

Review

The copper mine at Hofret en Nahas, Sudan

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Copper is the world's third most important metal after iron and aluminium. It has been used for thousands of years and continues to be an important item in manufacturing, medicine, construction and the electrical industries. The world has enormous reserves of copper ore: It is found in many African countries. Sudan has considerable resources in the Red Sea area and in the southwest of the country but almost none of these has been used to extract copper metal. The Hofret en Nahas mine in southwest Sudan or northwest South Sudan, depending on how local geography is interpreted, has been exploited by artisanal methods for hundreds of years and is important in local culture and to a lesser extent in current times in the local economy. The mine was visited by European explorers from the mid nineteenth century and through to the mid twentieth century by potential entrepreneurs with a view to exploit the mineral. Various analyses have shown that the ore can produce high quality pure metal. Among the many reasons for the mine not being developed are the remoteness of the location, poor and only seasonal access by road, a distance to the railway of more than 200 miles (320 km), lack of a local labour force and difficulties about feeding such a force. In recent years (since 2011) the failure to secure an agreement on the international boundary between the Republic of Sudan and the Republic of South Sudan inhibits any progress towards development of the mine. This diachronic study of more than 170 years of events and activities at Hofret en Nahas covering actual artisanal copper extraction, geographical and geophysical exploration, the cultural setting and the causes of and problems with civil war in the area. As far as can be ascertained the paper is the only synthetic review of these subjects and could form the basis of future studies.

Key words: Darfur, Bahr el Ghazal, chalcopryite, artisanal exploitation, geographic exploration, geological exploration, cultural value, slavery.

INTRODUCTION

Copper has been used in coins and ornaments since 10,000 BP, making it one of the first metals to be used by humans (Doebrich and Masonic, 2009). Copper is malleable and ductile, resists corrosion and conducts

heat and electricity efficiently. It was very important to early humans and continues as a preferred element for many domestic, industrial and high-technology applications (Flanagan, 2020).

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A great leap forward in human society was made about 5000 BP when it was found that copper could alloy with tin to result in bronze. This moved advanced man from the primitive tools of the Stone Age to the more technologically advanced Bronze Age. Another major and important alloy of copper is its connection with zinc which results in brass. Both these alloys extended the use of copper to additional functions in somewhat different roles as bronze is harder than brass.

Recent uses of copper have been in medicine although some medical properties were already recognized in ancient times (Morrison, 2020). Copper has antimicrobial properties effective against a wide range of pathogens. One example is that of the novel covid-19 virus which can survive for long periods on glass, plastic and stainless steel surfaces, but dies within hours on a copper surface (van Doremalen et al., 2020). Another is the death within minutes of some microorganisms when exposed to a dry copper surface.

Copper is used in the construction industry, in the generation of power, the manufacture of industrial machinery and especially modern vehicles. The metal is an essential component in the engines, wiring, radiators, connectors, brakes and bearings used in motor vehicles. A small car contains 1.5 km (0.9 mile) of copper wire whereas the total amount of copper ranges from 20 kg (44 pounds) in small cars to 45 kg (99 pounds) in luxury and hybrid vehicles (Copper Facts, 2023).

At least 160 copper-bearing minerals are known, many being important as jewelry. Among the most familiar are chalcopyrite, malachite, azurite and turquoise. Chalcopyrite is the most abundant and economically significant of these minerals. Porphyry, the most important type of deposit, is associated with igneous intrusions and yields about two-thirds of the world's copper. Deposits in sedimentary rocks, such as those in the Copper Belt of Central Africa, account for about one quarter of the world's identified copper resources. Individual deposits may contain hundreds of millions of tons of copper-bearing rock that is often recovered by open-cast techniques.

Copper is the world's third most industrial metal after iron and aluminium. World production (supply) and consumption (demand) increased dramatically in the late twentieth and early twenty-first centuries. As large developing countries have entered the global market demand for mineral commodities, including copper, has increased. In the past 20 years, the Andean region of South America with Chile well to the forefront has emerged as the world's most productive copper region. In 2007 about 45 per cent of the world's copper was produced from the Andes Mountains. Secondary production – “recycling” – contributes about two-thirds of total copper production. Copper and its alloys can be recycled many times without loss of their properties at a cost of about one-sixth of production from ore (BGS,

2007).

