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'Part and parcel'—blade industries and modern human behaviour

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"...the recent prehistory of North America and Australia shows that blades are not part and parcel of complex, sophisticated or highly-mobile adaptations of 'modern' hunter-gatherers." (Bar-Yosef and Kuhn 1999:323)

Abstract

In this paper I address the question of the presence or otherwise of elongated parallel-sided blades in Australian stone artefact industries. I begin with a set of data from European sites which shows that such blades are indeed characteristic of later phases of European prehistory, but not exclusively so. I then show that by these criteria, there are blades in Australia too, recorded both ethnographically and archaeologically. I then argue that blades in the European Upper Palaeolithic show some characteristic properties which can be related to the use of indirect percussion as the technique of production. This technique seems to be absent from Australia. Following discussion of the relevance of the appearance of blades in making judgements about the history of modern humans, I conclude, as Peter White did in 1977, that Eurocentric models are not relevant.

Introduction

Peter White's work has been characterised by a willingness to puncture, where necessary, the poor thinking of others, whatever their reputations. This is well demonstrated by his book about the pernicious silliness of von Daniken's claim that aliens produced the monuments of antiquity (White 1974), but it has also been applied to more respectable archaeology as well. In 1977 he published a critique of widespread attitudes to the stone industries of Australia (White 1977). The paper began with a quotation from 'one of the world's eminent prehistorians', Grahame Clark, then recently retired as Professor of Archaeology at Cambridge University (in the UK) (Clark 1968:21-22): 'The crude and rather colourless nature of this industry may serve to remind us that the original Australian aborigines issued from one of the most unenterprising parts of the late Pleistocene world.' Peter argued, correctly in my view, that stone artefact industries were a poor measure of enterprise or colour.

In this paper, I want to enter into the spirit of Peter's paper and begin with a quotation from another eminent Professor of Archaeology at the other Cambridge (Massachusetts, USA), Ofer Bar-Yosef, in a his recent paper with Steven Kuhn (of the University of Arizona, USA) (Bar-Yosef and Kuhn 1999). The quotation is the epigraph to this paper. Admittedly. Their paper is in the same tradition as Peter's—to show that 'evolutionary trends in Pleistocene Eurasia were historically contingent and not universal'—but in the process, they repeat some statements about Australian stone tools which make it appropriate to look at the whole question of blades again, from an Australian perspective.

One of the problems is that publications of detailed studies of Australian stone industries have been rather scarce in the 25 years since Peter's paper, although there are signs that this is changing. For example, the two recent volumes of tribute to other elders of the Australian archaeological community contain few stone artefact studies, and, apart from an idealised version of the standard sequence (van der Leeuw 2000), have not one illustration of a knapped stone artefact (Anderson and Murray 2000; Anderson et al. 2001). My own most recent review of the Australian story used no evidence from the stone tools, save their implicit presence as indicators that dates from sites were dates for the presence of people (Davidson 1997, 1999), a feature I only recognised after publication. This is not to say that there have been no studies of stone tools—on the contrary there has never been a period in which so many have been done—but these, including some of very great importance, such as Koettig's (1994) remarkable conjoins at Bulga, in the Hunter Valley, have largely remained unconsidered in the pages of consultancy reports. We need to change our approach if scholars outside Australia are to banish some of the old preconceptions still held about Australian stone industries. I think it is fair to say that, by an ironic twist, Peter showed in his 1977 paper that some of the preconceptions about stone industries across the world could be banished by careful consideration of what we know about stone industries in Australia. Similarly, the Australian evidence shows that some of its 'modern' fisher-gatherer-hunters *did* use blades (Allen 1997). The problem lies in thinking that something like the production of a particular form of stone flake can be a marker of modernity without some intervening argument about the reasons for such an implication.

'Crude, colourless and unenterprising'

Peter White's 1977 paper was a critique of the way stone tools haved been used in writing history from archaeological evidence. He asserted (1977:13): 'If we cannot usefully employ the stone tools, we cut out a very large part of our direct data from the past, data which provide many of the foundations of our more theoretically oriented upper stories.' This assertion is still true but, as I have taken pains to point out elsewhere (Davidson 1991, 2002; Davidson and Noble 1993), some old habits die hard. The use of stone tools in writing history is still partly driven by preconceptions with a very long standing in the study of archaeology. Peter's paper contributed to understanding the extent to which stone tools had been harnessed to the service of a more pervasive story about hominin evolution being one of progress and advance through more efficient and complex use of technology. Peter argued that many (if not all) of the key concepts (progress, advance, efficiency, complexity) in this story are very difficult to measure. Although some of his points had already been recognised by others, the implications have still not been fully integrated into our

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understandings of changes in technology during hominin and human evolution (see Noble and Davidson 1997). In a similar way, the concept of modernity is problematic in the argument of Bar-Yosef and Kuhn (1999) and its theoretical ramifications are still to be developed.

Peter also pointed out that his evidence from the archaeology of Papua New Guinea showed that the archaeological signatures became less complex over time—a theme taken up later by Torrence (1989:65) in looking at the 'amorphous, unstandardized and highly variable artefacts' of Neolithic Britain. She extended her argument to the other side of the world:: '[a]lthough the character of change in Australian lithics is similar, i.e. a shift from the small tool tradition to recent more uninformalized, expedient assemblages, we cannot invoke domestication as an explanation for the change in risk.' Peter's conclusion, still of lasting merit, was that there is 'no necessary relationship between stone tool morphology and efficiency of energy harnessing' and that 'the majority of stone tool forms were not necessary, in a utilitarian sense, at all.'

