

THE EARLIEST AUSTRALIAN STONE TOOLS AND IMPLICATIONS FOR SOUTHEAST ASIA

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Since the late Cretaceous, over 60 million years ago, Australasia (that is, Australia and Melanesia) has been separated from the rest of the world by deep water barriers. All our understanding of evolution and biogeography indicates that human beings must have migrated to Australia from elsewhere. Archaeologists would all probably agree on two points:

1. That Australasia was colonised by human beings at least 50,000 years ago.
2. That the first colonists probably came from Southeast Asia.

The evidence for the first point is a lot more substantial than that for the second, which is a construct based more on logic and expectation than on really solid archaeological or human fossil evidence.

AUSTRALIA

Several Australian sites or site complexes now demonstrate firm dated evidence of human occupation of the order of 35,000 years or older. Recent claims for a date of c.50,000 BP for human occupation at Malakunanja II in northern Australia need further substantiation and clarification, but such a date is not especially surprising (Roberts *et al.* 1990a, 1990b, 1990c; Hiscock 1990; Bowdler 1990a, 1991). Otherwise, the earliest firmly dated site is Upper Swan, located on an alluvial terrace of the Swan River on the outskirts of Perth. The evidence consists of about 200 flaked stone artefacts in stratigraphic association with charcoal from which a series of dates yield a mean of 38,000 BP (Pearce and Barbetti 1981). Verification of this general level of antiquity derives from a date of 29,000 BP for charcoal associated with artefacts in the same alluvial deposit in another place (Schwede 1983).

South of Perth, excavations in a limestone cave called Devil's Lair (a reference to the past use of the site by Tasmanian devils, extinct on the Australian mainland since c.3500 BP) have produced a long intermittent sequence of not very intensive human occupation.

There is some difficulty about what constitutes the oldest indubitable evidence for human presence in this site. Most would agree with a date of 28,000 BP, and some would extend this to 30 or 32,000 BP (Dortch 1979, 1984).

Lake Mungo is a dried out lake bed in western New South Wales which, between 40,000 and 20,000 years ago, was full of water. People camped here on the lakeside lunette (dune formation) and left hearths with scattered artefacts and faunal remains, freshwater mussel middens, and human remains dated to between 36,000 and 26,000 BP. The oldest evidence here consists of shell midden (Bowler 1976).

A more problematic site is that of Keilor, near Melbourne. There appears to be some evidence here for a human presence c.36,000 or possibly 40,000 years ago, but it remains to be substantiated, which further recent work has so far failed to do (see Jones 1979).

A number of sites have been dated to between 35,000 and 25,000 BP. Mandu Mandu rockshelter at Northwest Cape in Western Australia now has artefactual and other archaeological evidence dated to 33,000 BP (Morse 1988 and personal communication). In Tasmania, a cave site in the southwest has been dated to 35,000 BP, and two others in the southeast to a little under 31,000 BP (Cosgrove 1989; Allen 1991). Widingarri 2 in the west Kimberley has been dated to c.28,000 BP (O'Connor 1990), the Ethel Gorge rockshelter in the Pilbara has been dated to 26,000 BP (Brown 1987) and the Silver Dollar site at Shark Bay, also in Western Australia, has been dated to older than 25,000 BP (Bowdler 1990c).

MELANESIA

Significant sites have recently been described in Melanesia. One is on the Huon Peninsula of the main island of New Guinea, which was connected to Australia at various times during the Pleistocene. Stone artefacts have been found here on an uplifted coral reef within volcanic tephra. The coral of the reef has been dated by uranium thorium dating to between 45,000 and 53,000 years ago and thermoluminescence dating of the tephra itself shows it to be of the order of 40,000 years old (Groube *et al.* 1986).

Of particular significance is the discovery of sites on New Ireland, a true oceanic island east of New Guinea, which would have required two further water crossings to reach. Within Matenkupkum cave, 50m from the present shore, a dense layer of marine shell midden containing over 200 stone artefacts has been dated to c.33,000 BP (Allen *et al.* 1988). Kilu rockshelter, on the island of Buka in the northern Solomons, has similar evidence dated to 28,000 BP (Wickler and Spriggs 1988).