The world's identified copper resources are estimated at 1.6 billion tonnes not including 0.9 billion tonnes in deep sea nodules¹. About 30% of resources are in Chile with much lesser amounts in the USA and Indonesia (7.5% each) and less than 6% in several other countries. Reserves in Zambia, at 19 000 tonnes, are 4.1 per cent of total reserves.

Copper is produced in about fifty countries, of which six produce more than 500 000 tonnes each year and together account for more than 80% of total output. Africa produces less than 3% each of smelter copper and refined copper.

Sudan has huge reserves of copper ore, mainly in the Red Sea Hills area in the northeast of the country. Other deposits occur in the Nuba Mountains in the south of the country bordering Republic of South Sudan). Further exploration is under way in these areas. There are large reserves around the “Copper Pit” in the southwest of the country which also contain gold and uranium (Sudan Government, n.d.).

The Copper Pit (generally known as Hofret en Nahas (usually translated as the Copper Hole) is located at 9° 37' N; 24° 05' E (Figure 1) and is one of the remotest places in Africa². As far as is known this is the only national resource from which copper has been extracted. This paper reviews the literature of the mine and its surrounds from a wide range of sources with regard to their history, exploration, exploitation, culture and geological context. It is, as far as the author has been able to discover, the first synthesis of this nature and is a contribution to the body of knowledge of a remote part of the African continent³.

This diachronic study of more than 170 years of events and activities at Hofret en Nahas covering actual artisanal copper extraction, geographical and geophysical exploration, the cultural setting and the causes of and problems with civil war in the area. As far as can be ascertained this paper is the only synthetic review of these subjects and could form the basis of future studies.

EARLY HISTORY AND NINETEENTH CENTURY

The earliest reference to exploitation of the Hofret copper deposits dates from the middle of the fifteenth century when the Genoese trader Antonio Malfant referred to copper from that area being traded across much of central Africa (Thomas, 1997). It can reasonably be assumed, however, that exploitation of the deposits pre-

¹billion is 10 to the power of nine (10⁹; 1,000,000,000).

² Transliteration to English of Arabic orthography for the area is not standard and is rendered in various forms. Hofret en Nahas (sometimes truncated to Hofret) is employed in this paper as it is the most common usage.

³ This paper was inspired by the Author's “tourist” visit to Hofret en Nahas: writing was started on 10 April 2023, the fiftieth anniversary of that visit.



Figure 1. Old workings at Hofret en Nahas being studied by the Author's wife Mary, colleague Stan E Clarke and a Sudanese colleague.
Source: Photo by the Author taken on 10 April (1973).

dated that account, but the origin of mining and copper production in the region is unrecorded. The cultural and economic importance of copper is, however, indisputable. One symbol of this is the possession of a drum of copper with a leather skin as its head (Figure 2). Ownership of such an artefact bestowed great prestige on the possessor and was usually limited to the Sultan of Darfur and a small coterie of notables (Arkell, 1966; O'Fahey and Spaulding, 1974; O'Fahey, 1980).

Smelted copper made into rings weighing 10 to 12 lbs (pounds avoirdupois; 4.5 -5.4 kg) was traded from the mines to Kordofan whence it was presumably traded farther afield (Afia and Widatalla, 1961).

In the first quarter of the nineteenth century Hofret's fame was a main reason for the annexation of Darfur by Mohammed Ali Pasha, Khedive of Egypt. In 1838 Mohammed commissioned the Austrian geologist Burgrath Russegger to conduct a feasibility study of Hofret. It is unlikely that Russegger ever reached the mines – Darfur had not been annexed to the Sudan at the time – but based his reports on information and samples (in the form of small pellets) that he obtained in Kordofan

(Herbert, 1984:161). Russegger (as cited in Afia and Widatalla, 1961) described the copper as of a light yellowish colour, extremely fine and pliable and so pure that he was unable to detect traces of any other metal with any type of reagent.

