

Historical accounts of the Maitland argentiferous galena deposit, Eastern Cape – the first lead discovery in South Africa (1792)

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Abstract. The Maitland prospect is a polymetallic Pb-Ag-Cu-Zn deposit located in the Eastern Cape, some 35 km west of Gqeberha (Port Elizabeth). It consists of quartz-calcite veins with argentiferous galena, together with copper sulphides and sphalerite, hosted by marbles of the Neoproterozoic to Early Palaeozoic Gamtoos Complex. It is of great historical interest as the first known lead prospect in South Africa, and early descriptions of its geology and mineralization are given here. It was first prospected in 1792, by a Major Von Dehn who found rich Pb-Ag ores. It is suggested that the Maitland polymetallic deposit may have been originally discovered and exploited by the indigenous Xhosa clan, the AbaThembu, who manufactured copper-silver ear rings which were described from this area by the Swedes Anders Sparrman and Carl Peter Thunberg in 1772. The Maitland prospect was visited by Englishman John Barrow in 1797, and by the Germans Hinrich Lichtenstein and Baron von Dankelmann in 1803 and 1804 respectively, who had further assays made of the ores in Germany. The economic prospects of the deposit were encouragingly described by Centlivres Chase in 1843. The Maitland Mining Company, formed in 1846, issued £10,000 worth of shares. During the development stage, the Maitland mines were visited from 1845 to 1857 by the road builder Andrew Geddes Bain, the physicians William Atherstone and Richard Rubidge, and the geologist Andrew Wyley. The mining operations were unprofitable, and the mines were closed. Renewed prospecting was carried out from 1924 to 1931, and from 1970 to 1975, without success. In over 200 years of exploration, the Maitland deposit has been repeatedly investigated, but the lack of continuity of the mineralization at depth, and the lack of rich mineralized lodes, has meant that it is completely uneconomic, even for a small-scale mining operation.

Key words: Gamtoos Complex, Early Palaeozoic, Pb-Ag-Cu-Zn veins, uneconomic.

INTRODUCTION

Lead mineralization is almost invariably associated with zinc, and commonly also with copper and silver, in numerous deposits of different ages, and in differing geological settings. The first recorded discovery of lead mineralization in South Africa was in 1792, at a deposit that was subsequently named the Maitland Mine, after the British Governor of the Cape Colony, Sir Peregrine Maitland, who governed from 1843–1846.

Two small open pits, where veins with galena and chalcopyrite had been exploited, were found in the Waterberg District of the Transvaal. Roorda Smit (1882) thought that these had been worked too methodically to have been mined by the local inhabitants for use in cosmetics, and he suggested (without any evidence) that they may have been mined by the Portuguese in the 16th or 17th centuries. In 1893 galena was discovered in Transvaal Supergroup dolomites of the Campbell Rand Group in the Griqualand West region of the Northern Cape Province (Bain, 1893). Subsequently, lead and zinc was produced from mines such as Pering and Bushy Park, in Griqualand West, and smaller occurrences such as in the Malmani Dolomites (Hammerbeck, 1976). Today the largest lead producers in South Africa are the Proterozoic polymetallic massive sulphide

deposits of Black Mountain, near Aggenys, and Gamsberg, in the Bushmanland region of the Northern Cape Province (Snodgrass, 1986; VZI, 2020).

The “Maitland Mine” is a series of small workings situated at 33°57'43" South, 25°17'6" East, some 35 km west of Gqeberha (formerly called Port Elizabeth, in Delagoa Bay), in the Eastern Cape Province of South Africa. These workings were for lead ore, and contained argentiferous galena, together with sphalerite and chalcopyrite, which occurred in veins cutting carbonate host rocks, which were folded into a simple syncline. The deposit is located within rocks of the Kaan Calcareous Formation of the Gamtoos Group (Willebees, 1984; Hill and Nolte, 1989), which is part of a complex horst block of pre-Cape Supergroup rocks, called the Gamtoos Complex (Shone et al., 1990).

The Maitland deposit is the southernmost occurrence of Pb-(Cu-Zn-Ag) mineralization hosted by Neoproterozoic to Early Paleozoic carbonate rocks in the “Pan-African” Belts of Africa. Similar deposits are known from: the West Congolian Belt in Gabon, Republic of Congo, D.R. Congo and Angola; the Otavi Mountainland of the Damara Belt, Namibia; and in the Gariep Belt of SW Namibia and South Africa (De Kun, 1965).

Ever since its discovery, the Maitland lead deposit has been the subject of many research studies, much prospecting, and trial mining attempts – right through to the 1970s. It just did not have the continuity of grades, or sufficient resources, to ever become economic to mine, and although trial mining took place in the mid-19th century, it never returned a profit. Hence, even though it has been called the Maitland “Mine”, it should strictly be termed the Maitland Prospect.

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HISTORICAL DESCRIPTIONS OF THE MAITLAND PROSPECT

John Barrow (1801)

In August 1797, John Barrow (Fig. 1), who was secretary to the Earl of Macartney, Governor of the Colony of the Cape of Good Hope, visited the eastern part of the Colony, including the lead deposit in the van Staden's valley, which he showed on the map of the Cape Colony that was published by him (Figs. 2 and 3; see also Liebenberg, 2021). In the account of his travels at the Cape, Barrow (1801) gives the following:

"About twenty miles to the westward of Zwartkop's bay commences another wide, open, unsheltered indent in the coast called Camtoos bay, into which fall the Krommé river, the Camtoos river, Van Staden's river, and several other inferior streams. At the mouth of the Krommé river two or three ships may ride anchor in tolerable good shelter from north winds except at the south-east. The country that surrounds this large bay is covered with thick brushwood, and in places with clumps of forest-trees. Near the mouth of Van Staden's river we found, in the steep sides of a deep glen, several specimens of lead ore. It was of that species known by the name of galena, which is lead mineralized with sulphur. The masses had no appearance of cubic chrySTALLIZATION, but were granular and amorphous in some specimens, and the surfaces in others were made up of small facets. This sort of galena is sometimes called by miners *white silver ore*, on account of the large proportion it has been found to contain of that metal. It is well known that all galenas contain more or less of silver; and it has been observed that those whose configuration is least distinct have the greatest proportion, the heterogeneous metal having disturbed and obstructed the natural arrangement of the particles, which would be that of a mathematical cube if perfectly pure. The vein of the ore was about three

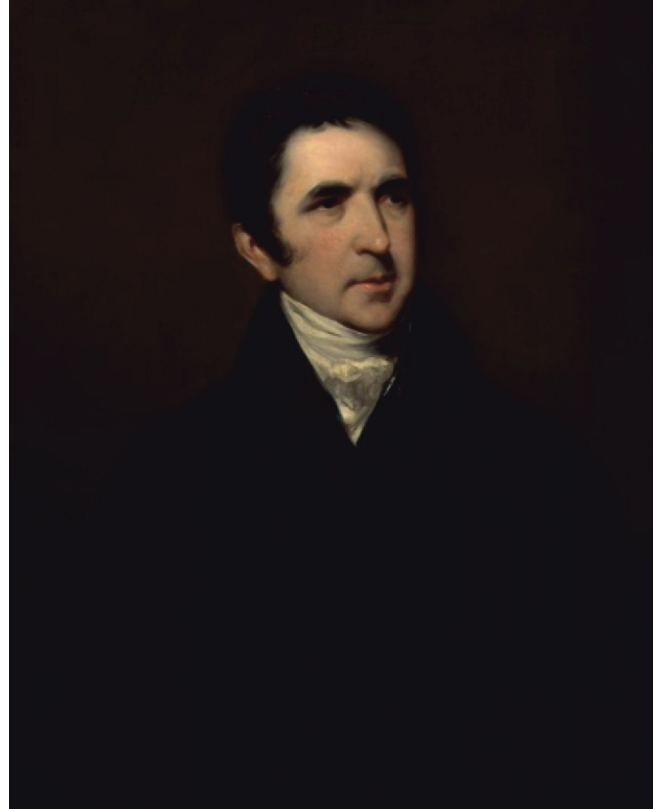


Fig. 1. Sir John Barrow, 1st Baronet (1764–1848)

Painting by John Jackson, in the collection of the National Portrait Gallery, London



Fig. 2. Map of the Colony of Cape of Good Hope (from Barrow, 1801)



Fig. 3. Detail from Barrow's (1801) Map of the Colony of Cape of Good Hope, showing the position of "Leadmine" (to the south-west of "Krankamma"), which was later named the Maitland Lead Mine

inches wide and an inch thick, and it appeared to increase both in width and thickness as it advanced under the stratum of rock with which it was covered. The *gangue* or *matrix* was of quartzose sand-stone of a yellowish tinge, cellular and fibrous, harsh to the feel and easily broken.

Some experiments were formerly made, in a rough way, at the Cape of Good Hope, upon specimens of this identical vein of lead-ore by Major Von Dhen [sic; Dehn], an officer in the Dutch service, and the result of these proved it to be uncommonly rich in silver. According to this gentleman's statement of the assay, two hundred pounds of the ore contained one hundred pounds of pure lead and eight ounces of silver. Should this on a more accurate trial turn out to be the case, it may hereafter prove a valuable acquisition to the colony. Lead mines, it is true, are generally very deep below the surface of the ground, and the working of them is both troublesome and expensive. But at this place, a vein of rich ore, shewing itself at the surface, gives reasonable grounds for presuming that the large body of this mine is at no great depth, and if so it might be worked with great advantage. The surrounding country is particularly favorable for the prosecution of such an undertaking. Wood is in such abundance both for building and for fuel, that it could not be exhausted in age. Two streams of water unite in the bottom of the glen. The country would support with cattle and corn any number of people that might be required to carry on the works; and the distance of the mine is only five miles from the mouth of Van Staden's river in Camtoos bay" Barrow (1801: 141–143)

Martin Hinrich Lichtenstein (1812)

Martin Hinrich Lichtenstein (1780–1857; Fig. 4) was a German medical doctor and naturalist, who came to the Cape in 1802 in order to act as a personal physician to the Dutch Governor, Jan Willem Janssens (1762–1838), and as a tutor for his



Fig. 4. Portrait of Hinrich Lichtenstein (from Lichtenstein, 1811–1812)

son (Lichtenstein, 1811). In 1803 he embarked a long tour of the northern and eastern districts of the Cape Colony, accompanied by the Commissary-General Jacob de Mist and his young daughter, 18-year old Augusta de Mist. By early January they arrived in Algoa Bay, in the vicinity of which was situated the lead mine, which was visited by Lichtenstein and a few others from the party (Lichtenstein, 1812).

