Use-wear analysis on preceramic Colombian artefacts of te Abrience toolclass

Nieuwenhuis, C.J.

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The application of micro-wear analysis to the artefacts of a series of pre-ceramic sites in Colombia is expected to amplify the interpretative possibilities of chert implements of a typo-morphologically undiagnostic character. As a pilot-study for this research project, a selection of artefacts from the site Galindo was analyzed. The results of the analysis indicate that the traditional typology used to classify these tools is not always relevant for a functional interpretation.

1. Introduction

The most characteristic artefacts produced by preceramic groups of hunters and gatherers in Colombia, are flakes and core tools made of chunks of tabular chert or water-worn chert nodules. The technology by which the main part of these tools was manufactured is sometimes referred to as the "edge-trimmed tool tradition" (a.o. Hurt 1977). It is characterized by the use of direct percussion; in most cases the working edges have no retouch at all, occasionally there are artefacts with unifacial retouch. No bifacials are found among these tools. This expedient technology is not limited to Colombia but is typical for the whole Northwest of South America (a.o. Cardich 1991; Hurt 1977; Stothert 1985). From the early pre-ceramic up to the colonial period these artefacts were manufactured without significant morphological or technological changes. In Colombia, this tool class is usually called "Abriense", after the type-site El Abra.

In the past two decades Colombian archaeologists have developed an extensive classification system to catalogue these tools on the basis of morphological and, to a lesser extent, technological criteria. The largest number of artefacts though, is inevitably classified as "atypical flakes" (Correal Urrego 1977, 1979, 1990; Correal Urrego/ Pinto Nolla 1983; López 1991 a.o.) or "amorphous multifunctional tools" (Ardila 1984). However useful this classification system may be for typological purposes, when it comes to a functional attribution there is only one certainty: interpretation as (used) tools is always doubtful.

As microscopical analysis of use-wear traces on flint implements has been developed into a mature analytical tool and has proven to be essential for the interpretation of tool functions, a research project was started to apply this method to the Colombian artefacts in order to extend the interpretative possibilities of this undiagnostic toolclass.

First, experiments were conducted to determine whether the use-wear traces on tools of the different chert types of which the Abriense artefacts are usually made, are comparable to those known to develop on flint tools. Several contact-materials (wood, hide, bone, meat, fish, siliceous plants) were worked on, using tools made of tabular blocks of coarse chert from the Sabana de Bogotá and finely grained chert pebbles from the Magdalena valley (fig. 1). It was confirmed that wear-trace formation on these cherts is comparable to the formation on flint, but traces are usually less developed on the coarser types.

Although it has been established that micro-retouch displays comparable characteristics on different lithic materials (a.o. Shea 1988), this analysis concentrated on the presence of use-polish, edge-rounding and striations, and not on use-retouch. The analysis of the formation of edge-removals and of the indicative value of these removals on this specific tool-class and material is part of the research project, but has not been investigated thoroughly enough yet.

2. The sample

A selection of *c.* 200 implements from Galindo, a preceramic open-field site, was chosen for a pilot study. The site is located on a colluvial terrace on the Sabana de Bogotá, an intermontane plain at a height of 2,600 m above sea level in the eastern Andes-chain in central Colombia (fig. 1). The terrace is part of a 25 m high hill, deposited during the late cretaceous (Guadalupe Superior). One of the characteristic sediments of this formation consists of tabular chert blocks, found on the top of the hill and on the slopes.

Thousands of stone fragments were excavated on the terrace, as well as a remarkably low amount of animal bones, some fireplaces and one male burial. The material was found in four occupational levels, the oldest three dating from the 9th millennium BP and the youngest level dating from the ceramic period. The site was excavated in 1986 and 1987 and the artefacts seemed well preserved for a microscopical analysis.

