Iron Age mining in the Transvaal

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SYNOPSIS

Mining was a widespread economic activity in the African Iron Age. This paper reviews the available evidence on the archaeological, historical, ethnological, and technological aspects of early mining in the Transvaal.

A number of analyses of ores found at archaeological sites (especially at Broederstroom) are reported, and an interpretation of the analytical results is suggested.

Descriptions of Iron Age copper- and tin-mining complexes, and of iron-ore workings, are given, and techniques of Iron Age mining are discussed. The evidence of gold mining in Iron Age Transvaal is examined.

SAMEVATTING

Mynbou was 'n algemene ekonomiese bedrywigheid gedurende die Ystertyd in Afrika. Hierdie referaat gee 'n oorsig oor die beskikbare bewyse betreffende die argeologiese, historiese, etnologiese en tegnologiese aspekte van die vroeë mynbou in Transvaal.

Daar word verslag gedoen oor 'n aantal ontledings van ertse wat by argeologiese terreine (veral by Broederstroom) gevind is en 'n vertolking van die analitiese resultate word aan die hand gedoen.

Koper- en tinmynkomplekse uit die Ystertyd en ysterertsdelfplekke word beskryf en mynboutegnieke van die Ystertyd bespreek. Die tekens van goudontginning in Transvaal gedurende die Ystertyd word ondersoek.

Introduction

The books [1-2] of the early European travellers and missionaries, and the reports[3-6] of prospectors, geologists, mine inspectors, and mining engineers often refer to 'ancient workings'. It should be noted that the terms *ancient workings*, *pre-European mines*, and *Iron age mines* are synonymous in the Southern African context. The customary term *ancient working* does not imply affinities with European or Eastern cultures[7]. The term *South African Iron Age* was defined by Mason[8] in 1952.

By the end of the 1920s enough information had accumulated for Wagner[9] to draw a map showing the pre-European mine workings of Southern Africa and to give a lecture on 'The Pre-European Mines and Smelters of South Africa' to the Science Congress in Johannesburg. The map, which was first exhibited at that Congress, is included in the present paper in memory of a great scientist, who died over fifty years ago (Fig. 1).

Wagner was an eminent mining geologist. During his twenty years of working life, he published no fewer than 12 books and 114 papers and articles, most of them of lasting value. In many of his geological publications, he gave notes on ancient workings and archaeological finds. In several papers, he described ancient tin and copper smelters in the Waterberg district, and he was preparing a history of mining and metallurgy in Southern Africa[10, 11] when he died in November 1929.

Iron Age Mines in the Transvaal

Wagner's map (Fig. 1) shows the more important Iron Age workings of Southern Africa — among them 25 iron mines, 26 copper mines, 3 tin mines, and 6 gold mines in the Transvaal. The map was designed to indicate the relationship between the old gold workings and the ruins of Zimbabwe. Wagner believed that it was necessary 'to distinguish clearly between the really ancient workings of central and south-eastern Africa and the more modern workings made by the present-day natives and their predecessors'.

The metallurgical regions of the Transvaal are clearly recognizable on Wagner's map: the copper centres of Phalaborwa and Messina, the tin mines of Rooiberg, a chain of smaller iron mines along the ironstone deposits south of the Magaliesberg, and some pre-European copper workings near the border area of the western Transvaal towards Botswana. A number of smaller copper and iron mines and a few gold mines are also shown on Wagner's map, but little more than their names is known about most of them.

This basic picture of archaeo-metallurgy (to use a recent term to indicate the prehistory of mining and metal-working) has not changed much in the past fifty years. Only a few more Iron Age mines have been discovered and described (Fig. 2). One of the most notable contributions in this field is an investigation by Evers of a copper mine excavated on the farm Harmony in the eastern Transvaal[12]. Much information on the prehistory of northern Transvaal mines is given in publications by Van Warmelo[13] and Bullock[14]. The story of Phalaborwa[15], in addition to providing valuable material on the archaeological and ethnological aspects of the Phalaborwa mines, contains the first reliable chronology of mining in that area. The work[16] of Mason on the Early Iron Age site of Broederstroom takes our knowledge of South African archaeo-metallurgy as far back as to the 5th century A.D. — a period on which there had been little information.

The Mining of Iron

Iron was, of course, the most important metal in the culture and economy of the Iron Age people. Early evidence of iron smelting in the Transvaal, and therefore, by implication, of iron-ore mining too, comes from the Broederstroom site (Hartebeespoort Dam), where slag, iron ore, and charcoal dated to the 5th century A.D. have been found next to the excavated remains of smelting furnaces. The sources of the ore used have not been discovered so far, but there is no shortage of ferriferous deposits near the settlement site[17]. For example, iron ore was found in a donga only a few hundred metres away from the smelting furnaces, and about 2 km