“Young de Mist, however, my friend Winters, and myself, determined to stay behind, and make an excursion to the celebrated lead mine, two hours distance from this place on Van Stade’s river. We followed the course of the river upwards, and came to the farm of a certain Christian Vogel, which had been destroyed...., and was now uninhabited: near this place lay the object which had occasioned our journey. An old slave who lived in the ruins, taking care of the owner’s cattle, said, that we had only to go towards the hill, and we should soon see the shining earth. We had some trouble, however, to discover it, since the rain had brought down such a quantity of sand that the spaces were all filled up. After having searched some time in vain, we succeeded at last, and in turning up a stone, we found some fine pieces of lead-ore, which we charged the old man to keep for us carefully, as we intended to carry them away with us. The whole side of this hill, up to a considerable height, consists entirely of the same shining stone that forms the bed of the Silver-river, and in this the lead-ore is enclosed. The vein seems almost perpendicular, stretching from the north-west to the south-east. According to the researches of Major Von Dehn, in the year 1792, a hundred weight of earth contains between fifty and sixty pounds of pure lead, and about fifteen pounds of base-silver. Some which I brought home with me was examined by the chief physician Klaproth, at Berlin, when he found in a hundred parts fifty three of lead, thirteen of sulphur, and a small quantity of silver, scarcely worth mentioning. My friend, Baron Dankelmann, who visited the country a few months after me, by command of General Janssens, and examined the earth very accurately, found nearly the same result as Major Von Dehn. Further information from him upon the subject may be expected by mineralogists. In his official report to the government, he submitted to their consideration proposals for working this mine, as it promises, particularly in the first years, to yield abundantly; but after an accurate calculation of the cost, it was found, that notwithstanding every thing that was placed in the most favourable point of view, yet from the high price of labour, from the difficulty of land-carriage, and from the dangers of the coasting trade, the lead could scarcely be sold at so low a price in Cape Town as that brought from Europe. The mine then must rest till a new day dawns upon the cultivation of this quarter of the globe – till the time arrives when an increasing population shall, with their necessities, increase their industry” Lichtenstein (1812, 1: 283–284).

The Major von Dehn who had assayed the lead ores, mentioned by Lichtenstein (1812), and also by Barrow (1801; who had misspelled his name as “Dhen”), was attached to the Wurttemberg Cape Regiment. This regiment, of about 2000 soldiers, had been seconded to the Dutch East India Company by the Duke Charles Eugene of Wurttemberg, and arrived in 1787 (Spohr, 1974). By 1791, most had been sent on to the East Indies, with only a few staying behind at the Cape, among which were educated men like Dr Friedrich Ludwig Liesching and Major Von Dehn who also collected botanical and geological specimens (Prinz, 1932). Nothing is known about the circumstances leading to Major Von Dehn’s discovery of the lead ore samples, nor is anything known about where they had been analysed. The “chief physician Klaproth” was Martin Heinrich Klaproth (1743–1817) in Berlin, who had been one the pioneers

of mineral chemistry, and who had described other minerals from the Cape that had been brought by Lichtenstein, including crocidolite and pseudocrocidolite (Master, 2018).

Baron von Dankelmann was a skilful pupil at the renowned Bergakademie (Mining School) in Freiberg, which at that time was under the direction of its famous founder, Abraham Gottlob Werner (1749–1817). Through his zeal in mineralogy, von Dankelmann entered the service of the Dutch East India Company. After a four-month stay in Batavia, he returned to Europe in 1804 via the Cape of Good Hope. The main object of his visit was the mineralogical exploration of the interior of the Dutch colonies, especially the copper ores there (Bertuch, 1806). While he was at the Cape, he was instructed by Governor Janssens to visit the lead mines near Van Staden’s River.

John Centlivres Chase (1843)

John Centlivres Chase (1795–1877; Fig. 5) was born in England and came to South Africa in 1820 as one of the 1820 settlers, settling in Algoa Bay. He was elected a board member of the South African Literary and Scientific Institution, and was its joint secretary from 1835 to 1838 (Plug, 2020a). He was also a cartographer involved with early mapping of the Eastern Cape (Liebenberg, 2007). The following description of the lead deposits near the mouth of Van Staden’s River by Chase in his 1843 book *The Cape of Good Hope and the Eastern Province of Algoa Bay* may have stimulated investors to put money into opening a mine there:



Fig. 5. Portrait of John Centlivres Chase (from McLelland, 2017)

"It appears from Barrow that upwards of thirty years ago this valuable mineral was discovered about twenty miles westward of Algoa Bay, near the mouth of Van Staden's River. According to Major Von Dhen [sic] the assay was favourable; 200 lbs. of ore containing 100 lbs. of pure lead, and eight ounces of silver. A rich vein being found unusually near the surface, gives reasonable grounds for supposing that a large body of the mine may not lie at any great depth, and if so, would be worked advantageously. The surrounding country is particularly favourable for the prosecution of such an undertaking; which is abundant both for building and fuel. Two streams unite in the glen; the country would support, with cattle and corn, any number of people that might be required to carry on the works, and the distance of the mine is only five miles from the mouth of Van Staden's River, in Camtoos Bay. England is rich in lead, and imports none. From the colonies the duty is only 5s. per ton, and, therefore, it would first serve as ballast, and still render a profit if a rich load" Chase (1843, p. 319).

M. Harries (1846)

On Friday 16th January 1846 the *Cape of Good Hope and Port Natal Shipping and Mercantile Gazette* carried an announcement in its leader columns for the establishment of the Maitland Mining Company, for the mining of the Maitland Mines which name was given to the lead workings near the Van Staden's River, in honour of Sir Peregrine Maitland (1777–1854), who was the Governor of the Cape in 1844–1847.

Prospectus of the Maitland Mining Company
Maitland Mining Company:

Capital £10,000 in 200 Shares of £50.0.0 each.

Provisional Committee of Management:

Smith Esq. – Chairman

Messrs. Andrews, Bevan, Fleming, Harries, D. Phillips

Andrews, Esq. – Treasurer.

Eastern Province Bank – Bankers.

This Company has been formed with a view of working the valuable MAITLAND MINES in a more efficient manner than could be accomplished by a private individual.

The Committee has made arrangements with the present proprietor, Mr. Bevan, for taking over his purchase at prime cost, he receiving a bonus in shares only.

The Estate is 6000 acres in extent and the purchase money will amount to £ 1600, being its value considered only with reference to its capabilities as a farm.

The Mine, which is situated at a distance of about 20 miles from Port Elizabeth by a good level road, was first favorably noticed by the intelligent traveller, Barrow, and an assay of some of the Ore was made with a very encouraging result by Major Van Dehn, at the instance of the Dutch Government, but the Mineral Treasures which this tract of country contains were never fully or satisfactorily ascertained, until it came into the hands of the present proprietor.

Extensive veins, cropping out in various spots on the surface afford certain indications of a rich bed of metal beneath, and an experienced geologist has pronounced a decided opinion as to the vast extent of the metalliferous limestone Formation.

Specimens of the Lead and Copper are undressed and unwashed, extracted in both instances nearly from the surface have been sent to England – the result of the assay of the first gave 60 per cent of Lead, and 26 oz. 5 dwt. of Silver in the ton of Lead, and 12 oz. to the ton being the average of the mines in the North of England. The Specimens of Copper, which are very in-

ferior to those since obtained, yielded 2¹/₂%, that however, being higher by one per cent than the produce of the celebrated Swedish mines of Fahlun. An offer of £11.10. 0 per ton was made for the Lead Ore. The Committee entertain no doubt that the ore extracted at a greater depth will be found to be much richer in quality.

The facilities for working the Maitland Mines cannot be surpassed. The character of the ground is so undulating, and the ore lies at such an elevation on the very surface, the adits [a horizontal passage leading into a mine for the purposes of access or drainage] can be opened at a depth of 200 feet (one being now in progress) and all the difficulties incident to mining operations from the drainage of water will be obviated without the use of machinery. There is abundance of Fuel & Lime on the spot for smelting purposes, two streams of excellent water unite in the vicinity of the Mine, and the land being of superior quality for pasturage and agriculture, is capable of supporting a dense population.

The Committee does not anticipate that more than £5000 will be required to enable them to work the Mines with every prospect of a lucrative return to the Shareholders and it is calculated that considerable advantages, will be derived from smelting the ore at the Mines and supplying the wants of the Colony, as well as the Mauritius and Eastern Markets with the pure metal.

The Committee proposes to send immediately to England for a gang of practical Miners, and a scientific Superintendent, for whom they hope to obtain a gratuitous passage under the Government regulations.

A deposit of £1. 0. 0. per share will be required immediately, and an instalment of £5.0.0. per share on signing the Trust Deed. Due notice will be given of all future calls.

Applications for the unappropriated Shares will be received by letters (prepaid) addressed to the Hon. Secretary until the 31st Inst. at whose office Specimens and Analyses may be seen. M. Harries, Hon. Secretary, Port Elizabeth, 7th January 1846.

Andrew Geddes Bain (1856, 1847b, Anon [Bain] 1858)

Andrew Geddes Bain (1797–1864; Fig. 6) was a road builder and self-taught geologist, who is widely regarded as the "Father of South African geology" (Rogers, 1937; Haughton, 1944), based on a paper he published in the *Transactions of the Geological Society*, accompanied by a geological map, and descriptions of fossils he had collected (Bain, 1852). In 1845 he was awarded the Wollaston Fund by the Geological Society of London for his efforts in obtaining fossils from the Eastern Cape Karoo rocks. He made a trip to Van Staden's River, and the Maitland Mine, in the company of Dr Guybon Atherstone, most likely in 1845 (Bain, 1856, 1898, p. 70). He gave a lecture on "The Geology of South Africa" to the General Institute in Graham's Town, which was published in two parts in the first volume of the Eastern Province Monthly Magazine (Bain, 1857a, b). Bain (1857b) mentions the rocks hosting the Maitland Mine, which he thought were Carboniferous in age:

"CARBONIFEROUS SYSTEM. – This system differs little, lithologically, from the quartzose sandstone of the Silurian ranges of the western parts of the colony (except that the Carboniferous rocks have no inbedded pebbles). The quartzose sandstone, which is the general characteristic of this system, passes into chloritic schist at the De Stade's and Van Staden's Rivers, where mines of galena and copper have been for some time worked but, I fear, not very profitably" Bain (1857b, p. 456).



Fig. 6. Andrew Geddes Bain
(from https://en.wikipedia.org/wiki/Andrew_Geddes_Bain)

The following year, an article was published anonymously in *The Eastern Province Monthly Magazine*, on “Economic Geology of the Colony”, but was actually written by Andrew Geddes Bain (1858). He briefly mentioned the Maitland Pb-Cu deposits as follows:

“The lead and copper ores of the Maitland Mines are found in veins of carbonate of lime and quartz, lying parallel with the strata of the chlorite schist and crystalline limestone. In some spots where the rock had undergone decomposition freely, masses of rich copper and lead ores were found; but on tracing these down into the hard matrix, they were soon lost in threads. I think that more extended research might be made in this neighborhood with some prospect of success, provided the true nature of the veins was born in mind, and the works abandoned when they ceased to be profitable” Anon [Bain] (1858: 376–377).

