

## *Introduction to Pacific Islands Archaeology*

by Patrick V. Kirch

The Pacific Islands, also known as Oceania, have been subdivided traditionally by anthropologists into three main geographic regions: Melanesia, Micronesia, and Polynesia (Fig. 1). Following Green (1991), prehistorians now stress the division between Near Oceania in the west (including the Bismarck Archipelago and the Solomon Islands), and Remote Oceania (which includes all of island Melanesia southeast of the Solomons, along with Polynesia and Micronesia). This latter distinction recognizes the Pleistocene settlement of Near Oceania, whereas the widely dispersed islands of Remote Oceania were discovered and settled only within the past 4,000 years. Archaeological research in Oceania has a long history, but modern efforts emphasizing stratigraphic excavations did not begin until after World War II (Kirch 2000), and have revealed the main chronological sequence for human settlement. This sequence is summarized here, followed by reviews of the development of complex societies in Oceania, and of human impact on island environments.

### *1. Early Human Settlement of Near Oceania*

The oldest known occupation sites are radiocarbon dated to ca. 36,000 years ago (the late Pleistocene), on the large island of New Guinea and in the adjacent Bismarck Archipelago (Allen 1996). At several times during the Pleistocene, New Guinea was joined to Australia as a single land mass (known as Sahul), and human entry into and expansion throughout this vast Australasian region occurred rapidly. Late Pleistocene sites in the Admiralty Islands, New Ireland, and Buka (Solomons), all would have required open ocean transport, suggesting the presence of some form of watercraft (possibly rafts, bark boats, or dugouts) (Irwin 1992).

Early human colonists in Near Oceania were hunters-and-gatherers, who exploited tropical rainforests as well as inshore marine resources (see Hunter-Gatherer Societies, Archaeology of). Long-distance communication and exchange is indicated by the movement of obsidian between islands. By the early Holocene period (after 8,000 B.C.), there is archaeobotanical evidence for domestication of tree, root, and tuber crops (such as the *Canarium* almond, and various aroids) within Near Oceania. Archaeological evidence for cultivation of swamplands at Kuk in the Highlands of New Guinea commences as early as 7,000 B.C. (Golson 1988). These archaeological indications confirm the long-held ethnobotanical hypothesis that Near Oceania was one of several independent centers for the origins of tropical horticulture.

### *2. Austronesian Expansion and Lapita*

During the early Holocene, the southeastern Solomon Islands marked the limit of human expansion. Beginning around 2,000 B.C., a major expansion or diaspora of people speaking languages belonging to the Austronesian language family commenced (Blust 1995). Their immediate homeland has generally been regarded as comprising the island of Taiwan (and perhaps adjacent areas of mainland China). The ability of early Austronesians to disperse rapidly has been attributed to their invention of the outrigger sailing canoe (Pawley and Ross 1993). The Austronesians were horticulturalists who transported root, tuber, and tree crops via their canoes, along with breeding stocks of domestic pigs, dog, and chickens.

The Austronesian diaspora rapidly encompassed the major archipelagoes of island Southeast Asia; one branch of Austronesian-speakers expanded along the north coast of New Guinea into the Bismarck Archipelago. This branch is known to linguists as Oceanic, and the Oceanic languages (numbering about 450 modern languages) include most of those spoken throughout the Pacific. The great exception is New Guinea, where roughly 750 Non-Austronesian languages are spoken.

Archaeological evidence for the initial Austronesian dispersal into the Pacific comes from both western Micronesia (the Marianas and Palau archipelagoes), and from the Bismarck Archipelago. In western Micronesia, early sites contain red-slipped pottery, some of which is decorated with lime-filled, impressed designs (Rainbird 1994). These sites, along with radiocarbon-dated sediment cores exhibiting signals of human presence (e.g., high influxes of microscopic charcoal resulting from anthropogenic burning) suggest that humans settled Marianas and Palau no later than 1500 B.C., and possibly as early as 2000 B.C.

In the Bismarck Archipelago, the initial Austronesian incursion has been correlated with the appearance of a distinctive suite of sites, also containing pottery with lime-infilled decorations, but with motifs made largely by a technique of dentate-stamping. These sites and the associated artifacts (such as *Tridacna*-shell adzes and *Trochus*-shell fishhooks, as well as ornaments) represent the earliest known phase of the Lapita cultural complex, dating to ca. 1500-1300 B.C. (Gosden et al. 1989; Spriggs 1997). Early Lapita sites were frequently hamlets or villages consisting of houses elevated on posts or stilts, situated over tidal reef flats or along shorelines. Excavated plant and animal remains indicated a mixed economy with horticulture and marine exploitation. Substantial quantities of obsidian, chert, pottery, shell artifacts and other materials were exchanged between communities (Kirch 1997).

