Introduction

JIM ALLEN & JAMES F. O'CONNELL*

The interval between the Last Glacial Maximum, roughly 18,000 radiocarbon years ago, and the mid-Holocene 'climatic optimum', at 5–7000 b.p., has long been identified as a time of major change in human affairs. World-wide, the archaeological record indicates clear, broadly coincident, essentially unprecedented shifts in the size, distribution, subsistence economy, technology, and social organization of human populations everywhere. Large areas of the world were inhabited for the first time; the size, number, and permanence of settlements generally increased; foraging ranges became smaller; certain subsistence items were added to the diet or exploited more intensively — notably locally abundant but high-cost terrestrial plant foods and marine resources; technology became more complex — especially that connected with food processing and storage; initial steps were taken in the domestication of plants and animals; networks for the exchange of scarce resources were broadened substantially; social boundaries were more commonly, often more sharply, defined; social and political hierarchies elaborated (e.g. Fagan 1995: 151–73). Once established, these general patterns (collectively called 'Mesolithic' in the Old World, 'Archaic' in the New) persisted in some areas, with little real change right to the 'ethnographic present'; elsewhere they formed the basis for further, sometimes more profound innovations. Either way, these terminal Pleistocene 'transitions' represented a fundamental shift in the pattern of human experience and, as such, have been an important focus of archaeological inquiry.

Explanations for these developments have generally appealed to one or a combination of three factors: climatic change, population growth, and social 'forces'. Of these, climatic change has been most favoured as single catalyst (e.g. Fagan 1995; Price & Brown 1985; Wenke 1990). Patterns in global temperature, atmospheric circulation and precipitation all shifted dramatically across this time-period; their effects on ice-volume, sea-level, and resource availability were striking and ubiquitous. Collectively, these changes created new opportunities and imposed new constraints on humans everywhere. Most of the behavioural innovations and adjustments noted above can be seen, plausibly if not compellingly to all, as 'adaptive' reactions.

Though still not well known archaeologically, the Australian archipelago offers what seems, from the current literature at least, an important exception to this line of reasoning. Defined here as Australia and its neighbouring continental and oceanic islands, including New Guinea, New Britain, New Ireland, the northern Solomons and Tasmania, this region witnessed the full suite of climatic and environmental change characteristic of the terminal Pleistocene. At Last Glacial Maximum, low sea-levels exposed broad areas of the now-submerged continental shelf, providing dry-land connections between New Guinea, Australia and Tasmania, which formed a single enormous land-mass, sometimes called 'Greater Australia' or 'Sahul' (Ballard 1993). Colder, drier, windier than today, with extensive montane glaciers on its margins, north and south, and a greatly expanded arid core, it must have been (important local exceptions apart) a hostile and unforgiving place. Fifteen thousand years later, it was quite different, essentially presenting the same suite of habitats one can see today, minus the effects of European colonization: still austere, but warmer and wetter overall, with more surface water in the interior and a much more extensive, increasingly productive coast-line.

Initially occupied about 40,000 radiocarbon years ago (Allen & Holdaway 1995; cf. Roberts

* Jim Allen, Department of Archaeology, La Trobe University, Bundoora 3083, Australia. James F. O'Connell, Department of Anthropology, University of Utah, Salt Lake City UT 84112, USA.

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et al. 1994), in the first wave of anatomically modern *sapiens* expansion, this vast landscape subsequently witnessed many of the changes elsewhere seen as typical of the Pleistocene–Holocene transition. Oddly, however, their timing is off, different from that seen in other parts of the world. Some changes appear early in the local record, at or relatively soon after initial occupation: these include the use of coastal resources and related developments in marine technology, and the practice of modifying plant and animal distributions (notably through the use of fire). Others, seen to be late, include most of those commonly regarded as typical of Mesolithic economies elsewhere — sharp increases in site density and discard rate, heavy use of high-cost plant foods, intensive exploitation of coastal resources, technological diversification, and the appearance of patterns in ritual and social practice typical of the ethnographic period. By conventional assessment (White with O'Connell 1982; Lourandos 1993) these are no earlier than the mid Holocene anywhere in Greater Australia, in some areas as late as 1000–2000 b.p. Only the initial development of agriculture, dated to about 10,000 b.p. in the New Guinea Highlands, looks 'right' from a global perspective, and even there, the evidence is thin: good indications of intensive plant cultivation date only to about 6000 b.p., roughly coincident with other forms of 'intensification' further south (e.g. Golson & Hughes 1980).