The Old World artefact sequence

Let us see how Bar-Yosef and Kuhn (1999) dealt with the question of blade industries, and, in particular, with the question of blades in Australia. The issue is not a trivial one, since adherence to an old model of the sequence of evolution of human behaviour still places great emphasis on the importance of stone industries containing blades (e.g. McBrearty and Brooks 2000). The view is promulgated by standard textbooks, contributing to its unquestioned acceptance as a starting point by many archaeologists. For example, a popular, textbook (Renfrew and Bahn 2000:319) recently stated:

> Around 35,000 years ago, with the Upper Palaeolithic period, blade technology became dominant in some parts of the world. Long, parallel-sided blades were systematically removed. ... This was a great advance, ... because it produced large numbers of blanks that could be further trimmed and retouched into a wide range of specialized tools (scrapers, burins, borers) ...

The emphasis on the importance of blades arises from the early dominance of our understanding of the evolution of human behaviour by the 19th century European database of observations and thinking about major changes in the human story. But what was an old issue has become rejuvenated because of the growing interest in the emergence of modern human behaviour (Noble and Davidson 1991; Davidson and Noble 1992; McBrearty and Brooks 2000). As Bar-Yosef and Kuhn (1999:322) stated when commenting on persistent generalisations from previous generations of prehistorians:

> One of the most persistent of these is the assumed correlation between blade technologies, Upper Paleolithic industries, and anatomically (and behaviorally) modern humans. A heavy reliance on specialized methods for producing elongated parallel-sided stone flakes (or blades) is often cited in textbooks as a defining characteristic of the lithic assemblages of anatomically modern human populations in Eurasia and Africa (the Upper Paleolithic and Late Stone Age).

Bar-Yosef and Kuhn (1999:323-4) pointed out that there are many ways in which elongated flakes with parallel sides can be produced. Further, blade production is often said to be an economical use of stone, producing greater lengths of useable edge for a given unit of raw material than other techniques despite the fact that only one study has evaluated this claim (Sheets and Muto 1972). Experimental knappers argue that setting up a core to produce many blades is an expensive and time-consuming process (Bar-Yosef and Kuhn 1999).

Bar-Yosef and Kuhn (1999:324-328) reviewed some of the industries in Africa, western Asia and Europe that have produced blades earlier than the European Upper Palaeolithic. Of course, the focus on the importance of blades means that it is relatively easy to pick out elongated flakes with parallel sides, but much less easy to describe how these fit into the whole technology. At very least, their survey should hammer another nail firmly into the coffin of a view of unremitting progress in stone tool industries. Further, they showed that there is no simple equation between skeletal form and stone industry. Blades occurred with Neanderthals and with modern humans, and both Neanderthals and modern humans made both blade and non-blade industries. This is further evidence of the difficulty of establishing clearly the relations between culture and anatomy (Davidson 2003). Bar-Yosef and Kuhn (1999) concluded by pointing to the inconsistent presence of blades among modern humans, noting for Australia that 'the production of blades or elongated flakes from both Levallois and prismatic cores is known (Binford and O'Connell 1984; Dortch and Bordes 1977), but it is comparatively rare.' What, then, *is* the status of blade industries in Australia?

What is a blade?

Bar-Yosef and Kuhn (1999:323) defined what they mean by a blade:

> The standard morphological definition of a blade is any flake more than twice as long as it is wide, although some investigators prefer ratios of 2.5 or even 4 to 1. The technical definition is somewhat narrower, limiting use of the term to elongated blanks with parallel or slightly converging edges. Normally, technical blades possess one or more ridges running parallel to their long axes, giving them a triangular or trapezoidal cross-section.

In the following discussion, I will refer to this value of 2:1 for the length:width ratio as the Blade Limit. This is commonly used to identify blades, but as these authors and others (e.g. Kooyman 2000) point out, the Blade Limit alone does not define bladiness; that requires parallelness too.

How this works in the standard sequence can be seen in some data from the European Palaeolithic that I collected in 1989 for purposes not specific to this paper. Figure 1 shows data on the form of unretouched flakes from single assemblages at two sites in Europe. The site of Bilzingsleben, in eastern Germany, dates to about 280,000 BP (Schwarcz et al. 1988); Tata, in Hungary, dates to around 100,000 BP (Schwarcz and Skoflek 1982).

In Figure 1 and the other graphs show Elongation as Length divided by Width, where Length is the maximum length from the point of force application along the axis of