In the 1850s the Arab slave and ivory trader, al-Zubayr Rahma Mansur, settled in the Bahr el Ghazal area and gradually built up a trading empire (Figure 3). He was largely left alone by the local Zande chiefs and the Government in return for respecting administrative authority (Jackson, 1913; Afia and Widatalla, 1961). In 1869 an adventurer named El Haj Mohammed en Billali, returning from the pilgrimage to Mecca and, backed by the Sudanese authorities, arrived in the area with a considerable force intending to occupy Bahr el Ghazal. Billali had been to Cairo and told the Khedive that he had conquered Darfur and wished to resume possession of the mines at Hofret en Nahas, then considered to be in Darfur. Over the next year Zubayr and Billali fought several battles, the one being successful at some time and the other at another. On one occasion (and for unknown reasons) Zubayr allotted Billali and his



Figure 2. Beaten copper and leather drum, the ownership of which was a mark of authority and social standing in Darfur (Source: National Army Museum Study Collection Accession Number NAM 1963-05-13-1 (<https://collection.nam.ac.uk/detail.php?acc=1963-05-13-1>); The illustrated drum is reputed to have been taken as a trophy after the defeat of the Dervish forces at the Battle of Omdurman in 1898).

followers 1500 purses of gold together with some clothes and copper from Hofret. It was claimed that the copper was worth Egyptian Pounds 15 per kantar, was of extraordinary purity far exceeding that of European copper and from which ninety nine kantars of pure copper and one kantar of gold could be extracted from one hundred kantars of raw copper. The extraction was an “easy task” as it was accomplished by the many slaves owned by Zubayr⁴. Billali was eventually killed, Zubayr conquered the whole of Darfur and later became Governor of Bahr el Ghazal where he remained from 1873 to 1877 (Jackson, 1913:32-44).

Copper from Hofret was exported to Kano (now in northern Nigeria) as early as the 1850s where the “useful and handsome metal is also imported every year by the Jellaba of Nimro in Waddy, who bring it from the celebrated copper-mine, “el hofra,” situate to the south of Dar-Fur” and rendered a profit of more than 100%. Purchase of a young slave cost one kantar of copper, equivalent to the cost of 100 kg of ivory which was then

sold for two kantars in Kukawa (Barth, 1857). Copper rings and wire were also exported to many destinations (Walz, 1978). It was not only copper; however, that was the wealth of the Hofret region. According to Romulu Gessi, who was General Gordon’s attack dog and hounded Zubayr across the Bahr el Ghazal and Hofret en Nahas region, the area furnished at least 80 000 slaves a year and more than 20 000 Arabs were engaged in the trade. In Deim Suleiman (formerly Deim Zubayr and the capital of Western Bahr el Ghazal) (Figure 4), Gessi found bills for 90 000 thalers payable to different merchants, Government Officials and traders for the slaves they had supplied (Jackson, 1913; Thomas, 2009)⁵.

During the late 1860s the area was traversed by the Latvian botanist and ethnographer Georg August Schweinfurth. He described the artisanal method of smelting and noted that it took place only after the crops had been harvested and the rains had receded. The smelter was made of clay, about five feet (1.5 m) in height, with three distinct compartments of the same size

⁴ 1 kantar = 44 okes = 123.2 pounds avoirdupois (55.88 kilogram); the oka, okka or oke (Ottoman Turkish *هقولا*) was an Ottoman measure of mass equal to 400 dirhems (Ottoman drams); its value initially varied but it was standardized in the late empire as 1.2829 kilograms.

⁵ A thaler was a large silver coin about 40 mm in diameter and weighing 25 - 30 grams minted in the territories of the Holy Roman Empire; the word “dollar” is derived from this term.



Figure 3. Portrait of al-Zubayr when Governor of Bahr el Ghazal.

Source: https://en.wikipedia.org/wiki/A-Zubayr_Rahma_Mansur#/media/File:Al-Zubayr_Rahma_Mansur.jpg.

(Figure 5). The middle compartment was separated from the lower one by a kind of frame resting on a circular projection and was filled with alternate layers of fuel and

ore. This middle chamber was divided from the one above by a narrow neck. The upper and lower chambers were for fuel only. The base of the lower chamber was

pierced by four holes into which “tewels” or pokers were inserted and attached to bellows, used to increase the intensity of the combustion. A fifth hole was stopped with clay and opened periodically to allow the metal to be raked out after it had trickled down into the cavity below the frame (Schweinfurth, 1874, vol. 1, 274).