Dr William Guybon Atherstone (1849, 1857a)

Dr William Guybon Atherstone (1814–1898; Fig. 7) was born in England and came to South Africa as an 1820 settler, residing in Grahamstown since 1828 (Plug, 2020b). He was the best known physician in the Eastern Cape, and was also well known for his geological and palaeontological researches. On behalf of the Cape Parliament he studied the copper deposits of Namaqualand (Atherstone, 1857b), investigated reports of gold in the Gough, and reported on coal in the Stormberg, and on the Millwood goldfield. Although he first visited the Maitland

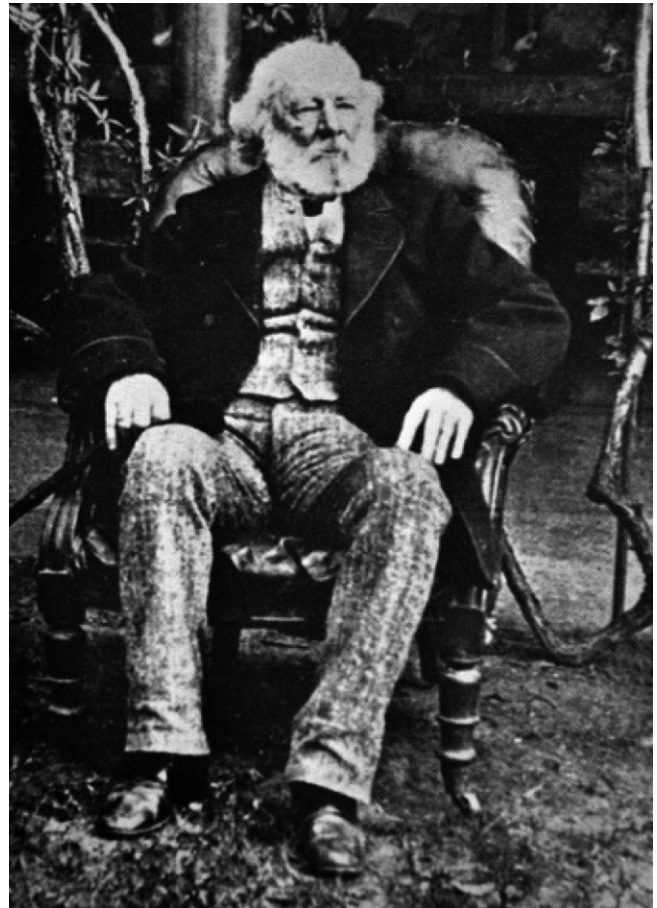


Fig. 7. William Guybon Atherstone
(from https://en.wikipedia.org/wiki/William_Guybon_Atherstone#/media/File:William_Guybon_Atherstone.jpg)

Mine in 1845 (with Andrew Geddes Bain), his only detailed account of the deposit was given in his diary for 1849, and published by Mathie (1998):

“Trip to Zuurberg, Zwartkops and Maitland Mines — 26th March to 7th April 1849.

Monday 2nd April, 1849.

Had some tea, and eggs, and water, at Coega, where I learned that Bevan had gone to Maitland mines, so I determined to follow him and started at ten past three for Uitenhage which I reached at half past four. Robb Penhay, formerly Director of Dartmoor Mines in Australia, says that the Maitland Mines lie in the New Red and white sandstones. The lode is running in a bituminous marl stone, one of the series of the New Red Sandstone!!! (N.R.S.). Robb Penhay thinks it will become the Cornwall of South Africa! There are two distinct lodes, one of lead runs nearly N.E. and S.W. The second or Champion masterly copper lode, runs nearly N.W. by S.E.!!!; of such a nature with three distinct qualities of ore, the blue carbonate, green carbonate and yellow sulphuret- this lode is about six feet in width with a regular dip at an angle of seventy degrees. He expects after a few fathoms of depth a change of strata will take place in the rocks of killow or primary mica slate. He has traced the lode four hundred yards. He believes the different ores are colored by Carbon and Sulphurous vapours, exhalations from beds of copper beneath. What an imposter!

Started from Uitenhage at twenty past four. The Zwartkops hill is purple Lias (calcareous) capped with conglomerate. At five passed on the right of a hill of Quartzite dipping at a high an-

gle apparently, in the road. This continued till twenty five past five, when the strike was W. by N. and the dip S.W. It had here the appearance of slate near porphyry [sic]. After passing the mountain, took the left hand road – it got dark, but I fortunately stumbled on the right road and after travelling two hours, I saw a light to the right deep down in a kloof and another on the left. After some consideration the balance being in favour of the left hand light, it being not so deep down, I took it and found Bevan and his companions here. The house is a fine large spacious house, well papered. The men being in the drawing room was a sign of English Comfort, the Illustrated News and the English paper were lying about etc. The widow Rens and her daughter reside here in the house, where Bevan resided when I last visited the mines, four years ago. Bevan gave the farm for one of the mines, as he could not afford to pay for both.

3rd April started off at six thirty, the dip of the sandstone in the drift is forty eight degrees S.W. At the mouth of the van Staden's River there are porphyritic rocks which have all the appearance of stratified rocks with an apparent dip, (bedding or angle of cleavage) of thirty five degrees S.W.? In some parts it resembles chlorite and slate. There are large pebbles of quartz, hornstone hornblende, entic (cubic) pyrites (iron) – in some parts this porphyry [sic] resembles sientite (?) [sic] or granite – with large imbedded pebbles of quartz colored in places with chlorite. There is no doubt this is the upheaving rock in this part.

The rocks at the adit of the copper mines, (Bevan's) dip thirty eight degrees S. and by W. They are separated at intervals by squats of lead; one lump seventy eight pounds, others fifty pounds each. On the other side of the valley, where the old lead mines are in the adit, the dip is twenty five degrees – to the N. The rocks are greyish calcareous rock above, with a talcose schist below. Harris's party are working through a lateose [sic] schist. The line of their adit is S.S.W. and N.N.E., the rocks are very wavy and dip at all angles of about fifty degrees.

Penhey appears to follow the quartzite veins. I saw no indication of metal except the residue and chlorite and a small sign of lead, Penhey had worked in the other places also following the quartzite vein. Mr Copeman tells me there is a conglomerate three hundred feet thick from Uitenhage along the bed of the Zwartkops. An half an hour beyond the hut of Scheepers, the source of the Zwartkops is about twenty miles above Uitenhage. Apparently, the conglomerate is cemented with red earth and continues for three or four miles" Diary entry of Dr William Guybon Atherstone (1849), in Mathie (1998).

Atherstone (1857a)

Atherstone (1857a) also wrote on the Maitland Mine in his report on the geology of Uitenhage (which was officially renamed Kariega in 2024), published in the Eastern Province Monthly Magazine in Grahamstown:

"Above the quartzose and micaceous sandstones and chloritic schists at the Maitland mines, and also along the "Loorie" river to Hankey, and still further on in the Gamtoos river, a dark grey fine grained magnesian limestone is found... It is in this limestone that the argentiferous Galena and copper are found at the Maitland mines. ... I met with the same limestone at the Congo, the celebrated caves being formed in this rock, and was informed that it is also found in the Kamuanassie. ... Above this limestone in some places, as at the Maitland mines, van Staden's River and the Loorie River, there is a hard coarse sandstone with quartz pebbles, which makes excellent millstones,- all the mills in the neighbourhood being supplied with stones from this "millstone grit". Below the magnesian limestone lie conformably quartzose sandstones and micaceous shales and schists". Atherstone (1857a: 585–586).

Andrew Wyley (1856)

Andrew Wyley (1820–1885) was an Irish geologist and botanist, working for the Irish Geological Survey, who was brought to the Cape Colony to work as the first government geologist of the colony (Rogers, 1937; Plug, 2020c). He produced a number of reports on the copper mines and plants of Namaqualand, on the Stormberg coals, and on gold deposits. Wyley (1856) produced a Parliamentary Report on the Maitland lead deposit (discussed further by Rogers, 1937), and found that there had been a considerable amount of underground exploration without any apparent measure of success:

"The Maitland Mines are situated about 20 miles from Port Elizabeth, in a direction nearly west by south, on both sides of the De Stade's or De Staden's River, and about 2 miles from its mouth. The Van Staden's River discharges into the sea about 8 miles further west, and the Gamtoos River about double that distance in the same direction.

The only places where the rocks are seen, besides in the workings, are in the river bed, and in some few places on the high banks above, and for a short space upon the sea-coast.

On examining the rocks near Captain Mallor's house, it will be seen that the beds on both sides of the river dip towards each other, thus forming a small synclinal trough or basin. The upper beds of this basin, or those seen on the hill where the old Dutch works are situated, are of very variable and indefinite composition.

They are usually micaceous sandstones, all usually calcareous and, in some places, passing into a pretty good limestone, putting on a great variety of appearances, according to the proportion of the ingredients. The rocks thus constituted, are, in some cases, indistinguishable from a fine-grained granite, or elvan, while in others, they put on the look of ordinary gneiss, or mica schist. I have nowhere seen in the colony, rocks so difficult to describe by any known geological appellation. They are neither true sandstones, true mica schist, or true limestone, but form a sort of transition or passage slate from the one to the other.

In what appears to the uppermost beds of these, small "squats", or patches of lead ore have been found – not in a regular lode, or even well defined bed course, but in an interrupted layer between the strata, which are here more calcareous than usual. It was on the slope of the hill opposite Captain Mallor's house that they were first observed, and works were here commenced by the Dutch before the first capture of the Cape, but they were carried only a short way on the surface, and then abandoned. They have, since that, attracted attention at several times. Barrow, and some other observers, have spoken very favourably of them, taking their accounts, although on the ground, from hearsay, as must be the case, when a technical knowledge of these things is wanting; and in the course of time a very exaggerated notion of the richness of the deposit got abroad, and further trials were made.

It so happened that the dip or inclination of the beds corresponded in a great measure to the slope of the hill, thus exposing these small patches of ore at several points, particularly in the roadway and wagon tracks, and thus, though forming in reality only one single layer on the surface, they gave the impression that there were several veins, and that, on sinking into the hill, abundance of ore would be found. A level accordingly has been driven under the hill, and from the river an incline shaft sunk about 30 feet, then a level driven either way on the "vein", and here patches of galena, blende, and brown calcareous spar were found. It is somewhat doubtful whether this is the same band of ore that is worked on the surface a little higher up, or a new layer, some yards deeper in the beds. Be this as it may,

there was nothing fallen in with to warrant further trial on this side. Another level was driven in from the opposite side, next the workmen's cottages for 40 fathoms; but as this level seems to have been entered below the lead-bearing beds, and to have got further and further away from them as it went in, we cannot be much surprised that no ore was found in it. The rock on both these levels was either a hard slaty sandstone or a micaceous schist, or an impure limestone. The larger the amount of calcarious matter, the rock was the more decomposed.

