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# Raspadita: a new lithic tool from the Isthmus of Rivas, Nicaragua

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## Abstract

A new lithic tool type was discovered at the Pacific Nicaraguan archaeological site of Santa Isabel (AD 800–1350) and named raspadita (small scraper). Thousands of these small tools (1–2 cm in length) were found. They have a rounded proximal edge and a pointed distal end. In this study, the raspaditas are proved to be a coherent tool class with minimal variation in size, shape, material type and usewear. They were manufactured from white chert bladelet cores using soft hammer percussion and pressure flaking unifacial retouch. Usewear points to a composite tool form and a scraping function for the raspaditas. Scanning electron microscopy determined a ventral leading, dorsal following, unidirectional scraping motion for the raspadita proximal end. The material that was scraped has still to be definitely determined but phytoliths visible in the SEM images suggest that the composite tool was used for plant processing.
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*Keywords:* Raspadita; Composite tool; Grater; Chert; Stone tool function; Usewear; Scanning electron microscopy; Nicaragua; Santa Isabel

## 1. Introduction

The raspaditas were found at the archaeological site of Santa Isabel, on the shore of Lake Nicaragua in the Isthmus of Rivas, Nicaragua. Excavations, between 2000 and 2004, revealed thousands of these small lithic tools (McCafferty et al., 2003). The raspaditas are about 1–2 cm in length with a rounded proximal edge and a pointed distal end. They can be divided into symmetrical and asymmetrical forms (Fig. 1). Symmetrical raspaditas are identified by a mirror plane of symmetry along the length of the tool, bisecting the end at 90°. Asymmetric types do not have a mirror plane of symmetry.

Due to their size and to the configuration of the proximal surface, these tools were named raspaditas, meaning small scrapers in Spanish (McCafferty et al., 2003). This new tool, comprising over 70% of the 3000 formal tools at Santa Isabel, has not been reported from other sites in the region.

The 16-hectare residential site at Santa Isabel contains at least ten house mounds (Fig. 2) (Fowler, 1989; Healy, 1980; McCafferty et al., 2003; Niemel, 2002). Willey and Norweb first reported the site in 1959–1961 (Healy, 1980), although it remained relatively unexcavated until 2000. The site was dated to the Ometepe period (1350–1550 CE), based on diagnostic ceramics collected from the surface and later recovered from subsurface deposits (Fowler, 1989; Healy, 1980; McCafferty et al., 2003; Niemel, 2002; Steinbrenner, 2002). However, 12 recent radiocarbon dates (890–1290 CE), from the site, place it in the ceramic Sapoa period (850–1350 CE) (McCafferty and Steinbrenner, 2005).

The objectives of this study were (1) to determine if raspaditas form a coherent new lithic type, (2) to define this tool class and (3) to determine how the tools were used. To identify the unique characteristics of the raspaditas, their dimensions were compared with those of other lithic tools from Santa Isabel. If the raspaditas form a proper lithic type, then the defining characteristics of the group should be unique and have a degree of homogeneity that is statistically significant.

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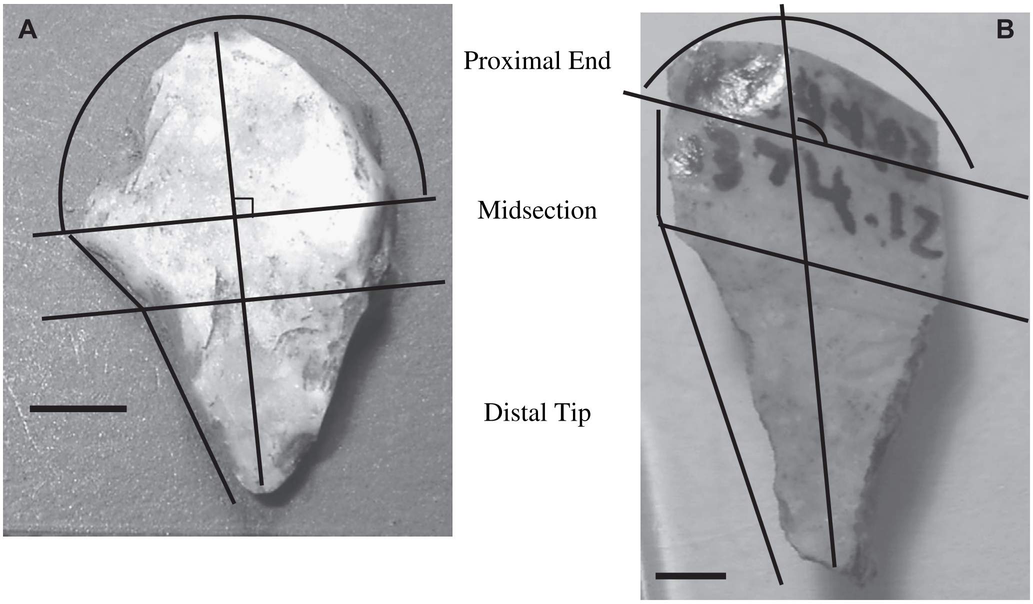


Fig. 1. Symmetrical (A) and asymmetrical (B) raspaditas: scale bar is 0.5 cm.

Function was addressed by examining the traces of usewear using optical and scanning electron microscopy (SEM). The location of the raspaditas was fed into a geographical information system (GIS) to observe the spatial clustering.

## 2. Methods

The geographical coordinates and depth data for all raspaditas collected in 2004 were entered into an Excel spreadsheet grouped by locus. Locus and shovel test data were then imported into ArcView as separate databases. The location of the raspaditas locations were then compared to archaeological features.

The length, width, and thickness of 244 unbroken raspaditas were measured with callipers. The length is defined as the distance from the proximal end of the tool to the distal tip (Fig. 1). The width is the widest part of the proximal end, which is perpendicular to length for the symmetrical raspaditas (Fig. 1a). In the case of asymmetric raspaditas, the width was measured along the use edge (Fig. 1b). The thickness was measured as the maximum difference between the dorsal and ventral surfaces, regardless of location. The edge angles were measured, with a contact goniometer, on 1349 raspaditas which had a portion of the proximal end unbroken. Traces of manufacture and usewear were recorded in the field, for all raspaditas collected.

The dimensions of 244 complete raspaditas were analysed statistically to determine if the raspaditas constituted a definable lithic tool class. Co-variation and correlation factors were used to determine if there was a dependence of the length, width, and thickness of the raspaditas.

Cluster analysis was applied to 698 unbroken lithic tools collected from Santa Isabel including 244 symmetric raspaditas, 7 asymmetric raspaditas, 5 axes, 15 bifaces, 21 blades, 22 borers, 4 choppers, 31 drills, 3 hafted blades, 24 hafted knifes, 10 hafted scrapers, 14 knives, 1 multitool, 16 perforators, 15 points, 111 scrapers, 3 spokeshaves, 150 utilized flakes and 2 pieces of utilized shatter (Fig. 3). The characteristics entered were length, width, thickness, edge angle, material type, unifacial or bifacial, retouch and use locale. Some of these are not numerical qualities, and as such had to be converted into binary terminology. Traits defining the raspadita tool class were given the value of 0, and the others were valued at 1 (Table 1).

