Revisiting Rapa Nui Matā

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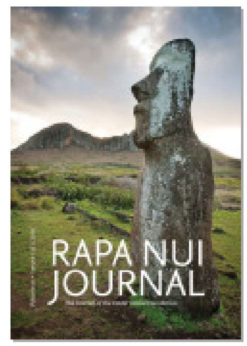

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Revisiting Rapa Nui Matā

Robin Torrence[a,b,c], Nina Kononenko[a,b], Peter White[b]

Based on a use-wear and residue analysis of a collection of 12 matā in the Australian Museum, Sydney, we question the value of relying on tool shape as an adequate indication of past use. Although the tools in this collection were used for a broad range of tasks, including plant processing, wood, shell and bone working, and cutting and piercing of flesh or skin, some may have been used in interpersonal conflict. The study illustrates the value of museum ethnographic collections for understanding past tool use.

Keywords: Rapa Nui, matā, use-wear, residue

Introduction

Recent scholarship on Rapa Nui has mounted an impressive set of data contesting the role that societal conflict played in cultural change prior to European contact (e.g., Lipo & Hunt 2009; Hunt & Lipo 2011). One key part of the critique of previous theories revolves around hafted obsidian artifacts known as *matā*, often stated to have been spear points used in internecine warfare on the island. In a recent article, Lipo et al. (2016) tested three hypotheses concerning the relationship between the shape of *matā* and their possible use as "weapons of war" and found they were not supported. The lack of a "spear-like shape" on the majority of the 423 artifacts in their sample combined with the considerable variability in shape led to their conclusion that "the evidence to support *matā* as lethal weapons of warfare does not exist" (Lipo et al. 2016:184). Based on a new study of use-wear, we identify problems with accepting that *matā* were never used in warfare.

There appear to be three main problems with attempts by previous scholars to understand how *matā* were used. Firstly, the classification of an artifact as a *matā* is based solely on the presence of a retouched stem. Surprisingly, the blade portion of the tool, where the working edge is located, is not part of the definition. It is not clear why all tools with a "handle" should share a function. Secondly, one can question whether stone tool morphology is an accurate guide to how the artifacts were actually used. For example, Robertson et al. (2009) demonstrate convincingly that Australian-backed artifacts with identical forms served a wide range of uses. We argue that a more appropriate way to reconstruct how *matā* were really used is to employ well-understood use-wear methods that combine a program of replication with high-powered microscopy. The resulting determinations inspire high levels of confidence because they are based on an extensive number of experiments using obsidian and the wear traces have been confirmed by multiple researchers (e.g., Hurcombe 1992; Kononenko 2011; Van Gijn 2014; Stemp 2016a, 2016b). Unfortunately, this technique has largely been overlooked in discussions about the function

[a]Geosciences and Archaeology, Australian Museum, Australia. [b]Archaeology, SOPHI, University of Sydney, Australia. [c]Centre for Australian Biodiversity and Heritage, University of Wollongong, Australia.

of the *matā*, despite previous use-wear studies of 12 artifacts that identified plant processing as the primary use (Church & Rigney 1994; Church & Ellis 1996; Church 1998). Given these studies, Lipo et al. (2016:184) do conclude that there was more than one function for *matā*, but they disregard the possibility of personal violence. Finally, variation in shape may not necessarily be determined by intended function. Variability may actually have been a desired feature of tools if they played a role in expressing individual identity.

In this study, we begin the process of unpacking the highly variable category encompassed by Rapa Nui *matā* by undertaking a use-wear and residue study of 12 *matā* from the Australian Museum ethnographic collection. Despite the small sample size, these new use-wear findings question the value of relying on morphometric variation as a sole and accurate measure of how tools were used or not used as proposed by Lipo et al. (2016). Our study also illustrates both the values and limitations of using historic ethnographic collections for understanding ancient tool use.

Methods and Materials

The majority of the Australian Museum *matā* were obtained in the nineteenth century, probably as purchases from local residents on Rapa Nui, although a recent acquisition is claimed to have been recovered from a cave on the island (Table 1). The metric data in Table 2 together with Figures 1–7 demonstrate that this small sample encompasses a broad range of shapes paralleling the large morphometric variability reported by Lipo et al. (2016), although the average size is larger, as might be expected for a selection made for sale to private collectors (Figure 1).

In order to remove grease from recent handling and loosely adhering contaminants such as dust acquired from over a century of sitting on a museum shelf, the artifacts were immersed for 3–5 min in an ultrasonic bath containing warm water to which a few drops of nonabrasive liquid detergent were added, air dried, and wiped gently with diluted ethanol (30%) using a Kimwipe ©. They were examined under a digital microscope (Dino-LiteTM AM413ZT) with reflected light and magnifications from 10× to 100× and then with an Olympus BX60M metallurgical microscope fitted with vertical incident and transmitted light sources, bright and dark field illuminations, and cross-polarizing filters under magnifications ranging from 50× to 1000×. An Olympus DP72 camera with Soft Imaging System GmbH was used to make a photographic record of use-wear traces and residues.

Table 1. Acquisition of Australian Museum *matā*.

Registration Numbers	Date	Source	Acquisition Details
A18926-28	1882	J. Weisser	Four-day visit to Rapa Nui (Ayres & Ayres 1995)
E30734-41	1920	Capt. J. F. Robins (RAN)	Unknown; donor states that some Rapa Nui artifacts in this collection are said to have been obtained in 1860 (AM collection records)
E65164	1971	Dr. Solomon M. Bard	“Found in a cave near Ahu Vaiteke” (AM collection records)

Table 2. Australian Museum *matā* metrics.

