Archaeology and Physical Anthropology in Oceania 12(1): 51-76; 1977.

A SURVEY OF PREHISTORIC SITES IN THE TOM PRICE REGION, NORTH WESTERN AUSTRALIA

By Robert G. Bednarik*

DIFFUSIONIST speculation in Australia, largely based on the known distribution pattern of advanced implement types, frequently draws attention to the need for, and availability of, evidence from the continent's Northwest. The apparent absence of microlithic backed blades and several other prominent lithic artifact types in Australia's northernmost regions has provoked various speculations. Jones (1968:190) deliberates upon the possibility that Western Australia had served as a bridgehead to Palaeolithic migrants. Mulvaney (1969:127) calls for fieldwork in the Northwest and suspects the Fortescue River district of representing a potential entry point for immigrant *"tula* folk" (Mulvaney 1969:115). Apart from motives involving this tempting hypothesis interest in the region would be amply warranted by its numerous petroglyphs which are of outstanding cultural significance and artistic merit.

The remarkably small quantity of archaeological data actually available from this area does not do justice to the importance repeatedly ascribed to it. Notable exceptions are the studies concerned with, or emphasizing, rock art; among them McCarthy (1961, 1962, 1967a), Worms (1954) and more recently B. J. Wright's (1968, 1972) comprehensive work which is still in progress, and Palmer's (1975).

Due to the present industrial development in the Australian Northwest and the resulting population influx, the district's abundant prehistoric sites, the majority of which were comparatively safe until the early sixties, are becoming increasingly exposed to vandalism. Most vulnerable are rock engravings and surface occupational sites. Art galleries have been destroyed (*e.g.* Rio Tinto Gorge, or Dampier power station site) or defaced, and there is evidence that collectors have become cognizant of camp site debris and, by their selective approach, will eliminate the possibility of any later statistical investigation.

During a three year stay in the area (1968-1970) I undertook an archaeological survey in a number of localities, one being the region surrounding the Tom Price townsite. I believe that the majority of the sixteen surface occupational sites discovered here had remained undisturbed, excepting Sites 1, 7 and 10. Fortunately, most of the previously collected material has been

made available for inclusion in this report, although the presence of specimens of unrecorded origin made the "site unknown"-column in Table 1 necessary.

Considering that every living floor of a stratified deposit has, at some stage, been a surface site and is therefore, subject to the same limitations, the stigma of comparative worthlessness frequently attached to surface finds is deserved only where previous collecting activity is suspected. The prevalent argument confronting an unsheltered surface site is quite valid, namely: the possibility that differing industries could be present as a result of an erosion rate equal to, or exceeding the rate of sediment deposition, in an arid environment for example. But an unprotected stratified deposit in the same locality should be equally suspect because a composite occupational floor may have become covered and archaeological confusion could ensue if its temporal unity was proposed on the basis of stratigraphic proof.

Recognition of the significance of statistical research into lithic industries as a criterion of reconstructing economic aspects of prehistoric assemblages has increased in recent years, and the gathering of data assisting such enquiries is a priority. Faced with the prospect of unco-ordinated collectors' activities I was compelled to virtually clear the sites of retouched surface stone.

Environmental Setting

North Western Australia's 8% of the continent's area includes its heat centre. The mean annual rainfall is 9 to 11 inches in the coastal zone and slightly higher inland, but exceeds nowhere 14 inches. These values are, however, purely theoretical because a 10 inch fall over 48 hours may be succeeded by a two year drought, and cyclones have resulted in up to nearly 30 inches of rain in a single day. The consequent reliability of precipitation must be regarded as being particularly low at present. Palaeoclimatic investigation has not been attempted in the region.

In the Hamersley Ranges, residuals carved from Proterozoic rocks stand above the widespread remnants of the Tertiary plane whose deep weathering is associated, as is commonplace in Australia, with duricrusting. The few summits rising to above 4000 ft. (Mt. Meharry 4056 ft., Mt. Bruce 4024 ft.) are the highest in the continent's western third.

Intermittent water supplies are scattered throughout the Hamersleys but permanent sources are usually restricted to places where the water table is exposed, generally in deep gorges. Vegetation consists largely of spinifex and occasional acacias like kanji or snakewood.

Mabbutt (1971, Fig. 6:2) classifies the region as mountain and piedmont desert. In his view, this combination of desert habitats is the most desirable of the arid environments, for a hunter and gatherer society. Hill country is suited for a higher population density than the sandplain (Meggitt 1962:32) on account of the more advantageous run off and water storage, and of the

TABLE 1

Distribution of the lithic artifacts at the Tom Price sites.
"4A" denominates excavated implements from Site 4.

SITE No.	Microlithic util. flakes	Macrolithic util. flakes	Adzes, general	Tula adzes	Tula slugs	Hamersley adzes	Hamersley slugs	Elouera like adzes	Micro tula	Serrated flake?	Leilira	Burins	Fabricators	Piercers	Backed blades	Bondi points	Percussion stones	Axe?	TOTAL
1	20	29	3		1		1		5			3	4	4	4	3			77
2	4	14	4			1	9					2							34
3	1		1			2	3										1		8
4	3	13	3	3	1	2	2		1		1	2		1			1		33
4A	8	9	4	1	2		1					2				1			28
5							3												3
6						1	6	1			4	1							13
7	2	13	2	2	1		10	2			3	1	1	1			2	1	41
8							2												2
9			1				1												2
10	1	18	8	1		2	4				1					1			36
11		1	1				2												4
12					1														1
13		2			2		2								1				7
14			1				1	1											3
15			3		1		1												5
16						1	1			1									3
Unknown	4	1	4				3		1				2		1	1			17
TOTAL	43	100	35	7	9	9	52	4	7	1	9	11	7	6	6	6	4	1	317

Figure 1—Map of the region surrounding Tom Price, North Western Australia.

resulting combinations and variety of flora and fauna suitable for exploitation. This agrees with B. J. Wright's (1968:1) regionally more relevant reflection that, for the tribal Aborigines, the environment of the Pilbara district must have been very much more favorable than that of the desert country not far to the east.

The Sites

To eliminate the need of describing the boundaries of the territory covered by this survey Fig. 1 only shows the areas actually investigated.

Four of the sixteen occupational sites discussed here are open camp sites, while the remainder are located in caves or rockshelters. This, however, should not be looked upon as suggesting the former inhabitants' preference for caves, but more as recognizing the vulnerability of open sites to both fluvial and aeolian erosion, and possibly as indicating that the sheltered sites are usually more readily detected, unless a highly time consuming systematic search is embarked upon.

All caves and rockshelters recorded in this paper as having been inhabited, possess an entrance facing east to north-east. The user's possible motive for their selection was that such caves offered access to the morning warmth as well as maximum protection against the afternoon heat. Whilst this explanation is being reinforced by similar observations made in the Ophthalmia Range, it must not be accepted as a universal rule, but rather as evidence of a marked preference (Bednarik 1973:141).

The petroglyphs associated with Site 1 vary in style and technique, displaying two phases. The older is represented by deep abraded outlines of naturalistic style, supplemented sometimes by interior line design. Considerable antiquity is suggested by the proposition that the dominating engraving, which conceivably depicts Thylacines (B. J. Wright 1972:18), was executed prior to the temperature-strain fracture of the boulder bearing it. Both the rock surface within the resulting cracks and the engraved grooves display a full degree of patination matching that of the boulder's original surface (*cf.* Edwards 1971:361).