During the early 1870s a decommissioned ex-Civil War officer of the United States Union (Northern states) Army was recruited along with other Americans by the Egyptian Khedive to bolster his staff. Together with two other American officers and nine Egyptian officers Erasmus Sparrow Purdy set off in 1874 towards Dongola and the capital of Darfur province. One of Purdy's discoveries on that trip was Dar Fertit. The expedition explored the iron mines of Kordofan and completed a minute reconnaissance as far as the Shakka district and Hofret en Nahas (Rafaat, 1997).

Unfortunately for posterity Purdy's report of the southern Darfur part of his journey has been lost so nothing is known of his findings (Douin, 1942).

During a period of fighting in Darfur in the later 1870s, Governor Rudolf von Slatin (Figure 6) and his forces were besieged by the Mahdist army. The situation of the Government troops was perilous:

My ammunition was becoming critically low, and I found myself in a quandary regarding how to replenish my depleting stock. While I had an ample supply of powder and shells, my primary challenge was acquiring lead. Despite this, I managed to refill the empty Remington cases by melting down bullets from percussion guns and muskets. A small quantity of these bullets remained available. Additionally, I created copper bullets using the supply of copper obtained from the mines of Hofret en Nahas. To bolster this supply, I purchased copper bracelets and anklets from Black women who were fond of such copper ornaments (von Slatin, 1896:249)⁶

At the very end of the Nineteenth Century it was remarked that:

⁶ This is a translation of the original German version – Rudolph Carl Slatin (1896) *Feuer und Schwert im Sudan, Meine Kämpfe mit den Derwischen, meine Gefangenschaft und Flucht. 1879 -1895* published in Berlin by Verlag der Pioniere. The original full English translation is https://access.bl.uk/item/viewer/ark:/81055/vdc_0000001CEA8#?c=0&m=0&s=0&cv=77&xywh=139%2C1194%2C2586%2C12801896. Rudolf Karl, Baron von Slatin, also called Slatin Pasha (7 June 1857-4 October 1932) was an Austrian who served in the Egyptian army in Sudan. Slatin first arrived in Sudan in 1874 and became Governor of Darfur province in 1881 a year before the Mahdist revolution began. Slatin fought with determination against the Mahdist forces (even converting to Islam to improve the morale of his Sudanese troops) but was forced to surrender at the end of 1883. He was a prisoner during the period the Mahdists controlled the country. He escaped in 1895 and made a perilous 3-week journey across the desert to Khartoum. Created Pasha by the Khedive of Egypt his book was instrumental in enlisting support against the Mahdists. Following service with Lord Kitchener (1897-1898) in the reconquest of Sudan he was made the country's Inspector General in 1900 and served in that capacity until 1914. His 40 years in the country indelibly influenced its development.

Incredible as it may seem to those who do not know the history of Bahr-el-Ghazal, the veins of copper of Hofret en Nahas, which are celebrated throughout the Sudan, have never been the object of serious enterprise, although in Europe attention was drawn to them over fifty years ago (Gleichen, 1898, 1899).

TWENTIETH CENTURY

The untamed and disorderly character of the region encompassing western Bahr el Ghazal, southwestern Kordofan, and southern South Darfur during the early twentieth century was emphasized during an administrative patrol led by Governor Sparkes Pasha of the Bahr el Ghazal Province⁷. He met two Arab traders between Wau and Hofret en Nahas who alleged they had been robbed by a band of locals (Sparkes, 1903). Sparkes was the first European to visit Hofret in almost thirty years.

Natives of the area stated that no one from the Congo Free State had been at Hofret in 1894 as had been claimed (Gleichen, 1905:156 footnote). King Leopold II of the Belgians and “owner” of the Congo Free State did, however, have designs on parts of Bahr el Ghazal and southern Darfur and wanted possession of the Hofret mine. A mission of 400 soldiers was mounted, commanded by a Commandant Royaux but it did not reach the mine and returned to the Congo (Heyse, 1953).

The presence and activities of Hofret en Nahas were well known in 1903. It was said to be the only copper-producing mine in the Sudan and also to be in southwest Kordofan. At that time Darfur was an independent sultanate and not part of Sudan to which it was incorporated in 1916 after the sultan was killed in battle (Theobald, 1965).

