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1

The Aru Islands In Perspective: A General Introduction

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I realise my position as the first European who has ever lived for months together in the Aru Islands, a place which I had hoped rather than expected ever to visit. I think how many besides myself have longed to reach these almost fairy realms, and to see with their own eyes the many wonderful and beautiful things which I am daily encountering ...

Wallace 1869:450

Prologue: In the Footsteps of Wallace

Alfred Russell Wallace arrived at the sand-spit settlement of Dobo in the Aru Islands (Fig. 1.1) on January 8, 1857, having travelled from the Kei Islands by local sailing *perahu* on a journey which had taken 30 hours. The following day he set off to explore the small island of Wamar, to which that sand-spit was connected, but soon lost the path to the village of Wamma and had to turn back. But not before he 'had taken about thirty species of butterflies, more than I had ever captured in a day since leaving the prolific banks of the Amazon, and among them were many most rare and beautiful insects, hitherto only known from a few specimens from New Guinea' (1869:433). Apart from a day trip to nearby Wokam Island, Wallace was held up in his travels by bad weather and pirate raids on coastal shipping. This gave him time to observe daily life in Dobo and the differences in appearance and behaviour of the 'Malay' traders and the 'Papuan' indigenous population of the group: 'So far as I have yet seen, the Malay and Papuan appear to be as widely separated as any two human races that exist, being distinguished by physical, mental and moral characteristics, all of the most marked and striking kind' (1869:439).

On March 13 he was finally able to transfer to the larger island of Wokam. Negotiating a berth in a house already occupied by a dozen men, women and children, Wallace remarked: 'I felt that degree of satisfaction and enjoyment which I always experience when, after much trouble and

delay, I am on the point of beginning work in a new locality' (1869:445). Even though he was a couple of months too early to find the various birds of paradise in their best plumage, he was quietly ecstatic over a specimen of the King Bird of Paradise, and over other bird species he was able to collect. His two week stay allowed him to observe the local economy:

The Aru men have no regular supply, no staff of life, such as bread, rice, mandiocca, maize, or sago, which are the daily food of a large proportion of mankind. They have, however, many sorts of vegetables, plantains, yams, sweet potatoes, and raw sago; and they chew up vast quantities of sugar-cane, as well as betel nuts, gambir, and tobacco. Those who live on the coast have plenty of fish; but when inland, as we are here, they only go to the sea occasionally, and then bring home cockles and other shell-fish by the boatload. Now and then they get wild pig or kangaroo, but too rarely to form anything like a regular part of their diet, which is essentially vegetable (Wallace 1869:452).

Once Wallace (1869:454) got his anthropometric eye in, he noticed that there was considerable variation in appearance among the indigenous inhabitants of Aru.

Many of the natives, though equally dark with the others, have little of the Papuan physiognomy, but have more delicate features of the European type, with more glossy, curling hair. These at first quite puzzled me, for they have no more resemblance to Malay than to Papuan, and the darkness of skin and hair would forbid the idea of Dutch admixture. Listening to their conversation, however, I detected some words that were familiar to me ... This cleared up the difficulty. I at once understood that some early Portuguese traders had penetrated to these islands, and mixed with the natives ...

At the end of March, Wallace shifted to the area of Wanumbai on the island of Kobroor (not Maykor as he called it), after an abortive attempt to reach the village of Watelai (Batulei) on the east coast of Aru. He stayed at Wanumbai for six weeks, much of his time spent laid up with ulcerated feet from insect bites, but had good collecting and was sorry to leave (Fig. 1.2). Our collecting experience in the same area nearly 140 years later was similar, though we were after different kinds of specimens. The cave site of Liang Lemdubu is situated in the same area as that where Wallace stayed (see Chapter 9, this volume).

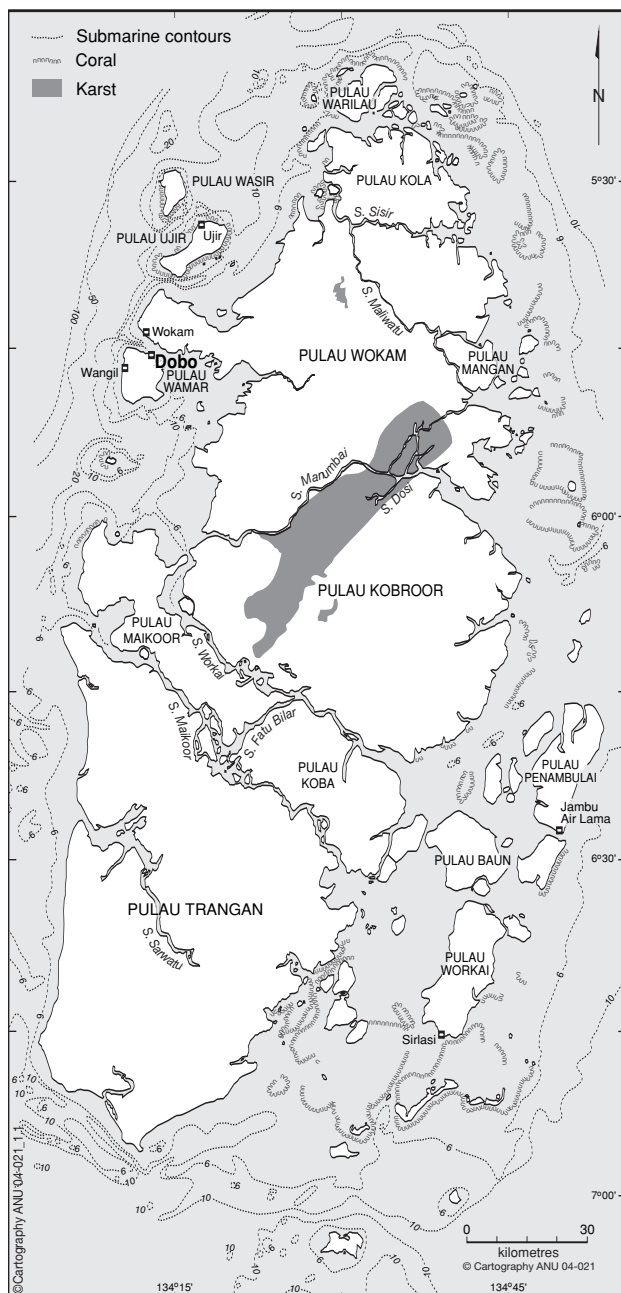


Figure 1.1 Map of Aru showing main islands, *sungai* (rivers) and towns



Figure 1.2 Small hut on *sungai*, probably very similar to the one in which Wallace would have stayed

Wallace headed back to Dobo and watched the traders packing up before they headed back to Sulawesi and points west, with the shifting wind of that season. He had time to wonder at the price of European goods in this out of the way port:

One of the most surprising things connected with Aru was the excessive cheapness of all articles of European or native manufacture. We were here two thousand miles beyond Singapore and Batavia, which are themselves emporiums of the 'far East', in a place unvisited by, and almost unknown to, European traders; everything reached us through at least two or three hands, often many more ... (Wallace 1869:478–9).

