

A Microwear Analysis of Tools from Site 10-241, Easter Island-- An Inland Processing Site

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A high-power use-wear analysis has been conducted on a sample of chipped obsidian artifacts from Site 10-241, an upland site located approximately 5 km from the southern coast of Easter Island near *Vaihu* (Figure 1). The site was occupied between AD 1400 and AD 1680 (Stevenson, Pollack, and Ramirez 1991). Site 10-241 was selected for excavation in 1989 in order to document the variety of prehistoric economic activities conducted at high inland sites.

The site consisted of a disturbed pavement of flat, irregular stones located on the southern slope of the Mt. Terevaka volcano. A high density of subsurface features was identified, including cooking ovens (*umu*), hearths, storage pits, stains, and midden. The lack of other architectural features such as chicken houses and garden enclosures, along with *umu* without perimeter stones, led to a preliminary interpretation of the site as a special function site repeatedly occupied on a short-term basis for the processing of plants grown within the upland area (Stevenson, Pollack, and Ramirez 1991).

The obsidian assemblage consisted of 1,136 items, including debitage, eleven *mataa* fragments, two complete *mataa*, and four possible drills. A sample of this material was subjected to a high-power microwear analysis to determine

the range of activities performed at the site.

Methods

Eighteen items were selected for analysis in order to sample a variety of artifact classes and artifact proveniences (Table 1). After the sample items were processed through detergent, weak hydrochloric acid, and weak sodium hydroxide baths, and allowed to air dry, each item was then analyzed using an incident light microscope with a magnification range of 80X-1000X. Patterns of striations, polishes, and abrasion were compared with those developed on experimental tools and previous obsidian studies of archaeological materials (Church and Ellis 1993; Hurcombe 1992) to determine activities performed and the nature of worked materials.

Results

Four small flakes (22% of the sample) were not utilized; forty-four examples of use-wear were identified on the remaining fourteen items. Activities were predominantly scraping, followed by cutting, sawing, and whittling (Figure 2). The most frequently worked materials included fresh plants, an unknown material 'A', and soft wood, then fish with single instances of hard wood, sweet potato, chicken bone, bone/meat, meat/plant, and material 'A'/plant (Figure 3). Combining activities with materials worked reveals that scraping material 'A' was the most common activity, followed closely by cutting fresh plants. Secondary activities included scraping plants, soft wood, and fish (Plate 1). Minor activities were sawing plants (Plate 2), scraping soft wood, cutting sweet potato, scraping material 'A'/plant, sawing hard wood, cutting meat/plant, cutting chicken bone, sawing bone/meat, hafting, and whittling soft wood (Figure 4).

