THE HUMAN COLONISATION OF SUNDA AND SAHUL: CULTURAL AND BEHAVIOURAL CONSIDERATIONS

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ABSTRACT

The maritime abilities of Homo sapiens *have generally been considered to be of relatively recent origin. In Europe, the question of whether people had reached the islands of the Mediterranean by boat before the end of the Pleistocene is still debated. The archaeological record for Southeast Asia and Australasia, however, shows clearly that humans were capable of substantial maritime voyages during the late Pleistocene.*

EVOLUTIONARY CONSIDERATIONS

Australasia, or "Sahul land", has never been linked by land to Southeast Asia, "Sunda land". Australasia has been isolated by a water barrier since at least the end of the Cretaceous some 60 million years ago, at the dawn of the age of mammals. As a result, Australasia's mammals are of the phylogenetically primitive sort known as marsupials and monotremes, as distinct from the more advanced placental mammals (or eutherians) of the so-called Old World (Africa, Asia and Europe). Because of this, if we accept the basic tenets of evolutionary theory and its placement of humans not only amongst the eutherians, but also amongst the primates, we must look for the origin of our species elsewhere. Many of the Aboriginal people of Australia believe they have always inhabited that continent. Evolutionary scientists look towards Southeast Asia for a colonising source, and note that it must *a priori* have depended on the ability to cross water barriers.

The modern view on human evolution is generally as follows. The ancestors of human beings diverged from the ancestors of the chimpanzees and gorillas relatively recently, perhaps within the last 5 million years. The oldest identifiable human ancestor is probably one of the Australopithecines, dated to c.3.5 million years ago in Africa. The oldest member of the genus *Homo*, considered by some to be *Homo habilis*, appeared about 2 million years ago, along with identifiable, patterned stone tools. About 1.6 million years ago, *Homo erectus*, the species usually considered immediately antecedent to modern humans, appeared, again in Africa. It is, however, *H. erectus* who appears to have been the first hominid to spread across the globe, with their remains being long known from China ("Peking man") and Java ("Java man", formerly *Pithecanthropus erectus*).

The question of the emergence of modern humans is currently controversial. On the one hand, some scholars consider that *Homo erectus* in different parts of the world evolved into regionally distinctive populations of *Homo sapiens*; this is the "Regional Continuity" view. Other scholars believe that modern humans evolved only once, in Africa, and spread all over the world, replacing the more primitive *H. erectus* populations in other regions. This is known as the "Replacement" hypothesis. This replacement is thought to have occurred within the last 100,000 years.

With respect to Asia and the Pacific, adherents to the regional continuity model see two relevant lineages. In China, a line of descent is envisaged leading from early *Homo erectus* populations represented at the hominid fossil sites Lantian and Yuanmou through the more evolved Zhoukoudian specimens to more sapient forms such as Dali and Maba and eventually modern Asian ("Mongoloid") populations. In Southeast Asia and Australasia, the lineage leads from the Javanese *Homo erectus* forms of the earliest Pucangan formations, through the younger Trinil then Ngandong fossils to

modern Australian Aboriginal ("Australoid") populations. Fossil evidence from Australia is considered by some to support this argument.

With respect to the replacement model, much the same evidence is interpreted differently, with the relatively recent colonisation of Australasia taken to support the movement of fully modern humans out of Africa and across the globe. For all these reasons, it should be apparent that the colonisation of the southwest Pacific needs to be considered as part of the general story of Asian prehistory.

AUSTRALASIAN COLONISATION

The question of the human colonisation of a hitherto unoccupied region demands some assessment of "the earliest", but this is fraught with archaeological difficulty. We are hampered by the large statistical standard deviations inevitably attached to radiometric dates, and we can never be sure of all the ways in which the vagaries of time and environment have differentially spared or destroyed our original evidence.

