in tropical rain forest. The single Pleistocene site known in the Solomons, on Buka Island (Wickler 2001), is discussed below.

Pulses of Deposition

Our understanding of the regional archaeology is limited by the very small number of sites representing any given period, but some broad trends are becoming apparent. Allen and I (Leavesley and Allen 1998) have identified six "pulses" of deposition representing shifts in human behavior in the New Ireland sites. Four of these pulses are relevant to the Pleistocene. They can illuminate specific aspects of behavioral complexity through broad comparisons with patterns in the Holocene.

Pulse I

The first pulse represents initial human colonization of the region and is intimately associated with the colonization of Sahul, the continent formed when low sea levels joined Australia, New Guinea, and Tasmania (Birdsell 1977; Lilley, this volume). There are two likely routes into "Greater Australia" from Southeast Asia, a northern route via Sulawesi and a southern route via Timor, and compelling arguments have been made for the use of both (Allen and Gosden 1996:184; Chappell 2000; Lilley, this volume). The earliest evidence for colonization of the Bismarcks comes from the cave site of Buang Merabak in central New Ireland (Leavesley et al. 2002), which indicates that humans may have reached the island by 39,500 B.P. In addition, there are dates of at least the same magnitude from Matenkupkum cave in southern New Ireland (Leavesley and Allen 1998) and from open sites around Yombon in interior New Britain (Pavlides 1999 and this volume). The passage from northern Sahul (i.e., New Guinea) to New Britain signals the beginning of a learning process, of adaptation to biotically increasingly-depauperate islands and, with the colonization of the Solomons, to lengthening sea-crossings, a process that ultimately led to the colonization of Polynesia (Allen and Gosden 1996:185).

There is comparatively little evidence from the Bismarcks for the period following the initial incursion of people until about 20,000 B.P. This sparseness is taken as the signature of the activities of small, highly mobile groups of hunter-gatherers who moved to find the resources they required (Allen and Gosden 1991). On the basis of continuing work in western New Britain, however, Torrence et al. (2004) argue that this pattern may be peculiar to New Ireland, as they have evidence that resources were moved over reasonable distances to people, rather than the reverse. As they suggest, such regional variation is to be expected, and we are likely to see more of it as research in the region progresses. Be that as it may, a significant movement of people occurred by 28,000 B.P., in the form of the colonization of the main Solomons chain. This evidence comes from Kilu Cave on Buka (Wickler 2001) and represents a sea-crossing from New Ireland of 180 kilometers (Allen and Gosden 1996:186). This event stands apart from others in the region because there is little evidence for continuing communication between Buka and the Bismarck

Archipelago (Spriggs 1997). The colonization of Buka, then northern "Greater Bougainville," represents an important phase of human adaptation in Oceania because the environment is even more depauperate of terrestrial human prey than the Bismarcks. During the Pleistocene, the Solomons had only a limited range of bats, rats, and reptiles including the large and now-extinct rats *Solomys spriggsarum* and *Melomys spechti*. The cuscus *Phalanger orientalis*, which is an important part of the Pleistocene diet in the Bismarcks, is absent in the Solomons until after 3300 B.P. Moreover, although the variety of pelagic fish in the Indo-Pacific region is presumed to have been relatively constant, the reefs of the Solomons have a lower coral biodiversity than the Bismarcks (Veron 1995). This may imply a more general reduction in reef-based marine life. In this context the large rats are likely to have played an important role in human subsistence.