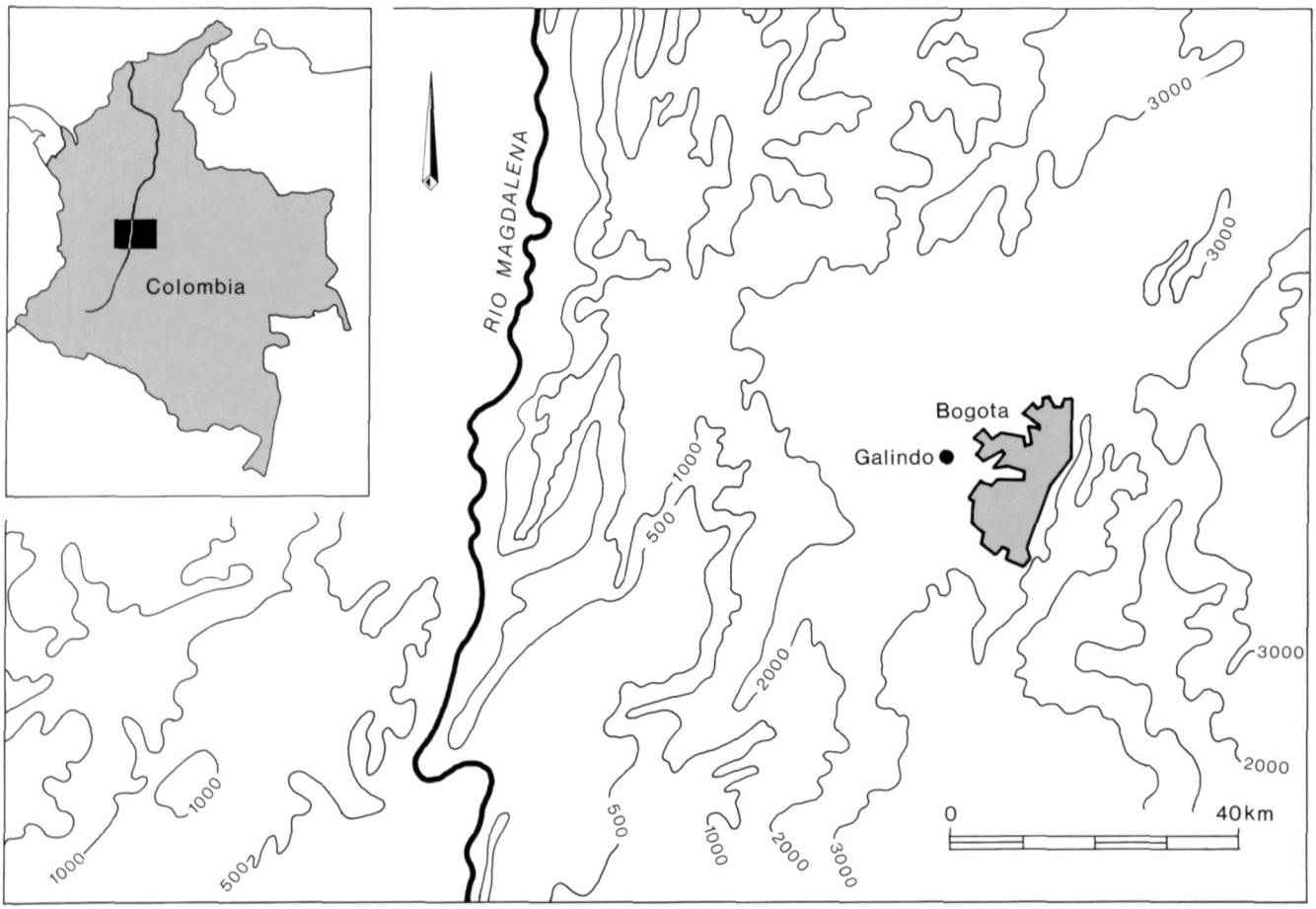

Figure 1. Research area. Location of the site Galindo on the Sabana de Bogotá.

The sample was selected by the excavator[1] from all four occupational levels and contains tools of most of the Abriense categories that are usually distinguished. Guided by the aforementioned morphological and technological criteria, she made a selection of artefacts that in her opinion were most likely to have been used as tools. Although the percentages of selected artefacts (listed in tab. 1) are too small to be statistically significant and are not systematically spread over the various tooltypes, the sample was useful for this pilot study, meant to enhance knowledge of the characteristics of use-wear traces on the Abriense class chert tools. Following the results of this study, a larger and more representative sample of the artefacts from this site and other preceramic sites will be analyzed.

Practically all the artefacts are made from local chert, found on the hill itself. A number of tools are made of finely grained chert which was extracted from the Magdalena valley, at least 60 km to the west of the site (Pinto Nolla 1991).

3. The analysis

On a total of 211 artefacts, 300 possible working edges were distinguished and analyzed with a high power microscope, using magnifications between 100× and 300×. All artefacts were cleaned with a 10% HCL solution in an ultrasonic tank for five minutes, then immersed in a 10% KOH solution for another five minutes and thoroughly rinsed with water; the implements were cleaned with alcohol during microscopical examination. The use-wear traces were classified and coded with an adapted and simplified version of the system developed by Van Gijn (1990).

