Chapter 11
Uncertain Evidence for Weapons and Craft Tools: Functional Investigations of Australian Microliths

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Abstract At least two general hypotheses have been proposed to explain microlith function in Australia. Recent residue studies of Australian microliths, commonly called backed microliths, suggest that these small stone tools were hafted and used in a variety of tasks but lack compelling evidence of use as spear tips or barbs (Hiscock et al. 2011). In contrast, earlier studies have supported Johan Kamminga's conclusion that, on the balance of evidence, Australian microliths were "primarily the penetrating or lacerating elements of composite spears" (Kamminga 1980: 11). I argue that it is premature to reject either of these hypotheses, and argue that current evidence for microlith function is consistent with a limited range of composite tool forms including elements in spears and multi-purpose knives.

Keywords Usewear • Residues • Spears • Stone tools • Backed artifacts

Introduction

Debate about microlith functions in Australia is constrained not so much by available techniques including usewear and residue analysis, but by their limited application to a few stone artifact assemblages. These standardised tools, often called backed microliths, were made from a wide variety of stone types, are found archaeologically across most of mainland Australia (the exceptions being zones in the far north), and they first appeared in the terminal Pleistocene (Slack et al. 2004; Hiscock et al. 2011). Backed microliths did not become abundant and widespread until after the mid Holocene. Studies of usewear, including breakage, and residues on Australian backed microliths suggest that these small implements were used for a range of tasks including craft activities, multi-purpose knives, hunting spears and deadly weapons (see Case Studies below). While hafting traces have not been extensively studied in Australia, it is often presumed that Australian backed microliths were indeed hafted, largely on the basis of plant resin residues (cf. Rots 2016). Elsewhere in the world, backed microliths have been primarily identified as projectile armatures for arrows as well as spears (see Hiscock et al. 2011; Lombard and Wadley 2016; Marreiros et al. 2016). A characteristic of recent arguments about tool function has been reliance on diverse lines of evidence: usewear (including breakage patterns and impact damage), hafting traces and residues from use (Rots 2016). However, these various lines of evidence have rarely if ever been deployed together in an Australian context.

The question can be asked: what makes the Australian evidence of microlith function different from the evidence obtained in other places in the world? One response is to consider diversity of backed microlith functions in other parts of the world (Hiscock et al. 2011: 306). Here, I suggest that despite recent work indicating that Australian microliths were used on a wide range of contact materials, several details are lacking, and questions remain unanswered. For instance, what form(s) did the composite tool (composed of backed microlith elements) possess? Could one or two primary functions (e.g., spear armatures and/or multi-purpose knives) and extensive recycling account for the (apparently anomalous) variation in modes of use and contact materials observed for Australian backed microliths?

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Background

The first systematic usewear study of Australian microliths was based on examination of thousands of specimens in antiquarian museum collections and professionally excavated archaeological collections (Kamminga 1978, 1980). Kamminga identified three forms of fracture damage that could be interpreted as usewear (although not necessarily in all instances): edge fracturing, tip snapping and transverse snapping. He argued that edge fracturing (bending-initiated and feather-terminated scars) on low edge angles and typically below 1 mm in size are not in any way diagnostic on their own. Kamminga suggested that tip fracturing was also of little diagnostic value – in part because this kind of damage was observed on experimental stone tools used for other activities (e.g., tip snapping on 50% of experimental stone awls used to pierce kangaroo skin). The third type of damage he observed was transverse snapping, which he also argued was not diagnostic of function because it occurred on many experimental tools in the course of manufacture and also on tools used for quite different tasks. Kamminga did not study use-polishes under vertical incident light but used a stereoscopic microscope with oblique reflected light mostly at low magnification.

Although distinctive projectile usewear (e.g., burin-like impact scars) observed under the oblique light microscope was rare, he argued that the low incidence of usewear in conjunction with other available evidence supported his interpretation that the primary function of microliths examined was to serve as penetrating or lacerating elements of composite spears. In his conclusion, Kamminga explicitly did not exclude the possibility of other backed microlith functions for assemblages or specimens in particular areas of prehistoric Australia. Burin-like impact damage or "longitudinal macrofracture" (Dockall 1997), a potentially significant form of usewear, is rare but has been found occasionally (e.g., Clark 1979). Although not commonly reported in Australia, burin-like impact is a useful indicator of head-on impact.