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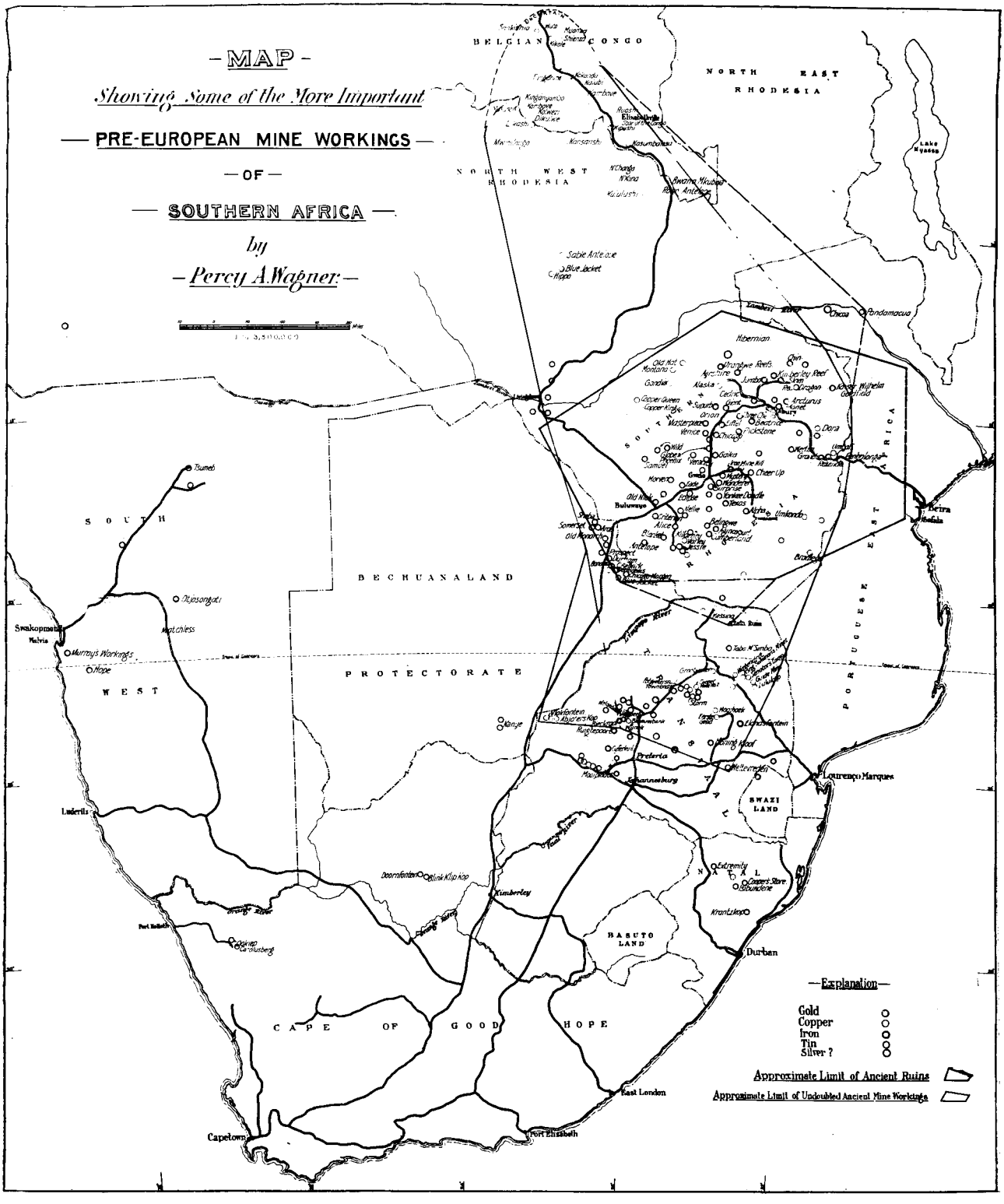

Fig. 1—Map drawn by P. A.Wagner, 1929. Reproduced by kind permission of Dr J.Wagner

