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# Observations on edge-ground stone hatchets with hafting modifications in Western Australia

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## Abstract

*In 1972 Charlie Dortch reported the discovery of grooved, ground-edge stone hatchet-heads in an archaeological site at Stonewall Creek in the east Kimberley in Western Australia (WA). This discovery was completely unexpected and considerably extended the known distribution of grooved and/or waisted stone hatchets in Australia. Observations made by the author over the past 40 years show that such axes have an even wider range within WA and are likely to be from an early, but as yet undated, period in Australia's past. They probably also had a much greater cultural significance than their possible roles in wood-procurement, woodworking or contributing to the food quest would suggest.*

## Background

In 1938 Davidson (1938) conducted a preliminary survey of the distribution of stone axes (hatchets) in Western Australia (WA), recognising two types:

1. The partially ground hatchet, which is hafted in a bent, withy handle, or enclosed in the crutch of a slat of flexible wood bent around the head and with the arms tied together with sinew or fibre cord to hold the head firmly in place. Vegetable resin or beeswax is placed between the stone component and the handle to ensure a tight bond; and,
2. The flaked axe 'with single or double blade', generally known as the *kodj* or *kodja* and restricted in distribution to the southwest of WA. The *kodj* consists of one or two pieces of flaked stone fixed to a rod-like wooden handle with vegetable resin, and does not require lashings (Massola 1959; Tindale 1950).

Davidson (1938:44) also drew attention to several fully ground and polished 'adzes' or 'chisels', recognising that they were unusual and not part of the regular stone artefact inventory for the state. At this time grooved or waisted stone hatchet-heads, common in the eastern states, did not appear to be present in the west.

The distribution of edge-ground hatchets in WA was reviewed again in 1957 by Davidson, in a post-humously published paper that discussed the distribution and chronology of a selection of stone implements and other artefact types (Davidson and McCarthy 1957). This detailed but confusing discussion did not clarify the known distribution of ground-edge hatchets and the accompanying

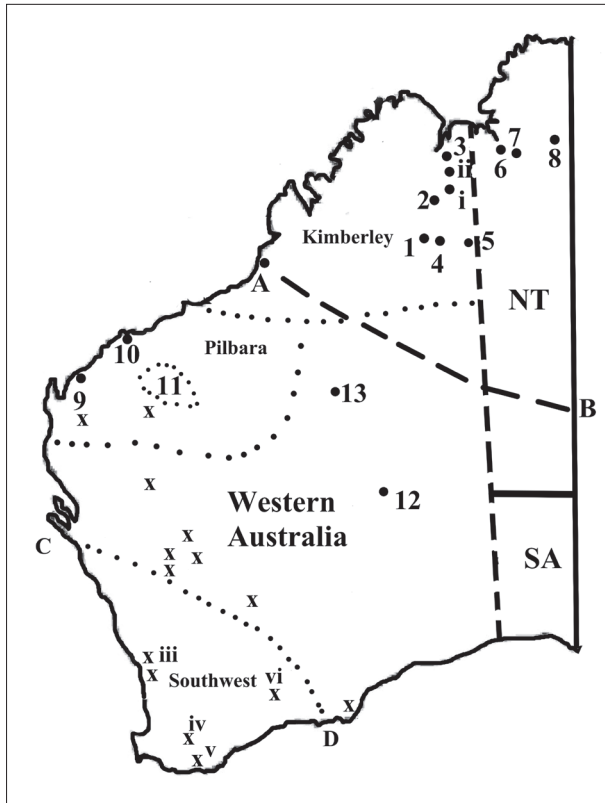
map did not distinguish between what may well have been rare and casual finds, and the presence of industries based on ground-edge hatchets as were found in the Kimberley (Davidson and McCarthy 1957:423–436, Fig. 7). What is fairly clear though is that, while edge-ground hatchets occurred in the Pilbara, there was little ethnographic or historical evidence that they were used as such or even recognised as 'axes' by Aboriginal informants:

In Western Australia the manufacture of stone axes apparently is unknown west of the La Grange [*Bidyadanga*]-MacDonnell Range line (Davidson and McCarthy 1957:429) (A-B in Figure 1).

The authors drew attention to the fact that not all Aboriginal 'tribes' east of this line may in fact have made hatchets and suggested that the Nyul-Nyul of the Dampierland Peninsula imported these objects from sources along the Fitzroy and Meda Rivers. My own work in the 1960s and 1970s with elderly Aboriginal men and women on traditional exchange systems in the Kimberley suggested that this was the case in the recent pre-contact period, but it is apparent that some ground-stone hatchets were in fact made locally on the Dampierland Peninsula. I was informed by senior Bardi men of a source of hatchet stone at Cunningham Point on the eastern side of the Dampierland Peninsula and have recorded edge-ground hatchets made from local, fine quality silcretes normally used for the knapping of blades and points from sites on the west coast between Broome and Pender Bay (Akerman 1975:96–97, Fig. 4).