A sample of 70 raspaditas was selected for usewear examination. Of these, 26 were selected for SEM based on their completeness and the presence of usewear. The usewear on each tool was recorded by section (end, tip, and midsection) and by the location in that section (body, edge, ridge, depression or arris). The type of usewear was described as (1)

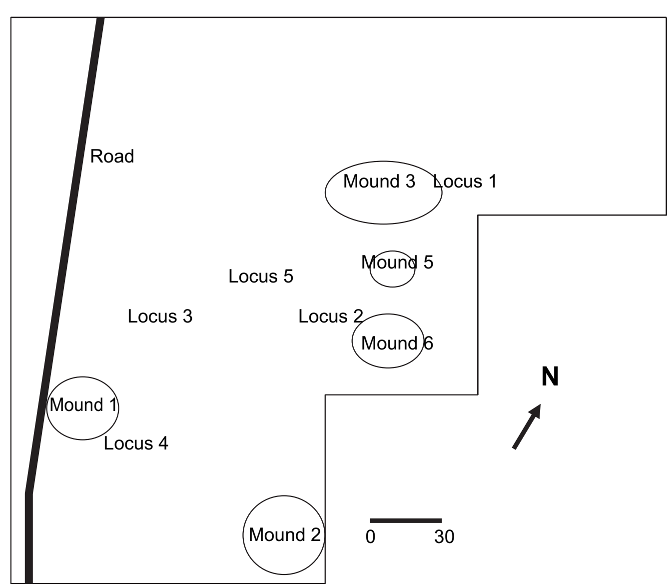


Fig. 2. Diagram of the archaeological site of Santa Isabel showing the position of mounds and excavated loci.

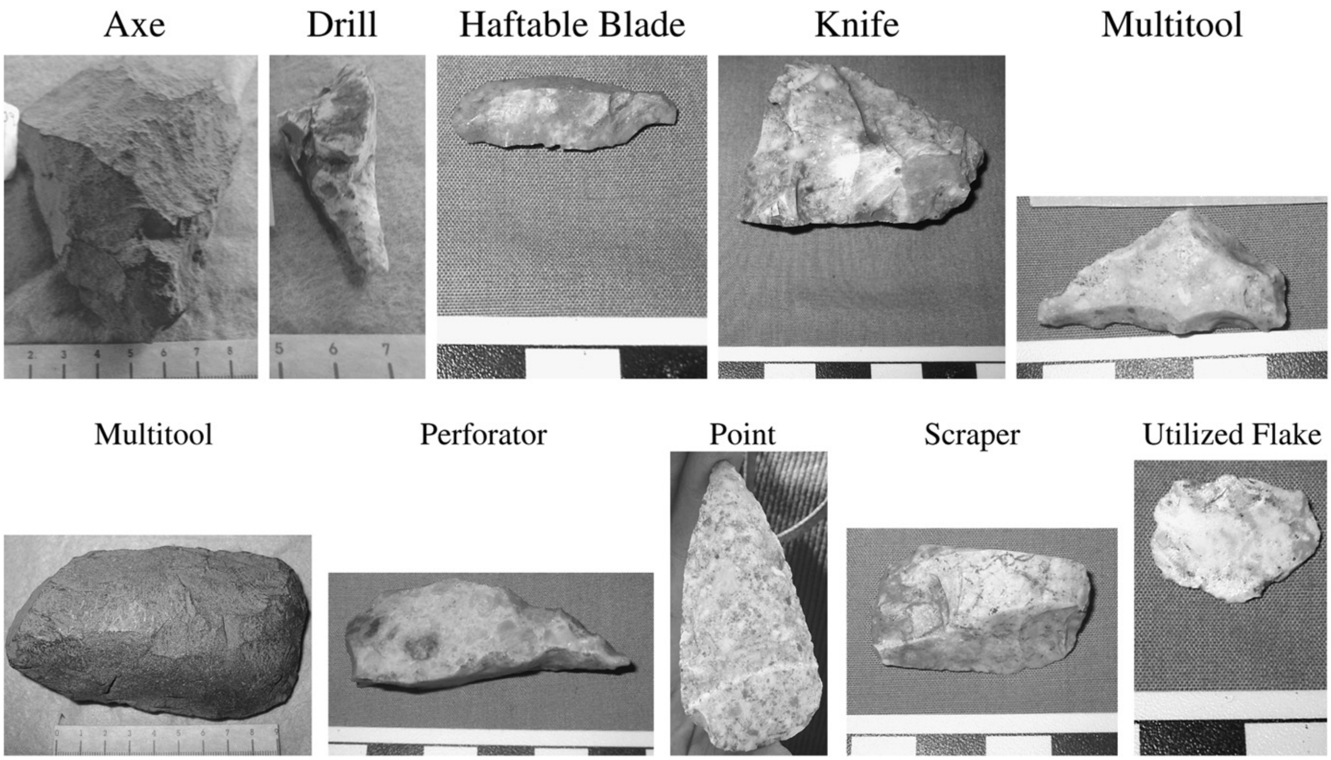


Fig. 3. Tools types, other than raspaditas, included in dimension cluster analysis. Scale intervals are 1 cm.

microchipping, i.e. small flakes removed during use not exceeding 5 mm (Katz et al., 1974); (2) micropolish, i.e. a general smoothing and removal of topography, caused by abrasion (Andrefsky, 1995); and (3) striations, i.e. linear scratches caused by abrasion (Katz et al., 1974). Micro-chipping was recorded as step terminating, transverse (across the edge), isolated or chained; polish, as fully or partially developed or only rounded; and striations as perpendicular to, parallel to, or transverse (across) the use edge, and as isolated or grouped.

The raspaditas selected for SEM were washed in ultrasonic baths of soap and water, then in double distilled water and finally in acetone. They were mounted onto aluminium stubs and coated with gold to prevent charge build up in the SEM chamber.

## 3. Distribution of the raspaditas

There is a spatial concentration of raspaditas with other lithic tools in specific regions of the excavated portion of Santa Isabel. The majority of the 1 $m^2$ excavation units contain <20 raspaditas but five units contain over 60. One of these units is in Locus 4, on the slope of Mound 1 (Fig. 2). A second unit is in Locus 5, in a low-lying area between Mounds 1, 6 and 3, which is associated with human burials. The other three units are all in Locus 2 on Mound 6. In Locus 2, a unit in the northwest corner is associated with a possible kiln or hearth feature and two units in the southeast are associated with a number of floors and walls. Thus, the raspaditas, as well as other lithics, cluster around cultural deposits, including non-domestic areas.

## 4. Unique form of the raspaditas

The raspaditas have a consistent unifacial form with a proximal convex surface and a distal tip. On average, they are 1.50 cm long, 0.40 cm wide and 0.48 cm thick with a tip length of 0.54 cm (Table 2). The edge angles of the 1004 complete or almost complete raspaditas ranged from 58° to 123° similar to the expected range for scrapers (60–150°) (Andrefsky, 1995). The dimensional co-variance and correlation factors were determined for the raspaditas collected in 2004 (Table 3). Length and width have the highest co-variation, and, thus, are the most dependant. However, all dimensions co-varied with each other to some extent.