We were equally bemused to find that the same was true in 1995 when we first set foot in Dobo, but by then the cheap goods were all Japanese or Chinese rather than European.

Wallace left the Aru group on July 2 with the Malay traders. His enthusiastic summary of achievements demonstrates that Aru was a seminal experience in his visit to the East Indies and in his career as a naturalist:

I brought away with me more than nine thousand specimens of natural objects, of about sixteen hundred distinct species. I had made the acquaintance of a strange and little known race of men; I had become familiar with the traders of the far East; I had revelled in the delights of exploring a new fauna and flora, one of the most remarkable and most beautiful and least-known in the world; and I had succeeded in the main object for which I had undertaken the journey — namely to obtain fine specimens of the magnificent Birds of Paradise and to be enabled to observe them in their native forests. By this success I was stimulated to continue my researches in the Moluccas and New Guinea for nearly five years longer, and it is still the

portion of my travels to which I look back with the most complete satisfaction (Wallace 1869:486).

In the same year he penned a brief account (Wallace 1857) that would be the forerunner to one of the most important scientific texts ever published, which appeared the following year in February 1858 (Wallace 1858) (see Bastin 1986:xxii). Together with that of Charles Darwin (1859), it formed the basis for modern evolutionary thought. The first edition of Wallace's major work on the region, *The Malay Archipelago*, from which the above quotations come, was published in March 1869 some 11 years later.

At various points in the book, Wallace suggests on the basis of the distribution of animals and birds, that Aru had once been joined to New Guinea, although his explanation of its separation did not consider sea level rise (see for instance Wallace 1869:489–92). Earlier (1869:20–1), he tipped the hat to George Windsor Earl, who had first contrasted the shallow continental shelves of what he called 'the Great Asiatic Bank' with 'the Great Australian Bank', corresponding respectively to what archaeologists would now generally call Sunda-land, and the continent of Sahul, incorporating Australia, New Guinea, Aru and Tasmania (Earl 1845; see Ballard 1993 for discussion). It was precisely the position of Aru, as once a series of low hills on the edge of a continent, which attracted our archaeological team to explore it as a potential early landfall for Pleistocene seafarers out of Asia.

The Aru Islands

Much of the following account is taken from Healey (1995, 1996). The Aru Islands archipelago centres on about 6 degrees south Latitude, 134 degrees 30 minutes east Longitude, and is part of the *Kabupaten* (Regency) Maluku Tenggara in Maluku Province of Indonesia. New Guinea is some 150km to the north across a shallow sea; central Arnhem Land in Australia is some 550km to the south; and the Kei Islands lie across a deep ocean trench some 120km to the west. There are six low-lying islands of significant size — Kola, Wokam, Kobroor, Maikor, Koba and Trangan — and many smaller ones, comprising about 180 islands in total. The archipelago stretches about 180km north to south, and is 80km east to west at its widest, with a total area of about 8225km² (van Balgooy 1996). It has a low dissected terrain including chains of low hills with the highest point only some 240m above sea level, and extensive areas of coastal and inland swamp (van Balgooy 1996).

The bedrock consists of a variety of raised marine deposits (Fig. 1.3), with the harder limestone substrates displaying sinkhole caves and abandoned underground river channels. The northern islands are rainforest-covered, giving way in the south to drier savannah with *Pandanus* palms on Trangan. Much of the coast and the tidal channels or *sungai* (river in Malay) between islands are fringed with mangroves. The channels, which in some of their upper reaches are true rivers, are the most remarkable feature of the topography, allowing rapid penetration by boat well into the interior of the various islands, and the availability of estuarine shellfish and other 'marine' resources far from the coast as conventionally defined. The *sungai* also form the access routes via which goods such as forest products and pots are moved in canoes or small boats and traded between villages (Fig. 1.4).

The fauna, described in detail in Chapter 3, is basically Australian and Papuan, which bears witness to the land connection to Australia and New Guinea surmised by Wallace. This includes three species of birds of paradise common on the New Guinea mainland, and a variety of marsupial species.

The people of Aru live in 122 mostly coastal villages and the town of Dobo — the only town of significant size. The population reached 62,893 in 1998, comprising 32,048 males and 32,299

females in 12,713 families (Hidayat 1998). The majority of the 15,000 or so residents who are not indigenous to the archipelago live at Dobo and at the fishing port of Benjina. Raw population density outside Dobo is close to five people per square kilometre of total land. The population is said to be predominantly Christian: 90% Protestant, six per cent Catholic, and four per cent Muslim (Dolcemascolo 1996). However, our impression was that the percentage of Muslims must be considerably higher than this, so perhaps Dolcemascolo's figures relate only to the indigenous population. The commercial economy is dominated by fishing and pearl-farming, and is run almost exclusively by non-Aruese. The indigenous Aru Islanders work for these enterprises, and gain a further source of monetary income from the sale of marine and forest resources.

The village subsistence economy relies on processing the extensive stands of 'wild' and planted sago palms, and the swidden agriculture of bananas, cassava and maize (Figs 1.5, 1.6). Hunting and collecting of forest resources are also important (Figs 1.7, 1.8), as is fishing (Fig. 1.9). The dry season from May to December can result in seasonal water shortages, water being particularly critical for sago processing. Malaria is a common cause of death and the population, almost completely bereft of modern medical facilities, is also subject to high levels of hookworm and tuberculosis (Dolcemascolo 1996).

The earliest direct historical reference to Aru is in the *Suma Oriental of Tomo Pires* dating from 1512–15, from information collected at Melaka (Courtesao 1944:209). Subsequently, the Portuguese must have at least circumnavigated the archipelago by about 1530, as it appears on maps from that time (see Chapter 5, this volume, for information on historical sources for Aru). Apart from the construction of occasional forts such as that at Wokam from the mid-17th century onwards, there was little attempt by the Dutch to establish a significant presence on Aru until well into the 19th century (see Chapter 4). Islam may have been introduced in the late 15th century, and Christianity came in with the Dutch in the 17th and 18th centuries. While much of the population was not converted to Christianity until the 20th century, it is untrue that Christian missionaries did not have any success until the 1920s as claimed by Dolcemascolo (1996:82).