Ethnographic examples of Kimberley stone hatchets were generally made by bifacially flaking pieces of material that may be derived from naturally occurring sources—tabular

pieces of float, cobbles etc.—or cores which were themselves large flakes removed from either bedrock or boulders. Grinding usually covers less than one-third of each face and is sometimes confined to the edge only. The finished hatchet head is usually either ovate or amygdaloidal in plan view (see McCarthy 1967:Fig. 32-10). Hammer-dressing or pecking to remove flake scars and level the artefact surface does not seem to be a technique used in the manufacture of stone hatchets during the ethnographic period in the Kimberley.



**Figure 1** Locations of the hatchets (1–12) referred to in the text. Note that multiple finds of hatchets have occurred in the area in and adjacent to the Hamersley Ranges (11). Roman numerals i–vi are locations of hatchets referred to in earlier literature: i. Miriwn Shelter; ii. Stonewall Creek; iii. Walyunga and Bullsbrook; iv. Kojonup; v. Mount Barker and vi. Lake Hope. A–B = The La Grange–MacDonnell Ranges line. C–D = Line demarcating the southwest of WA as referred to in this paper.

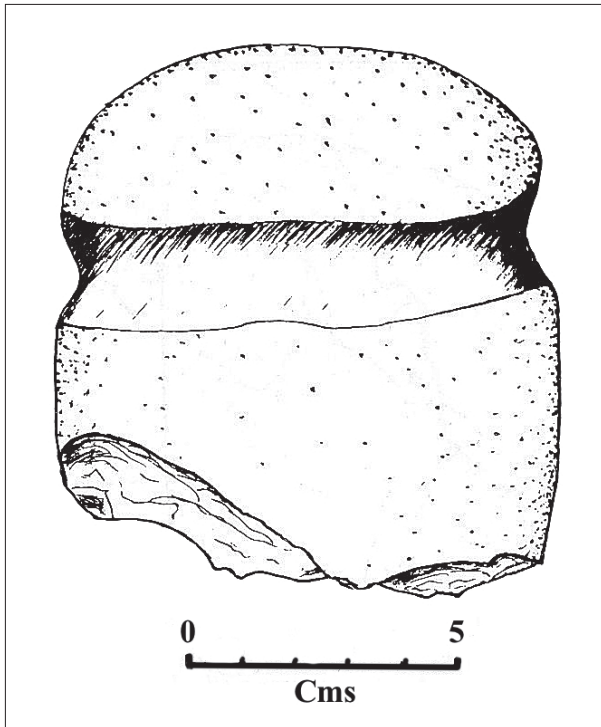
There is some evidence that some edge-ground hatchets occurred and were possibly reworked, if not manufactured, in the southwest of WA (C–D in Figure 1). Ride (1958:162–179) drew attention to a number of stylistically different types of southwest hatchets, and I have reported on others from Walyunga and Bullsbrook (iii in Figure 1), and south and east to Kojonup, Mount Barker and Lake Hope (iv, v and vi in Figure 1) (Akerman 1969:15, Fig. 41, 1973:107–111). Those examples discussed by Ride appear to come from various sources including the Kimberley—or at least some are similar to the amygdaloidal, bifacially flaked hatchet-heads from that region. One, described as a ‘small polished axe of rectangular section’, appeared to Ride (1958:165) to be of possible non-Australian origin. My opinion is that this particular object is in fact not rectangular—that is with four distinct and deliberately fashioned faces—in section, but an example of a ground-edged chisel from the south Kimberley, many of which are similarly fully ground (see Akerman and Bindon 1984:357–373). As noted above, in my experience, Kimberley hatchets are generally of the biface coroid type,

that is, they are bifacially flaked, oval in plan shape and of lenticular or biconvex transverse section. However, hatchet-heads made on minimally modified cobbles do occur in the Kimberley, although not in any great numbers, and hammer-dressed hatchets are extremely rare. The hammer-dressed (i.e. ‘pecked’) heads reported on in the current paper appear to be either of an origin outside the Kimberley or, if local, are not from the ethnographic or historical period.

