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1986 The Clemente and Herminia Hinojosa Site, 41 JW 8: A Toyah Horizon Campsite in Southern Texas. Center for Archaeological Research, The University of Texas at San Antonio, Special Report 18. (p. 78-85)

(U1) End Scrapers (N=64; Fig. 8,a-n)

Group U1 consists of complete and fragmentary unifacial tools that have a carefully trimmed semicircular distal end. The group could be divided into a number of subgroups depending on the criteria selected. For example, one could sort the group into flakes with intact platforms (26), flakes with trimmed platforms (4), and flake fragments which do not have platforms (34). Flake type could also be used as a sorting criteria: interior (14), secondary (12), corticate chip (9), and decorticate chip (29). Some variation in trimming location and extent occurs; hence one can distinguish between distal end trimming only (19), distal end and one side (8), distal end and two sides (15), and circumference trimmed (8).

These types of sorting criteria are considered to be functionally irrelevant by this researcher. It is suggested that all group U1 end scrapers were used in similar ways to perform similar functional tasks (probably animal hide scraping). Variations in flake type, trimming extent and location, and platform presence are believed to be fortuitous differences reflecting raw material availability, individual flake morphology, and knapping skill or style.

Small end scrapers have been described under a variety of terms, including: "thumbnail scrapers" (informal designation), "snub-nosed scrapers" (Jelks 1962), "small snub-nosed scrapers," "small turtle-back scrapers," and "trimmed flakes" (Hall, Black, and Graves 1982). Most of these terms are used to describe the appearance of these tools.

End Scraper Attribute Data, Metric Data, and Wear Patterns

Table 6 presents attribute data for all 64 U1 specimens and metric and microwear data for 30 complete specimens that were examined in greater detail. The 30 examined end scrapers have very consistent wear patterns that strongly confirm the accuracy of the functional term "end scraper."

The 30 end scrapers recovered from 41 JW 8 that have intact or trimmed flake platforms were carefully examined microscopically for wear patterns. The remaining 34 end scrapers do not have intact platforms, hence must be considered chips rather than flakes. Most of these are thought to have been flake tools that were broken during or subsequent to use or resharpening. Some no doubt originally began as chip tools (i.e., a flake fragment was used as a tool blank). Due to the difficulty of distinguishing between broken flake tools and chip tools and because the end scraper wear patterns are extremely consistent, the 34 end scrapers (or end scraper fragments) are not included in the wear study. A quick examination of several of these 34 excluded artifacts revealed identical wear patterns as those in the following discussion.

During the initial examination of the entire U1 sample, all 64 artifacts were examined for four attributes (material type, flake type, trimming location, and platform type). About a third of the way through this process, the author became aware that many of the end scrapers had readily observable edge rounding and polishing. The final two-thirds of the 64 end scrapers (41