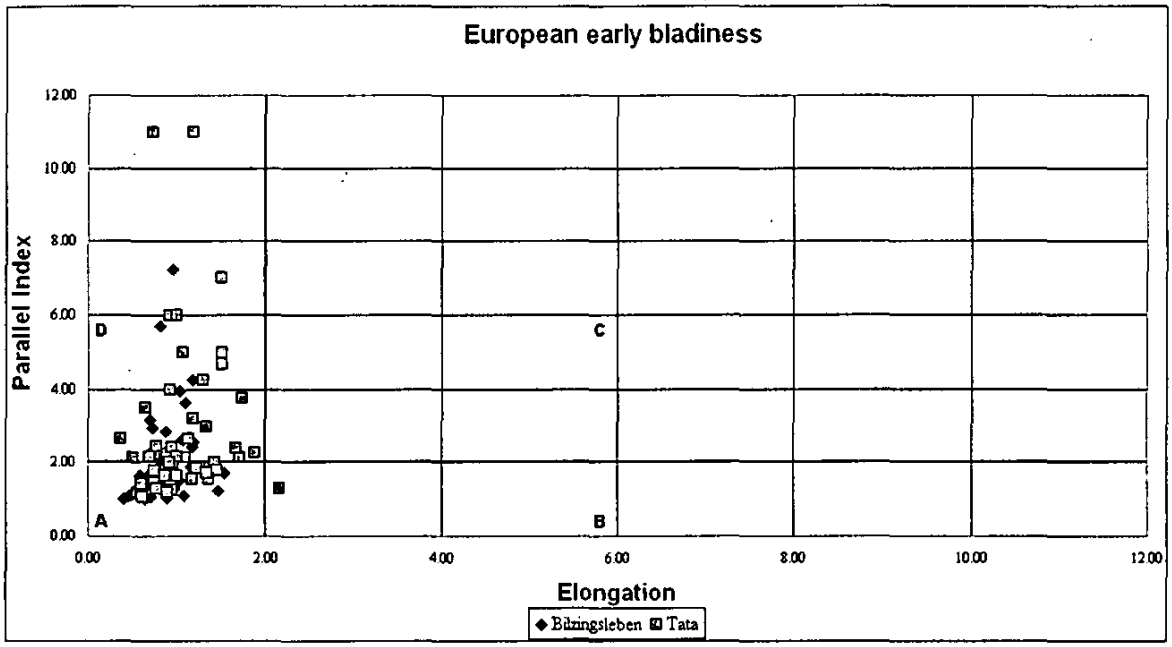

Figure 1 Bladiness Chart of Elongation against Parallel Index for two European Middle Palaeolithic assemblages.

percussion, and Width is measured at the mid-point of the length and perpendicular to it. I have plotted this against a Parallel Index calculated by dividing this Width by the Width of the Striking Platform. I call such charts 'Bladiness Charts'. While this Parallel Index is not necessarily the only way to measure parallelness, it serves as a standard and useful first approximation. A Parallel Index of 1 shows approximate parallelness, while an Index greater than 1 shows diverging flake form, and less than 1 shows converging form. If we divide the Chart into four quadrants and label them as indicated, then all assemblages have large numbers of artefacts in Quadrant A (low Elongation, low Parallel Index); non-blade industries have relatively large numbers in Quadrant D (low Elongation; high Parallel Index); there are few artefacts generally in Quadrant C (high Elongation, high Parallel Index); and blades are found in Quadrant B (high Elongation, low Parallel Index).

On Figure 1, both of the early European industries generally have flakes with Elongation below the Blade Limit, and that the variation in Parallel Index is very great (Quadrants A and D). This general pattern is seen also in the larger assemblage of measurements for the French Mousterian site of Combe Capelle (Dibble et al. 2003). It is this pattern which is important, not the frequencies of artefacts in the graph quadrant of the graph below the Blade Limit and relatively parallel. These are abundant in many different assemblages.

Figure 2 shows the pattern of these two indices for the published database of artefacts from the site, showing the combination of wide variation of Parallel Index below the Blade Limit, with a narrow range of Parallel Index above it, with relatively few artefacts in Quadrant C above the Blade Limit having a Parallel Index of more than 3.

Figure 3 shows my data from the Upper Palaeolithic Swabian sites of Hohle Fels (Conard and Bolus 2003; Schiegl et al.) and Geissenklosterle (Richter et al. 2000; Conard and Bolus 2003) compared with the Amudian industry at Tabun in Palestine that I recorded in 2002. Garrod (Garrod and Bate 1937) called the Amudian 'Pre-Aurignacian' because, among other things, the elongated flakes reminded her of the early Upper Palaeolithic but they turn out to date to about 270,000 BP (Jelinek 1990; Mercier et al. 1995). The similarity with the Upper Palaeolithic is shown in Figure 3 by the fact that the Elongations for the Amudian artefacts go above the Blade Limit, mostly in Quadrant B, and when the Elongation is above 2, the Parallel Index is generally below 3. Significantly, there are some artefacts in Quadrant C. I return to this point at the end of the paper.

There are three issues here. First, there is a tendency for the standard model to be upheld by these tiny samples—in Europe, blades (defined metrically) tend to be more obvious in the Upper Palaeolithic than in the Middle Palaeolithic. Second, notwithstanding the first point, there are certainly elongated flakes with a tendency to be parallel-sided in Middle Palaeolithic sites. Third, calculation of numbers of blades relative to other flakes could be misleading. These studies looked at assemblages from discrete excavation units without seeking to differentiate flakes from blades. In most assemblages containing blades there were also flakes produced which did not have the metrical characteristics of blades. It is not the principal point here to assess the relative frequencies of blades in such assemblages, particularly given the small sample sizes of Old World assemblages I have measured. Nevertheless, the blades in Quadrant B are 10% of the assemblage or more for the Upper Palaeolithic sites, and less for the earlier sites, except Tabun (Table 1).