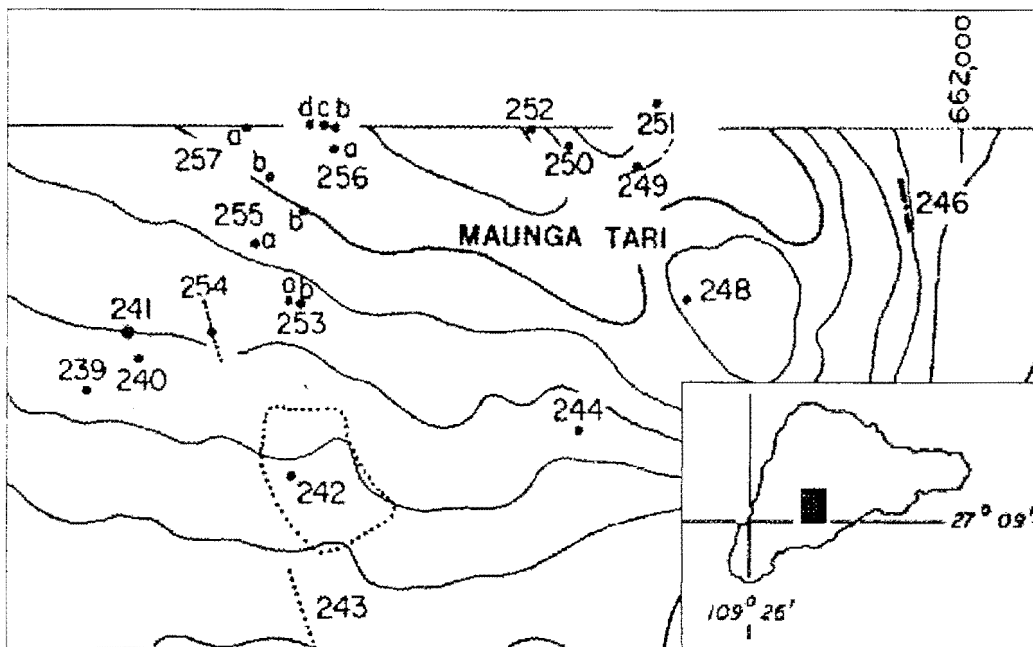


Figure 1: Location of Site 10-241, Easter Island (From Christino et al. 1981)

ITEM #	DESCRIPTION	LENGTH (mm)	WIDTH (mm)	THICK (mm)	ACTIVITY/ MATERIAL WORKED
0-241-1	Flake	24.5	20.7	6.1	Scraping soft wood; cutting fresh plants;
0-241-2	Scraper				Scraping material 'A'
0-241-3	Flake	39.5	46.9	9.5	Cutting sweet potato; scraping soft wood; scraping material 'A'
0-241-4	Flake	32.6	29.9	11.8	Not utilized
0-241-5	Mataa blade	68.7	54.4	11.5	Cutting fresh plants; scraping material 'A'/plant; scraping soft wood
0-241-6	Mataa fragment	50.2	—	10.6	Cutting fresh plants; scraping material 'A'; sawing soft wood
0-241-7	Flake	65.0	48.0	13.0	Sawing hard wood; cutting meat/plant
0-241-8	Scraper	39.1	11.6	10.8	Sawing plants; cutting fresh plants; scraping plant; scraping soft wood; scraping material 'A'
0-241-9	Scraper	25.5	12.0	8.3	Scraping fish; scraping plant
0-241-10	Flake	51.5	36.0	12.5	Light cutting fresh plants; light sawing plants; whittling soft wood; scraping material 'A'
0-241-11	Flake	31.0	23.0	9.2	Cutting fresh plants; scraping material 'A'
0-241-12	Flake				Scraping fish; cutting fresh plants; scraping soft wood; scraping material 'A' scraping plants
0-241-13	Flake	42.0	15.2	9.6	Cutting fresh plants; cutting chicken bone; scraping fish; scraping material 'A'
0-241-14	Flake	56.0	37.0	12.0	Sawing soft wood; scraping material 'A'; hafting(?)
0-241-15	Flake	34.0	24.0	6.4	Not utilized
0-241-16	Scraper	32.0	12.0	11.0	Cutting fresh plants; scraping dry plants; scraping fish; sawing bone/meat
0-241-17	Flake	35.0	29.0	8.6	Not utilized
0-241-18	Flake	36.0	19.9	7.7	Not utilized

Table 1 .Summary of Use-Wear Traces Identified on a Sample of Tools from Site 10.241

ACTIVITY/ MATERIAL WORKED	SITE 6-356 (%)	SITE 10-241 (%)
Cutting plants	41	20
Cutting sweet potato	3	2
Scraping material 'A'	14	25
Scraping fish	5	9
Scraping bone	5	—
Scraping soft wood	3	11
Scraping hard wood	3	—
Whittling soft wood	5	2
Cutting chicken bone	8	2
Hafting	3	2
Sawing bone	3	2
Sawing plants	8	7
Scraping plants		9
Sawing soft wood		5
Sawing hard wood		2
Cutting meat		2

356, an *ana kionga*, such traces were first identified (Church and Ellis 1993). A tentative hypothesis at that time suggested that 'hide'-wear might correspond to some material used in lieu of hide-- such as bark cloth or *mahute*. However, this material could not be tested experimentally, and the interpretation was considered tentative at best.

