

Prehistoric mining of mica schist at the Tsodilo Hills, Botswana

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Synopsis

This paper reports on what appears to be the first discovery of prehistoric mica-schist mining in southern Africa. The mine concerned was found in a location very rich in rock art that is one of the most important archaeological sites in the Kalahari.

The authors conclude that the oval pieces of mica schist that were found at the mine site were used by Khoisan peoples to scrape fatty tissue from hides that were to be cured. Radiocarbon datings seem to indicate that such ovals were used for at least 20 000 years.

Introduction

During the Iron Age in southern Africa, the mining of gold, copper, iron ore for smelting, specularite for body paint, and other materials became an increasingly important activity^{1,2}. The development of indigenous African mining is a reflection of the growth of sociopolitical complexity, and of the control and optimization of labour and involvement in long-distance trade networks that were sometimes international in scope. In this paper we report on the discovery of mica-schist mining from the Tsodilo Hills in the Kalahari Desert of northwest Botswana (Figure 1). As far as we are aware, the mining of mica schist has not been reported in the archaeological record of southern Africa and is therefore of considerable interest.

Before describing the mines, we present a brief overview of Tsodilo archaeology for the purpose of providing a context in which to consider the mines.

Tsodilo consists of 3 main hills, known as the Female, Male, and Child Hills. Tsodilo is a national monument containing over 3500 rock paintings³. It is one of the richest rock-art sites in southern Africa, and one of the most important archaeological localities in the Kalahari. During the past decade, major excavations at Tsodilo have had far-reaching implications, significantly changing the stereotyped view of the Kalahari as an isolated backwater in prehistory. Key to our discussion are two early Iron Age village sites called Divuyu and Nqoma (Figure 1). Both are situated high on the Female Hill, within 2 km of the mica mines⁴.

Pottery from Divuyu, the earlier site, suggests that the first Iron Age immigrants came from the northwest, possibly from the coast of Zaire or the Congo⁵. Work at the rock shelters, known as Depression and White Paintings which are two additional significant sites at Tsodilo, suggests that these Iron Age peoples encountered local 'Late Stone Age' (LSA) Khoisan hunter-fisher-foragers who had been living in the area for well over 20 000 years⁶⁻⁸. Small quantities of Iron Age pottery occur in the shelters in association with tools from the LSA, suggesting an exchange with Iron Age peoples. Excavations at the village of Divuyu produced numerous iron and copper artifacts, which had probably been traded in since these metals do not occur as natural ore in the hills; however, few lithic artifacts have been found, suggesting little immediate contact with neighbouring Khoisan peoples at the village itself.

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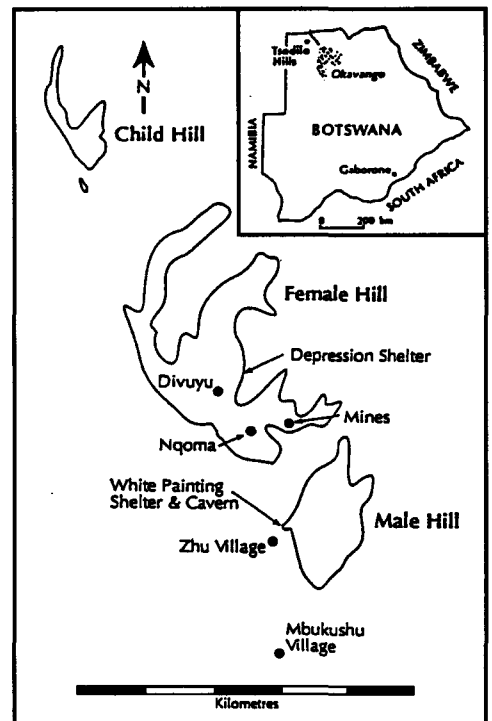


Figure 1—Map showing the mines in the Tsodilo Hills

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By about AD 850, the people occupying Divuyu had been replaced by new people whose village was established at Nqoma. The pottery from Nqoma suggests that these people originated from the upper Zambesi River area⁵. They were rich in cattle and small stock; grew grain crops; traded iron, copper, and glass beads; and, from the large quantity of microlithic remains, had close contact with neighbouring Khoisan peoples at the actual village. Nqoma was apparently deserted some time after AD 1000. In summary, the archaeological data indicate that both Khoisan and Bantu-speaking peoples of early Iron Age inhabited the Tsodilo Hills and, at times, interacted with each other. We shall explore this further in the interpretation of the mica-schist mines.