SOUTHEAST ASIA

From Australia, we look northwest to see what antecedents we can find for Australia's first colonists. On the one hand we have the Javanese hominid fossil record. On the other, we look for relevant archaeological, that is, cultural, evidence.

The early *Homo erectus* fossils, known since the nineteenth century, are considered to date from perhaps 1.7 million years or less to perhaps 500,000 BP. Some of these are thought to have very primitive characteristics. A later group, the Solo or Ngandong fossil

hominids, are variously described as early *sapiens* or evolved *erectus*, with dates estimated at anything between 300,000 and 80,000 BP (Bellwood 1985: 43,50-2; Bartstra and Basoeki 1989). None of these skeletal remains has any precise cultural context or direct archaeological associations: no stone artefacts in primary association, no hearths, no evidence of subsistence, economic or any other activity. Some widely distributed surface assemblages of "poorly differentiated pebble and flake industries", including the industry designated "Pacitanian", have been attributed to *Homo erectus*, but no proof of such an association exists (Bellwood 1985: 56-67). Bartstra and Basoeki (1989) also suggest that some small "inconspicuous" flake and core artefacts from the Solo High Terrace are attributable to *Homo erectus soloensis*, but the association is hardly firm, and the artefacts themselves await further description.

Fifty years ago Australian archaeologists were suggesting that Australian industries were related to the Hoabinhian (Tindale 1937; McCarthy 1941). Twenty years ago, Matthews (1966) carried out some statistical comparisons between Australian and Hoabinhian stone artefacts and, while showing similarities, cautioned against attempts to see "historical relationships". It is only in the succeeding twenty years that it has been demonstrated that, on the one hand, Australia has been occupied for some 40,000 years and that, on the other, the true Hoabinhian industries are unlikely to be older than 13,000 years (Bellwood 1985: 162). We therefore need to look elsewhere for Southeast Asian antecedents for Australian colonists.

In searching the literature for dated cultural evidence from Southeast Asia which predates the colonisation of Greater Australia, I can find only three artefacts from northern Thailand. Three worked cores (what in Australia would probably be called pebble choppers) were collected from fluvial gravel deposits which stratigraphically underlie a basalt dated by potassium argon to between 800,000 and 600,000 years. The actual artefacts do not, however, appear to have been stratified beneath the basalt when found (Pope *et al.* 1986).

All other firmly dated archaeological sites in Southeast Asia are contemporary with or younger than those in Australia. Relevant sites are Lang Rongrien shelter in peninsular Thailand, with human occupation dated to c.37,000 BP; the West Mouth of Niah cave, Sarawak, with its oldest occupation dated to between 35,000 and 40,000 years BP; Leang Burung 2 in southern Sulawesi, dated to c.31,000 BP; Tabon cave on Palawan Island, c.26,000 BP (Fox 1970; Anderson 1987; Bellwood 1985); and Kota Tampan, in Perak, peninsular Malaysia. This last name is of course well-known in Southeast Asian prehistory, as it was claimed in the 1950s to represent a Middle Pleistocene occupation site. That interpretation has been called into question on several occasions (e.g. Harrison 1975), but recent research by Zuraina Majid has established the existence of a workshop site firmly dated to c.31,000 years ago (Zuraina 1990; Zuraina and Tjia 1988). One might also include Tingkayu in Sabah, Island Malaysia, indirectly dated to 28,000 BP. These dates conform very closely to those on the other side of Lydekker's Line, in Australasia.

With the possible exception of the three artefacts from northern Thailand, all dated Southeast Asian archaeological manifestations, in the sense of cultural evidence, are

restricted to the last 40,000 years: that is, to within the same time range as the human occupation of Australia. If it were not for the *Homo erectus* fossil material, we could argue on archaeological grounds alone that Southeast Asia was unoccupied until 40,000 years ago. Bellwood (1985: 67) comments that it could be argued that no human crossed Huxley's line before 40,000 BP. I would certainly argue that no *Homo sapiens* was present in Southeast Asia before 40,000 (see also Bowdler 1990b; Hutterer 1985).