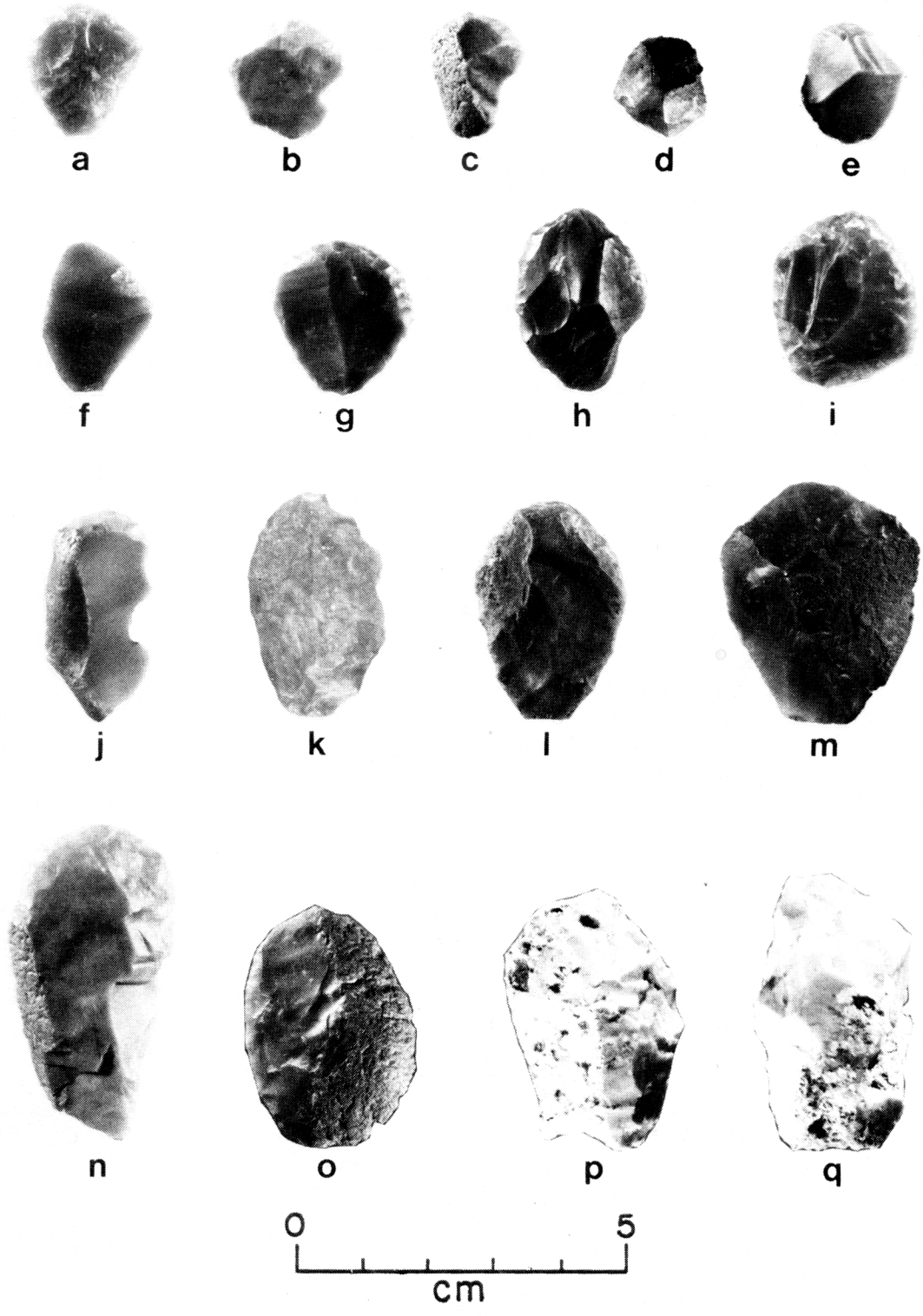

Figure 8. **Unifacial Tools.** a-n, end scrapers (U1); o-q, miscellaneous scrapers (U2). Lot numbers: a, 338; b, 311; c, 252; d, 339; e, 341; f, 375; g, 316; h, 284; i, 111; j, 191; k, 523; l, 375; m, 275; n, 368-1; o, 159; p, 327; q, 472-15.

artifacts) were examined under good lighting by the unaided eye, and the presence or absence of obvious edge rounding and polish was noted. Obvious wear was observed on 23 of the 41 (56%).

The microscopic examination confirmed the macroscopic observations and revealed edge rounding and polish on all 30 complete artifacts, even those which did not appear to be worn in the first examination. The qualitative and quantitative extent of the edge rounding and polish varies from specimens that have only isolated traces of wear to artifacts which have completely rounded and polished working edges. This variation probably reflects the amount of use since the last edge rejuvenation rather than the total amount of use the artifact received. Evidence of edge rejuvenation was observed on 19 specimens (63%). Additional polish and rounding were observed on the flake ridges and protrusions on the ventral face adjacent to the edge on 18 specimens (60%). Use wear striations were observed on four of the specimens (13%). Different types of wear, edge spalling and bifacial edge damage, were observed on 11 specimens (37%). Each of these aspects of the observed wear is discussed in greater detail later.

All examined specimens have edge rounding and edge polish. Edge rounding and edge polish are easily observed under low magnification (10-30X) by holding the artifact with the edge angled toward the lense under high angle oblique lighting. In all but a few specimens the edge rounding and polish are concentrated on the semicircular end of the tool. Most specimens evidence this wear only over a 10 to 20 mm section of the end (equivalent to width of semicircular end or bit). A few tools with wider bits have correspondingly wider areas of polish (up to 35-40 mm). The rejuvenated specimens only have isolated remnants of edge rounding or polish or very light wear, depending on the thoroughness of the edge rejuvenation.