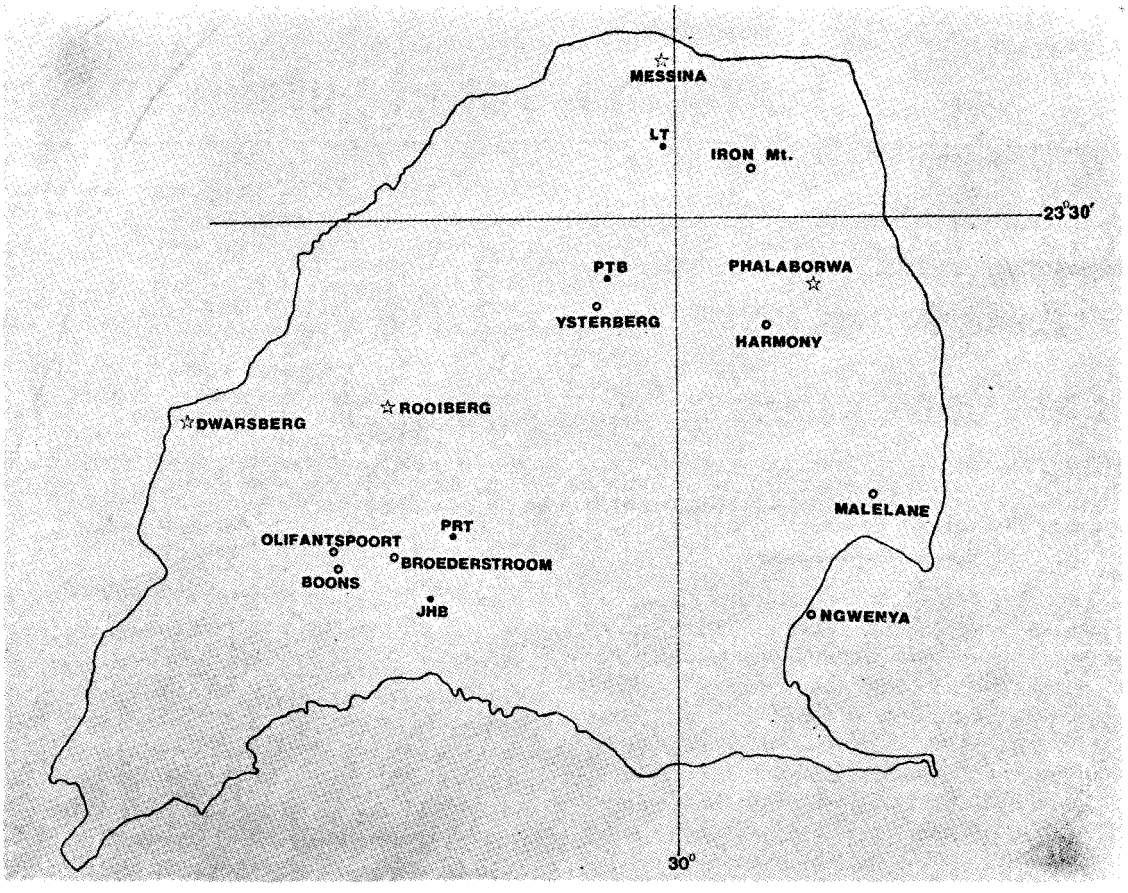

Fig. 2—Map showing the positions of Iron Age mines in the Transvaal mentioned in the text
***Mining complexes** °Mining sites

distant, at Welgegund, there is a rich ironstone outcrop[11].

Many ironstone deposits have been found in the hills and valleys of the Magaliesberg ranges, continuing westward into the Marico district of the western Transvaal[17]. The availability of these ores was probably one of the reasons for the presence of the many Iron Age settlements in these regions. The area around Boons siding is, as Wagner[10] noted, 'riddled with ancient workings'.

Many deposits mined by the Iron Age people were probably shallow and of low grade, but there are some places where iron ore is found in large, rich deposits. Bullock[14] reports on the famous Iron Mountains of Tshimbupfe near Levubu in Vendaland:

> In the south-eastern part of the Venda country there lie the Iron Mountains of Tshimbupfe whose rocks have a considerable iron content. In the olden days the Vhavenda travelled to these mountains to obtain the iron ore they needed . . . . They had to take with them goods for barter which could be exchanged for the ore mined by the inhabitants of those parts. Corn usually served this purpose. It was carried in the leather bags which at the same time served as a measure for a load of ore. The journey to the mines took two days. A supply of mined ore was always kept ready for barter by the owners of the mines. The ore was cut out from seams or leaders. If a seam was rich, a pit was dug from which occasionally underground stopes branched out to follow the ore. When the carriers of the ore had returned home, they delivered it to the smelter who gave the smelted-out crude iron to the village smith who made axes and assegais from it.

It therefore appears that there was a well-organized village iron industry in Vendaland.

There is another 'iron mountain' further south (near Pietersburg) called Yzerberg. Baines[18] recorded in 1860 that this mountain is 'an immense mass of iron ore which the natives have quarried for ages past and the holes they have dug are visible as dark spots upon its sides'.

Long before the Iron Age began, a softer type of iron ore (specularite, ochreous hematite, 'sibilo') was mined in South Africa. The crushed and powdered ore was used for cosmetic purposes as body smear and hair powder. The best known of such pigment mines is Lion Cavern, at Ngwenya in Swaziland, near the South African border. Beaumont[19] identified Stone Age artefacts found at Lion Cavern 'as mining tools belonging to the full Middle Stone Age'. Unfortunately, no detailed report on these artefacts is available.

Mason[20] discovered hematite and ochre 'pencils' in a Middle Stone Age bed at Olieboompoort (north-western Transvaal), which was radiocarbon-dated to over 33 000 years ago. Stone Age people ground these materials to powder for painting red or yellow designs. Nodular hematite was found underlying the Middle Stone Age beds there.

Large specularite mines are found all over the Transvaal. Wagner[11] mentions many extensive ancient workings, e.g. near Boons in the western Transvaal, in the Rooiberg area, in the Zoutpansberg area, and at a site near Malelane (eastern Transvaal), 'where the ore obtained from the workings has and is still being used