Recent genetic studies (Cann *et al.* 1987; Stoneking and Cann 1989) argue that *Homo sapiens sapiens* originated in Africa between 100,000 and 300,000 years ago. This view is also supported by the work of Australian geneticists, whose work suggests that the ancestral lines of Aborigines, black Africans and east Asians diverged between 100,000 and 200,000 years ago (Kirk 1987). Some archaeologists and palaeoanthropologists find support for this view in the archaeological and fossil records (Delson 1988; Gowlett 1987). One implication of this is the terminal nature of *Homo erectus* populations outside Africa. This argument sees no relationship between Javanese *Homo erectus* and regional *H. sapiens* populations; a view not of course shared by all (Wolpoff 1989; Wolpoff *et al.* 1984).

Turning again to the archaeological evidence, we can plot the earliest dated cultural sites for both Greater Southeast Asia and Greater Australia on a map (Figure 1), and we begin to see something that looks very uniform in time and space. But what of content? There certainly appear to be resemblances between the stone artefacts at the different sites. A summary of these, on the evidence available to me, is as follows.

Australia

Stone artefacts from the lowest occupation levels of Malakunanja II are said to consist of "silcrete flakes, pieces of dolerite and ground haematite, red and yellow ochres, a grindstone and a large number of amorphous artefacts made of quartzite or white quartz" (Roberts *et al.* 1990a).

Upper Swan artefacts consist mostly of small (less than 15mm long) unworked flakes of quartz. Items with secondary working are mostly small irregular pieces, including steep edge scrapers (Pearce and Barbetti 1981: 174-5). A similar range of artefacts was found at the related 29,000 year old Helena River site (Schwede 1983: 55).

Devil's Lair artefacts from the lower levels of the site present some problems. I am reluctant to accept the identification of most of the calcrete and limestone objects as artefacts. In my view, the earliest definite artefacts are those of quartz, a stone foreign to the site, in layers 29, and 30 (upper) dated between 28,000 (layer 28) and 33,000 BP (layer 30 lower). All these quartz pieces are identified as debitage (Dortch 1979). Only 12 tools altogether occur in layers 11 to 29 (c.20,000-30,000 BP), and most of these are described as small scrapers, including steep edge scrapers (Dortch 1979, 1984).

Lake Mungo artefacts were originally characterised in Bowler *et al.* (1970). They included horse hoof cores, steep edge scrapers, flat scrapers and small concave scrapers. While horse hoof cores may in some contexts be very large (e.g. Kangaroo Island,