Davidson and McCarthy (1957:426) specifically noted that ‘pecked and grooved types of eastern Australia compare in quality and workmanship with those of eastern North America and eastern Asia’, suggesting that such forms were not to be found in WA. Unfortunately, in both Davidson (1938) and Davidson and McCarthy (1957), little attention was given to the method of manufacture of edge-ground hatchet forms. A brief note in the section dealing with millstones that had been shaped or refined by hammer-dressing recorded that ‘Their distribution corresponds largely to that of pecked edge-ground axes in the region’ (Davidson and McCarthy 1957:441, Fig. 11). Again, their map showing the distribution of grindstones and mortars is not particularly helpful in determining the distribution of either hammer-dressed grindstones or hatchet-heads shaped by hammer-dressing.

The distribution map of edge-ground hatchets was radically altered when Dortch (1977) published a paper on his work in the Ord River Valley in which he illustrated a rather substantial hammer-dressed and grooved edge-ground hatchet head from the upper layers of Miriwn rockshelter (Dortch 1977a:121, Fig. 9:1). This artefact lay above a charcoal fragment dated to 2980±95 bp. He later described three additional grooved, edge-ground, stone hatchet-heads discovered on an eroding terrace of the Stonewall Creek just north of the Argyle Dam (Dortch 1977b:23–30). These were shaped either by hammer-dressing and grinding, or flaking, hammer-dressing and grinding, and were argued by Dortch to belong to his ‘Early Phase’ of east Kimberley prehistory, noting that ‘The Ord Valley grooved axes are typologically similar to the grooved axes associated with Early Phase assemblages in Arnhem Land’ (Dortch 1977b:29). Dortch’s two-phase division of Kimberley prehistory was based on the presence or absence of unifacial and bifacially flaked stone points; the Early Phase relates to the period prior to the introduction of points and the Late Phase to that period subsequent to their introduction about 3000 years ago (Dortch 1977a:113–123). If pecked and grooved edge-ground implements in the Kimberley do belong to the Early Phase, the Miriwn hatchet may in fact be older than its stratigraphic situation suggests. As Dortch pointed out, these hatchet-heads were, apart from a cursory reference provided by McCarthy (1967:48), the only such artefacts reported to date from the Kimberley. Unfortunately McCarthy provided no details relating to the hatchet(s) he may have been referring to and I can find no other reference to them. The only other grooved hatchet-head from the region was recorded in 1953, at Moolabulla in the southeast Kimberley by Tindale (1974:85). Tindale (1981:1772, Fig. 5) later provided a sketch of this artefact (reproduced here as Figure 2): a grooved hatchet-head made on a quartzite ‘pebble’ with an edge that had been reworked by unifacial flaking to form a chopper or adzing tool. Although a surface find, Tindale thought on the basis of the grooving that the artefact was from a pre-ethnographic time, crediting it to his ‘Pirrian’ period in the first publication (Tindale 1974:85), and to his ancient ‘Kartan’ period in the second (Tindale 1981:1772).

THEMED SECTION



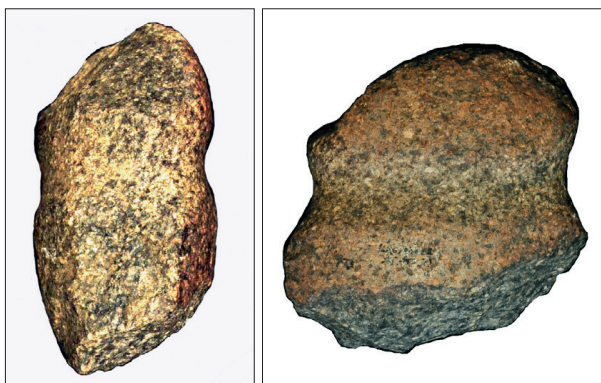
**Figure 2** Grooved hatchet-head made on quartzite cobble, Moolabulla, Kimberley, 1953 (after Tindale 1981:Fig. 5).

### Further Australian Evidence

The following observations refer to a series of hatchet blades recorded since the 1970s that differ in varying degrees from those collected in ethnographic situations from WA and recorded by Davidson (1938) or Davidson and McCarthy (1957).

#### The Kimberley

The Moolabulla hatchet-head (Figure 2) is similar to one I saw in the scree outside a limestone cave at the junction of Pear and Limestone Creeks, Lissadell Station in the east Kimberley in 1979. As shown in Figure 3, the latter is a small battered, hammer-dressed, grooved hatchet-head of quartzite re-worked to form a unifacially flaked chopping tool. The differences in patination between the main body of the artefact and the flaked area about the edge suggests that some time had elapsed between the manufacture of the hatchet-head and the subsequent flaking of the edge.