TABLE I

ANALYSES OF IRON ORES FOUND AT TRANSVAAL ARCHAEOLOGICAL SITES

	Broederstroom near Hartebeespoort Dam, Brits District Archaeological Sites					Kloof Resort, nr De Wildt, C.Tvl	Syferfontein, nr Boons, W.Tvl, mean of 4 analyses	Pretoria Townlands, mean of 43 analyses	Melville Koppies Nature Reserve (Jhb), near furnace sites		Farm Schield, Sibasa, N.Tvl, nr Iron Mountain, Vendaland	Lulukop, Phalaborwa, E.Tvl
	24/73	24/73	24/73	24/73	24/73	35/75			7/63a	7/63b		
	1	2	3	4	5	6	7	8	9	10	11	12
Constituent %	Donga	K	Bu	Azv	Y				Goethite	Goethite	Magnetite	Magnetite
Silicon (SiO_2)	27,92	31,52	2,52	34,44	13,72	48,4	11,71	21		51,36	0,8	0,2
Aluminium (Al_2O_3)	8,49	6,28	4,27	6,15	5,32	1,33		5,6		7,75	1,2	1,4
Iron (Fe_2O_3)	42,79	40,51	79,06	46,92	63,63	48,9		65	61,2	29,41		
Iron (FeO)	8,46	10,22	4,20	0,36	2,89	0,74		3,2		0,13		
Magnesium (MgO)	0,40	< 0,1	< 0,1	< 0,1	0,21	< 0,1		0,17		< 0,1	3,9	1,45
Calcium (CaO)	0,04	0,14	0,11	0,10	0,11	0,04		tr.		0,03	0,8	4,90
Sodium (Na_2O)	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1				< 0,1	0,2	0,2
Potassium (K_2O)	0,34	0,09	0,18	0,11	0,08	0,02				0,83	0,1	0,1
Titanium (TiO_2)	0,32	0,34	0,13	0,35	0,21	0,09		Nil	0,52	0,27	1,7	1,4
Chromium (Cr_2O_3)	0,11	0,12	0,08	0,12	0,09	0,03				0,06		
Manganese (MnO)	0,16	0,09	0,14	0,10	0,07	0,05		0,26		0,03	0,64	0,19
Phosphorus (P_2O_5)	0,20	0,38	0,38	0,38	0,32	0,18	(P)0,012	0,55		0,35	0,03	0,02
Copper (Cu)	0,01	< 0,01	0,32	< 0,01	tr.	< 0,01		Nil		0,012		
Sulphur (S)							0,004	0,03				
Total iron (Fe)							50,2	48	42,8		66,2	64,7
Other elements 0,01 to 0,1%	Ni,Pb	Ni	Ni,W,Zn	Ni	Ni	Ni,W,Zn Pb 0,12%				Ni,Zn,Rb		
Water, CO_2 (loss on ignition)	10,82	10,23	10,67	9,70	12,42	0,40				10,03		
Analyst	Geological Survey Laboratory, Pretoria, Project 78/203								Analytical Services, Johannesburg	Geological Survey 78/203	J. G. D. Steyn	
References							11 p. 98	11 p. 86			21	

mainly for making ochre. This is traded all over Portuguese East Africa'.

Nearly all the iron ores mined in the Transvaal were iron oxides such as hematite (specularite), goethite (limonite), and magnetite. Table I gives analyses of some of the ores found at or near Iron Age smelting sites in the Transvaal. The iron contents of the ores analysed range from 21 to 66 per cent.

At the Broederstroom site, two different grades of iron oxide can be recognized: one with a low iron content (approximately 35 per cent), possibly originating from an ore source exposed at a donga near the Early Iron Age settlements; the other with an iron content ranging between 47 and 58 per cent, perhaps brought from an ore occurrence on the farm Welgegund, adjoining Broederstroom[11]. Ores from deposits at other Magaliesberg sites such as Syferfontein and Pretoria Townlands (Table I, nos. 7 and 8) are of medium grade and have an iron content of approximately 50 per cent.

The iron contents of the banded ironstones of the Witwatersrand System (Hospital Hill Slate Zone) range from 20 to 35 per cent[11], occasionally rising to approximately 43 per cent (Table I no. 9). It is difficult to understand how ores with iron contents of as little as 20 per cent (Table I, no. 10) could have been smelted. Perhaps such ores found near smelting sites were rejected material or were mixed with higher-grade ores.

Interesting are the analyses of the high-grade ores of the Sibasa and Phalaborwa area showing very low silica values (less than 1 per cent) and very high iron values (66,2 per cent and 64,7 per cent)[21]. Such high-grade ores are not considered good material for smelting in primitive furnaces because their rather high hardness, low permeability, and low silica content do not contribute to the formation of a good bloom (a spongy mass containing solid iron, slag, and unburnt charcoal). However, it is possible that higher temperatures and a better heat economy could have been obtained in the Venda-type furnaces used in the northern and eastern Transvaal than in the furnaces found in other parts of the Transvaal[22].

It is generally difficult to pinpoint the source of an ore used at a particular smelting site. Occasionally, local traditions give a hint of the locality from which an ore may have originated[14]. In some cases, the presence or the quantity of certain indicator elements such as titanium, cobalt, arsenic, and rubidium may enable an investigator to connect ores, slags, or pieces of metal found at a smelting site with known ore deposits. However, there are considerable difficulties in such investigations, since ores found at smelting sites may have originated from elsewhere or may have undergone decomposition by weathering, while the slags may contain external material such as scrap additions, fuel residues, and flux. The frequent difficulty of obtaining sufficient representative sample material compounds the problem.

The Mining of Copper

Copper was valuable to the Iron Age people of South Africa for the making of ornaments and for use as a trade object. Large Iron Age copper workings have been found around Messina and Phalaborwa, which are both centres of modern copper production. As in Zimbabwe, European prospectors investigated the traces of old mining activities and found that some of the present copper mines have been established where Iron Age miners once worked.

The workings in the Messina area were very extensive. On a reconnaisance tour to the north-western Zoutpanberg district, Trevor[5] observed an almost continuous line of old workings, stretching for more than 29 km from Messina to the south-west. All the workings had been filled in with rubble and soil, presumably by those who had abandoned them. He considered these workings to be the most extensive mines in the Transvaal and Zimbabwe.

The old workings of the Phalaborwa area spread around the (now destroyed) hill Lolwe (Loolekop). The archaeological history of Lolwe is described as follows by Van der Merwe and Scully[15]:

> Lolwe was the site of mineshafts, galleries and adits, which were uncovered in the course of blasting. A rough estimate by mining engineers indicates that well over 10 000 tons of rock containing secondary copper ore deposits (malachite and azurite) had been removed from the hill before the start of recent mining activities . . . . The diggings followed the veins with great accuracy, and were small enough in diameter to indicate the use of child labour (probably girls) in many instances.