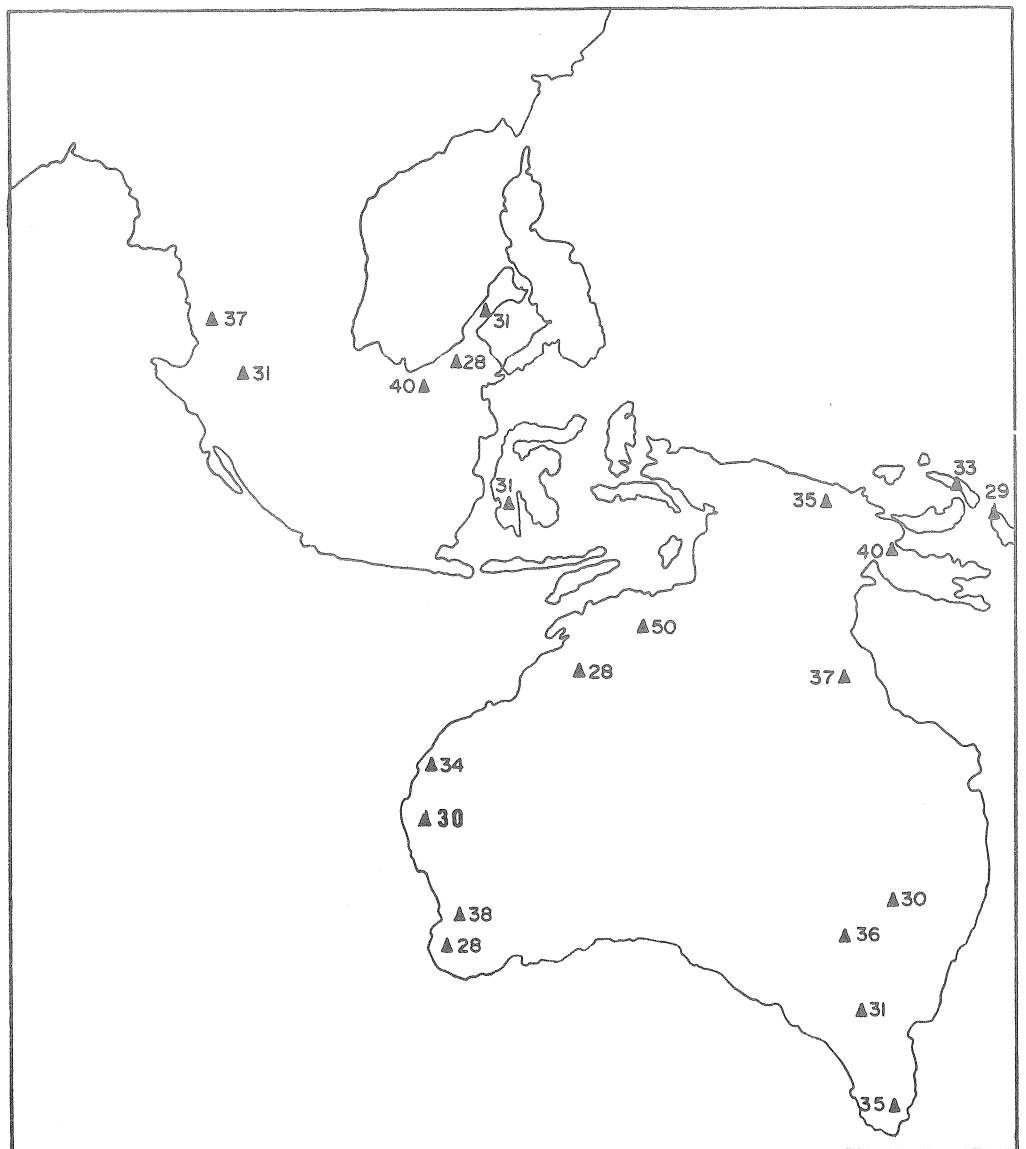


FIGURE 1: AUSTRALIA AND SOUTHEAST ASIA AT TIMES OF LOWERED SEA LEVELS, SHOWING LOCATIONS OF ARCHAEOLOGICAL SITES WITH DATES IN MILLENNIA BP

Lampert 1981), the examples described and illustrated by Bowler *et al.* (1970) are quite small; the largest object they illustrate has a maximum dimension of 7 cms.

No sensible description exists of artefacts from Keilor. Artefacts from Widgingarri and Mandu Mandu Creek are currently under study. The sample from the Ethel Gorge site is very small; the oldest examples are simple flakes (Brown 1987). Artefacts from the older levels of the Silver Dollar site consist mainly of small primary flakes, but steep edge scrapers are also present.

Artefacts from the Tasmanian sites Nunamira and Bone Caves and ORS 7 contain "largely amorphous" stone industries, with one distinctive element, the thumbnail scraper, occurring in the first two sites (Cosgrove *et al.* 1990: 71-70).

Melanesia

The Huon Terrace artefacts are not described in detail. Most attention is drawn to the large waisted tools found here which are known from other New Guinea sites of Pleistocene age, and which are known from Australia only from undated contexts (Groube 1986; Groube *et al.* 1986).

From Matenkupkum Cave on New Ireland the artefacts from the oldest layer consist of 200 flaked tools (Allen *et al.* 1988). These have not as yet been described in print. They consist mainly of small primary flakes and simple cores. There is little evidence of secondary working. Kilu implements are said to consist of *ad hoc* scrapers (Wickler and Spriggs 1988: 705).

Southeast Asia

Niah Cave artefacts from the lowest levels include semi-lunar scrapers, endscrapers, notched scrapers and pointed flakes, and some pebble implements (Zuraina 1979: 103-4). From the published examples, I would suggest some resemblance between the semi-lunar scrapers and the Australian steep edge scrapers, and between the endscrapers and Australian thumbnail scrapers.

Lang Rongrien artefacts dated to between c.27,000 and 37,000 BP include predominantly small flake tools, mostly rather irregular scrapers. Anderson (1987, 1988) comments on the fact that surprisingly few of the Pleistocene implements are pebble tools. Leang Burung 2 artefacts dated to between 20,000 and 31,000 BP include steep edge scrapers, small multi-platform cores, and also blade-like forms (Glover 1981).