Pulse 2

The second pulse in archaeological deposition occurred at the Last Glacial Maximum (LGM) about 22,000–20,000 B.P., when a series of significant behavioral changes occurred in the Bismarck Archipelago. People occupied Manus for the first time by at least 20,000 B.P. (Minol 2000:25). The journey was probably made either by island-hopping from New Ireland via New Hanover and Mussau, or from the north coast of Sahul/New Guinea (Spriggs 1997:29–30). Both routes were used in the ethnographic period and both potential source-regions have later archaeological connections with Manus. The colonization of Manus required an open-sea crossing of over 200 kilometers, about 75 kilometers of which would have been out of the sight of land (Allen and Gosden 1996:188; Irwin 1992). This makes it the longest sea journey up to this time anywhere in the world and the only known Pleistocene voyage beyond the limits of one-way island intervisibility. It implies capable marine craft and considerable navigational ability, even by modern standards. Today, journeys of this distance are rarely attempted by anyone but the people who reside on remote islands such as Wuvulu or Nugaria between Manus and New Guinea, who use modern navigational equipment. In other words, the colonization of Manus entailed extensive planning and great skill in execution.

New Ireland also saw an increase in communication with New Britain at this time. Prior to 20,000 B.P., people moved to the resources they required. After 20,000 B.P., Matenkupkum and Buang Merabak contain cuscus bones and obsidian, intimating the movement of exotic wild animals and stone into New Ireland and thus reflecting an increase in the complexity of human behavior in the region (Allen et al. 1989; Flannery and White 1991; Gosden and Robertson 1989; Summerhayes and Allen 1993). The introduction of *P. orientalis* entails the manipulation of the environment through the addition of a new prey taxon to provide an extra protein source. This indicates increased awareness of the rain forest and its resources and how they might be altered to better sustain human life (Gosden and Robertson 1991). The presence of obsidian from Mopir in central north-coast New Britain signifies an awareness of its superior flaking properties and perhaps recognition of its potential social value. It is also an expression of the presence of an expansive interaction sphere in which obsidian was exchanged down-the-line across more than 350 kilometers to southern and central New Ireland (Summerhayes and Allen 1993). Those who worked the quarry presumably knew at the very least that the people they gave it to valued it, but need not have had any idea of the geographical spread of its distribution.

The second phase is followed by a gap in the evidence for occupation in New Ireland between the LGM and 15,000 B.P. which is broadly mirrored elsewhere. In the rain forests of interior western New Britain, Yombon was occupied until 17,000 B.P. with a hiatus until 12,000 B.P. (Pavlides 1999 and this volume), and Kilu in Buka has a gap from 20,000 to 10,000 B.P. (Wickler 2001). In New Ireland the hiatus is signaled by a reduction in the number of sites with evidence for human occupation. This shift may indicate a reduction of occupation or even regional abandonment. Alternatively, it may result from a change in the focus of landscape use away from cave sites or a destruction of archaeological deposits by non-human taphonomic processes (Specht in press).

Pulses 3 and 4

The third pulse, beginning around 15,000 B.P., sees the reoccupation of the cave sites in central and southern New Ireland and the first evidence for occupation in northern New Ireland sites, with similar processes evident in western New Britain and Buka at slightly later dates. In particular, we see the reuse of Matenkupkum at 16,000 B.P., Buang Merabak at 14,000 B.P., and Yombon at 12,000 B.P. (Pavlides 1999). In northern New Ireland, Panakiwuk was first occupied at 13,000–15,000 B.P. and Balof at 12,000 B.P. This pulse represents the greatest density of deposition of any period in the New Ireland sites, which suggests that regional populations had grown substantially.

The fourth pulse occurred at about 12,000–10,000 B.P., when all the New Ireland sites show their highest rates of cultural deposition (Allen and Gosden 1996:189). This change may represent some form of intensification (Spriggs 1993:190). It is paralleled in New Britain by the first use of Misisil Cave (Specht et al. 1981; see Figure 10.1) and the re-occupation of the Yombon area (Pavlides 1999 and this volume), while Kilu in Buka is reoccupied at 10,000 B.P. (Wickler 2001). In New Ireland, the fourth pulse was followed by the abandonment of all the sites at about 8000 B.P.

The four pulses of deposition provide a broad framework in which to consider notions of complex human behavior in the Bismarcks and Solomons during the Pleistocene. What follows is a more detailed discussion of specific aspects of economic, technological, or social complexity, including some thoughts on ways in which our understanding of these matters could be enhanced.

