

BONE WEATHERING AND THE PROBLEM OF BONE PSEUDO-TOOLS

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ABSTRACT

The effect of an arid climate on bones is at present being studied at the Namib Desert Research Station near Walvis Bay. Many of the bones collected in this area show indications of having been used as tools; they taper to smooth points and have polished surfaces. It was found that these pseudo-tools were produced naturally as a result of lying on sand in areas much frequented by animals and men. They were picked up round waterholes, among huts, in goat kraals and on much-used paths. A particular kind of surface weathering of the bone, followed by abrasion in sand constantly disturbed by the feet of animals and people, is responsible for the formation of such pseudo-tools. Differences between genuine and pseudo-tools are discussed.

Many of the bones from the australopithecine sites of Sterkfontein and Swartkrans show evidence of having experienced severe weathering prior to their fossilisation in the cave breccia. Teeth are frequently cracked in a characteristic way and the bone itself shows signs of long exposure to the atmosphere. It has been established that the greater part of the Sterkfontein deposit accumulated under arid conditions, although the climate during the time of the Swartkrans cave infilling did not differ significantly from that of today. In order to distinguish between the effects of a dry and more humid climate on bones, experiments have been set up at the Transvaal Museum's Namib Desert Research Station and in Pretoria, in which fresh bones are allowed to weather under controlled conditions. Some are fully exposed to the sun, others kept in open shade while two groups are buried in sand and leaves. The specimens in the desert are periodically compared with those weathering in the Transvaal environment.

In the course of setting up the experiment at the Desert Research Station, some 70 miles inland from Walvis Bay, many bones were collected which had been lying for years on the surface of the desert sand, in an area receiving an average of less than

half an inch of rain a year. Such bones have two particular characteristics: they have bleached chalky surfaces and they often show remnants of gristle or other tissue adhering to them in a completely desiccated form.

Working through a collection of bones from the Kuiseb River area, some were encountered which seemed to be unquestionable bone tools. They showed an even polish and several tapered to beautiful smooth points (Figure 1). There seemed no doubt that they had been used for the preparation of skins or some other such purpose. Careful investigation showed that all these apparent tools had come from the sand surrounding the waterhole of the Ossewater Hottentot village (Figure 2) on the Kuiseb River about

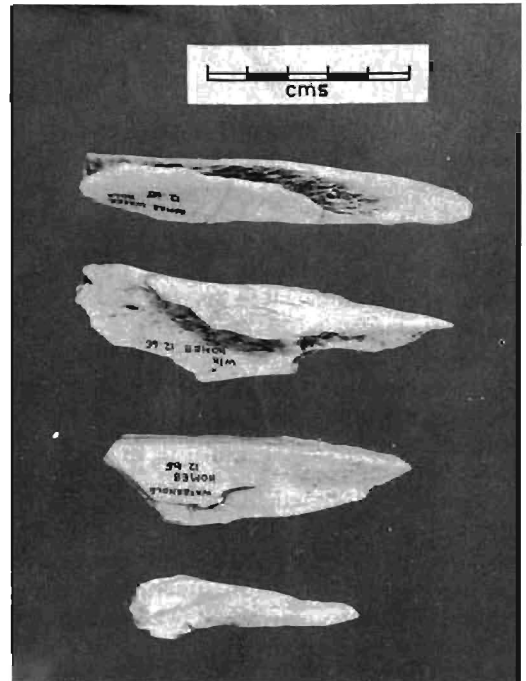


Fig. 1: Bone pseudo-tools from South West Africa. The smoothness and polish of these bones is the result of natural abrasion.

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Fig. 2: The Ossewater waterhole in the bed of the Kuiseb River, South West Africa. Bone pseudo-tools are produced in the sand surrounding this waterhole.

10 miles upstream from the Namib Desert Research Station. Here it was possible to make a fairly large collection of bones, mostly of donkey and goat, which gave every indication of being bone tools.