ID	Maximum Length (mm)	Maximum Width (mm)	Weight (g)	Stem Length (mm)	Stem Thickness (mm)	Stem Width (mm)	Blank	Stem aligned	Stem Location on Flake	Stem Retouch	Blade Shape	Edge Shape Opposite Stem
A18926	n/a	76.2	130.1	26.9	11.2	21.6	cortical flake	Y	Proximal	Bifacial	Square	?Broken
A18927	118.7	110.6	155.4	27.2	9.6	25.8	flake	N	Proximal	Unifacial	Triangle	Point
A18928	90.0	84.0	129.5	19.8	14.8	23.6	flake	Y	Proximal	Bifacial	Horizontal rectangle	Straight
E30734	76.9	120.5	86.6	29.6	7.7	19.5	cortical flake	Y	Lateral	Bifacial	Horizontal rectangle	Straight
E70735	107	116	141.6	37	13	21	kombewa flake	Y	Proximal	Bifacial	Triangle	Point
E30736	114	111	176.4	32	6	21	kombewa flake	N	Proximal	Bifacial	Oval	Convex
E30737	122	79	115.3	27	14	22	flake	Y	Lateral	Bifacial	Triangle	Point
E30738	93	121	100.3	31	12	23	flake	N	Lateral	Bifacial	Horizontal rectangle	Point
E30739	116	85	145.4	26	9	21	kombewa flake	Y	Lateral	Unifacial	Triangle	Point
E30740	123	106	200.4	27	11	23	cortical flake	Y	Lateral	Bifacial	Triangle	Point
E30741	139	104	292.2	37	17	24	flake	N	Lateral	Bifacial	Horizontal rectangle	Straight
E65154	73	45	35.3	30	7	18	flake	Y	Lateral	Unifacial	Triangle	Point
Mean	107	96	142.4	29	11	22						
SD	21	23	63.6	5	3	2						

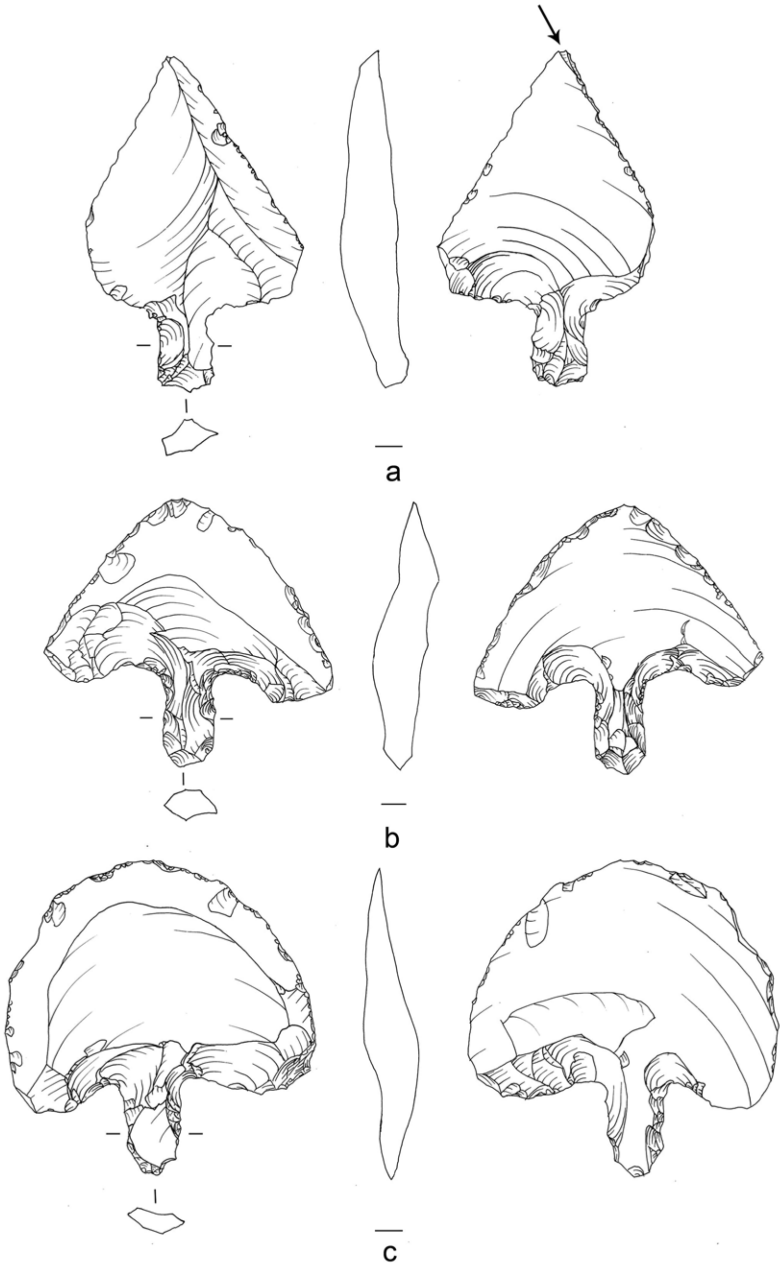

Fig. 1. *Matā* from Australian Museum: a) E30737 used for piercing and cutting soft pliable material, for example, flesh or skin; b) E30735 used for cutting a soft pliable material, for example, flesh or skin; and c) E30736 used for scraping bone or shell. Scale bars are 1 cm.

The determination of tool use was based on characteristic wear attributes shown in previous experimental studies to be especially valuable for reconstructing wear traces on obsidian artifacts. These include edge scarring, edge rounding, attrition, striations, polish, and residues (e.g., Hurcombe 1992; Aoyama 1995; Kononenko 2011; Stemp 2016c).

A comparison of the wear attributes on the artifacts with experimental use-wear data informed by ethnographic sources also assisted identification of the mode of use and the material worked, following procedures developed for obsidian (e.g., Kamminga 1982; Fullagar 1986; Lewenstein 1987; Hurcombe 1992; Kononenko 2011; Kononenko et al. 2015, 2016; Stemp 2016a, 2016b, 2016c).

Results

Extensive taphonomic damage was identified. First, it was not possible to remove all the modern surface residues. In particular, a lacquer-like substance coated a large portion of the surface of six tools. It is not known whether it was applied in Rapa Nui or by collectors or museum curators to enhance or preserve the tool surface. Secondly, postdepositional damage by trampling and/or during transport and handling by collectors or within the museum obscured much of the tool surfaces. Despite these difficulties, it was still possible to locate a sufficient number of spots where wear traces were preserved. These enabled a reconstruction of mode of use (cutting, scraping, etc.), worked material, and presence/absence of hafting with high confidence in many cases. Interpretations of the use-wear traces are summarized in Table 3. The variable states on which these are based and the confidence levels of our interpretations are reported in full in the Appendix.