Some of the shafts were as deep as 21 m, with diameters as small as 500 mm.

Besides, these two large mining centres, numerous smaller ancient workings have been discovered. The best investigated is a mine on the farm Harmony in the Letaba District, which Evers[12] described in 1974 as follows: 'The mine consists of a line of twenty-five units, with a total length of about 400 m. Between them the units contain 31 shafts and one open stope'.

Copper was also mined in the Rooiberg tin-mining complex, so that the two ores used in the production of metals for bronze alloying were present in one area. However, there is no incontrovertible evidence that bronze was actually produced there[23].

Interesting is the occurrence of small copper deposits near the Early Iron Age site of Broederstroom and the Later Iron Age site of Olifantspoort in the Magaliesberg area. Copper artefacts were found at both settlements[16, 17, 24].

Another interesting but little known mining area is in the Dwarsberg Hills, in the north-western corner of the Marico district (western Transvaal). The ancient workings there stretch over a range of more than 30 km. Boshier[25] investigated these mines in 1964, and found many shafts and adits cut into the dolomite. Most of the mines had been filled up, but in some of them it was still possible to descend for 12 to 18 m.

The Mining of Tin

The old mines around Rooiberg, in the Waterberg district west of Warmbad, are of particular interest, since they are the only Iron Age tin mines found in the Transvaal and also, as far as we know, the only ones in the whole of Southern Africa. The existence of these mines had been quite forgotten up to the beginning of this century. It was thought that the old workings found in the Rooiberg area were the remains of copper and

iron mines, and their true nature was recognized only when tin ingots were found and the tin content of dumps led prospectors to the parent deposits in this area. The Waterberg tin fields cover an area of more than 180 km^2. Many of the recent shafts and stopes intersect old workings or are close to them. Baumann[6] in 1919 gave a good description of the old workings and of the mining practices used by the Iron Age people. The old mines were opened by the sinking of vertical or inclined shafts, and the tin lodes were followed by drives to pockets and pipes (Figs. 3 and 4). The drives were low and narrow, and, although they must have been uncomfortable to work in, the miners worked very cleanly and left little tin ore in the lodes. Baumann estimated that as much as 18 000 tons of ore, corresponding to about 1000 tons of tin, were taken out of the old mines.

Baumann[6] and, more recently, Oxley Oxland and White[26] have given us a good idea of the mining technology used in the old Rooiberg mines, but a number of questions remain unanswered.

When were these ancient workings started? Who were the people who did the mining and smelting there? How did they learn to prospect for an ore that is not as conspicuous or as eye-catching as copper or iron ores? Why did they mine and extract tin ore? What techniques did they use? What did they do with all the tin they produced? Did the Rooiberg smiths know the art of bronze-making?

Not much archaeological and archaeo-metallurgical work has been done to solve these interesting problems. However, the Archaeological Research Unit of the University of the Witwatersrand is conducting research on the Rooiberg mining complex, and it is hoped that these investigations will increase our knowledge of tin mining in the Iron Age.

Gold mining

The earliest information on gold mining in the Transvaal comes from a report by Bronkhorst, a Voortrekker who accompanied a reconnaissance party (the Potgieter Commissie) on their journey to the northern Transvaal in 1836. Bronkhorst's report[27] records: 'The people also showed us a mine from which they extract gold and make rings which I have seen: we have also brought some of the ore with us: this mine is just opposite the camp of Louis Trichard on the Zoutpansberg'. The mine mentioned by Bronkhorst may have been a small working in one of the outcrops of gold-bearing ore found at many places in the Transvaal.

A number of so-called ancient gold mines are mentioned in the reports of South African geologists, mining engineers, and archaeologists. Table II records the names

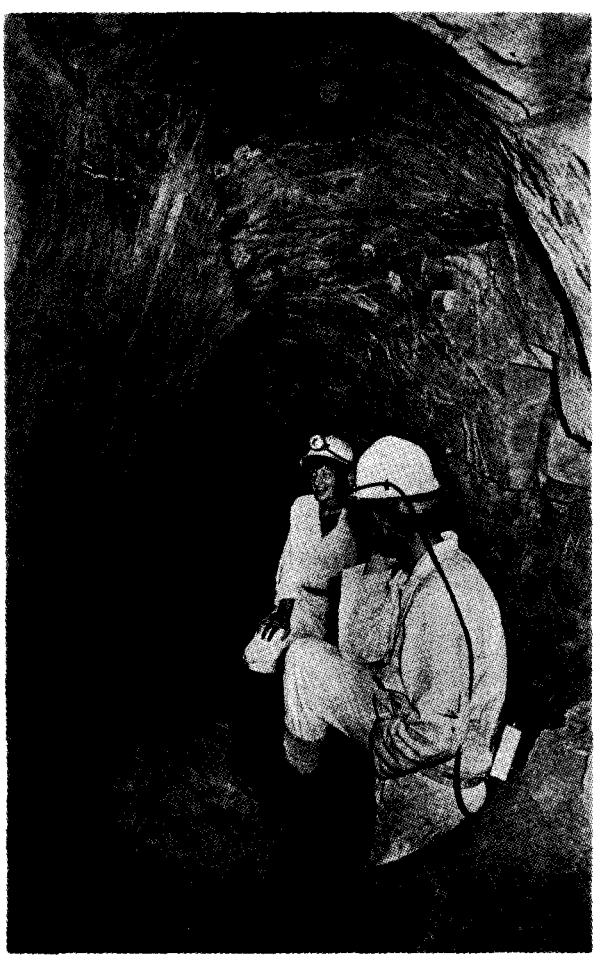

Fig. 3—Inclined shaft in ancient Rooiberg tin mine (H lode) Photograph: D. Vermeulen

