An Experiment in the Replication and Classification of Easter Island *Mata'a*

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Introduction

EASTER ISLAND *MATA'A* HAVE defied classification for over a century. These objects are most commonly interpreted as "spearpoints" that were hafted to a handle and used in combat (e.g., Métraux 1940:166-7). The traditional account of the origin of these objects is likewise linked to warfare (Métraux 1940:376). However, more recent studies (Church and Rigney 1994; Church and Ellis 1996) involving use-wear analysis suggest that at least one of the functions of the *mata'a* analyzed was plant cutting. The ambiguity of the function of *mata'a* extends into efforts to classify their wide array of forms. Thomson (1891:536) was the first to attempt to classify *mata'a* using a nine-type system, each with a purely descriptive Rapanui name. However, he acknowledged that differences in shape were not functional, but reflected individual skill and preference. Decades later, Routledge (1919:223) collected fourteen such descriptive names (e.g., "tail of a fish"). Métraux (1940:166-7) described a classification system devised by H. D. Skinner in a manuscript now apparently lost.[1] Skinner's system grouped *mata'a* into six types. Finally, Bórmida (1951) developed a four-type system with two subdivisions each. Overall, Skinner's system is the best known and most widely used, although it has been soundly criticized (e.g., Mulloy 1961). Mulloy (1961:151) considered all *mata'a* classification systems purely subjective, and "that the material represents a continuous range of variation without objective natural order, and that the only classification possible must involve the subjective selection of ideal types from an infinite series of possibilities, and the arbitrary reference of intermediate form to one or another of these." Nevertheless Mulloy did employ Skinner's system with the *mata'a* that the Norwegian Archaeological Expedition collected in order to compare them other collections described using Skinner. Scholars (e.g., Mulloy and Figueroa 1978; Ayres et al. 2000) continue to use Skinner's system to this day.

In all these attempts at classification and the criticism they have inspired, firsthand experience with manufacturing *mata'a* is lacking. This article is intended as a pilot study to remedy this. Our experiment was designed to provide some firsthand knowledge of how *mata'a* can be made, and what factors, intentional and unintentional, contribute to their variety of forms. We began this experiment in general agreement with Mulloy's assessment; namely, that any attempt to classify *mata'a* based on shape is largely a subjective exercise. However, the fact remains that Skinner's six basic types do occur, although no one, including Skinner, has ever offered an explanation (apart from happenstance) as to *why* they occur on a fairly consistent basis from one collection to another. To attempt to answer this question, we designed an experiment around the replication of *mata'a* with a focus on Skinner's six basic types. Were the shapes the result of a predetermined ideal, or, as Mulloy (1961:151) believed, were they the result of "the fortuitous shape of the unmodified flake"?

Skinner's Typology

SKINNER (MÉTRAUX 1940:166-7) CLASSIFIED *mata'a* into six different types, each with a traditional Rapanui name. In this study these names will not concern us, for as Ayres et al. (2000:175) wrote, "The traditional Rapanui category names are mostly untranslatable; those that do translate refer principally to shape characteristics, that is, they are traditional morphological types and there are no recorded functional distinctions for each shape." Table 1 describes and illustrates Skinner's six types, as well as the proportions of each found in both the Bishop Museum collection as of Métraux's writing (194 classifiable *mata'a*), and in the collection of the Norwegian Archaeological Expedition (219 classifiable *mata'a*) as described by Mulloy (1961). It is to be noted that the percentages are vastly different between the two collections. The results led Mulloy (1961:151) to write, "Proportional occurrence of types in this series bears little relation to Skinner's series, a fact which may be due to the subjectivity of the classification." However, both these collections of *mata'a* were surface-collected, and the possibility of sampling bias cannot be overlooked. Furthermore, Skinner's system was unable to account for 61 points in the Bishop Museum collection, being either broken or too rough (Métraux 1940:166); 136 out of 355 specimens in the Norwegian collection were likewise unclassifiable (Mulloy 1961:151).

Methodology

OUR PRELIMINARY GOAL DURING THE experiment was to produce as many *mata'a* as our obsidian supply allowed. We focused particularly on Skinner's six basic types, and at-

