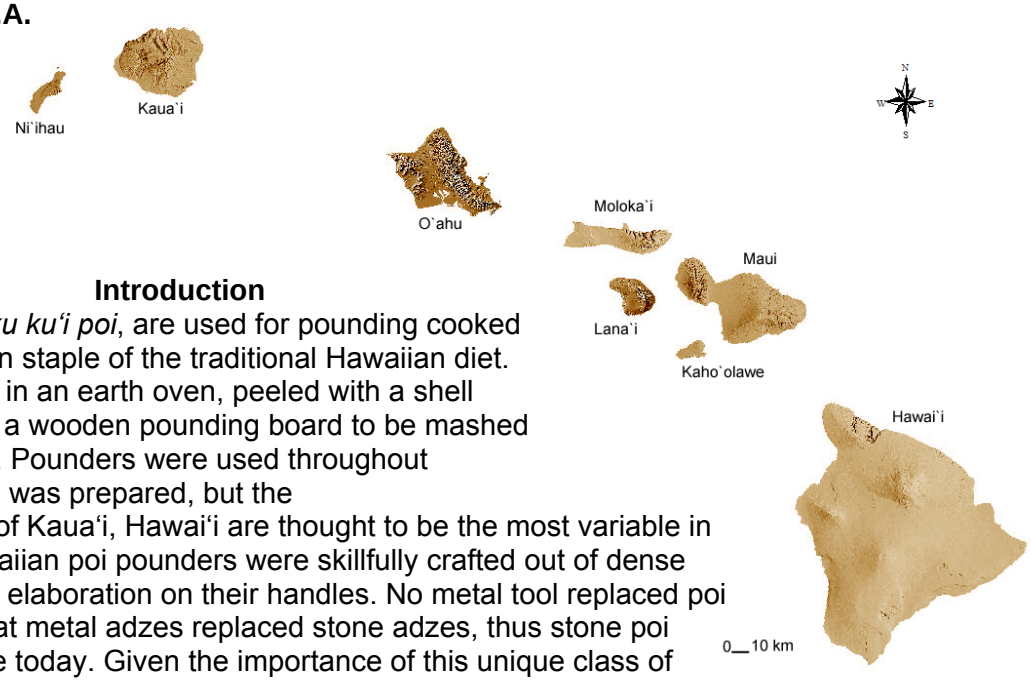
Variability in Poi Pounders from Kaua‘i Island, Hawai‘i
By Windy McElroy, M.A.



Introduction

Poi pounders, *or pōhaku ku‘i poi*, are used for pounding cooked taro root into poi, a main staple of the traditional Hawaiian diet. Taro root was steamed in an earth oven, peeled with a shell scraper, and placed on a wooden pounding board to be mashed with the stone pounder. Pounders were used throughout Polynesia wherever poi was prepared, but the pounders of the island of Kaua‘i, Hawai‘i are thought to be the most variable in morphology. Most Hawaiian poi pounders were skillfully crafted out of dense basalt and often exhibit elaboration on their handles. No metal tool replaced poi pounders in the way that metal adzes replaced stone adzes, thus stone poi pounders are still in use today. Given the importance of this unique class of artifacts, surprisingly little systematic research has been done on Hawaiian poi pounders.

This research utilizes paradigmatic classification to examine stylistic and functional variability in poi pounder morphology. The seriation method is used to order this class of tools through time and to illuminate patterns of interaction and transmission among Hawaiian groups on the island of Kaua‘i. I also examine the distribution of poi pounders across space on Kaua‘i and carry out functional analyses to help explain processes of selection and interaction between poi pounders and the environment.


knobbed


ring


stirrup

Previous Research

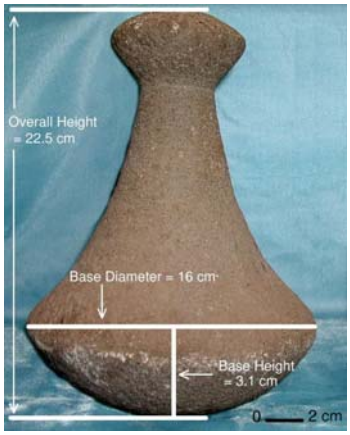
Previous research identifies three basic forms of poi pounders: the knobbed, ring, and stirrup forms. All sources assert that the ring and stirrup pounders are limited in distribution to Kaua‘i Island, and it has been proposed that the knobbed pounders are most recent, the ring pounders intermediate in age, and the stirrup forms oldest. However, this rough chronology has never been systematically analyzed. In addition, the distinguishing features of the three forms are not clearly defined, nothing is known about their distribution across the landscape of Kaua‘i, and the way in which these artifacts vary in terms of functional attributes has never been considered. This research addresses these issues.