The ore here found is argentiferous galena; the silver, according to analyses by Henry, reaching from $7\frac{1}{2}$ to 12 ounces in the ton. But, even of this quality, in order to prove remunerative, it should occur in a continuous solid vein of an average thickness of five or six inches – whereas, it is only in small elongated nodules, 4–12 inches square and one or two inches thick, and even those, at distant intervals. Nor does there seem to be any prospect of improvement, more ore being found at the commencement than at any subsequent period.

With these facts before us, I think the above workings have been very properly abandoned.

Below the beds in which the lead occurs, are some strong beds of arenaceous limestone, – shewing at the river bend below the old Dutch works, and in a cliff or Krantz on the other side.

...About 200 yards further up the river, where it makes a sudden bend, some irregular veins of quartz are seen in the bed, containing green carbonate and yellow ore. The rock here is peculiar, being a green chloritic schist of somewhat promising appearance, and in the bedding of this, the above quartz veins hold on for a considerable depth, though subject to occasional interruptions. Being first reached by a small cross-cut from the river, and a shaft from above, the quartz veins have been followed about 14 fathoms, by an incline shaft, conforming to the dip of the beds, which is here 37° . All along, it has been found to contain copper pyrites, usually mixed with crystallized iron pyrites, in small veins, seldom more than one inch in thickness. Similar veins occasionally run in the schist alongside.

...The copper pyrites, is reported by the late Professor Johnston, by whom it was analysed, as containing 50 oz. of silver to the ton. This is certainly a very large and unusual percentage; but this argentiferous character seems to be a characteristic of South African copper. Most of the copper ornaments brought from the interior, and manufactured by the natives there, are said to contain a large amount of silver.

But, admitting the richness of the ore, the quantity hitherto found has been miserably small, – a solid vein of copper pyrites, of an average thickness of six feet would be requisite, and it is a question whether that would pay in a country where the labour is so dear and so bad; and as there does not seem to be any great prospect of such a vein being met with, I should not recommend any further expenditure at this place”.

In his concluding remarks, Wyley (1856) stated:

“It does seem strange that these small strings of ore should occur, without some larger mass in the neighbourhood, and such may really exist, ... but admittedly it would be too great a venture for a small proprietary company like the Maitland to go in search of it. A public company, with larger funds at their disposal may go a great deal further than it would be prudent for a few individuals to do. But, even supposing the Maitland mines to be taken up by a large company, with sufficient capital, they might have a long way to go, before finding any such lode, although the chances are somewhat in favour of its existence. And there would be little use of their attempting further trials unless they were prepared to spend a large amount of money upon the chance of ultimate success”.

Wyley (1856) ended his report with a final note stating: “Note – Copies of a Map, illustrative of the Report, have been placed in the Libraries of the Legislative Council and House of Assembly, in the Commercial Exchange and in the Surveyor General's Office”. His map has not as yet been relocated, and it is uncertain whether it merely shows the location of the workings, or whether it also showed details of the underground development.

Andrew Wyley's attribution of some analyses to “the late Professor Johnston” is apparently a reference to Professor James Finlay Weir Johnston, FRS (1796–1855), who had been a Reader in Chemistry and Mineralogy at Durham University (Goodwin, 1892). Presumably Wyley had sent samples of Maitland lead ore for analysis to the well-known Professor Johnston, who was the author of “A Catechism of Agricultural Chemistry and Geology” (Johnstone, 1845), which went through numerous editions in the UK and in America.

Dr Richard Nathaniel Rubidge (1856, 1858)

Dr Richard Nathaniel Rubidge (1820–1869), of Port Elizabeth, was one of the best known medical doctors in the Eastern Cape, together with Dr Atherstone, and like him, also had a great interest in geology and palaeontology, having accompanied Atherstone to the copper mines of Namaqualand (Jones, 1899; Plug, 2020c). Rubidge (1858, 1862) mentioned the Maitland lead deposits, and also discussed the stratigraphic position of the host magnesian limestones. His report on a visit to the Maitland deposit is included in a book by Fleming (1856):

“The geology of Uitenhage is very interesting, and the district appears rich in ores and minerals. Lead is, in many places, apparently close to the surface, and, in others, it has also been discovered. Copper, of a fine description, is largely scattered through the mountains, and has been made, to a considerable extent, the subject of examination, and even speculation, as an article of commerce.

In this Eastern district of Uitenhage, at about thirty miles distance from Port Elizabeth, the “Maitland lead and copper mines” are situated, where these ores were first discovered, some years ago. A mining company was then formed to work them; but, from want of geological knowledge, and competent directors for the miners, they have, as yet, been unproductive. They are not, however, wholly abandoned, and there is a possibility, even now, of the speculation not only succeeding, but realizing a profit. With regards to past efforts, the following statement of these “Maitland mines” was given seven years ago:

In November 1845, a commencement was made with working the old vein of lead, and 10 cwt were sent home to England, to be assayed; the result of which is, that one ton of ore gives 11cwt. 3 qrs. 5 lbs. of lead, and 26 ozs. 5 dwts. of fine silver, being nearly the same proportions given by Major Van Dehn, some fifty years ago. The veins have been followed to the depth of twelve feet; here the ore is twelve inches thick, and much purer than near the surface, and will probably yield seventy or seventy-five percent. The silver is more than double the average of the English ore, which gives only 11 oz. to the ton.

Since commencing the above, a series of veins of lead, and lead and copper combined, in a highly metaliferous [sic] formation, have been discovered; where the indications are even better than at the original mine, from which it is distant about half a mile, and separated by a river. The veins, in this place, cross out on the side of a steep hill, and dip, in an opposite direction, into the other veins, forming what geologists call a fault (quite common in metaliferous formations). Where the strata have been raised in the form of an immense basin, there is every

probability of the veins extending for miles, nearly East and West, as the metaliferous limestone, in which the ore found, can be traced to a considerable distance.

A little of the copper has been analyzed at Cape Town, which gives upwards of thirty per cent of copper, and a little arsenic; but the quantity was small, and cannot therefore be taken for a just estimate. Twenty tons of lead and copper ore have been sent to England to be analyzed. There are also several other metals, which have not been analysed, but they are not yet found in sufficient quantity to become a special object of working.

The Author, whilst at Port Elizabeth in 1854, personally visited these Maitland mines, and can accredit the truth of the above statements. That ore, to a very large extent, exists there can be very little doubt: if it lies too deep, to pay for excavating it, is another question. Not professing, however, any accurate knowledge of such matters, he has pleasure in inserting the opinion respecting these mines of a scientific person fully competent to judge – It is as follows:

The lead ore, in the Maitland mines, is in the form of a sulphuret disseminated, in greater or less means, through a crystallized carbonate of lime, in a layer parallel to the stratification of its matrix, which is a semi-crystalline limestone, lying conformably on the quartzite rock of the country, at an angle (I believe) of about 65°. The Galena (Sulphuret of lead) is found, crossing out on the top of the hill which faces the lodge, and also on the eastern extremity of the same. It was stated, that, on the top of this hill, it was found, when examined, to become richer the deeper the exploration was carried.

From this circumstance, (supposing it to be correct) one would be led to hope that the adit, facing the lodge, would prove highly productive when the lead-bearing spar was reached. Although the fact, that the same layer, examined on the Eastern end of the hill above-mentioned (if it really was the same, a fact which I think of the highest importance to be determined) did not prove rich in that situation, would not lead to favourable augury.

The copper ore is yellow, and variegated sulphuret. It occurs in a vein of quartz, parallel to the stratification of the chlorite schist, a rock dipping nearly the same angle as the limestone, but in an opposite direction.

The quartz vein is traceable for some miles through the country; now, on the top of the hill, then, in the bottom of a deep glen, and again, on the sides of a ravine.

In many of these localities, the pyrites appear in the quartz vein, but no where in very great quantities: nor does it appear that there is any decided increase of richness with the increase of depth. At one spot, viz "Andrew's Shaft", this certainly does appear to be the case, and, it seems to me, that if further examination proves it to be so, that there is a good prospect of ultimate success in the search. If the adit into the lead-hill proves that the ores are richer, when followed to a depth, I shall have better hope of the copper veins.

With regard to the discovery of gold, Sir R. Murchison says, "that gold has never been found in the metallic state, in any quantities where there were not metamorphic rocks lying on granite, with a strike varying but little from North and South in direction". These are what he calls the "constants" of gold. Now there is no granite in the Maitland mines, nor, in fact, any igneous rocks of any kind, and the few rocks which, presenting some traces of the action of heat at depth, may be called metamorphic, have been already sufficiently explored, to make it very improbable that gold may be found, in the metallic state, in that neighborhood.

With regard to the grey sulphuret of copper, in the Western adit, I believe it to be a mere concrete mass of copper ore, aggregated together in the decomposition of the limestone, through which it was originally disseminated in small quantities, as it is now, on the hill facing this adit.

I have heard it stated, that these Maitland mines must be productive, because sulphuret of copper is always found in large quantities. To those who entertain this opinion, I would recommend a reference to Averman's "Practical Mineralogy", p. 40, in which the following passage occurs, relative to this ore of copper, as found in North America; 'There are very few instances in which the ore in these veins will pay for the labour and expense of excavation and transportation.'

I record these few observations, merely for my own satisfaction, to show what my opinions really are, and the ground I have – or fancy I have – for entertaining them. I have not, hitherto, and I do not now conceal that my opinions of the paying qualities of these mines are not favourable, but I shall be most happy to find that I have been mistaken. I believe a very erroneous notion is very relevant, to the effect that men, who take an interest in science, are so tenacious of their opinions, as to wish to support them through right and wrong. I totally disclaim any such feeling for myself, and, I believe, may safely do so for the majority of my brother amateurs in science. I have often had to change, and to modify, opinions on points of science, and would always rather be convinced that I am wrong, than remain in error" R. Rubidge [sic, Rubidge], M.D., Algoa Bay.

The above, as here inserted, was presented to the Author, for use, by the Hon. W. Fleming, of Port Elizabeth, South Africa, to whom his best thanks are due. Fleming (1856: 117–121).

Rubidge (1858)

Dr Rubidge, in an article on the economic geology of the Cape Colony, mentioned the lead and copper workings of the Maitland Mines (Rubidge, 1858):

"The lead and copper ores of the Maitland Mines are found in veins of carbonate of lime and quartz, lying parallel with the strata of the chlorite-schist and crystalline limestone. In some spots where the rock had undergone decomposition freely, masses of rich copper and lead ore were found; but on tracing these down into the hard matrix, they were soon lost in threads. I think that more extended research might be made in this neighbourhood with some prospect of success, provided the true nature of the veins was borne in mind, and the works abandoned when they ceased to be profitable" Rubidge (1858, 376–377).