Blade industries in Australia—ethnographic

Bar-Yosef and Kuhn (1999) cite the description of modern Australian stone knapping by Binford and O'Connell (1984) in Central Australia. There are many other ethnographic sources on stone knapping, but two are particularly are relevant here. First, Peter White's own work

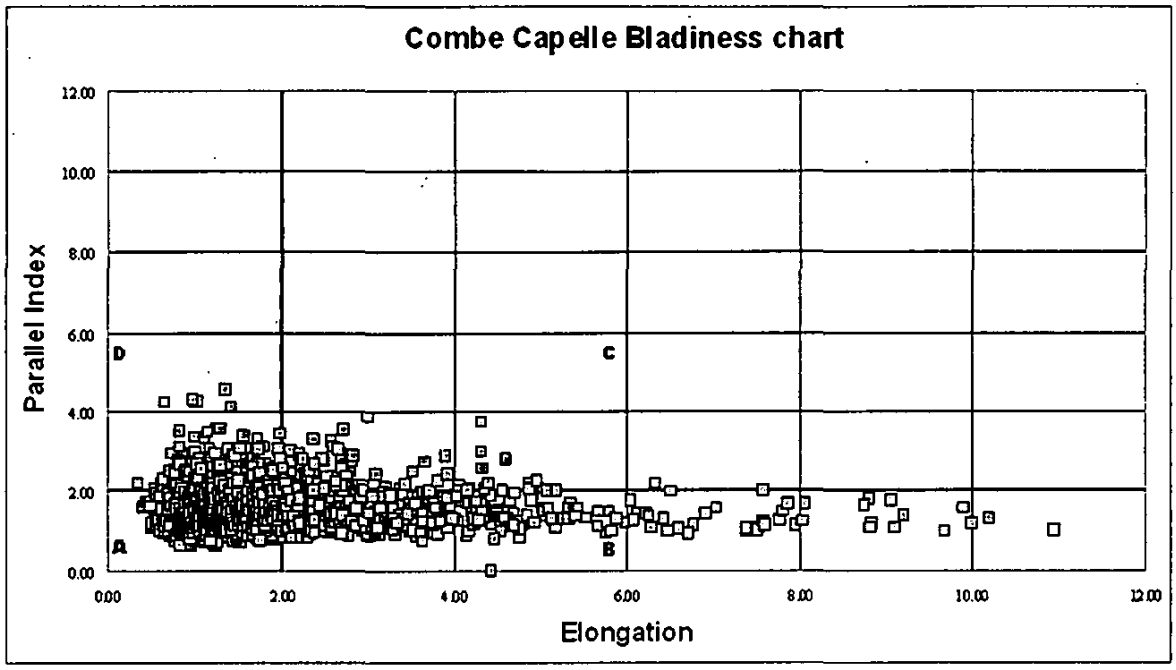

Figure 2 Bladiness Chart of Elongation against Parallel Index for Combe Capelle Mousterian assemblages.

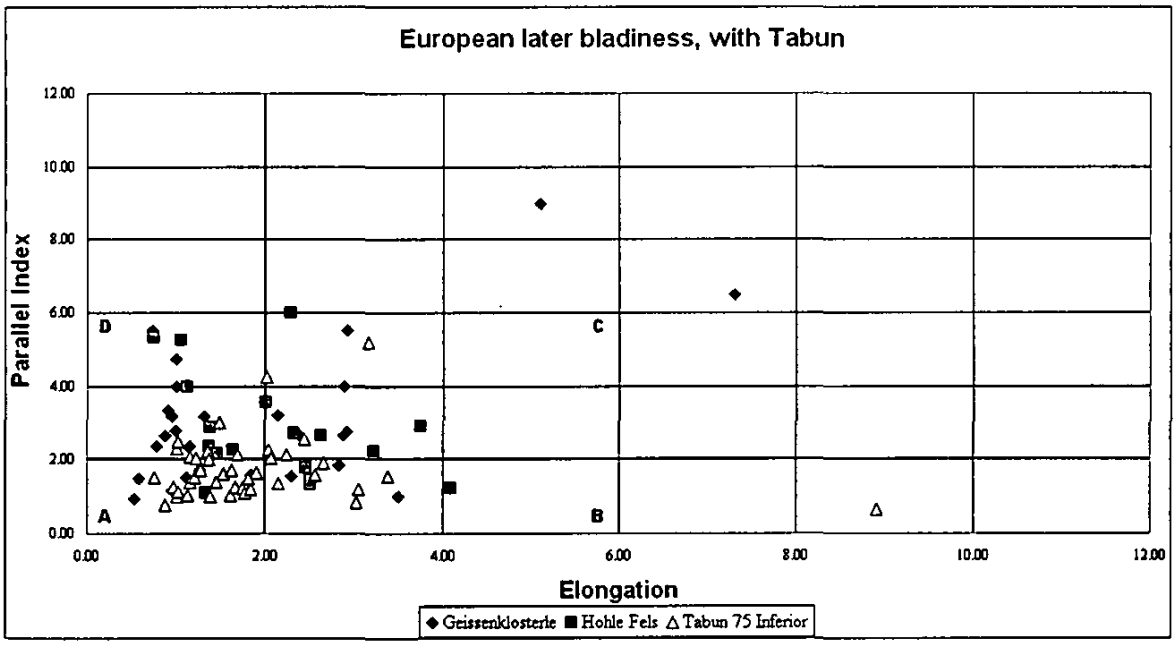

Figure 3 Bladiness Chart of Elongation against Parallel Index, for European Upper Palaeolithic assemblages, compared with Tabun.

among the Duna in Papua New Guinea is one of the most detailed documentations of people who learned to knap when there was no option but to use stone tools (e.g. White 1972b; White et al. 1977). White and Dibble (1986) gave summary statistics of flakes (*aré kou*) selected by the knappers for use as tools. Of 96 samples of these tools, 51 had median values for length:width ratios greater than 2, above the Blade Limit. Elongation was a characteristic of substantially more than 25% of the flakes chosen for use. Unfortunately, the statistics are not very definitive about the bladiness of the artefacts selected, and still less definitive about the characteristics of all flakes. Strathern (1969) showed that elsewhere in New Guinea the stone industries were characterised by rather nondescript flakes, but among the Duna, at least, some blade-like flakes were produced and selected for use. There is also an important *caveat* here: the knapping methods were clearly not designed to produce large numbers of blades, yet many were produced.