As expected given the previous use-wear research (Church & Rigney 1994; Church & Ellis 1996; Church 1998), some of the Australian Museum *matā* with wear traces were used to chop, whittle, or scrape woody plants (25%) or soft plant material (leaves, green stems, grasses) (12.5%) (Table 3: Figures 2 & 3) E30736 illustrates a new use for *matā*. Several spots with severe attrition and rounding as well as slightly diagonal thin striations

Table 3. Summary of use-wear and residue interpretations.

ID	Proposed Contact Material	Proposed Mode of Use	Proposed Hafting Material
E30734	soft, elastic material, possible fish	cutting	probable wooden handle
E30735	soft, elastic material (meat, flesh, skin)	cutting	probable wooden handle
E30737	soft, elastic material (meat, flesh, skin)	cutting, both edges	probable wooden handle
E30740	soft, elastic material (meat, flesh, skin)	cutting	probable wooden handle
E30741	soft woody plant	chopping	probable wooden handle
E65154	soft, siliceous woody plant	whittling, both edges	probable wooden handle
E30739	soft, siliceous, and resinous plant or grasses	scraping	probable wooden handle
E30736	shell or bone	possible scraping	probable wooden handle
E30738	not used	not used	probable wooden handle
A18926	not used	not used	absent
A18927	not used	not used	absent
A18928	not used	not used	absent

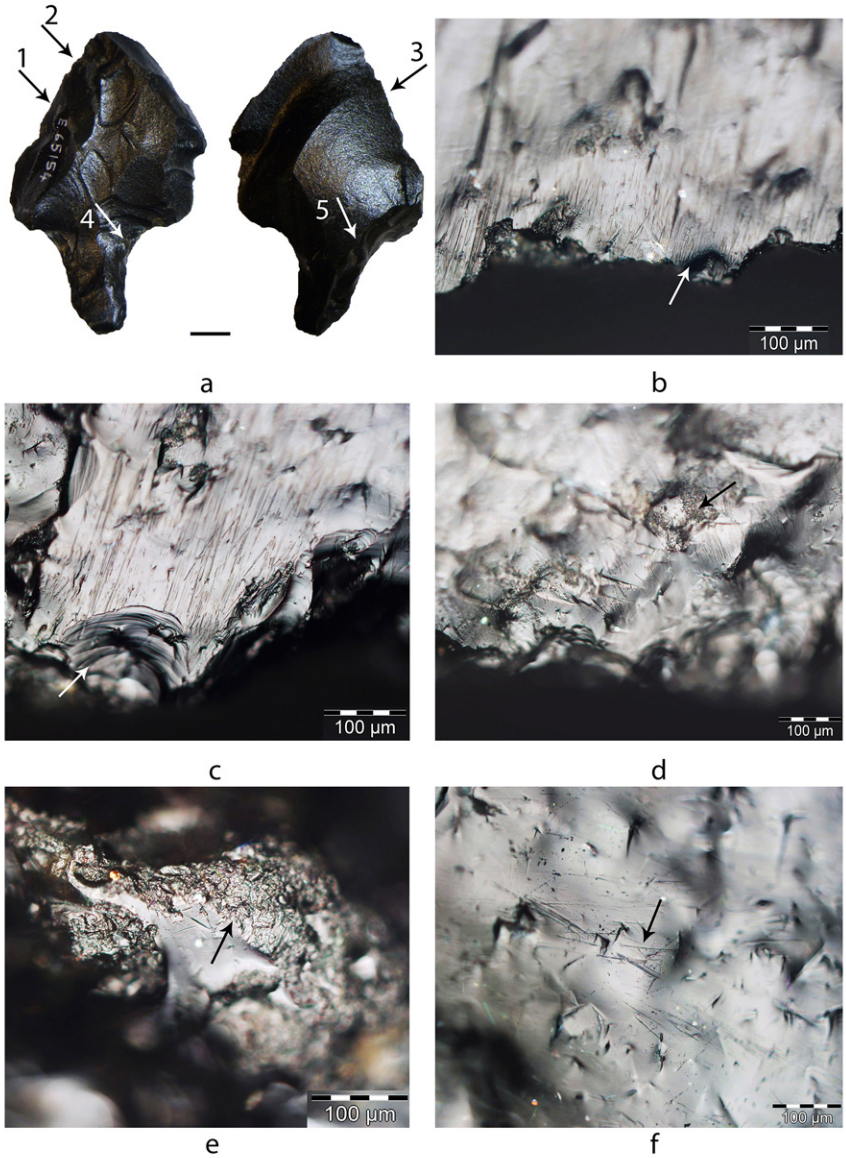

Fig. 2. Soft, siliceous woody plant: E65154. a) location of images, scale bar is 1 cm; b) point 1, edge rounding and polish; c) point 2, edge rounding, polish, and striations; arrow indicates postdepositional scars with freshly flaked surface; d) point 3, scars, polish, striations, and surface attrition; e) point 4, attrition and striations on ridge of stem; and f) point 7, crossed striations on surface of stem. Use-wear features are indicated by arrows.

are comparable with experimentally replicated wear patterns on tools used to scrape marine shell (Kononenko 2011: Plates 96A-B, 97A-B). It therefore seems likely that this tool was used for a scraping a hard material, probably bone or shell (Figure 4).

Surprisingly, given the Lipo et al. (2016) predictions based on comparisons with extensive experimental data, the most common use material identified, comprising half of