Edward John Dunn (1844–1937)

The British-born Australian geologist Edward J. Dunn (1844–1937; Fig. 8) spent a number of years, from 1871 to 1886, mapping and examining various prospects in the Cape Colony, at the behest of the Cape government (Plug, 2024). He produced an updated geological map of the Cape Colony (Dunn, 1872), and the first geological maps of South Africa (Dunn, 1875, 1887). Dunn (1873) published a Parliamentary Report on gold prospecting and coal in the Eastern part of the Cape Colony, in which he also mentioned a visit to the Maitland Pb deposit, which he regarded as quite worthless. He was the first to report sphalerite in the ores there, in addition to pyrite, chalcopyrite ("copper pyrite"), and galena. He also reported, for the first time, the occurrence of silver-rich copper ores, running at between 10.7 and 214.3 g/t.

"The mines are in the same condition as when reported on by Mr. Andrew Wyley in 1855.

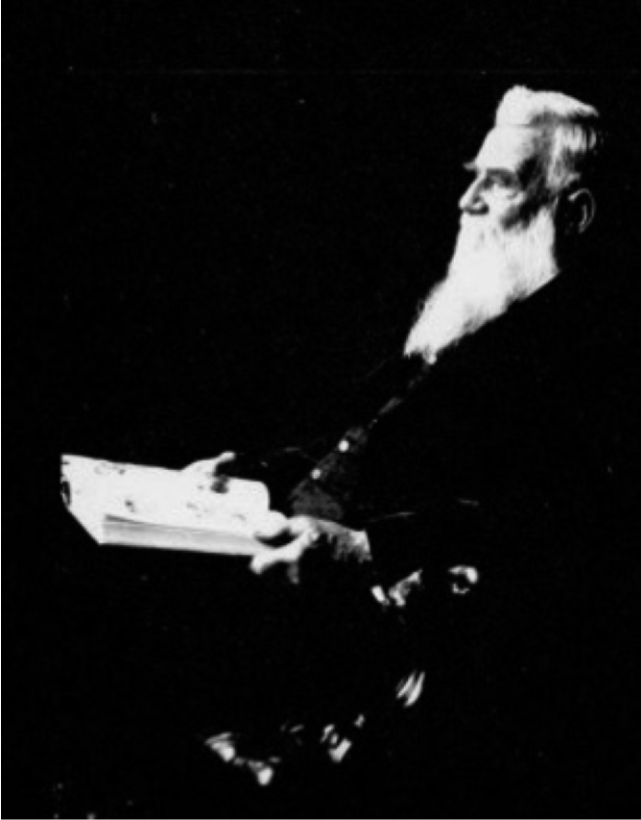


Fig. 8. Edward John Dunn
(courtesy of National Library of Australia)

Their site is on Van Staden's River, about 3.7 miles (6 km) from its mouth, and 21 miles (34 km) from Port Elizabeth. From their general strike and dip, the rocks appear to belong to the same series as Witteklip, Van Staden's Range, Table Mountain

sandstone, but their character and contents cause them to strongly resemble the Namaqualand schists. Careful examination only could settle the point. A thick covering of soil and undergrowth renders every attempt to follow out the beds ineffectual.

The principal bed in which copper has been found is a peculiar grit, which from metamorphic action assumes in places a gneissose or almost granitic appearance. About 98 yards (90 m) to the west of Mr. Holland's house openings have been made in the rock, exposing veins of quartz lying irregularly between the laminae. In these veins a few copper and cupriferous pyrites occur. Irregular lumps of calc spar are enclosed in the mass of the rock. On the south bank of a tributary flowing into Van Staden's River, and about 300 yards (275 m) above their junction, the principal shaft (Andrews) has been sunk. For the first few metres through the grit mentioned, then through chloritic schists, penetrated in line of strike by numerous short quartz leaders or small veins containing a sprinkling of cupriferous iron pyrites and poor copper pyrites. Calc spar occurs frequently in the quartz veins. On the west side of Van Staden's River, opposite Mr. Holland's house, adits have been driven into the hill, cutting small veins of quartz, bearing copper pyrites. A few loose stones were found containing a good quality of pyrites and a little grey ore.

About 300 yards (275 m) down the creek, facing the house, is the Lead Hill, in which adits and shafts have been driven and sunk. The rock is crystalline limestone in a synclinal trough. Lead, in irregular small pieces, occurs disseminated, but with such irregularity and so sparsely as to give no hope of remuneration from a further search. Zinc blend occurs in small pieces, the size of peas, scattered through the limestone. Nothing at all resembling a lode has been met with.

Two analyses of grey copper ore were made. In the one silver was found to be present in the proportion of 10.7 gm to one ton of copper ore; in the other, at the rate of 214.3 gm per ton. Even taking the larger amount, it could not be extracted with profit with an abundant supply of ore, whereas the grey ore occurs in this locality in traces only.



Fig. 9. A group of picknickers at the abandoned Maitland Mine, in the late Nineteenth Century
Source: National Library of South Africa, Cape Town

For several miles along the strike of these rocks copper pyrites are met with in quartz veins. It is certainly strange that such mineral outcrop should occur in the neighbourhood. It would be advisable for residents in the vicinity to pay attention to any minerals that may attract their notice, as by this means some better outcrop might eventually be discovered.

Many thousands of pounds have been spent in a reckless and extravagant manner, where two or three hundred pounds would have been sufficient to prove the worthlessness of the site as a mine” Dunn (1873), quoted, with metric conversions, by Willebees (1984).

By the time of Dunn’s visit to the Maitland mines in 1873, the workings had been abandoned for many years, and area was used for recreational purposes, including for picnic outings by the locals from Port Elizabeth (Fig. 9).

Hatch and Costorphine (1909)

Hatch and Costorphine (1909), in the second edition of their textbook on the Geology of South Africa, gave information about the Maitland Mine exactly as given by Atherstone (1857b), with no reference the later work of Rubidge, which questioned the correlation of the host strata as given by Wyley (1956) and Rubidge (1862).

“In the Eastern Province at Maitland, along the Loerie River to Hartley, and in the Gamtoos River, there is, according to Atherstone, a dolomitic limestone identical with that of Congo. In the limestone copper and argentiferous lead ores were formerly opened up at Maitland mine. Above the limestone, as can be seen at Maitland, Van Stadens River, and at the Loerie River, there is a hard, coarse, pebbly sandstone, used, in the

neighbourhood, for making millstones. Conformably below the limestone there are quartzose sandstones, micaceous shales and schists (Atherstone, 1857)” Hatch and Costorphine (1909, p. 56).

Accounts of Maitland prospect in the 20th Century

Amm (1935) mapped the geology of a portion of the Uitenhage Division that included the “Maitland Mines” (Figs. 10 and 11). He described the prospecting work at Maitland mines in the 19th Century, and by the Buffelsfontein Syndicate (1924–25). Further work in the region of the Gamtoos Valley was done by Frankel (1937), but did not bear on the lead mineralization.

“A most active period in the working of the mines followed their appropriation by the Buffelsfontein Syndicate in 1924 and 1925. Many of the old shafts were reopened, and new drives and shafts made. A diamond drill was acquired for exploration at greater depths. Unfortunately the money and labour were entirely misplaced. Most of the workings encountered small veins, and narrow horizons of rock impregnated with ore, but never revealed a lode or large body of the ore sufficiently remunerative to warrant working it. Prospecting and exploration in the area was carried on in a smaller way until 1931.

Through disuse most of the workings here became inaccessible. The older shafts have fallen in, while many of the more recent excavations are flooded out with water. Investigation as to the nature of the occurrence was thus limited to a far less adequate inspection than is demanded in an accurate account of the mines.



Fig. 10. The geology of part of the Uitenhage Division (from Amm, 1935). The “Maitland Mines” are shown on Buffelsfontein Farm, upstream from the Maitland River which reaches the coast

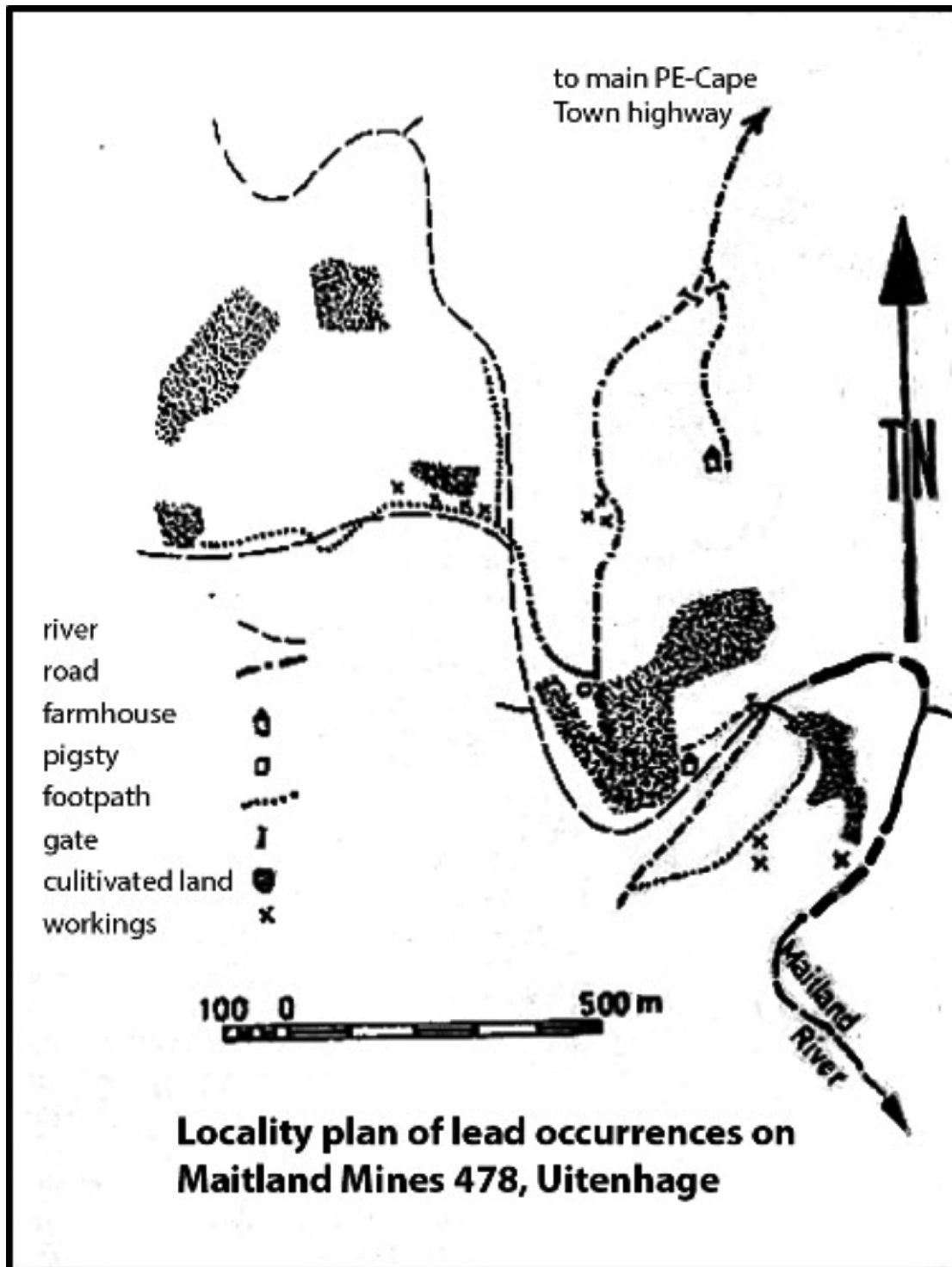


Fig. 11. Locality plan of lead occurrences on Maitland Mines 478, Uitenhage (Kariega) after Willebees (1984)

The workings are situated on both sides of the Maitland River, where the structure is that of a simple East-West syncline, both limbs of which dip towards the river. The outcrop of bluish dolomitic lime-stone, which is the main ore-bearing formation, is duplicated. in the syncline. The trough of the syncline was considered to be a likely spot for the development of a large ore body, and many deep borings. were made here with this objective.