	Bilzingsleben	Tabun	Tata	Combe Capelle	Geissenklosterle	Hohle Fels
Sample size	47	48	56	2934	28	18
Blades-Quadrant B	0	8	1	227	3	4
% Blades	0	16.7	1.8	7.7	10.7	22.2

Table 1 Sample sizes and blade percentages for Old World assemblages.

Jones and N. White (1988) provide additional information in their study of knapping at the Ngilipitji Quarry in northern Australia. Unlike the New Guinea study, these Australian knappers were separated by some time from traditional use of the quarry, although the men clearly had detailed on-going spiritual knowledge of the place and had knowledge of the process. In 1935 (Thomson (1949) visited the quarry, and there are collections of artefacts from that more traditional time in the Melbourne Museum (formerly the Museum of Victoria). Jones and White (1988) provide measurements of flakes removed during their visit, showing that only 30% were elongated beyond the Blade Limit, but that most of the spearheads collected by Thomson were longer and more elongated. In addition, they illustrate a core made during the manufacture of these elongated flakes, showing that it was made by removing flakes from a single flat platform, of the type generally called 'horsehoof' core in Australia and more generally associated with the early stone industries (Bowler et al. 1970).

Ngilipitji Quarry was of particular importance in Thomson's time as a source of 'fine flint spear heads and knives' which entered trading networks that covered 80,000 km^2 of Northern Australia. Further south, Spencer and Gillen (1899) described large blades, which they called *Leilira*, and emphasised their symbolic significance (Fig. 4).

Graham and Thorley (1996) recently emphasised the wide distribution of the production of large flakes of *Leilira* type across arid Australia at the time of the first scientific expeditions to Central Australia. These artefacts entered into the spiritually sanctioned long-distance exchange networks described by the early ethnographers (Roth 1897; Thomson 1949; Mulvaney 1976; McBryde 1987; Allen 1997; Davidson et al. in press). Mainly on the basis of the scarcity of excavated evidence for a great antiquity of large blade production, Graham and Thorley defended the rather surprising argument that production of large blades increased as a result of contact with Europeans, in a way similar to Thomson's (1949) argument that Arnhem Land exchange was a result of interaction with Macassans.

Even if Graham and Thorley are correct, and the production of large blades for ceremonial knives was a reaction to contact with people from outside Australia, the implications are surprising. At face value, it seems to support the argument in the epigraph to this paper—blade industries on the continent of fisher -gatherer-hunters appear to be a product of interaction with people outside Australia. Closer examination shows that this is not the most useful way of looking at the argument. No one is suggesting that the production of large blades was a result of the immigration of skilled knappers from outside Australia. Even in the extreme interpretation by Graham and Thorley, the specialised knapping became part of the ritually sanctioned behaviour of fisher-gatherer-hunters by developing existing knapping skills previously used to make smaller flakes and blades. Indeed, Jones and White observed that 'horsehoof' cores were produced during the manufacture of large blades. It would be a legitimate interpretation that the skill needed to make large blades is as old as the production of many of those single platform, 'horsehoof' cores—certainly as old as the industries at Lake Mungo (Bowler et al. 1970). The issue, then, is why people who had the skill to produce large blades had to wait to be stimulated by external circumstances into producing them. At all events, it seems to suggest that no judgement should be made about the presence or absence of the making of (large) blades as a characteristic of modern human behaviour in Australia or anywhere else.

Blade industries in Australia——archaeological

Partly as a result of this background knowledge that Aboriginal people were capable of making elongated parallel-sided flakes with regularity, and partly as a consequence of a liberation of Australian studies from the preconception that the European sequence somehow defined the nature of human 'progress', few studies have paid much heed to the question of the bladiness of Australian assemblages. Resemblance to the Upper Palaeolithic is simply not a question of interest. A further factor accounting for this lack of interest was the adoption of the study of edges rather than whole tools relatively early in the history of Australian professional archaeology. Peter

Figure 4 Large blade of *Leilira* type in the UNE collections, provenience unknown.

White's (1972a) PhD work adopted this approach, and it is implicit in White and O'Connell's (1982) textbook on Australian archaeology. The issues are well argued in Bowdler's (2001) discussion of Rhys Jones's PhD thesis. It is difficult to demonstrate, therefore, the general presence of blade industries from published sources.

Allen (1997) summarised the archaeological evidence for the production of the large blades discussed in the ethnographic record. He concluded that the evidence from dated archaeological sites is mainly confined to northern Australia, and not older than the period 500-1000 years ago, despite the fact that the large quarries are found over a large part of arid Australia. There is evidence, elsewhere, for a more widespread and general practice of making elongated, parallel-sided flakes.

Work at Rouse Hill in western Sydney (Balme et al. 1994-1995 [revised 2001], in the area now known as Stanhope Reserve, revealed several knapping floors and probable living areas. While there are older dates, the major use of the site was in the last 1000 years. The artefact analysis has shown not only opposite platform cores (Fig. 5) of the type inferred from Koettig's (1994) conjoins at Bulga (Fig. 6), but also Bladiness Charts that show consistent production of blades. The Bladiness Chart (Fig. 7) for one of the knapping floors at the K3 site and the Dam site, an occupation site, shows the now familiar pattern of varied Parallel Index below the Blade Limit (Quadrants A and D), and restricted Parallel Index when Elongation is greater than 2 (mostly Quadrant B).

