THE GRIPPING NATURE OF OCHRE:

The association of ochre with Howiesons Poort adhesives and Later Stone Age mastics from South Africa

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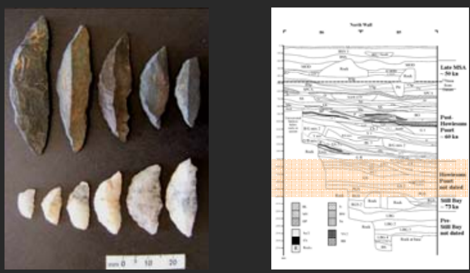

Fig. 1. The Howiesons Poort Industry of southern Africa is a horizon marker within the Middle Stone Age. It is a blade-based industry with backed tools, specifically crescent-like segments. At Sibudu Cave it occurs between the Still Bay Industry with an OSL age of > 70 ka, and a post-Howiesons Poort assemblage with an OSL age of ~ 60 ka.

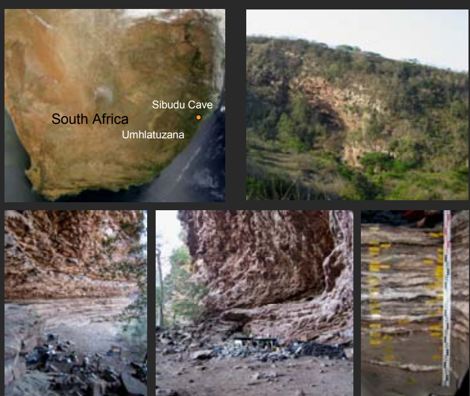

Fig. 2. Sibudu is a large rock shelter 15 km inland from the Indian Ocean. The site has a long cultural sequence with clear, but complex stratigraphy.

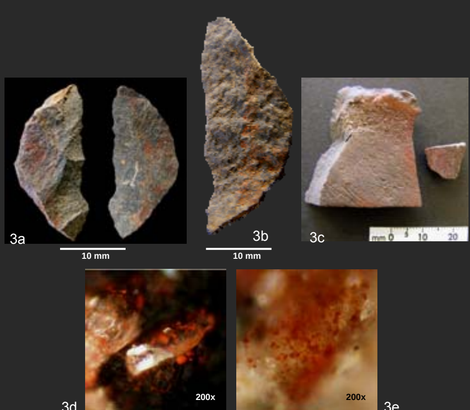

Fig. 3. (a&b) Segments from Sibudu, Sample A with macroscopically visible ochre distribution on the backed portions. (c) Ground ochre pieces from the same layers. (d) Clear resin with red ochre grains on a replicated stone tool hafted with a resin and ochre adhesive mixture. (e) Clear resin with red ochre grains on a segment from Sibudu.

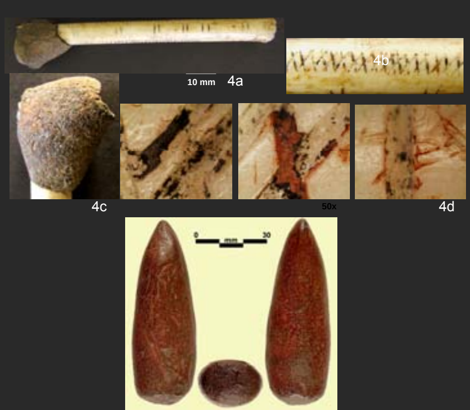

Fig. 4. (a-c) Later Stone Age engraved bone haft with mastic lump, courtesy of Albany Museum. (d) Microscopy of the engravings show no evidence of being deliberately filled with ochre. Later Stone Age mastic object from Steenbokfontein, curtsey of A. Jerardino, photograph D. Hallket.

INTRODUCTION

The role of ochre during the Middle Stone Age in Africa and the Middle Paleolithic in Eurasia has recently been the topic of lively discussion. While the presence of ochre on archaeological sites is often interpreted as evidence for symbolic activity this contribution provides direct evidence for the use of ochre in adhesive recipes during the Howiesons Poort Industry of South Africa more than 60 ka ago. Stone segments from Sibudu and Umhlatuzana were microscopically analyzed to document ochre and resin micro-residues (Figs 1-2).