Methods

I examined a total of 173 poi pounders from Kaua'i; 132 of these were housed at museums where I was able to physically examine them. In addition, I gathered information from photographs and measurements of 41 ethnographic pounders recorded in the Bishop Museum archives. I was not able to obtain a complete set of information for every artifact (e.g., some lacked precise provenience information, while others lacked weight data), thus not all 173 artifacts were used for each analysis. For the spatial and temporal analyses I utilized 94 of the poi pounders that had provenience information to the scale of district or better and for which the dimensions of my classification could be clearly identified. For the functional analyses I utilized 149 of the pounders that had weight, height, and base diameter data available.

Database for Study

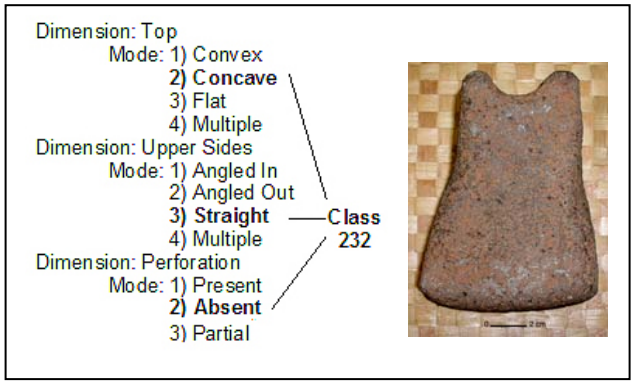
Collection	Number Employed: Spatial & Temporal Analyses	Number Employed: Functional Analyses	Overall Total
Grove Farm Ethnographic Collections	1 (1.1%)	44 (29.5%)	44 (25.4%)
Bishop Museum Ethnographic Collections	46 (48.9%)	73 (49%)	78 (45.1%)
Bishop Museum Archaeological Collections	6 (6.4%)	10 (6.7%)	10 (5.8%)
Bishop Museum Archives	41 (43.6%)	22 (14.8%)	41 (23.7%)
Totals	94	149	173

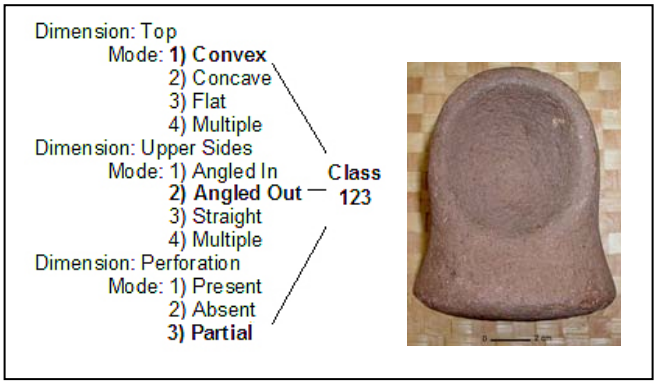


For the pounders that I was able to physically examine, I took digital photographs and used these to obtain precise measurements to characterize the morphology of each artifact. Digitally measuring these highly variable artifacts proved advantageous in that the exact location of each measurement could be documented for future replication. I also recorded the weight and material type of each artifact. Basalt density was calculated through visual inspection with reference to illustrations designed for estimating the percentage composition of rock.

Based on this information, I devised a simple paradigmatic classification for poi pounders. Paradigmatic classification is based on the intersection of attributes and dimensions. A dimension is a set of mutually exclusive features of artifacts, and modes are the different attribute states of a dimension. For example, the inner edge of a fishhook head is a dimension, while flat or stepped would be modes of that dimension. The classification used here focuses on the handle region of the artifact, as this is the most promising area in which to identify stylistic variability. The handle region was targeted as a stylistic portion of the poi pounder because it exhibits the most elaboration and is not the working surface of the implement.