When the dimensions of the raspaditas are compared to those of the other complete tools from Santa Isabel (Figs. 4–6), they cluster together with minimal visual variation. Some

Table 1
Schematic of binary values for raspadita characteristics

| | Length (cm) | Width (cm) | Thickness (cm) | Facial | Rock type | Colour | Edge angle | Retouch | Retouch | Use locale |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | <3 | <2 | <1 | Uni | Chert | Light | 60–130 | Present | 2 areas | 2 areas |
| 1 | ≥3 | ≥2 | ≥1 | Bi | Non-chert | Dark | <60, >130 | Absent | <2> areas | <2> areas |

Table 2
Dimensions of raspaditas

| Measurement | Range (cm) | Average (cm) | Standard deviation |
|---|---|---|---|
| Length | 2.60–0.75 | 1.50 | 0.37 |
| Width | 1.80–0.40 | 0.89 | 0.24 |
| Thickness | 1.00–0.20 | 0.48 | 0.15 |
| Length of tip | 0.98–0.37 | 0.54 | 0.09 |

tool classes have individuals that plot within the raspadita cluster but there is considerably more variation within other groups. Drills, perforators and borers plot closest to the raspaditas but they do not have scraper edges. Hafted knives have a similar shape but they have more acute edge angles (<50°) and these angles are usually found on a side not on the proximal end like the raspaditas (58–123°).

Another way of determining whether the raspaditas constituted a unique group was to convert all traits into binary values and then run cluster analyses. Raspadita characteristics were given the value 0 and deviations the value of 1. The higher the average score for each tool the greater the difference from the raspadita tool class. Tools were grouped according to assigned type. Symmetrical and asymmetric raspaditas were treated as separate groups. Table 4 contains the summation of binary values for each characteristic and each class of tools.

All symmetric raspaditas obtained a value of 0, but two of the seven asymmetrical raspaditas varied from the group because of different edge angles, giving this group a difference of 0.3 (Table 4). When the average differences were examined four separate groups can be identified with average differences below 1 (symmetrical and asymmetrical raspaditas), between 1 and 2 (haftable blades, scrapers, and knives, and spoke shaves), between 3 and 4 (blades, perforators, utililized shatters, borers, knives, and drills), and above 4 (biface points, choppers, utilized flakes, axes, multitools and bifaces).

## 5. Material and manufacture

The colour of the chert was recorded for all of the tools collected in 2004. The symmetric and asymmetric raspaditas were made entirely of white and pinkish white chert with inclusions. When all of the tools are compared, the raspaditas have the highest percent of white chert whereas the category of pinkish chert is evenly distributed throughout the total tool collection.

The platforms at the proximal end of the raspaditas contain 1–2 platform scars and are ovate, plano-convex or triangular; ovate being most common (52%). Most raspaditas contain bulbs of percussion, which are quite diffuse and do not show bulbar fissures or eraillure scars (Luedtke, 1992; Odell, 1981). The platforms, which are from 4.2 mm to 2.9 mm in length and 2.4 mm to 1.5 mm in width, are often associated with lips (Fig. 7). These characteristics suggest soft hammer flake detachment (Andrefsky, 1995; Katz et al., 1974). Unifacial retouch has removed most traces of the original termination from the distal tips of the raspaditas. The retouch flake scars (from 5.3 mm to 3.1 mm) are feather terminating and relatively shallow indicating a possible pressure flaking removal strategy (Andrefsky, 1995; Katz et al., 1974; Odell, 1981).

Table 3
Co-variation of dimensions of raspaditas; correlation coefficients are given in parentheses

| | Length | Width | Thickness |
|---|---|---|---|
| Length | 1 | | |
| Width | 0.039 (0.45) | 1 | |
| Thickness | 0.024 (0.43) | 0.016 (0.44) | 1 |

Fifty-eight blade or bladelet cores, that were the appropriate size and material for the raspaditas, were found at Santa Isabel in 2004 (Fig. 8). It is likely that the cores used to produce raspaditas were prepared and the removal of flakes organized so that the resulting blanks would be uniform and require limited retouch. Also, the small number of chert blades found at Santa Isabel could indicate that blade cores were used to manufacture the raspaditas.

## 6. Usewear

The usewear is not distributed evenly across the surface of the raspaditas as the proximal ends contain more microwear than the tip and the mid-section. However, there is a consistent usewear pattern among the 26 raspaditas examined under SEM. The usewear of symmetrical and asymmetrical raspaditas are compared with tanged points, end scrapers, drills and perforators. These lithic categories would be expected to show usewear consistent with hafting, perforating or scraping (Table 4).

Microchipping is confined to and spread across the proximal end of the raspaditas in an equidistant pattern on the dorsal edge surfaces. Most microchips are feather terminating and ovate, although 23% of the raspaditas also contain step-terminating microflaking (Fig. 9). All raspaditas contain ventral end edge rounding and polish, as well as dorsal end ridge rounding and polish (Fig. 10). Striations, perpendicular to the edge, are present in the ventral end edge polish on 85% of the raspaditas (Fig. 11). The ends of 12% of the raspaditas examined also contain parallel striations and 15% have transverse striations (Fig. 12).

The majority of microwear on the tip section of the raspaditas consists of spot polishing, rounding and sporadic microchipping on ridges and edges, with about 30% containing step-terminating microflakes (Fig. 13). Striations, on about 20% of the tips, are in areas containing spot polish and rounding (Fig. 14). Microchipping is distributed randomly across the tips in inverse proportion to the number of striations. This type of microwear is often caused by the movement of a tool within its haft (Anderson, 1980; Cantwell, 1979; Johannessen and Hasdorf, 1994; Mansur, 1982), suggesting that the tip was inserted into a haft and the proximal end used.

Microchipping was found on the mid-section of 58% of the raspaditas. Forty-six percent contained ridge and 50% edge rounding, while 23% also have ventral edge and dorsal ridge polish. The striations in the mid-section appear to relate to the microwear found on the proximal end. 8% contained parallel, 12% perpendicular, and 8% transverse to edge striations.

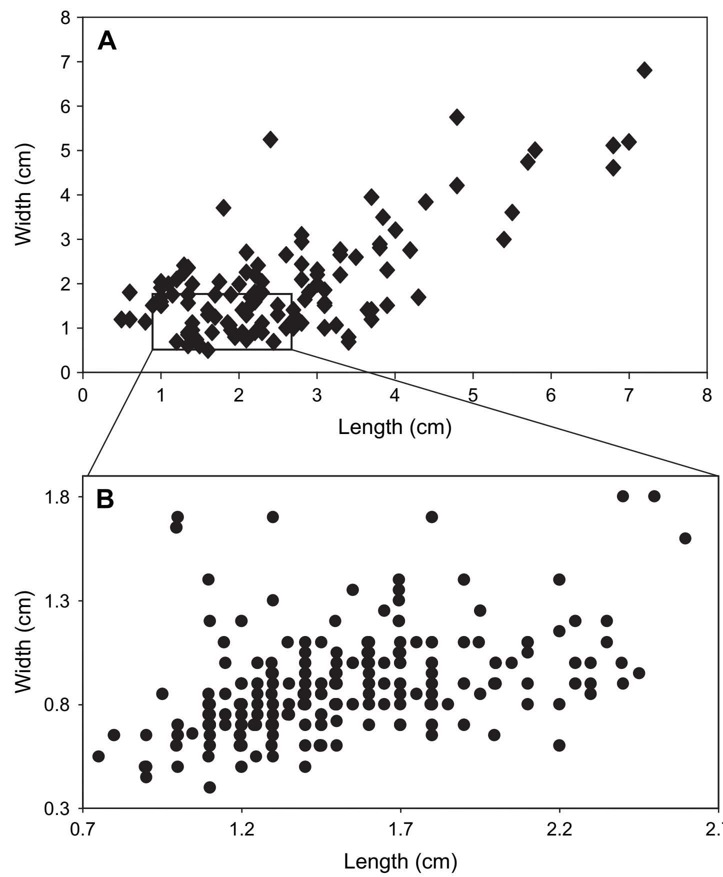


Fig. 4. A plot of length vs width for (A) all tool classes except raspaditas and (B) for unbroken raspaditas.