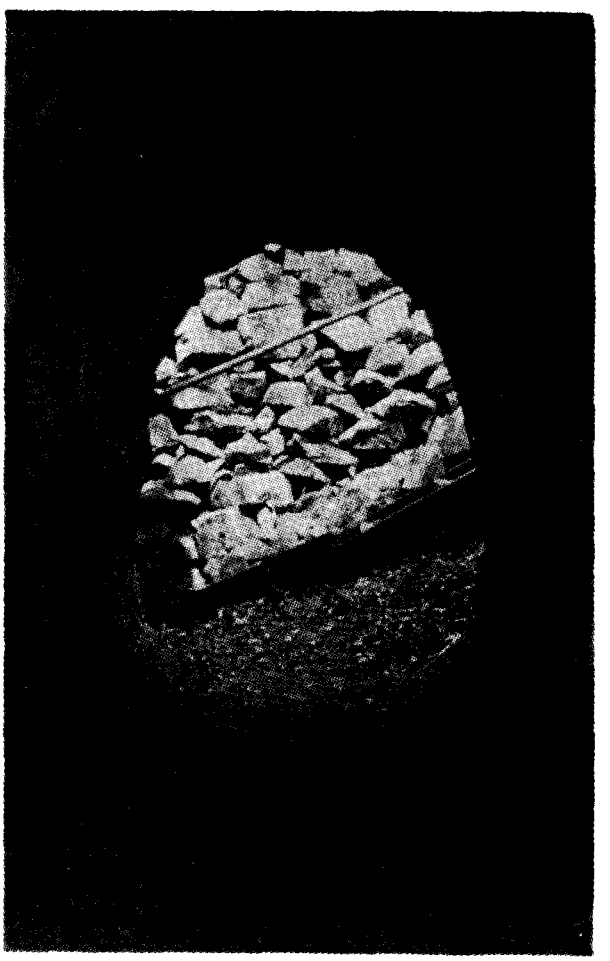

Fig. 4—Entrance to adit in ancient Rooiberg tin mine Photograph: D. Vermeulen

Table II

GOLD WORKINGS IN IRON AGE TRANSVAAL

No. of sample	Site	Position	Type of rock	Assay value	Type of working	Dimensions	Notes on working	Reference
1	Cyferkuil	32 km N. of Brits, W.Tvl		29 dwt/t (in 1 sample)			'Gold found in old working'	28
2	Ruigtepoort (Goudkopji)	66 km N. of Brits, W.Tvl						28
3	Honingkloof 112	16 km S. of Roossenekal, E. Tvl	Outcrop of quartz reef	Visible gold in places, values erratic	Trench	Trench 15 m downwards, several hundred metres long	'rich sections worked out'	29
4	Weltevreden 215	Near Waterval-Onder, E. Tvl	Outcrop of huge vertical reef	Good values in quartz rubble alongside trench	Sections of reef trenched out	Depth 3 m, length ≈ 900 m along outcrop		29
5	Doornpoort	20 km W. of Roossenekal, E. Tvl	Schist-like outcrop	18 dwt/t	Horizontal tunnel	Tunnel about 12 m long; 6 m below surface, 1,2 m high, 0,6 m wide	'narrow pillar of ore rock left to support roof of tunnel'	30
6	Elandsfontein 167	N. of Pilgrims Rest, E. Tvl	Reef carrying gold and copper				'considerable ancient workings'	29
7	Pilgrims Rest area	E. Tvl	Theta Reef bedded veins				'large old workings', rich finds of alluvial gold in area	29, 17

and some details for seven suchworkings. All contain gold in smaller or larger quantities, but, as Wagner[28] comments on two of these mines (Table II, nos. 1 and 2), 'natives did not necessarily work for gold [there]'.

The remains of three mines discovered in the Middleburg and Carolina areas (Table II, nos. 3, 4, and 5) are either open-cast trenches or tunnels driven horizontally into the rock. These workings are fairly large and indicate that those responsible for them had a considerable knowledge of mining techniques, but not one of them can be described with certainty as a gold mine. Since ores containing both copper and gold are found at many places in the Transvaal, these workings could have been concerned with copper. Schoefield[31] comments in this connection that 'at an old gold mine south of Pietersburg phenomenally rich outcrops of gold have been left untouched as though the old workers were ignorant or indifferent to them'.

Old workings have also been discovered in the hills of the eastern Transvaal, especially in the Lydenburg–Pilgrims Rest–Sabie region and in the De Kaap fields further south (Table II, nos. 6 and 7). European prospectors around 1875 found a considerable amount of gold in these goldfields, and it is unlikely that gold nuggets and gold sand lying in the creeks and stream beds, and visible gold in the rock outcrops, had escaped the attention of the Iron Age people living there. The gold that they had collected or mined in the hills they may have brought to the trading post established at various times during the 18th century by Portuguese, Dutch, and Austrian companies at Delagoa Bay, about 200 km away. The records of the Dutch East India Company, which traded there between 1721 and 1730, give some information on the gold trade. The records[32] mention trade in quantities as small as 60 g or 'a little gold dust' or 'gold a few pound worth'. Small expeditions sent out to reconnoitre the way to the goldfields of the interior, and to find out what quantities of gold occurred there and how the ore was obtained, were repulsed by unfriendly tribes and did not bring back any information — not even whether the gold brought to the trading post came from the mountains to the west (the present eastern Transvaal) or from the east coast further up north or from the fabulous land of Monomotapa beyond the Limpopo. Since, as recorded by Coetzee[33], the discovery of the goldfields was the first and only reason for the establishment of the trading post, and the personnel manning the post had failed to locate the goldfields, the Dutch East India Company abandoned its post at Delagoa Bay in 1730.