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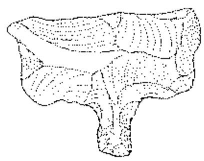
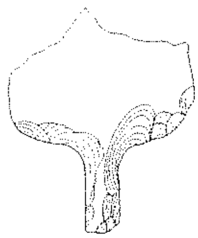
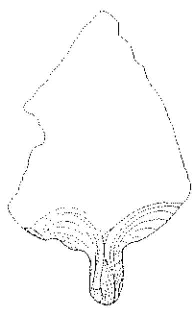
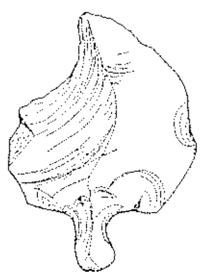
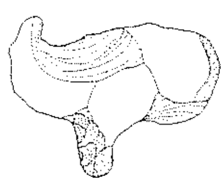
[1] According to Métraux (1940), Skinner's original manuscript was kept at the Bernice P. Bishop Museum. However, when we went to review the original copy, we discovered that it was missing. Along with a collection of images for Métraux's work was a note stating that several field notebooks that were loaned out at his request some time in 1956 have never been returned to the museum. However, it is likely that Métraux cited all the relevant information and it is unlikely that Skinner's original manuscript had additional insights that would have been essential to our purposes.

Table 1. Skinner's classification system, with the amounts and percentages of each type found in Bishop Museum and the Norwegian collection.

Type	Description	Illustration (Métraux 1940:Figure 3)	Amount In Bishop Museum (Métraux 1940:167)	Amount In Norwegian Collection (Mulloy 1961:Table 2)
1	Most easily made; cutting edges round in outline; blade resembles ace of spades without point		122 (63%)	52 (24%)
2	Straight cutting edge		11 (6%)	75 (34%)
3	Central point emerging from transverse cutting edge		4 (2%)	13 (6%)
4	Triangular with no lateral wings		3 (2 %)	33 (15%)
5	Roughly triangular with point to one side		30 (15%)	38 (17%)
6	Most specialized type. Cutting edge transverse; generally slanting; raised at one side to form lateral point		24 (12%)	8 (4%)

tempted to classify our specimens accordingly. The experiment took place on the University of Hawai'i Mānoa campus from April-May 2006. First, we examined the Bishop Museum's collection of *mata'a* to gain firsthand experience handling the artifacts and insight into the manufacturing sequence. We then photographed selected specimens for later reference. A flaking site was prepared on the University of Hawai'i Mānoa campus. As Easter Island obsidian was unavailable to us, cores of Oregon obsidian were used instead (Figures 1 and 2). Easter Island obsidian is quite different from Oregon obsidian; it is of a denser, tougher consistency, is opaque with a rather dull sheen, and has an almost plastic-like quality. The Oregon obsidian used is more brittle and far less opaque. Despite these differences, the flaking qualities of different types of obsidian are similar enough for our purposes, especially considering the simplicity of the *mata'a*.

The Manufacturing Process Part 1: Core Preparation and Primary Flake Removal

Based on the research of Stevenson et al. (1984) at the Orito obsidian quarry on Easter Island, the lithic reduction sequence of *mata'a* is well understood. The raw material was extracted by digging, and commonly occurred as 20-30 cm slabs about 10 cm thick (Stevenson et al. 1984:120). The tabular slabs of obsidian limited the lithic reduction sequence to discoidal and block cores, the latter being slabs "with flakes removed from one or two edges, but only from one face" (Stevenson et al. 1984:121). Stevenson et al. (1984:121) wrote, "The decortication of only one surface may have been employed to retain mass so that large broad flakes could be removed." Based on the presence of finished *mata'a* among the quarry's surface debitage, it appears that they were manufactured on-site, obviating the necessity of carrying the larger nodules elsewhere. Stevenson et al. (1984:122) speculated that only one or two suitably large flakes could have been produced per block core: "The type of flakes selected for *mataa* production are quite specific and there would have been a large amount of discarded material associated with this activity."

Based on his observations of the specimens in the Heyerdahl collection, Mulloy (1961:151-3) reconstructed the basic manufacturing sequence of *mata'a*, which we successfully employed in our replication. Mulloy (1961:151-2) wrote, "Certain characteristics of manufacture deserve mention. Practically all specimens are made of flat flakes on which a face and back can be distinguished. Most seem to have been deliberately struck from the side of a core by a blow near the edge of a transverse, or oblique, striking platform to remove a thin flake, the back of which usually bears several flake scars, and on the face of which the bulb of percussion and peripheral curves are usually apparent." Charleux (1986) and Inizan et al. (1992:57-9) discussed the use of the Kombewa method of flake manufacture regarding *mata'a*. Kombewa cores are large flakes that have been used as cores from which a smaller flake could be removed from the interior surface, especially near the flake-core's bulb of percussion. The flakes so produced follow the outline of the bulb of percussion, and so possess the rounded edges that are optimal for *mata'a*.