Correlations among archaeological assemblages, language groups, and human biological populations are often complex, and need not be isomorphic. However, a strong consensus is emerging among scholars in several disciplines that the initial phase of the Lapita cultural complex can be correlated with the Proto Oceanic interstage of the Austronesian language family. Moreover, genetic evidence (such as mtDNA and hemoglobin markers) supports the view that the Lapita phenomenon reflects a substantial population intrusion into the Bismarck Archipelago, deriving out of island Southeast Asia (Hill and Serjeantson 1989). At the same time, the Proto Oceanic speakers undoubtedly had considerable interaction (cultural, linguistic, and genetic) with the indigenous Non-Austronesian speaking populations who already occupied the Bismarck region in the mid-Holocene. Thus the Lapita cultural complex is seen as an outcome of cultural processes of intrusion, integration, and innovation.

### *3. Human Colonization of Remote Oceania*

Beginning ca. 1300 B.C., the Lapita pottery-makers expanded rapidly beyond the Solomons and into the southwestern archipelagoes of Remote Oceania: Vanuatu, the Loyalty Islands, New Caledonia, Fiji, Tonga, and Samoa. Numerous radiocarbon-dated archaeological sites document that Lapita sites in all of these archipelagoes no later than 900 B.C.

We have already noted that the westernmost islands of Micronesia were colonized directly out of island Southeast Asia by Austronesian speakers ca. 2000-1500 B.C. Around 2,000 years ago, Oceanic speakers who made plainware pottery (a late form of Lapita) and who used shell adzes, fishhooks, and other implements, founded settlements on several volcanic islands of central Micronesia (Chuuk, Pohnpei, and Kosrae). The atolls of the Marshall Islands were also colonized at this time.

The final stage in the human settlement of the Pacific Islands began after 500 B.C., with the Polynesian dispersals eastwards out of Tonga and Samoa. Ancestral Polynesian culture and Proto Polynesian language themselves had developed in this Tonga-Samoa region between ca. 900-500 B.C. in this homeland region, directly out of the founding Lapita cultural complex (Kirch 2000; Kirch and Green, in press). While archaeologists debate the exact chronology and sequence of Polynesian dispersals, most agree that the central Eastern Polynesian archipelagoes (such as the Society Islands, Cook Islands, and Marquesas Islands) were settled first, no later than A.D. 300 and perhaps some centuries earlier (Rolett 1998). Remote Easter Island was discovered by A.D. 800-900 (Van Tilburg 1994), while the Hawaiian Islands were also well settled by this date. The twin large, temperate islands of New Zealand were colonized by Polynesians around A.D. 1200 (Anderson 1989; Davidson 1984). Critical to the success of this unprecedented diaspora was the double-hulled sailing canoe, capable of carrying 40-60 people on voyages lasting one month or longer (Irwin 1992). That the Polynesians reached South America and returned is suggested by preserved remains of the sweet potato (*Ipomoea batatas*), a South American domesticate, in several prehistoric Polynesian sites.

Because it was the last sector of Remote Oceania to be settled, and because its populations represent a single radiation or diaspora, Polynesia constitutes a monophyletic cultural and linguistic group. Thus, Polynesia has often been regarded as an ideal region for testing models of cultural differentiation from a common ancestor (e.g., Kirch 1984; Kirch and Green, in press).

### *4. Development of Complex Societies*

When the 18th-19th century European voyages of discovery inspired by the Enlightenment encountered Pacific island societies, they frequently encountered large, dense populations organized into complex, hierarchical sociopolitical formations. With populations often numbering

into the tens or hundreds of thousands, such societies had two to three decision-making levels, and hereditary leaders who enjoyed elite privileges and status markers. Anthropologists classify such sociopolitical formations as chiefdoms, and indeed, the Polynesian chiefdoms are often considered the archetypal model (see *Chiefdoms, Archaeology of*).

The origins, development, and elaboration of Pacific island chiefdoms have been a major topic of archaeological research (e.g., Davidson 1984; Kirch 1984; Rainbird 1994; Sand 1995; Spriggs 1997). Based on linguistic and archaeological evidence, early Austronesian societies were characterized by some degree of internal ranking (especially between senior and junior branches of a descent line), but were probably heterarchical rather than hierarchical in structure. However, heterarchic competition (in such social arenas as marriage and exchange, as well as competition for land) between social groups provided the basis for true hierarchy (and eventually, in the largest societies, class stratification) to emerge.

Archaeologists have identified several factors and processes that were significant in the rise of Oceanic chiefdom societies. Many of these were closely linked, and should not be considered uncausal variables. For example, population growth leading to large, high-density populations can be identified as a necessary, but probably not sufficient, cause underlying sociopolitical complexity (Kirch 2000; Sand 1995). The human populations of the volcanic islands typically reached densities of between 100-250 persons per square kilometer prior to European contact, resulting in intense competition for arable land and other resources. Such conditions encouraged centralized, hierarchic control, as well as providing incentives for militaristic aggression.

A second process linked to population growth and to increased hierarchy was intensification of production, including agricultural systems and other forms of production or resource extraction, as well as economic specialization (e.g., in pottery production and trade). On many islands, large-scale irrigation works or dryland field systems were developed during late prehistory. Although population increases may have initially spurred intensification, once in place such intensive production systems provided a means for surplus extraction by chiefs and other leaders, thus encouraging hierarchy. Often culturally marked as tribute, such surpluses were the economic foundation of an emergent elite, including not only hereditary chiefs, but priests, warriors, craft specialists, and others.

