So far forty excavations have been completed, seventy collections made and 300,000 artefacts recovered. It has unexpectedly emerged at Ngwenya, particularly from the site called Lion Cavern, that the mining is of great antiquity.

Lion Cavern is at the southern end of a steep scarp face of the haematite hill, Lion Peak, where ancient miners cut into the face of a cliff, more than 500 ft. high, a shelter-shaped working about 25 ft. wide, 30 ft. deep and 20 ft. high. The floor of the shelter was covered by haematite soil and rubble. The first excavation, just inside the cavern's drip-line, bordered on the inner aspect of a large 5 ton haematite boulder fallen from above and almost blocking the entrance to the cavern.

The deposit, 9 ft. deep in this area, had the following characteristics: (*a*) 0–7 ft. contained stone-mining tools with a few sherds, which were restricted to the upper 4 ft.; (*b*) 7 ft. of worked bedrock 9 ft. down contained an atypical assemblage of stone artefacts chiefly quartzite and quartz. Irregular flakes predominated, and there were a few chisels. The industry was ascribed provisionally to the Later Stone Age.

Dr Minze Stuiver gave as the date[3] for the basal level $Y-1713$, 9640 ± 80 B.P./7690 ± 80 B.C. We therefore decided to remove the obstructing haematite boulder by undercutting it on its talus-slope side and excavated the underlying deposit. Here the deposit had a maximum depth of more than 11 ft., with details as follows: (*a*) 0–6 ft. contained a few mining tools; (*b*) 6–8 ft. contained undoubted Middle Stone Age artefacts and possible Later Stone Age tools; (*c*) 8 ft. of worked bedrock deeper than 11 ft. yielded 23,000 artefacts belonging unquestionably to a middle stage of the Middle Stone Age. Occasional stone mining tools were also found. Well defined ash levels showed that the assemblage was *in situ*.

Quartz, white quartzites, grey and white dappled quartzite, black indurated shales and greenish cherts were the principal materials used by the miners. These rock types occur mostly on a ridge overlooked by, and about 0·25 miles from, the cavern. The exposures there are patently flaked. Dappled grey and white quartzite exposures occur about a mile and more north-west of the site.

Samples of charcoal nodules from the middle to lower levels of the Middle Stone Age level were sent to the Yale and Groningen Laboratories, and the following dates were given:

$Y-1827$, $22,280\pm400$ B.P./$20,330\pm400$ B.C.
$GRN-5020$, $28,130\pm260$ B.P./$26,180\pm260$ B.C.

The dates harmonize with the archaeological evidence and suggest that there was mining here for a very long time, terminated perhaps by the fall of the haematite block.

Mr John Strathern, chief geologist at the mine, confirmed the artificial nature of the rock surface underlying the Middle Stone Age stratum. He classified the bedrock as a specularite-rich, crumbly greasy red haematite, and stated that plain crumbly greasy red haematite occurs in large areas and in far more easily accessible locations at Castle Peak, only half a mile to the south. He therefore considered specularite to have been the incentive for the concentration of mining at Lion Cavern.

The worked floor must extend for at least another 10 ft. beyond the outside edge of this second excavation. Its outer part, as yet unexcavated, may date back another few thousand years. Evidence of an earlier culture may also be located there; there is an enormous Later Acheulian site, estimated to contain ten million artefacts barely a mile away.

At least 50 tons of haematite rich in specularite must have been removed from Lion Cavern; two-thirds of it during the Middle Stone Age. Boshier found it was held traditionally in high regard by Swaziland counsellors. Haematite and specularite occur at many sites ranging back to Earlier Middle Stone Age times within 20 miles of Ngwenya.

These datings demonstrate that haematite has been mined at Ngwenya, on and off, for at least 28,000 yr. They afford the first dated presumptive evidence that all foreign ores and pigments found in prehistoric deposits all over the world were the result of deliberate mining. Dates of cavern strata containing haematite in Rhodesia and South Africa have ages ranging from 37,000 to 42,000 B.P. Incidentally, the claim made almost 35 yr ago, that "manganese was being deliberately mined in Zambia by a foreign people familiar with its potentialities in Late Stone Age times", and Boshier's expectation[2] that "In this field (of ancient mining) Bomvu Ridge (Ngwenya) is of supreme significance; its thorough investigation might well furnish us with knowledge of the genesis of South African mining", have been fully justified.

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Amino-acid and Peptide Synthesis from Hydrogen Cyanide

The recent interesting findings of Matthews and Moser[1] and the earlier work of Lowe *et al.*[2] involving the abiogenesis of amino-acids and their precursors from simple molecules (HCN, H_2O, NH_3) raise two important issues which stem from my observations[3] of the amino-acid content of atmospheric precipitation.

First, abiogenic processes leading to amino-acid systems are usually considered in connexion with remote times, yet amino-acids and their precursors can be detected in rainwater and snow, and the experiments carried out so far indicate at least the possibility that their genesis may be abiogenic.

Second, both groups of investigators subject their systems to acid hydrolysis by refluxing with azeotropic hydrochloric acid. Unless this acid is freshly distilled before use, however, it will be found to contain small amounts of amino-acids after reflux—a phenomenon which itself is worthy of further study. I do not mean to suggest the invalidation of the hydrogen cyanide synthesis of amino-acid systems, but simply that a re-appraisal of the data may be useful.

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