Since the discovery of these two illustrations of striped mammals in 1968, which had been preceded by publication of the Juna Downs design (B. J. Wright 1968, Fig. 863), evidence has accumulated that the Aborigines of North Western Australia not only could have known the marsupial wolf but may well have attempted its portrayal (Brandl 1972, B. J. Wright 1972). It would in fact be remarkable if the possibility of depicting such a surely prominent creature had never occurred to them. Thylacines' former distribution encompassed many regions of Australia and New Guinea, and it may have become extinct in parts of Western Australia as recently as 3000 years ago

(Partridge 1967, Lowry and Merrilees 1969). But however convincing the cumulative evidence may appear, establishing Thylacine in faunal remains associated with human occupation would seem desirable, before the inference that an extinct species has been portrayed in Australian prehistoric art can be accepted.

The fully pecked figures are comparatively recent. Although some are slightly patinated, they still display adequate colour contrast but, owing to the shallowness of the marks they consist of, they tend to become unintelligible as they weather.

The petroglyphs are located along a normally dry rainwater course, close to an intermittent rockpool (Grid reference Mt. Bruce 599173). Some 200 metres upstream, where the creek bed forms a sharp bend, a clearing measuring approximately 18 by 10 metres is dotted with thousands of tiny flakes, many showing wear, a few trimming. Microlithic proportions clearly dominate: 96% of this abundant surface material possesses weights of 4 gm or less. For the specimens removed from the site and designated implements, the figure is 85.7%, and even the proportion of artifacts weighing 3 gm or less is 72.6%.

Shortly before the northbound road intersects the railway line, some 10 road-kilometres from Tom Price (Fig. 1), it crosses a shallow ravine. If this rainwater channel is followed uphill Site 2 is entered upon reaching a rocky depression shortly before the ridge is fully scaled. Of the few engraved designs seen here, the well detailed profile view of an echidna and a partly completed representation of a macropod are noteworthy. Both belong to the outline phase. The encampment, situated on the southern slope, practically adjoins the nearest petroglyphs and is distinguished by a relatively high percentage of steptrimmed adze remnants. These witness to an industry predominantly involved in the manufacture of wooden utensils.

Site 3 is a small cave, 7.5 km NW of the township, at the northernmost tip of a low ridge (Grid reference Mt. Bruce 594174). Each of the two millstones recorded here showed deep pecking marks covering most of the grinding surface. If one follows the line of cliffs on the ridge's north eastern slope the spacious entrance portion of a cave is reached within minutes (Site 4). It reveals rich occupational debris, and a concentration of wasteflakes outside its dripline indicates where much stone knapping has been done. Site 8, 40 metres further on, is a cave containing carbonate precipitates that yielded a few trimmed flakes, as did the adjacent rock shelter Site 9.

Just before the road heading north reaches the first range on the way to Dampier, and commences to negotiate the steep hillside, Site 6 is to the left, an open camp a few hundred metres distance from the road. Approximately midway between its location and Site 9, and due NW from Tom Price, lies a rounded hill, covered sparsely by triodia and the occasional ghost gum. Its

eastern incline accommodates the triangular shaped aperture of a rock shelter (Site 5) where both a muller and a grindstone were recorded.

Sites 11 and 12 are approached by following a well defined valley south of the road leading towards Mt. Lionel. Each consists of a rock shelter. They are situated on the valley's western slope and only about 50 metres apart (Grid reference Mt. Bruce 591176). Lumps of red and yellow ochre were collected in a rock niche at No. 11, the first shelter after leaving the road.

A low ridge just west of Tom Price is locally known as Chaos Range. The escarpment on its eastern flank contains a number of shallow caves, some of which have habitational remains. The arcuate rock protecting Site 7, near the southern extremity of the range is clearly visible from a distance. The precipice to the north forms an almost continuous large overhang for about 70 metres which has revealed occupational debris in two more places, recorded as Sites 13 and 14.

The line of cliffs extends south of the road connecting the town with the open cut mine. Site 15, a cave with a steeply sloping floor is located below the water reservoir, and a rock shelter (Site 16) some 100 metres further south.

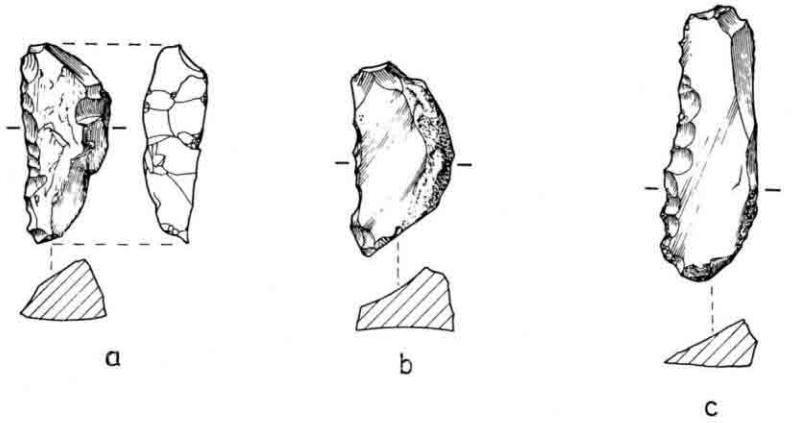
At the extreme eastern tip of the vast camping area described here as Site 10 is a third engravings site; it consists only of some geometrical designs and a few outline figures. Two representations of saltwater turtles or freshwater tortoises closely resemble some of those recorded by B. J. Wright (1968, Figs. 402, 578) on the Upper Yule River and at Hamersley Station. The abandoned encampment associated with these petroglyphs is located along a rainwater course just NE of the town and covers an area more then 500 metres in length. Its lithic assemblage is distinguished by a profusion of large, mostly broad and massive flakes of dark grey quartzite. Finely trimmed chert flakes and bladelets account for a very small proportion of the surface finds.

There is a notable absence of camp sites in the terrain surrounding the only permanent waterhole in the Tom Price vicinity. It is located about 8 km south of the town, in a deep and narrow canyon which is heavily frequented by game, particularly macropods. The setting would be an outstanding hunting trap. Quite likely camps were not made near this well concealed gorge less hunting be jeopardized. However, sacredness of the well would be an equally convincing explanation (*cf.* Thomson 1975:139).

The sites listed here are those investigated in this preliminary work. The list is not considered a complete record of all prehistoric sites in the region. I expect that further inquiry will result in the detection of more sites, and in the acquisition of additional evidence.