Taken at face value, this picture makes conventional arguments about the effect of the Pleistocene–Holocene transition on human affairs suspect. It is for this reason that many Australianists prefer to appeal to social process and demographic pressure to account for local 'intensification' (e.g. Beaton 1977; 1985; Bowdler 1981; Lourandos 1983; Ross 1985; Ross *et al.* 1992; Williams 1987). Their appeals display a common form: depending on context, individuals or sets of individuals are said to have acted in ways that changed local patterns of social interaction to their own advantage; such changes in turn purportedly had catalytic effects on resource exploitation, technological development, exchange, ritual and religion, and political interaction. The initial shift in social relationships is often seen to have been a result of population pressure (e.g. Beaton 1983; Lourandos 1980): at some point in the past, critical densities were reached; different forms of interaction became possible; individuals began to take advantage of those possibilities; major changes in social and economic behaviour followed.

Appealing as this formulation may be, it is not without problems, especially with respect to timing. Greater Australia was occupied more than 25,000 years before the Americas, perhaps as long as 40,000 years before, and at very much lower densities, yet the bulk of the evidence for local 'intensification' occurs much *later* than it does on the opposite side of the Pacific, at minimum some 3000 years later. Why does it take so long to reach the critical demographic threshold in Sahul? Why is it crossed so quickly in the Americas? The problem is further compounded by evidence that all but the very poorest parts of Greater Australia were occupied by 30,000 b.p.; in some areas at least, populations had reached levels equal to or greater than those of the mid Holocene prior to the Last Glacial Maximum (e.g. Holdaway & Porch 1995; O'Connor *et al.* 1993). If this was the case, why is the Mesolithic so late in those areas? Indeed, given the evidence for some elements of the Mesolithic transition early in the Greater Australian sequence, why doesn't the full package appear at about the same time? To the degree the answer turns on habitat characteristics and their modern form, the argument begins to re-implicate terminal Pleistocene climatic change. Or does it?

These problems have been increasingly apparent to interested parties (particularly those who teach world prehistory and follow the literature on Greater Australia) for some time. For us, they reached a critical threshold at the Society for American Archaeology meetings in Anaheim in May 1994. One of us (JA) had delivered a paper, co-authored with palynologist Peter Kershaw, on the effect of terminal Pleistocene climatic change on human populations throughout Sahul. In conversations, in the bar, over lunch, especially with colleagues John Beaton and Christopher Chippindale, we rehearsed issues reviewed above.

Several important observations emerged.

First, overall knowledge of the Pleistocene–Holocene transition and its impact on Great Australian environments was better than some of us had imagined, partly as a function of sustained fieldwork and growing data-base, but

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also through increasingly sophisticated global and regional climatic modelling (e.g. Wright *et al.* 1993). This work confirms that the terminal Pleistocene was a time of major environmental change throughout Greater Australia; the period 9000–12,000 b.p. was marked by particularly sharp adjustments, both climatic and environmental — but modern habitats were not established in many areas until much later, not before the mid Holocene.

Second, increasingly intensive regional studies in several parts of Australia have revealed close links that connect fluctuations in local climate and environment to shifts in the basic structure of the archaeological record, notably in site distribution and discard rate. In some areas, aspects of 'intensification' seem to be tied closely to the appearance of modern habitats. In others, they do not.

Third, and most important: despite this complex and provocative picture, regional specialists have — by and large — become less concerned with relating their research results to global issues. At the same time, and again despite the potential significance of the Greater Australian evidence, outsiders interested in 'intensification' have continued to ignore it.

Given all this, a comprehensive, to some extent deliberately provocative review of the field, preferably in a global venue, seemed likely to be useful. Chippindale agreed that ANTIQUITY was the right outlet; Allen set about assembling the team, defining the task for each author and establishing a schedule.

Those we approached accepted the task enthusiastically, produced manuscripts promptly, and engaged in active commentary on each others' works. The finished volume was reviewed by two outside readers, whom we thank for their generous efforts. The Antiquity team provided critical encouragement and a tight time-schedule.

We are pleased with the result, and hope that readers find the exercise of engaging these contributions as stimulating as was ours in assembling them.

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