Figure 1.3 Island in *sungai* showing bedding in uplifted marine sedimentary rock



Figure 1.4 A mobile hunter sells or trades his catch of deer and cassowary from his canoe on the *sungai*



Figure 1.5 Sago processing



Figure 1.6 Slashing and burning for swidden agriculture on Sungai Papakulah near Benjina



Figure 1.7 Hunters and local villagers with catch of Rusa deer



Figure 1.8 Three arrows collected by authors from a hunter at the village of Papakulah Besar



Figure 1.9 Fishtrap made of wood and brush in *sungai*

As we have seen earlier, Wallace (1869) along with other travellers and savants have left us with some detailed accounts of the islanders from the later 19th and early 20th centuries. Prominent among these accounts is Riedel (1886), von Hovevell (1890) and Merton (1910). Kolff (1840) is an extremely important account from an 1826 visit to the group when the Dutch government was trying to re-establish control. The fifth article of his personal instructions was: 'you will inquire as to what remains of the forts erected by the East India Company on the islands, especially those of Arru, Tenimber, and Kessa, noting down with correctness the particulars you may obtain concerning them, subjoining your own observations on their positions and other points' (1840:31). He was an astute observer and provides several important notes on sites which we later visited as part of our reconnaissance surveys of Aru. These are integrated into our own site descriptions in Chapters 4 and 5. Von Rosenberg's account (1867) of his 1865 visit was similarly useful for its descriptions of sites we visited.

Modern ethnographic studies are limited. The most comprehensive to date are: Spyer's (2000) ethnographic study of the Aruese today in the context of the historical imprint of the archipelago's trading past, based on her earlier thesis (Spyer 1992); Healey's (1995) account of trapping methods and their place in the traditional and contemporary economy of Jirly village, and his more general account (1996) of Jirly; Dolcemascolo's (1996) study of Wokam village; and economic studies by Universitas Pattimura researchers referred to by Healey and Dolcemascolo. The languages have been researched in recent times by Summer Institute of Linguistics workers, with 12 distinct languages known (Hughes 1987). All of them are Austronesian languages of the Central Malayo-Polynesian grouping, but may have traces of a non-Austronesian substrate which requires further detailed study (Jock Hughes, pers. comm. 1996).

Aru in Perspective: Research Questions in Maluku Archaeology

Sustained archaeological research started late in Maluku compared to regions to the east and west. The first archaeological survey in the region was conducted by Danny Miller and Matthew Spriggs in 1975 in Ambon, Haruku, Saparua, West Seram, Banda, and Kei Kecil (see Spriggs 1990 for a summary). Scientific excavations began only in 1990–91 with Peter Bellwood and his colleagues in Halmahera, Gebe and Morotai (Bellwood 1992, 1998a, 1998b; Bellwood et al. 1993, 1998; Irwin et al. 1999) and Wilhelm Solheim on Halmahera (Solheim 1998). In a paper given at the First Maluku Studies Conference in 1986, Spriggs sketched what was then known about Maluku archaeology and how it fitted into the regional picture (Spriggs 1990). Since that time research has been undertaken in northern Maluku, as already noted, and further archaeological work has been conducted on Ambon, Buru and Seram in Maluku Tengah by a joint Indonesian–University of Hawaii team (Latinis 1999, 2000; Stark 1996; Stark and Latinis 1992, 1996), and on Banda by Peter Lape (2000a, 2000b). Significant archaeological research began in southeastern Maluku with our project in the Aru Islands in 1995 — as documented in this volume — after some earlier exploratory work on Kei Kecil (Ballard 1988, 1992; Spriggs and Miller 1988). Initial reports of our work have already appeared as O'Connor et al. (2002a), Spriggs et al. (1998), and Veth et al. (1998a, 1998b, 2000). The first palaeoenvironmental studies in Maluku were carried out in waters off Halmahera (Barmawidjaja et al. 1993; van der Kaars 1991), and on Obi in northern Maluku by Geoff Hope of The Australian National University (pers. comm. 2003). Such work, using pollen analysis and other techniques, will prove vital for establishing the nature of human use of the environment over time, particularly with questions in mind about the change from hunting and gathering economies to agriculture, and the date of any such change (see Chapter 2, this volume).

Results bearing on the archaeology of the region have also come from the re-awakening of archaeological research in New Guinea (see for instance Denham et al. 2003; Pasveer 2004; Pasveer et al. 2002; papers in Bartstra 1998, and in Denham and Ballard 2003), and particularly the Bismarcks and Solomons in the last two decades (summarized in Allen and Gosden 1991; Spriggs 1997). It is instructive to examine Maluku, as a group of islands immediately to the west of the large island of New Guinea, in the light of the mass of research that has taken place in the islands immediately east of New Guinea. There are a series of similar challenges facing the human inhabitants of both these island areas and, when research is able to resume in Maluku, comparisons and contrasts in their archaeologies will be important in assessing how humans have been able to adjust to these challenges.

In starting research in northern Maluku in 1990, Bellwood identified four major questions to be investigated at the initial stage of research (Bellwood et al. 1993:20):

- 1) The date and source of initial Pleistocene settlement;
- 2) The role played by the region in the Austronesian settlement of the Pacific;
- 3) The nature of the interaction between the two major ethnolinguistic population groups of the region — Papuan (or Non-Austronesian) and Austronesian — during the past 4000 years; and
- 4) The history of the spice trade with China, India and the West.

The program of research of Bellwood's team has mainly come up with information on the first three topics. They are all pertinent to research anywhere in the archipelago, as we shall see.

Another topic which has proved important in the archaeology of the Bismarcks and Solomons, and for which information is also available in Maluku research, is the nature of the economic system of the region's earliest inhabitants and changes in this economy through time. The origins and development of an agricultural and/or arboricultural economy are pertinent here (most recently see Latinis 2000). Let us look at these five topics in more detail as background to the particular research questions we set out to answer in Aru.

The Date and Source of Initial Pleistocene Settlement

During Pleistocene low sea levels, Sunda was the southernmost extension of the Afro-Eurasian-American continent, comprising Sumatra, Java, Bali, Borneo, Palawan and the now drowned shelf in between. Sahul formed a large continent comprising New Guinea and Australia, including the present islands of the Aru group. Wallacea is a series of island stepping stones between these two extensive land areas. Wallacea includes the islands of the lesser Sundas, much of Maluku including the Kei and Tanimbar islands, Nusa Tenggara, Sulawesi and the Philippines. The zoogeography of the two regions — the placental/marsupial divide — supports this history of isolation.

Movement beyond Sundaland, out into the Wallacean islands and on to Sahul required maritime technology and had to await the advent of anatomically modern humans. Middle Pleistocene cultural deposits in Flores have been documented (Morwood et al. 1998, 1999) but are not conclusively related to modern human voyaging. *Homo erectus* is postulated to be the hominid responsible. *Homo floresiensis*, a diminutive species thought to be descended from *Homo erectus* (Brown et al. 2004), is believed by the excavators of Liang Bua on Flores to be the creator of the cultural assemblage deposited in that cave from 95,000–74,000 years through to about 12,000 BP (Morwood et al. 2004). Others are less convinced and suggest that the artifacts in question were made by modern humans, whose own occupation of the island most certainly overlapped for a considerable period with that of *H. floresiensis* (Lahr and Foley 2004). It must be said, however, that if the stone artifacts from 95,000 to 74,000 year levels are made by the same species as those in the 38,000 to 12,000 BP levels, then that species would be unlikely to be *Homo sapiens* if it really did arrive in the region only 65,000 to 50,000 years ago.