Lithic Remains

Of the 486 modified stone objects removed from the sites, 317 were classed as either deliberately re-shaped or as showing a degree of use-wear



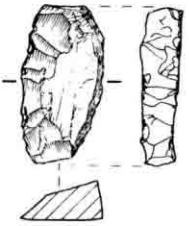
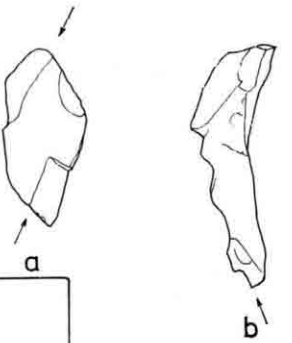


FIG. 3



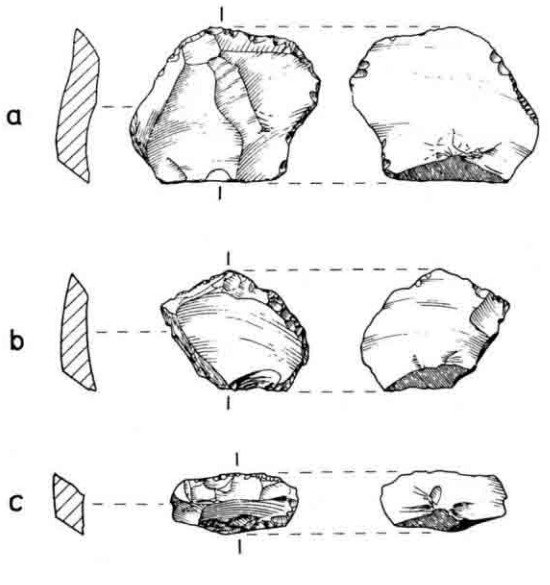


FIG. 2

FIG. 9

Figure 2—*Tula* adze flakes, of varying degrees of wear, from Sites 4(b), 10(a) and 13(c).
Figure 3—*Elouera* like adzes, from Sites 6(b), 7(a, c) and 14(d).
Figure 9—Two burins, from Sites 4(b) and 6(a). Below, a serrated flake from Site 16(c).

sufficient to warrant beyond doubt their designation as implements. These are listed in Table 1.

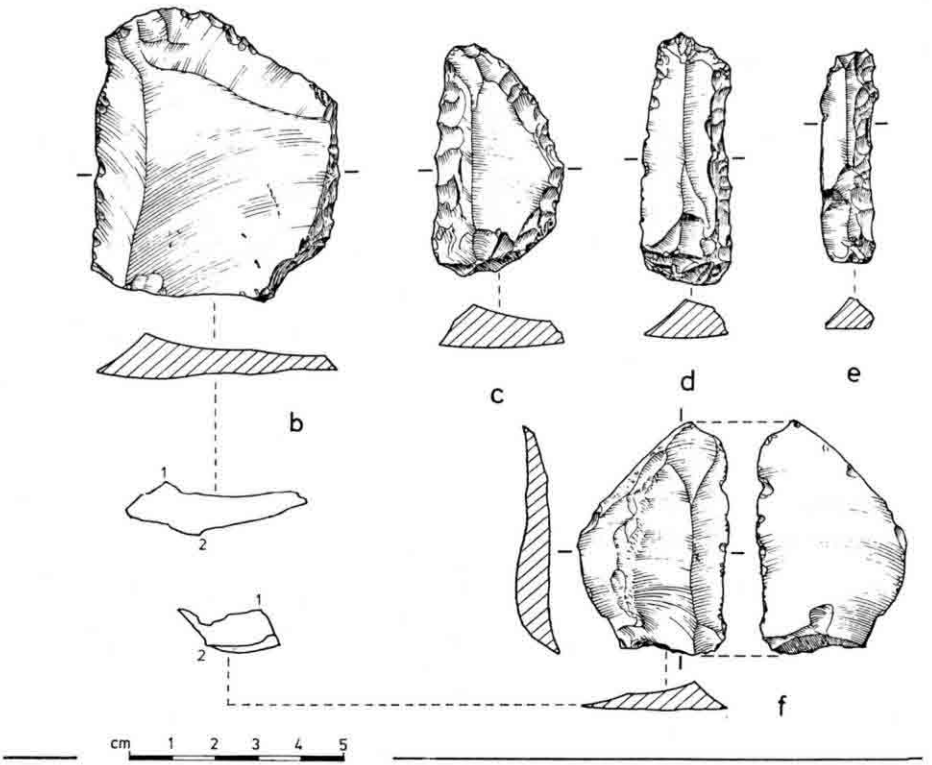
To emphasize differences amongst the adze flakes no less then six classifications were employed in this index. A pronounced dominance of adzes is evident, Site 1 being the conspicuous exception. The chief criterion for recording an adze was the high angled, heavy trimming that is associated with wood working on ethnographic specimens and that, if continually applied to a flake will ultimately result in remnants of a size and shape frequently rendering them unsuitable as hand-held instruments, thus postulating hafting.

Tula adzes at Tom Price (Fig. 2) differ in no way from those described elsewhere but only account for 5.0% of all implements here, or for 13.8% of all adzes. The concave dorsal face variety is dominant. Although re-sharpening may commence obliquely, the distal edge of the fully worn slugs invariably runs parallel to the striking platform, as it always does on ideal *tula* slugs. At least some of these tools appear to have been removed from their gum mounts during use. Damage to the proximal portion of the flakes seems to confirm that they were not always modified while hafted. Most stages of wear are represented.

The vast majority of the adzes observed at Tom Price are of a type requiring detailed description. To comply with the necessity of terminological identification in this paper it has been named *Hamersley* adze. In its unworn state this implement averages 50.2 mm length (range 32-75 mm) and a weight of 18.8 gm (range 5.4-52.0 gm). It displays one usually straight, sometimes slightly convex lateral margin, opposed by a pronouncedly convex edge which may form a semi-circle. The flakes striking platform is plain and high angled and the composition of its dorsal face is frequently dominated by a longitudinal ridge that runs close to, and parallel to, the fairly straight margin (Fig. 4). At manufacture, the striking point was not positioned opposite a rib formed by two flake scars as would be done to effect a symmetrically shaped flake or blade, but some 10 or 15 mm laterally from it, thereby resulting in a broad flake displaying a very characteristic cross section. The striking platform's contour, too, is most typical (Fig. 4b, f. Observe position of the point of percussion "2" relative to the spur of the outer face ridge "1"). The intention appears to have been to produce a flake with the largest possible area of a thickness best suited for re-sharpening, and to have it backed by a stout portion (*cf.* McCarthy 1965:83) which was destined to eventually become the slug.

This concept of producing an implement best suited for being worn away by retouch is equally applicable to the *tula* adze and the two tools simply represent two different responses to this demand, of which the *Hamersley* adze could be regarded as the more specialized solution. It stipulates a considerable degree of preconception of the artifacts form prior to the flakes detachment,

FIGURE 4



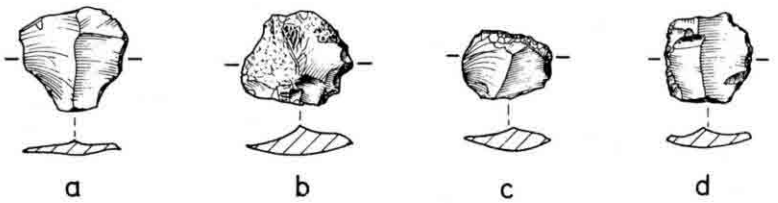


FIGURE 6

Figure 4—*Hamersley* adzes, of varying degrees of wear, from Sites 4(a, c), 5(d, e) and 10(b).
Figure 6—Micro *tula*, from Sites 1(a, c, d) and 4(b). Specimen c is about 40% worn.

as well as the necessity of predetermining its thicker portions position, and direction of the ridge, if the apparently ideal shape was to be achieved.

In comparison to the *tula* adze's reasonably balanced morphology the Hamersley type's asymmetrical shape is not only non-incidental, but in fact definitely intended and sought. Whereas *tula* is believed to have been subjected

to two alternative, greatly differing modes of retouch, the *Hamersley* adze's exclusively lateral trimming is already inferred from its deliberate and designed contour. Close inspection of all specimens tends to give the impression that only one lateral margin was employed as a working edge, namely the convex, or the one usually closer to the point of percussion than to the dorsal ridge. Of 52 fully worn slugs, 18 are retouched only unilaterally. The trimming of the second, opposing margin of the others is reminiscent of a "blunted back" which I believe it to be on at least 9 specimens. Two others have had a protuberance along part of the supposed "backing" margin detached, evidently to assist hafting (Fig. 5c).