Figure 8 shows the Bladiness Chart for artefacts from my extensive survey work in the Selwyn Ranges, northwest Queensland (Davidson 1993; Davidson et al. 1993). Further work in the region has revealed the existence of quarries for the production of blade cores, marked by the

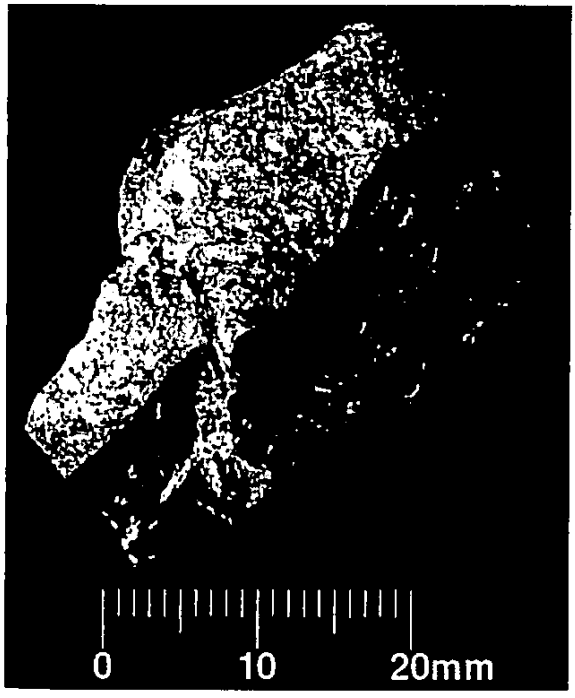

Figure 5 Opposite platform core from Stanhope Reserve, western Sydney, of the type produced by the reduction strategy shown in Figure 6.

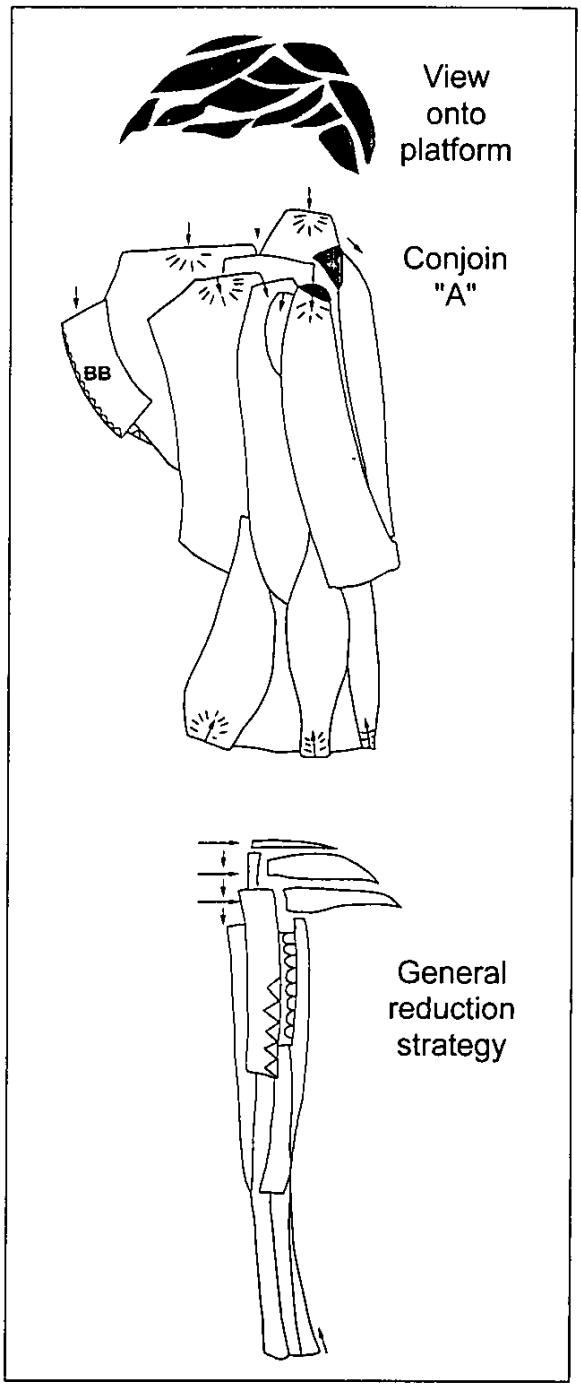

Figure 6 Conjoined blades from Bulga, showing reduction strategy for opposite platform core (redrawn by Michael Roach from Koettig 1994).

debris of elongated flakes that would have left regular, parallel arrisses on the core (Fig. 9), and artefacts made on blades are commonplace (Fig. 10) (cf. Davidson and Fife 1994). For comparison with the data from the Old World, Table 2 shows the relative frequencies of the metrical blades (defined as those in Quadrant B on the scatter plot).