Other lithic tools, examined with the raspaditas, were also divided into end, tip and midsection (Table 5). Spot polish, rounding and striations of different orientations, and sporadic microchipping were found on the haft of the tanged point. This is similar to the usewear on the tip of the raspaditas. The end of the drill contains spot and ridge rounding and polishing suggesting prehension or hafting (Calley and Grace, 1988; Yerkes, 1983). The perforator has only ridge rounding with a few random shallow microchips. The end scraper has similar usewear, including edge polish and rounding, ridge polish and rounding on both sides and striations perpendicular or transverse on both edges on its end, tip and midsection. Other scraper microwear in the form of micro and macrochipping was observed throughout the length of the tool. All this wear is confined to one side of the tool. The broken surface gives this end scraper a characteristic raspadita form but it does not contain any microwear.

The similarities, between the usewear on the tip of the raspaditas and the hafted, more conventional tools, indicate that the raspaditas were most likely inserted into a board to form a composite tool. The scraper type of usewear on the proximal end of the raspadita shows that they had a scraping function.

## 7. Residues

Residues were found by SEM embedded in the ventral edge polish on the proximal ends of the raspaditas. The residues were subdivided into four sub categories based on morphology. These included short-ovate (length ≈ width), long-ovate (length ≥ 2× width), rectangular (squared off edges), and cross-shaped (rectangular with corners removed) (Fig. 15). The size of the residues is 15–20 μm in length and 5–20 μm in width. Energy dispersion X-ray (EDX) spectra of the residues showed a slight increase in Si content relative to the background chert but no additional elements. If these structures are organic, a drop in Si counts would be expected as EDX cannot detect elements lighter than fluorine. Therefore, the residues appear to contain silicon. Over 50 individual ovate residues were found, generally clustering in groups larger than five.

The ovate residues are similar in form and location to the experimental phytolith residues produced by Anderson (1980). Her work established a new relationship between phytoliths and the creation of polish. Previously, the silica in plants was thought to increase polish through abrasion. However, she suggested that phytoliths aid in the formation of amorphous silica, comprised of both the tool and plant silica, which is responsible for the smooth surface of the polish. She also found that during the formation of the polish, unmelted phytoliths can become trapped in the surface and in some cases retain enough of their structure to be identified (Piperno, 1989; Piperno and Pearsall, 1998).

Silica phytoliths range in size from 5 to 30 μm depending on the shape (Piperno, 1989; Piperno and Holst, 1998; Piperno and Pearsall, 1998). The ovate residues are the right size, shape and material to be phytoliths. Their location in areas

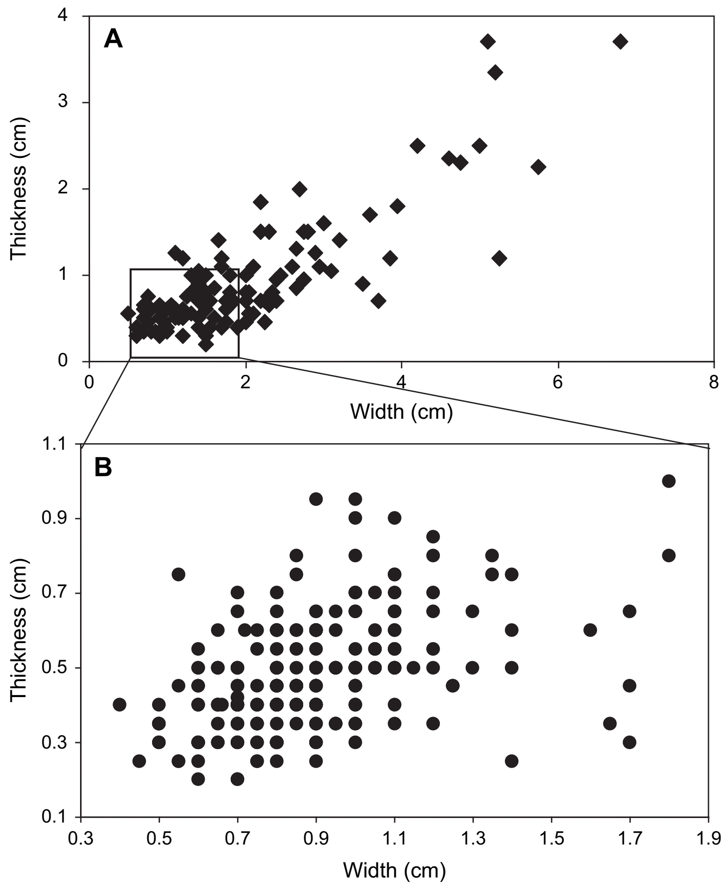


Fig. 5. A plot of width vs thickness for (A) all tool classes except raspaditas, and (B) for unbroken raspaditas.

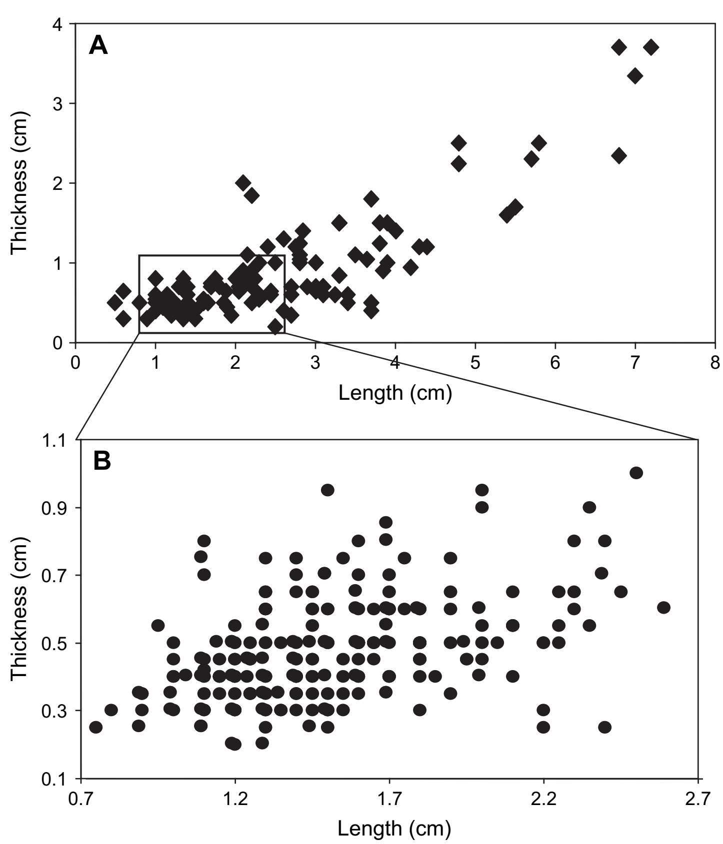


Fig. 6. A plot of length vs thickness for (A) all tool classes except raspaditas, and (B) for unbroken raspaditas.