The *Hamersley* adze slug (Fig. 4d, e; Fig. 5a - r) normally retains much, if not all of the implement's original length. Partly worn specimens (Fig. 4c) occur at the major sites. When fully worn the slug consists of a narrow strip commonly featuring the intact ridge on the outer face, a densely trimmed, often concave and undercut working edge and a portion of the striking platform. By contrast, the *Burren* slug, despite its otherwise often similar treatment, rarely displays any remainder of the *tula's* striking platform. Some workers in fact consider the platform's absence one of its diagnostic characters.

Probably a large component of Glover's (1967:422) "side struck adze flakes", collected with the material from Millstream (about 155 km NW of Tom Price) *ca.* 1912 (Newall 1913) is analogous with the *Hamersley* adze, as are his "scrapers" numbered 219, 220 and 4759 (Glover *op. cit.* Fig. 2). Glover reports the presence of both unilateral and bilateral retouch, which is consistent with the observations made at Tom Price.

The Hamersley type does not necessarily have to be considered a local adze variant of restricted distribution. Although discrimination between its slug and the *tula* derived *Burren* slug should be quite practicable when dealing with a larger sample it may not be readily possible when examining single specimens; hence the probability that some of the implements previously described as side worn adzes, or inappropriately termed *Burren* adze flake (Mulvaney 1969:113, 115), would deserve further inquiry. My tentative and reserved identification of the *Hamersley* adze at Sturts Meadows, New South Wales is pertinent. In the light of reports such as R. V. S. Wright's from Laura, Cape York Peninsula, it appears less far fetched than is implied by geographical remoteness. The upper horizon's lithic industry at Laura is dominated by longitudinally worn adze flakes, and Wright (1971:138) records specimens with parallel retouch, which he interprets as evidence of their having been remounted in an inverted position. Uniform asymmetry and the possibility that "backing" could be involved remain unmentioned, but the composition of the attendant lithic assemblage is of some relevance. *Elouera* and ground axe (single specimen) are present, while the absence of backed blades, *pirri* or other trimmed points, fabricators and "thumb-nail scrapers" is sufficiently

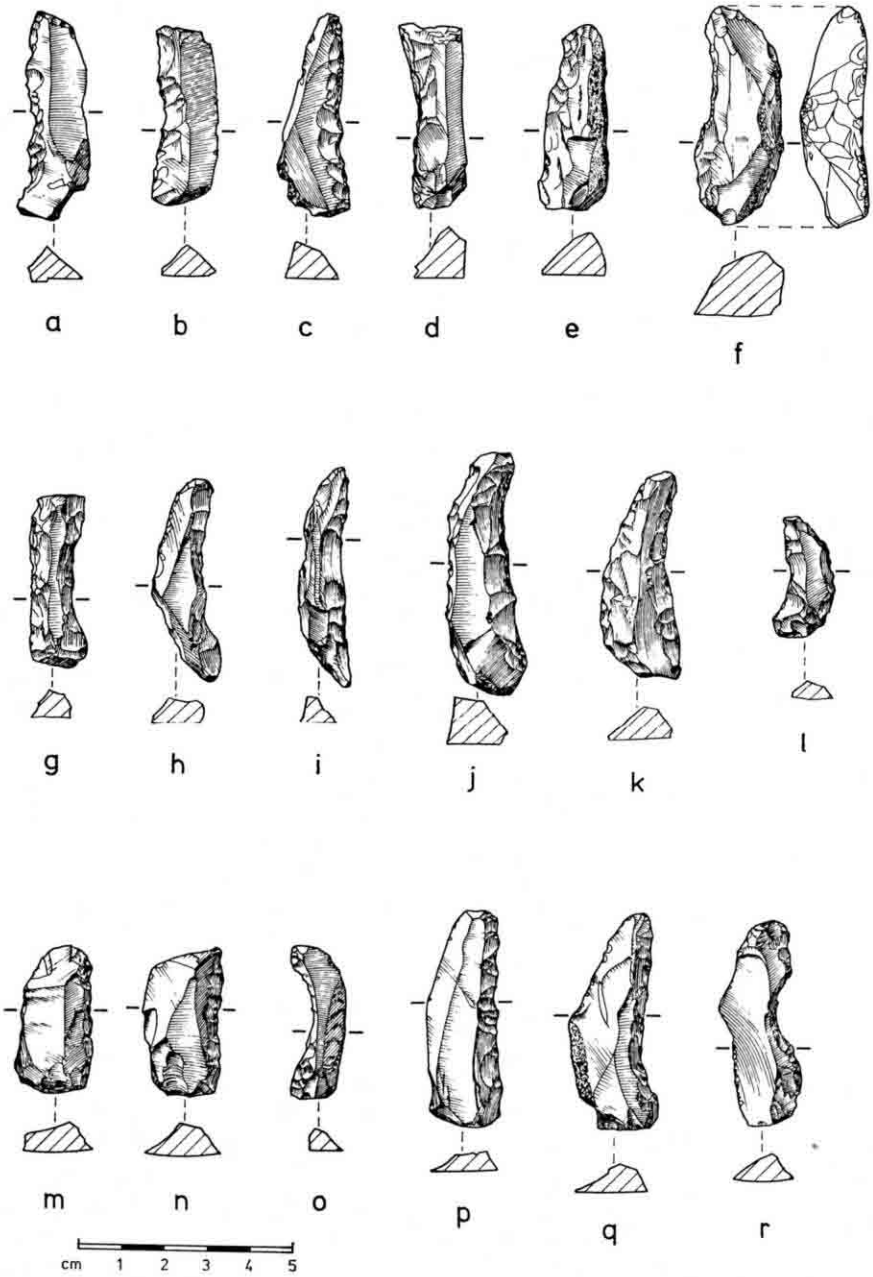


Figure 5—*Hamersley* adze slugs, from Sites 2(b, c, 1), 3(h), 4(i, m), 5(q), 6(d, j, n), 7(f, g, k, p, r), 9(a) and 10(e, o).

noticeable to need mention. Most significant are the resin traces detected on some of the adzes, verifying the mode of hafting.

A comparison of the *Hamersley* adze with the flat adze (Gould and Quilter 1972) is of interest because of the relative proximity of the latters geographic distribution. The flat adze has been described as a small and thin, unspecialized tool that apparently served as both cutting knife and adze. The first function is suggested by its low angled working edge, the second is convincingly demonstrated by Gould and Quilter on the basis of retouch and use wear. The authors did not record any distinctive pattern of retouch, but their disinclination to employ the implement's maximum length in their analysis of its quantitative attributes, which is justified by the presence of successive stages of wear, would appear to stipulate a predominance of distal trimming. This treatment is virtually absent from the *Hamersley* adze. It is also significant that modification

TABLE 2

Comparison of flat adze and *Hamersley* adze.

Criteria of comparison	Flat adze	*Hamersley* adze
Mean maximum thickness	5.4 mm	9.4 mm
Mean maximum length	Not recorded due to retouch	48.0 mm
Mean maximum width	27 mm	Not relevant for comparison due to dependency upon degree of wear
Shape	No regularities recorded	Most typical
Angle of cutting edge	37 - 63° (mean 46.5°)	55 - 109° (mean 79.9°)
Type of retouch	No regularities recorded	Lateral only
Treatment other than re-sharpening	None	Trimming, to promote hafting
Inferred function	Cutting knife, woodworking scraper or adze	Woodworking adze or chisel

of the flat adze, other than working edge trimming, was not attempted either at manufacture or during use or re-sharpening.