Description of the Mines and Their Oral Tradition

The schist mines are located on the southeast of the Female Hill in a narrow valley high on a rocky spur. The valley has sheer rock sides, and is about 90 m long by 15 m wide. The valley is completely hidden; the western approach is a narrow entrance at the top of a steep climb, while that at the east is formed by a long, low arch below massive rocks that block the valley end. It is so well concealed that nobody would be likely to find it unless having prior knowledge of its existence, or after systematic search. We suggest that the mining site may have been chosen deliberately because of its relatively inaccessible and protected location.

The two mines are situated adjacent to each other on the northwest wall of the hanging valley (Figures 2 and 3). Elsewhere in the valley, the northwest wall exhibits natural depressions, perhaps 200 mm deep. We believe that the mine excavation sites started as similar natural depressions in the rock, and that these were excavated using the techniques described later. The mining operation appears to have followed the bedding planes of the parent material, which is a micaceous quartzite schist that in this area dips to the north. Thus, the northern mine is situated somewhat lower than the entrance to the southern mine. The entrances to the mines are rather low and oval in appearance, with vaulted ceilings. To gain entrance to the northern mine, we had to crawl but, once inside, we were able to stand fully erect. The floor covers approximately 20 m² in area. The ceilings of both mines were covered with soot from fires and, as will be discussed later, we believe that the caves were excavated using some form of fire-setting technique. Outside the mouth of each mine were large piles of tailings consisting of broken and discarded slabs and fragments of mica schist.

When we brought local San and Mbukushu residents to the site, they at first claimed not to know of the existence or the purpose of the mines. Later, Mukate Samuchau, a local Mbukushu headman who visited the mines with us when we took the San there, admitted that he had known of their presence. He thought that they had been created naturally. He told us that, according to Mbukushu legend, the mines are called Dive da Matjena (the Cliffs of Matjena). He said Matjena was the sister to Ququdi (q = palatal click), the first Mbukushu to settle in the Hills, possibly about 1860. Apparently, she had taken shelter in one of the mines during a long, wet period, and the mines had been named after her.

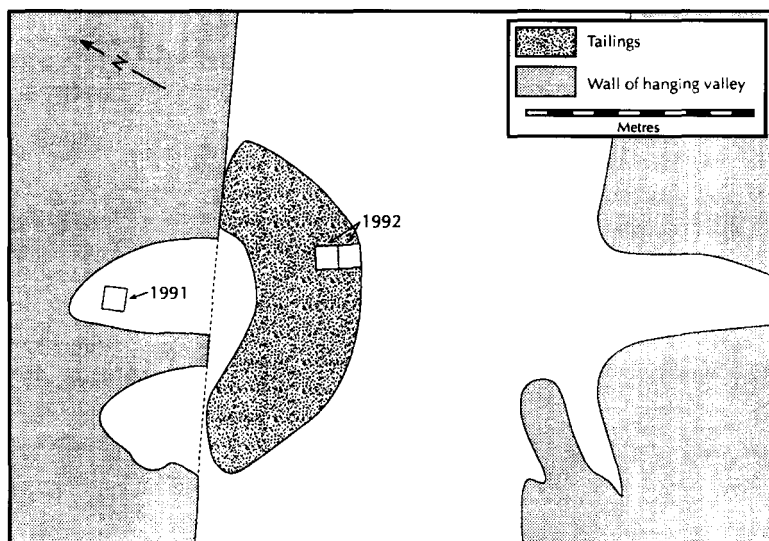


Figure 2—Test pits at the Tsodilo mines

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Figure 3—One of the test pits at the Tsodilo mines