The edge rounding (abrasion) and polish are on the extreme edge of the ventral tool face and extend over a much wider area of the dorsal face. This clearly indicates the ventral face of the tool was in minimal contact with the worked material while the dorsal face was in much greater contact. The worn ends have well-rounded edges that are completely smoothed over and lightly polished. The tools with the heaviest wear have an edge that is about as round and smooth as the back of a stainless steel table knife blade (although obviously more irregular and not of the same shape). The polish is fairly bright and uniform but does not appear to be built-up like "hoe" polish or silica polish. The end scraper polish seems to result from the complete rounding and smoothing of the edge and appears identical in description to experimentally produced wet hide and meat polish (Keeley 1980:49-54). Protruding areas of the edge, such as flake ridges, are always the most heavily rounded and polished sections. Sections of the edge which have spine-plane angles approaching 90° are almost always more heavily worn than sections with spine-plane angles approaching 60°. The spine-plane angle, while not consistently measured, varies on most specimens, and ranges from about 60 to 100°. Most artifacts have spine-plane angles in the range of 70 to 90°. The steepest areas of the edges are invariably the end sections.

The ventral face of the artifacts (i.e., the flat side of the flake) has very little indication of wear except for the portion of the face immediately adjacent to the edge. Along sections of the edge, which are well rounded and

polished (mostly along the bit), light polish can be observed on the ventral face along a narrow band that extends no more than 1 mm from the edge. Two artifacts have minute traces of a very reflective high polish. These areas are near the edge but do not appear connected with the edge polish or any other visible wear. It is suspected that the apparent high polish is actually the result of limited contact with a hard material. Given the minute amount and the lack of any regular pattern, these patches could be the result of impact with a piece of flint or even an excavation tool. The only other wear observed on the ventral face was the edge spalling or random nicking that will be discussed later. Thus, the ventral face of these tools seems to have little wear and must not have been in contact with the worked material except along the immediate tool edge.

In contrast, the dorsal face of the tools has much more extensive wear on most specimens. As mentioned, most edge rounding and polishing extend several millimeters onto the dorsal surface of the tool. It should be noted that while the ventral face is flat, the dorsal face is curved both by the original form of the flake and especially by the unifacial flaking along the dorsal face on the end (i.e., the end trimming that formed the tool edge). An additional aspect of the dorsal wear is the rounding and polishing of flake ridges and protrusions. This type of wear is more difficult to observe due to several factors. First, evidence of dorsal and edge wear is partially removed by edge rejuvenation on many specimens. Second, the ridge or protrusion wear is only present on heavily worn specimens. Finally, while the tool edge is easy to examine by rotating the artifact under the microscope along the edge, the ridge wear can only be observed by turning the artifact many different times in hopes of catching reflecting light just right. The easiest way to find dorsal flake ridge wear is to first locate the most heavily worn section of the edge and then check the adjacent flake ridges. Heavily worn sections of the edge are invariably accompanied by rounded and polished flake ridges or protruding areas of the dorsal surface.

Striations are on four of the most heavily worn specimens. The striations are only found on extremely worn sections of the tool which always occur near the center of the semicircular end. On all four examples, the striations are only on very steep sections of the edge and oriented perpendicular to the edge. The striations are less than a millimeter from the edge on the ventral face, continue over the edge, and onto the dorsal face up to 1.7 mm from the edge. On the very limited areas of the four artifacts that have striations, there seem to be a parallel series of closely spaced striations. The striations, when viewed under 30-160X, are seen as wide, shallow grooves with rounded and polished edges rather than sharp scratches.

The presence of well-worn edge remnants adjacent to unworn or lightly worn sections of the edge provides good evidence of edge rejuvenation. In addition, several specimens have very little indication of wear along what appears to be a freshly flaked edge. These are interpreted as rejuvenated tools that were never used again or were used for such a limited amount of time that no appreciable amount of wear was produced. Evidence of prior use is found in the form of tiny wear remnants on protruding ridges along the edge or on ridges that are still present on the dorsal surface. In other examples, edge rejuvenation is present along one continuous section of the