Boot (2005) further explored the potential of transverse snaps via experiments that included manufacturing, backing, spear throwing and woodworking. His experiments included two spears each armed with seven backed silcrete microliths, each thrown twice. Four of the barbs on the first spear, including a barb that contacted bone, were undamaged and three sustained one to four fractures (apparently after contact with the ground). Four barbs on the second spear did not have contact with the target (gel block with bone inserts) and three sustained edge fractures after contact with the ground. The three barbs that entered the target sustained tip snapping. Key conclusions were that usewear was sometimes absent but that the proportion of transverse snapping may be indicative, but not necessarily diagnostic of projectile armatures.

Recent unpublished studies by Chris Clarkson and his students at the University of Queensland have further explored the nature of damage and potentially diagnostic impact fractures on projectile tips and barbs. Preliminary results suggest a range of fracture types, scar sizes and breakage location although the incidence of tip impact fracture was often low, only about 10% (Chris Clarkson, personal communication; Clarkson 2016). A recent unpublished report (Fullagar 2011) for the Pilbara in northwestern Australia indicates that 14/74 (19%) of all backed microliths had barb or tip impact damage; and 3/8 (37%) Bondi points (asymmetrical backed microliths) have tip damage *consistent with* (rather than *diagnostic of*) impact.

As is the case for stone knives and projectile points (e.g., Akerman et al. 2002), few if any backed microlith studies in Australia have integrated all lines of evidence (e.g., usewear, manufacturing damage, hafting traces, breakage patterns, diagnostic impact marks and residues). To evaluate how reliable and convincing our current methodology is, I address evidence from two key studies that provide quite different interpretations of function. I do not question the actual results of usewear/residues in these recent studies; nor do I question the significance of context or that different site settings are indeed likely to reveal different data sets and interpretations. I simply consider the possible interpretations and ask two questions. Are the backed microlith data in Case Study 1 consistent with a different hypothesis; that the primary function was spear armatures? And are the backed microlith data in Case Study 2 consistent with an alternative hypothesis: that a couple of backed microliths were used as spear armatures but most were unrelated to the cause of death, and merely the remnants of the victim's toolkit of multi-purpose, multi-functional implements?

Case Study 1

Robertson (2005) undertook a usewear/residue study at three sites in the Mangrove Creek catchment just to the north of Sydney in southeastern Australia. Publication of the microliths in three rock shelter assemblages (Deep Creek, Emu Tracks and Mussel) revealed traces of six classes of contact material (plant, wood, bone, skin, feather, flesh) and five modes of use (cutting, drilling, incising, projectile/thrusting and scraping) in various combinations (Robertson et al. 2009). The apparent projectile/thrusting traces were associated with wood and other plant working, and consequently the interpretation identified no unequivocal evidence for hafted microliths on spears and or projectiles. Robertson et al. (2009: 305) infer that "…backed artifacts were used on multiple occasions and/or were often multi-purpose and multi-functional." Other studies in the Hunter Valley, further

Table 11.1 Frequency (%) of task association and function/mode of use for backed artefacts analysed by Robertson and colleagues. Note that the percentages refer to proportions of used specimens and multi-functional tools are counted more than once. Note also that percentages of unknown function and unknown task association are not included. (See Robertson et al. 2009 for details)

	Site		
	Deep creek n = 41 all specimens	Emu tracks n = 65 all specimens	Mussel n = 93 all specimens
Task association identified	n = 39 specimens	n = 49 specimens	n = 26 specimens
Plant (incl. wood)	24.3	43.8	34.8
Animal	81.2	66.8	6
Function/Mode of use identified	n = 37 specimens	n = 49 specimens	n = 39 specimens
Parallel to long axis	59.5	60.4	34.8
Transverse	54.1	97.9	37.8
Incising	37.8	33.3	13.6

to the north, suggest a similar range of functions but with more evidence of spear armature function (Fullagar et al. 1994).

The task associations identified included a high proportion of animal contact materials (bone, skin, feather and flesh) at Deep Creek and Emu Tracks, and a high proportion of use traces associated with directionality aligned parallel with the long axis of the backed microlith, and incising compared with transverse motion (e.g., scraping). Tip use associated with incising is also indicated in Table 11.1.

The absence of diagnostic impact traces on specimens with animal traces might be explained by robust artifact morphology, particular hafting configurations, the experimental evidence that such traces are rarely observed or the tool stone (e.g., silcrete) which usually lacks the micro-polish traces more often observed on fine-grained flint. Projectile/thrusting traces were often observed in association with plant and woodworking traces at Mussel.