No publications on the Flores cave site have appeared so far with dates for *Homo sapiens* which are earlier or even as early as the Australian sites. Indeed, a central problem is that there are still no dates for modern human occupation in Island Southeast Asia beyond the Sunda shelf as old as the earliest dates obtained for occupation in Australia based on applying Optically Stimulated Luminescence (OSL). Sundaland sites such as Lang Rongrien in southern Thailand and Niah Cave in Sarawak have dates in excess of 40,000 years BP and therefore are up against the so called 'radiocarbon barrier' (Chappell et al. 1996). Dates from the Wallacean Islands are more recent, but only radiocarbon and Uranium-Thorium dating have been undertaken apart from the recent work on the Flores assemblages. The present oldest sites dating to 35–30,000 BP are thus unlikely to represent earliest colonization. Bellwood's team obtained a date of 37,500 BP on marine shell from within a rubble and sediment layer (Layer 2) in Tanjung Pinang rockshelter in southern Morotai, but the shell is thought to be natural and derived from the cave walls, and the deposit at this depth is culturally sterile (Bellwood et al. 1998:237–45). From Gebe Island, at the site of Golo Cave, a more obviously cultural deposit has provided a date of 31,000 BP (Bellwood et al. 1998:249), and from other sites on that island and on Halmahera there are continuous sequences covering the last 15,000 years or more of human occupation (Bellwood et al. 1998; Irwin et al. 1999). Also from within Wallacea are dates of 28,000 BP from Leang Burung 1 cave in southeast Sulawesi (Glover 1981) — although the basal levels remain undated — and, most recently, 35–30,000 BP dates from caves in East Timor (O'Connor et al. 2002b; Spriggs et al. 2003). The site of Labarisu cave on Buru, excavated by Stark (1996), may also date to this early period.

The suggested date of human settlement of the then-continent of Sahul, comprising present day Australia, Tasmania, New Guinea and the Aru Islands, has recently been pushed back to about 55,000 to 65,000 years ago by the use of new dating techniques at sites in both northern and southern Australia (Roberts et al. 1990, 1994; Thorne et al. 2000) although there is vigorous debate about these claims (e.g. O'Connell and Allen 2004; O'Connor and Chappell 2003). Occupation of what is now northeastern New Guinea is documented for at least 40,000 years (Chappell et al.

1994; Groube et al. 1986). The islands to the east of New Guinea were also first settled at least 40,000 years ago (Allen 1994:341; Allen et al. 1988; Leavesley and Chappell 2004; Leavesley et al. 2002; Pavlides and Gosden 1994). The sea crossings from New Guinea to New Britain and New Ireland and onwards to the main Solomons chain (the latter settled by at least 29,000 BP: Wickler and Spriggs 1988) were no greater distance than those traversed in passing from Southeast Asia to Sahul. Manus Island in the Admiralties, however, requires an open ocean voyage out of sight of land to reach it. It is some 200km from the nearest significant land and was settled at sometime prior to 21,000 BP (Fredericksen et al. 1993; Spriggs, ongoing research). Although we do not know what kind of watercraft were used at this time, the Manus case suggests a sophisticated boat technology capable of successfully delivering colonists across long stretches of open ocean.

One of the two likely routes of colonization into Sahul (Fig. 1.10; Birdsell 1977) passes through Maluku via Sula, splitting to form a northern route via Halmahera to the Bird's Head, with alternative southern routes via Buru and Seram either directly from Seram across to the Bomberai Peninsula area of present day New Guinea, or via Kei across to Aru, which in the Pleistocene was a series of low hills on the edge of the Sahul continent. The second main hypothesized early colonization route ran along the Lesser Sundas to Timor and then either directly across to present-day Australia, or again via Maluku through Wetar, Babar and Tanimbar to make a landfall south of Aru (Fig. 1.10). The Manus evidence for advanced boat technology in the Pleistocene does raise the possibility of direct settlement of the Australian part of Sahul from a jumping-off point in the Lesser Sunda Islands which bypasses Maluku, but it is quite possible that Maluku was reached and explored at about the same time. An up to 55,000-year history for at least some parts of Maluku is therefore a real possibility.

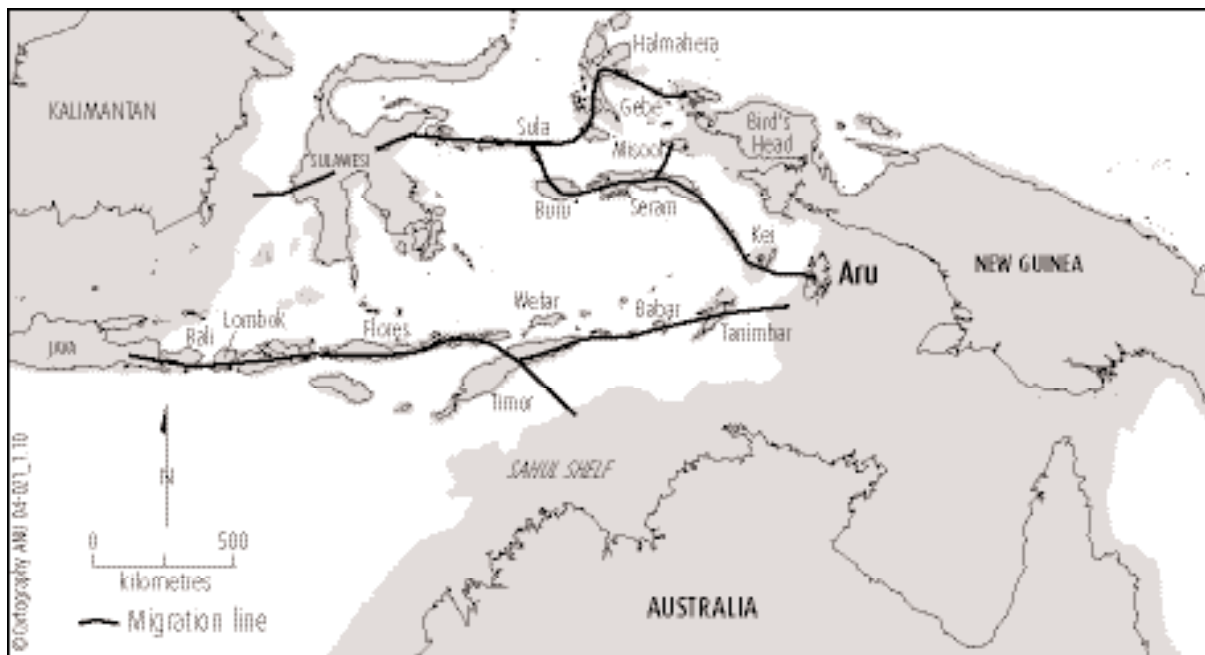


Figure 1.10 Birdsell's proposed colonizing routes through Island Southeast Asia and into Sahul

Economic Changes in the Pleistocene and Early Holocene

Human impact on the environment of the wider region did not start with agriculture (Hope and Golson 1995), and early signs of forest disturbance may point to the kind of 'hunter-horticulturalism' suggested at least for the area to the east, in New Guinea and the Bismarcks and

Solomons (Guddemi 1992). This is seen as an economy beyond simple hunting and gathering which incorporated low intensity gardening and tree cropping, and deliberate movement of plants and animals across water gaps to more impoverished environments. The antiquity of this kind of economy in New Guinea and Island Melanesia goes back at least 20,000 years and probably a lot longer (Gosden 1995; Spriggs 1996a).