The 300 possible working edges were selected on the basis of edge morphology and other phenomena which could be observed without microscope: (intentional) retouch, a straight cross section of the edge, polish or protruding points.

Of these 300 edges, 75 appeared to be actually used. Of the remaining edges, 38 were coded as "probably used", 56

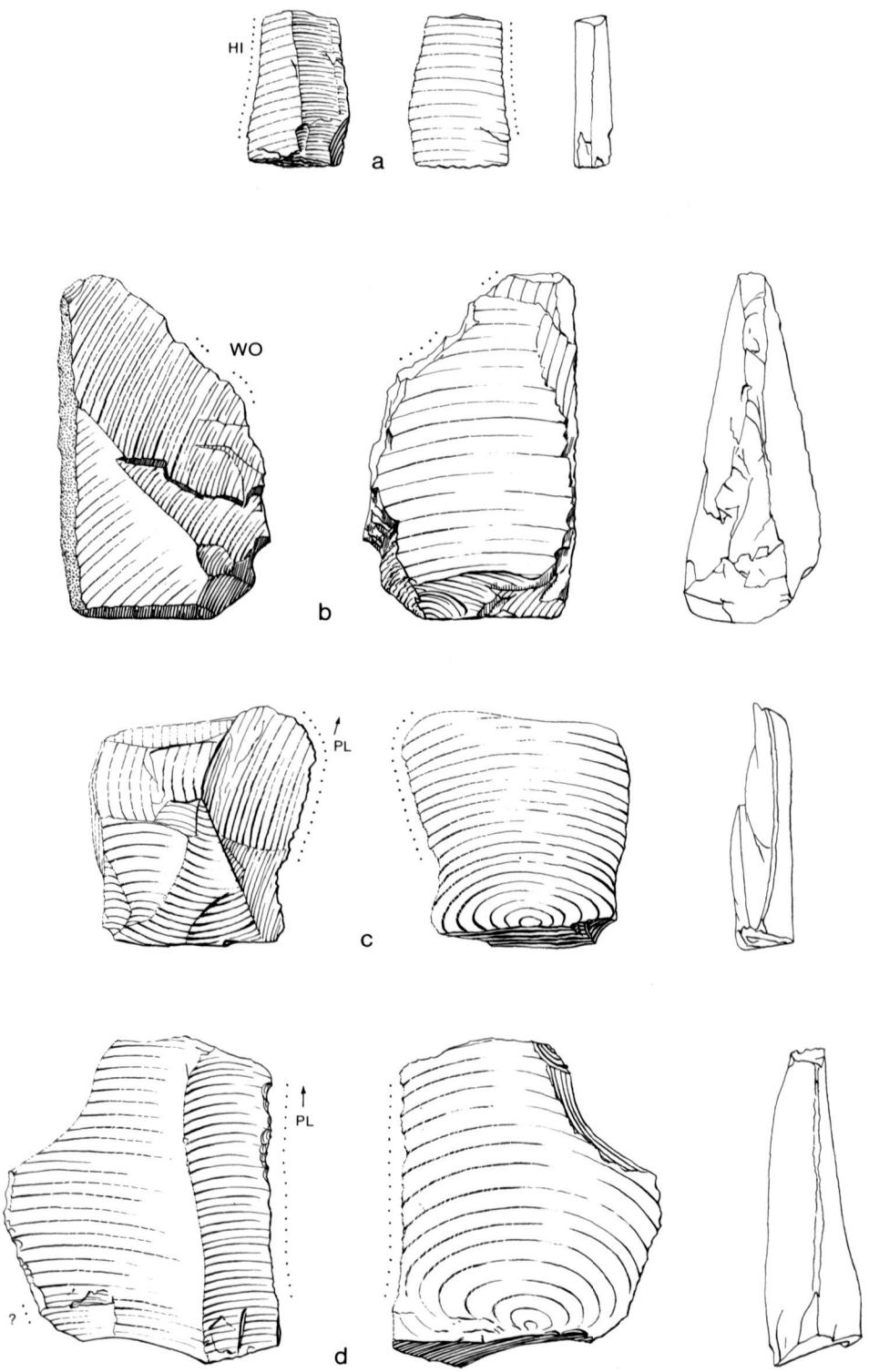

Figure 2a. Tool nr. 909. Prismatic flake with hide-working traces.
Figure 2b. Tool nr. 855. Lateral scraper with wood-working traces.
Figure 2c. Tool nr. 762-25. Concoidal flake used for plant-working.
Figure 2d. Tool nr. 768-26. Classified as "a-typical flake", used for plant-working.