In our experiment, all flaking was done through hard hammer percussion. The hammerstones used were rounded, water-worn stones of various densities and sizes (Figure 3). Primary flake removal was accomplished using larger and heavier hammerstones. Our cores of obsidian were not tabular, so a different approach had to be used than that documented by Stevenson et al. (1984). When confronted with a large core containing limited striking platforms and a significant amount of cortical surface (such as the core in Figure 1), we began by removing the largest flakes possible using the most suitable striking platforms that met the cortical face at an acute angle. If no platforms were readily available, a strong blow was usually required to dislodge a part of the original core (see Figure 4). Another blow could then completely fracture the original core to produce two smaller cores with suitable striking platforms (see Figure 5). The primary objective was to reproduce the larger blade surfaces seen in existing *mata'a*. Good striking platforms were frequently maintained by removing a flake from a surface that had served as a former platform. Flakes were removed in this fashion until the original core became either too small to produce large flakes, or simply shattered. Occasionally a large flake was removed that served as a core, producing flakes according to the Kombewa method (see Figures 6 and 11). On average, an approximately 20 x 20 cm core furnished a maximum of three optimal blanks and more often only two optimal specimens (see Figures 6 and 7), confirming the observation of Stevenson et al. (1984:121) that the amount of discarded material per core would have been significant in comparison with the yield suitable flakes.

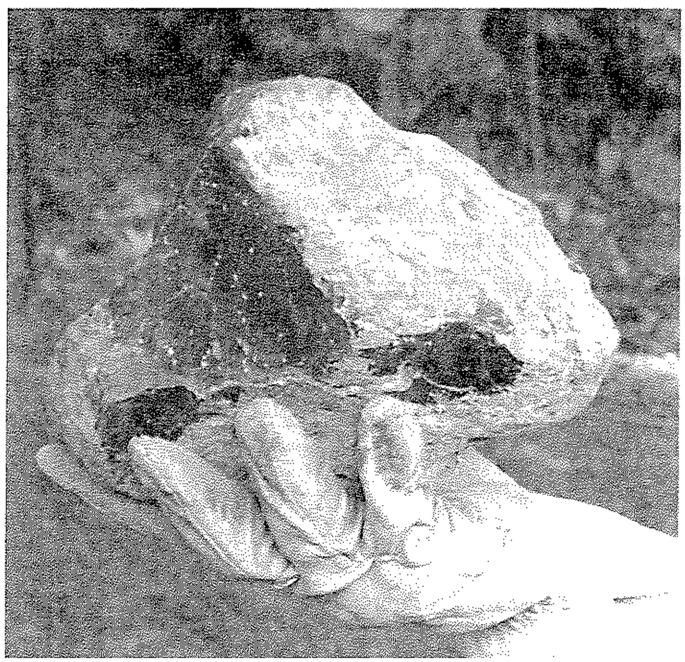


Figure 1. Unmodified obsidian core. Note the cortex.

Figure 2. Unmodified obsidian core.

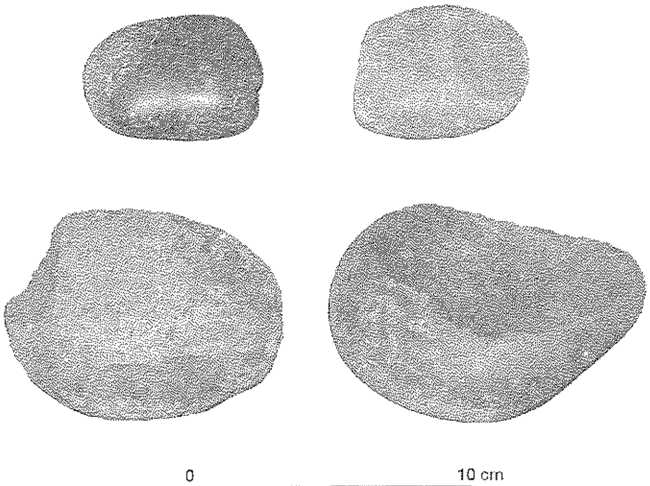


Figure 3. Selected hammerstones. Top: smaller hammerstones used for tang formation and secondary modification; Bottom: heavy hammerstones used for primary flake detachment and core splitting.

Figure 4. Core with corner removed, furnishing a striking platform so that the core can be split

Figure 5. The split obsidian core. The striking platforms are now present and primary flakes can be detached.

Figure 6. Primary flake removed from Kombewa core for replication 23, ventral surface.

Figure 7. Primary flake for replication 23, dorsal surface.

Figure 8. Tanged and completed replication 23, dorsal surface.