Without further data and experimental testing of hafting configurations, interpretation of the residues remains uncertain. Although there is little doubt about the range of contact materials demonstrated by Robertson et al. (2009), the plant/wood residues might also be consistent with specimens hafted on wooden shafts or associated with other plant materials (e.g., as bindings). The percentage of specimens with more than one function is interesting: Deep Creek (60%), Emu Tracks (9.2%) and Mussel (41.7%). Multi-functionality in conjunction with hafting, which seems to be generally inferred for all specimens, suggests a multi-purpose, composite knife with a sharp tip, but is consistent also with a detachable spear fore-shaft.

There may be good counter arguments to these suggestions, but the scarcity of impact traces may not be conclusive evidence for the absence of backed microliths functioning as spear armatures at these sites and without more detailed study of hafting traces and configurations it remains uncertain whether backed microliths are primarily associated with more than one class of composite tool (e.g., knives, spears, drills, etc.).

Case Study 2

In the Sydney region, Fullagar (2009) and McDonald et al. (2007) examined usewear/residues and apparently diagnostic impact fractures on microliths associated with the violent death of a human victim (Table 11.2). The evidence suggested various possible weapons, which most likely included a spear (thrown or thrusted). Given the likely weapon entry orientations, it was concluded that a spear was used in at least one body penetration. Barb and tip fractures on the microliths suggested possible microlith orientations in a haft. The only surviving residue detected was bone tissue attached to microlith tips that were embedded in the human bones. Nevertheless, some of the backed artifacts displayed usewear suggestive of other functions (e.g., an awl). However, it was suggested that any microlith might serve equally well as a barb or lacerating element in a composite spear.

At least six specimens had traces of use with no definite functional assignation. And of six specimens likely to be associated with hard contact (probably from a thrusted or thrown spear) the use traces on their own do not provide unequivocal or diagnostic evidence; some uncertainty remains and an experimental testing program is needed to assess hafting arrangements (see Fig. 11.1) and the inferred impact damage. The conclusive evidence for spears (thrown or thrusted) is contextual, and provided by several specimens buried and oriented in particular skeletal remains, one with bone impacted at the tip. Although similar usewear is found on some other specimens, it is uncertain whether they are all elements of the deadly weapons used.

At least one specimen had clear micro-polish indicating skin working, most likely repeated hide penetrations. I interpreted this implement to be an awl, and not a projectile tip, since it lacked diagnostic indications of impact damage, despite the fact that the lack of impact damage is not uncommon in stone-tipped spear experiments. It is possible that this "awl" could have been subsequently hafted and used as a spear tip, but had simply avoided contact with a hard surface. Alternatively it could have had served more than one purpose, originally as part of an implement used as an awl (e.g., the tip of a composite knife) and later recycled as a spear armature.

Most specimens, which lack apparently diagnostic impact fractures, may in fact have been part of the victim's tool kit, and the remains of a few multi-functional backed microlith implements not dissimilar to the findings of Robertson et al. (2009) (Table 11.2).

Table 11.2 Summary of use-wear and residues on stone artifacts from the Narrabeen site. Reproduced from *Antiquity* (McDonald et al. 2007, Table 1 at http://www.antiquity.ac.uk/projgall/mcdonald). [a]Type refers to presence of backing and technological classes. [b]Tip cross sectional area after Shea 2006. [c]Observations are from incident light only. Residues have not yet been removed for study under transmitted light microscopy. [d]Use refers confidence of interpretations, as follows: 0 (no traces of use), 1 (possible), 2 (probable) and 3 (definite). [e]Function refers to the likely cause of dominant usewear: [f]protruding oblique impact, [g]head-on impact, [h]dominant function not from hard impact. Bold emphasis indicates conjoin set