Excavation in the Interior of the Mine

In 1991 we excavated a 1-metre square test pit in the middle of the interior of the northern mine. This pit produced one Iron Age decorated pottery sherd, several schist ovals (as discussed later), some hammer stones and grindstones, and an abundance of well-preserved charcoal. The charcoal, which consisted of large pieces, many about 3 cm long, was found interspersed with slabs of schist throughout the approximate 53 cm of the deposits. The charcoal recovered from the mines was in such a high concentration that we were led to believe that the technique utilized for excavation was a form of fire-setting in which the rocks were heated, causing the schist to spall along its bedding plains. The large amount of labour that must have been required to excavate the mines in solid rock by simple fire-setting techniques indicates an ability to organize labour and to sustain a considerable work effort. A charcoal sample from the base of the excavation overlying bedrock between 40 and 53 cm yielded a radiocarbon date of 1150+/-50 BP (Beta 47863). This date fits in well with the dates for the early Iron Age villages mentioned, namely 7th to 11th century AD.

The large sherd with a decorated rim was recovered just below the surface of the excavation (Figure 4). The original vessel was a large globular jar, which is directly comparable with Vessel Shape 2 as described by Hendrickson⁹, who provides a detailed study of the early Iron Age ceramics of the area. The tempering material included in the sherd is charcoal, which has a moderate distribution. The overall surface of the vessel has been smoothed. Decorative motifs found on the sherd include diagonally incised lines bordered by a horizontally oriented line. The sherd has elements that are somewhat comparable with those on the Nqoma vessels described by Hendrickson¹⁰, yet the decoration on the sherd found within the mines appears to be restricted to the uppermost portion of the vessel and is bounded by a horizontal incised line above the neck region.

Excavation of the Tailings Pile

While our 1991 research had convinced us that the 'caves' we had found were not natural but were, in fact, mines, we did not know exactly what was being mined. For this reason, we decided to return to the site in 1992 and excavate a test pit on the outside of the mines to examine the low mound that we believed to be a mine-tailings pile. This mound covered an area of about 30 m², and rose to a height of some 40 cm along a middle ridge.

We excavated a trench of 1 by 2 m cutting across the edge of the tailings pile in front of the northern mine (Figures 2 and 3). The surface consisted mainly of schist fragments and a minimal amount of soil. Below the surface, the dense schist slabs continued to a depth of approximately 40 cm, where the original soil surface was encountered. There was no stratigraphy present in the test pit. Some of the schist appeared to have been roughly chipped into oval preforms, and several had clear traces of grinding on their edges. We immediately noticed a similarity between these worked schist ovals and similar ones that we had already found in LSA levels at the rock shelter in the Tsodilo Hills referred to as the White Paintings Shelter.

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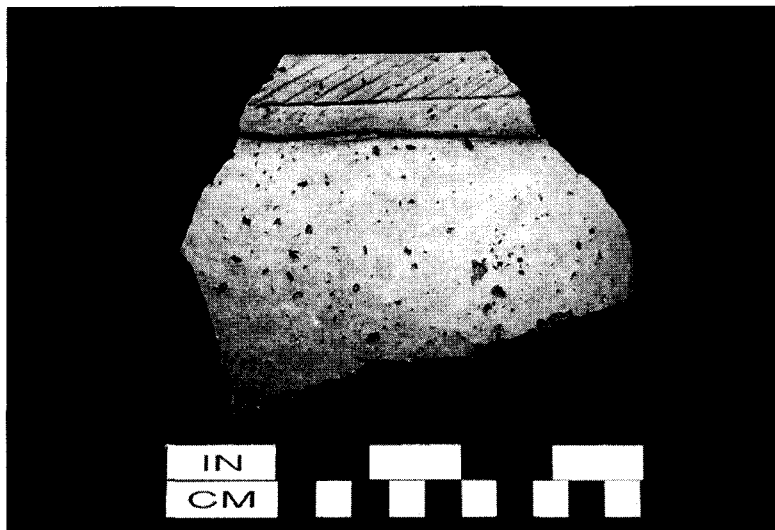