Kota Tampan is unusual in that it is a workshop site; we would not therefore necessarily expect to find at it many finished implements. The artefact categories recognised at the site included anvils, cores, hammerstones, flake blanks and debitage, but also included flake and pebble tools. The flake tools were recognised by the presence of secondary working or utilisation, but are otherwise characterised as "amorphous" (Zuraina 1990). Some other types have been recognised from the more recent excavations of the site. These include notched flakes, pebble tools with a flaked "nose" or beak (similar to Australian examples, including specimens collected from Hunter Island,

Tasmania, by the author) and perimeter flaked core tools, very similar to the disc cores known from Lake Mungo, for example (Zuraina Majid, personal communication).

Tabon Cave artefacts consist largely of rather large (over 5 cm) flakes, with less than one per cent having secondary working. These include steep edge scrapers (Fox 1970).

Tingkayu is a series of open sites on the shores of a defunct lake. The date of the lake's formation is "probably indicated" by the dating of a lava flow which dammed the river course at c.28,000 BP, thus creating the lake (Bellwood 1985: 180). This does not seem to me necessarily to indicate such a date for the sites themselves, but I include them here for completeness. A further complication is the fact that at least one of the sites was disturbed by a bulldozer. Artefacts include bifacial points or knives and at least one thumbnail scraper (Bellwood 1985: 182, Fig. 6.14); earlier claims for pebble tools and horsehoof cores have now been withdrawn (Bellwood 1988:72-5).

SUMMARY

Clearly this is only a superficial review, and no substitute for a detailed statistical comparison. Such a study however, is obviously hampered by the lack of detailed published reports, although more will soon be available, it is to be hoped, from the very many sites excavated in the last five years or so. In the meantime, I would venture the view that these assemblages can be construed as being part of a common tradition, with local variation due to different environments, site usage and raw material availability. In the light of earlier opinion, it is interesting to note the general low frequency of pebble tools and other large core tools, with the exception of the Huon Terrace waisted tools. Otherwise, with the exception of Tingkayu, these industries may be characterised as somewhat amorphous, comprising *ad hoc* flake tools. There are, however, some types which occur in several sites, in both the Sunda and Sahul provinces, namely small steep edge scrapers and thumbnail scrapers.

Another intriguing similarity may be noticed between some early Australasian sites and their Southeast Asian counterparts. Where there is sufficient information, and sufficient evidence to demonstrate change through time, it seems that initially amorphous industries become somewhat more formalised after the initial occupation at the respective sites. This has been demonstrated for sites in southern Tasmania, by Cosgrove *et al.* (1990), where thumbnail scrapers, the only distinctive type recognised, appear at four out of five sites some time after their initial occupation. Similarly, in Niah Cave, Zuraina's (1979, 1982) re-analysis shows that the only recognizable type in her Unit 1 is the semi-lunar scraper (steep edge scraper); that pebble tools only appear in Unit 2; and that in Unit 3, eight new types are distinguishable, including the endscraper (thumbnail scraper).

It is possible that these earliest industries represent a sort of travelling survival kit, that their frequently amorphous nature reflects not a lack of sophisticated knowledge, so much as a flexible and opportunistic repertoire which becomes more defined as its owners become more attuned to local conditions and necessities. Thus these apparently amorphous industries may in fact suggest yet another advantage possessed by *Homo*

sapiens sapiens over their forbears, not stuck in the groove of an inflexible tradition of tool-making like for instance the makers of the seemingly interminable Acheulian hand-axes.

DISCUSSION

There is no doubt that the first hominid occupant of Southeast Asia was *Homo erectus*. This hominid had certain primitive morphological features, but also appears to have been, compared with the populations in Africa, Europe and China, virtually bereft of culture. It is my contention that this population evolved to some extent, as shown in the Ngandong fossils, but sometime perhaps in the Middle Pleistocene or even early Upper Pleistocene became extinct.