OON No.	Type[a]	Location	Refit with no.	Stone material	Length (mm)	Width (mm)	Thick. (mm)	TCSA[b]	Retouch	Damage	Usewear	Residues[c]	Hafting	Use[d]	Function[e]
51	Backed flake	Backed blade, vertebral column		Pink-red silcrete	17.4	10	8	40	Bi-directional backing	Broken tips	Rounding on backed edge; none on chord, use scar at proximal tip; cf. barb	Grey residue on backed edge	Probably hafted. Grey residue is possibly resin	3	[f]Impact, probably projectile barb
2	Backed flake	Around skull		Grey quartzite	21	11	5	27.5	Bi-directional backing	No breakage	Rounding, polish, striae	Dark smears cellulose, starch on backed edge	Probably hafted. Dark smears are possibly resin	3	[h]Piercing and slicing skin. Not from a projectile.
3	**Backed broken flake (tip)**	**Around skull**	**4**	**Pink silcrete**	**10**	**6.3**	**4.2**	**13.2**	**Bi-directional backing**	**Crushed tip**	**Crushing at tip**		**Complex fracture, probably from hafting configuration**	**3**	[g]Likely damage from projectile tip
4	**Backed flake**		**3**	**Pink silcrete**	**16**	**10**	**11**	**55**	**Bi-directional backing**	**Steps from break**	**Scaring on chord**	**Plant tissue, charcoal, carbonate**		**3**	
5	Backed flake	West side vert column		Red silcrete	17.4	7.7	5.8	22	Uni-directional backing initiated on ventral		Impact scar on tip		Probable	3	[g]Likely damage from projectile tip
6	**Backed fragment**	**Underneath skull**	**8**	**Red silcrete**	**13.3**	**8.4**	**5.3**	**22.3**	**Bi-directional backing but rare**	**Break is probably along 'old' fracture caused by backing**	**Probable impact scar**	**Impacted yellow tissue same colour as bone fragments**	**Probable**	**2**	[g]Likely damage from projectile tip
8	**Fragment (tip)**	**Underneath skull**	**6**	**Red silcrete**	**6**	**4.6**	**2.4**	**na**						**2**	
7	Backed flake	Excavated around skull		Grey quartzite	18.8	8.6	4.6	19.8	Bi-directional backing near tip		Rounding and step scar on tip	Dark residues on backed edge	Dark residue is possibly hafting resin	3	Uncertain, tip used
9	Backed flake			Quartzite	14.2	6.5	3.6	11.7	Bi-directional backing		Possible impact scar			1	Uncertain, tip used
10	Bipolar piece	Around skull		Quartz	15.7	7	4.4	15.4	Backing not clear	Bipolar crushing and scars	Uncertain	Carbonised plaques – probably not from use		1	Uncertain, possible use of tip

(continued)

Table 11.2 (continued)

OON No.	Type[a]	Location	Refit with no.	Stone material	Length (mm)	Width (mm)	Thick. (mm)	TCSA[b]	Retouch	Damage	Usewear	Residues[c]	Hafting	Use[d]	Function[e]
11	Backed flake	Vertebral column		Quartzite	15.1	10.4	4	20.8	Bi-directional backing, not very steep	Tip broken	Scars associated with broken tip		Probable	3	[f]Hard impact, possibly from projectile
12	Backed flake			Red silcrete	15	7.5	5.6	21	Uni-directional backing, initiated on ventral	Tip broken	Rounding and longitudinal striations near tip			3	[h]Uncertain, probably not hard impact, awl or projectile?
13	Backed fragment	Dry sieved		Quartzite	19.7	10	4.2	21	Bi-directional backing	Tip crushed or broken?	Scarring on chord, tip crushed	Black residue on backed edge	Uncertain	2	Uncertain, possible use of tip, awl or projectile?
14	**Backed fragment**	**Dry sieved**	**15**	**Red silcrete**	**11**	**7.6**	**3.8**	**14.4**	**Bi-directional backing**	**Tips broken**	**Rounding, bending scars along chord**	**Sediment, unidentified particles**	**Probably hafted**	**3**	[f]Hard impact possibly from projectile; also
15	**Backed fragment (tip)**	**Inside vertebral canal. Dry sieved**	**14**	**Red silcrete**	**4.5**	**3.6**	**2**	**na**	**Bi-directional backing**	**Missing fragments.**	**Impact scar cf. barb**			**3**	considerable damage along chord
16	Backed flake	Between L1 and L2		Red silcrete	18.8	8.8	3.8	na	Bi-directional backing	Tip broken	Impact scar cf. barb, scarring		Probably hafted	3	[f]Hard impact possibly from projectile
17	Fragment			Grey quartzite	7.5	5.6	4.1	na	Possible backing, uni-directional	Broken	Impact damage unclear			1	Uncertain, possible use of tip