Economy

Economic complexity is measured by the number of steps undertaken to acquire a resource, primarily raw materials and food. The following discussion focuses on such matters but also considers broader economic strategies associated with particular periods of time or environmental contexts.

While the Wallace Line marks the divide between the placental fauna of Asia and the marsupials of Australia and New Guinea, no such divide occurs between the marine faunas of the two regions (Allen 2000:144). There is also a direct relationship between the size of a given landmass and its biotic diversity. Thus people became dependent upon a restricted range of terrestrial resources for subsistence when they crossed the Vitiaz Strait to move from New Guinea, the second largest island in the world, out into the Bismarck Archipelago and Solomon Islands. In order to exploit these taxa, high mobility predicated on watercraft was essential (Allen 2000:144–145). Before the discovery of Pleistocene evidence from the inland site of Yombon (Pavlides 1999; Pavlides and Gosden 1994; also Pavlides, this volume) it was suggested that the first colonists of the Bismarck Archipelago and other parts of the Pacific employed a "strandlooper" strategy of resource procurement and exploitation (Groube 1971). Strandloopers were small, transient groups of hunter-gatherers predominantly using reef and coastal resources (Spriggs 1997:37; cf. Galipaud, this volume, regarding much later Pacific strandloopers).

There are four converging lines of archaeological data in support of the strandlooper model. First, in order to colonize an island from the sea, one must land at the coast. Secondly, all the earliest sites with the exception of Yombon (Pavlides 1993) are coastal sites. Thirdly, there are more Pleistocene coastal sites than inland sites overall, and fourthly, the coastal sites all contain shell middens (Allen 2000:144–146). However, the earliest sites do not contain large quantities of fish and their capture would not have required any specialized technology beyond the "fortuitous accidental or deliberate trapping or spearing on reefs on outgoing tides" (Allen 1993:144). With the discovery of evidence for the human exploitation of resources deep in the rainforest at Yombon during the Pleistocene, the strandlooper model has been scaled back to apply perhaps only to the initial colonization phase. Evidence from the New Guinea highlands clearly shows that settlers on mainland Sahul had adapted to non-coastal environments by at least 25,000 B.P. and probably before (Allen 1993:141; Denham, Lilley, this volume). Moreover, although Buang Merabak and Matenkupkum in New Ireland are coastal sites, their faunal assemblages include extinct forest birds, consistent with the use of the forests for hunting (Steadman et al. 1999). They also contain large quantities of bat remains, confirming that people targeted a variety of bush animals. In Buka, the Kilu evidence shows the exploitation of two large rodent species and reptiles, both of which may indicate the use of inland resources (Wickler 2001). Thus present results suggest that while the exploitation of coastal resources was extremely important to the Pleistocene colonists of the Bismarcks and Solomons, they also exploited inland resources from soon after their arrival. As an adaptation to depauperate island environments, this multifaceted foraging strategy clearly entails increased behavioral complexity.

New Ireland has an even more depauperate fauna than New Britain. The first colonists undoubtedly had to adjust their behavior in order to survive in an environment with a different range of taxa from their place of origin. The focus of hunting and gathering may have become skewed, if not specialized, toward the taxa known previously from New Britain, although there is very little evidence as to what these taxa might have been. A case in point is the shell midden at Matenkupkum. After the initial colonization of New Ireland, people selected larger individual shell specimens from a narrow range of the larger available taxa. The pattern subsequently alters to the selection of smaller specimens from a wider range of taxa. This pattern has a number of implications. First, it suggests selective shellfish gathering, requiring knowledge of the range of taxa available and a view about which taxa are most desirable. Second, Gosden and Robertson (1991) interpret the data as an indication that shellfish resources in the vicinity of the cave were "over-predated" in the pre-20,000 B.P. period because people continually selected the biggest shellfish. Subsequently, a general diminution in size of the largest individuals is interpreted as representing the human response to diminishing shellfish stocks.