Table 4
Differences of tool classes; each cell contains the number of tools which differ from the properties of the raspaditas

| Tool type | Two retouch areas | Edge angle 60–130 | Number of use locales | Thickness | Length | Width | Chert/non | Light/dark | Uni/biface | Retouch | Total difference | Total tools | Average difference per tool |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Symmetric raspaditas | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 244 | 0.0 |
| Asymmetric raspaditas | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 7 | 0.3 |
| Haftable blades | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 4 | 3 | 1.3 |
| Haftable scrapers | 0 | 0 | 1 | 3 | 3 | 3 | 0 | 0 | 0 | 1 | 11 | 8 | 1.4 |
| Spoke shaves | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 3 | 1.7 |
| Haftable knifes | 0 | 23 | 0 | 3 | 6 | 6 | 2 | 0 | 0 | 2 | 42 | 24 | 1.8 |
| Total scrapers | 88 | 2 | 24 | 11 | 18 | 25 | 20 | 4 | 5 | 15 | 202 | 110 | 1.8 |
| Blades | 21 | 11 | 1 | 1 | 1 | 6 | 4 | 0 | 19 | 1 | 65 | 21 | 3.1 |
| Perforators | 15 | 16 | 16 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 51 | 16 | 3.2 |
| Util. shatters | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 1 | 7 | 2 | 3.5 |
| Borers | 22 | 22 | 22 | 4 | 4 | 4 | 2 | 0 | 0 | 1 | 81 | 22 | 3.7 |
| Knifes | 12 | 14 | 1 | 6 | 3 | 9 | 2 | 0 | 0 | 6 | 53 | 14 | 3.8 |
| Drills | 30 | 31 | 31 | 0 | 4 | 1 | 1 | 0 | 0 | 7 | 105 | 31 | 3.9 |
| Biface points | 2 | 0 | 0 | 11 | 7 | 10 | 12 | 3 | 15 | 14 | 74 | 15 | 4.9 |
| Choppers | 0 | 0 | 0 | 4 | 4 | 4 | 3 | 3 | 0 | 3 | 21 | 4 | 5.3 |
| Util. flakes | 152 | 88 | 152 | 17 | 22 | 93 | 8 | 1 | 152 | 152 | 837 | 152 | 5.5 |
| Axes | 0 | 1 | 1 | 5 | 5 | 5 | 4 | 4 | 0 | 3 | 28 | 5 | 5.6 |
| Multitools | 0 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 12 | 2 | 6.0 |
| Bifaces | 8 | 13 | 12 | 7 | 11 | 14 | 10 | 2 | 0 | 14 | 91 | 15 | 6.1 |

The far right column contains the average difference for each tool class.

of high polish and only in use locales also supports this finding. An alternative explanation is that amorphous silica may have been liberated during use and formed these ovate masses (Krauskopf, 1979; Morey et al., 1962, 1964). The consistent dimensions and the structure of the ovate residues do not support this hypothesis of melting and recrystallization.

## 8. Function of the raspaditas

The abundance, uniformity, usewear characteristics and geographical clustering of the raspaditas suggest that they formed part of a composite tool. The form of the composite tool could be similar to the bitter manioc (*Manihot esculenta*) graters found to the south of Nicaragua (Sauer, 1950), where flakes are inserted in a parallel orientation to the length of a relatively flat wooden surface.

The phytolith residues indicate that the raspaditas came into contact with plants. As the raspaditas were recovered from agricultural fields, it is possible that these residues adhered to the surface after use. However, the restricted area and the tenacity of their attachment suggest that the raspaditas were used on plant material containing phytoliths.

Functions hypothesised for the raspadita composite tool included manioc grating, fish scaling, maize processing or as general graters. As each of these functions would require different orientation and usage, they would create different usewear patterns on the tools (Table 6). The usewear found by SEM analysis could then shed light on the usage.

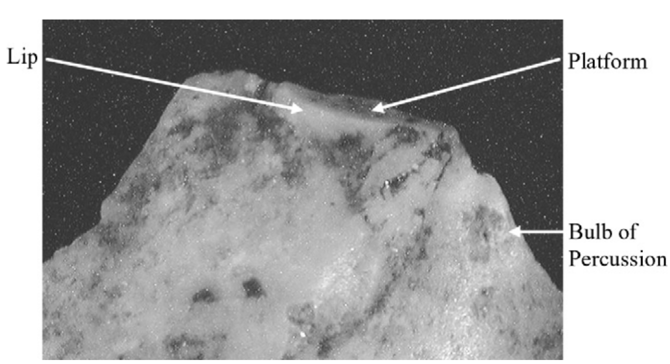


Fig. 7. Raspadita manufacture characteristics.

Fig. 8. White chert bladelet core from Santa Isabel which contains a termination and parts of a prepared platform. Scale bar is 1 cm.

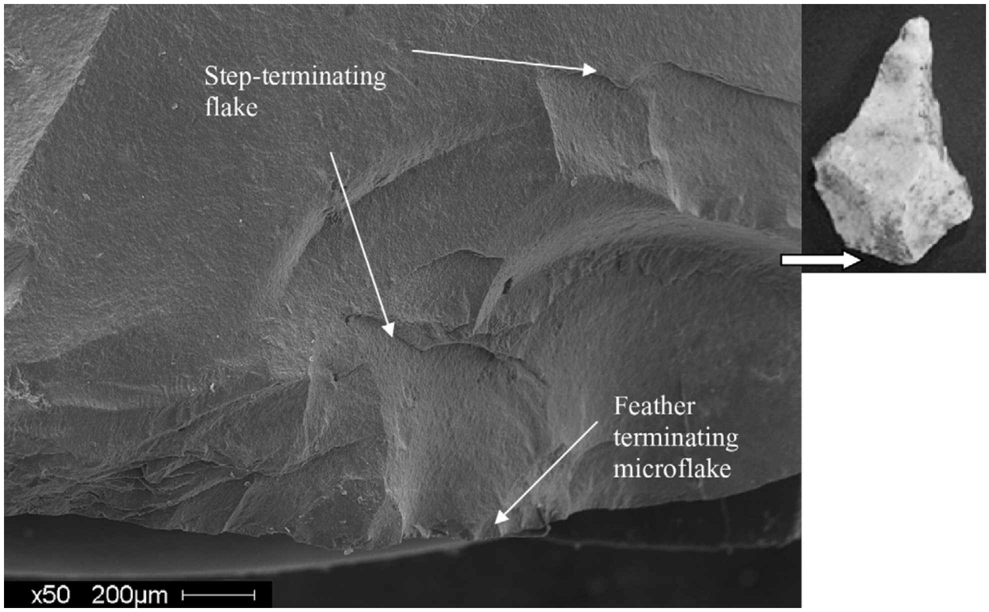


Fig. 9. Microflaking on proximal dorsal end of symmetric raspaditas. Note the abrupt termination of step-terminating flakes. The broad arrow indicates the location of the SEM image on the raspadita.