For this analysis, given the preliminary interpretation of site function linking Site 10-241 to stone planting circles and to other sites located nearby, a more plausible analogy for the 'hide'-wear traces was sought among possible plant crops. Experiments were carried out scraping sweet potato tubers. Sweet potatoes were chosen because these tubers have a rough, fibrous surface with a softer interior, approximating hide. The experiment did not produce a strong correspondence between wear patterns on the experimental scraper and the artifacts from Site 10-241. A second experiment was made, this time scraping a tough fibrous scrap of leather. Wear traces, while light, did resemble those identified on the Easter Island tools. Thus, the conclusion remains the same: hide-working is not expected to be a major activity on the island; therefore, the 'hide' wear

Table 2. Comparison of Results from Site 6-356 and Site 10-241.

The unknown material 'A' category of materials worked was identified as a pattern of striations and polish similar to that identified by Hurcombe (1992) as fresh hide scraping. Because economically useful hide-bearing animals were lacking on Easter Island prehistorically, except for the occasional sea mammal, it is assumed that an analog was needed for the 'hide'-wear traces identified on Easter Island tools. During the examination of a set of tools from Site 6-

trace remains anomalous and has been designated Polish A. Further experiments are necessary to identify the source of the material being worked. It may be seen, then, that 25% of all activities at this site as identified by use-wear traces on chipped obsidian tools, involved scraping the unknown material represented by Polish A and 9% scraping other plants (Figure 3).

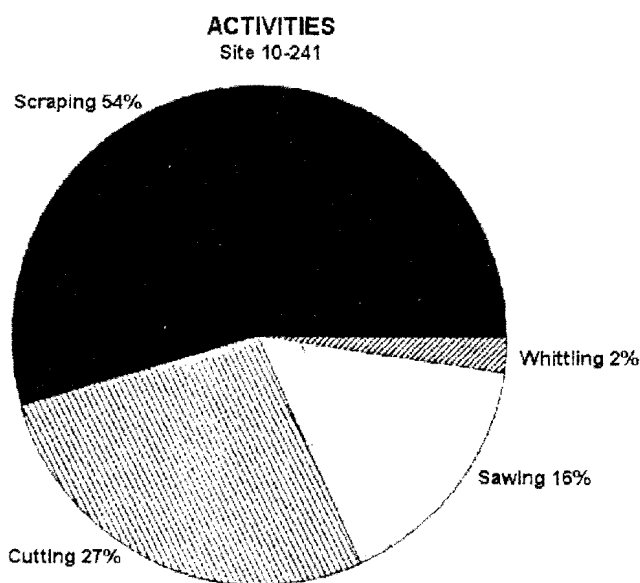


Figure 2. Activities identified through use-wear traces.

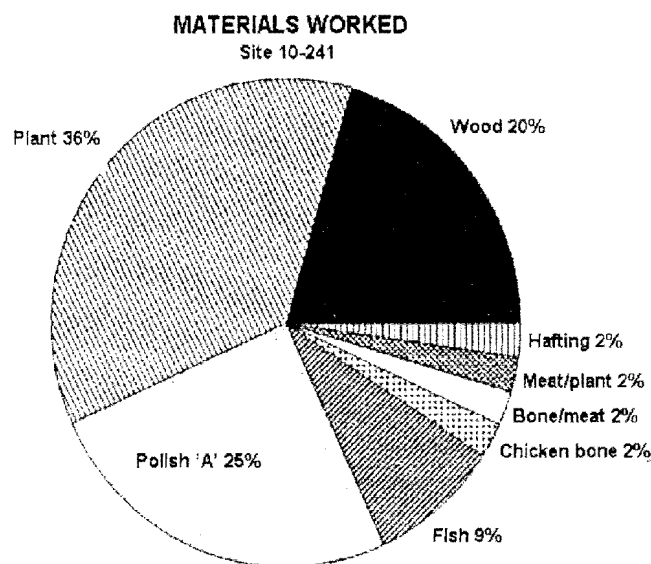


Figure 3. Materials worked identified through use-wear traces

Discussion and Summary

These results support the preliminary interpretation of Site 10-241 as a special purpose site which functioned for the processing of plant resources. Experimental replication efforts indicate that the dominant single wear pattern approximates that produced by scraping an unknown substance. Cutting, scraping, and sawing fresh plants contributed 36% of activities, with woodworking at 21%. Scraping fish was next in rank, followed by single instances of other wear types.