SAMPLES

Sample A (n = 53) and Sample B (n = 14) were recently excavated at Sibudu, a site with excel- lent organic preservation throughout the sequence. The layers from which Howiesons Poort tools are excavated at the site is older than ~ 60 ka and younger than ~ 70 ka. I excavated Sample A, placed them individually in re-sealable bags and only handled them again during the analysis. These segments therefore represent an ideal sample for micro-residue analysis. Sample B segments excavated during a previous field season. This sample was not curated under ideal circumstances for micro-residue analysis. It was analyzed as a control sample to establish the extent to which resin and ochre residue distribution patterns are affected by post-excavational handling.

Sample C (n = 30), non-quartz segments, and Sample D (n = 25), quartz and crystal-quartz segments, were excavated at Umhlatuzana in 1985. A preliminary feasibility study assessed whether micro-residues, especially resin and ochre, preserved on the tools. Preservation of these residues appeared to be good and distribution patterns seemed to be in tact.

While it can be expected that some residues may have accumulated accidentally on archaeological tools (pre- or post-depositional, as well as post-excavational in the case of samples B-D), it is unlikely that clustering of a micro-residue type will happen coincidentally on identical positions of numerous tools in a sample. Clear and repetitive distribution patterns can therefore be used as a preliminary feasibility indicator before detailed study.

METHODS

I used micro-residue analysis to investigate whether adhesives were used to attach the segments to hafts. The method is based on the morphological identification of microscopic residues and their distribution patterns on the tools. A stereo binocular metallographic micro-scope was used with analyzing and polarizing filters and bright and dark field incident light sources. Micro-residues were identified in situ within the framework of a multi-stranded app-roach in which attendant and associated residue types were consistently used to cross-check and strengthen identifications.

The entire dorsal and ventral surfaces, including the edges, of each tool were systematically scanned under the microscope at magnifications of 50x, 100x, 200x and 500x enlargement and at different lighting conditions. All residues were recorded, plotted and counted as occurrences in relation to their positions on the tool (Fig. 5). Archaeological residues are continuously compared to those from modern experimental tools (Figs 3d and 3e) to cross-check interpretations.

Where tools are excavated with micro-residue research in mind, sediment samples are collected from the same layers. Microscope slides are prepared the sediment samples and photo-graphed under the same magnifications and lighting conditions as the residues on the tools. This provides a record of the microscopic morphology of the matrix from which the tools were excavated that can be compared to the residues or matrix adhering to the tools.

To establish whether there is a relationship between hafting and microscopic traces of resin and ochre on the tools, I divided each tool into six portions. Each portion include a dorsal and ventral side. The portions are referred to as upper blade (portion 1), medial blade (portion 2), lower blade (portion 3), lower back (portion 4), medial back (portion 5) and upper back (portion 6) (see Fig. 5). Residues are plotted and counted in relation to these portions. This method highlights the possible existence of distribution patterns and serve as basis for further interpretation.

RESULTS

The analysis of Sample A shows clear concentration of ochre and resin residues on the backed portions (Fig. 6a). On 53 tools 502 ochre occurrences and 585 resin occurrences were documented. 80% of the ochre and 87% of the reason occurs on the portions usually associated with hafting. The distribution of ochre could also be observed with the naked eye on some pieces (Fig. 3a & 3b), and ground ochre pieces were excavated in association with the sample (Fig. 3c). A further strand of evidence is the variation in distribution patterns for the organic residues. 1826 organic residue occurrences were documented. Most of the animal residues are concentrated on the blade portions, while plant residues are concentrated on the backed portions (Figs 6b & 6c).

RESULTS CONTINUED

Sample B and C shows similar tendencies (Figs 7 & 8). The implications are that an ochre/resin mix is robust, and that post-excavational handling did not affect the distribution patterns of these residues. It also shows that the adhesive recipe was used at Umhlatuzana as well as Sibudu.

The results of Sample D were different. While 269 resin occurrences were counted, only 43 ochre occurrences were recorded (Figs 9 & 10). Although most of these residues were associated with the backed portions many segments had resin, but no ochre on these portions (Fig. 11). The results from this quartz sample show that ochre was not used to the same extent in the adhesive recipe on quartz as on tools made from other raw materials. Statistically (χ^2), there are significant differences between the observed distribution patterns of the residues on all four samples and patterns that could be expected if all things were equal.

DISCUSSION

The notion that ochre was mixed into some prehistoric adhesives is not new. Still archaeological material is seldom systematically analyzed to test whether this was the case. The data presented here confirm that powdered ochre was mixed into hafting adhesives during the Howiesons Poort. This use of ochre may have been a regional trait, but observations on tools from other Middle Stone Age/ Middle Palaeolithic contexts, and the results of replication work indicate that this may have been a widespread technology.