The evidence available at present does not allow any statement on the extent, or even the existence, of prehistoric (Iron Age) gold mining in the interior of the Transvaal, but some small-scale gold mining, gold collecting, and gold trading may have been carried out occasionally in the eastern and northern regions of the Transvaal.

Technology of Pre-European Mining

There is not much difference in the ways mining operations were conducted for the various types of ore (iron, copper, tin) in different parts of the Transvaal. Generally, surface outcrops were cleared first, and then trenches were dug. Pits were carried down to depths of from 4 to 15 m. The lodes or reefs were followed in trenches or underground drives, sometimes branching off into short tunnels. In the larger copper and tin mines, vertical and inclined shafts were sunk to considerable depths, but not deeper than 25 m when water, bad ventilation, or transportation difficulties stopped further work.

Hall[3] makes an interesting comment on copper mining:

> there are two distinct types [of workings] conveniently referred to as potholes and reefworkings. The slopes of Loolekop [Phalaborwa] are riddled with potholes, some still about 6 m deep and 12 m wide . . . excavated in a very primitive and crude manner. Reefworkings, totally distinct from potholes, are very well defined parallel trench-like workings . . . . [Their] most remarkable feature is the very regular method of mining, well defined pillars having been left supporting the hanging and foot wall.

Adits (horizontal passages) driven into hillsides were less frequently used, but there are some reports [6, 15, 25] of such passages at Rooiberg, Phalaborwa, and Dwarsberg.

The iron mines were generally less elaborate. Outcrops of iron ore were widespread, and it appears that the Iron Age miners often extracted low-grade ores, which European miners would have regarded as unsuitable or unprofitable. Ore was often scooped from the surface or from shallow pits and, when one ore deposit was exhausted, another was easily found. Few traces are left of such workings since grass and bush have covered them. However, some sites had larger and richer deposits of iron ore, where the ore was mined in a more elaborate way, e.g. at the iron mountains that were mentioned earlier.

The methods of breaking the ore were similar in all the Iron Age mines of the Transvaal — the miner either used a hammer and chisel or, less frequently, he broke the rock by fire-setting and quenching. The chisels and gads found in some of the old mines were made of iron, mostly carburized and cold-hammered to give them greater strength. The miners used hammerstones for driving their chisels into the rock. The hammer stones, made from dolerite, quartzite, or diabase, were roughly spherical to fit the shape of the hand, and weigh about 600 to 1400 g. Many of these handless hammers show one or more dimple marks on the surfaces where the hammer had struck the head of the chisel (Fig. 5). In fire-setting[6] (a method that was still used in Europe until only a hundred years ago), a fire was lit in front of the rock face, and water was poured onto the rock until it fractured and cracked, when pieces could be chipped away.

The most serious problems in Iron Age mining were probably posed by ventilation and illumination. In some of the old workings in the Transvaal (Rooiberg, Phalaborwa, and the Dwarsberg), and also in Zimbabwe, narrow shafts, only 30 to 40 cm wide but sometimes more than 10 m deep, have been found[6, 7, 15, 25]. Such shafts could have served as vents (especially when fire-setting was used) to create an up-draught, drawing clean air down the wider access shaft. However, it is difficult to understand how such narrow shafts were sunk. The use of artificial lighting in pre-European underground workings is mentioned in some reports.

The Musina miners are said to have worked by the light of candles made from the leaves of euphorbia trees or the pods of cassia bushes[13].

The journey up and down the slopes and shafts, and the lifting of the broken ore from the working level to the surface, must have been a difficult task. Crude ladders have been found in some mines — just tree trunks with the stumps of the cut-off branches left as a foothold. The Musina miners are said to have travelled up and down in big baskets tied to long leather cords, but there are also reports that they used ladders of thongs with wooden rungs[13].

The broken ore was brought up in various types of containers: leather bags made from the skins of antelopes, baskets woven from palm ribs and reinforced with leather, or small wooden buckets[13, 25].

Work in the deeper mines, where conditions were awkward and the available equipment was rather primitive, must certainly have been unpleasant and dangerous. It is to the credit of the Iron Age miners that they worked efficiently and cleanly under difficult conditions, and brought out large tonnages of ore from many of their mines.

The Identity of the Iron Age Miners

In the earlier years of this century, it was generally believed that the 'old mines' of Southern Africa were worked, or at least managed, by foreign people: Sumerians, Phoenicians, Egyptians, Arabs, or Indians. Even nowadays, affinities with one or the other of these people are still suggested. However, there is no convincing evidence of the presence of foreign miners in Southern Africa during the Iron Age. The present consensus of opinion among prehistorians and ethnologists is that the Early Iron Age peoples coming from the north into Southern Africa brought with them a knowledge of mining and smelting. It is likely that later migrations, and trade and other contacts with neighbouring countries, sometimes introduced new technical skills, but it appears that, apart from a few minor innovations, the basic technology of mining in Iron Age South Africa never changed very much.