On the basis of the known archaeological record, it can safely be asserted that humans had reached Australasia 40,000 years ago, establishing a continuous presence which continues up to the present. There is argument amongst archaeologists as to whether an earlier presence can be established. Thermoluminescence dating of sediments in the Arnhem Land (Northern Territory, Australia) rockshelter site of Malakunanja II shows them to have been deposited between 50 and 60,000 years ago (Roberts *et al.* 1990). There is not clear evidence, however, that those sediments are associated firmly with evidence of a human presence (Bowdler 1992). It is also possible that thermoluminescence time is not the same as radiocarbon time. Other archaeological sites in Arnhem Land show a human presence no older than 24,000 years.

Elsewhere in Australasia, several archaeological sites are dated to between 40,000 and 35,000 years. The Huon Peninsula on the north coast of New Guinea has evidence of human occupation said to date to 40,000 years ago, but there is some dispute about this (Groube *et al.* 1986; Allen 1989). Also on the north coast of New Guinea, occupation of the Lachitu rockshelter seems firmly dated to 35,000 years ago (Gorecki *et al.* 1991).

The Australian mainland shows human occupation of a similar age in the north, at Carpenters Gap in the Kimberley region of northwest Australia (39,000 BP); at Nurrabulgin Cave in Cape York Peninsula (37,000 BP); in the southwest, at Upper Swan on the outskirts of metropolitan Perth (38,000 BP); in the southeast, at Lake Mungo and associated sites in the Murray-Darling basin (37,000 BP); and also in Tasmania, at the cave site Warreen (35,000 BP) (Bowdler 1992, 1993a; Sue O'Connor, pers. comm.).

These may or may not represent the earliest occupations of these areas. If they are accepted as such, does this indicate a rapid colonising process? This is unfortunately inestimable. The standard deviations of radiocarbon dates indicate the range of time which such dates may actually represent. The full radiocarbon date for Lachitu, for example, is 35,360±1400 BP, which indicates that the actual date falls somewhere within the range 36,760 and 34,200 BP, or, to be 98% sure, between 39,160 and 32,800 BP. The date thus embodies some 7000 years of uncertainty. All we can really say is that in terms of archaeological time, colonisation of the new continent was extremely rapid.

SOUTHEAST ASIAN COLONISATION

When we look, as we naturally do, to Southeast Asia for the antecedents of this colonising push, we are faced with a puzzle. The famous "Java Man" fossils were discovered a century ago and now take their place as one of the furthest flung examples of *Homo erectus*, believed to originate in Africa c.1.6 million years ago. The dating of the Javanese specimens is controversial, but many would agree with a date of a little under 1 million years for the oldest examples (see van den Bergh *et al.*, this volume, for a further review of this question). Even more problematic are the Ngandong or Solo forms, considered to be a more evolved form of *Homo erectus*, or perhaps even an archaic *Homo sapiens*; they are considered to date from anything between 600,000 to 60,000 years ago, with a general view that between 300,000 and 100,000 years is probably most likely (Bowdler 1992).

One aspect of the puzzle is that there is no cultural evidence whatsoever associated with these fossils, nor is there any such evidence anywhere in this region, not only Java but throughout Southeast Asia (i.e. south of China) which can be confidently dated to that period of time (but see Sémah *et al.* 1992). In fact, there is no archaeological evidence from Southeast Asia which is older than that found in Australasia, i.e. 40,000 years. This evidence is remarkably similar to that from Australasia in its distribution. In peninsular Thailand, human occupation of Lang Rong Rien cave has been dated to c.37,000 BP; in northern Vietnam, the oldest of a series of rockshelters is dated to c.33,200; and in peninsular Malaysia, in Perak, the Kota Tampan stone workshop site is dated to c.31,000 BP. Similar dates are found in island Southeast Asia: the Niah Cave in Sarawak, in the north of the island of Borneo, is dated to c.40,000 BP; the

rockshelters Leang Burung 2 in southern Sulawesi is dated to c.31,000; and Tabon Cave on the Philippine island of Palawan has human occupation by 30,000 years ago.