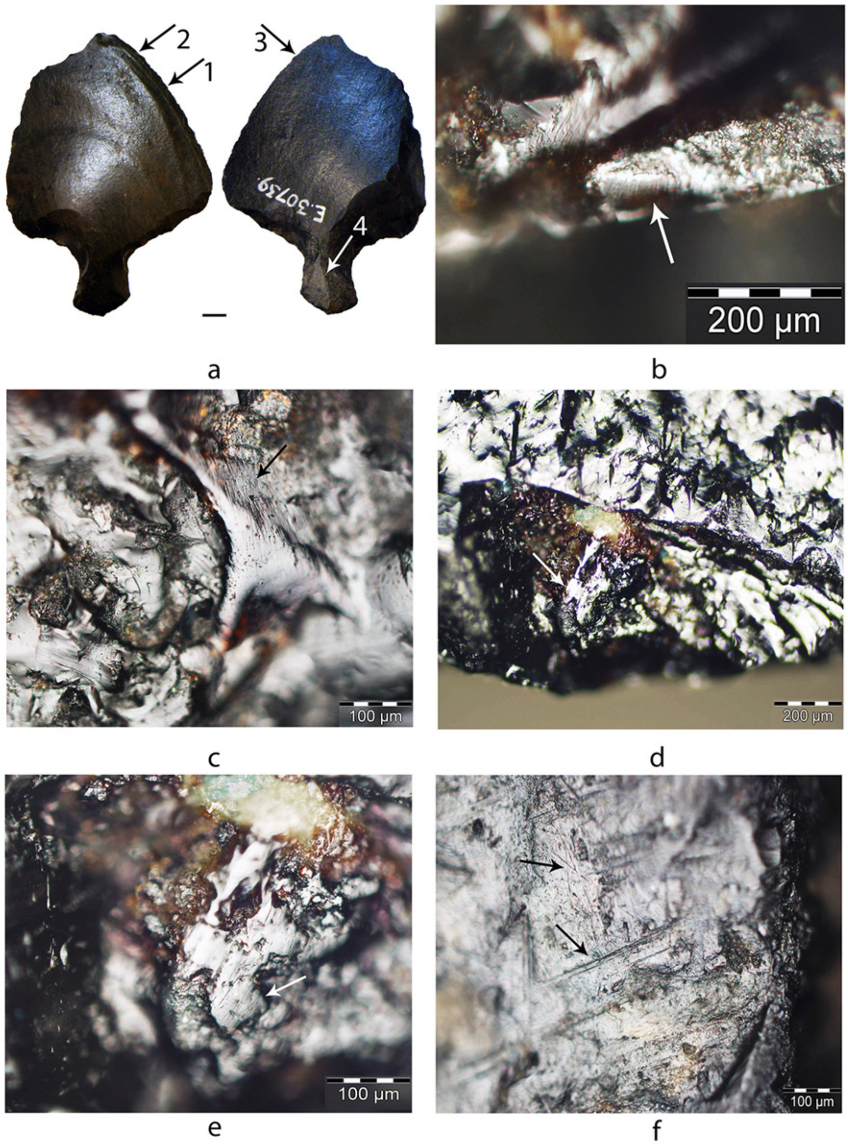

Fig. 3. Soft, siliceous, and resinous plant or grasses: E30739. a) location of images, scale bar is 1 cm; b) point 1, scars, edge rounding, polish, striations, and residues; c) point 2, polish and striations on elevated points of surface topography; d) point 3, scars, resin-like residues within scar and spot of elevated surface with polish and dense striations; e) point 3, polish, striations, and residues within scar; and f) point 4, rough striations and residues on ridge of stem. Use-wear features are indicated by arrows.

the Australian Museum *matā* with preserved wear traces, is a soft, pliable substance most likely to have been flesh or skin (Hurcombe 1992:43–44; Aoyama 1995; Kononenko 2011:32–33; Kononenko 2012; Stemp & Awe 2014; Stemp 2016a, 2016b, 2016c). Within this group, E30734 was probably used for cutting/slicing fish (Figure 5). This interpretation is based on the continuous microscars and light to developed polish. Key

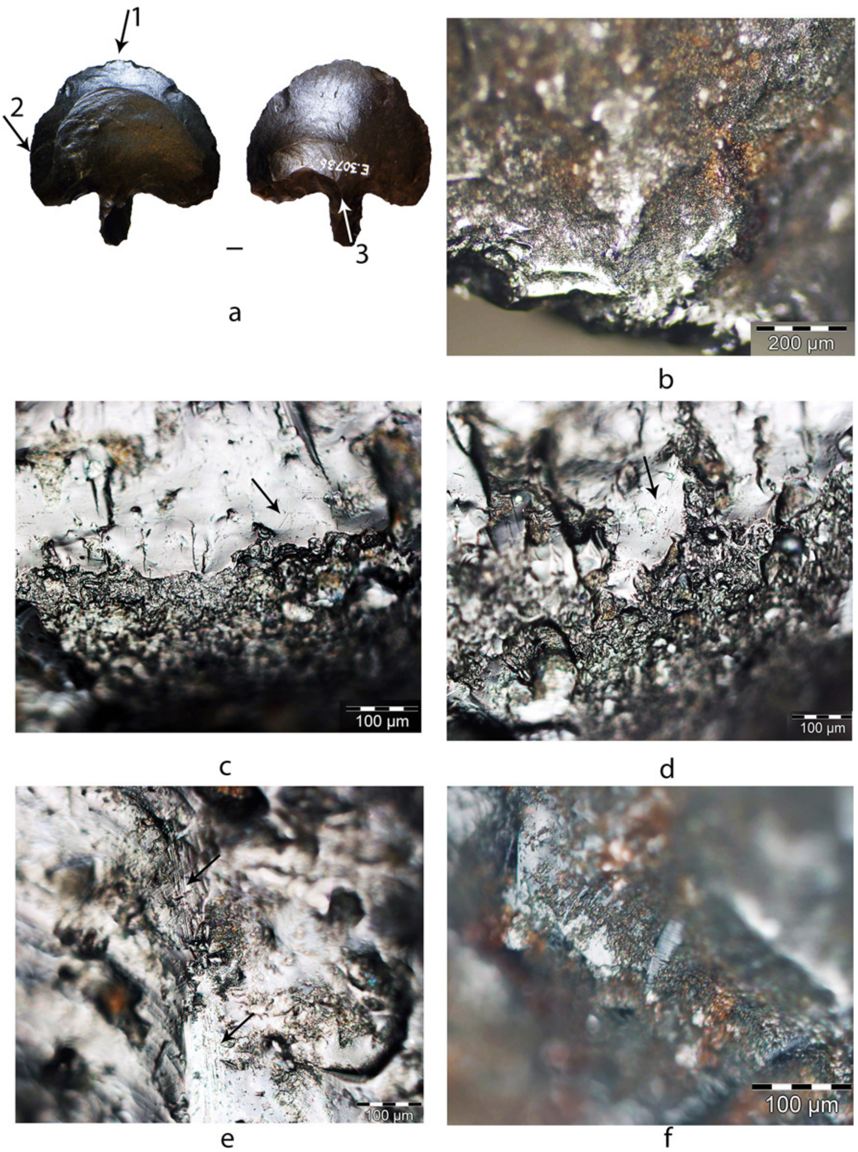

Fig. 4. Shell or bone: E30736. a) location of images, scale bar is 1 cm; b) point 1, postdepositional damage and residues; c) point 2, edge attrition and striations; d) point 2, edge attrition and striations; e) point 3, striations on stem; and f) point 3, attrition, striations, and resin-like residues on scar ridges of stem. Use-wear features are indicated by arrows.

attributes that match experimental data used to process fish include spots of light, pronounced attrition on the edge, and relatively numerous fine, isolated, long, and short striations on the ventral face of the edge (Hurcombe 1992:44–45; Kononenko 2011:34, Plate 90).