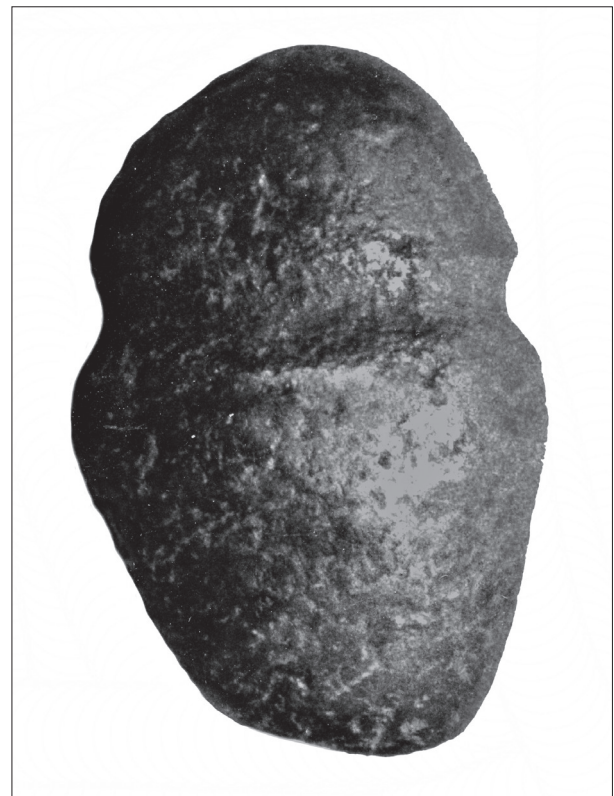


**Figure 3** Battered hammer-dressed and grooved quartzite hatchet-head with unifacial flaking along the edge, Lissadell Station, 1979. H = 80 mm, W = 79 mm (photographs by Kim Akerman).

In the 1970s I was sent a photograph of a hammer-dressed and grooved, edge-ground stone hatchet said to have been found at Goose Hill south of Wyndham in about 1971 (Figure 4) (Mary Macha pers. comm. 1997).

Another fine example of a hammer-dressed and grooved hatchet-head was found near the original Halls Creek township in 1978 by Kija senior man Essie Wallesi (*Tjilbada*) (Figure 5).

In 1971 a flaked, hammer-dressed and grooved, edge-ground stone hatchet was found 5 km east of Nicholson Station homestead by the station manager (Figure 6). This hatchet-head was made from a dark, very dense material reminiscent of the material used to make the discoidal and shouldered



**Figure 4** Hammer-dressed and grooved hatchet-head. Goose Hill, Wyndham, 1971. H = 135 mm, W = 90 mm (photograph courtesy of Mary Macha).



**Figure 5** Hammer-dressed and grooved hatchet-head, Old Halls Creek, 1978. H = 130 mm, W = 90 mm, T = 45 mm (photographs by Kim Akerman).



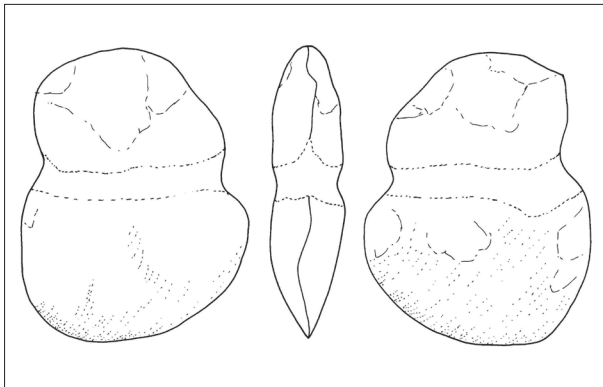


**Figure 6** Flaked, pecked and grooved hatchet-head, Nicholson Station, 1971. H = 90 mm, W = 62 mm, T = 45 mm (photographs by Kim Akerman).

hatchets originating from western Queensland (Qld). The stone was unweathered and did not appear to have developed any patina. It is interesting to note that the grinding on this hatchet-head is more extensive than that seen in Figures 4 and 5, and that pecking has not obliterated all of the flake scars created during manufacture.

### Northern Territory

Adjacent to the Kimberley, grooved hatchet-heads have also been found in the Northern Territory (NT) at Timber Creek on the Victoria and Flora Rivers (Figure 1).



**Figure 7** Hammer-dressed and grooved hatchet-head recovered from '4 feet below the surface', Timber Creek, NT, 1999 (photograph and sketch courtesy of Ken Mulvaney).

The extremely weathered hatchet-head from Timber Creek was found 'about 4 feet [122 cm] below the surface of the ground' (Camille Fogarty pers. comm.), in the late 1990s while excavating house foundations near the old Timber Creek Police Station (Figure 7). Unfortunately this specimen has subsequently been lost and is not available for further examination.