The over-all pattern of activities at this small upland site differs significantly from that identified at Site 6-356, the *ana kionga* (Table 2). The two sites share ten activities: cutting fresh plants; cutting sweet potato; scraping the unknown material 'A', fish, and soft wood; whittling soft wood; cutting chicken bone; hafting; and sawing bone and plants. However, cutting and sawing fresh plants accounted for 49% of all activities at the *ana kionga*, or twice as much as was present at the upland site. This was followed by scraping material 'A' and woodworking, both at approximately half the frequency observed for Site 10-241. Cutting chicken bone was documented at the *ana kionga* at four times the rate seen at the present site, while sawing bone and plants were identified at approximately the same levels. Two minor activities were identified at the cave which were not found in use-wear patterns at Site 10-241; these included scraping bone and hard wood. Also, four minor activities were identified at Site 10-241 which were not present in the sample of tools analyzed from the *ana kionga*. These activities consist of scraping plants, sawing soft and hard woods, and cutting meat.

In addition to describing a different pattern of site activities and identifying new use-wear patterns for an Easter Island site, the current research project has also refined the identification of two tool types-- the *mataa* and drills. While drills have been documented from numerous *Rapa Nui* site assemblages, Site 10-241 produced two items which superficially resemble drills, being long, narrow chipped obsidian tools with a tip on one end. However, initial analysis of these items prior to the use-wear inspection revealed that both artifacts in question were triangular in cross section with one side decidedly flat and unworked or modified. This seemed inconsistent with their proposed usage as drills, in which each artifact would have been rapidly rotated back and forth in whatever material was being worked. This type of action produces wear on all high points of a drill's topography and rounds or abrades all edges, depending upon the particular material being worked. The flat edge of these two items makes it seem unlikely that either would have functioned efficiently as a drill. Subsequent microwear analysis revealed that both artifacts had been used predominantly for scraping material 'A'.

The second tool type is the *mataa*. Six types of *mataas* have been described as 'spearpoints' (Metrax 1971: 166-167). Type 1 *mataas* have been analyzed as part of the sample of both Site 6-356 and Site 10-241.

In all cases, the predominant use of the tool has been for plant processing. At Site 6-356 this consisted of cutting fresh green plants; at Site 10-241 cutting fresh green plants and scraping material 'A' were both activities for which *mataa* were used. These activities are inconsistent with the original proposed function of these tools as spearpoints.

In conclusion, the analysis reveals that the results of high-power use-wear analysis can be used to define patterns of activity at sites, providing fuller interpretations of site functions. This allows more detailed descriptions of and comparisons between different site types to be made. Finally, micro-wear analysis can be helpful in refining descriptions of artifact types.

References

- Church, Flora and J. Grace Ellis. 1993. A Use-Wear Analysis of Obsidian Tools from an *Ana Kionga*. Paper presented at the 1993 *Rapa Nui Rendezvous*, University of Wyoming, Laramie, Wyoming, 3-6 August 1993.
- Cristino, C., P. Vargas, and R. Izurieta. 1981. *Atlas Arqueológico de Isla de Pascua*. Facultad de Arquitectura y Urbanismo, Centro de Estudios, Isla de Pascua, Santiago, Chile.
- Hurcombe, Linda M. 1992. *Use Wear Analysis and Obsidian: Theory, Experiments and Results*. Sheffield Archaeological Monographs 4. University of Sheffield.
- Stevenson, Christopher M., Eloisa Aguilar-Pollack, and Jose Miguel Ramirez. 1991. Archaeological Investigations at Site 10-241, Easter Island: The 1989 Field Excavation Report.