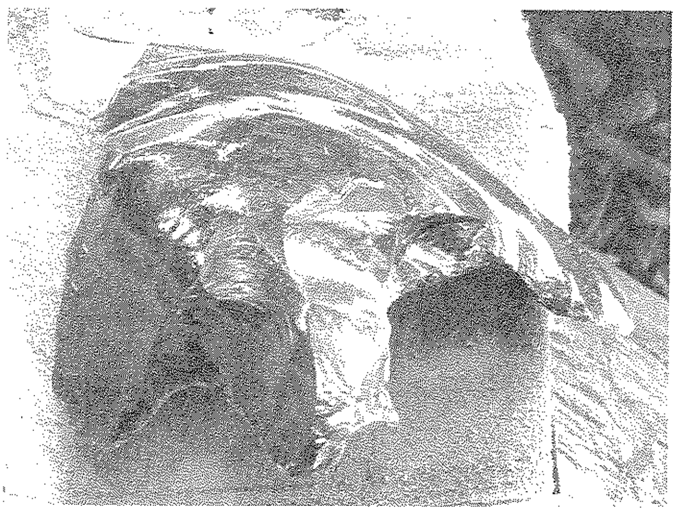


Figure 9. Tanged and completed replication 23, ventral surface.

Figure 10. Completed replication 23 together with debitage from tang formation.

The Manufacturing Process Part 2: Tang Formation

Smaller and lighter hammerstones were employed for tang formation, as were basalt and obsidian flakes. Not surprisingly, we found that breakage occurred most frequently during this stage in the process. From his examination of specimens, Mulloy (1961:152; see also Mulloy and Figueroa 1978; Ayres et al. 2000) wrote, "The maker had the choice of forming the tang about the striking platform remnant, at the side of the flake, or at its point. Only the first two systems are frequent, as the thinnest part of the flake is usually left as the cutting edge. The third usually occurs in particularly thin flakes." Our experimentation confirmed Mulloy's observations. When possible, the thinnest (and sharpest) edge of our primary flakes was preserved for the cutting edge and the tang was fashioned on the opposite side. When the bulb of percussion was too thick and there were no platforms available to allow for thinning, the tang was produced on one side of the bulb. Mulloy (1961:152) wrote, "Tang formation customarily involved two distinguishable phases. The primary flaking consisted of the removal of several large flakes by percussion to form the indentation at either side of the tang (see Figures 8 and 9). Most commonly this is bilateral, involving the removal of two flakes from each surface." Again our experiences mirrored this stage in the process. Subsequent flaking was then needed to define the tang more precisely. This was accomplished through lighter retouch, either unifacial or bifacial as necessary. Breakage usually occurred during modification of the upper portion of the tang where it meets the blade. All the debitage from each attempt was collected and stored with the finished piece (see Figure 10). In total, our obsidian cores yielded 26 *mata'a*.

Discussion of Types

Based upon our experience, we are now in a position to discuss the formation of Skinner's six types of *mata'a*. In the following discussion we structure our conclusions regarding each type based on three "Stages" that represent points in a hypothetical "life history" of a *mata'a*. It is important to note that these stages are not chronological points. Rather, they represent the degree of divergence from the "ideal" or "archetypal" *mata'a*, which we believe is represented by Skinner's crescent-shaped Type 1. The "life history" thus begins with Stage 1 when the blade is the unmodified cutting edge of the primary flake. Stage 1 *mata'a* include Skinner's Types 1, 3 and 4. Stage 2 occurs when, for one reason or another, the pristine cutting edge is in some way modified to the least possible degree. This secondary modification can be either intentional or due to breakage. A Stage 1 *mata'a* may or may not become a Stage 2 *mata'a*. Stage 2 incorporates Skinner's Types 5 and 6. The final period in the "life history" is Stage 3, when the *mata'a* is the most changed from its initial "ideal" (Type 1) form, when further modification is no longer desirable or possible. Stage 3 *mata'a* can result from breakage, use, retouch, and any combinations of the three. Skinner's Type 2 classifies as a Stage 3 *mata'a*. Just as a

Stage 1 *mata'a* may or may not become a Stage 2 *mata'a*, a Stage 1 or Stage 2 *mata'a* may or may not become a Stage 3 *mata'a*.