Table 1. Number and percentage of analysed artefacts of Galindo
rect.= rectangular, not interpretable (burned, patina)

type	total	analyzed (%)	contact material interpreted (%)	probably used	unsure	no traces	not interpretable	hafting traces
triangular flake	268	30 (11)	17 (57)	4	2	3	3	3
prismatic flake	253	25 (10)	4 (16)	3	2	11	5	1
concoidal flake	155	21 (14)	11 (52)	4	3	2	1	0
rect.lateral flake	75	12 (16)	7 (58)	4	0	0	0	1
tronconical flake	19	5 (26)	0	1	2	2	0	0
rect.end flake	76	3 (4)	0	0	2	1	0	0
atypical flake	676	15 (2)	4 (27)	2	3	6	0	1
scrapers	74	14 (19)	2 (14)	0	2	6	4	0
lateral scraper	243	8 (3)	2 (25)	1	2	2	1	0
end-scraper	235	6 (3)	2 (33)	1	3	0	0	0
discoidal scraper	12	5 (33)	1 (20)	0	2	2	0	0
multiple scraper	46	7 (15)	0	2	1	1	3	0
perforators	65	60 (92)	14 (23)	8	12	23	1	2
total	2197	211 (10)	64 (30)	30	39	59	18	8

Table 2. Contact materials.
observed phenomena: 0= no observed phenomena; 1= retouch larger than or equal to 1 mm; 2= retouch smaller than 1 mm; 3= polish; 4= straight edge; 5= ground surface; 6= protruding point
tooltypes: 3= perforators; 11= triangular flake; 12= prismatic flake; 13= concoidal flake; 14= rectangular lateral flake; 15= tronconical flake; 16= rectangular end flake; 17= atypical flake; 21= lateral scraper; 22= end scraper, 23= discoidal scraper; 24= multiple scraper

contact material	total	tooltypes	observed phenomena
bone	2	11	4
soft plant	3	13	1 3 4
wood	9	3 11 13 14 20 21	1 4 6
siliceous plant	3	11 17 22	1 3 4
hide	12	3 12 13 14 17 22	1 2 4 6
hard material	3	3 11 23	4 6
soft material	3	11 14 17	1 2 4
soft animal material	3	13	4
hard animal material	1	11	4
bone/wood	3	11 21	1 4
unknown	3	12 13	1 2 4
greasy lustre	3	3 12 14	1 2
wood/bone/antler	10	3 11 14 17	1 4 6
meat/bone	6	11 20	2 4 6

as "unsure", 101 displayed no traces at all, and 30 could not be interpreted because they were either burned or had colour patina on the surface. In most cases only one of the registered edges was actually used; when different possible working edges on one single tool were interpreted as used, this was mostly on the same contact material.

The different tooltypes and observed (and not observed) traces are presented in table 1, where the number of tools is counted, not the number of possible working edges. Hafting traces are found once in combination with contact material (butchering) and seven times on tools registered as "probably used".

The contact-materials the 64 tools are thought to be used on, are listed in table 2. Most frequent are the tools used for hide-and woodworking (resp. 12 and 9 implements; figs 2a, b, 3a, b), and for a mixed category wood/bone/antler. Other polishes were interpreted as being the result