Our understanding of the situation at Matenkupkum could be strengthened in three ways. First, the archaeological sample for the earliest time unit could be increased to provide a more secure basis for interpretation. Although the excavation trench was 9 meters × 1 meter, the earliest stratigraphic unit contains only a small quantity of specimens (Robertson 1986:66–67). Secondly, the site's chronology could be investigated further, with the aim of refining its temporal resolution. Presently the chronological units span 10,000, 6,000, and 2,000 years respectively. In a best-case scenario, chronological resolution would mirror the life cycle of the taxa in question. Thirdly, more malacological research on the relevant taxa in the region would facilitate a more informed consideration of the environmental effects of the human collection on shellfish populations (Spriggs 1993:190).

Other interesting examples of people moving into new islands with low levels of taxonomic diversity come from Buka and Manus. Buka had none of the varieties of cuscus or pademelon (small wallabies) of New Britain and also had a reduced range of bats and birds. However, Buka did have the two large species of rat mentioned earlier (Flannery and Wickler 1990), which appear to have made up a large percentage of the terrestrial component of the Pleistocene diet prior to their extinction somewhere between 20,000 and 5000 B.P. (Wickler 2001). Manus also had a restricted range of fauna primarily consisting of bats, rats, and birds prior to the introduction of the spotted cuscus *Spilocuscus kraemeri* and spiny bandicoot *Echymipera kalubu* at 13,000 B.P. (Spriggs 1997:54).

Environmental Manipulation

Discussion of the human translocation of animals between islands in the Indo-Pacific is not new (Wallace 1869). The cuscus *P. orientalis* first appears in New

Ireland at 19,000–20,000 B.P. and is thought to be the product of possibly deliberate but probably accidental human behavior (Flannery and White 1991; White 1993:174). Flannery and White (1991) list four criteria on which they base their proposal concerning human rather than natural translocation. First, cuscuses have been moved extensively elsewhere in Melanesia (see also Grayson 2001). Second, its prospects of successful establishment on previously uninhabited islands are good because it was known to regularly produce twins. Third, *P. orientalis* can inhabit a range of environments. It is a lowland species with broad ecological tolerance, its generalized diet enabling it to survive in secondary as well as primary forest (Flannery 1993:175). Finally, the natural translocation of *P. orientalis* appears unlikely because it does not seem to occur in New Ireland for at least one million years prior to human occupation (Flannery and White 1991:108). Flannery (1993:175) subsequently added that the New Ireland *P. orientalis* colonists were probably "back young," that is, young animals that have developed beyond dependence upon their mothers' milk but remain with them, on their backs, for about a month after weaning. "Back young" are considered to be the optimum age for transfer because younger animals can easily succumb to illness and older animals are less tractable and more likely to be injured during capture or suffer from "capture myopia."

Specht (in press) questions animal translocation in general on two grounds. First, terrestrial animal protein remains very limited in the Bismarcks even today (Allen 2000:144–145), so if human translocation of animals was undertaken as a strategy to increase the availability of prey it was not very successful. Second, the appearance of taxa in an archaeological deposit represents their first inclusion in the human diet, and perhaps only in the archaeological record, not necessarily their introduction into the wider environment. A natural bone-trap such as a sink-hole in limestone would be the ideal context in which to determine when a species first entered a given environment (Heinsohn 1998:77; Specht in press). In the absence of any systematic paleontological studies in New Ireland there is no pre-20,000 B.P. natural material with which to compare the archaeological assemblages. In addition, "recent natural range extensions and human-assisted dispersals may mimic each other in effect and . . . zoogeographic evidence may be inconclusive" (Heinsohn 1998:76). Although the case for the human translocation of *P. orientalis* is strong, the limitations listed above suggest that a number of lines of scientific enquiry remain to be pursued before we understand the processes that brought the cuscus to New Ireland. Irrespective of the answer, however, the phalanger's appearance coincides with the aforementioned change in shellfish selection at Matenkupkum and Buang Merabak. The cuscus may have taken pressure off existing prey, moving the focus of protein procurement from the rocky shore to the adjacent forests. If these two events can be demonstrably linked in this way, more light will be cast on the complexities of people's response to the changing availability of prey.