In considering the Lipo et al. (2016) conclusions about *matā*, E30737 is particularly important because the use traces show that it was used with some force to pierce a substance

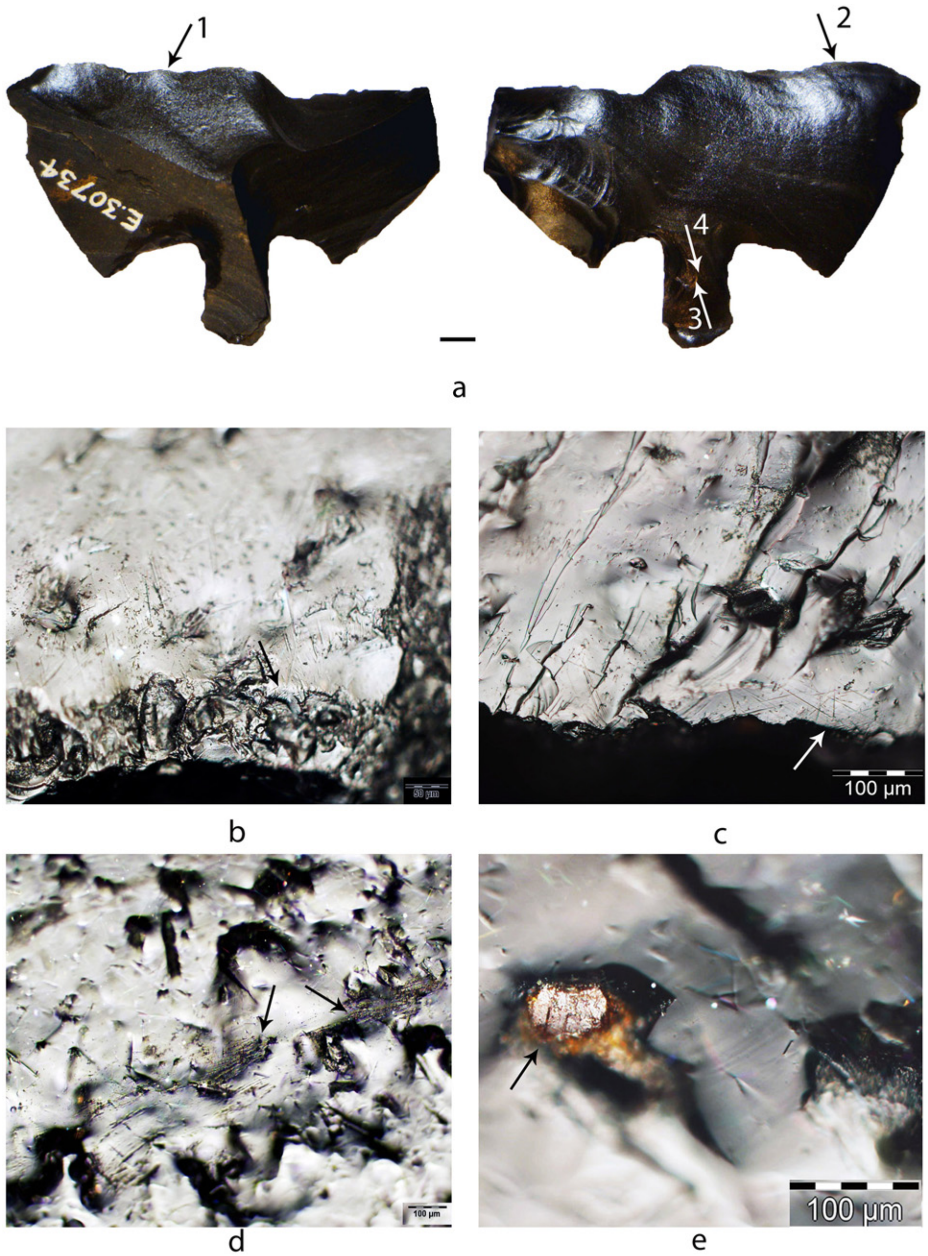

Fig. 5. Soft, elastic material, possible fish: E30734. a) location of images, scale bar is 1 cm; b) point 1, edge rounding, attrition, polish, and fine striations; c) point 2, microscars, edge rounding, polish, and fine striations; d) point 3, attrition and striations on stem; and e) point 4, resinous residues on stem. Use-wear features are indicated by arrows.

that was probably flesh, and at the same time, encountered a hard material that caused impact damage (Figure 6). A small elongate and narrow burin-like spall at the tip of the point, which resembles the "diagnostic impact-fractures" defined by Hutchings (2016),