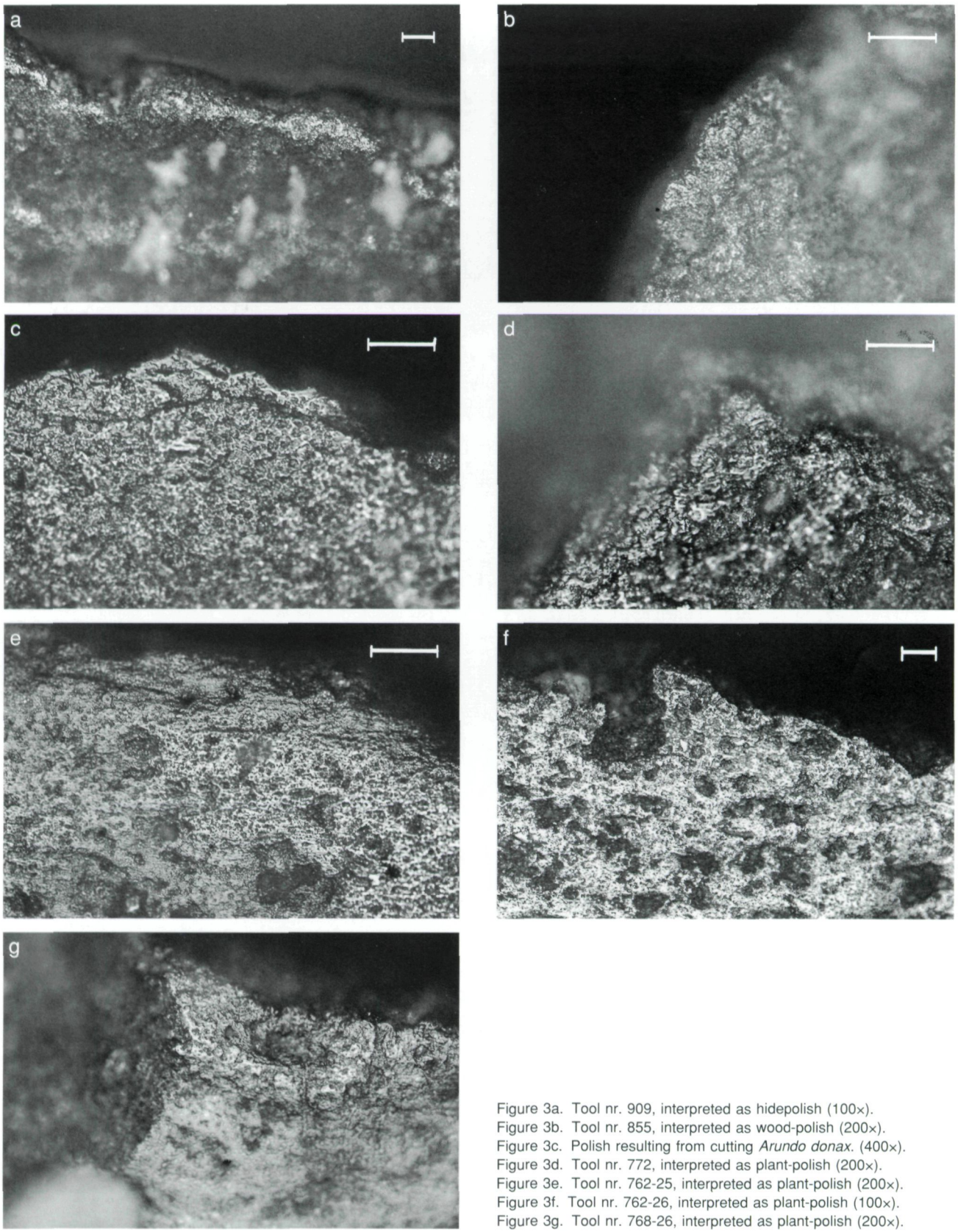

Figure 3a. Tool nr. 909, interpreted as hidepolish (100×).
Figure 3b. Tool nr. 855, interpreted as wood-polish (200×).
Figure 3c. Polish resulting from cutting *Arundo donax*. (400×).
Figure 3d. Tool nr. 772, interpreted as plant-polish (200×).
Figure 3e. Tool nr. 762-25, interpreted as plant-polish (200×).
Figure 3f. Tool nr. 762-26, interpreted as plant-polish (100×).
Figure 3g. Tool nr. 768-26, interpreted as plant-polish (200×).

Table 3. Working edges and the presence or absence of wear traces.
* should not have been registered as possible tool
** all perforators and one atypical flake

observed phenomena	total	contact material interpreted (%)	possibly used	unused	no traces	not interpretable	hafting traces
no phenomena observed*	1	0	0	0	1	0	0
retouch ≥ 1mm	55	14 (25)	11	11	9	10	0
retouch < 1mm	25	7 (28)	6	6	6	0	7
polish	2	2 (100)	0	0	0	0	0
straight edge	149	27 (18)	15	22	61	18	7
ground surface	1	0	0	1	0	0	0
protruding point**	67	14 (21)	8	16	28	2	0

from contact with bone, different plants and soft and hard (animal) material (sometimes, when found on one tool, interpreted as "butchering"). On six tools traces of unknown contact materials were registered, one of which is described as a "greasy lustre". In 32 cases a probable motion could be established, mostly in combination with a specific contact material. Although flakes were normally used in a longitudinal motion, four flakes (two with a straight edge and two with retouch) were employed as scrapers on hide and on wood/bone/antler.