Dimension: Top
Mode: 1) Convex
2) Concave
3) Flat
4) Multiple
Dimension: Upper Sides
Mode: 1) Angled In
2) Angled Out
3) Straight
4) Multiple
Dimension: Perforation
Mode: 1) Present
2) Absent
3) Partial

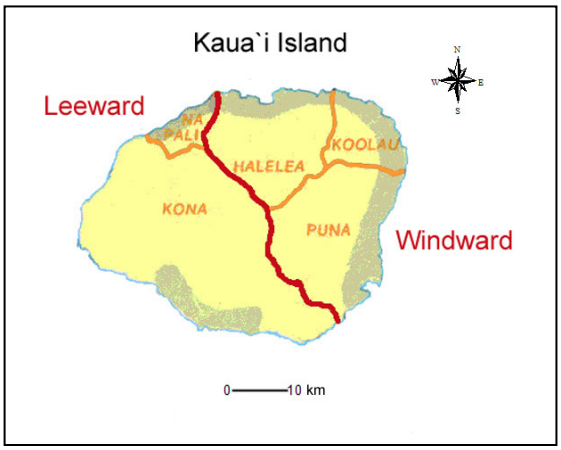


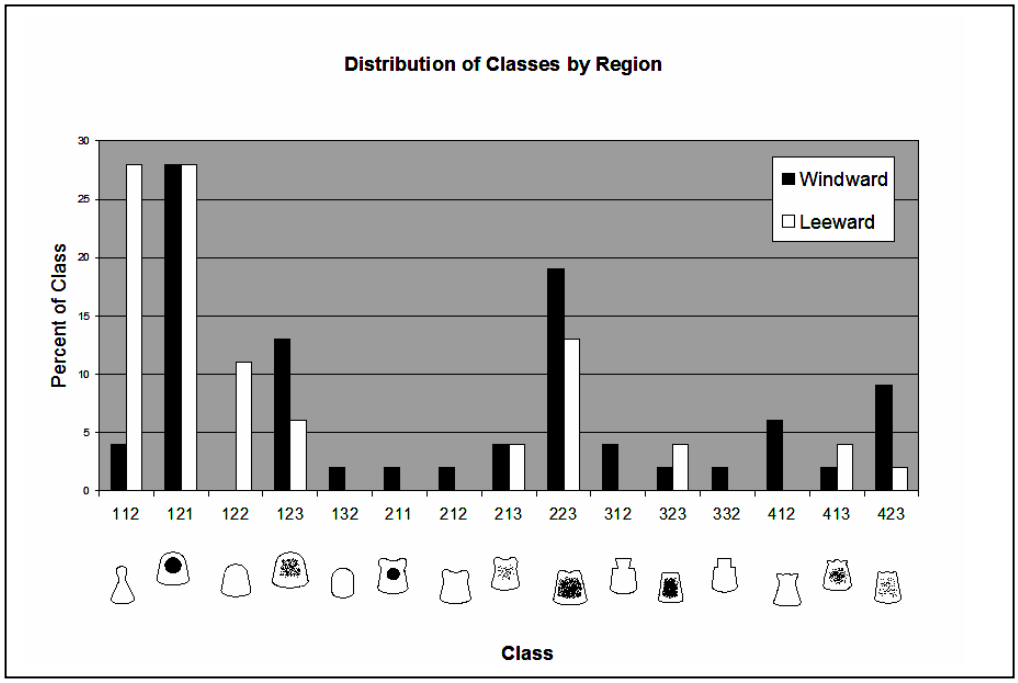


The first two dimensions of the classification have four modes and the last has three, therefore this classification produces 48 classes (4x4x3). For example, a pounder with a concave top, straight sides, and no perforation is a class 232 artifact, while one with a convex top, sides angled out and partial perforation would fall into class 123. These classes are clearly capable of tracking variability at a finer scale than the traditional three-group classification of poi pounders (knobbed, ring, and stirrup).

Spatial Analysis

Poi pounders were grouped according to the windward and leeward divisions of Kaua'i. The classic knobbed form represented by class 112 is predominantly a leeward phenomenon, while the ring pounders (class 121) were equally distributed on both sides of the island. The more variable stirrup forms were more common on the windward side. As the stirrup pounders are thought to be earlier, this suggests a shift through time in the location where poi pounders were manufactured. The windward poi pounders exhibited greater diversity overall, with 47 artifacts spread across 14 classes. By contrast, leeward's 47 poi pounders were distributed among only nine classes. The greater variability in windward pounders may be attributed to a greater importance of poi in the wet windward region or a longer period of occupation on the windward side of the island, or both. The degree of political control and the number of artifact manufacturers may have played a role as well.