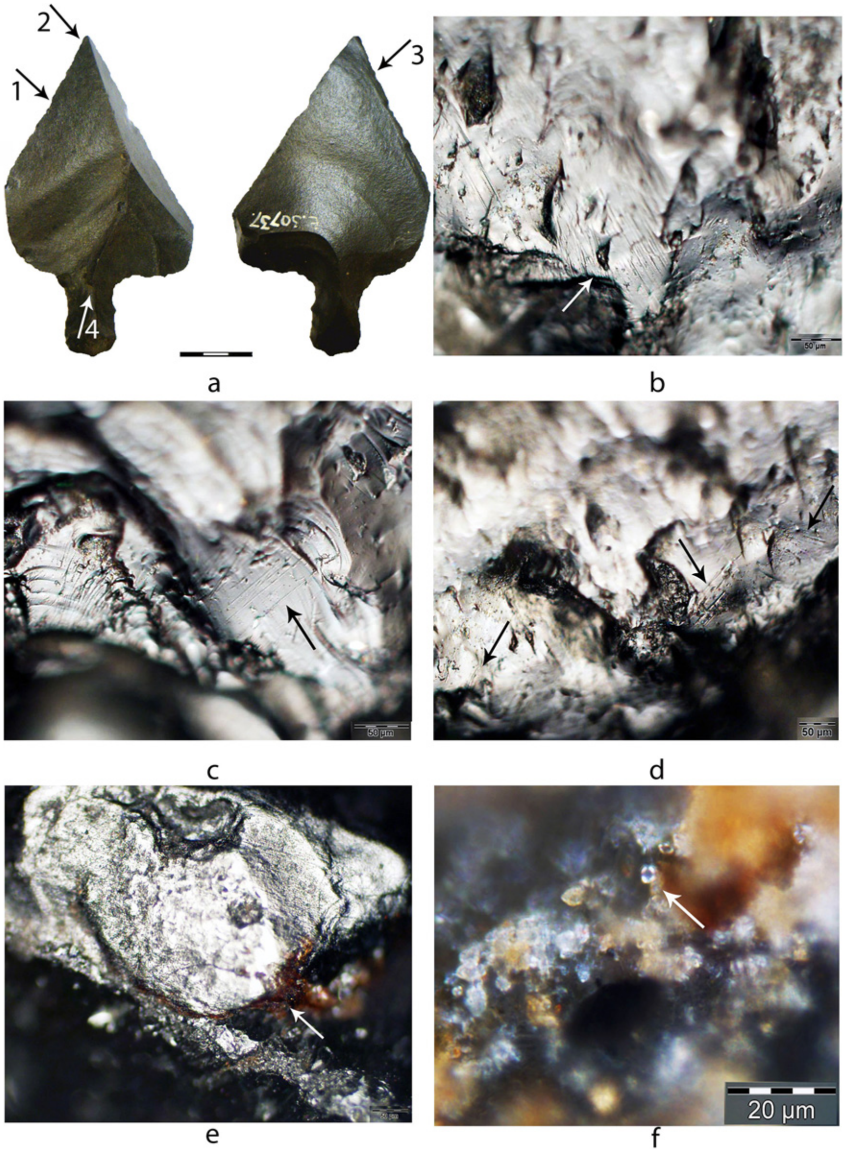

Fig. 6. Soft, elastic material such as meat, flesh, skin: E30737. a) location of images, scale bar is 1 cm; b) point 1, scars, edge rounding, fine striations, and polish on elevated point of surface topography; c) point 2, scars and fine striations within scars on tip of tool; d) point 3, scars, attrition, edge rounding, and fine striations; e) point 4, attrition, striations, and resinous residues; and f) point 4, starch grains within resinous residues. Use-wear features are indicated by arrows.

occurs in association with diagnostic wear traces that include continuous microscars and small scars with feather and bending terminations, light and some moderate edge-rounding, small pockets of well-isolated fine striations, light to developed polish. Together these traces indicate a penetrating mode of use as in the case of a spear (for further examples see articles by Fullagar, Hutchings, Iovita et al., Yaroshevich et al. in Iovita & Sano 2016).

The occurrence of this "snapping spall" (Kamminga 1982:45) is also commonly observed on experimental obsidian tools with very thin fragile tips used to puncture skin with a "pushing" action, as recorded by Kononenko et al. (2016) and Stemp (2016a). As E30737 had a strong thick tip, we assume the impact fracture was caused by contact with a hard substance.

Eight of the tools preserved use-wear traces on the retouched stem. Based on similarity to experimental data (Kononenko et al. 2015), they are interpreted as having been hafted on a wooden handle of some type. Key attributes observed include rough, flattened attrition and striations on the ridges located between flake scars formed by retouch on the stem, together with numerous patches of embedded resinous residues that occasionally preserved starch granules (e.g., Figures 2–6). The ubiquity of hafting for the *matā* is significant given the descriptions of "lances or spears" in the historic accounts quoted by Lipo et al. (2016:174).

Given the small sample size, the actual proportions of the various categories of tool use may not be representative of the general category of *matā* uses, but the results from the Australian Museum collection do confirm that this tool group was used in a very broad range of activities and, in particular, that a significant proportion were used to cut and pierce flesh and/or skin. These results therefore indicate that some *matā* may have been used in interpersonal conflict both as spears and, perhaps, as slashing tools. Others might have been used for scarification or tattooing in ritual practices or medical practices, as speculated by Lipo et al. (2016:184).

Form Versus Function

Given the high degree of variability in the morphology of *matā*, as documented by Lipo et al. (2016), we are not very surprised to find that use-wear analysis shows they had been employed in a wide range of tasks including plant processing, wood, shell and bone working, and cutting and piercing of flesh or skin. Following Lipo et al. (2016), many of the uses would not be subject to selective pressure, because there would have been no deleterious consequences if the tasks were not completed in a timely or efficient manner and so their shapes were not standardized. The root problem, however, is not that "there appear to have been no systematic performance requirements that influenced blade shape," as argued by Lipo et al. (2016:184), but that the definition of this group was never based on function in the first place. The category of *matā* as applied by archaeologists is constituted solely by the presence of a stem. The assumption that a tool type defined only by having a handle would genuinely reflect a single-purpose reflects flawed logic. In our view, the Lipo et al. (2016) test failed from the first assumptions because there is no satisfactory argument that *matā* ever represented a coherent functional class. Previous use-wear analyses, now supported by our studies, show that the variety of artifacts defined as *matā* was never a functional class and includes a mix of domestic tools and weapons.

Where did the idea that *matā* were a single-purpose functional group come from? Modern observations may be the source, particularly Cook's March 17, 1774 statement concerning spears "about 6 or 8 feet long which are pointed at one end with pieces of black fli[n]t" (Beaglehole 1969:352). Routledge (1919:223) collected 14 names for *matā*, but these refer to shape and not to how they were used. Similarly, Skinner classified *matā* into six types, each with a traditional Rapanui name (Métraux 1940:166–167), none of which demarcate function.