This evidence, taken overall, suggests two things. Firstly, we may entertain the hypothesis that, regardless of the older fossil material, Southeast Asia was colonised by modern humans at the same time as Australasia. Secondly, this colonising event was, in archaeological time, extremely rapid. It leaves open the issue of whence came the colonists; at the present time, the most likely source appears to be China (Bowdler 1992).

The story envisaged here is that modern humans swept out of southern China to find their way with archaeological rapidity to the mainland and islands of Southeast Asia, the continent of Australia and at least part of the island world of the Pacific. In real time, this process could have occurred in anything between 50 and 5000 years; we currently have no way to assess this. There is also little to help us explain why this occurred at this time, and no earlier. It has been said that it is due to the uniquely developed capabilities of *Homo sapiens sapiens*, fully modern humans, but this begs as many questions perhaps as it answers. Obviously, the new immigrants needed the adaptive skills to cope with a variety of new environments. Another essential prerequisite was of course adequate watercraft and navigational skills.

PLEISTOCENE VOYAGING

During the Pleistocene there were times of lowered sea level, and hence of expanded land masses. To get to Australasia, however, there were always water barriers to be crossed. To reach Vietnam, Thailand and Peninsular Malaysia did not require water crossings from any other part of the Old World. During times of lowered sea level, water crossings were also not needed to reach Java, Palawan and Borneo. To reach Sulawesi did, however, necessitate watercraft, with a crossing of perhaps 50 km. To reach the expanded land mass of Australasia, several crossings were needed, of a maximum of 100 km. The new colonists did not however stop there. Archaeological evidence showed they went beyond the Australasian land mass, to the oceanic islands of New Ireland in eastern Papua New Guinea, by 33,000 years ago (Allen *et al.* 1989), and to Buka, the northernmost in the Solomon Islands chain, by 28,000 years ago (Wickler and Spriggs 1988).

These feats of voyaging suggest many questions. What kind of watercraft were used, what routes were followed, were such voyages accidental or deliberate? To some extent, these arise from a continued disparaging and perhaps Eurocentric view of the capabilities of our forbears. In Europe, as mentioned above, it is still a matter of debate whether pre-agricultural humans had the ability to voyage to Cyprus or Sardinia, Mediterranean islands requiring maximum water crossings of less than 50 km (Simmons 1993; Cherry 1990).

We have no idea what kind of watercraft may have been used at this early time. No archaeological evidence, direct or indirect, exists to shed light on this question. The sea-going canoes of the Pacific, outriggers and dugouts, known from the historical period are of unknown antiquity. It is, however, usually assumed that they date from relatively recent times, consistent with the Austronesian expansion. In Australia, it has been assumed that that expansion made little or no impact (but see Bowdler 1993b; Rowland 1987). It might be thought, therefore, that Australian watercraft of the ethnographic present reflect a Pleistocene inheritance. We need to discount the dugouts of the north coast and the outriggers of the northeast, as these are thought to reflect the recent influences of Macassans and Papuans (Davidson 1935; Rowland 1987).

We are thus left with a variety of bark canoes and log rafts which were made and used by Aboriginal people in different parts of Australia. They do not generally seem capable of long ocean voyages, and indeed there is some archaeological evidence to suggest they are none of them of any great antiquity. A survey of archaeological and ethnographic evidence shows that offshore islands visited by Aboriginal people by sea during the Holocene with such craft involved water crossings of no more than 25 km, with most crossings being less than 10 km. Furthermore, the earliest dates for such crossings are, with perhaps two or three exceptions of 26 dated instances, only within the last 4000 years (Bowdler 1988). This suggests therefore that the maritime technology observed in recent times in Aboriginal Australia was not that used to colonise the Pacific originally.

It has been suggested that the original voyages of Pacific discovery were accomplished with bamboo craft, perhaps rafts (Birdsell 1977). Since substantial stands of large species of bamboo do not occur indigenously in Australia, this could explain the lack of survival of this technology into recent times.