In the banded limestone..., galena, occurs in irregular lumps enclosed in a soft, powdery, brown earth. This weathered product forms elongated pockets in the undecomposed rock, which show some conformation to the dip of the strata.

The association of ore with irregular veins of calcite in the dolomitic limestones indicates development of the minerals along zones of crush. In general, however, the galena occurs

disseminated in small quantities along horizons and in irregular veins and stringers, which show no directional properties" Amm (1935).

Arthur W. Rogers (1935) mentioned the work of Wyley and Bain, but not the more recent prospecting work reported by Amm (1935). Alexander L. du Toit (1939, p. 152) summarised the work reported by Amm (1937), and gave his own opinion on the viability of the deposits, as being "unworkable". Frankel (1937) and Haughton et al. (1937) mapped the area around the Gamtoos Valley.

Haughton (1944) discussed some of the previous work at the Maitland Mine, and added some further information, concluding that it was unlikely that this deposit could ever be worked profitably.

"Near the workings the Maitland river flows for a certain distance in an easterly direction. On its south bank in the adit called Grove's Pit and in the working called Bat's Cave, limestone, un lithified limestone, quartzite and phyllite are found dipping to the north, with fault and breccia zones present. On the northern bank is exposed, in a series of short adits and tunnels, a group of rocks dipping in a southerly direction. The slope get steeper as one heads uphill" Haughton (1944).

By the time that Eric Hammerbeck (1976) wrote up his chapter on Lead for the Mineral Resources of South Africa, it had apparently been 45 years since the last prospecting was done around Maitland, and the original discovery of the mine was so far back in the past, that the name of its discoverer was forgotten, and the date of its discovery was wrongly thought to be 1782. Hammerbeck (1976) was clearly unaware of exploration work, including geochemical and geophysical prospecting, that had been done at the Maitland prospect in the early 1970's by Anglo-American Corporation (1970–1975).

Le Roex (2000) published 1:50,000 scale geological maps of the Port Elizabeth-Uitenhage area (now renamed, since February 2021, as the Gqeberha-Kariega area). Gaucher and Germs (2006) found acritarchs in the Sardinia Bay and Gamtoos areas, apparently giving Neoproterozoic ages for these rocks. However, U-Pb dating of rocks from the Gamtoos Complex by Miller et al. (2016), has revealed youngest detrital zircons of Cambrian age, as well as intrusive sills.

The exploration work of the Anglo-American Corporation (1970–1975) at the Maitland prospect was unpublished, and so were the Honours projects of Gray (1976) and Harris (1976), which came out of that work. Gray (1976) was apparently the second author to report the presence of the zinc sulphide sphalerite in the ores at Maitland. Harris (1976) did underground mapping at the Maitland mines at a scale of 1:5000. The findings of Anglo-American Corporation, and Gray (1976) are briefly summarised by Miller et al. (2016):

"A review of mineralisation in the area was undertaken by Anglo American in the 1970's where a number of geophysical and geochemical techniques were applied to establish the feasibility for further exploration, but this was never followed up. Mineralisation occurs primarily in dolomitic limestone as irregular veins and nodules of argentiferous galena, chalcocopyrite, pyrite, chalcocite, sphalerite, malachite and azurite (Gray, 1976)" Miller et al. (2016).

In the early 1980s (1982–1985), Anglo-American Corporation did additional prospecting work around the Maitland Mines, including geophysics, geochemistry, core drilling, percussion drilling, and assaying. Their entire 3.5 year project, from inception to closure, cost less than 1 million SA Rands, which at that time was around 500,000 US\$ (Marc L. Goedhart, pers. comm., 2023). The conclusion of that exploration project was that there

is no economically viable deposit of any combination of base and precious metals (Pb, Cu, Zn, Ag, Au) at the Maitland prospect and its surroundings.

The most recent exploration activity that has taken place at the Maitland Mines is the search for groundwater resources in the flooded shafts and underground workings by a private company, Kainos South Africa, in 2020–2021 (Goedhart and Murray, 2021).

DISCUSSION

The early accounts of the Maitland prospect show the practices, exploration tactics, weights and measures, technical terminology, and beliefs about ore-forming processes that prevailed in a long bygone era, in the very earliest stages of the modern mining history of South Africa. Also revealed in these accounts is the fact that, owing to the lack of proper analytical facilities in the Cape of Good Hope, samples of the lead ore were sent to experts overseas for assays. The initial analyses, of samples collected in 1792 by Major Von Dehn, were done at the Cape of Good Hope, presumably by a goldsmith or silversmith, but these initial analyses needed to be verified by analyses done by more qualified chemists – an early example of "quality control"! Hinrich Lichtenstein sent his samples to Klapproth in Berlin; and Baron von Dankelmann had his samples analysed in Europe in 1804, probably in Werner's Bergakademie in Freiberg. Much later, in the early 1850s, Andrew Wyley sent samples to Professor Johnston at Durham University in England.

Although the Maitland deposit, discovered in 1792, is the oldest historically documented Pb-(Cu-Zn-Ag) prospect in the Eastern Cape, there is evidence that indigenous inhabitants had been mining some of these metals (but not lead) even earlier. Olaf Mentzel (1787, 1944), whose work was originally published in 1787, mentioned that the Swedish naturalist Anders Sparrman, who had travelled extensively in the Cape in 1775–1776 (e.g., Sparrman, 1787), had obtained a ring from a tribe called the "Tambucki", made of a metal resembling "pistol gold" (i.e., 21-carat gold). However, an analysis by the Swedish Director of Mines, Von Engeström, found it to be a mixture of silver and copper (Sparrman, 1787; 1977). Mentzel (1787, 1944) commented that "it would be a very important discovery if great quantities of copper rich in silver were found in this country". The "Tambucki" referred to by Sparrman (1787) were also known in the 19th Century as "Tambookie", which is the Khoisan name for people who are known today as the AbaThembu, a Xhosa clan (Forbes, in Sparrman, 1977), among whose famous members were Nelson Mandela and Walter Sisulu. Sparrman (1787, 1977) referred to the "Tambuki metal mines", which he had planned to visit, but did not see. He had obtained "Tambucki" ear-rings from the "Snese-Hottentots" at Agter Bruintjies Hoogte (Sparrman, 1977, vol. 1, plate 2; Fig. 12), and one of these rings is in the Sparrman ethnographic collection in Sweden (Rudner and Rudner, 1957). Where the AbaThembu, that Sparrman met in the 1770s, obtained their Ag-Cu metal alloy from is unknown. There is a strong probability that it originated from the Maitland deposit, which, even though it was mainly silver-rich lead, also contained argentiferous copper ores, as described by Dunn (1872). Another Swedish botanist (and friend of Sparrman), Carl Peter Thunberg (1986) had reported that in 1772 he had been shown ear rings made of copper mixed with silver (Fig. 13) at the Gamtoos River (not far from the Maitland Mine). If locally sourced, then the copper and

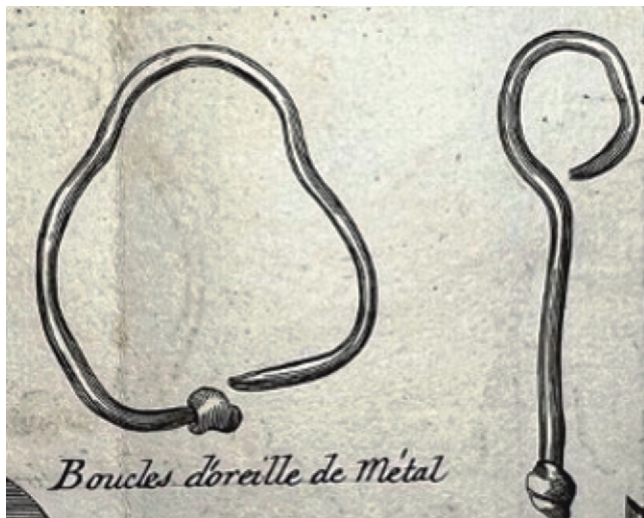


Fig. 12. “Tambucki” copper-silver earrings obtained at Agter Bruintjies Hoogte from the “Snese-Hottentots” by Sparrman (1787, 1977)

silver ear rings seen by both Sparrman and Thunberg raise the possibility that the Maitland deposit originated as a mine developed by the indigenous AbaThembu, and their workings may have been re-discovered by Major Von Dehn in 1792.

In 1752, Ensign Beutler, an employee of the Dutch East India Company (VOC), made an excursion to the Eastern Cape region (Crampton et al., 2013). One of his instructions was to return via the Copper Mountains, which were almost certainly the mountains in Namaqualand visited by Simon van der Stel’s expedition in 1685–1686 (de Wet and Pfeiffer, 1979; Wilson et al., 2002). It was pointed out, however, by Crampton et al. (2013, p. 9) that in the Journal of Governor Adriaan van der Stel on 13 March 1724, it was reported that the deputy head (Secunde) of the VOC force occupying Delagoa Bay, Jan Christoffel Steffler, was killed while searching for another “copper mountain” in the hinterland (Leibbrandt, 1886, p. 296–297). “Some of the natives from the region of Paraota had brought to the office for sale 1¹/₄ oz. of gold dust, which they weighed with their own scales and stone weights. From this we infer that they had already traded with other Europeans” (Leibbrandt, 1886, p. 297). To this day, the only known metallic deposit in the vicinity of Delagoa Bay is the Maitland prospect, which, because of its copper-stained outcrops, could have been the “copper mountain” that was being searched for in 1724. Since none of the analyses of Maitland ores have yielded any gold, the gold dust obtained by the native prospectors may have come from a different place, such as the auriferous quartz veins paralleling the strike of the Pre-Cape rocks at Blackguards Retreat, some 16.5 km WNW of Maitland (Haughton et al., 1937). The locality of Paraota is unknown today.