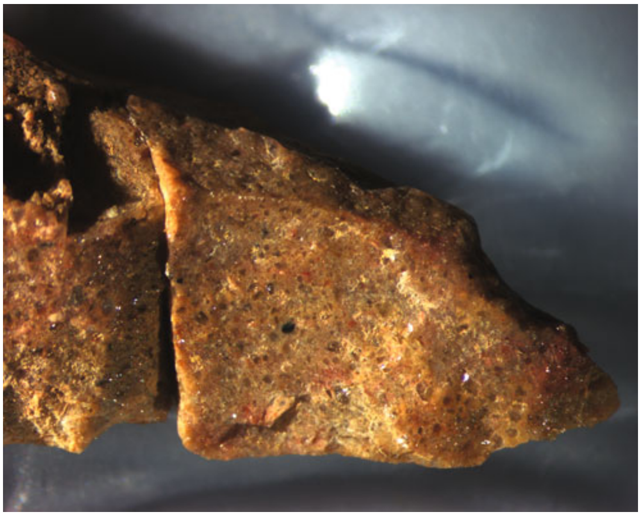

Fig. 11.1 Tip break of refitted specimens OON4 (left) + 3 (right), showing a long narrow impact fracture (initiated at the tip) with a step termination that initiates a spin off fracture (with step termination). The maximum length of OON3 is 10 mm

Discussion and Conclusion

As stated above, I do not doubt the range of contact materials or modes of use recently proposed for Australian backed microliths. The essential question is: are there alternative explanations that limit the kind of composite tool to which microliths were hafted? Second, did most microliths found in Australia serve one primary function? The case studies above suggest uncertainties that imply a need for more experimental and archaeological data on hafting configurations, and there is a need to further reconstruct the types of prehistoric composite implement(s) on which microliths were fixed. Moreover the archaeological context raises a key issue. The Narrabeen microliths with compelling evidence for use as hafted spear tips and barbs are found at the likely kill site. In contrast, the Mangrove Creek microliths are found at what appear to be dwelling locations where tools, even those with a dominant primary function, might be repaired, removed from hafts and used incidentally for a range of incidental tasks.

Could one or two composite tool forms account for the variation observed in backed microlith function? I suggest that without detailed study of hafting arrangements and further projectile damage experiments, it is premature to conclude that microliths were not commonly utilised elements i.e., armatures on thrown spears in Australia. Robertson et al. (2009) raise another key issue worthy of further study: "… that backed artifacts might sometimes have been modified by further retouching, perhaps in association with re-hafting events". This latter issue of further modification suggests that implement shape and extent of retouch may be linked with reduction stages.

The traces found on Australian backed microliths are consistent with two main tool forms: composite spears and multi-purpose knives with sharp tips (see Fig. 11.2). The haft configuration and variation of spear armatures has not been securely reconstructed, but evidence at the Narrabeen site suggests a series of hafted elements serving as tips and barbs. The suggested haft configuration of multi-purpose knives has not been tested experimentally, but evidence from several sites suggests that such an implement would have fixed elements (for cutting and scraping) with a protruding tip (used for awling and piercing, drilling and incising).

While study of usewear and residues has made considerable advances, future studies should target hafting traces, impact scars and breakage patterns on experimental and archaeological specimens. White (2011; see also the comments that follow his article) reviewed "utilitarian explanations" (e.g., backed microliths as standardized, portable reliable tools) and has argued that "social explanations" need to be given more weight (e.g., stylistic phenomena and symbolic associations). One way to investigate this would be via a firmer reconstruction of the complete implement(s) to which backed microliths were hafted.

White (2011) also notes previously postulated links between climate change, faunal remains, hunting, backed microliths and the need for more efficient tools. He asserts that links are based on that assumption that backed artifacts were primarily made for spear armatures, which, he goes on to say "…we now know was almost certainly not generally the case". If this is the current consensus, I cannot agree. I do not think that any study has yet demonstrated that Australian backed microliths are *generally* not projectile armatures. Robertson et al. (2009) may well be correct in their interpretations that seem to eliminate a projectile function at the analysed sites. However, the archaeological context (e.g., at habitation vs. kill sites) of microlith occurrence needs further theorising; and the diagnostic indicators of microlithic armatures requires further experimental testing with Australian tool stones. Moreover, the argument that Australian backed microliths are *generally* not elements of projectile weapons remains a proposition that needs to be tested by integration of key multiple lines of evidence: hafting traces, usewear and breakage patterns, contact residues and archaeological context.