Type 1

Skinner (Métraux 1940: Figure 3) defined Type 1 as "Most easily made; cutting edges round in outline; blade resembles ace of spades without point." We successfully reproduced six examples of Type 1 *mata'a* (Figure 11). The key factor to this type is the lack of secondary modification of the cutting edge. While it can be seen that specimens 15 and 23 have slight points, these are not the result of modification, but the natural outline of the primary flake (see Figures 7-10 regarding specimen 23). Mulloy's Type 1 specimen (1961:Figure 37.j) is also slightly pointed. Achieving the rounded cutting edge is entirely dependent upon the form of the primary flake. The form of the flake is, in turn, dependent on the shape of the core. A successfully detached flake (without hinge or step fractures) tends to have a rounded cutting edge, hence the practicality of using the Kombewa method when possible. Specimens 5, 11, 12, 15, and 23 (Figure 11) were struck off of Kombewa cores. The unmodified cutting edge of an obsidian flake is the sharpest possible edge and therefore the most effective cutting tool, whether used as a weapon or not. In this respect, the use-wear analyses of Church and Rigney (1994) and Church and Ellis (1996) are significant. Church and Rigney (1994:104) wrote, "Type 1 *mataas* have been analyzed as part of the sample...In all cases, the predominant use of the tool has been for plant processing." Church and Rigney (1994:104; see also Church and Ellis 1996:Table 1) found the predominant uses to have been cutting fresh green plants and scraping, interpretations far from the traditional "spearpoint". If the Type 1 *mata'a* is, at least in part, a plant-cutting tool, then clearly an optimal, unmodified cutting edge is desirable. We believe that Type 1 *mata'a* represent the "ideal" form that the Easter Islander were aiming for. We classify *mata'a* with unmodified cutting edges as Stage 1 *mata'a*. The full implications of this term will be discussed below.

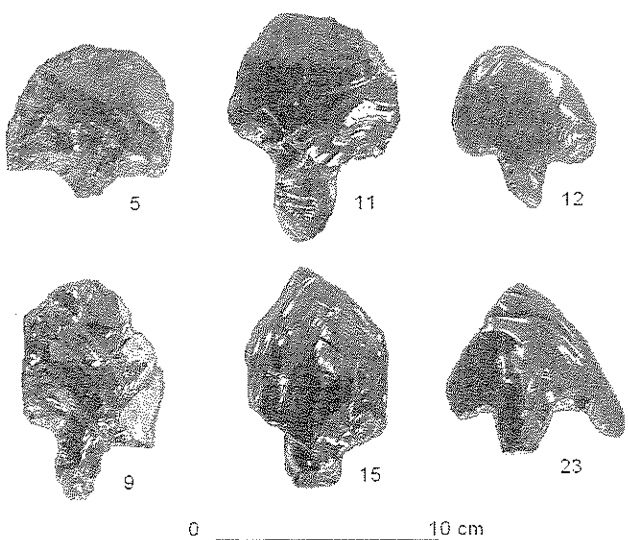


Figure 11. Skinner Type 1 replications. Specimens 5, 11, 12, 15, and 23 were struck off of Kombewa cores.

Type 2

Skinner (Métraux 1940:Figure 3) defined Type 2 as having a "Straight cutting edge." The example illustrated in Métraux (1940: Figure 3) is apparently the result of deliberate modification. Mulloy's (1961:Figure 37.p) example, on the other hand, appears not to have been the result of deliberate modification, but rather of breakage. This could be the reason that such a large percentage of *mata'a* in the Norwegian collection (34%) are classified as Type 2 (although only one is illustrated). As there is no way of telling which have been deliberately straightened, we cannot address this issue. We produced two examples of Type 2 *mata'a* (Figure 12). Specimen 6 was deliberately straightened from an irregular example while specimen 25 was the result of breakage. In both cases, a straight cutting edge was produced. This makes Skinner's Type 2 especially problematic; the straight cutting edge could be the result of intentional or unintentional action, or a combination of both. For example, if a Type 1 *mata'a* were dulled, chipped or broken, forming an uneven edge, the edge could be straightened by flaking. Alternatively, the *mata'a* could break, resulting in a straight cutting edge. We classify Type 2 specimens as examples of Stage 3 *mata'a*. Stage 3 *mata'a* have undergone the most drastic modification and differ the most in shape from Stage 1 *mata'a*.

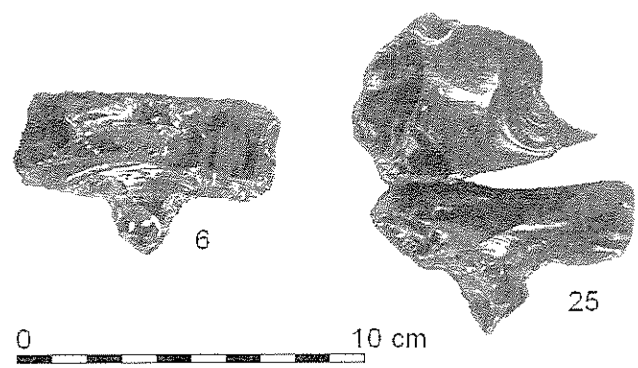


Figure 12. Skinner Type 2 replications. Number 6 (left) was produced intentionally and Number 25 (right) was the result of breakage.