From at least 20,000 years ago, the economy in the Bismarcks and Solomons incorporated features such as long-distance exchange of the valued stone obsidian, and the transport of nut-tree species and 'wild' animals from the New Guinea mainland into the forests of the Bismarcks, which were naturally poor in food species.

Advances in analyses of the residues often found on stone and other artefacts mean that the plant food part of ancient diets can now be investigated in much greater detail. Initial results from the northern Solomons suggest that people were exploiting and possibly planting root vegetables such as taro (*Colocasia* sp.) at least 28,000 years ago (Loy et al. 1992). Maluku is clearly within the natural range of a variety of important food plants, including sago. Indeed, the region is implicated in the domestication of some of these plants as part of a putative New Guinea centre of plant domestication (Yen 1991, 1995). Important among the early exploited trees of New Guinea and Island Melanesia are *kenari* trees, various species of the genus *Canarium*. Their human use (and transport between islands) is attested from before 13,000 BP. It is interesting that among the artefacts from early Holocene levels at Tanjung Pinang in southern Morotai, and at Um Kapat Papo on Gebe, were nut-cracking stones identified by people from the area as being for opening *kenari* nuts (Bellwood et al. 1998:242, 247).

This is not the only evidence that Maluku had an early economy of the same type as found in Melanesia. The most important of the animal species transported from New Guinea to the Bismarcks is the cuscus, *Phalanger orientalis*. Later introductions in the Pleistocene and early Holocene include a wallaby, *Thylogale browni*, the bandicoot *Echymipera kalubu*, and a bush rat, *Rattus praetor*. An introduction of unknown antiquity to New Britain but not to the other areas of Island Melanesia is the large flightless bird, the cassowary. The sugar glider, *Petaurus breviceps*, also occurs on New Britain and may have been introduced (see Flannery 1995a, 1995b for a general description of New Guinea and Southwest Pacific [including Maluku] mammals and their distribution).

In the Aru Islands there are many marsupial species of New Guinea origin, but we must remember that until about 11,500 years ago Aru was not an island group but part of the Sahul continent incorporating New Guinea and Australia. These animals therefore more likely represent New Guinea species stranded by rising sea levels at the end of the Pleistocene, and not human introductions across water. In fact, the archaeological faunal assemblage from the lower levels of Lemdubu Cave contains a higher diversity of mammal species than the upper levels, suggesting a depletion of fauna following sea level rise and insulation (see Chapter 9, this volume).

From archaeological research carried out in East Timor, we do have evidence for the early introduction of wild animals to the islands west of New Guinea. There are of course two possible directions of introduction in this case: from New Guinea, and from further west in Southeast Asia. Later introductions of wild animals to Timor, such as the civet cat, deer, macaque monkey, and *Rattus exulans*, certainly came from the west. But the earliest example of an animal introduction there was the same cuscus as found in the Bismarcks, *Phalanger orientalis*, first recognized in Timor in deposits dating to about 6000 years ago (Glover 1986), and recently recovered from caves in the east end of the island in deposits dating to 9000 BP (Aplin and O'Connor, ongoing research). Its presence on several islands in Maluku (Kei, Banda, Leti, Gorom, Seram, Ambon-Lease, Buru and Sula) is almost certainly because of human introduction at some period in the past.

A second New Guinea cuscus, *Spiloglossus maculatus*, is also present on several Maluku islands including Kei, Banda, Seram, Ambon and Buru. At some point it was even spread further afield to Salayer Island, off the south coast of Sulawesi (Flannery 1995a, 1995b). Although we lack

the archaeological evidence it seems reasonable to hypothesize that this species was a human introduction to Maluku.

To the east of New Guinea a cuscus was introduced to the Mussau Group about 3300 years ago. A New Guinea bandicoot, *Echymipera rufescens*, is found on Kei, and words for what appears to be the same species have been collected from languages in Ambon, Seram, Leti-Moa and Damar (Blust 1993:251), so it may be more widespread in the islands. A related species of bandicoot was introduced to Manus, east of New Guinea, about 13,000 years ago, again suggesting that the present distribution of *rufescens* is humanly-assisted. Two rat species found today in Kei (*Uromys caudimaculatus* and *Hydromys chrysogaster*) are less likely to be human introductions from New Guinea, as rats are known to disperse across water by natural means such as drifting on logs. The cassowary, found on Seram, is not known to disperse naturally across water gaps and presumably represents a human introduction at a presently unknown time. Hints of the picture we are likely to find in the region were given by the results of the first seasons of excavations in northern Maluku. At Gua Siti Nafisah at Nusliko on southern Halmahera, Bellwood et al. (1993) and Flannery et al. (1995) report bones of two locally extinct marsupial species in pre-pottery levels dating to between 5120 and 3410 BP. They are a species of *Dorcopsis* wallaby (*Dorcopsis muelleri mysoliae*) and a bandicoot (cf. *Echymipera rufescens*). Also found was an endemic species of cuscus, *Phalanger ornatus*, which is still present on the island today. The *Dorcopsis* wallaby survived to be deposited into a midden with pottery that dates to about 1870 BP, and the bandicoot may have disappeared earlier at about 3000 BP. The initial interpretation was that the wallaby and bandicoot were probably endemic species rather than human introductions (Flannery et al. 1995). While still the case in relation to the bandicoot, Flannery et al. (1998) have more recently suggested the likelihood of human introduction for the *Dorcopsis* from Misool Island, via Gebe.

On Gebe, the same species of *Dorcopsis* wallaby first occurs in the archaeological record between 10,000 and 8500 BP and most probably represents a human introduction from Misool, which before 10,500 BP was part of the mainland of Sahul (Flannery et al. 1998). The Halmahera bandicoot species does not appear to have reached Gebe. The *Dorcopsis* had become extinct on the island by 1500 BP (Bellwood 1998b).

The sugar glider, *Petaurus breviceps*, is present on Halmahera today but has not been found in any of the archaeological sites, suggesting that it may be a comparatively recent introduction from New Guinea.

Local extinction of wild fauna after settlement by pottery-using Neolithic groups, as is documented for Halmahera and Gebe, is also a feature of the sites in the Bismarcks and Solomons to the east of New Guinea. There, endemic species of bush rats and several species of birds became extinct with the advent of the first pottery using cultures. The reasons given include competition with introduced domestic animals — particularly the dog — and rats such as *Rattus exulans* and *Rattus praetor*. The latter originated from the Asian mainland and was also a presumably pre-3500 BP introduction to Maluku. Hunting pressure, habitat destruction and, in the case of the birds, possible avian diseases introduced with the domestic chicken, are other likely causes of extinctions (Steadman 1997). Austronesian occupation of the empty islands of the western and eastern Pacific resulted in major environmental devastation and faunal extinctions (Steadman 1995).