The comparison of both implements' characteristics presented in Table 2, shows essentially no agreement in any aspect of importance. Their disparity, or rather contrariety, is further seen in Fig. 10.

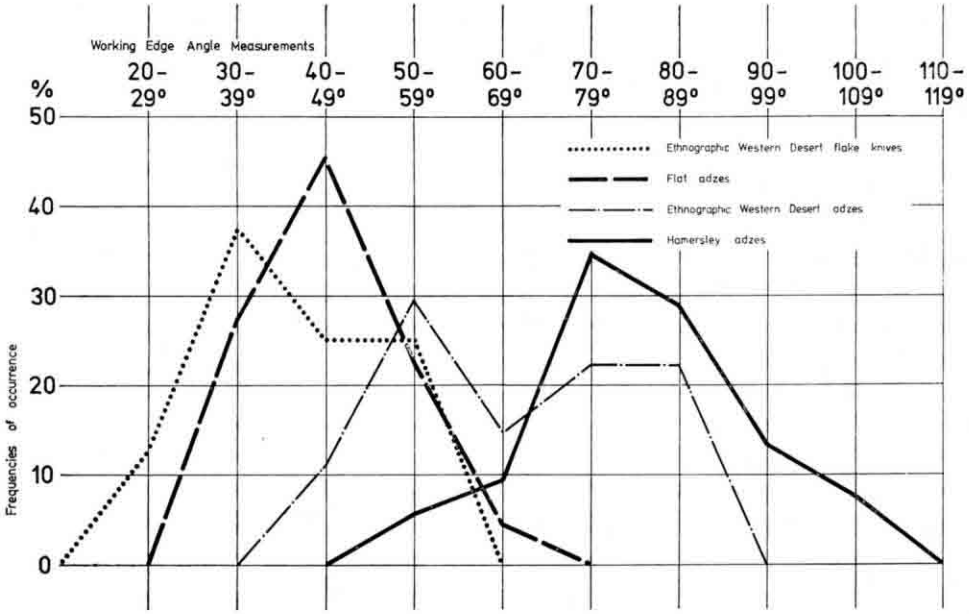


Figure 10—Working edge angle frequencies for flat adzes, ethnographic flake knives and ethnographic Western Desert adzes (adapted from Gould and Quilter, 1972, Fig. 4), compared with those of *Hamersley* adze slugs described here.

The column, "Adzes, general", in Table 1, representing adze like tools lacking the distinguishing properties required for tabulation as one of the specialized types does include five specimens possessing attributes analogous to the flat adze's. However, the small size of this sample, together with the flat adze's inherent lack of uniformity, would render the implement's inclusion in this assemblage too debatable.

Each of the four *elouera*-like adzes recorded at Tom Price (Fig. 3) possesses trimming along the chord which suggests a re-sharpening process. Two bear bi-directional retouch over the curved thick margin; on one this trimming is only superficial and consists of a few large scars. The remaining implement's "back" is mostly formed by cortex (Fig. 3b), a peculiarity frequently observed on *elouera*.

Since first recorded in 1925 (Turner 1932:88) interpretative description of the *elouera* has always been somewhat of a controversy. It was described as

a scraper originally (Towle 1930:8), then as a backed knife (Turner 1931:31). McCarthy, after initially refraining from attaching any specific function to it (McCarthy *et al.* 1946:28), introduced the side hafted specimen from Oenpelli (McCarthy and Setzler 1960) and subsequently defined *elouera* as a chisel or adze (McCarthy 1967b). It is normally associated with eastern Australia but is thought to sometimes occur in *tula* assemblages and possibly does so at Millstream. Glover's re-appraisal of this important collection describes seven flakes as resembling *elouera* (Glover 1967:422) but remains hesitant about this identification. The Tom Price assemblage is, unfortunately, unable to illuminate further the issue. Taking into consideration the meagre sample size and the rather extensive chord trimming observed, classification of the four adzes as *elouera* must remain equally dubious.

When Gould excavated the stratified deposits of a rockshelter near Warburton Mission, Western Australia, he observed a peculiar tendency towards microlithic proportions amongst the adzes with increasing antiquity, and coined the term "micro adze" (Gould 1968:168). In general, little attention has been devoted to the differentiation between microlithic and macrolithic *tula.* Four sites in western New South Wales, excavated by McCarthy in recent years yielded a quantity of micro *tula* slugs, the great majority of which measured from 12 mm to 20 mm. Radio carbon dating has indicated a recent origin here (McCarthy, pers. comm.).

The micro *tula* collected at Tom Price (Fig. 6) strongly resemble Gould's Fig. 6g (1968:169). They bear all characteristics of an ideal *tula* but range in size only from 21 mm to 27 mm maximum dimension (mean 24.3 mm) when unworn. Their general morphology as well as their dimensions are of pronounced homogeneity, and although no fully worn slugs were detected, the tool is retouched in the fashion to produce a *tula* slug, *i.e.,* by trimming the distal margin.

In my opinion the fragile micro *tula* could not have been utilized for the same purpose as the macrolithic variety had been. It would have been much more appropriate for use such as the Wongkonguru *kalara.* Horne and Aiston (1924:90) described this implement as sometimes resembling a small *tula,* with a chipped edge. They report that it was not so deeply embedded in the hafting gum, or not hafted at all, and operated rather as a gouge or scraper for the fashioning of long grooves on wooden surfaces. The micro *tula* at Tom Price and elsewhere could represent a similar tool, a speculation making re-examination of their classification as adzes desirable. Significantly, the smallest macro *tula* at Tom Price are almost twice the size of the micro *tula,* undeniably stressing the absence of intermediately sized specimens. Hence the micro *tula* has been segregated from the adze family in this paper, in favour of appraisal based on its microlithic characteristic. Table 1 only lists those flakes that bear trimming in addition to the other *tula* hallmarks. Any lacking these are

included with the microlithic utilized flakes despite a possibly extensive degree of similarity with micro *tula*. A number of corresponding specimens were listed as waste flakes because their hinge fractured distal margin had rendered them unsuitable. Due to their high angled striking platforms micro *tula* are just as prone to hinge fracture as is the bigger form.