Type 3

Skinner (Métraux 1940:Figure 3) defined Type 3 as having a "Central point emerging from transverse cutting edge." This type is scarce, and the central point probably accidental. Only one of our replications (Figure 13) can qualify as a Type 3, and that was produced accidentally. Mulloy's (1961:Figure 37.y) example also appears to have been unintentionally formed. Our specimen 26 and Mulloy's are quite alike in form. Type 3 qualifies as a Stage 1 *mata'a*, whose cutting edge has not been modified by secondary flaking.

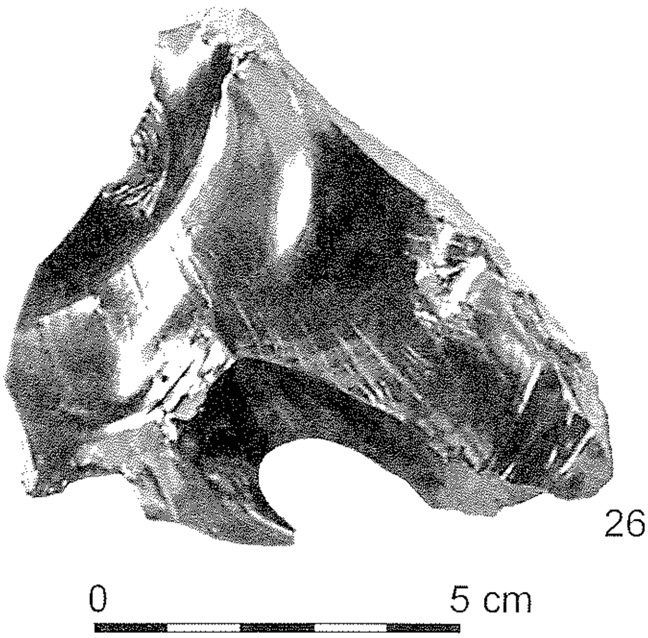


Figure 13. Skinner Type 3 replication

Type 4

Skinner (Métraux 1940:Figure 3) defined Type 4 as "Triangular with no lateral wings." We produced three examples of this type (Figure 14). These specimens were formed from long, narrow, bladelike primary flakes. Type 4 *mata'a*, like Type 1, do not require any secondary modification of the cutting edge. For this reason we classify them as Stage 1 *mata'a*. This type is not expected to be produced from a Kombewa core.

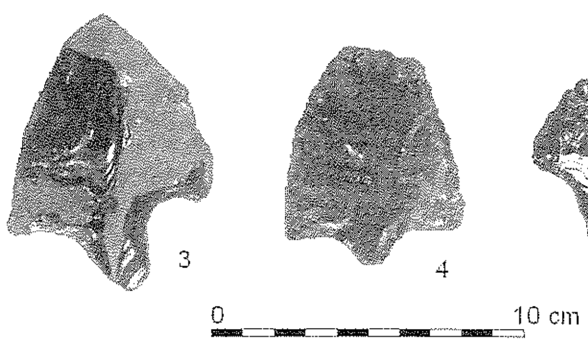


Figure 14. Skinner Type 4 replications.

Type 5

Skinner (Métraux 1940:Figure 3) defined Type 5 as "Roughly triangular with point to one side." Our experiment yielded more (nine specimens) of this type than of any other (Figure 15). In our experience, a Type 5 *mata'a* occurred most frequently through deliberate modification of the cutting edge *after* the tang had been formed. In other words, following the removal of the primary flake, the portion of the flake most suitable for tang formation was selected, preferably opposite to the cutting edge. Ideally, this would result in a Type 1 *mata'a*, especially if a Kombewa core were available. However, from a core with an irregular surface the cutting edge would often be marred by a flaw or irregularity that only additional flaking could remove. This was the case with specimens 2, 16, 17, 18, and 22. In all these cases we were aiming for a form as close as possible to Type 1 or 4, both being symmetrical, but the result was an off-centered point. (None of our Type 5 replications came from Kombewa cores.) A Type 5 could also be derived from a broken Type 1, as was the case with specimen 14. Finally, Type 5 can occur as a result of the original shape of the primary flake, as specimens 7, 20, and 21 demonstrate. In the majority of cases, however, Type 5 occurred following deliberate modification of the cutting edge, and we therefore consider Type 5 to fall into the category of Stage 2 *mata'a*.