Summary of Use-wear Results Site 10-241

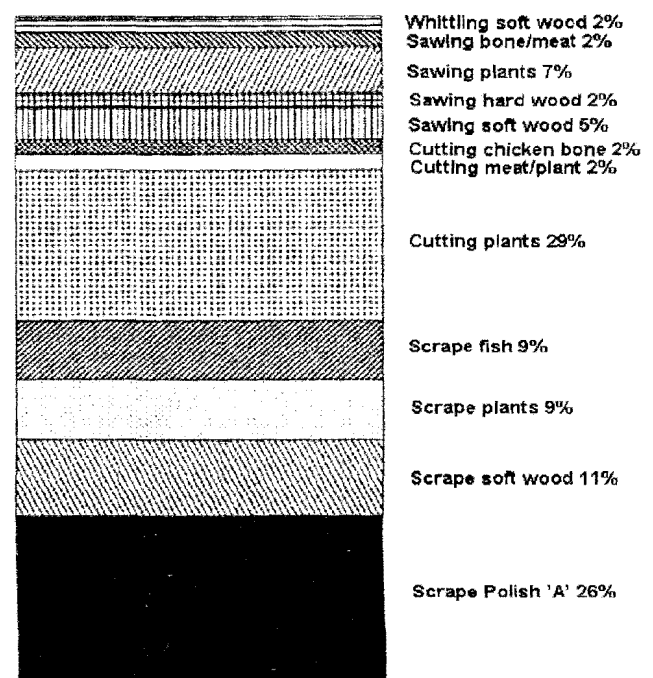


Figure 4. Summary of use-wear results from sample of tools from Site 10-241.

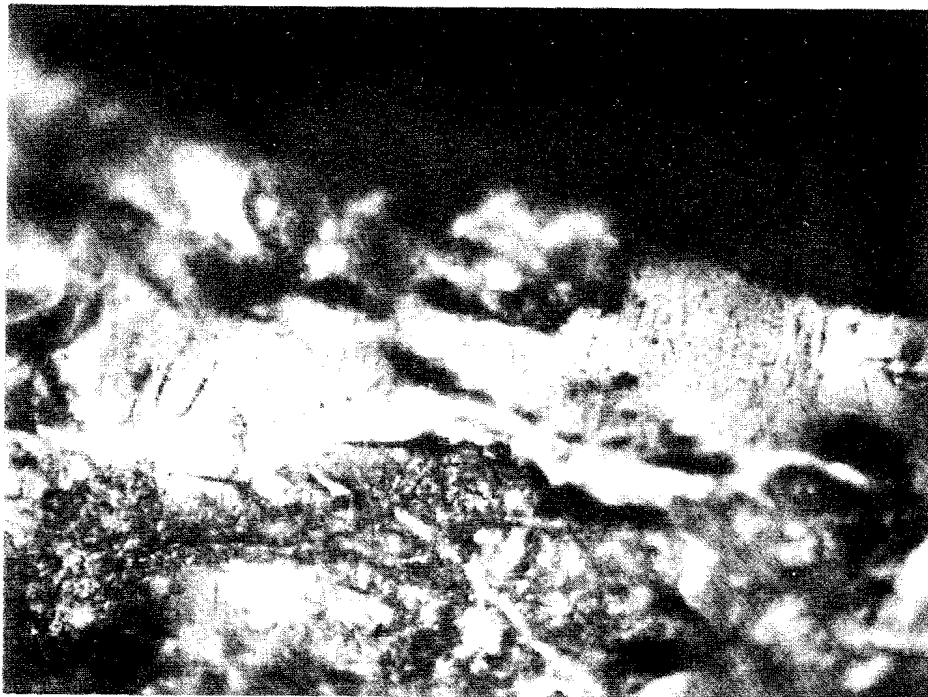


Plate 1. Traces of scraping fish scales, Item 10-241-9 (OM 250X).



Plate 2. Traces of sawing plants, Item 10-241-7 (OM250X).