The Role Played by the Region in the Austronesian Settlement of the Pacific

The 'package' which is known as the Island Southeast Asian Neolithic, is associated with the appearance of pottery, a fully agricultural economy, and domestic animals such as the pig, the dog and the chicken, and is thought by many researchers to be co-associated with the spread of Austronesian (AN) languages into this region (Bellwood 1997). The sudden appearance of the package within

archaeological site contexts, coupled with the linguistic evidence, has been interpreted as evidence for the rapid spread of an immigrant group (or groups). The colonization of the western and eastern Pacific was finally accomplished by speakers of AN languages taking with them an attenuated version of the economic suite by which they are distinguished in Island Southeast Asia. Its eastern expression in Island Melanesia and Western Polynesia is the Lapita culture which has a narrow spread of colonization dates from 3300 to 3000 BP across its range from the Bismarck Archipelago to Tonga and Samoa (Spriggs 1999). Ironically, the timing and nature of Austronesian impact is better understood archaeologically in the previously occupied regions of Island Melanesia and on the previously unoccupied islands of the Pacific, than for the donor area of Island Southeast Asia.

Bellwood has argued that the earliest Neolithic sites are found in Taiwan and dated at between 6000–5000 BP and that the subsequent spread of this culture through the southern Philippines, Borneo, Sulawesi and eastern Indonesia occurred *after* 4000 BP (Bellwood 1997:219). In view of the dates to the west and east of Maluku for the spread of Neolithic culture the expected age in the region should be between about 4000 and 3500 BP. If Bellwood is correct in his view of the Neolithic spread, the entire expansion beyond Taiwan through to the Western Pacific may have taken only 500 years. Such an extremely rapid rate would have implications for the demography of the migration and the interaction with indigenous groups along the way. Aside from the excavations of Bellwood and his colleagues in the northern Moluccan islands, there has been little excavation carried out in the immediate region which might clarify the situation.

An assemblage of classic Neolithic type with pottery has been found by Bellwood and his colleagues at Uattamdi on Kayoa Island off Halmahera, with clear links to contemporary assemblages from Sulawesi, Eastern Timor and the Bismarck Archipelago. Neolithic dates in Maluku do not yet go back beyond about 3300 BP, but this is to be expected at this early stage of research (cf. Bellwood et al. 1993:32). What is more surprising though is that Uattamdi is the only northern Maluku pottery site of this period, pottery occurring elsewhere in the area only from about 2000 BP, and being of common Indonesian Metal Age type (Bellwood 1998b).

Another site dating to this period was found by Lape on the island of Ay in the Banda Group (Lape 2000a:215–29, 2000b:141). Two dates were obtained on mammal bone of about 3200 BP associated with pig and fish bone, chert, obsidian of unknown source and pottery — including a red-slipped sherd with an incised decoration of a classic Lapita motif zone marker. Undecorated red-slipped pottery continued below the dated layers. Clearly it is a site with great potential for elucidating the early Neolithic of central and south Maluku, although the reliance on bone as a dating medium means that the age must be considered provisional.

According to Blust (1993), Central Malayo-Polynesian (CMP) Austronesian languages spread rapidly through Maluku and the Lesser Sundas from a primary dispersal point in northern Maluku soon after the break-up of Central-Eastern Malayo-Polynesian (Proto C-EMP), the language ancestral to CMP and Eastern Malayo-Polynesian (EMP). Pawley (1999:125) suggests that this split took place around 4000 BP. Recalculating his figure on the basis of revised dating of the break-up of the Oceanic group to 3200 BP rather than 3500 BP would suggest a slightly later date of about 3700 BP for the split. EMP includes the ancestor of the Austronesian languages spoken in South Halmahera and West New Guinea (the SHWNG group) and the Oceanic group which includes all the other Austronesian languages of New Guinea, Island Melanesia, Polynesia and most of the Micronesian languages. Northern Maluku is thus the key area for the dispersal of Austronesian languages across the region, and also by extension for the spread of Neolithic culture. Blust suggests that CMP languages later spread from Tanimbar to the Bomberai Peninsula of New Guinea (1993:278).

The spread of this Neolithic culture is interpreted to represent an immigrant group with a fully agricultural economy and domestic animals such as the pig, the dog and the chicken (Spriggs 1996b). The main variety of domestic pig in Maluku, New Guinea and the Pacific appears to be a

hybrid between *Sus scrofa vittatus* (naturally distributed in Malaya and Western Indonesia) and the endemic Sulawesi species, *Sus celebensis*. The hybridisation appears to have occurred in northern Maluku (Groves 1981:65–6). While earlier pig remains have been claimed from New Guinea, the weight of evidence now suggests that its introduction there occurred in association with the Austronesian expansion (Hedges et al. 1995). No definitely *in situ* pig remains have been found in the pre-pottery levels at the northern Maluku sites. The dog, the chicken, the commensal rat *Rattus exulans* and later animal introductions such as goat and deer, also came from the west.

There is evidence, however, of reciprocal influences from further to the east during this period of expansion, and also of an additional strand in the history of agriculture in the region. Evidence for the independent development of horticulture in the New Guinea Highlands between 9000 and 7000 years ago (Golson 1977) has recently been much strengthened by the research of Denham and his colleagues (Denham et al. 2003). It seems possible, therefore, that horticulture first reached the Aru Islands from the east rather than the west (cf. Spriggs 1996a, 2003). This hypothesis receives support from recent genetic and palaeobotanical research which show that some important domesticates that were previously believed to have a Southeast Asian origin — such as *Eumusa* section bananas, some *Dioscorea* yams and *Saccharum* sugarcane — have a New Guinea origin and likely diffused from there to Southeast Asia during the early to mid-Holocene after which hybridization with local varieties occurred (De Langhe and de Maret 1999:380; Lebot 1999:621–2). Based on the importance of forest and tree crops in Maluku (especially the sago palm, *Metroxylon sagu*), Latinis and Stark (1998; cf. Latinis 2000) have argued the need to incorporate more flexible models of mobility and subsistence in our modelling of early horticulture. In view of the proximity of the Aru Islands to the New Guinea mainland and Aru's biogeographical suitability for growing the same root and tree crops as grown in New Guinea, it seems possible that when Austronesian speakers arrived in the Aru Islands they discovered hunter-horticulturalists growing a range of root and tree crops, combined with exploitation of wild and cultivated sago stands, much as people were in the recent past in Aru.