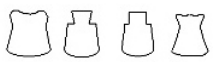
Temporal Analysis

An attempt to apply seriation to poi pounders adds to our understanding of interaction and transmission through time among Hawaiian groups on Kauaʻi. The dimensions of the paradigmatic classification were used to array the individual pounders at different geographic scales of analysis to track variation in poi pounder form across space and through time. Note that these seriations date manufacture, and not use. The seriations are based on the presence or absence of a given mode of the three dimensions defined in the classification: 1) a convex top, 2) upper sides angled out, and 3) perforation (partial or complete). Poi pounders were seriated at the scale of site, district, region (shown here), and the entire island. The seriations are flawless at all scales of analysis, and this provides clear evidence for transmission processes involving the production of poi pounders that spanned the entire island as a single local group.

Seriation by Region

Region	Convex Top	Upper Sides Angled Out	Part/Full Perforation	Classes
Windward	+			112,132
Windward	+	+	+	121,123
Windward		+	+	223,323,423
Windward			+	211,213,413
Windward				212,312,332,412
Leeward	+			112
Leeward	+	+		122
Leeward	+	+	+	121,123
Leeward		+	+	223,323,423
Leeward			+	213,413

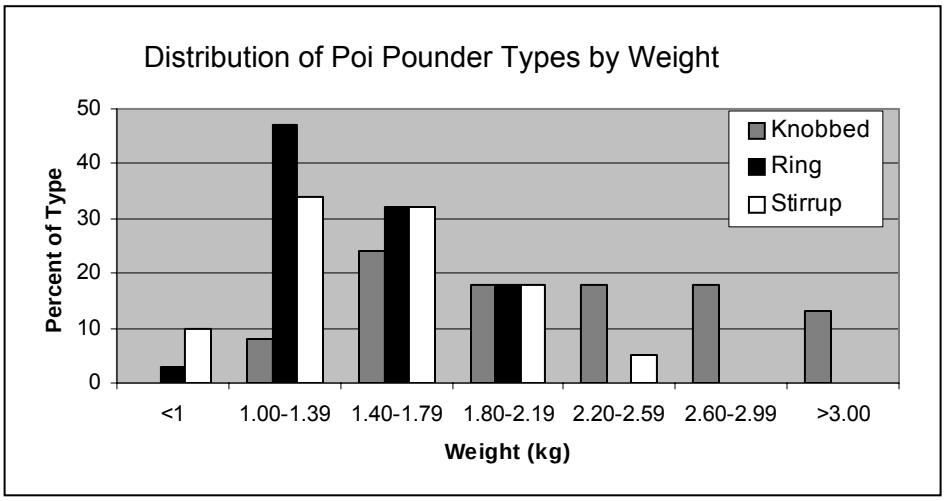
Chronology for Kauaʻi Poi Pounders

Temporal Unit	Convex Top	Upper Sides Angled out	Partial or Full Perforation	Classes	
1	+			112,132	
2	+	+		122	
2	+	+	+	121,123	
3		+	+	223,323,423	
4			+	211,213,413	
5				212,312,332, 412	

The seriations illustrate a hypothetical chronology for poi pounder form on the island of Kauaʻi. Each row in the seriation can be considered a temporal unit (TU), with TU 1 most recent and TU 5 oldest. TU 2 combined two seriation rows because of the limited distribution of class 122 and the similar morphology of these artifacts to those in classes 121 and 123. From this it is apparent that pounders with convex tops are most recent (TU 1-2) while those with concave, straight or multiple tops are older (TU 3-5). In addition, it appears that poi pounders were more variable in the distant past and became more homogenous through time.

Functional Analysis

Weight, overall height, base diameter, base height, and material type serve as functional or technological attributes. Weight and material type are shown here. Pounder weight plays a direct role in the time and energy it takes to process the taro root into poi. A heavier pounder exerts more force on the taro, mashing it in fewer blows than a lighter one, yet a heavier pounder takes more energy to lift. These heavier implements would require more strength to operate but would have gotten the job done in less time than a lighter poi pounder. Also, a heavier pounder may require basalt limited in distribution or larger blocks of basalt. The graph below shows that the knobbed pounders are clearly heavier than the ring or stirrup forms. Extra weight may have been necessary to exert heavier blows with the knobbed pounders because they were operated with only one hand. Additional weight may not have been as important to the ring and stirrup pounders as they may have utilized the force of two hands.



sedimentary rock

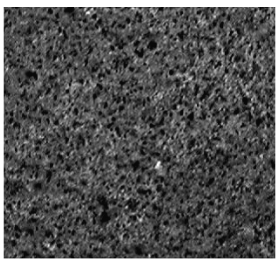
basalt

coral

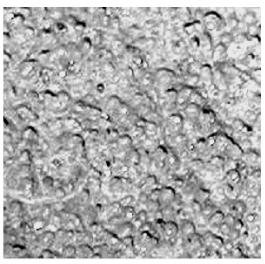
The poi pounders in this sample were manufactured from sedimentary rock (beach rock/sandstone), basalt (lava rock), or coral. Sedimentary rock is made from compacted sand, shell, and other particles. This material has large grains but is quite dense, as there is no pore space between the grains. Basalt varies in texture (as a result of varying levels of olivine, pyroxene, and feldspar phenocrysts) and density (because of differing amounts of pore space). Coral is generally very porous.