TABLE 6. END SCRAPER (U1) ATTRIBUTE DATA

Lot Number	Material Type	Flake Type	Trimming Location	Platform Type	Metric Attributes L	W	T	WT	Microwear Attributes: Edge Rounding and Polishing	Ridge Rounding	Striations	Edge Rejuvenation	Edge Damaged Sides
56	1	1	3	1	23	19	5	2.2	x	x		x	
56	1	4	3	3									
56	2	4	3	3									
70	1	2	3	1	15	18	4	1.3	x	x			
70	1	4	2	3									
102	2	1	3	1	27	20	7	4.0	x	x		x	
108	1	4	2	3									
109	1	5	3	3									
111	1	4	4	2	28	26	7	5.2	x			x	
131	2	4	4	3									
131	3	1	4	1	28	21	6	4.1	x	x	x		
131	1	2	5	1	33	20	3	3.2	x	x		x	x
131	1	4	-	3									
156	1	1	1	1	29	17	2	1.5	x	x			
157	1	5	4	2	26	20	7	3.8	x			x	x
158	1	1	1	1	26	19	4	1.9	x	x		x	
187	1	5	1	3									
191	1	2	2	1	33	17	7	4.1	x			x	
194	1	2	3	1	36	25	7	6.9	x	x	x	x	
195	1	4	-	3									
214	1	4	-	3									
246	1	4	3	3									
252	1	2	1	1	20	15	3	1.1	x	x			x
258	1	4	3	3									
261	1	4	-	3									
264	1	5	4	3									
269	1	4	-	3									
274	1	5	-	3									
275	1	2	2	1	38	31	10	10.0	x	x			x
279	1	5	2	3									
281-1	1	4	4	2	30	20	6	3.3	x			x	x
283	2	2	1	1	24	16	8	3.2	x	x			
284	1	4	1	3									
311	1	4	4	2	19	19	4	1.5	x	x	x	x	x
314	1	5	3	3									
316	1	4	-	3									

TABLE 6. (continued)

Lot Number	Material Type	Flake Type	Trimming Location	Platform Type	Metric Attributes L	W	T	WT	Microwear Attributes: Edge Rounding and Polishing	Ridge Rounding	Striations	Edge Rejuvenation	Edge Damaged Sides
316	1	1	4	1	24	22	5	2.8	x	x	x		
318	1	4	1	3									
319	1	4	-	3									
320	1	4	1	3									
320	1	1	2	1	26	15	5	1.9	x			x	
320	1	4	-	3									
326	1	5	-	3									
327	1	2	2	1	45	25	9	9.1	x	x		x	x
330	1	4	1	3									
331	1	1	3	1	24	23	6	3.4	x	x		x	
336	1	4	-	3									
338	1	1	3	1	21	19	5	1.8	x			x	
339	1	2	1	1	16	15	7	1.4	x			x	
340	1	4	-	3									
341	1	2	1	1	19	17	5	1.2	x			x	
342	1	1	-	1	23	14	4	1.4	x	x			
343	1	4	3	3									
354-7	1	4	2	3									
368-1	1	2	1	1	48	26	8	10.5	x	x		x	x
375	1	1	3	1	23	18	3	1.2	x	x			x
375	1	1	1	1	34	24	7	5.3	x	x			
386	1	2	1	1	26	22	7	3.8	x	x			x
397	1	4	1	3									
420	1	5	1	3									
433	1	4	1	3									
433	1	4	1	3									
473	1	1	1	1	34	19	5	2.7	x			x	x
523-3	1	1	3	1	34	20	6	4.1	x			x	

Legend

Material Type: 1 = fine-grained chert; 2 = white chert; 3 = quartzite.

Flake Type: 1 = interior flake; 2 = secondary flake; 3 = primary flake; 4 = decorticate chip; 5 = corticate chip.

Trimming Location: 1 = end only; 2 = end and one side; 3 = end and two sides; 4 = circumference; 5 = side only.

Platform Type: 1 = intact platform; 2 = modified platform; 3 = platform missing (i.e., chip).

Metric Attributes: L = length; W = width; T = thickness (mm); WT = weight (g).

Microwear Attributes: x = present, see text for explanations.

edge until a heavily worn and severely rounded steep section of the edge is encountered. These heavily worn areas appear to have prevented the user from finishing the edge rejuvenation. One such specimen has ring cracks along the worn area, attesting to the force used in an unsuccessful attempt to remove the dull section of the tool. An additional fact which may evidence rejuvenation is that some of the end scrapers are noticeably smaller. These tend to be more completely trimmed and shaped than other specimens.

All of the wear patterns discussed are consistent with scraper wear. About a third of the examined tools also have indications of random nicking or spalling and bifacial edge damage. Although the random nicking is also present along the bit end of several specimens, it most often occurs along one or both sides away from the rounded and polished bit end. The random nicking or spalling was noticed on the ventral face; similar spalling is no doubt present on the dorsal face but is concealed by edge trimming. Bifacial edge damage occurs on several specimens along one side. The term "bifacial edge damage" is used to refer to a series of small step fractures that occur on both faces along one side of a tool that lacks edge trimming (i.e., has end trimming only or end and side trimming on opposite side). Both random nicking and bifacial edge damage probably reflect use of the side edge of the end scraper to perform some short-term cutting or sawing function. The absence of edge rounding and polish or more extensive edge damage along the tool side edges in question, argues that the wear is neither similar to the predominate end scraper usage nor the result of a repeated long-term function. In other words, the additional wear patterns must represent incidental use of the tool much like that represented by the modified debitage category MD2.