We have already noted the humanly-assisted movement of animal species from New Guinea into Wallacea during the late Pleistocene or early Holocene period. The most tangible evidence of similar contacts during the Neolithic is the presence of obsidian sourced to the Talasea region of New Britain found in a site in Sabah dated to 3000 BP (Bellwood and Koon 1989; Chia 2001). The situation as regards the Lapita pottery design system of the Bismarck Archipelago is at present not so clear. Similar designs have been found on Island Southeast Asian Neolithic pottery, most recently on a Banda Island sherd as discussed above, but are nowhere clearly earlier than in the Bismarcks. Spriggs (1989:607) raised the possibility that the design system diffused back from the Bismarcks along the original route of settlement from Southeast Asia. These cross-overs (and potential cross-overs) are markers of what is increasingly appearing as not just a simple one way colonization 'out of Asia', as had earlier been thought, but rather a series of complex two-way interactions, both in the Pleistocene and the Holocene. For a recent review of the Island Southeast Asian Neolithic see Spriggs (2003).

Austronesian — Non Austronesian Interaction

Non-Austronesian (NAN) languages of the Maluku region include some on the islands near Timor, which are immediately derived from there, and the languages of northern Halmahera and Morotai. They are thought to be related to languages of Western New Guinea. Whether they represent ancient language stocks present in pre-Austronesian times throughout Maluku or are the result of more recent population movements from further east is unknown. For an extensive discussion of the linguistic evidence for northern Maluku see Bellwood (1998b). Archaeological

research elsewhere in Maluku is at too early a stage to try and compare it with the picture from linguistics. Possible NAN substrates or later connections between the Austronesian languages of Kei and Aru with the Asmat-Kororo family of the NAN Central and South New Guinea Stock have been suggested (Collins 1982; Jock Hughes pers. comm. 1996).

Wallace distinguished between Malays and Papuans as two populations present in different parts of Island Southeast Asia (Wallace 1869:584–98). He saw the boundary between these groups as occurring within Wallacea:

If we draw a line, commencing to the east of the Philippine Islands, thence along the western coast of Gilolo [Halmahera], through the island of Bouru, and curving round the west end of Flores, then bending back by Sandalwood Island [Sumba] to take in Rotti, we shall divide the Archipelago into two portions, the races of which have strongly marked distinctive peculiarities. This line will separate the Malayan and all the Asiatic races, from the Papuans and all that inhabit the Pacific; and though along the line of junction intermigration and commixture have taken place, yet the division is on the whole almost as well defined and strongly contrasted, as is the corresponding zoological division of the Archipelago, into an Indo-Malayan and Austro-Malayan region (Wallace 1869:592).

He noted Aru, along with Kei and of course New Guinea itself, as being ‘inhabited almost exclusively by the typical Papuans’ (Wallace 1869:591). In the light of recent genetic work showing that many distinctive Polynesian markers originate not in Taiwan as might be expected, but within southern Wallacea (Hurles et al. 2002; Oppenheimer and Richards 2001; Richards et al. 1998), Wallace seems particularly perspicacious in linking Polynesians more directly to ‘Papuan’ populations in this region than to the Malays (1869:593). The implications of this have recently been discussed by Spriggs (2003).

The implication would be that in large part the present populations of Aru descend from its Pleistocene settlers and that language shift to Austronesian languages, rather than a major immigration of Neolithic farmers en route from Taiwan (‘Malays’ in Wallace’s terminology) has been the main local mechanism which explains their current linguistic affiliation. The inland populations of Aru in particular may well have retained a primarily pre-Austronesian hunter-horticultural lifestyle until it was somewhat transformed by World System demands for forest products within the last 2000 and particularly the last 200 years.

The History of the Spice Trade

Until recently the earliest evidence of the international trade in Maluku spices came from Han Chinese and Indian sources of about 2000 years ago (Andaya 1993b:1–2), and hints from the spread of metal from mainland Southeast Asia through the islands as far as areas either side of Maluku, starting 2300–2100 years ago. The sudden appearance of metal and, a few hundred years later, the distribution of Dongson bronze drums originating in northern Vietnam and southern China and found as far as Maluku and the Bird’s Head of New Guinea, have been interpreted as marking the beginning of the spice trade (Spriggs and Miller 1988; see also Kempers 1988; Swadling 1996). The northern Maluku evidence for widespread adoption of pottery of general Indonesian Metal Age style from 2000 BP, would fit in with this interpretation.

Dramatic claims from Syria have extended the dating for the spice trade back another 1500 years. The evidence comes from the ancient city of Terqa (modern Ashara) on the Middle Euphrates, a halfway station between Ebla and Akkad. Excavation of a residential quarter of the city dating to about 3710–3550 BP (1760–1600 BC) revealed an area destroyed by fire. In the storage

area of one house were a series of jars and other clay vessels. One of them contained well-preserved spices including what has been claimed by the excavators to be a clove (Bucellati and Kelly-Bucellati 1977:116; Bucellati and Kelly-Bucellati 1977–1978:77–79). The clove, *Eugenia aromatica*, if it is such, can only have come from Maluku.

The dating of this evidence is from a period not long after the initial Neolithic Austronesian settlement of the region is inferred to have taken place. Perhaps part of the reason for the Austronesian expansion was to do with the extension of trading networks that were already at this time on an Old World scale? At the time, the connections of the Austronesian sphere ran north through the Philippines, Taiwan, and into South China. Cloves could potentially have moved along the ancient caravan routes north of the Himalayas to their Syrian destination.

So, at least, it seemed to Spriggs when he presented a paper in 1994 at the Third Maluku Studies Conference (later published in revised form as Spriggs 1998). Pam Swadling independently considered the implications of the Syrian finds in her book on the birds of paradise trade in Eastern Indonesia and New Guinea (Swadling 1996). Other early discoverers of the relevance of the Terqa finds to Maluku, and the first to get into print on it, were Taylor and Aragon (1991). The problem is that other Near Eastern specialists and palaeobotanists do not accept the original identification of the clove from Terqa, and believe it to be some other unrelated species (Carl Lamberg-Karlovsky, pers. comm. 1996). On the basis of the Terqa clove and early claimed pottery, betel nut and pigs from northern New Guinea, Swadling (1996:51–3, 269) has claimed that there was an early period of contact linking New Guinea and Asia dating from about 6000–5000 BP. She posits an association with the spread of Austronesian languages and claims an ‘almost simultaneous introduction of pottery across Island Southeast Asia as far as New Guinea about 5000 years ago’ (1996:51). The dating of pigs and pottery in northern New Guinea has been challenged (Spriggs 1996b), and the latest ideas on the spread of pottery through Island Southeast Asia and into the Pacific would put it as reaching Maluku only some 4000–3500 BP (see above).

Swadling’s (1996) claims for an important role for bird of paradise feathers in the later exchange systems associated with the spread of early metal in the region are far more persuasive. Such birds occur in Maluku only in the Aru Islands, but the long-standing connections between northern Maluku and New Guinea provide the conduit through which such feathers probably first entered the world market. Whether the spices or the feathers entered the exchange networks first, or together, is at present unknown, but Swadling’s book is an important corrective to earlier spice-centred views of regional trade. It is obvious that the more recent history of Maluku, including the archaeology of the Portuguese and Dutch colonial period, is closely bound up with the spice trade and the efforts of world powers to access and control it (Andaya 1993b), but the importance of other forest and marine products should not be underestimated.