While the inclusion of ochre in Howiesons Poort adhesives may have had symbolic value, this might be more difficult to establish. Currently I interpret the possible symbolic role that ochre could have had in prehistoric adhesive technologies as 'added value' over and above its functional application.

The symbolic and ritual application of ochre during the Later Stone Age in southern Africa is well established. Closer inspection of two objects on which ochre is associated with mastic may, however, indicate that ochre also had a practical role during this period, albeit different from its Middle Stone Age application. The ornamented bird-bone haft with mastic lump and stone tool impression at one end is possibly associated with pottery sherds that may be as recent as the 18th century (Figs 4a & 4b). While the mastic is completely dusted with ochre, the bone incisions were not deliberately filled with the colouring material as decoration, but the ochre in the grooves is probably due to handling contamination (Figs 4c & 4d).

The mastic object from Steenbokfontein (Fig. 4e) is about 2 ka old. One end of the object tapers to a smooth tip, while the other end is more abrupt and shows evidence of utilisation. Ochre staining is extensive on the surface of the object, but none was recorded on the used end. The mastic was probably used for gluing and small repair applications. Three finger impressions indicate that the tool was handheld and the working end exposed to a heat source to soften the mastic before use.

Both Later Stone Age objects would have required extensive handling of the mastic while they were used. Such handling with warm, clammy hands or during damp weather conditions may have resulted in the mastic becoming uncomfortably sticky. It has been suggested that ochre powder could have been used to dust mastic in order to render it less sticky during handling.

CONCLUSION

This study provides direct evidence for the use of ochre in the adhesives of hafted Howiesons Poort segments from two sites in KwaZulu-Natal, south Africa. Data are provided that might indicate variation in adhesive recipes to accommodate different raw materials during the same period. The Later Stone Age function of ochre associated with mastic was possibly different from the Middle Stone Age application. During the Middle Stone Age ochre was mixed into adhesives as an integral part of the recipes, while during the Later Stone Age it was applied to the surfaces, facilitating the efficient handling of some mastic objects.

The differences could illustrate developments in adhesive recipes and a shift in the use of ochre over time, other than through symbolic or ritual. These data and considerations are considered as an expansion of our current understanding of the versatility and value of ochre in prehistory rather than as an alternative or replacement hypothesis for its possible symbolic role. Developing additional hypotheses and using different methodologies to investigate the roles of ochre found in archaeological contexts have the potential to contribute to a more comprehensive understanding of past complexities in human behaviour – both technological and symbolic. This study shows that more than 60 ka ago. People understood the characteristics of various raw materials and adapted their adhesive technologies accordingly.

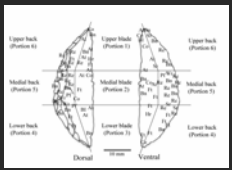

Fig. 5. Division of segments for the interpretation of microresidue distribution patterns.

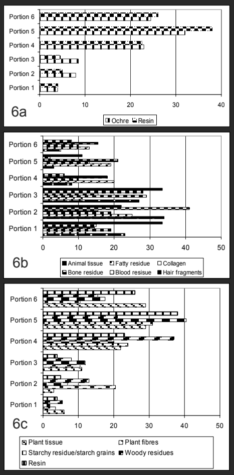

Fig. 6. Micro-residue distribution patterns on Sample A, Sibudu, (a) ochre and resin, (b) animal residues, (c) plant residues.

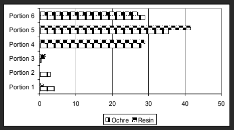

Fig. 7. Ochre and resin distribution patterns on Sample B, Sibudu.

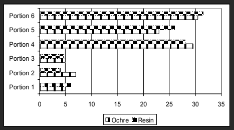

Fig. 8. Ochre and resin distribution patterns on Sample C (non-quartz) from Umhlatuzana.

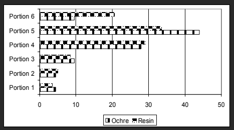

Fig. 9. Ochre and resin distribution patterns on Sample D (quartz) from Umhlatuzana.

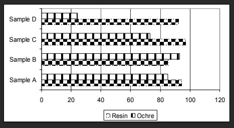

Fig. 10. Percentages of segments with ochre and resin micro-residues from all four samples.

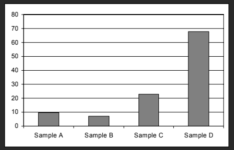

Fig. 11. Percentages of tools with resin, but no ochre residues on all four samples.