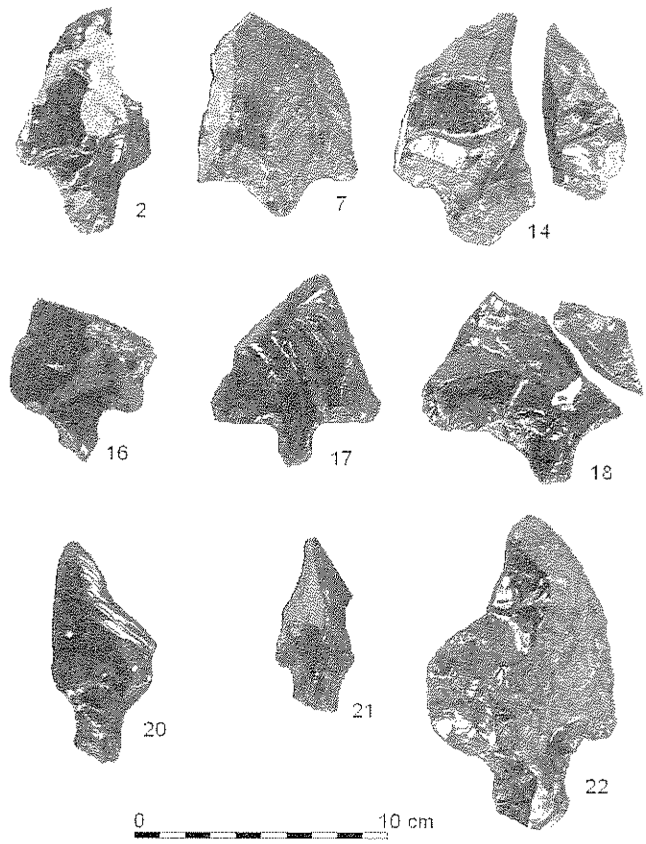


Figure 15. Skinner Type 5 replications.

Type 6

Skinner (Métraux 1940:Figure 3) defined Type 6 as the "most specialized type. Cutting edge transverse; generally slanting; raised at one side to form lateral point." Unfortunately, what Skinner meant by "most specialized type" is unknown. Our specimen 19 was originally of a highly irregular and unclassifiable shape without a suitable cutting edge, and a minimal amount of flaking was required to achieve Skinner's type (Figure 16). Mulloy's (1961:Figure 38.5) specimen also appears to have been flaked into its final form. Without any idea of what the raised side was used for or deliberately produced, we cannot know if the final form was intended or not. Additional modification could have been applied following breakage of a more pristine specimen, or to remove irregularities. For this reason we consider Type 6 as a Stage 2 *mata'a*.

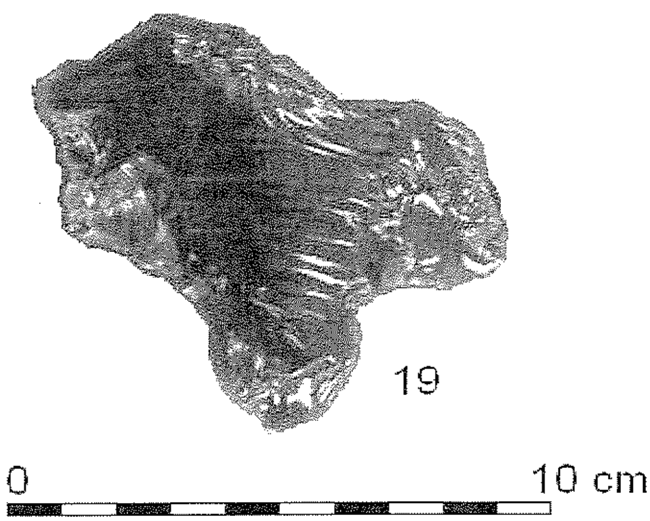


Figure 16. Skinner Type 6 replications.

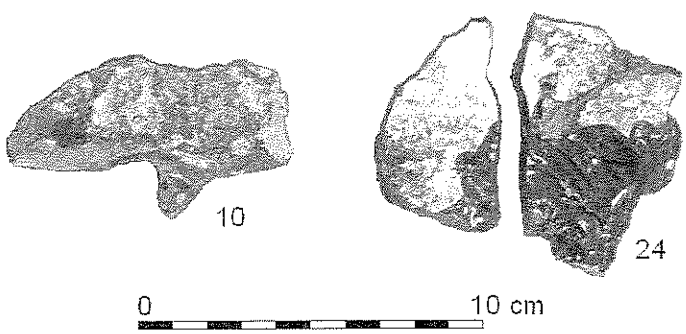


Figure 17. Unclassified replications.

Unclassified

Two of our replications cannot be classified using Skinner's types, although minimal work would have been required to turn specimen 10 into a Type 6 and specimen 24 into a Type 2 (Figure 17).