Moore's (2003) recent detailed analysis of reduction strategies at large quarries in NW Queensland defined two trajectories for the production of blades. One had three

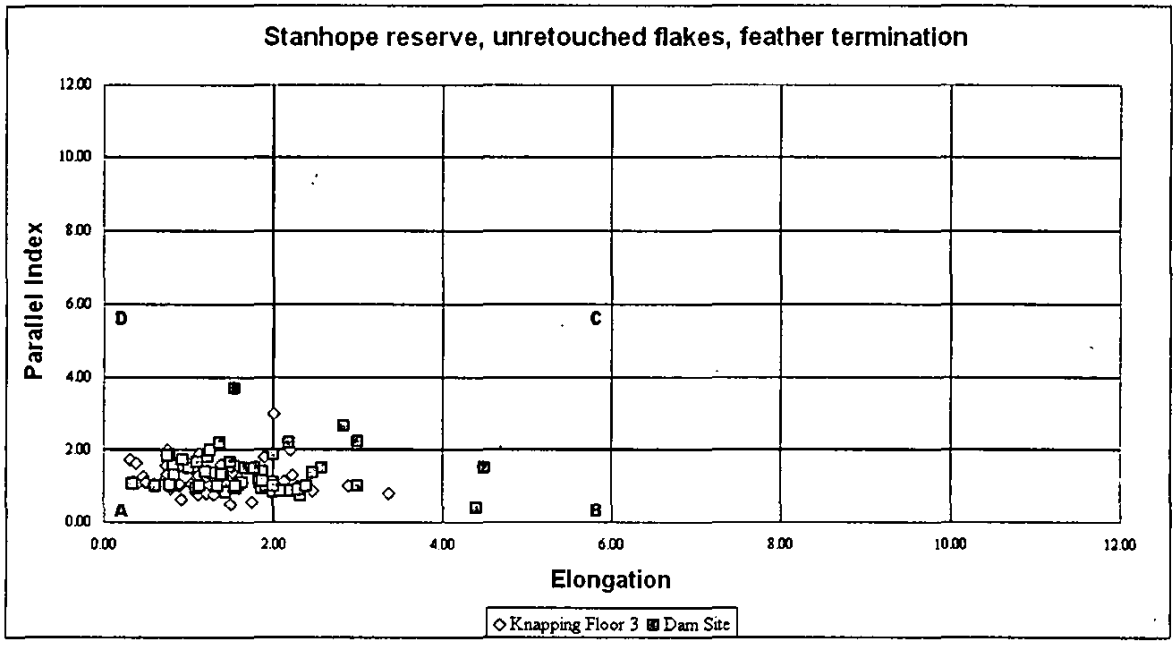

Figure 7 Bladiness Chart of Elongation against Parallel Index for two sites at Stanhope Reserve, western Sydney.

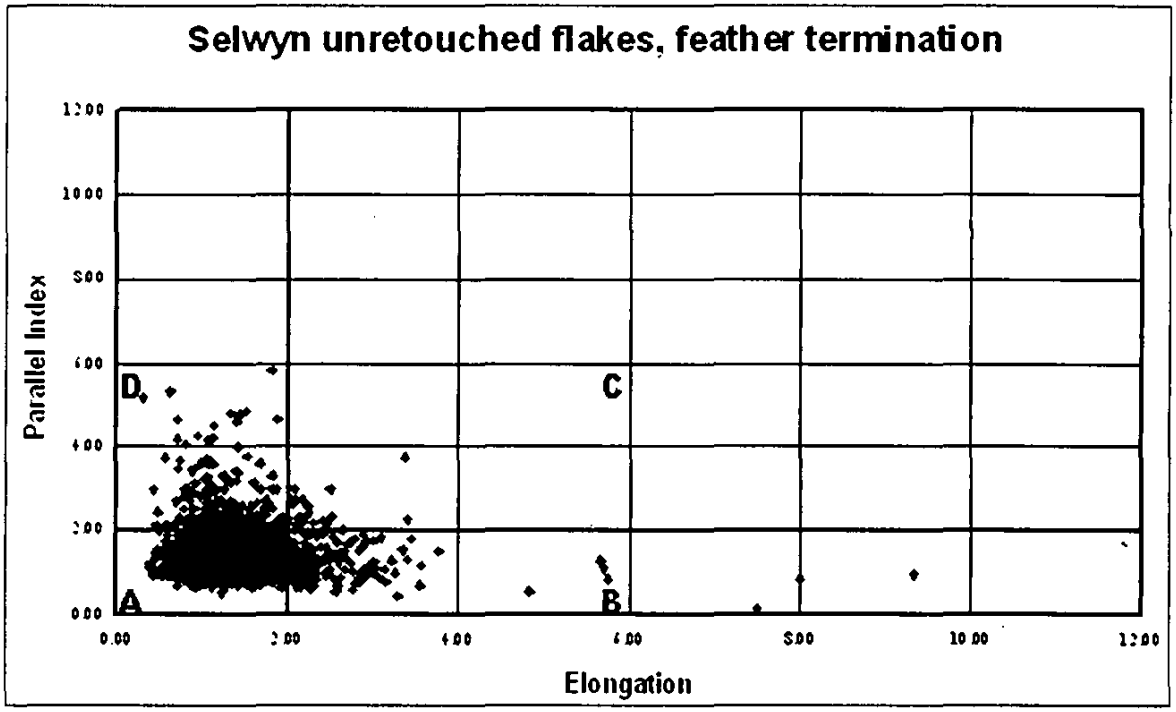

Figure 8 Bladiness Chart for artefacts from the Selwyn Ranges, NW Queensland.

different methods of producing large pointed blades, and the other produced small non-pointed blades. Further analysis both of flake measurements and of reduction strategies is needed to demonstrate the extent of bladiness of flake production in Australia.

There is, thus, abundant ethnographic or historical evidence for the skilled, repeated production of large blades in several different regions of Australia. While this evidence has been linked to an argument that particular large blades were produced for exchange systems that were stimulated by interaction with people from outside Australia, the techniques of production and the associated belief system seem likely to have a much greater antiquity. Archaeological evidence does not demonstrate a great time depth for the production of the *large* blades, but there is sufficient evidence to suggest that, more generally, blade production is unremarkable. Indeed, there is some suggestion that it may be as old as stone tool making in Australia.