The possible migration routes out of Southeast Asia into Australasia have been canvassed in detail by Birdsell (1977), and more recently by Irwin (1992). These routes are based on the assumption that routes involving the shortest possible crossings will have been the most likely,

and perhaps the most favoured; they are thus essentially variations on island-hopping. Birdsell suggested there were two main likely routes, one leading from Java through Timor to northern Australia, the other from Sulawesi through Halmahera to West Irian. He further assumes that such voyages would have been easier, and thus more likely to have been successful, during times of lowered sea level, when distances between islands would be lessened.

Irwin suggests that this is not a necessary assumption. He argues that "to make fine distinctions between the different distances is to miss the point that they were probably all short enough for the risks to remain much the same ... a boat that is seaworthy enough to cross 10 nautical miles can probably cross 100 or more, provided it is not of a type that becomes waterlogged and provided the weather remains the same" (Irwin 1992:27-28).

Irwin also addresses the issue of accidental versus deliberate voyaging. This has long been a matter of debate, with respect to the more recent Holocene colonisation of the far Pacific, as well as the earlier period under discussion here. It would now be generally agreed that, as a number of computer simulations have shown, any minimalist scenario involving the least possible number of people would have been demographically doomed to extinction. It seems that intentional voyaging is much more likely to have been the order of the day. As to the motives of such expeditions, we can of course only guess. Various ideas have been offered up, including population pressures in the hypothetical source area(s), and environmental episodes driving people in search of alternative resources.

The nature of the archaeological record does not lend any great weight to these kinds of suggestion. The patterning of dates in geographical space may be interpreted as representing an extremely speedy colonisation of the region. A theoretical colonisation model, based on expansion under duress, would posit a noticeable "gradient of antiquity" (cf. Jones 1968), with oldest dates in Mainland Southeast Asia, which would have included the modern islands of Java and Borneo in the Pleistocene. Younger dates would be expected in Sulawesi and the other non-continental islands, and younger still dates in continental Melanesia. We would then expect to find dates in northern Australia for early colonisation either contemporary with, or younger than, those in New Guinea, with successively younger dates in southern Australia and oceanic Melanesia respectively. This is not the case; the evidence does not suggest a gradual settling and "filling up" of new islands and ecological zones. There is no support here for a model of gradual population build-ups with ensuing pressure on resources forcing migrations onwards into new regions.

Some other motivation must have driven early humans to make deliberate and purposeful voyages of discovery. This may lay in the realm of unguessed at ideologies, social upheavals, or some aspect of economic endeavour beyond the exigencies of subsistence. Most archaeologists would agree that the people we are considering at this time were hunter-gatherers, dependent on wild plant and animal resources. While, however, it used to be thought that the hunter-gatherer way of life was, economically speaking, a somewhat random and difficult one, it has been recognised for some time now that such people had extremely sophisticated and systematic economic strategies, passing beyond mere subsistence. It is possible that such strategies are indeed the hallmark of modern humans, and may explain their extraordinary adaptive success (cf. Bowdler 1990a; see also Clark 1991).

Given their evident maritime abilities, it is logical to suppose that the early Pacific colonisers were coastally adapted, and were probably fishers and shellfish gatherers as much as hunters and plant gatherers (Bowdler 1977). Many early sites do not preserve the kinds of organic remains which might enable us to determine this, but it is supported by such evidence as is available. In the oldest levels of the Mandu Mandu Creek Rockshelter (Northwest Cape, Australia) and Matenkupkum (New Ireland, Papua New Guinea), both about 33,000 years old and both located near their respective Pleistocene coastlines, the remains of fish bones and shellfish are preserved (Morse 1988; Allen *et al.* 1989). At Lake Mungo and other Willandra Lakes sites, there is considerable evidence for freshwater fish and shellfish being part of the diet from 37,000 years ago (Bowdler 1977).