The prospecting work done at the Maitland lead prospect started off on a promise of riches in the 1790s and early 1800s, based on high silver values associated with the lead ores. Subsequent work also showed high copper values in places. Many of the leading geologists of South Africa in the 19th and 20th centuries gave some attention to this deposit. However, for almost two centuries, various prospecting enterprises, utilising underground development, diamond drilling, and numerous geochemical analyses, all the way through to modern geophysical methods, have failed to prove the presence of an economically viable deposit in the Maitland Pb-Ag-Cu-Zn prospect. It nevertheless remains as the oldest known and longest studied lead deposit in the history of South African geology.

The Maitland prospect, abandoned since the 1850s, continues to arouse interest today, as the mine is now part of a 250 hectare Maitland Nature Reserve, with a hiking trail and a biking

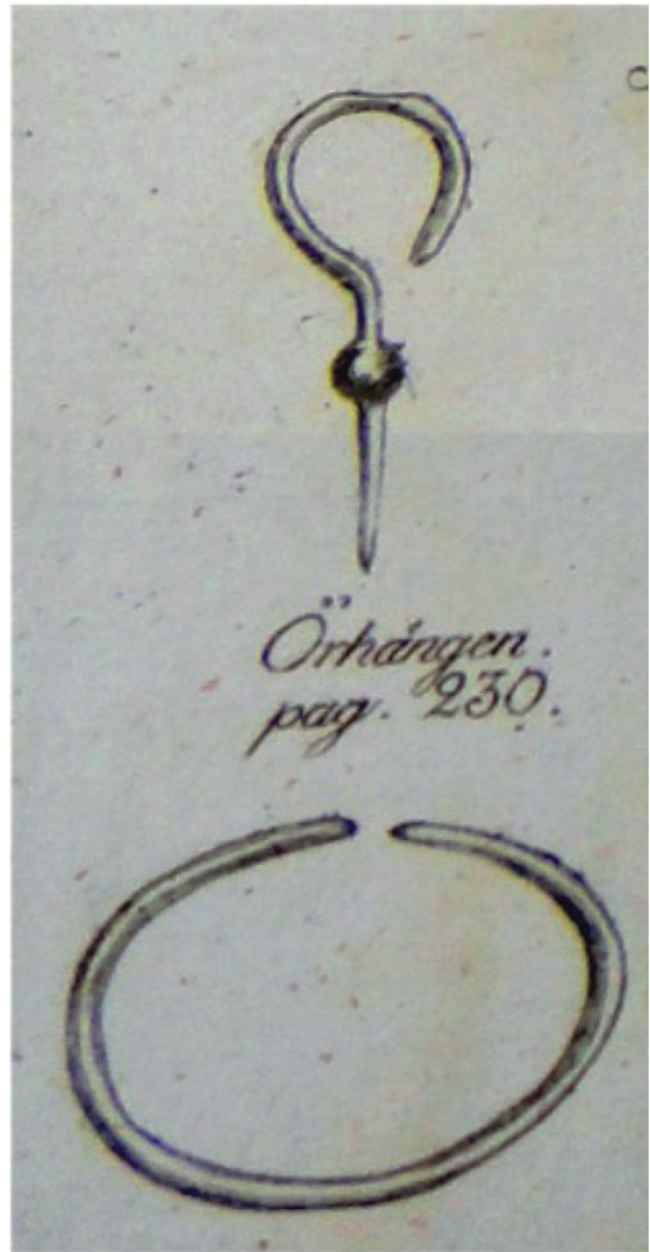


Fig. 13. Copper-silver earrings obtained from near the Gamtoos River (from Thunberg, 1986)

trail, with indigenous coastal forest, abundant birdlife, small mammals such as bushbuck and duiker, and a dirt road leading up to the old Maitland mine workings. Curious visitors still enter the shafts and adits that were mined during the prospecting operations. Figures 14 and 15 (from Fraenkel, 1982) show the very irregular nature of the excavations near the entrance of the adits. Figures 16 and 17, from McLelland (2018), show narrow mined stopes, with a pillar, and secondary copper staining on the wallrocks. Appendix 1 gives a Timeline of investigations of the Maitland prospect.

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Fig. 14. Entrance to the hillside adits into the Maitland prospect
(from Fraenkel, 1982)



Fig. 15. Inside an irregular stope near the adit entrance of the Maitland prospect
(from Fraenkel, 1982)



Fig. 16. Stope with a pillar near adit entrance, Maitland prospect
Note the green secondary copper staining, produced by malachite or other copper minerals
(from McLelland, 2018)



Fig. 17. Narrow dipping stope in the Maitland prospect
The hanging-wall appears to be lined with secondary efflorescences,
possibly sulphates derived from the oxidation of sulphides
(from McLelland, 2018), or aragonite

REFERENCES

- Amm, F.L., 1935.** The pre-Cape rocks of the Uitenhage Division. *Trans. Geological Society of South Africa*, **37**: 69–86.
- Anglo-American Corporation, 1970–1975.** Geochemical and geophysical exploration reports on prospecting at Maitland Pb-Cu prospect, Cape Province, South Africa. Anglo-American Corporation, Johannesburg, South Africa.
- Anon (Bain, A.G.), 1858.** Economic Geology of the Colony. The Eastern Province Monthly Magazine, Grahamstown, **2** (20), March, 1858: 372–379.
- Atherstone, W.G., 1857a.** Geology of Uitenhage. The Eastern Province Monthly Magazine, Grahamstown, **1** (10): 518–532; **1** (11): 580–595.
- Atherstone, W.G., 1857b.** Namaqualand and its mining prospects. Eastern Province Monthly Magazine, Grahamstown, **1** (12): 642–651; **2**: 1–8.
- Bain, A.G., 1852.** On the geology of South Africa. *Transactions of the Geological Society of London*, Second Series, **8**: 175–192.
- Bain, A.G., 1856, 1898.** Reminiscences and anecdotes connected with the History of Geology in South Africa, or the Pursuit of knowledge under difficulties. Eastern Province Monthly Magazine, September 1856. Reprinted in: *Transactions of the Geological Society of South Africa*, **2** (5), June, 1896: 59–75.
- Bain, A.G., 1857a.** Geology of South Africa. Part 1: Western Province. The Eastern Province Monthly Magazine, **1** (8), April, 1857: 396–407.
- Bain, A.G., 1857b.** Geology of South Africa. Part 2: Eastern Province. The Eastern Province Monthly Magazine, **1** (9), May, 1857: 456–465.
- Bain, T., 1893.** Discovery of galena in Griqualand West. Cape of Good Hope Parl. Repts., Cape Town, C. **13**, 1893.
- Barrow, J., 1801.** An account of travels into the interior of Southern Africa in the years 1797 and 1798. T. Cadell Jr. and W. Davies, London.
- Bertuch, F.J., 1806.** Baron von Dankelmann's Reise nach Ostindien. In: *Allgemeine Geographische Ephemeriden*, **19**, Vermischten Nachrichten, 5, Kurze Notizen. Verlage des Landes-Industrie Comptoir, Weimar.
- Buffelsfontein Syndicate, 1924–1925.** Reports to Chairman and Directors of Buffelsfontein Syndicate, South Africa, 1924–5.
- Chase, J.C., 1843.** The Cape of Good Hope and the Eastern Province of Algoa Bay. Richardson, London.
- De Kun, N., 1965.** The Mineral Resources of Africa. Elsevier, Amsterdam.
- de Wet, G.C., Pfeiffer, R.H., eds., 1979.** Simon van der Stel's journey to Namaqualand in 1685. Human & Rousseau, Cape Town.
- Dunn, E.J., 1872.** Geological Sketch Map of Cape Colony. Compiled from observations made by Messrs. A.C. [sic] Bain, A. Wylie, T. Bain, Jnr., Dr Atherstone, R. Pinchin. Scale: 1 inch = 24 miles. Edward Stanford, London.
- Dunn, E.J., 1873.** Gold prospecting expedition and on the Stormberg Coalfields. Cape of Good Hope Parliamentary Report G31-73.
- Dunn, E.J., 1875.** Geological Sketch Map of South Africa. From personal observations, combined with those of Messrs. A.G. Bain, A. Wylie, T. Bain, Jnr., Dr Atherstone and R. Pinchin in Cape Colony, Dr Sutherland in Natal, and Mr. E. Button North of 24° Latitude. Scale: 1 inch = 33 miles. Edward Stanford, London, England.
- Dunn, E.J., 1887.** Geological Sketch Map of South Africa. Second Edition. Scale: 1 inch = 33 miles. Sands and McDougall, Melbourne, Australia.
- du Toit, A.L., 1939.** Geology of South Africa, 2nd ed. Oliver & Boyd, Edinburgh.
- Fleming, R.F., 1856.** Southern Africa. A Geography and Natural History of the Country, Colonies, and Inhabitants, from the Cape of Good Hope to Angola. Arthur Hall, Virtue and Co., London.
- Frankel, J.J., 1937.** The geology of a portion of the Gamtoos Valley. *Trans. Geological Society of South Africa*, **39**: 263–279.
- Fraenkel, W., 1982.** The Mystery of Maitland Mine. Eastern Province Herald, Port Elizabeth, South Africa, 22nd May 1982.
- Gaucher, C., Germs, G.J.B., 2006.** Recent advances in South African Neoproterozoic to early Palaeozoic biostratigraphy: correlation of the Cango Caves and Gamtoos Groups and acritarchs of the Sardinia Bay Formation, Saldania Belt. *South African Journal of Geology*, **109**: 193–214.
- Goedhart, M.L., Murray, R., 2021.** Preliminary groundwater exploration in the 'pre-Cape' and lowermost TMG strata of the Maitland Mines area, and the way forward. Kainos South Africa, Report No. KSA-2021-0001 (confidential).
- Goodwin, G., 1892.** Johnston, James Finlay Weir. *Dictionary of National Biography*, Volume 30, Smith, Elder & Co., London. https://en.wikisource.org/wiki/Talk:Dictionary_of_National_Biography_1885-1900
- Gray, S., 1976.** The geology of the Maitland Mines. Unpubl. B.Sc. Hons. Proj., UPE (now Nelson Mandela University), Port Elizabeth (Gqeberha), South Africa.
- Hammerbeck, E.C.I., 1976.** Lead. In: *Mineral resources of the Republic of South Africa* (ed. C.B. Coetzee). 5th edition. Pretoria, Geological Survey.
- Harries, M., 1846.** Prospectus of the Maitland Mining Company. Cape of Good Hope and Port Natal Shipping and Mercantile Gazette, Friday, 16th January 1846.
- Harris, J.E., 1976.** The geology and regional setting of the Maitland Mines. Unpublished B.Sc. Hons thesis, Geology Dept., Rhodes University, Grahamstown, 47pp. & 1:5000 scale maps.
- Hatch, F.H., Costorphine, G.S., 1909.** The Geology of South Africa. Second Edition. Macmillan and Co., Limited, London.
- Haughton, S.H., 1944.** The father of South African geology. *Africana Notes and News*, **16**: 99–109.
- Haughton, S.H., Frommurze, H.F., Visser, D.J.L., 1937.** The geology of a portion of the coastal belt near the Gamtoos Valley, Cape Province. Explanation of Sheet 151 Gamtoos River, Geological Survey of South Africa.
- Hill, R.S., Nolte, C.C., 1989.** Gamtoos Group. In: *Catalogue of South African Lithostratigraphic Units* (ed. M.R. Johnson), **1**. SACS, Council for Geoscience, South Africa.
- Johnston, J.F.W., 1845.** *Catechism of Agricultural Chemistry and Geology*. William Blackwood, Edinburgh.
- Jones, T.N., 1899.** Obituary: William Guybon Atherstone. Born 1813, died 26th June 1898. *Natural Science*, **14**: 73–74.
- Le Roux, F.G., 2000.** The geology of the Port Elizabeth-Uitenhage area, Explanation of Sheets 3325 DC and DD, 3425 BA Port Elizabeth, 3325 CD and 3425 AB Uitenhage, 3325 CB Uitenhage Noord and 3325 DA Addo (scale: 1:50 000). Council for Geoscience, South Africa.
- Lichtenstein, H., 1811.** *Reisen im Südlichen Afrika in den Jahren 1803, 1804, 1805 und 1806*, Erste Theil. C. Salfeld, Berlin.
- Lichtenstein, H., 1812.** *Lichtenstein, Hinrich, 1780–1857. Travels in Southern Africa in the Years 1803, 1804, 1805, and 1806*, Vol. 1. Translated from the German by Anne Plumtre. Henry Colburn, London. [Reprinted by the Van Riebeeck Society, Cape Town, 1928].
- Liebenberg, E., 2007.** Mapping South Africa in the 1830s: the cartography of James Centlivres Chase. *Historia*, **52** (3): 1–17.
- Liebenberg, E., 2021.** Unveiling Southern Africa: John Barrow's map of 1801. *International Journal of Cartography*, **7** (2): 164–170.
- Maitland Mining Company, 1846.** Prospectus of the Maitland Mining Company. The Cape of Good Hope and Port Natal Shipping and Mercantile Gazette, Cape Town, Friday 16th January 1846.
- Master, S., 2018.** The discovery and description of crocidolite and pseudocrocidolite (tiger's eye) from the Northern Cape (1784–1811). Abstr., Geocongress 2018, Geol. Soc. S. Africa, Univ. Johannesburg, South Africa, 18–20 July 2018.
- Mentzel, O.F., 1787, 1944.** A Geographical and Topographical Description of the Cape of Good Hope. Part Three. The Van Riebeeck Society, Cape Town, **25**.
- Mathie, N., 1998.** Man of many facets: Atherstone Dr W.G. 1814–1898. Vol. 2: 401–799. N.P.C. Mathie, Grahamstown.