While protein acquisition is an important part of subsistence strategies, plants would have provided the bulk of the carbohydrate. The development of agriculture in the Bismarck Archipelago may have occurred through a series of phases starting with arboriculture amongst foragers (Gosden 1995; Yen 1995). Arboriculture is orchard-based tree cropping (Kirch 2000:82). A vast array of botanical remains have been collected from the Pleistocene deposits and identified to taxon. Edible types include *Canarium indicum*, coconut, *Aleurites*, *Terminalia*, *Panadanus*, *Pangium*, *Spondias*, and *Dracontomelon* (Spriggs 1997:79). Starch residues on stone artifacts from Kilu indicate the use of both *Alocasia* and *Colocasia* taro in Buka during the Pleistocene (Loy et al. 1992). Plant residues have also been identified on the Balof 2 stone artifacts (Barton and White 1993) from New Ireland, representing localized and short-term vegetation clearance of a sort that might be expected with small-scale cultivation or forest-edge manipulation (Spriggs 1997:85). Gosden (1995) has suggested that this evidence supports the case for Pleistocene arboriculture, which in turn reflects substantial behavioral complexity in a number of ways. First, it indicates intimate knowledge of New Ireland's flora. Second, it reflects the process of differentiating those plants that have value to humans from those that do not. Third, it adds a significant dimension to the region's Pleistocene hunter-gatherer economy, one more usually associated with more recent periods.

The quest for sustenance is a driving force of all life on earth, but only humans engage in the complex deployment of tools as capital equipment for the acquisition and processing of food. The redistribution of valuable raw materials for the production of capital equipment is commonly exemplified by the prehistoric exploitation of high-quality flaking stone such as obsidian. Obsidian appears in the New Ireland assemblages from 20,000 B.P. (Rosenfeld 1997; Summerhayes and Allen 1993). As obsidian occurs naturally in only a few places in the Bismarck Archipelago – and nowhere in New Ireland – its dispersal away from the sources implies the movement of resources to people (Gosden and Robertson 1991). From a microeconomic perspective, the most important items attract the highest input of resources in their acquisition and maintenance. In a highly mobile society with limited transport capacity, items which are either renewable or of lesser value would be disposed of first and those that are considered to be difficult to replace or important will be carried for longer. The identification of obsidian in central New Ireland over 350 kilometers from its sources in western New Britain signifies the prehistoric identification of a resource with intrinsic value. Noteworthy behavioral complexity is also indicated by the various stages of quarrying, distribution, and modification entailed prior to the obsidian's end use.

Technology

The late Pleistocene sites of the Bismarcks and Solomons contain evidence for technological complexity previously thought to have occurred only during the Holocene. As described above, early mariners developed the technology to cross wide water-gaps and, in cases such as Manus, may have deliberately sought out unoccupied islands. In addition, people selected between different raw materials for the production of stone tools and distributed obsidian across vast distances (Pavlides 1999 and this volume; Summerhayes and Allen 1993).

In relation to the first matter, Allen and Gosden (1996:184) propose a method of distinguishing between the deliberate and accidental colonization of the Bismarck Archipelago from northern Sahul/New Guinea. Colonization might have been deliberate if New Britain was settled via the Vitiaz Strait and both sides of the Strait were first settled at roughly the same time. Alternatively, if colonization east of the Vitiaz Strait significantly postdates that of northern Sahul/New Guinea it may imply an accidental crossing. Evidence from the Huon Peninsula indicates colonization by at least 40,000 B.P. (Groube et al. 1986). Leavesley et al. (2002) report that central New Ireland was occupied at 39,500 B.P., indicating that both sides of the Vitiaz Strait were occupied at approximately the same time at an archaeological scale. The rapid crossing into the Bismarcks suggests that it was colonized as part of a deliberate strategy of exploration. In this context, substantial behavioral complexity is evident in the process of purposeful migration requiring sailing technology, maintenance of watercraft, and the organization of populations large enough to sustain colonization.