### *8.1. Manioc grating*

Ethnographic as well as usewear studies on bitter manioc grater blades indicate that the preferred orientation of the flake inserts is parallel to the length of the board and use. This orientation creates edge polish, microchipping and ridge polish clusters at the lateral sides of the use end and the striations run parallel to this edge. The inserted portion should show evidence of hafting such as spot polish, and sporadic rounding (Nieuwenhuis, 2002).

The raspaditas show edge polish and microchipping on their proximal ends. However, the usewear is spread evenly across the surface suggesting that the entire surface was subjected to the wear not just the lateral edges. The striations on the raspaditas run perpendicular to the edge not parallel, which indicates that the raspaditas were used in perpendicular rather than the parallel orientation of the bitter manioc graters.

Bitter manioc blades are usually sharp unretouched flakes used to slice and shred the tuber, whereas the raspaditas are a uniform retouched tool type with a blunted end. Thus, there is limited evidence for the use of the raspaditas as bitter manioc graters blades.

### *8.2. Fish scaling*

Another composite lithic tool from South America, the fish scaler, is similar in appearance to a manioc grater and often

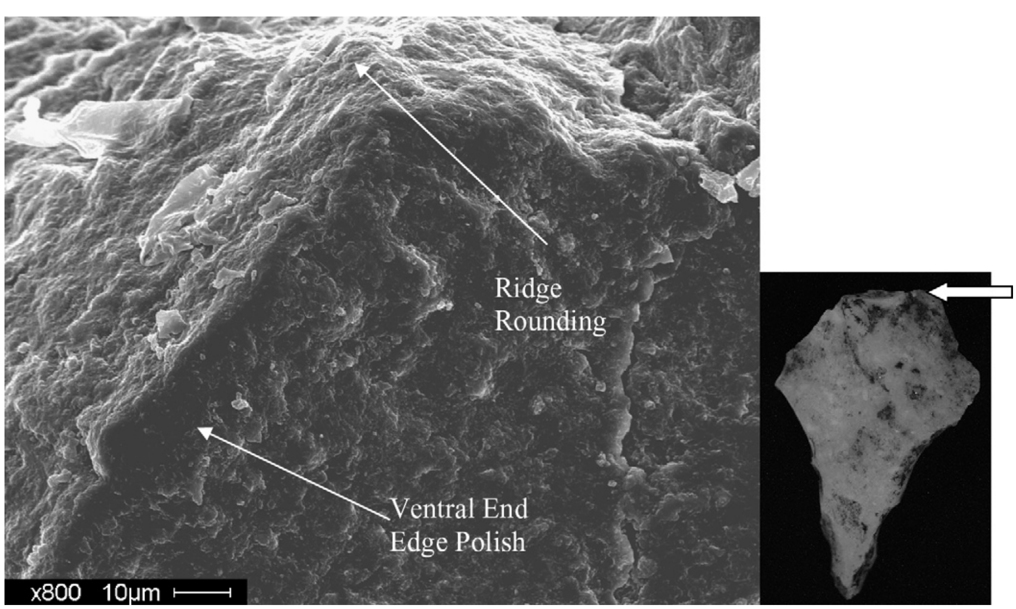


Fig. 10. Ventral end edge polish of a symmetric raspadita (the smooth dark band running along the edge). Rounding involves limited smoothing but not to the extent of polish which removes all topography. The broad arrow indicates the location of SEM image on the raspadita.

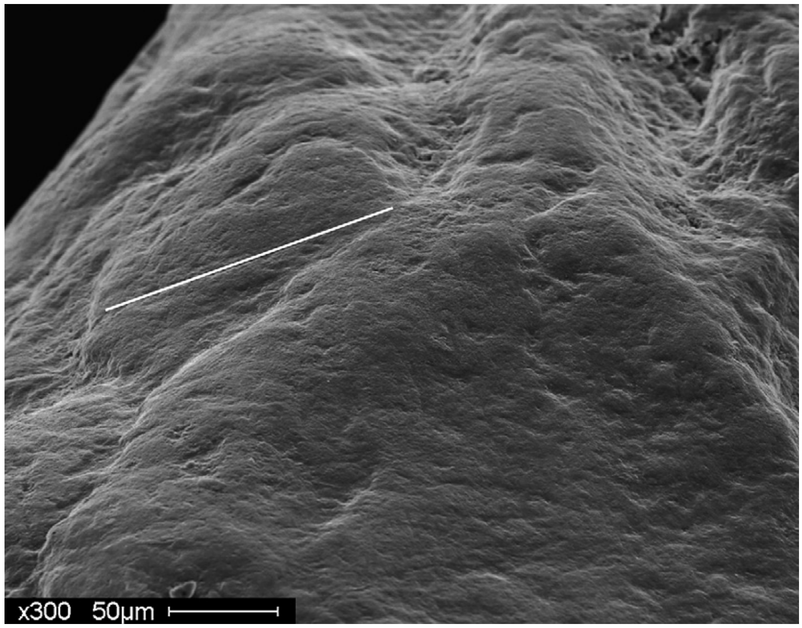


Fig. 11. A symmetrical raspadita showing striations (white line) perpendicular to the proximal ventral end edge. The dorsal side is on the left.

misidentified in the archaeological literature (Perry, 2002). Typically, fish scalers were made of wood and lithic flakes, but fish shaped ceramic boards containing ceramic appliqués have also been found (Perry, 2002). Traditionally, lithic inserts are unworked flakes, although unlike the manioc grater flakes a blunt edge is often selected or accomplished with minimal retouch for the use surface (Tomenchuk, 1997). This blunt surface is orientated perpendicular to the length of the board and use. The usewear associated with fish scalers includes microchipping, polish across the end edge ridge surface, striations perpendicular to edge with spot polish, and rounding on the tip.

The usewear study of the raspaditas supports the possibility of their use as fish scalers. Based on the type and location of the microwear fish scaling is a variable option for the raspaditas. The only difference is that the raspaditas are a formal tool type and the fish scaler inserts are flakes some with minimal informal retouch. The residue analysis on the raspaditas are not conclusive, however, they suggest that the proximal end was used on a phytolith containing plant material.

### 8.3. Maize processing

At contact, the Spanish reported that the staple foods of the inhabitants of Pacific Nicaragua were maize (*Zea mays*), beans (*Phaseolus* spp.) and squash (*Cucurbita pepo*) (Abel-Vidor, 1981; Fowler, 1989). Maize husks, silk and kernels must be

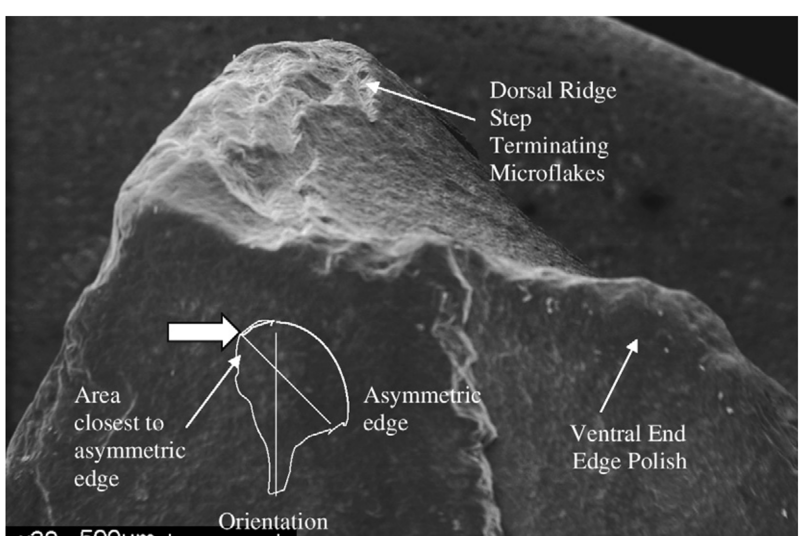


Fig. 12. End microwear on an asymmetric raspadita. The broad arrow indicates the location of the SEM image on the raspadita.