Figure 4—Large sherd with a decorated rim

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We recovered a total of 10 schist ovals from the excavation (Figure 4). Most of them appear to represent early stages in the manufacture of the ovals, which, when either finished or highly used, are usually more heavily ground on their edges than those found in the tailings pile. Given their presence in a dump, they were probably either rejects that had been discarded intentionally, or pieces that had been lost during the mining operation. The schist ovals from the excavation range in length from 5,8 to 17,5 cm, with a mean length of 0,9 cm. Ten additional pieces of schist were recovered with traces of grinding on them. There were also three combination grindstone/hammer stones and two hammerstones, and a double grindstone and hammer was recovered near the bottom of the excavation. At the base of the pit, which had formerly been the original ground surface, we recovered a small undecorated charcoal-tempered sherd. The charcoal temper (a local early Iron Age characteristic) suggests early Iron Age affinities, and is consistent with the date deduced for the interior of the mine.

We recovered, in addition to the schist ovals, pieces of friable red-orange schist, which crumbles easily into fine pigment. This may also have been sought after by the miners, although traces of deliberate use were not apparent. Finally, we noted that individual pieces of the schist occasionally contained crystals of asbestos. These may also have been used for some yet undetermined purpose, since they were found in the excavation at the White Paintings Shelter in most of the upper levels, and are believed to have been imported to the site.

It is clear from the contents of the tailings pile (the great density of schist slabs) and the worked pieces of highly micaceous schist, that the mica schist itself had been mined. It is suggested that the thin slabs, which had been spalled off the bedrock inside the mine, were subsequently roughed out by being hammered into an oval shape (Figure 5) and the edges on the schist ovals were then ground. We think that this was done to extract the mica, although the schist ovals themselves may have been used to scrape hides.

Beaumont²⁴ illustrates a specularite-covered stone (backed discoid) from the Middle Stone Age stratum at Lion Cave, Ngwenya, Swaziland, which he describes as a 'mining tool'. The illustrated discoid looks very similar to our ground schist ovals. It should also be noted that both specularite and mica when ground produce a glittering powder.

Relevant Ethnographic Data

The use of ethnographic analogy in archaeological interpretation has an extensive history^{11,12}. While we are aware of the problematical nature of this approach in the comparative study of artifacts, it is noteworthy that the Nama-speaking Khoi in Namaqualand use similar stones as hide scrapers¹³. The scrapers are used to remove the fatty tissue from the hide during the curing process. These scrapers are sandstone or chalky pebbles with an abrasive surface, rather than mica schist. The texture of the scraper is coarse enough to remove fatty tissue, yet not coarse-grained enough to tear hide. This compares nicely with the schist ovals from Tsodilo.

In regard to the acquisition of the raw material for scrapers, Webley¹³ documents that individuals quarried their own scrapers from favourite localities. Trips to the source area occurred only once a year. She also states that certain scrapers were curated and inherited from mother to daughter¹⁴. This ethnographic example gains significance if we consider that, in the desert setting of the Kalahari Sandveld, sources of suitable raw materials for scrapers are very rare and are found at widely dispersed locations. For this reason, as well as others, Tsodilo as a prominent source of raw material must have been especially important to peoples who lived in a very wide area. The San hvaro system¹⁵ for exchanging goods over long distances in the Kalahari, if it has ancient roots, may have facilitated the distribution of a wide range of lithic materials, including the schist ovals, among groups of peoples.

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Schist Ovals in the White Paintings Shelter

As discussed earlier, ovals and fragments of micaceous schist are consistently found in the LSA levels at the White Paintings Shelter. At first, when these were encountered prior to the discovery of the mine site, they were thought to have been spalls from the ceiling of the rock shelter. However, as they continued to be found, we noticed edge grinding and became convinced that they were artifacts (Figure 5). The schist ovals also appeared to be too regular in shape and size simply to have been chance occurrences. They had been consistently flaked and ground to regular ovate to sub-ovate shapes, and their edges in many cases were extremely smooth. Their size ranged from small (*ca* 4 cm) to fairly large (*ca* 15 cm), but in all cases they could have been hand-held. The mica content of the artifacts varied from some that were literally loaded with mica to others that contained a predominance of feldspars and other ferromagnesium minerals.