Another hatchet-head was seen on Fitzroy Station about 70 km east of Timber Creek by Darrell Lewis (Figure 8). The head lay on the surface of a highly eroded and deflated surface adjacent to the banks of the Victoria River (Darrell Lewis pers. comm. 2014). This pecked and grooved hatchet-head appears to have had some damage to one side of the poll or butt end.

Chris Clarkson (pers. comm. 2013) provided information on another extremely weathered, hammer-dressed and grooved hatchet-head that he had found while conducting surveys along the Flora River in 1998, presumed by him to have weathered from the extremely eroded banks of



**Figure 8** Hammer-dressed and grooved hatchet-head, Fitzroy Station, Victoria River, NT. Approx. 966 mm x 133 mm x 35 mm, Wt 800 g (photographs courtesy of Darrell Lewis).



**Figure 9** Hammer-dressed and grooved hatchet-head, Flora River, NT. Approx. 205 x 180 mm (photograph courtesy of Chris Clarkson).

the watercourse. The photograph appears to show that, subsequent to the edge suffering some damage, the area of damage was reworked by hammer-dressing (Figure 9).

### Pilbara and Deserts

Having discussed hatchet-heads from the Kimberley and adjacent subtropical areas of the same latitude where hafting modifications such as grooves, shoulders or waists are not found, I now look south to the Great Sandy Desert and the Pilbara. Moving south from the Kimberley it must be noted that edge-ground hatchets were a normal part of the traditional tool-kit only on the northern margins of the Great Sandy Desert. Like Kimberley hatchet-heads, they were bifacially flaked, with grinding varying from that restricted to forming the edge, to that which covers a substantial part of the body of the head. Some hatchets were made by flaking cobbles, while others were made from fully flaked or quarried pieces of stone. Cobble hatchets, where the only modification was the direct grinding of one end of a waterworn stone to form an edge, are extremely rare in the Kimberley and adjacent regions, although I have found one at Timber Creek.

Davidson and McCarthy noted that Kimberley hatchets were traded along the 80-Mile Beach area into the Pilbara and hatchet-heads of the normal Kimberley forms are found in the area of 80-Mile Beach. There is little ethnographic evidence, however, for either the use or manufacture of hatchets in the Pilbara and strangely not much evidence that suggests that the hatchet-heads found there are of a Kimberley origin. Davidson's (1938:41) material suggests that most references to WA edge-ground hatchets outside the Kimberley are vague and drawn from vocabularies such as those presented by Curr (1886) or Brough-Smyth (1878) and not linked to ethnographic observation or historic collections of hatchets. This is not to say that edge-ground hatchets do not occur in the area, but that there is virtually no sound literature referencing either their manufacture or use. All specimens appear to be archaeological, apart from a single hafted example in the Berndt Museum collections provenanced to Onslow<sup>1</sup>. The hatchets I discuss below, all of which were found in the Pilbara or the Gibson Desert, appear not to have a Kimberley origin.

Figure 10 shows a large hatchet-head made by hammer-dressing a piece of very dense stone, probably dolerite, which may have been initially flaked when preforming. It has a slight waist and shoulders, and grinding is confined to the very edge. Found on a coastal sand dune site near Onslow, this artefact has some polishing due to sand-blasting but no other evidence of weathering or similar deterioration. One face is convex and the other much flatter, the artefact has a plano-convex transverse section and the cutting edge has a distinctly adze-like profile.

In contrast, the example shown in Figure 11 has a 1 mm thick weathered cortex. While found in the Pilbara, its exact provenance is not recorded. According to Ken Mulvaney, who provided the information and images, it is made of dolerite or



**Figure 10** Pecked and ground, lightly waisted axe of local stone, Onslow, 1978. H = 148 mm, W = 94 mm, T = 46 mm (photographs by Kim Akerman).



**Figure 11** Hammer-dressed and ground, lightly waisted axe of local stone, on display at Karratha Airport. H = 187 mm, W = 87 mm, T = 50 mm (photographs courtesy of Ken Mulvaney).

possibly granophyre. There is extensive hammer-dressing over the body and the groove is also hammer-dressed. With one face rather convex and the other flatter the artefact has a plano-convex transverse section. The poll has use damage (battering) and the flatter face has some very light use-wear/polish, suggesting it was possibly used as a muller. Edge grinding is confined to a narrow 2 mm wide area about the edge. Like the previous hatchet-head from Onslow, the cutting edge of this artefact has an adze-like profile. The groove is 23 mm deep and up to 10 mm wide.

Richard Fullagar (pers. comm.) reported a very weathered, hammer-dressed and edge-ground hatchet-head with double grooves found in the Hamersley Ranges (Figure 12). This is, to my knowledge, the only double-grooved hatchet found in WA.