The Hottentots of the Ossewater village were questioned individually as to what use they had made of these bones. Without exception they stated that they had not used them at all. A natural explanation for these pseudo-tools had clearly to be found and on-the-spot investigation quickly suggested the mechanism involved. It was found that bones discarded by the Hottentots lie on the sand around the village. They become bleached and chemical alteration produces the characteristic soft chalky surface. However, the sand surrounding the waterhole is

constantly disturbed by people and goats coming for water. In the case of the Ossewater village, 460 goats converge daily to drink and spend a fair amount of time milling around on the sand awaiting their turn. Disturbance of the sand by their hooves serves to constantly abrade the weathered surface of the bone as it develops, producing a smoothness and polish of the sort that one would normally associate only with human agency.

If this theory is correct, it should be possible to find other places where similar abrasion occurs. We were in fact able to collect these pseudo-tools in every Hottentot village visited. A great many were recovered from the immediate vicinity of goat kraals, others were picked up on the paths habitually

used by Hottentots and their goats in the river bed. It was of special interest to notice that bones lying in protected situations, for instance between rocks, where abrasive action could not operate, were weathered normally but the chalky surface was intact, no smoothing or polishing having taken place.

One might be inclined to suppose that the action of wind-borne sand passing over a bone would be to smooth and polish it. However, observations made among the South West African dunes do not confirm this. A collection of bones has been made on the flat wind-swept areas between the moving dunes and these show severe etching rather than smoothing or polishing. The surface tends to be selectively eaten away as a result of constant bombardment by the sand grains.

Bones subjected to an arid environment are particularly prone to develop superficial chalkiness as they weather. However, in a moister climate, a similar effect is to be found on bones lying in a well-drained situation. One might well expect that pseudo-tools should then be produced in high-rainfall areas, provided local conditions are appropriate. This in fact proves to be the case. Close examination of a cattle path used daily by stock making its way to the

drinking troughs on the Swartkrans farm near Krugersdorp yielded several bones worn to various degrees (Fig. 3a).

CONCLUSIONS

It is clear from the foregoing observations that wear or polish on bones should not be automatically attributed to human use. Bones, which have rested on sand in situations much frequented by men or animals, can readily become worn through natural abrasion. The necessary conditions are these: a dry or well-drained locality in which surface weathering of the bone can occur, followed by an abrasive agency such as movement of sand around the bone. In this way bone pseudo-tools are likely to be produced in sand round human habitations, at entrances to caves where people walk to and fro across the sand, round drinking places and on tracks habitually used by men or animals. Abrasion by wind-borne sand does not appear to be a significant factor here.

Wear on pseudo-tools is characteristically fairly general and not specifically restricted to any one part of the bone. This is not true for genuine bone tools such as the one described by Robinson¹ from the middle breccia at Sterkfontein. This specimen (Fig. 3b) shows clear wear in certain areas while others have remained unaffected. Robinson suggested that it may have been used for the rubbing of skins.

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REFERENCE

1. ROBINSON, J. T. (1959): *Nature*. 184. 583-585.

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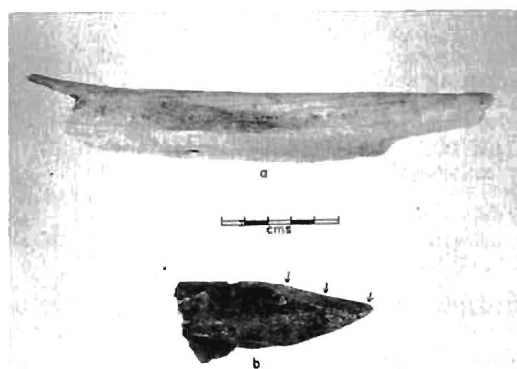


Fig. 3a: A well-worn bone from a modern cattle path in the Transvaal.

Fig. 3b: An apparently genuine bone tool from Sterkfontein. The arrows indicate one of the restricted areas of wear.