Figure 9 Elongated flake from quarry at Osborne Mine, NW Queensland.

	Selwyn Range	Stanhope Reserve K3	Stanhope Reserve Dam site
Sample	1471	54	54
Blades-Quadrant B	193	8	14
% blades	13.1	14.8	25.9

Table 2 Sample sizes and blade percentages for Australian assemblages.

Blade industries and the 'adaptations of "modern" hunter-gatherers'

Bar-Yosef and Kuhn (1999) related some contexts of blade production to a phenomenon, hafting, that is certainly part of the Australian story (Mulvaney and Joyce 1965). All authorities are agreed that the large blades produced in the major exchange systems were hafted either as hand-held knives or as spear points (Graham and Thorley 1996; Allen 1997), and most agree that backed artefacts, often but not always made from elongated flakes or blades (Hiscock and Attenbrow 1996), were hafted. At the same time, the Greater Australian region has provided evidence that for some purposes hafted tools were produced that did not use blades.

Hafting represents a significant event in hominin evolution where the tool is conceptualised as involving the combination of elements from different parts of the environment—its significance is akin to the construction of the watercraft that carried the first people to Australia (Davidson and Noble 1992). The question of the date of the earliest appearance of composite tools has been controversial, but isthey are now well documented earlier than the Upper Palaeolithic and outside Europe (Holdaway 1989; Boëda et al. 1999; Villa and d'Errico, 2001). Reynolds (1993) argued that such constructions were distinctively human and emerged late in the evolutionary story.

I pointed above to the presence of elongated flakes from Geissenklosterle and Hohle Fels which appeared to have very strongly divergent rather than parallel form (Quadrant C on the Bladiness Charts). One of the reasons for this is the occurrence in these assemblages of artefacts with very small striking platforms, of the type called 'punctiform', which produce high values of the Parallel Index. These are most often associated with the 'punch' technique of indirect percussion (Newcomer 1975).

The production of blades in the Upper Palaeolithic may be distinguished by the use of indirect percussion. This is not a new observation, but those who seek to emphasise the importance of blades outside the Upper Palaeolithic of Europe often overlook it. It would be a different exercise to identify the chronology and worldwide distribution of the technology of flake production by indirect percussion. It would also be a quite different argument if we stated that the originality of the stone technology of the Upper Palaeolithic of Europe and western Asia was the production of flakes

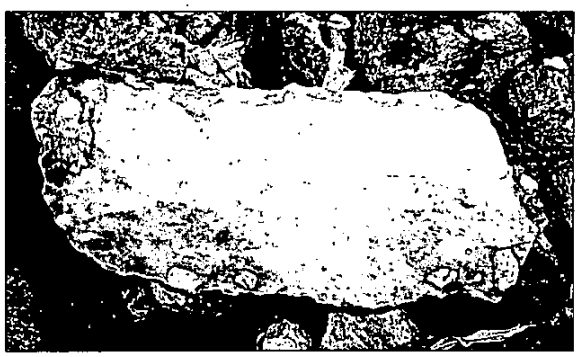

Figure 10 Retouched blade from mining village at Osborne, NW Queensland. Length approximately 60 mm.

using indirect percussion. Early appearances of elongated, parallel-sided flakes could not be taken as an indicator of the precocious appearance of any of the behavioural traits some would associate with the Upper Palaeolithic of Europe.

In Australia, as elsewhere, there were many different reduction strategies that produced blades, as Bar-Yosef and Kuhn (1999) acknowledged. But these authors concentrated on the wrong aspects of Australian stone technology. Blades were produced widely in Australia and were used as hafted tools, but they were not produced by methods common in the Upper Palaeolithic of Europe. The point is that bladiness of blades themselves may be of far less importance than their abundance in the Upper Palaeolithic seemed to suggest. It may be that indirect percussion of European Upper Palaeolithic blades (and flakes) is the significant marker of modern human behaviour. Many (perhaps all) of the examples before the Upper Palaeolithic will be found not to be produced by indirect percussion. Those blades I have seen from the Amudian appear not to be.

Would indirect percussion be a criterion for identifying the 'modernness' of human behaviour? I think not, although arguably it is an example of the same phenomenon as hafting—the use of tools with multiple components. It is, however, a familiar part of some arguments about modern human behaviour that the use of tools with multiple components is permitted by the creativity made possible by language (Reynolds 1993). Indirect percussion may be a result of modern cognitive capacity, but it is not a necessary condition. As almost all of the readers of this paper will testify, you can engage in all aspects of modern human behaviour without once producing a blade by indirect percussion! Some of those behaviours might well involve the same cognitive capacity, many of them involving the construction and use of tools with multiple components. Tools with multiple components *were* part and parcel of Australian technology, even if indirect percussion has not been documented. I would argue that both the construction of the watercraft and the early use of ground-edged, presumably hafted, hatchets (Schrire 1982) imply that the first Australians had modern cognitive ability; they just did not use it in the way Eurocentric archaeologists would like them to have done.

Elongated, parallel-sided flakes were certainly produced regularly in Australia and elsewhere at different time periods and by different techniques, but metrical attributes alone may be a poor measure of comparison between regions and times and a poor indicator of cognitive or technical ability. If

Graham and Thorley are to be believed, existing knapping techniques were capable of being transformed relatively rapidly to produce distinctive large blades. It is difficult not to agree with Peter White's (1977) conclusion that 'Eurocentric models are clearly inadequate for this part of the world.' They may also be inadequate elsewhere too.

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