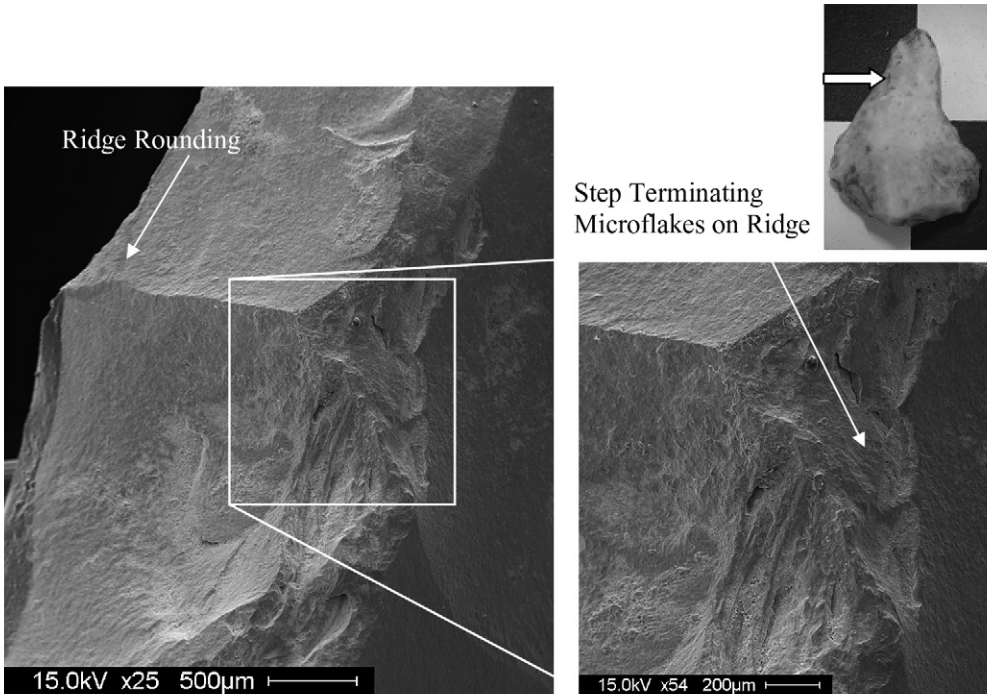


Fig. 13. Symmetric raspadita tip microwear. Note the sharpness of the dorsal ridge and lack of rounding on the flake scars. The broad arrow indicates location of the SEM image on the raspadita.

removed from the cob before the kernels are made into tamales, tortillas or atoles (Johannessen and Hasdorf, 1994; Katz et al., 1974). The predicted orientation of the inserts to remove maize kernels with a composite tool would be similar to a fish scaler, being perpendicular to length of board and usage. The resulting microwear would be distributed evenly across the width of the end and the striations would be perpendicular to the edge, identical to that of a fish scaler. The usewear results support the hypothesis of maize processing as well as fish scaling. However, maize processing accounts for the phytolith residues found on the proximal ends of the raspaditas.

### *8.4. General grating*

Perry (2002) analysed residues from ''manioc'' grater teeth from Venezuela and found eight different species, none of which were manioc. Therefore, the manioc graters found by

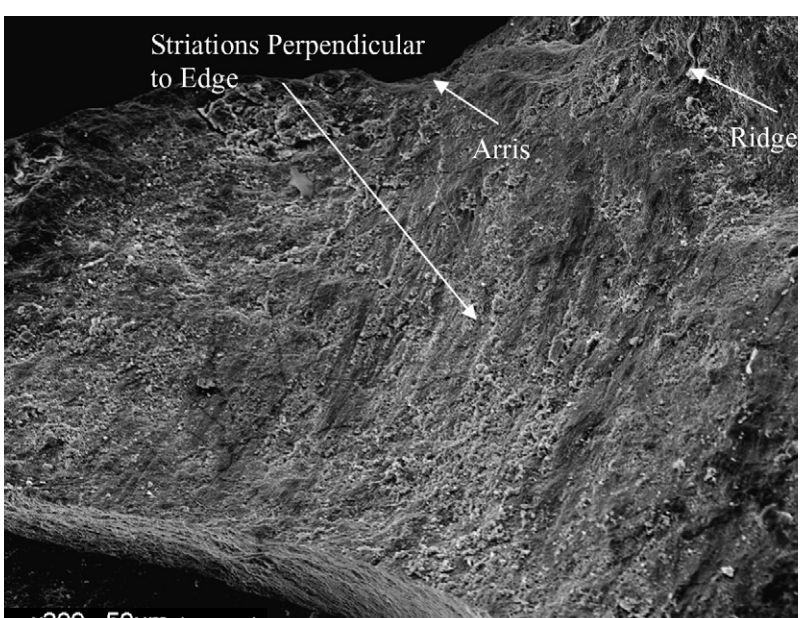


Fig. 14. SEM image of usewear on the tip section of the drill. The dorsal side is up and the arris is prominent.

Table 5
Summary of usewear, given as a percentage of tools examined (parallel (‖), perpendicular (⊥), transverse (≠) to edge)

| Tools | Striations | | | Chipping | | | | Polish | | Rounding | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ‖ | ⊥ | ≠ | Comet | Micro | Step | Macro | Edge | Ridge | Edge | Ridge |
| *End usewear* | | | | | | | | | | | |
| Symmetric raspadita | 0 | 85 | 5 | 5 | 100 | 20 | 45 | 100 | 100 | 100 | 100 |
| Asymmetric raspadita | 50 | 83 | 67 | 0 | 100 | 33 | 50 | 100 | 100 | 100 | 100 |
| Tanged point | 100 | 100 | 100 | 0 | 100 | 0 | 0 | 100 | 100 | 100 | 100 |
| End scraper | 0 | 0 | 0 | 0 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Drill | 0 | 0 | 0 | 0 | 100 | 0 | 0 | 100 | 100 | 100 | 100 |
| Perforator | 100 | 100 | 0 | 0 | 100 | 100 | 0 | 0 | 0 | 0 | 100 |
| *Tip usewear* | | | | | | | | | | | |
| Symmetric raspadita | 5 | 15 | 15 | | 85 | 30 | 55 | 25 | 25 | 95 | 90 |
| Asymmetric raspadita | 17 | 17 | 17 | | 83 | 33 | 50 | 33 | 33 | 100 | 100 |
| Tanged point | 0 | 0 | 0 | | 100 | 0 | 0 | 0 | 0 | 100 | 100 |
| End scraper | 0 | 100 | 100 | | 100 | 0 | 0 | 100 | 100 | 100 | 100 |
| Drill | 0 | 100 | 0 | | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Perforator | 0 | 0 | 0 | | 100 | 0 | 0 | 100 | 0 | 100 | 100 |
| *Mid-section usewear* | | | | | | | | | | | |
| Symmetric raspadita | 2 | 0 | 0 | | 60 | 20 | 25 | 15 | 15 | 45 | 30 |
| Asymmetric raspadita | 2 | 50 | 33 | | 50 | 2 | 50 | 67 | 67 | 100 | 100 |
| Tanged point | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| End scraper | 0 | 100 | 0 | | 100 | 0 | 100 | 100 | 100 | 100 | 100 |
| Drill | 0 | 100 | 100 | | 100 | 100 | 0 | 0 | 100 | 100 | 100 |
| Perforator | 0 | 0 | 0 | | 100 | 0 | 100 | 0 | 100 | 0 | 100 |

archaeologists could be general graters used on a variety of materials. Adopting this functional fluidity, the hypothesis is proposed that raspaditas were used to grate different materials varying in hardness and the desired fineness.