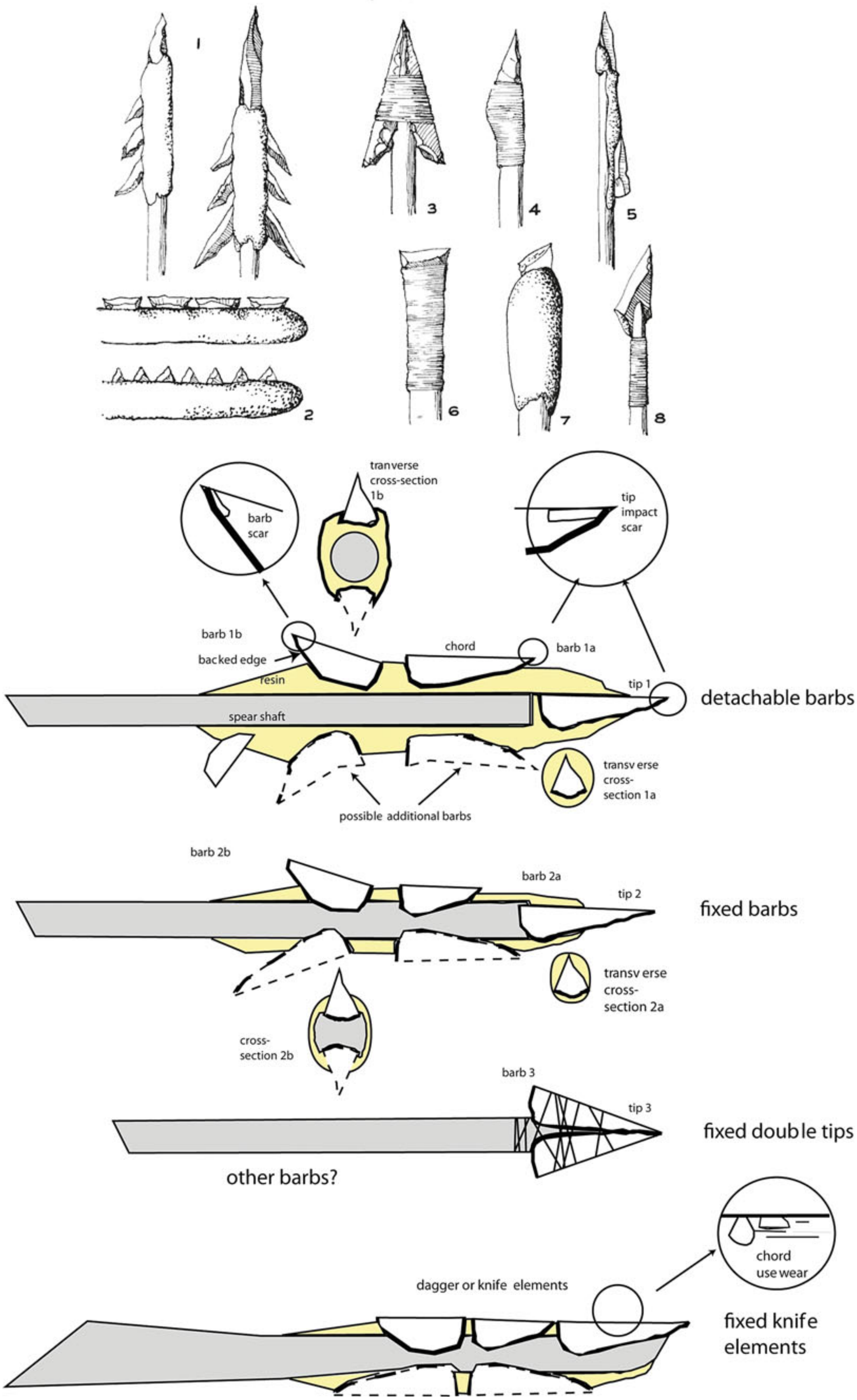

Fig. 11.2 Possible hafting arrangements of backed artifacts. McCarthy's (1976, p. 51) suggested hafting arrangements (top, nos. 1–8) reproduced with permission from The Australian Museum. [Reproduced from Fullagar et al. (2009)]

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References

Akerman, K., Fullagar, R., & van Gijn, A. (2002). Weapons and Wunan: Production, function and exchange of spear points from the Kimberley, northwestern Australia. *Australian Aboriginal Studies, 1*, 13–42.