Discussion

The hypothesis (e.g., Mulloy 1961) that the high degree of morphological variability of *mata'a* was the result of a strictly opportunistic approach to their production should be reexamined. Instead, we suggest that *mata'a* could be examined according to the amount of modification that the "life history" of the artifact. Retouch applied to worn or broken edges of certain *mata'a* could produce a form entirely different from the original. Taking these observations into account, the morphological variations seen in Skinner's six types may be derived from only one or two initial types. We hypothesize that *mata'a* can also be described in terms of "life history" stages rather than by morphological characteristics alone, a testable method that could provide a foundation for additional research in the manufacture and use of *mata'a*. Figure 18 illustrates this "life history" approach by rearranging Skinner's six types according to the amount of modification to the natural flake outline. We propose that the common Skinner Type 1 was most likely the intended form of most *mata'a* (Stage 1). This form utilizes the natural outline of an ideal primary flake struck off of a core, ideally a Kombewa one. The unmodified, preferably rounded cutting edge is the key characteristic, which is supported by the use-wear analyses of Church and Rigney (1994) and Church and Ellis (1996). Skinner's Type 4, of a triangular appearance, is, we believe, a natural variant of Type 1. In other words, flakes with a symmetrical triangular cutting edge are less likely to be produced from a core (especially Kombewa) than are flakes with a rounded edge, but both are primary, unmodified flakes. *Mata'a* with unmodified edges are thus grouped together as examples of Stage 1 points. (Skinner's Type 3 is scarce, and probably accidental.) We believe that these unmodified spade-shaped points are the "ideal" *mata'a* form that the Easter Islanders were aiming for. This conclusion is supported by the existence of a basalt "*mata'a*" precisely of this shape in the Bishop Museum collection (see Métraux 1940:168, Figure 5b). This "*mata'a*", whose edges are ground, is too dull for cutting and its function is of course unknown.

Skinner's Types 5 and 6 represent *mata'a* whose cutting edges have undergone some secondary modification (Stage 2). This modification, which results in a duller cutting edge, was most likely performed when the primary flake did not possess a naturally suitable cutting edge (such as a Type 1), or when breakage occurred. Stage 2 pieces are therefore identified by a small degree of secondary modification, usually evident by a single large flake scar along one edge, although several smaller flake scars are also common.

We believe that Skinner's Type 2 represents the last stage in the "life history" of an ideal Type 1 *mata'a* when breakage occurred, or when breakage and/or use necessitated or resulted in extensive modification (Stage 3). We suggest that most Stage 2 and 3 *mata'a* were probably ultimately derived from unsuccessful or broken Stage 1 forms, most likely of Type 1. This process is well demonstrated by our specimen 25 (Figure 12). While removing an imperfection along the side of the cutting edge, the piece broke horizontally above the tang. What began as a roughly spade shaped *mata'a* instantly became a Type 2.

Our experiment hopefully opens the door to new possibilities in the analysis of Easter Island *mata'a*. Our hypothesis involving "life history" stages is both testable and open to refinement and modification. Additional efforts at understanding *mata'a* are needed, especially experimental ones, both in terms of manufacturing *mata'a* and using them. Ideally, these would incorporate authentic Easter Island obsidian and larger sample sizes. We believe that these unique artifacts still hold great possibilities for research and study.

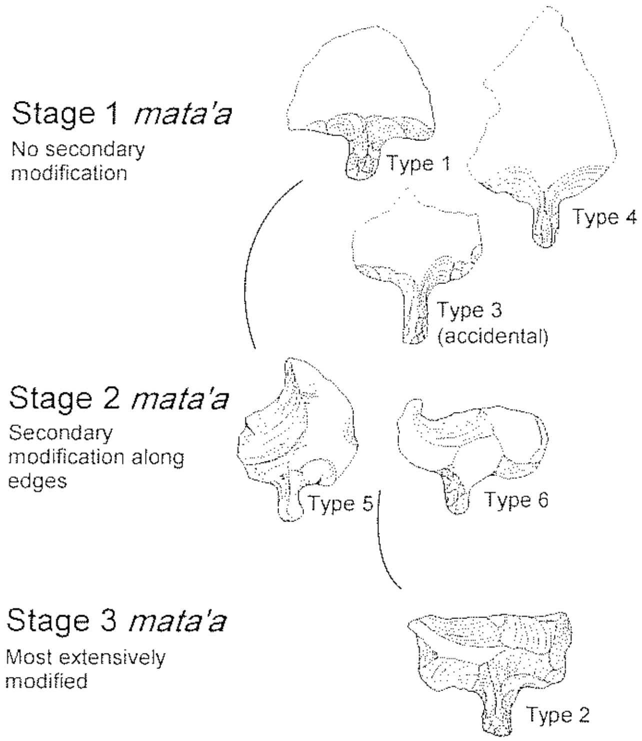


Figure 18. Revised classification system based on "life history" stages.

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