The first human occupation of Southeast Asia took place about 50,000 years ago, by *Homo sapiens sapiens*. This fully modern human was probably coastally adapted and equipped with highly functional watercraft. At a time of lowered sea level, water crossings of up to 65 km appear to have been negotiated across Wallacea into Australia and to oceanic islands of Melanesia. This was also a time of major dispersion of mammals into Southeast Asia (Darryl Kitchener, Western Australian Museum, personal communication). Whatever the reason, whether due to climatic change, and whether there is indeed any connection between human and beast, the major human dispersal took place at about the same time. The animals, however, were stopped by the larger water barriers; the humans on the other hand seem to have found them to be no barriers at all. Thus we may see mainland Southeast Asia, Wallacea, Melanesia and Australia colonised virtually simultaneously by modern human beings some 40,000 to 50,000 years ago.

This of course raises the question of whence they came. Even if we accept the genetic evidence which indicates an ultimate African origin, this need not mean an instant exodus from the dark heartland within the last 50,000 years. A recent summary of those findings suggests the time scale is somewhere between 50,000 and 500,000 years ago, and, furthermore, does not rule out interbreeding between "resident non-Africans" and the "dispersing African population" (Stoneking and Cann 1989). I would, on the basis of the archaeological evidence, argue against the "regional continuity" model as it is applied to Java and Australia. This does not, however, rule out another aspect of regional continuity, namely one which derives Asian populations, including Australian ones, from an ultimate Chinese *Homo erectus* origin. This at least leaves half the now conventional Australian dihybrid model intact.

What indeed does the Chinese evidence tell us? It is not easy to interpret the available English-language summaries without access to the primary data, but there would seem to be more evidence for cultural continuity in China during the Pleistocene than elsewhere in Asia. I do not discuss India in detail here, but I think this generalisation holds if India is included, given the continuing dearth of excavated stratified radiometrically dated Pleistocene sites from the sub-continent. As far as China is concerned the earliest sites are those at Lantian in the north and Yuanmou in the south; there is continuing controversy

as to their actual dating (e.g. Aigner 1988). Yuanmou may be as much as 1.7 myr old, and has yielded *Homo erectus* remains and a few, possibly associated, artefacts. Gongwangling, Lantian, also provides *Homo erectus* remains and rather more stone artefacts, possibly as old as 1.15 myr. The best known *Homo erectus* site is of course Zhoukoudian, where the excavators at least believe there is evidence of *Homo erectus* in firm association with stone artefacts, and evidence for the use of fire and for the hunting of large animals (Jia Lanpo 1989).

A number of other sites dated to between c.300,000 BP and 100,000 BP in both north and south China have human fossil remains in some cases apparently associated with stone artefacts. Sites dated to as recently as 200,000 BP (Hexian) and 131,000 BP (Xujiayao) appear to contain fossils of *H. erectus* or with strong *H. erectus* characteristics, while sites as old as 230,000 BP (Dali) and 220,000 BP (Changyang) appear to have evidence of early *H.sapiens* forms (see Brooks and Wood 1989).

With respect to cultural continuity, there is evidence both for and against. In favour is the fact that there appears to be a continued similarity in stone tool industries, or perhaps it might be more accurate to say there are no marked discontinuities in another fairly amorphous repertoire. Pebble choppers occur in low numbers at many sites throughout this time range. Dingcun is somewhat unusual in the presence of large bifaces. Otherwise, continuities occur in the form of amorphous flake scrapers, and, interestingly, bipolar flaking, especially of quartz (Zhoukoudian, Shilongtou, Shuicheng, Zhaocun, Xiaonanhai). Thumbnail scrapers are also noted at Xujiayao, at c.131,000 BP (Aigner 1981; Atlas 1980; Chang 1986; Bowdler 1992).

On the other hand, there may be something of a gap in the record, between c.115,000 BP and 67,000 BP, which might be construed as not dissimilar to the gap in the Southeast Asian record. The difference is of course that in China, both north and south, there is ample evidence for stone artefacts and other cultural behaviours prior to the Upper Pleistocene.

On the basis of the cultural evidence there seems to be a *prima facie* case for an hypothesis which derives Southeast Asian and Australasian populations of the Upper Pleistocene from China. This might fit one view of the human fossil evidence, but it is clearly in conflict with the other, which derives Australian populations at least from Javanese *Homo erectus* populations. As an archaeologist, I prefer to follow the interpretation which best fits the cultural evidence. This whole issue does in fact raise several questions as to what our data mean, and as to how we interpret notions of culture and humanity.

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