Usage parallel to the lithic inserts would result in a slicing function whereas scraping would require a perpendicular orientation. Therefore, a general grater board should show signs of both perpendicular and parallel use. However, if the raspadita board was used in the same orientation for all plants processing, then this remains a likely function. There could be a variety of sources for the residues.

## 9. Conclusions

Recent excavations at the site of Santa Isabel, Nicaragua, have yielded a new, distinct stone tool class. As raspaditas

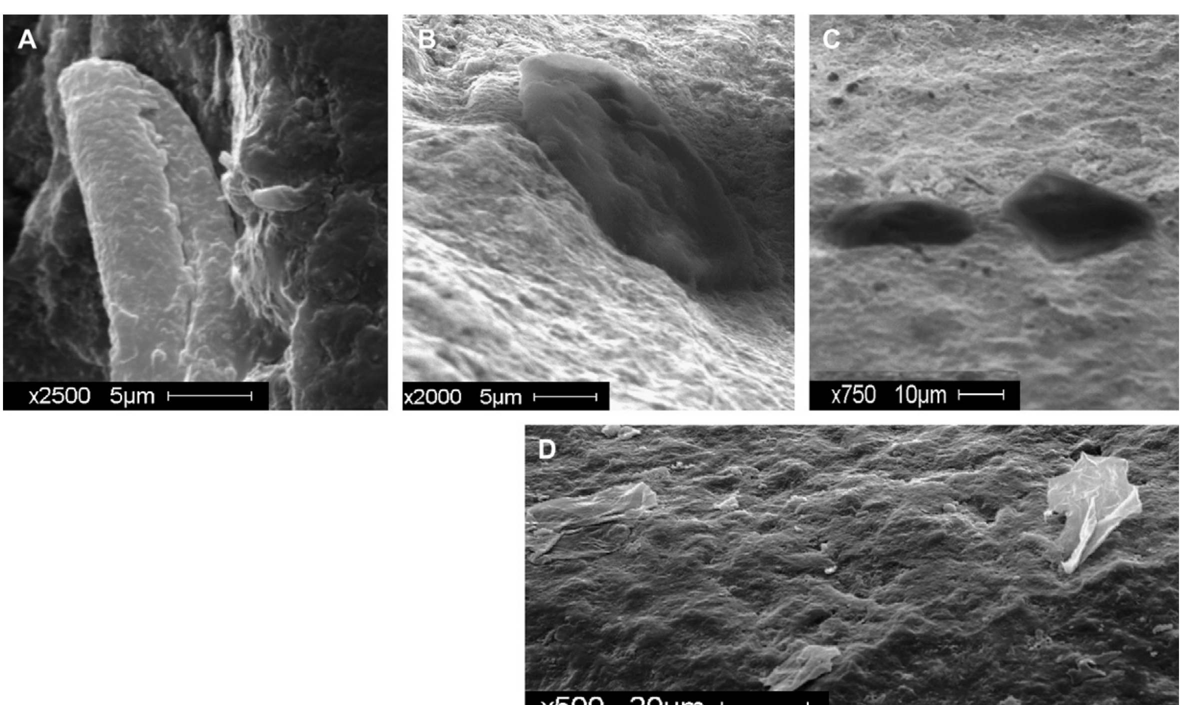


Fig. 15. Ovate raspadita residues: (A) long-ovate residue embedded in ventral edge polish; (B) short-ovate residue adhering to ventral end surface; (C) two rectangular-ovate residues in ventral end polish; (D) cross-shaped. Note: ovate residues usually occur in groups.

Table 6
A summary of expected usewear (parallel (||), perpendicular (⊥) to edge)

| | End usewear | | | | Tip usewear | | | |
|---|---|---|---|---|---|---|---|---|
| | Micro chipping (on edge) | Macro chipping (on edge) | Polish (ridge/ edge) | Orientation of striations (to edge) | Micro chipping | Macro chipping | Polish | Striation orientation (to edge) |
| Manioc graters | Lateral | Lateral | Lateral edges, ridges | \|\| | Sporadic | Sporadic | Sporadic | Variable |
| Fish scalers | Disperse | Disperse | Edges, ridges | ⊥ | Sporadic | Sporadic | Sporadic | Variable |
| Maize process | Disperse | Disperse | Edges, ridges | ⊥ | Sporadic | Sporadic | Sporadic | Variable |
| General grating | Variable | Variable | Variable | Variable | Sporadic | Sporadic | Sporadic | Variable |

are new to the literature, detailed descriptions of their unique characteristics are presented here. The function of the raspaditas was investigated through usewear and residue analysis.

The raspadita tool class contains members ranging from 0.5 to 3.0 cm in length, from 0.5 to 1.5 cm wide and less than 1 cm thick. The raspaditas have a convex proximal use end and a haftable pointed distal tip. The proximal end has edge angles clustering from 71° to 115°, but ranging from 58° to 123°. The distal tip is tapered with a blunt tip 0.5–1 cm long and <0.5 cm in diameter. They were manufactured using soft hammer percussion from white or pink chert, and then retouched using unifacial pressure flaking.

The raspaditas are the most common formal lithic tool type found at Santa Isabel, comprising approximately 70% of the collection. Spatial analysis suggests a correlation between raspaditas and cultural features.

Given the large number of raspaditas found (over 3000) the raspaditas were most likely hafted as a composite tool. The usewear found on the distal tip further supports this idea. The small size of the raspaditas corroborates the idea that a number of raspaditas were used in a single tool.

The configuration of perpendicular striations on the proximal end suggests that the ventral edge made contact with the material and the dorsal surface trailed behind in a unidirectional manner (Cook and Dumont, 1983; Mansur, 1982; Odell, 2004). The lack of edge damage indicates that a soft to medium soft material was scraped. This could include meat, fresh hides, green plants, soft plants, non-fibrous plants; soft woods, dry hides, reeds, grasses, fibrous plants, and plants with silica (Bamforth, 1987; Bradley and Clayton, 1983; Brink, 1978; Odell and Odell-Vereecken, 1981).

Of the four proposed functional hypotheses for the raspaditas grating bitter manioc and fish scaling are unlikely with the current usewear and residue data. Both maize processing and general grating are supported by the usewear and residues on the raspaditas.

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