How far south and east such trade connections went in this region in the recent past is attested by the Macassan trepangers and their contacts with Aboriginal groups along the northern coast of Australia from the seventeenth to the early twentieth centuries (Clarke 2000; Fox 2000), and also by some interesting linguistic material from southern New Guinea. This suggests a period of long-range interaction between the Non-Austronesian languages of northern Maluku, specifically Ternate and/or Tidore, and communities along the southern coast of New Guinea in the Gulf of Papua, to the east of Torres Strait (Donohue 1995:226–7; Voorhoeve 1982). The contact was also probably quite late, however, and was associated with the trade in birds of paradise plumes (Swadling 1998). It may be attested by stories in the Gulf of an attempted introduction of Islam — thus dating the connection to the period subsequent to the late fifteenth century AD (our interpretation of Laba 1996; cf. Wagner 1996:294). An additional clue may be the references in oral traditions in the Gulf to the place-name Adiri ‘at the extreme western border of the world’ (Wagner 1996:288, quoting Landtman 1917), which we take to refer to Tidore. Swadling (1996:154–65) prefers to see the contact in the Gulf as having been with traders from Seram Laut between 1645

and 1790, who were denied by the Dutch their traditional trade with the Aru Islands. She points to some linguistic connections but did not seem to be aware of Voorhoeve's (1982) publication. Tidore had traditional relations with Seram Laut, and Tidorese-speaking agents appear to have been based in the area (Andaya 1993a, cf. 1993b), but the strength of these connections is disputed by Ellen (1993).

Directions for Aru Research

When the Joint Indonesia-Australian archaeological team first set out for the Aru Islands in 1995 we thus anticipated finding archaeological evidence relating to several theoretical issues in Southeast Asian archaeology which also have parallels in other parts of the world. Such issues include:

- 1) the nature and rate of maritime colonization and island settlement by early *H. sapiens sapiens* in the Pleistocene, and the subsequent impact of such settlement on the 'pristine' landscapes of previously unoccupied islands;
- 2) the extent of inter-island connectivity or isolation and contact and exchange in the Pleistocene and early Holocene as demonstrated by the evidence relating to the translocation of animal species, plants and exotic stone;
- 3) the impetus for the development and/or adoption of agriculture by pre-agricultural communities or hunter-horticulturalists;
- 4) the interaction between indigenous groups and incoming Austronesian settlers and/or traders; and
- 5) the involvement of Aru as a supplier of bird of paradise feathers and other forest and marine products to world markets over the last 2000 years or so.

Aru was part of a continuous landbridge to both Australia and New Guinea for at least the first 40,000 years of occupation of Sahul by *H. sapiens sapiens*. Approximately 14,000 years ago rising seas began to encircle the island group, separating it from Australia and by 11,500 years BP it was completely separated from New Guinea (see Chapter 2, this volume).

As noted earlier, the presence on Aru of numerous marsupials and the cassowary attest to this shared history. While the waters to the east of the Aru Islands are relatively shallow, reflecting the previous landbridge with New Guinea and northwest Australia, the continental shelf to the west slopes steeply with the 100m isobath located as little as 10km away. Due to their optimal position, the Aru Islands have the potential to register a multitude of maritime colonizing events through time. It has already been mentioned that the Aru Islands and their now-inundated Pleistocene coastal plains are located on two of the major colonizing routes into Sahul, as proposed by Birdsell (1977) (Fig. 1.10). The key point is that branches of both the postulated primary northern and southern colonizing routes pass through, or close to, the Aru Islands. This feature, combined with the fact that they are positioned right on the edge of the Sahul Shelf, make them prime targets for investigating initial and subsequent maritime colonizations.

The narrow water corridor which separated the southeastern Moluccan islands of Kei and Tanimbar from the Aru Islands throughout the last 50,000 years and more, make this one of the most likely routes of colonization (Birdsell 1977; Irwin 1992). The steeply shelving off-shore profile in this region also makes Aru one of the most *discoverable* first jumping-off points into Sahul where evidence of early coastal settlement might be preserved. Such proximity would also have facilitated two-way voyaging in this region, both before and after Aru was separated from the rest of Sahul approximately 11,500 years ago.

The Aru Islands also have the advantage of being composed in part of limestone, with a substantial belt of karst located near the central western coast (see Fig. 1.1). Rockshelters and caves

occur in the karst and the alkaline environment has the potential to provide excellent faunal and botanical preservation. We expected to be able to track extinction and faunal introduction events from such sites.

We also anticipated that Aru would provide coastal midden sites of mid-Holocene to recent age, which would cover the period of the introduction of, or transition to, agriculture, and provide pottery and other artefactual sequences which could be linked to sites elsewhere in the region. Such base camp and/or village locations might also provide evidence for interaction between the Aru Islanders and exogenous groups, such as traders in search of forest or marine products.

Finally, following some of the early travellers' reports of Aru, we expected to find evidence of the attempts by the Dutch to establish control of the archipelago in the form of forts and other structures, which might be amenable to historical and archaeological research.

Our research was sponsored by the National Research Centre for Archaeology in Jakarta (Pusat Penelitian Arkeologi Nasional, also known as PPAN or Puslit Arkenas) as the 'Joint Indonesia–Australian Archaeological Project: Prehistory of the Aru Islands'. Co-operation with the National Research Centre was formalized in a Memorandum of Understanding (MOU) signed on October 8, 1996, which concluded at the end of 1999 after the fieldwork was completed. All finds from the field seasons have now been lodged with the National Research Centre after being taken out of Indonesia for analysis as part of the MOU. In Maluku the research was sponsored by Universitas Pattimura in Ambon.

Our team reached Dobo on December 1, 1995, having travelled over night by ferry from Tual in Kei Kecil. It consisted of Spriggs, Veth and Ako Jatmiko from Puslit Arkenas (Jakarta). Further trips to Aru were made in 1996 and 1997. The 1996 team consisted of O'Connor, Spriggs and Veth, Husni Mohammad from Puslit Arkenas (Branch Menado), and Widya Nayati, a lecturer in the Department of Archaeology at Gajah Mada University, Yogyakarta. The 1997 field team consisted of Geoff Hope from Australian National University, O'Connor, Veth, and Aliza Diniasti Saleh from Puslit Arkenas (Jakarta).

The research was funded by a Small Australian Research Council (ARC) Grant to Veth for 1995, and a Large ARC Grant to Veth, Spriggs and O'Connor for the period 1996–98. This monograph presents the results of these three seasons of fieldwork. Further research, extending coverage also to Kei and Tanimbar, had been planned to commence in 2000 and was funded by a further Large ARC Grant to Spriggs, Veth and O'Connor, but had to be abandoned owing to the deepening political and humanitarian crisis in Maluku. The research focus and the grant were then shifted to East Timor.

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