Boot, P. (2005). Transverse snapping on stone artefacts. In I. McFarlane, M. J. Roberts & R. Paton (Eds.), *Many exchanges: Archaeology, history, community and the work of Isobel McBryde* (pp. 343–366). Canberra: Aboriginal History Monograph.

Clark, D. (1979). An impact burin on a Bondi point from Hoods Drift, South Australia. *The Artefact, 4*, 68–72.

Clarkson, C. (2016). Testing archaeological approaches to determining past projectile delivery systems using ethnographic and experimental data. In R. Iovita & K. Sano (Eds.), *Multidisciplinary approaches to the study of Stone Age weaponry* (pp. 189–201). Dordrecht: Springer.

Dockall, J. E. (1997). Wear traces and projectile impact: A review of the experimental and archaeological evidence. *Journal of Field Archaeology, 24*, 321–331.

Fullagar, R. (2011). Usewear and residues on stone tools from MIB25 PAD3, Pilbara, WA. Unpublished Report to ACHM and Rio Tinto.

Fullagar, R., Furby, J., & Brass, L. (1994). Stone artefacts from Bulga, Hunter valley. Unpublished report for M. Koettig. [Fullagar, R., J. Furby and L. Brass 1994. Use-wear and residue analysis of stone tools from Bulga. In Bulga Lease Authorisation 219 salvage excavations. A report to Saxonvale Coal Pty Ltd, by M. Koettig, Vol. 5, pp. 26–105].

Fullagar, R., McDonald, J., Field, J., & Donlon, D. (2009). Deadly weapons: Backed microliths from Narrabeen. In M. Haslam, G. Robertson, A. Crowther, S. Nugent & L. Kirkwood (Eds.), *Archaeological science under a microscope: Studies in residue and ancient DNA analysis in honour of Thomas H. Loy* (pp. 248–260). Terra Australis 30, Canberra: ANU e-Press.

Hiscock, P., Clarkson, C., & Mackay, A. (2011). Big debates over little tools: Ongoing disputes over microliths on three continents. *World Archaeology, 43*, 653–664.

Kamminga, J. (1978). *Journey into the microcosms. A functional study of prehistoric Australian stone tools*. PhD dissertation, University of Sydney.

Kamminga, J. (1980). A functional investigation of Australian microliths. *The Artefact, 5*, 1–18.

Lombard, M., & Wadley, L. (2016). Hunting technologies during the Holwiesons Poort at Sibudu Cave: What they reveal about human cognition in KwaZulu-Natal, South Africa, between ~65 and 62 ka. In R. Iovita & K. Sano (Eds.), *Multidisciplinary approaches to the study of Stone Age weaponry* (pp. 273–286). Dordrecht: Springer.

Marreiros, J., Bicho, N., Gibaja, J., Cascalheira, J., & Pereira, T. (2016). Early Gravettian projectile technology in Southwestern Iberian Peninsula: The double backed and bipointed bladelets of Vale Boi (Portugal). In R. Iovita & K. Sano (Eds.), *Multidisciplinary approaches to the study of Stone Age weaponry* (pp. 147–158). Dordrecht: Springer.

McCarthy, F. (1976). *Australian Aboriginal stone implements, including shell, bone and tooth implements* (2nd ed.). Sydney: Australian Museum Trust.

McDonald, J., Donlon, D., Field, J., Fullagar, R., Coltrain, J., Mitchell, P., et al. (2007). The first archaeological evidence for death by spearing in Australia. *Antiquity, 81*, 877–885.

Robertson, G. (2005). *Backed artefact use in eastern Australia: A residue and use-wear analysis*. PhD dissertation, University of Queensland.

Robertson, G., Attenbrow, V., & Hiscock, P. (2009). Multiple uses for Australian backed artefacts. *Antiquity, 83*, 296–308.

Rots, V. (2016). Projectiles and hafting technology. In R. Iovita & K. Sano (Eds.), *Multidisciplinary approaches to the study of Stone Age weaponry* (pp. 167–185). Dordrecht: Springer.

Shea, J. J. (2006). The origins of lithic projectile point technology: Evidence from Africa, the Levant, and Europe. *Journal of Archaeological Science, 33*, 823–846.

Slack, M., Fullagar, R., Field, J., & Border A. (2004). New Pleistocene ages for backed artefact technology in Australia. *Archaeology in Oceania*, *39*, 131–137.

White, J. (2011). Backed artefacts: Useful socially and operationally. *Australian Archaeology, 72*, 67–75.