Does the finding that some *matā* were used to pierce flesh indicate the presence of systematic warfare on Rapa Nui? Only additional use-wear studies based on large sample sizes could adequately address that question. Our data indicate that some *matā* might have been used in interpersonal conflict, but sample sizes are not yet adequate for determining the incidence of warfare on Rapa Nui. Some of the tools used to pierce flesh may have been spears, whereas others that cut flesh might have been used in hand-to-hand combat. Another possibility is that some *matā* had ritual uses, for instance in ritual scarification or mortuary rites (cf., Lipo et al. 2016:184).

There is a final question that needs to be considered: why did people on Rapa Nui give the name "*matā*" to such a diverse group of tools? One possibility is that each *matā* was owned, used, and associated with a single individual. The tool might have been primarily a deterrent used for gesturing, threatening, and shouting, as described in the historical accounts, or as an insignia, as seen in Cook's encounter with a man who "hoisted a piece of white cloth on his spear and led the way with his Ensign of Peace" (March 15, 1774; Beaglehole 1969:344). Although applied to tasks ranging from defense to food preparation, the primary function of the distinctively shaped tool with its own handle may have been to signify the identity of its owner. Possibly the possession of a hafted obsidian artifact indicated some form of status, such as adulthood, but all were slightly different as they were meaningful personal possessions.

The combined use-wear studies, together with the Lipo et al. (2016) analysis of morphology clearly demonstrate a need for new research directed at untangling the various uses and meanings of Rapa Nui obsidian stemmed artifacts. A comparison of tool uses across the various archaeological contexts where *matā* are found would also be valuable. For example, studies from gardening, habitation, or cave sites (Church 1998; Church & Rigney 1994; Church & Ellis 1996) have identified plants as the major use material for *matā*, whereas other activities including piercing and cutting flesh are recognized in the Australian Museum collection. Perhaps the latter were collected from the surface of ceremonial sites, where large samples have been recorded previously (e.g., Mulrooney et al. 2014:303). Clearly, much research is still required before the function(s) of Rapa Nui *matā* can be satisfactorily demonstrated.

Postscript: Biases in Museum Collections

As a postscript, it is worth considering the values and limitations of museum collections in understanding the uses of artifacts such as the *matā* that are iconic representations of a place or people. Lipo et al. (2016:177) note potential biases inherent in the Bishop Museum collection of *matā,* which formed 69% of their sample. Although they rightfully acknowledge "actions of the original collectors" (Lipo et al. 2016:177), one must also consider the agency of the islanders who sold artifacts to visitors and overseas collectors (e.g., see accounts in Simpson 2010). It therefore becomes important to ask whether the *matā* in museum collections are traditional items or were made specifically for sale to outsiders.

Concerning the Australian Museum sample, it is interesting that three of the four artifacts lacking wear traces (Table 3; A18926–28) were collected by J. Weisser, the paymaster on the ship *Hyäne*. He accompanied Lieutenant-Captain Geiseler during a 4-day visit to Rapa Nui in 1882 (Ayres & Ayres 1995:xiii). The blades he procured are the most variable in shape among the sample, clearly lack a usable edge, and were never hafted (Figure 7). It seems highly likely that local people collected substandard, rejected artifacts

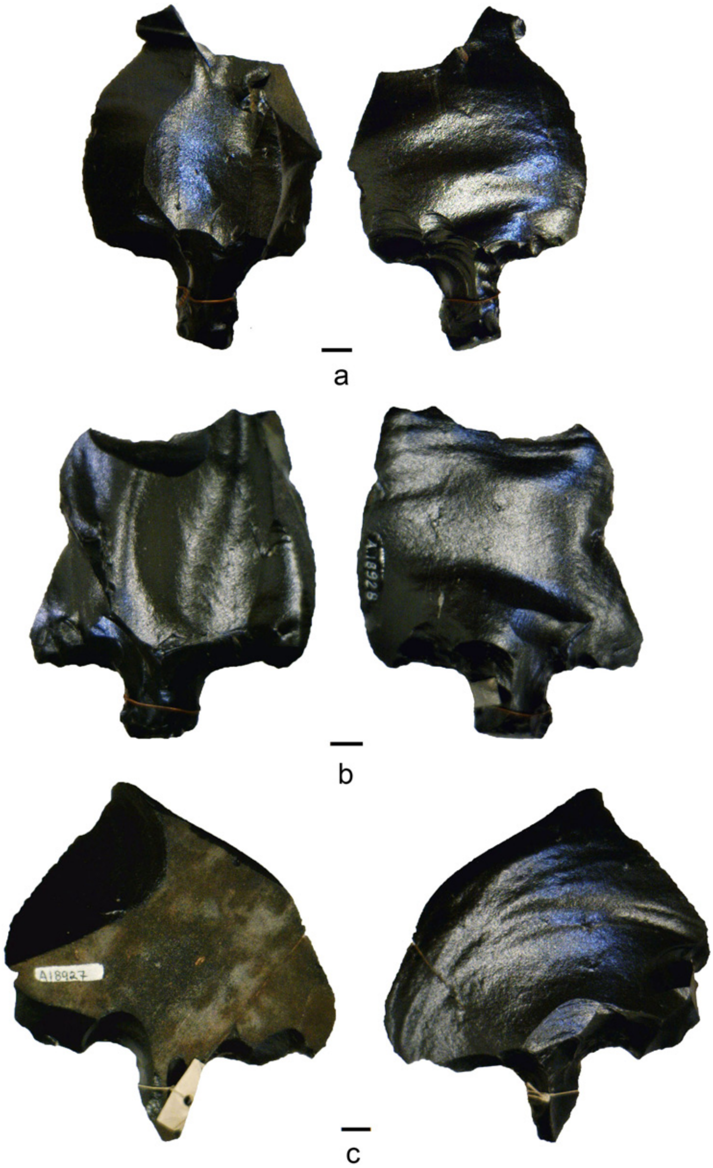

Fig. 7. *Matā* lacking use-wear: a) A18926; b) A18927; and c) A18928. Scale bars are 1 cm.

from the obsidian quarry (Stevenson et al. 1984) or even made copies themselves as described by Routledge (1919:224) (see Torrence 2000 for a similar case from Papua New Guinea). In contrast, unused E30738 was hafted in the past, but the handle has not been preserved. The presence of a handle on a *matā,* as observed in a number of museum specimens (e.g., Routledge 1919:Fig. 92; Simpson 2010:Fig. 10), does not therefore ensure that the tool was genuine and not made for sale. Since museum ethnographic collections largely represent the consequences of modern cross-cultural exchanges, rather than unbiased samples of past behaviors (Torrence & Clarke 2016), use-wear studies can play an important role in the detection of truly historic/ancient artifacts versus those fashioned as copies for sale (cf., Kononenko et al. 2010).