Several additional aspects of the end scraper wear pattern study deserve mention. Despite a careful search, no definite indication of hafting modification or haft wear was observed. If these end scrapers were hafted, one would seemingly expect to find either some type of haft modification such as notching or edge grinding, or evidence of haft polish on the flake ridges on the proximal section of the tool. The absence of these evidences may suggest that the end scrapers at the Hinojosa site were hand-held tools. This suggestion contradicts Hester's (1977:20) intuitive assertion that "given the small size of the specimens, they must have been hafted for use. . . ." It is also possible that the hafting method did not require hafting modification or result in distinctive wear. Wedel (1970) illustrates a variety of hafted scrapers from the Great Plains, including archaeological and ethnographic specimens. In particular, several specimens are shown which have small scrapers set in an antler handle with some type of mastic or resin.

The presence of striations on four heavily worn tools led the author to try and locate striations on the most heavily worn sections of other end scrapers. It was assumed that the striations were easy to overlook and might require higher magnification to observe. No additional definite striation patterns were found. Several explanations for the limited occurrence of striations are considered: (1) the striations may suggest that the four tools were used on a different material than the other 26 specimens; (2) striations only occur after extensive amounts of use; and (3) striations are present but not observed. While the first explanation cannot be ruled out, the other two explanations in combination seem most likely. Striations were

only observed on the most heavily worn specimens on the most heavily worn sections of the tool where large, smooth, highly reflective areas were present. The striations were only clear under higher magnification (>30X) and by using low angle oblique lighting. Hence, it seems likely that less obvious striations were present but not observed due to the difficulty of coordinating low angle lighting on small, rounded areas under higher magnification. An added factor that hampered examination of the many small, polished projections is that many tools are made of highly reflective, fine grain chert, hence it is difficult to isolate the reflected polish.

In summary, the wear patterns on the 41 JW 8 end scrapers are highly patterned and consistent with the hypothesis that Late Prehistoric end scrapers were in fact used to process animal hides. These artifacts were often resharpened when the used worn edge no longer functioned efficiently. The presence of additional wear on about a third of these tools suggests that end scrapers were also used to perform spontaneous secondary functions. The absence of the nonscraper wear on the scraper-worn end may suggest that these secondary functions were contemporary with the primary function. The Hinojosa site end scrapers may have been employed as short-term flake knives when necessary by using the side of the tool.

(U2) Miscellaneous Scrapers (N=3; Fig. 8,o-q)

Three unifaces were recovered from 41 JW 8 which are not end scrapers. All three have unifacially worked edges along one lateral edge and lack the semicircular end trimming of group U1. These unifaces could be termed "side scrapers." Due to the small number of artifacts in this category, they are briefly described on an individual basis.

The unifacial artifact from Lot 159 (Fig. 8,o) is a secondary flake which has trimming on one side; the opposite side and distal end are covered by cortex. Other than the absence of end trimming, this specimen is similar to the U1 group in terms of size, morphology, and edge angle. No noticeable wear was observed microscopically. It is 37.6 mm in length, 26.5 mm in width, 8.0 mm in thickness, and weighs 7.7 g.

The uniface from Lot 327 (Fig. 8,p) is made on a thick tertiary flake of a poor quality, whitish chert that has numerous tiny voids partially filled by crystals. One side is crudely flaked (many hinge fractures) to form a very thick, convex working edge. Microscopic examination reveals that the artifact had been resharpened prior to discard. Small remnants of the previous edge show extreme rounding and edge polish. The polish is rather general rather than faceted and very high, and is confined to within 1.3 mm of the edge. A few apparent striations were observed on the ventral surface of the edge and perpendicular to the edge. The wear and futile attempt at edge rejuvenation are consistent with scraper wear. It is 41.8 mm in length, 26.1 mm in width, 15.3 mm in thickness, and weighs 15.8 g.

The unifacial artifact, found in Feature 9 (Lot 472-15; Fig. 8,q), is a thick decorticate chip that is yellow to white in color and has numerous bedding plane flaws. It is similar in size, shape, and appearance to the Lot 327 U2 specimen. The proximal section of the flake has been snapped off, however,