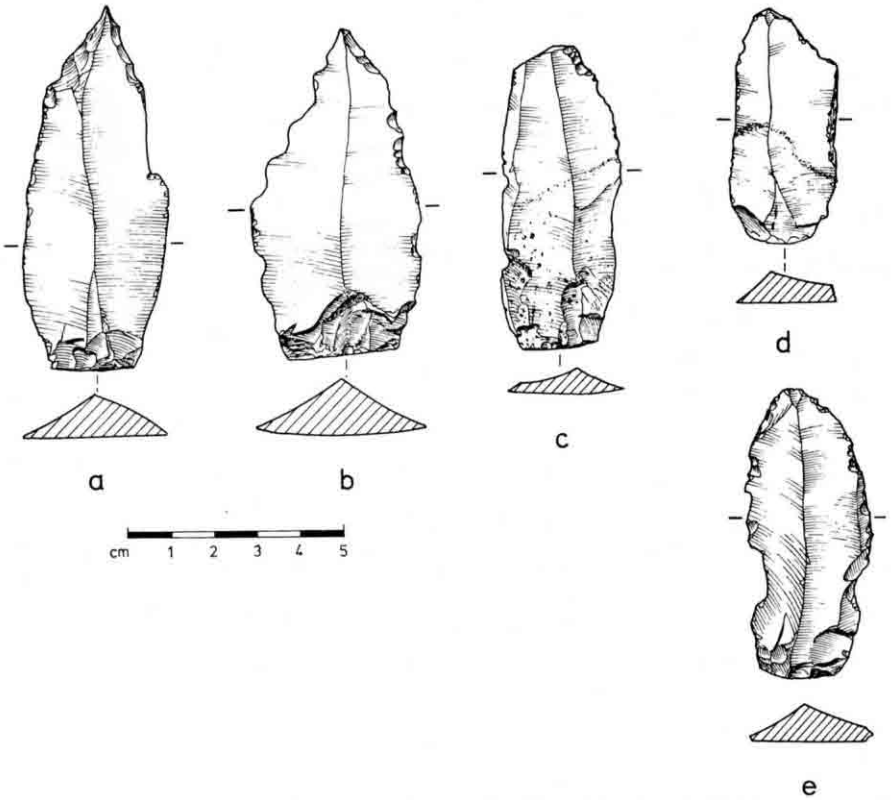


Figure 7—*Leilira*, from Sites 4(d), 6(a), 7(b, e) and 10(c).

The blade implements described here as *leilira* are of fairly consistent shape and size and present either trimming, use wear or both. Possessing large, plain and comparatively steep angled striking platforms, they range in length from 60 mm to 87 mm (mean 72.9 mm) and in breadth from 26 mm to 40 mm (mean 30.5 mm). Save one exception all exhibit secondary flaking in the proximal dorsal zone that has been effected by striking the platform in longitudinal direction, possibly with the intention of promoting hafting. One object (Fig. 7e) has the distal end trimmed in the manner typical for the Central Australian women's knife (Spencer 1928:502-508), two have it trimmed laterally to a point (Fig. 7a) and one has a dentated margin (Fig. 7b). Of interest are two other specimens (Fig. 7c, d) bearing traces of what could be

plant resin, covering about one half of the blade in both instances. The remains of this coating are arranged as thin flecks which brings to mind, and is in agreement with, what has been discerned on implements from Devil's Lair, South Western Australia (Dortch and Merrilees 1973:107).

The Stone Implement Committee recommended in its 1967 report that the term *leilira* be reserved for the hafted flake knife and that the denomination "*leilira* blade" should not be resorted to when identifying the unhafted stone component (Casey *et al.* 1969). Originally, the *lialira,* or *lalira,* had been described as a large stone knife "made of flaked quartzite" (Spencer and Gillen 1899:652). Later workers applied the name to a particular type of specialized blade which is readily recognized by its distinctive striking platform and certain modes of retouch and which was, when hafted, employed as a knife, fighting pick or spearhead. This usage of the name *leilira* is commonly accepted now.

The term utilized flakes, in Table 1, embraces all those lithic artifacts that, whilst displaying retouch or extensive wear, fail to present any of the discriminate features essential to warrant tabulation as one of the specialized tools listed. It appears safe to assume that the great majority of them has served as either scrapers or knives. Uniformity of their treatment patterns is not considered to be sufficient to justify demarcation beyond separating the flakes of 30 mm and over from the smaller, thus arbitrarily creating macrolithic and microlithic categories. Microscopic examination could be of advantage here but was not attempted.

Of the twelve backed blades collected at Tom Price one half are of the *Bondi* point variety (Fig. 8c-f) and five of the others are rounded segments, or lunates (Fig. 8a, b), The *Bondi* points range from 25 mm to 33 mm in length (mean 30 mm) and from 0.6 gm to 2.5 gm in weight (mean 0.9 gm); other backed blades from 20 mm to 34 mm (27.3 mm), or from 0.7 gm to 1.2 gm (1.1 gm). The sample seems consistent with the relevant Millstream material (Glover 1967, Fig. 1).

Macrolithic burins (Fig. 9a, b) occur sporadically at the major Tom Price sites. The spalled types prevail (rectangular, bevel and central spalled), supplemented by two rectangular scaled specimens. The burin depicted in Fig. 9b is manufactured from a rejuvenating flake.

With one exception, the few fabricators recorded all originate from the microlithic assemblage of Site 1. Whilst it is a matter of certainty that some, if not most of them are actually scalar cores (White 1968) and possibly should not be listed as implements, one at least (1-1125) is a true *outil écaillé*: a comparatively large, thick flake (30.1 gm) with battering along virtually all margins. Displaying in fact a total of 22 cm of bruised edges it evidently demonstrates the validity of the term fabricator. Futher investigation into the

Australian scalar core/fabricator issue is required to determine the extent to which types manufactured with greatly differing concepts of purpose have been combined under a collective denomination, on account of their analogous treatment.

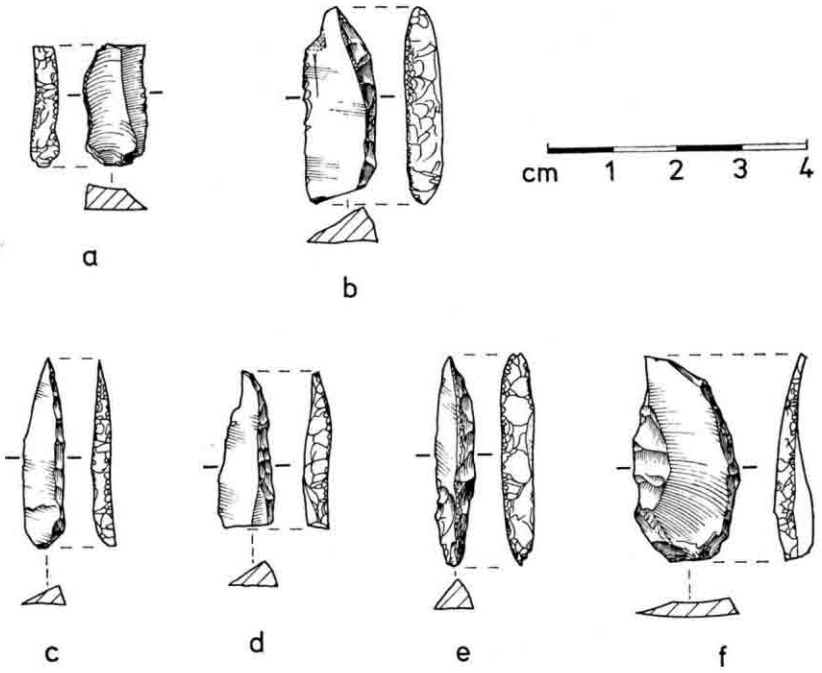


Figure 8—Microlithic backed blades, from Sites 1(a) and 13(b), and *Bondi* points, from Sites 1(d, f), 10(e) and of unknown origin (c).

Newall (1913) expresses his amazement over the lack of "hammers and axes" at Millstream. A similar comment comes from McCourt (1975:43) when he discusses an area east of Tom Price. Reflecting on the provocative observation that not one demonstrable axe head was to emerge from amongst the tens of thousands of artifacts and waste flakes I examined, in various regions of North Western Australia, one is compelled to look for an acceptable interpretation of such a distinct hiatus. The solitary object registered as a possible axe at Tom Price, although of the ideal form and size required, consists of a lenticular, symmetric quartzite flake devoid of use wear or any signs of modification, such as pecking or grinding marks.