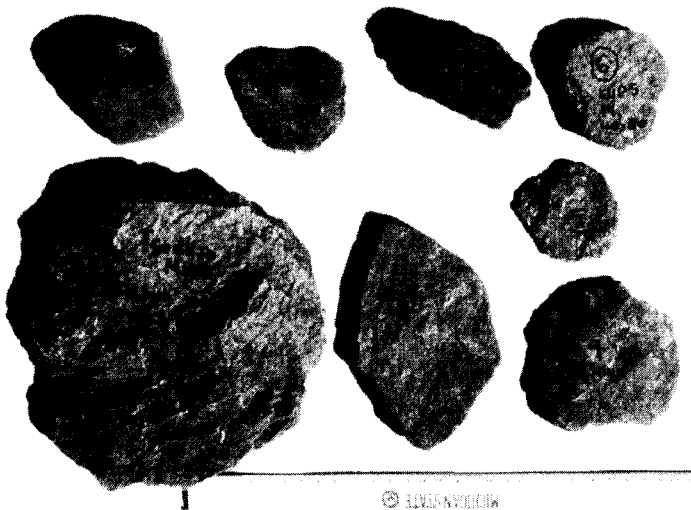


Figure 5—Schist ovals recovered from the excavation

The schist ovals were not restricted to particular levels at the White Paintings site, but were concentrated in the LSA horizons. While the analysis is still in progress, preliminary findings have revealed a minimum of 20 schist ovals in at least 7 different excavation units. Typically, only one or two examples were found in an individual 10 cm level within a square of 1 m. The schist ovals occur both in the LSA levels that contain Iron Age pottery, and in the preceramic LSA levels that clearly date from before the period when early Iron Age peoples arrived at Tsodilo. For example, 9 specimens were recovered from levels above 70 cm containing pottery, while the remainder were found below that depth; 2 were found in the level 120 to 130 cm, which immediately underlies an area with radiocarbon dating of 4330+/-160 BP (Beta 47865). The deepest find came from sq. 18 at 330 to 340 cm, and is associated with early LSA remains. This oval was found just below a sample of burnt bone (320 to 330 cm) that yielded a radiocarbon date of 20,340+/-520 BP (Beta 47866). Thus, the ovals appear to have been used for a least 20 000 years.

Two additional ovals were recovered at the Tsodilo Depression Shelter in preceramic and ceramic LSA levels. Several others were recently found in the Tsodilo Male Hill Cave (sq. 2, 160 to 170 cm) in pre-ceramic LSA levels that date to earlier than the first century AD.

Use of the Schist Ovals through Time

What do these data suggest regarding the use of schist ovals through time at Tsodilo, and how does one interpret the excavated mine? First of all, it is clear that the schist ovals were being used over a very extensive period, much of which is substantially older than the mine itself. Given the general assumption that the pre-Iron Age peoples in southern Africa were Khoisan peoples, one might conclude that, during much of the time that the ovals were used, they were associated with Khoisan peoples¹⁰. It is possible that the schist was *not* being mined during that period (before the Iron Age). Instead, slabs may have been collected on the surface below rock outcrops. However, during the early Iron Age, as trade networks increased in importance, the schist mines were developed.

The Ethnicity of the Miners

We recognize that it is difficult to associate little-known archaeological sites that are neither settlements nor cemeteries (both of which may contain important clues to ethnicity and language) with specific ethnic or linguistic groups. Therefore, our ideas about ethnicity must be regarded as best guesses, rather than established facts.

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The presence of schist ovals in rock-shelter archaeological deposits that contain LSA lithics and small amounts of early Iron Age pottery may suggest that local Khoisan populations practising a hunting and foraging economy (with occasional use of livestock) were obtaining schist ovals, and perhaps ceramics, from their early Iron Age neighbours, who were doing the mining. The discovery of an early Iron Age sherd in the floor of the mine would support this view. This hypothesis would be consistent with Denbow and Wilmsen's interpretation⁴ of long-standing trade relationships between the early Iron Age food producers and the hunter-foragers of the Kalahari Sandveld.