Basalt Density

1-3%
pore space

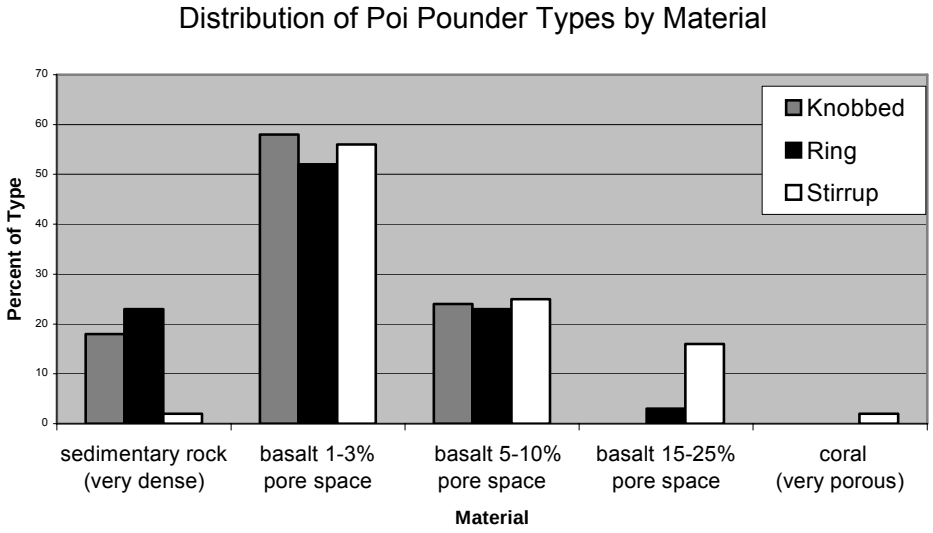


5-10%
pore space



15-25%
pore space

Material density is an important aspect to examine as it has a direct relationship with pounder weight and size. Dense materials are heavier than porous ones and require less volume of raw material per unit of weight. Basalt was the only material that exhibited within-group variability with regard to density. I chose to measure basalt density by estimating the percentage of pore space with reference to illustrations designed for estimating the percentage composition of rock.



91% of the poi pounders were made from dense materials (i.e., basalt of ≤10% porosity and sedimentary rock). A likely explanation is that manufacturers selected for heavier stone to add more weight to the pounders relative to their size. Alternatively, porous materials may have been avoided because pounders made from these materials would have been more difficult to clean. The porous basalts have larger or more numerous pores for poi to get stuck in. If not thoroughly cleaned, this lodged poi would ferment and contaminate fresh poi pounded with that implement.

All of the knobbed pounders were manufactured from dense materials, while the stirrup forms tend to be made from less dense material than the other pounder types. Since the stirrup pounders are the earlier forms, this suggests a shift toward materials of higher density through time. It is possible that manufacturers were initially experimenting with different materials and came to find dense rock most efficient.

Conclusion

This research shows the value of examining artifacts from museum collections, even if they are poorly provenienced. By making better use of previously excavated artifacts and those donated to museums, we can acquire new knowledge without excavating new sites. This approach contributes to our understanding of these collections and the past while helping to preserve the archaeological record.

Hawaiian poi pounders are unique artifacts which have received inadequate attention by the archaeological community and whose potential to yield useful archaeological information has not been exhausted. The classification presented here highlights some of the variability within and between the traditional three-group classification of poi pounders and identifies similarities and differences in poi pounder form across space and through time.

Further Reading:

McElroy, W.
2003a *Variability in Poi Pounders from Kauaʻi Island, Hawaiʻi*. M.A. Thesis, Department of Anthropology, University of Hawaiʻi at Mānoa, Honolulu, Hawaiʻi. Available at www.proquest.com/umi/
2003b Rethinking the Traditional Classification of Hawaiian Poi Pounders. *Rapa Nui Journal*. 17(2): 85-93.