Other edge-ground hatchets have also been found east of the Pilbara in the Gibson Desert and in the area of Rudall River. The Gibson Desert hatchet-head is bifacially flaked with some light hammer-dressing, a reduced butt and an expanded edge (Figure 13). It is debatable whether the shape of the hatchet was deliberately designed as a hafting aid or whether it was fortuitous. Of all the hatchets described in this paper the bifacial flaking suggests that this artefact has an affinity with some ethnographic hatchet-heads from the Kimberley. This artefact was found by Bob Adamson of Yackabindi Station at Kadubarra Soak in 1973. Rowley Hill, a Wangkayi man from the area told me at the time that such stone hatchet-heads were believed to have been used by the

<sup>1</sup> This hatchet, which appears to have been hafted immediately prior to collection, is part of a collection of artefacts with which I was familiar, and, because of the form of the head and the fact that there are no records of the ethnographic use of stone hatchets in the area, I believe it to be of Kimberley origin and only linked to Onslow purely through poor documentation within the original collection.





**Figure 12** Hammer-dressed and lightly ground, double-grooved hatchet-head, Hamersley Ranges, 2012. H = 168 mm, W = 95 mm (photographs courtesy Richard Fullagar).

mythic *Tingari* (travelling groups of men and boys) to cut *jibberi* (tribal scars) on the *Tingari* youths in their party.

The Rudall River hatchet-head was given to a Native Welfare District Officer in the 1950s by a ‘desert bloke’ (Adrian Day pers. comm. 2010). It is a very symmetrical artefact with extensive grinding on the edge and over most of both faces. Flaking is visible at the sides and it is clear that it had been hammer-dressed into final shape before being ground. The transverse section is unusual in that one side is flat and shows flake scars, while the other is convex and any flake scars have been removed by hammer-dressing (Figure 14). The hatchet-head is of very recent appearance, with no evidence of weathering. I am not aware of hammer-dressed hatchet-heads with such extensive grinding over the body from the Kimberley and it is possible that it originated from much further east in Central Australia. According to Spencer (1938:497, Fig. 338), stone hatchet blades in Central Australia were normally refined by hammer-dressing prior to grinding the edge.

Further information on other ground-edged hatchets from the Pilbara region has been provided by Craig Westell (pers. comm. 2013). Westell, who has worked extensively in the Pilbara, noted the discovery of 12 hatchets and has information on a further 27 that are referenced in survey reports: at least 13 of the latter group are without specific provenance. In his experience, Westell noted that specific locations for the production of hatchets—i.e. quarries or knapping areas—do not seem to occur in the Pilbara. In addition, he reported that the majority of hatchets seem to be made on cobble preforms of a variety of lithic types, including mafic volcanic material (metadolerite/basalt/gabbro), as well as rhyolite and ironstone. Of a provenanced sample of 33 hatchet-heads found between Pannawonica and Mount Newman, Westell noted that, while there is no (or incomplete) data on 21 of them, seven of the remaining 12 were modified by waisting or notching to create hafting features. Noting that Westell’s data come from a limited range of sources, it is apparent that access to, and analysis of, the many archaeological survey reports executed in the Pilbara over the past three decades would need to be undertaken to gain a clearer idea of the range, typology and status of edge-ground hatchet-heads in the region as a whole.



**Figure 13** Flaked and pecked hatchet-head with reduced butt and expanded blade, Gibson Desert east of Carnegie Station, 1971. H = 120 mm, W = 95 mm, T = 27mm, Wt 410 g (photographs by Kim Akerman).



**Figure 14** Hammer-dressed and ground, stone hatchet, Rudall River area, 1950s. H = 135 mm, W = 85 mm, T = 50 mm, Wt 1135 g (photographs courtesy of Adrian Day).

## Discussion

Generally it can be said that those hatchets that have been physically modified for hafting differ from ethnographic stone hatchets from WA in a number of ways: they appear to have been made by flaking followed by hammer-dressing; the degree of grinding is usually very slight and confined to the cutting edge and adjacent faces of the implements; and they may be waisted, waisted and grooved, notched or tanged. Some are very weathered, while others are not so altered in texture. Ethnographic stone hatchets from WA are generally flaked into shape, rather than flaked and hammer-dressed, prior to grinding; they do not have hafting mechanisms, such as waisting, grooving or shoulders, and rely rather on the use of adhesives and binding to hold them in their helvcs.