Upon arrival in the Bismarck Archipelago there is evidence from both New Britain and New Ireland that people distinguished between stone raw materials on the basis of quality. Judgments about quality require in-depth knowledge of available resources and their suitability for particular processes of reduction. The human settlement of Yombon at 35,500 B.P. is associated with the exploitation of local outcrops of high-quality chert (Pavlides 1999 and this volume; Pavlides and Gosden 1994). At the same time, the southern New Ireland assemblages consist of a wide variety of material including small quantities of high-quality local chert (Allen and Gosden 1996:186; Allen et al. 1989). The presence of the chert artifacts at Yombon indicates deliberate exploration of the rugged rain-forest interior of New Britain and the repeated systematic exploitation of a valuable resource (Allen and Gosden 1996:186). In New Ireland it reflects a process of discrimination amongst local sources. In addition there is evidence for variation through time in patterns of source selection (Allen et al. 1989). Before 20,000 B.P., the high-quality stone in the assemblages consists solely of local chert (Allen et al. 1989:554). Obsidian occurs from 20,000 B.P. and increases through time as a proportion to other types of stone, seeing the use of chert diminish significantly.

Accepting that both resources remained available throughout the period of human occupation, the foregoing trend indicates a cultural change in preference for exotic obsidian over local chert as a raw material for the production of artifacts. In utilitarian terms, it is hard to judge why this may have occurred. Obsidian is a volcanic rock containing more than eighty percent glass. The glass content gives it exceptional flaking qualities, enabling the production of very sharp edges and making obsidian highly desirable for stone artifact production. For most purposes, however, there would be little if any discernible difference between the ease of flaking or the sharpness of the edges of obsidian and high-quality chert. Moreover, there would have been much greater costs involved in obtaining obsidian from far distant sources than there would have been in using local chert sources. These factors suggest there may have been additional dimensions to the acquisition and use of obsidian, similar perhaps to the sociopolitical characteristics of obsidian trade in ethnographic times, which saw tiny pieces of obsidian given great social value when traded from a great distance (e.g., Harding 1967).

The acquisition of specific raw materials for artifact production also extended to marine mollusk shell. Shell artifact manufacture involved a range of technologies applied to specific taxa (Leavesley and Allen 1998; Smith and Allen 1999; Wickler 1990:140). Smith and Allen (1999:293) identified a pattern of "tab" removal from the medial whorl of the turban shell *Turbo argyrostroma*. In some instances the tab was removed by drilling a sequence of holes to weaken the shell before separating the tab. For those shells without drill holes it appears that there is little to distinguish between tab removal and meat extraction as the cause of observed breakage patterns. The production of shellfish hooks on the top shell *Trochus niloticus* has also been posited for the Pleistocene (Smith and Allen 1999:293–294). While such shell industries were not as developed as the shell technologies of the mid- to late Holocene (Green 2000), the fact that shell artifacts were made at all during the Pleistocene greatly diminishes the technological distance conventionally thought to exist between that period and more recent times.