Similarly, speculative recording of the only serrated flake (Fig. 9c) needs confirmation by other finds before discounting it as a merely fortuitous product.

A trimmed point adequately suggestive of a puncturing purpose was the criterion for tabulation as one of the smaller number of piercers.

Site 6 surrendered an exceptional find, a quartz crystal weighting 207.4 gm, that has apparently not been modified from its quarried state. Specks of a dark substance adhering to some of its recesses could be construed as evidence of hafting with a resin handle and suggest tentative interpretation of the crystal as a magic stone. Although no corroborative ethnographic comments seem to be obtainable for the area under survey, the use of rock crystal for this application was a widespread practice in Australia.

Millstones were observed at Sites 1, 3, 4, 5 and 10. Lacking any pronounced collective attributes, they were made of locally procurable sandstone slabs, were deficient of any trimming or axe grinding grooves (none were recorded anywhere in the district), and dressing was restricted to Site 3. In addition to these portable stones, suitably flat rock surfaces have occasionally been taken advantage of as a substitute.

Ochre particles were recorded at Sites 1 and 11, and excavated at Site 4, from 32 cm depth. Pictographs, incidentally, are quite rare in North Western Australia, and none at all are known in the Tom Price region.

The meagre product of the only excavation undertaken, a test-pit of 45 cm depth had been intended to be the rock-near extremity of a one metre wide trench traversing the Site 4 shelter to its drip line. However, my stipulation of stringent minimum requirements (*e.g.* recording in situ of all foreign objects of 10 mm and over) resulted in an expectably slow advance. As a consequence only 0.37 cubic metre of sediment filling was extracted during nearly 60 hours of digging. Owing to limitation of the time available progress remained confined to the excavation of Square One, which is partly occupied by the rock wall at the rear of the shelter.

The test-pit yielded a total of 132 modified lithic items of which 28 justified cataloguing as tools. The consequent density of *débitage,* 281.1 per cubic metre (7.96 per cubic foot) is within the prevalent range and comparable, for instance, to that encountered at Warburton Mission (Gould 1968:167) although I must emphasize that it is no reliable indication of the intensity of occupation, as is implied by Gould. The deposit's accumulation rate is a decisive factor in this context, yet it will vary substantially in different localities. This rate is suggested to be exceedingly low at Tom Price.

The proportion of reputed implements is at 21.2% remarkably high, and even more so when considering the small waste-flakes being included here that are normally lost through screening. Most stone knapping has evidently been performed outside the cave.

The artifactual sample recovered is certainly too small to attempt any conclusive evaluation, although the occurrence of *tula* adze both below and above the sole *Bondi* point (at 26 cm depth) merits mention. Burins appear to be restricted to the uppermost level, and possibly the *Hamersley* adze is a

more recent innovation. Habitational evidence was present at virtually all levels of the test-pit.

The quality of the lithic raw materials employed in the manufacture of the industries at all Tom Price sites is superb in comparison with the general Australian situation, and more so when likened to the nearest coastal assemblages, such as at Dampier Archipelago, or at Port Hedland. Silcretes and coarse quartzites are scarcely represented, the bulk of the flakes being fashioned from compact cryptocrystallines including chalcedony, flint, jasper and various types of chert, many attractively coloured or banded. Finely grained quartzite, milky quartz and, at Site 1, clear quartz crystal supplement this combination.

Attempts were made to trace these materials back to their probable places of origin but with only modest success. A porous, grey quartzite sometimes utilized at Tom Price (and also near Wittenoom, 75 km NE) occurs in outcrops near the Rio Tinto Pass, 53 km NNE of the town. The anthracite-hued dense quartzite frequently used, particularly at Site 10, can be commonly observed in alluvial deposits and was thus readily attainable.

Non-Lithic Remains

The relatively low pH-values recorded at most sites (Bednarik 1973:142) have resulted in detrimental conditions for the preservation of organic matter. Site 8, a cave terminating in a chamber featuring dry and presumably semi-active speleothems could be a notable exception. The near alkaline status of the floor sediments, coinciding with a generally favourable morphology of the cave, would seem to recommend investigation of their potential as a depot of palaeontological material.

Two rounded clumps of a resinous substance were collected at the entrance to this cave. They are somewhat egg-shaped, weigh 81.4 gm and 77.8 gm respectively and, on account of the deteriorated condition of their near surface layer appear to be of considerable antiquity. Plant remains contained in the material, as well as the familiar fragrance emitted by it when heated, designate it as from triodia derived resin.

A local Aboriginal informant's assertion that it was gained by raiding the underground stores of a gum-procuring ant species, will, in view of the customary, well documented methods of extracting this resin require verification before it can be accepted.

The shell of a Common Baler (Melo amphora) was encountered near the base of Mt. Nameless, a commanding feature west of Tom Price, 230 km from the nearest coast. The specimen is surprisingly well preserved, displaying only marginal damage, and measures 90 mm. It brings to mind Newall's description of large broken sea shells at his Millstream site.

The only other item of organic origin recorded in the region is a damaged flat spear thrower from Site 7. It was not closely examined by me but is thought to be a children's toy, as is implied by its small dimensions. The wooden artifact's degree of decay suggests comparative antiquity.

Conclusions

Bearing in mind the preliminary nature of this survey it was not expected that any conclusive findings could be offered. The prime objectives had been to initiate prehistoric investigation in an area that had hitherto been neglected in this field; to ascertain the range of implement types in the area as data of this nature is lacking for the greater part of Western Australia; to secure evidence capable of supporting or challenging Glover's (1967) views on the Millstream assemblage; and generally to provide a broader basis for future archaeological research in this district. However, the evidence so far assembled does permit some conclusions, although most of it was secured from surface sites.

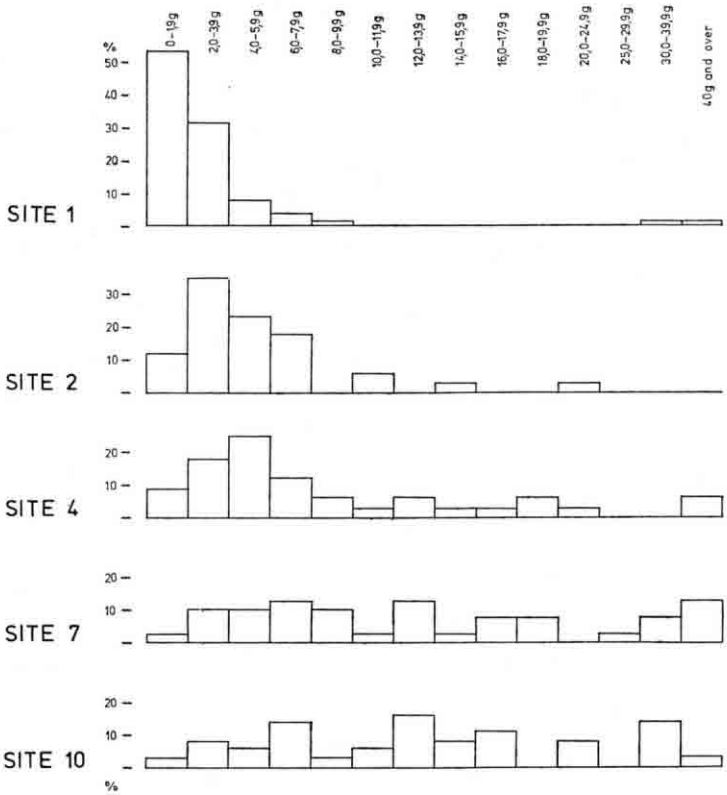


Figure 11—Comparison of lithic artifact weight frequency characteristics of some Tom Price industries.