There do not appear to be any recent records of the type of edge-ground artefacts described by Davidson as ‘highly polished chisel-like implements’ (1938:44, Fig. 3), or illustrated by Noone (1943:273–275, Figs 10 and 11), and thought by Davidson to be of possible non-Aboriginal origin. Ride (1958:165, Fig. 3a) illustrated a small edge-ground artefact similar to Noone’s Figure 10; however, this was found in southwest WA with two hatchets made on bifaces in a typically Kimberley style. Small edge-ground chisels, whose use continued into the contact period, are common on sites along the Fitzroy River. Many of these exhibit extensive

grinding and the larger examples resemble smaller edge-ground implements from Melanesia or South East Asia (Akerman and Bindon 1984:357–373).

Twenty-five years ago Morwood and Trezise (1989:78) summarised knowledge of Pleistocene hatchets in Australia, making it clear that such implements were found above 20°S in the most northerly regions of the continent. Moreover, it seemed that a significant proportion of these archaic hatchets were further refined with the provision of notches, waists or grooves to facilitate hafting. It was also apparent that, apart from the hatchet-heads found in Pleistocene sites in Arnhem Land, most are single finds. There is no sense of either stylistic homogeneity or of their functioning as a major artefact necessary in the day-to-day economic life of the people who may have made and used them.

Comparing the few hammer-dressed hatchets with hafting modifications that have been found in northwest Australia to the numbers of edge-ground hatchets without such modifications and from more recent sites in the Kimberley suggests that the northwestern hatchets may have had some other, more important, function. Notwithstanding the late Holocene age of the dated Miriwun hatchet, I argue that hammer-dressed and waisted or grooved hatchets are of some antiquity, and, if not of the same age as similar hatchets from Arnhem Land (White 1967), were made and used prior to the ethnographic period.

In a recent paper, Tsutsumi (2012:73) noted that 36 complete edge-ground hatchets were found at the late Upper Pleistocene site of Hinatabayashi B in the Japanese archipelago. A further 12 hatchets had a ‘naturally edge-ground surface’ and another 12 were either broken (i.e. missing their cutting edges) or were flaked only; the latter were argued to be preforms for edge-ground tools. According to Tsutsumi, late Upper Pleistocene edge-ground hatchets are restricted to the islands of Kyushu and Honshu, initially appear at about 38,000 cal. BP and disappear at about 32,000 cal. BP. As an artefact type they do not reappear in Japanese prehistory until the Incipient Jomon Period (approximately 13,000–10,000 bp).

The hiatus in the presence of edge-ground hatchets in Japan may be reflected to a degree in the gap in time in Australia which sees Pleistocene hatchets restricted to far northern Australia and absent further south until about 4500 BP (Mulvaney and Kamminga 1999:221). Davidson and McCarthy (1957:435) suggested that the lack of edge-ground hatchets in much of WA was ‘due to the breakdown of trade and diffusion as a result of the occupation of the country by Europeans, and the introduction by them of steel tools’. I suggest that their presence in the Pilbara, particularly with the apparent lack of edge-ground hatchets in the ethnographic record of this region, indicates that the hiatus was maintained in this area and that, while some edge-ground hatchets may have been traded south from the Kimberley in the recent past, there is no indication that this was of great import, at least in terms of adding to the material culture inventory of the Pilbara. Few, if any, hatchets seen in the Pilbara are of types that would suggest that they are of a recent Kimberley origin.

Recently, several finds have been published that indicate a widespread Pleistocene distribution of edge-ground hatchet-heads across northern Australia. Flakes of edge-ground artefacts (presumably resharpening flakes from

hatchets) have been recovered from deposits dating to 28 ka (~33 ka cal. BP) from Widgingarri 1 rockshelter, in the western Kimberley (O’Connor 1999:75) and from below deposits dating to 33,847–32,970 cal. BP from Carpenters Gap 3 in the southern Kimberley (O’Connor et al. 2014). In Arnhem Land edge-ground flakes have been recovered from Nawarla Gabarnmang dating to 35,400±410 bp (Geneste et al. 2010).

I am not sure whether the edge-ground hatchets maintain unbroken continuity from the Pleistocene into the ethnographic present in northern Australia, but, to my knowledge, by the latter period and up in to the early 20<sup>th</sup> century in some areas, stone hatchets were an integral part of an adult’s (male or female) toolkit in the Kimberley and I would expect a similar situation in the NT. In the 1970s there were men and women still alive who had seen their parents make and use stone hatchets. One woman I knew well at Old Mowanjumb even had a scar on the back of her hand that marked a cut made accidentally by her mother’s stone hatchet when she made a snatch at a piece of beehive that had been exposed as her mother was still chopping it out.