- McLelland, D., 2017.** Port Elizabeth of Yore: John Centlivres Chase- Father of the Eastern Cape. <http://thecasualobserver.co.za/port-elizabeth-yore-john-centlivres-chase-early-pe/>, 26 April 2017.
- McLelland, D., 2018.** Port Elizabeth of Yore: the Maitland Mines. <http://thecasualobserver.co.za/port-elizabeth-yore-maitland-mines/>, May 2018.
- Miller, W., Armstrong, R., de Wit, M.J., 2016.** Geology and U/Pb geochronology of the Gamtoos Complex and lower Paleozoic Table Mountain Group, Cape Fold Belt, Eastern Cape, South Africa. *South African Journal of Geology*, **119** (1): 147–170.
- Plug, C., 2020a.** Chase, Mr John Centlivres (geography, cartography). S2A3 Biographical Database of Southern African Science. https://www.s2a3.org.za/bio/Biograph_final.php?serial=488
- Plug, C., 2020b.** Atherstone, Dr William Guybon (geology, palaeontology, botany, medicine). S2A3 Biographical Database of Southern African Science. https://www.s2a3.org.za/bio/Biograph_final.php?serial=104
- Plug, C., 2020c.** Wyley, Mr Andrew (geology, plant collection). https://www.s2a3.org.za/bio/Biograph_final.php?serial=3206
- Plug, C., 2020d.** Rubidge, Dr Richard Nathaniel (geology, palaeontology, plant collection). S2A3 Biographical Database of Southern African Science. https://www.s2a3.org.za/bio/Biograph_final.php?serial=2422
- Plug, C., 2024.** Dunn, Mr Edward J. (geology, archaeology). S2A3 Biographical Database of Southern African Science. https://www.s2a3.org.za/bio/Biograph_final.php?serial=798
- Prinz, J., 1932.** Das Württembergische Kapregiment 1786–1808. Strecker, Stuttgart.
- Rogers, A.W., 1937.** The pioneers in South African geology and their work. *Trans. Geol. Soc. S. Afr., Annex. to Vol.*, **39**: 1–139.
- Rogers, A.W., du Toit, A.L., 1909.** An introduction to the Geology of Cape Colony, 2nd edition. Longmans, Green & Co., London.
- Roorda Smit, J.A., 1882.** De bodemgesteldheid van de Transvaal, Voordracht. Koninklijk Nederlands Aardrijkskundig Genootschap, **6**: 1ste Serie: 92–99.
- Rubidge, Dr R.N., 1858.** Economic geology of the Colony. *The Eastern Province Monthly Magazine*, Grahamstown, **2** (19): 372–379, March, 1858.
- Rubidge, Dr R.N., 1862.** On the metamorphosis of rocks in the Cape Town district, South Africa. *The Geologist*, **5** (10): 366–372.
- Rudner, I., Rudner, J., 1957.** A. Sparrman's ethnographic collection from S. Africa. Smärre Meddelanden, Ethnographical Museum of Sweden, Stockholm.
- Shone, R.W., Nolte, C.C., Booth, P.W.K., 1990.** Pre-Cape rocks of the Gamtoos area- a complex tectonostratigraphic package preserved as a horst block. *South African Journal of Geology*, **93**: 616–621.
- Snodgrass, R.A., 1986.** Lead in South Africa. *Journal of the Southern African Institute of Mining and Metallurgy*, **86** (4): 97–111.
- Sparrman, A., 1787.** Voyage de Cap de Bonne-Esperance, et autour du monde avec le Capitaine Cook, et principalement dans les pays des Hottentots et des Caffres. Chez Buisson, Paris.
- Sparrman, A., 1977.** A voyage to the Cape of Good Hope, towards the Antarctic Polar Circle round the world and to the country of the Hottentots and the Caffres from the year 1772–1776. Based on the English editions of 1785–1786 published by Robinson, London. Edited by Prof. V.S. Forbes. Van Riebeeck Society, Cape Town, Second Series No. **7**, Vol. 1–2.
- Spohr, O.H., 1974.** The Württemberg Regiment at the Cape. Quarterly bulletin of the South African Library, **29** (1), September 1974.
- Thunberg, C.P., 1986.** Carl Peter Thunberg: travels at the Cape of Good Hope 1772–1775. Edited by V.S. Forbes. Van Riebeeck Society, Cape Town.
- Toerien, D.K., Hill, R.S., 1991.** The geology of the Port Elizabeth area: explanations Sheet 3324 (scale: 1:50,000), Geological Survey of South Africa.
- VZI, 2020.** Gamsberg is triggering a new wave of industrial and economic development in the Northern Cape. Vedanta Zinc International, Fact-sheet 2020.
- <https://www.vedanta-zincinternational.com/component/jdownloads/send/33-2020/321-gamsberg-the-future-of-zinc> (Accessed 17/8/2020)
- Willebees, G.L., 1984.** Early lead mining at the Maitland Mine, Uitenhage District. *Geobulletin*, Geological Society of South Africa, **27**(4), December 1984.
- Wyley, A., 1856.** Report upon the Maitland Mines (Lead and Copper), near Port Elizabeth, 21 December 1855. Cape of Good Hope Parl. Repts., Cape Town, G.5.

APPENDIX 1

TIMELINE OF INVESTIGATIONS OF THE MAITLAND PROSPECT

1792. Discovery, and sampling of ores for assay by Major Von Dehn.
- 1797, August. Visit by John Barrow, Secretary to Lord Macartney, Governor of the Colony of Cape of Good Hope.
- 1804, 7 January. Visit by Hinrich Lichtenstein, with Winters and de Mist. Lichtenstein's samples analysed by Heinrich Klaproth in Berlin in 1806.
- 1804, March or April. Visit by Baron von Dankelmann, at behest of General Janssens. Assays of 1804 samples collected yielded similar values to those reported by Von Dehn (1792).
- 1845, November. Resumption of mining operations at Maitland. Ores assayed.
1845. Visit by Andrew Geddes Bain and Dr William Guybon Atherstone, from Grahamstown.
1846. 16th January. Publication of prospectus of the Maitland Mining Company, for mining the Maitland Lead Mines, named in honour of the Governor Sir Peregrine Maitland.
- 1849, 2–3 April. Visit by Dr William Guybon Atherstone, Robb Penhay, and Mr Bevan.
- 1853? Report by R. "Roubridge" [Rubidge] from Port Elizabeth.
1854. Visit by Francis Fleming.
1856. Report and map by Andrew Wyley, who found there had been considerable amount of underground exploration at Maitland without any apparent success, and regarded the abandonment of the mines justified.
1857. Atherstone's account of Maitland published in his *Geology of Uitenhage*.
- 1857–1858. Paper by Andrew Geddes Bain, regarding the host rock chlorite schists of the Maitland Mines as being of Carboniferous age. In 1858 Bain suggested that more work in the neighborhood might have a prospect of success.
- 1924–1931. Renewal of prospecting by the Buffelsfontein Syndicate, without much success.
- 1935–1937. Reports on the geology of the pre-Cape rocks around Uitenhage and Gamtoos valley by Amm (1935) and Frankel (1937).
- 1970–1975. Geochemical and geophysical exploration by Anglo-American Corporation.
1976. B.Sc. Honours Project on the geology of Maitland Mine, by S. Gray, at the University of Port Elizabeth, reveals sphalerite is present together with galena and chalcopyrite.
1976. B.Sc. Honours Project on the geology of Maitland Mines and surroundings, by J. E. Harris at Rhodes University, Grahamstown, resulting in 1:5000 scale underground geological maps of the Maitland Mine workings.
- 1982–1985. Extensive exploration program by Anglo-American Corporation, including core and percussion drilling, and geochemistry, fails to find an economic deposit at the Maitland Mines.
2000. Le Roex (2000) published 1:50,000 scale maps of the Port Elizabeth-Uitenhage area.
2006. Gaucher and Germs (2006) found acritarchs in Sardinia Bay and Gamtoos areas, giving Neoproterozoic ages for these rocks.
2016. First U-Pb zircon ages of rocks of the Gamtoos Valley by Miller et al. (2016) show the rocks to be Cambrian in age.
- 2020–2021. Additional structural mapping and search for groundwater at Maitland Mines by Goedhart and Murray of Kainos South Africa.