The microlithic trend at Site 1, manifest in Fig. 11 has been emphasized previously, but the station emerges as equally distinctive upon statistical appraisal of the functional properties of the implement types (Fig. 12). Whilst the industries of all other Tom Price sites contain a minimum of 33.3% adzes the proportion is only 6.5% at Site 1. Backed blades and micro *tula* (Gould has also associated micro adzes with other microlithic artifacts - 1968:170), burins, fabricators and piercers are typical for this locality, whereas the *leilira* is completely absent, and *tula* would be, were it not for a single slug.

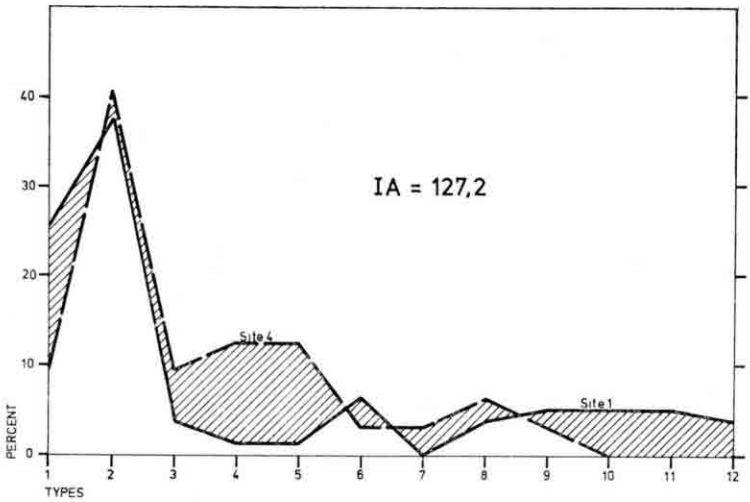


Figure 12—Comparison of Site 1 with the typologically closest assemblage, Site 4 by means of Robinson agreement coefficient. The area of disagreement is shown hatched, the area of agreement is unfilled, and below it.

The Brainerd-Robinson Technique (Robinson 1951, Brainerd 1951), although mostly used for dating seriation and employed only rarely because of the time involved, was considered suitable to express relative frequencies of artifact type for the Tom Price sites. The matrix resulting from this exercise (Table 3) is self-explanatory and sustains clearly the extreme nature of Site 1. It must remain debatable whether a chronological order is achieved, although that plotted would be the most acceptable on the basis of all evidence.

The emerging conclusion strongly suggests the presence of two distinct assemblages at Tom Price. The corroborative observation that the proportional distribution of functional types at the principal adze-dominated sites is of noticeable uniformity, underlines this conception further. The adze content at these stations is surprisingly consistent: 41.2% at Site 2, 33.3% at Site 4, 41.5% at Site 7, 41.7% at Site 10.

Newall's comment that tool accumulations were graded in accordance with their implement's dimensions at Millstream is relevant, but his inference that

TABLE 3
Brainerd — Robinson seriation of the major Tom Price assemblages.

Sites					
1	200				
7	107.6	200			
4	127.2	147.0	200		
2	116.8	147.4	155.6	200	
10	99.4	129.0	141.8	144.6	200

this separation has been effected by selective conveyance through rainwater is not convincing. Fluvial transportation would hardly be adequately discriminative in this region. Moreover a seemingly better hypothesis can be offered now. The Millstream sample's typological composition permits it to be readily comparable to the industries at Tom Price, and in view of the strong evidence of statistical findings there, its conglomerate nature seems inevitable. The present survey's attempted demonstration of the occurrance of more than one cultural trait at Millstream is sustained by Newall's observation that the backed blades were restricted to the site's northern portion. The exceedingly slow rate of soil deposition characteristic of the district renders it quite conceivable that two different industries, although separated by a considerable time span, are found on the surface of the same site. Relying on the extent of desert varnish as a means of distinguishing the dissimilar tool traditions would seem in this instance a desperate, but feasible expedient of supporting typological indications. Desert varnish, a patina-like surface-glazing associated with arid conditions, lends itself, to a limited degree, to relative dating of lithic material from a single surface site (Goodwin 1960).

Glover (1967) discusses the possibility that the *tula* slug is a distinct implement type, at least at Mill stream. Apart from the absence of partly worn specimens the criteria he bases this view on is the differing amount of retouch in the proximal dorsal area of the flakes.

The margin formed by striking platform and outer face on the *tula* slugs from Tom Price also displays short abrupt scaled flaking, of the fashion obtained when striking an edge hard at an angle unsuited for proper flaking, or it may appear splintered or bruised. This type of preparation is not restricted locally; it is evident at sites in South Australia and Northern Territory, and also common at some localities in Western New South Wales. Unworn *tula* only rarely possess the same treatment whereas partly worn specimens usually do, to a lesser degree than the fully worn slugs. This suggests the accessory nature of this flaking and its connection with the re-sharpening process. To retouch the *tula* adze it was often removed from the hafting gum

and could then be trimmed by placing the butt end against an anvil. Damage to the proximal margin was inevitable and true bipolar scales, which are consequential to a practice of trimming on the scalar core principle, have been observed in some instances.

As a result of it being retouched only laterally, the *Hamersley* adze is distinguished by the near absence of the described incidental trimming of the proximal end.

At Milli-milli Springs, about 30 km from Tom Price, fragments of bottle glass were collected at an old encampment. Some of these show retouch or use wear; and the blue or purple hues are frequent, which are peculiar to very old manganese containing glass that has been exposed to intense sunlight for a long period and thereby has been subjected to a chemical change producing manganese silicate.

These glass scrapers are representative of the final phase of "stone" knapping in this district because glass could have become readily available inland only during the second half of the nineteenth century. In the light of Newall's remark of glass being a "very favourite material for making implements", the complete lack of glass, or any other allochthonous matter at the Tom Price stations becomes conspicuous. The near absence at these sites of substances that are subject to disintegration is another shred of negative evidence seemingly suggestive of their nonoccupation during historic times. This would not only correspond with Newall's observations at Millstream but also agree with Gould's (1968-178) view of a decline in the habitational use of rockshelters in the Warburton Ranges. His tentative interpretation, a reduction in precipitation and ensuing shift in settlement pattern, would be equally credible and admissible at Tom Price. The present undependability of the intermittent water sources that are found in the close proximity of all Tom Price sites except perhaps Site 6, would severely restrict, if not inhibit, even seasonal occupation of these stations under existing climatic conditions. Palaeoclimatic investigation will eventually show whether it would have been justified to subscribe to the possible Thylacine and tortoise petroglyphs as palaeoenvironmental clues.

Annotations and Acknowledgements

The artifact material from the Tom Price sites is still in my keeping. I will present it later to an appropriate institution for permanent housing. The illustrations in this paper are my own.

I am grateful to Mr. F. D. McCarthy and to Mr. B. J. Wright for their encouragement, and to Mr. D. Landless for assistance in fieldwork and for the loan of his collection. The help of Mr. C. E. Dortch, who made available one of the literary sources, is also much appreciated. Above all, I wish to thank Emeritus Professor A. P. Elkin for his valuable comments.

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ROBERT G. BEDNARIK