On the other hand, the stone hammers from the mine did not look similar to those usually associated with the mining carried out by Iron Age people since they had not been ground smooth. They did not exhibit dimples around the sides caused by the striking of metal points into rock fissures to loosen spalls; nor did we find sharp scrape marks along the roof of the mine caused by metal points being hammered in and used as levers. Outside the mine, we found none of the usual artifacts associated with Iron Age mining, such as numerous sherds, small scraps of iron, pieces of slag, and the residue of smithing iron points. All this suggests that the mining itself was not directly linked to Iron Age peoples, but was rather the product of peoples working generally without metal tools and with a limited knowledge of mining techniques.

This analysis suggests that some of the hunter-forager groups may have carried out the actual mining. Evidence for this interpretation is offered by Robert Gordon's historic research¹⁷ in Namibia. He states¹⁸ that 'trade and especially mining of copper, was one of the features that impressed many early travelers [sic] in their encounters with Bushmen in this part of Africa'. Gordon also notes¹⁹ that an early traveller, Hugo Hahn, observed that Bushmen were mining copper near Otavi and trading it to Ovambo, but that they refused to allow outsiders to visit the actual mining site. Another explorer and adventurer named Gerald McKiernan reported searching for and finding one of these secret mines in 1875 'only after much difficulty'²⁰. While Gordon's historic data apply to copper mining, the emphasis on inaccessibility is important given the hidden nature of the Tsodilo mines. We suggest that the relative inaccessibility of the Tsodilo mines may reflect a long-standing tradition of Khoisan peoples to locate their mines in hidden areas.

Both the HaMbukushu and the Zhu San today resident in the Hills say that they are fairly recent arrivals in the area. When they first came to the Hills, they found a remnant population of Ncaikhoë living there. The Ncaikhoë are Khoë-speaking, as opposed to the Zhu, who speak a Northern San dialect of !Kung. Today, the Ncaikhoë live along the western fringes of the Okavango Delta and south of Lake Ngami, where many of them appear to have a long history of residence, whereas the Zhu are probably more recent arrivals in western Botswana, coming from north of the Okavango River.

Many Khoë groups in Botswana have lived along the rivers of the Okavango-Chobe-Makgadikgadi area for considerable periods. For instance, the Badete of the Boteti River say that they are the traditional owners of the river, a claim that is acknowledged by all the Bantu-speaking peoples living along the river, who agree that they are more recent arrivals and were originally allocated land by the Badete²¹.

As these riverine Khoë are expert fishing people, we returned to findings from the White Paintings Shelter to examine another piece of the puzzle. This site recently revealed evidence of the longest and most consistent orientation towards fresh-water fishing in southern Africa^{8,22}. Our oral information indicates that the Zhu at Tsodilo did not eat fish until fairly recent times, when they were taught to do so by the Hambukushu²³. For this reason, as well as the strong oral traditions of former Ncaikhoë occupation at Tsodilo prior to the coming of the Zhu, we suspect that much of the archaeological sequence in the White Paintings Shelter (with the exception of the upper 10 to 15 cm) is associated with the Khoë and their ancestors, rather than with the Zhu. The circumstantial evidence that links the White Paintings Shelter with its long record of fish exploitation and schist ovals to the Ncaikhoë suggests that they may also have been the miners. This interpretation is consistent with the previously mentioned view that the mine was not the product of Iron Age peoples.

Regardless of who carried out the mining (and it is still an open question), it is very clear from Denbow and Wilmsen's work⁴ at Divuyu and Nqoma that beads and other items were imported into the Tsodilo area. Perhaps the mica and schist ovals represented items that were exported in the other direction in exchange for non-local goods. Future excavations at other, more distant sites may indicate whether or not this is correct. Finally, we suggest that the control and exportation of the products of the mines in a region where rock outcrops are rare may have been a significant part of the overall economy of the prehistoric inhabitants of Tsodilo. ♦