Six tools were used for plant processing, four of which are made of a non-local, finely grained chert (figs 2c, d, 3e, f, g). One of these tools derives from the ceramic level, the others were found in the pre-ceramic levels. The plant-polish on one of these pre-ceramic tools is very similar to the polish that resulted from experiments conducted on "cañabrava de Castilla" (*Arundo donax* L.; figs 3c, d).[2]

One triangular and one atypical flake were interpreted as possible arrowheads. Among the Abriense artefacts no projectile-points are distinguished, due to the absence of certain technological characteristics like bifacial retouch. From a morphological point of view, however, it should not be excluded that triangular flakes with sharp edges could have been used for this purpose (comp. Odell 1988). The two possible arrowheads were interpreted as such because they showed micro-linear impact traces; one of them seems to have hafting traces at the proximal end whereas the other one has a broken tip and traces of contact with hard material (bone/wood).[3]

4. Conclusions

As was expected, not all artefacts classified as tools display interpretable wear-traces: even in a sample of "most probable tools", only one fourth of the artefacts was interpreted as used implement. This can be caused by (a combination) of the following factors:

1. Only few artefacts were actually used; many of the artefacts classified as tools may be debris.
2. Most of the tools are made of coarse grained chert, on which the formation of wear-traces is slower than on fine grained flints. Due to this fact and the expedient character of this tool-class, it is fairly safe to state that most of the implements were probably used for a time too limited to produce recognizable wear-traces.
3. Wear-traces of soft contact materials have disappeared due to post-depositional processes and treatment during and after excavation.
4. The author did not recognize traces on the other artefacts.

It is not yet clear which of these factors is the main cause of the low number of tools among the selected artefacts. Analysis of a larger number of implements from this site and other contemporary sites on the Bogotá plain and in the Magdalena valley is expected to shed more light on this matter.

As far as the size and the choice of this sample allows any interpretations concerning a correlation between typology and function of the tools, it can be stated that there seems to be no correlation at all. All tooltypes were used on different contact materials, and all these materials were worked on with different tooltypes (tab. 2). Analyzing this specific toolclass, there appears to be more correlation between the morphological aspects of the edges and other "observed phenomena", and the presence or absence of wear-traces (tab. 3). Retouch seems to be a relatively good indication for use. Of the artefacts displaying retouch smaller than 1 mm, 28% was interpreted as being used; when retouch was equal to or larger than 1 mm, 25.5% of the analyzed artefacts were registered as used. A straight cross section could be associated with use in 18.1%, which would mean that this phenomenon is slightly less indicative. In this sample, polish visible without microscope always

indicates use (two artefacts, figs 2c, d.) One of these tools also has retouch on the used edge. A separate cluster are the artefacts with protruding points, as observed on all the perforators, and on a few other tooltypes. On 14 of these tools, contact material could be established (20.9%), and on 28 (41.8%) no traces were registered. None of these percentages is high (or low) enough to lead to detailed conclusions, but it is expected that this will be possible at a more advanced stage of this project.

The fact that there are artefacts displaying interpretable wear-traces stimulates further research. The results prove that use-wear analysis supports the interpretation of certain artefacts as tools, which were traditionally only classified as such on typo-morphological grounds. However, without devaluating the traditional typology, in view of the absolute absence of technological predetermination it seems to be better to focus on edge-morphology than on the typological categories for a functional analysis of this tool-class.

notes

1 Mrs. Maria Pinto, Universidad Nacional de Colombia, Bogotá. An extensive report of this analysis will be published as an appendix to her doctorate thesis.

2 This specific reed did not exist in precolonial times, but according to different sources (a.o. Simon 1627, T III, 185), in colonial times comparable species were widely used, on the Bogotá plain *e.g.* for construction. An archaeological reference for the use of reed-like plants for constructions can be found at the Aguazuque site on the same Bogotá plain, dated between 5025 and 2725 BP. All occupational levels of this site revealed circular series of postholes, one of which contains remains of a *Bambusea*. Besides, all levels contain graminea-pollen (Correal Urrego 1990). Wear-traces on the stone artefacts from this site will also be analyzed in the near future.

3 Analyzing the material from the preceramic site Tequendama, also located on the Sabana de Bogotá, the author found triangular flakes with the same characteristics: strongly developed micro-linear impact traces, broken tips and hafting traces.

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C.J. Nieuwenhuis
Instituut voor Prehistorie
P.O. Box 9515
NL 2300 RA Leiden