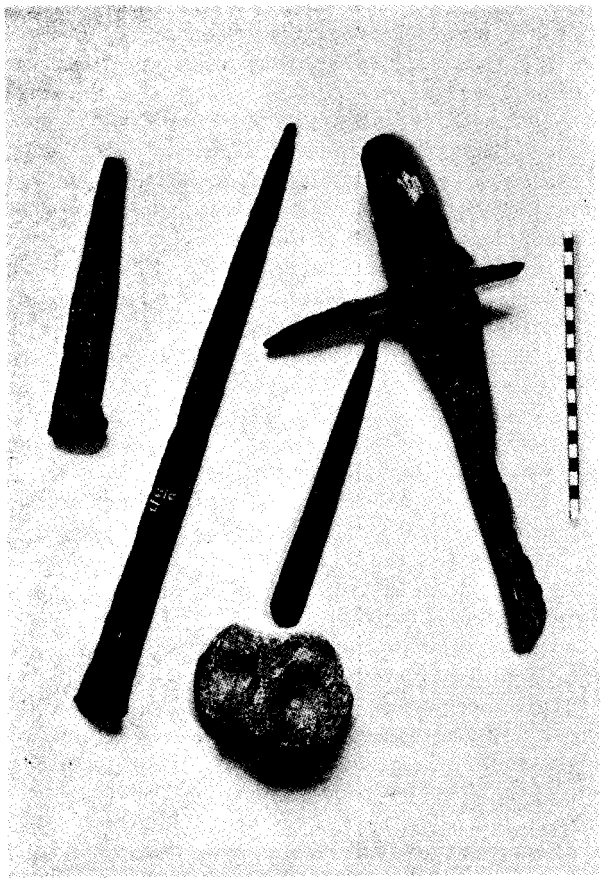

Fig. 5—Iron Age mining tools found in ancient Rooiberg tin mine (stone hammer, chisels, gad, adze). By courtesy of Archaeological Research Unit, University of the Witwatersrand

The Early Iron Age people were probably negroes, but about their tribal histories we know little. Sometimes, as in the Phalaborwa area, the archaeological and ethnological evidence[15] indicates a long continuity in the cultural life of the people mining there. However, smaller or larger groups often migrated to find better pastures or richer ore sources. There are vague traditions that some of the ancestors of the Bantu people who mined and smelted in the northern Transvaal (like the Venda and the Lemba) came from Zimbabwe or the countries round the Great Lakes; others (like the Rhonga and the Phalaborwa people) from the south-east over the Lebombo Mountains[13].

Through the research of Van Warmelo and Mamadi[13] we have much information about the copper miners of Musina. The Musina and Thsope — said to have come from the Phalaborwa region — had a virtual monopoly on mining and copper working in the Messina area. Their wealth and their pride made these clans unpopular with their neighbours, and finally led to their downfall.

Among the Sothos of the western Transvaal, the Hurutshe and the Barolong were famous for their skill in metal-working. The tradition of the Barolong goes back to the 14th century, when their ancestor Morolong, the smith, worked at Mosika (Mosega) in the iron-rich Zeerust area[34].

Another Sotho tribe, the Lete (Ba-ga-malete) had a long and interesting story of migration, which led them through a number of places where they mined and smelted. The tradition of the Lete tells that they lived, at the end of the 16th century, in the hills of Mogodumu (probably near the present Potgietersrus) near a high mountain. 'They dug there for iron on one side of the mountain, while from the other side they obtained red ochre'[35]. Later they migrated southwards and westwards, until in the 18th century they settled in the valley of the Taung River, near the Dwarsberg in the western Transvaal. The Lete chief Mokgosi told in 1881 that his ancestors dug for black iron and also for white iron (probably tin) in quarries[35]. It is remarkable how closely the migration route of the Lete followed the mineral occurrences of the central and western Transvaal, from the iron deposits of the Pietersburg–Potgietersrus area, along the ironstone outcrops of the Pretoria–Magaliesburg–Zwartruggen–Zeerust line, to the mineral-rich regions of the north-eastern Marico district.

Chronology of Mining

The only area for which a satisfactory chronology of

pre-European mining has been established is the Phalaborwa Complex[15]. The radiocarbon dates for samples taken from the mines there cover a time span of nearly a thousand years, from 770 to 1750 AD. Other age determinations[12] for mining sites in the Transvaal give dates for a copper mine at Harmony (about 1260 A.D.) and for a Rooiberg tin mine (about 1515 A.D.).

Mining and metal-working in the Magaliesberg Valley probably goes[16] back to the 5th or 6th century A.D., as already mentioned.

No dates are available for mining at Messina, but, if one considers the ages determined for mines in the eastern Transvaal and Rhodesia, a date in the earlier part of the second millenium A.D. appears to be likely.

Ancient mining in the Transvaal ended at about the middle of the 19th century, probably as a result of the Nguni raids and the unrest of the Difaquane, after which iron, copper, and tin were imported from Europe.

Conclusions

Mining in the Iron Age was limited by the small range of available techniques for shaft sinking and underground workings.

There is much evidence of intensive mining for copper ore at Messina and Phalaborwa and for tin mining at Rooiberg.

Iron-ores were mainly dug from outcrops and open-cast workings. The iron ore found and used for smelting was generally middle to low grade, but some richer ore sources were occasionally exploited, especially in the northern and eastern Transvaal.

There is no evidence of strong foreign influence on the technologies used by the Iron Age people of the Transvaal.

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