Ideology likewise played a key role in Pacific island societies, with the elite cadres of the larger and most complex societies actively employing ideological control as a means of legitimation. The origins of Oceanic ritual systems can be traced back to common Austronesian concepts of the sacredness of ancestors; these concepts later became elaborated as cults in which the highest chiefs were seen as directly descended from powerful gods, and hence essential to the continued well-being of the society at large. Archaeologically, the rise of elite-dominated ideological systems is particularly reflected in monumental architecture, of which the most impressive examples are the giant statue-bearing temples of Easter Island (Fig. 2), and the site of Nan Madol on Pohnpei. Other forms of monumental architecture, however, are ubiquitous throughout Pacific islands chiefdoms. Even when monumental architecture is absent, material signs of ideological control can be quite striking, as in the multiple sacrificial interments associated with the burial of Roy Mata, a chief of Vanuatu (Garanger 1972).

Finally, competition, conflict, and warfare also characterized many of the complex societies of the Pacific, especially following the rise of large and dense populations (see also *Conflict and War, Archaeology of*). Archaeologically, warfare is marked by a diversity of kinds of fortifications, such as the palisaded pa volcanic cones and headlands of New Zealand, or the ring-ditch fortified villages of Fiji. Another, more gruesome signal of the levels that inter-societal aggression reached on some islands is cannibalism (or para-cannibalistic treatment of enemies, such as dismembering, roasting, and non-funerary discard of skeletal remains). Although some anthropologists have expressed skepticism regarding European voyagers' accounts of cannibalism in the Pacific, there is now direct archaeological evidence for cannibalistic or para-cannibalistic practices in late prehistory on Easter Island, the Marquesas, New Zealand, Mangaia, and Fiji.

##### *5. Human Impacts to Island Ecosystems*

The islands of Remote Oceania, due to isolation and related factors, provide model conditions for studying the effects of human colonization and land use on pristine ecosystems. Interdisciplinary research among archaeologists and natural scientists (see also *Environmental Archaeology*) over

the past three decades has amplified our understanding of such human-ecosystem interactions (Kirch and Hunt, eds., 1997).

Because of the substantial open-ocean distances isolating them from continents as well as other islands, and the difficulty of dispersal to islands, prior to human arrival oceanic ecosystems were typically characterized by: high species-level endemism, but lower diversity in higher-level (generic and family) taxa; lowered competition; survival of archaic forms; and vulnerability to disturbance from outside agents. Larger vertebrates such as marsupials (wombats, cuscus) and rats, snakes, frogs, and most lizards were restricted primarily to Near Oceania, with only a handful of species declining in numbers eastwards to Fiji and Samoa. (The reef and marine resources of Pacific islands also display a west-to-east decline in species diversity.) Throughout most of Remote Oceania, pre-human vertebrate faunas were dominated by birds (including many flightless forms which had evolved in situ from flighted ancestors). Prior to human arrival, these bird populations lacked large vertebrate predators, and presumably also a typical predator avoidance strategy. They must have been extremely easy prey for the first humans to step foot on islands.

When humans first arrived in Remote Oceania, they typically found the islands to be forested, and inhabited by a range of largely endemic species, dominated by birds, along with invertebrates such as landsnails and insects. Oceanic peoples possessed a successful colonization strategy that allowed them to exist on isolated islands, by: (1) transporting in their sailing canoes stocks of horticultural crop plants, along with domestic pigs, dog, and chickens (rats came along, presumably as "stowaways"); (2) clearing areas of rainforest for garden land; and, (3) intensively exploiting the abundant natural avifaunal and marine resources.

This colonization strategy had several consequences for island ecosystems, all of which are increasingly well documented through both archaeological and paleoenvironmental indicators. Forest clearance on many islands is signaled in changing pollen spectra from sediment cores, with tree taxa rapidly giving way to ferns and grasses; also characteristic are sharp increases in microscopic charcoal influxes, indicating human-induced burning, in most cases probably associated with shifting cultivation. On some islands, forest clearance led to increased erosion rates, along with alluviation of valley bottoms or along coastal plains. The exploitation of natural resources is particularly evident in the zooarchaeological assemblages from early settlement sites, which are characterized by high numbers of land and seabirds, many of them representing now extinct or extirpated species (Steadman 1995). A dramatic case of avifaunal extinctions on Pacific islands is that of the moa, a group of 13 species of large, flightless birds which became totally extinct in New Zealand during the brief period of Polynesian occupation (Anderson 1989).

Cumulative effects of human actions on islands led to irreversible changes, such as dramatic declines in biodiversity, and the conversion of natural rainforests to intensively-managed, anthropogenic landscapes. The consequences for human populations themselves were undoubtedly mixed. The replacement of natural ecosystems with intensive food production systems enabled the growth of large and dense human populations. At the same time, reduction or depletion of natural resources, coupled with the necessity for intensive land use, encouraged highly complex sociopolitical systems which at times competed fiercely for control of land and the means of production.

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