Society

While the movement of artifacts across the landscape is commonly described in economic terms it also inevitably entails social interaction (Gosden 1993). In an attempt to elucidate the "social" in Pleistocene Melanesia, Allen and Gosden (1996:184) drew on Caldwell's (1964) idea of interaction spheres to propose that "social, ideological and trade connections between different populations in different places . . . [were vital for] locally specific forms of change." Such interaction spheres encompass local and regional change as equally important causal processes and there are no hierarchical distinctions between the regions involved. A variety of evidence indicates there may have been a series of such spheres in Melanesia from the Pleistocene onward. Normally archaeological interpretations of information exchange rely on the demonstration of the two-way movement of material goods, but one-way movement of material such as New Britain obsidian to New Ireland is also indicative of communication. In the absence of any direct evidence, Allen (2000:142) has also suggested that the presence of shell ornaments may also reflect social as well as economic behavior, on the basis of ethnographic reports of the use of shell ornaments in ceremonies and for exchange.

Discussion

Archaeologists have spent a great deal of time contemplating the many issues that arise in the Pleistocene prehistory of the Bismarck Archipelago and Solomon Islands. While much important research has been completed, many tantalizing gaps remain. One curious aspect of the southern New Ireland Pleistocene sites stems from differences between Matenbek and Matenkupkum (Gosden 1995:811). The sites are located on the same cliff-line only 70 meters apart, with no evidence for any past barrier between them. While it is easy to imagine the two sites constituted a single unit of behavior, they have remarkably different contents. It is not clear why. Matenbek has abundant evidence for human behavior during the height of the LGM while Matenkupkum does not. The lack of deposit at Matenkupkum is difficult to understand given its proximity to Matenbek and the lack of an obvious physical barrier between them. Matenbek contains significant difference in content to Matenkupkum (Allen 2000:152). Matenbek contained 435 fragments of obsidian from a 1 meter × 1 meter test-pit including only deposits dated from 8000 to 6000 B.P., while Matenkupkum has a total of 106 fragments from a 10 meter × 1 meter trench (Robertson 1986:102) which spans the entire period that the site was occupied. Why should Matenbek contain so much less obsidian? Allen proposes that the variation results in part from sampling error at Matenbek. Roof-fall at some time in the past has partially closed the mouth of cave, restricting archaeological access to some of the deposit. It is also possible that the two sites were used in different periods (Allen 2000:152), but that begs the question of why only one was used at a time.

Another more fundamental question concerns the development of agriculture. This is an extremely important issue for the region because agriculture provided the economic basis of the late Holocene Lapita expansion into the biotically extremely depauperate islands of Remote Oceania (see Denham, Galipaud, Lilley, Pavlides, Sand et al., and Walter and Sheppard, this volume). A crucial concern is whether agriculture as we understand it today existed in the region prior to 3500 B.P. (Denham, this volume). One way to approach this question might be to accept the argument that humans required agriculture to colonize very small, very remote islands and then survey Pleistocene and pre-Lapita Holocene landforms on small islands in the Bismarck Archipelago and Solomons. One such small island with pre-Lapita Holocene evidence is Nissan, between New Ireland and Bougainville. A reduction in density of shellfish after Spriggs's Halikan Phase is consistent with a switch from subsistence strategies based on foraging and arboriculture before 3500 B.P. to a greater reliance on agriculture (Spriggs 1997:80; 1991:240). While Gosden (1995) has addressed the issue of early agriculture in the Bismarcks, no pre-Lapita agricultural sites in the region have been identified, much less intensively investigated after the fashion of the Kuk site in the New Guinea highlands (Denham, this volume). Plainly, research of this kind would help determine the role, if any, of agriculture in the Bismarcks and Solomons before Lapita and the colonization of the remote Pacific.

Conclusion

The purpose of this chapter has been to emphasize the economic, technological, and social complexities of human behavior during the Pleistocene in Near Oceania, and how received wisdom regarding directionality in long-term patterns of cultural change is undermined by the evidence emerging from the Bismarcks and Solomons.

In doing so, it has summarized some of the major interpretations while also drawing attention to a number of questions yet to be resolved. It is hoped that it has in this way highlighted the importance of the matters that have been comparatively well researched and placed them within the overall context of archaeology in Oceania, but at the same time shown that much remains to be done. The Pleistocene archaeology of Near Oceania is nothing if not a work in progress!

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