Other sites of similar age are however located at considerable distances from the then coastline, and it is evident that the early immigrants had the ability to exploit a wide range of resources in unfamiliar terrain, including what must have been previously unknown, not to say strange, resources. The range of ecologies brought into the economic sphere by 35,000 years ago is indeed remarkable. What we must assume to have been tropical dwellers accustomed to the products of the Asian forests and savannahs are by this time seasonally targeting wallabies on the edge of the Tasmanian glaciated highlands and collecting emu eggs on the edge of the Western Australian desert (Cosgrove *et al.* 1990; Bowdler 1990b).

We may also be seeing complex economic systems at work by this time. Evidence from New Ireland suggests that seafaring humans may have been introducing mammals into new environments during the Pleistocene (Flannery and White 1991). Intriguing evidence from the Kilu site on Buka Island (north Solomon Islands) shows the presence on starch grains on stone tools dated to c.28,000 years ago; the starch has been identified as deriving from a species of taro (Wickler and Spriggs 1988). it is still open to argument as to whether taro might be indigenous to Buka, or whether indeed it had to have been brought by humans. These areas need further work and replication, but they do hint at the deliberate human dispersal of both plants and animals during this early colonising period. This may in turn be open to several interpretations. On the one hand, we may be dealing with extremely sophisticated environmental managers, which is not necessarily to call them "agriculturalists". On the other hand, such dispersals may have been the by-product of providing sufficient provisions for extended sea voyages.

There are also some early suggestions of the movement of hard goods amongst early colonists over considerable distances. In Australia, rockshelter sites on what is now the coast of the Kimberley region contain pieces of baler shell dated to c.28,000 BP; at that time, the coast would have been over 50 km away. Later in the sequence, pearlshell as well as baler is found in levels dated to c.18,000 BP, when the sea was some 200 km away (O'Connor 1990). Further to the south, a site at Shark Bay has also produced baler shell dated to c.30,000 BP, and here also the coast would then have been some 100 km to the west (Bowdler 1990b). In several areas of Australia in the ethnographic present, both pearlshell and baler shell are known to have been significant items in long distance trading patterns. Pearlshell was generally of ritual significance; baler shell was also sometimes considered in this way, but also had a pragmatic function, in often being used as a receptacle. We cannot of course conclude that these items held such significance 30 to 18,000 years ago, nor can we be sure that they imply trading patterns similar to those of recent times. They do, however, show that the early colonists who had begun to exploit the interior resources of the new continent were in some way maintaining links with the coast.

In southwest Tasmania, the Darwin meteorite impact crater contains small seams of glass produced by the collision of the meteor with local rocks. Small pieces of Darwin glass in the form of flakes and tools have been identified in dated archaeological deposits up to 28,000 BP. The distance of the sites from the Darwin crater, in terms of the actual routes humans would need to take in this terrain, varies from 25 to over 100 km (Cosgrove *et al.* 1990).

Natural glass occurs also on several Melanesian islands, in the form of volcanic obsidian. This has been known to be an important trade item in recent times, and archaeological research keeps extending its significance back in time. New Ireland sites contain obsidian demonstrated to derive from New Britain sources in deposits dated to 20,000 BP. The distance from the source is some 350 km in a straight line, involving a minimum sea crossing of 30 km (Allen *et al.* 1989).

All these instances suggest that the early colonists not only made rapid adaptations to new and unfamiliar environments, but also quickly established local regional networks which allowed them to maximise the use of new resources. Again, this is far from the idea of desperate drift voyages, accidentally happening into new lands, or even of deliberate but desperate explorers driven by the vagaries of environmental change.

SUMMARY

Some 40,000 years ago, fully modern humans embarked on a series of voyages which brought them out of China, across Southeast Asia and into the new lands of Australia and Melanesia. It is likely that archaeological research will show in due course that this colonising movement reached as far as the southern end of the Solomon islands chain, but probably not beyond. Adaptations to an extremely wide range of environments appear to have been rapid, with the sophisticated economic networks set up with remarkable rapidity. The archaeological record shows continuity from the earliest times, up until the end of the Pleistocene. This is not to say, however, that no further voyages took place. While the archaeological record does not provide any evidence, it is interesting to speculate as to whether there were return voyages or not.

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