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Appendix

Part 1

ID	Blank Type	Used Edges	Surface Preservation	Scar Type	Scar Distribution	Attrition	Striation Type and Orientation	Striation Distribution	Edge Rounding	Edge Rounding Distribution
Soft pliable material (meat, flesh, skin)										
E30734	flake with cortex	1	rough texture with extensive postdepositional residues	microscars, some small, fresh scars	continuous	light to pronounced, few spots on edge	fine, slightly diagonal, and crossed	both faces	light to moderate	patches
E30735	kombewa flake	2, both margins	rough texture with extensive postdepositional residues	small and large scars from postdepositional damage, microscars, and small scars from use	continuous	few spots on edge and surface		both faces	light to moderate	patches
E30737	flake	2	rough texture with extensive postdepositional residues	microscars and small scars, some post depositional	continuous microscars; discontinuous small scars, both edges	few spots on edge; light, both edges	fine, isolated, parallel, and slightly diagonal; few crossed, both edges	both faces; both edges	light to intensive, both edges	patches
E30740	flake with cortex	2, both margins	rough texture with extensive postdepositional residues	small scars from postdepositional damage and patches of microscars from use	continuous, patchy	few spots on used surface	fine, parallel, and slightly diagonal	both faces	light to moderate	patches

ID	Blank Type	Used Edges	Surface Preservation	Scar Type	Scar Distribution	Attrition	Striation Type and Orientation	Striation Distribution	Edge Rounding	Edge Rounding Distribution
Woody plants										
E30741	flake	1	rough texture with extensive postdepositional residues	small and medium sized scars, feather, bending	continuous, both faces	numerous patches, pronounced, and severe	numerous, deep, slightly diagonal, and crossed	both faces	intensive	patches
E65154	flake	2	rough texture with extensive postdepositional residues	small scars and microscars, feather, bending, some postdepositional	continuous small scars and microscars, both edges	few spots on surface; both edges light	dense, diagonal	both faces; both edges	intensive	numerous patches
Softer parts of plants, grasses										
E30739	kombewa flake	1	rough texture with extensive postdepositional residues	microscars and small scars, mixed step, feather, bending	continuous	pronounced; few spots on edge	dense, relatively shallow, perpendicular, and slightly diagonal	both faces	intensive	patches
Bone or shell										
E30736	kombewa flake	1	rough texture with extensive postdepositional residues	postdepositional damage by small and medium scars	continuous	severe, few spots on edge and stem	few, fine, slightly diagonal	dorsal face	intensive	patches
No wear										
E30738	flake	0	rough texture with extensive postdepositional residues	postdepositional damage by small scars and microscars	discontinuous	absent	absent	absent	absent	absent

ID	Blank Type	Used Edges	Surface Preservation	Scar Type	Scar Distribution	Attrition	Striation Type and Orientation	Striation Distribution	Edge Rounding	Edge Rounding Distribution
A18926	flake	0	rough texture with extensive postdepositional residues	postdepositional damage by small scars and microscars	discontinuous	absent	absent	absent	absent	absent
A18927	flake	0	rough texture with extensive postdepositional residues	postdepositional damage by small scars and microscars	discontinuous	absent	absent	absent	absent	absent
A18928	flake	0	rough texture with extensive postdepositional residues	postdepositional damage by small scars and microscars	discontinuous	absent	absent	absent	absent	absent

Part 2

ID	Polish Development	Polish Distribution	Residue on Edge	Proposed Mode of Use	Mode of Use Confidence	Proposed Contact Material	Contact Material Confidence	Intensity of Use	Hafting Wear	Proposed Hafting Material	Residue on Stem
Soft pliable material (meat, flesh, skin)											
E30734	light to developed	patches	absent	cutting	definite	soft, elastic material, (possible fish)	probable	moderate	attrition, striations	probable wooden handle	resin-like
E30735	light, few spots of developed	rare patches	absent	cutting	definite	soft, elastic material (meat, flesh, skin)	probable	probably intensive	attrition, striations	probable wooden handle	absent
E30737	light to developed, both edges	patches	absent	cutting, both edges	definite	soft, elastic material (meat, skin)	definite	intensive	attrition	probable wooden handle	resinous residue with embedded starch grains
E30740	light	rare patches	absent	cutting	probable	soft, elastic material (meat, flesh, skin)	probable	probably moderate	attrition, striations	probable wooden handle	absent
Woody plants											
E30741	developed	patches	absent	chopping	definite	soft woody plant	probable	intensive	attrition, striations	probable wooden handle	absent
E65154	developed, both edges	numerous patches	absent	whittling, both edges	definite	soft, siliceous woody plant	definite	intensive	attrition, striations	probable wooden handle	absent

ID	Polish Development	Polish Distribution	Residue on Edge	Proposed Mode of Use	Mode of Use Confidence	Proposed Contact Material	Contact Material Confidence	Intensity of Use	Hafting Wear	Proposed Hafting Material	Residue on Stem
Softer parts of plants, grasses											
E30739	developed to well developed	patches	resin-like	scraping	definite	siliceous and resinous soft plant and grasses	definite	intensive	attrition, striations	probable wooden handle	resin-like, wax
Bone or shell											
E30736	absent	absent	absent	possible scraping	uncertain	shell or bone	uncertain	uncertain	attrition, striations	probable wooden handle	not use-related, postdepositional
No wear											
E30738	absent	absent	absent	not used	not used	not used	not used	not used	attrition, striations	probable wooden handle	absent
A18926	absent	absent	absent	not used	not used	not used	not used	not used	absent	absent	absent
A18927	absent	absent	absent	not used	not used	not used	not used	not used	absent	absent	absent
A18928	absent	absent	absent	not used	not used	not used	not used	not used	absent	absent	absent