The lack of suitable hatchet stone on Cape York appears to be the reason for the presence of a different set of social parameters for the ownership, control and use of imported stone hatchets among the Yir-Yiront, as presented by Sharp (1960). Until recently ground stone hatchets were not uncommon on many Kimberley sites that had known ethnographic occupation in the pre-contact and immediate post-contact periods. Density varied depending on the accessibility of sites. Hatchets were commonly collected in WA by non-Indigenous peoples (but not in the same manner or to the same degree as in the eastern states) and by Indigenous people for sale to non-Indigenous friends, colleagues, collectors and tourists. However, even in the 1970s it was not uncommon to be able to step out of a vehicle in remoter areas of the Kimberley and see from 1 to 25 stone hatchets on the ground within a 20 m radius.

Returning to the question of the stone hatchets with modifications for hafting in WA and their relatively high frequency in the Pilbara—an area in which evidence of the ethnographic use of edge-ground tools is extremely scant—it is clear that, at some point in antiquity, such tools played a not-insignificant role in the societies that produced and used them. If Davidson and McCarthy’s (1957:429) conclusion from the ethnographic evidence that their manufacture was ‘apparently unknown west of the La Grange-MacDonnell Range line’ is correct, then how do we explain the thin scatter of hammer-dressed, notched, waisted or grooved hatchets from the Pilbara and the Kimberley that are unusual when compared with ethnographic hatchets from the Kimberley?

Were such implements required to fulfil mundane tasks, such as opening hollow trees or logs to obtain honey, bird’s eggs or small animals? Were they required for the tasks involved in obtaining and shaping suitable raw materials when making wooden weapons and utensils or building shelters? To a certain degree there do not appear to be many functions that a hatchet made in the Australian tradition can fulfil that cannot also be undertaken with a simple, unhafted flake, or even a natural-edged piece of stone of appropriate mass (for example see Love 1942:215–217; Mountford 1941:312–316; Thomson 1964:411–416). The situation is radically different when considering the hafted edge-ground axes and adzes of Melanesia, Micronesia or Polynesia, however, where such



tools were important in agricultural and maritime economies for clearing forests and building gardens or manufacturing sophisticated and complex watercraft. Perhaps the early Australian hatchets had a deeper social significance, a symbolic role that defined political or spiritual power, leadership or status for the people who used them.

The question of the ethnographic symbolism and the more esoteric associations between Aboriginal people and stone hatchets was elegantly summarised by Brumm (2004:143–157) and there seems no reason to doubt that similar properties may have been ascribed to hatchets from an earlier period. There may well have also been a gender bias in terms of access to, and use of, early stone hatchets. It must be remembered that the earliest image in the world of a person carrying a hafted stone tool is probably an Arnhem Land painting, executed in the Dynamic Style, of a woman holding a hafted stone hatchet (Chaloupka 1993:Fig. 117; Tacon and Brockwell 1995:687, Fig. 8). Questions of population size versus the numbers of archaic hatchets present in the landscape may also reveal something of the wider social roles possibly played by these tools. In relation to the Pilbara we may ask if there is any relationships between these very sophisticated stone tools and the creation of the petroglyphs that abound across much of the landscape. To a certain degree we may consider Tindale's (1987:49–50) discussion of hatchets among the Kariyarra (Kariara) of the Port Hedland area. Writing in relation to motifs he interpreted as depictions of hafted stone hatchets in the petroglyphs found at Port Hedland itself and, noting that stone hatchets were not made by the Kariyarra, Tindale suggested that they may be from 'pre-Kariara times'.

## Conclusion

Like Charlie Dortch, I consider that the hammer-dressed, waisted, notched or grooved hatchets of WA are from an early, but as yet undated, period in Australia's past. I also propose that they had a much greater cultural significance than their possible roles in wood-procurement, woodworking or contributing to the food quest would suggest. Their limited numbers suggest that access to them was restricted, and not for the same reasons that Sharp (1960) noted for the Yir-Yiront of Cape York. Suitable stone for the manufacture of hatchets is plentiful in both the Kimberley and the Pilbara, and in the former area such stone was exploited for this purpose even into the 20<sup>th</sup> century. The increase in surveying that has occurred in the Pilbara in recent years has revealed that stone hatchets, while not recorded in the numbers found in the Kimberley, are not rare, and that many of them, in contrast to those in the Kimberley, were modified to assist hafting. Ethnographic evidence suggests that such artefacts were not in use in historical times and consequently they may be of some antiquity.

The wide variety of styles, or rather the inconsistency in style, suggests that style was not necessarily of great significance and did not play an important part in the production of these hatchets. Currently, the many questions that one may ask of these presumably ancient hatchets are naturally limited until we not only have a real understanding of their relative numbers and distribution across the landscape, but also, as in Arnhem Land, find them in dateable contexts. By placing them in time as well as in space a real grasp of their significance may begin to emerge.

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