Remoteness and lack of transport were reasons for the

⁷ William Spottiswoode Sparkes (1862-1906) was born on 4 July 1862. He joined the Welsh Regiment of the British Army on 22 October 1881. Promoted to Captain in 1888 he was seconded to the Egyptian Army in 1894 and posted to Sudan where he fought in several battles in the Second Sudan War of 1896 -1899. He was Mentioned in Despatches by Kitchener for his action in the Battle of Omdurman in 1898 (having previously been Mentioned in Despatches for the action at Dongola) and awarded the Turkish Order of Osmanieh, 4th Class. By the Egyptian Khedive. As Governor of Fashoda in 1899 he was involved in the Fashoda Incident and confronted the French under the command of Captain Jean Marchand. In 1901 Sparkes led a patrol among the NiamNiam in southern Bahrel Ghazal and acted as an intermediary to get one of their leaders to Khartoum with the objective of gaining cooperation from the local people for the Anglo-Egyptian Government and in return he received a present of 80 elephant tusks which were transported by 100 bearers (Sparkes 1901; Tuttle 2019). He commanded a detachment of the Egyptian Army in 1901 -1903 which occupied Bahrel Ghazal during which he raised the British and Egyptian flags at Wau. In April 1902 Major and Brevet Lieut -Colonel Sparkes was promoted to Colonel in recognition of his services during an Expedition in the Bahrel Ghazal Province (RUSI 1902). In 1906 Colonel WS Sparkes was appointed a Companion of the Most Distinguished Order of St Michael and St George and died shortly afterwards of ill health on 4 July 1906.



Gessi Pasha's Troops advancing to the attack on "Dem Suleiman."

Figure 4. Troops of Romulu Gessi attacking Deim Suleiman. Painting by R Talbot Kelly. Source: von Slatin, "Fire and Sword ..." [18, Guggenheim Edition].

mine being worked solely for local use with mining and smelting being on a primitive scale. Other reasons probably included disruption of trade by the Mahadiya and severe drought and serious famine in the 1910s. Prospecting had begun elsewhere in the country but, although copper had yet to be found, it was thought to be present in Suakin District (Stevens, 1903a:148; 1903b:334). Analysis of an ore sample at this time showed it to be of silicate and carbonate and not a sulphate of copper and contained 14 per cent of pure metal (Gleichen, 1905:156).

On reaching the mines Comyn was not much impressed. He described the area as containing a lot of shallow pits about thirty yards (27.4 m) across and ten to twenty feet (3.0-6.0 m) deep on an area of about half a mile square (0.8 x 0.8 km). He bemoaned his lack of geological knowledge but he bought a huge ingot of horseshoe shape, seven inches (17.8 cm) across by two inches (5.1 cm) thick which was later mislaid (Comyn, 1911:170).

To ensure that his visit would not go unnoticed he annotated a map of the country with traces of all the journeys he made during his 4 -year service in the country (Figure 7).

The mines were visited by a Burgess-Watson in 1918 who at the time was the Inspector based in Raga District

and who took rock samples with the long term objective of opening up the deposits at a future date. Between 1918 and 1922 the Nile-Congo Divide Syndicate was granted a concession and explored the Hofret en Nahas mine. The company sunk shafts and boreholes and dug trenches. No exploitation of copper took place largely because of the remoteness of the mine and the associated problems of transport but an estimate of 400 million tonnes of copper ore was made (Afia and Widatalla, 1961:5). There was further interest in the mine in 1948 and in the early 1950s (Guernsey 1948), both initiatives coming to nought (Afia and Widatalla, 1961:6). In 1961 the African Mining Corporation took a lease on the mine from which the Director of the Geological Survey Department "anticipated that some practical steps would [...] be taken to initiate the exploitation of Hofret" and that "opening of the Hofret mine would be the beginning of a sustained development in the mining industry". The Director's hopes were – regrettably – unfulfilled.

Further visits, reconnaissance trips and minor expeditions were made by various enterprises including one in 1945 by geologists of the Anglo-American Corporation of South Africa (Afia and Widatalla, 1961). The Messina (Transvaal) Development Company Ltd visited Hofret in 1952 and demonstrated that a

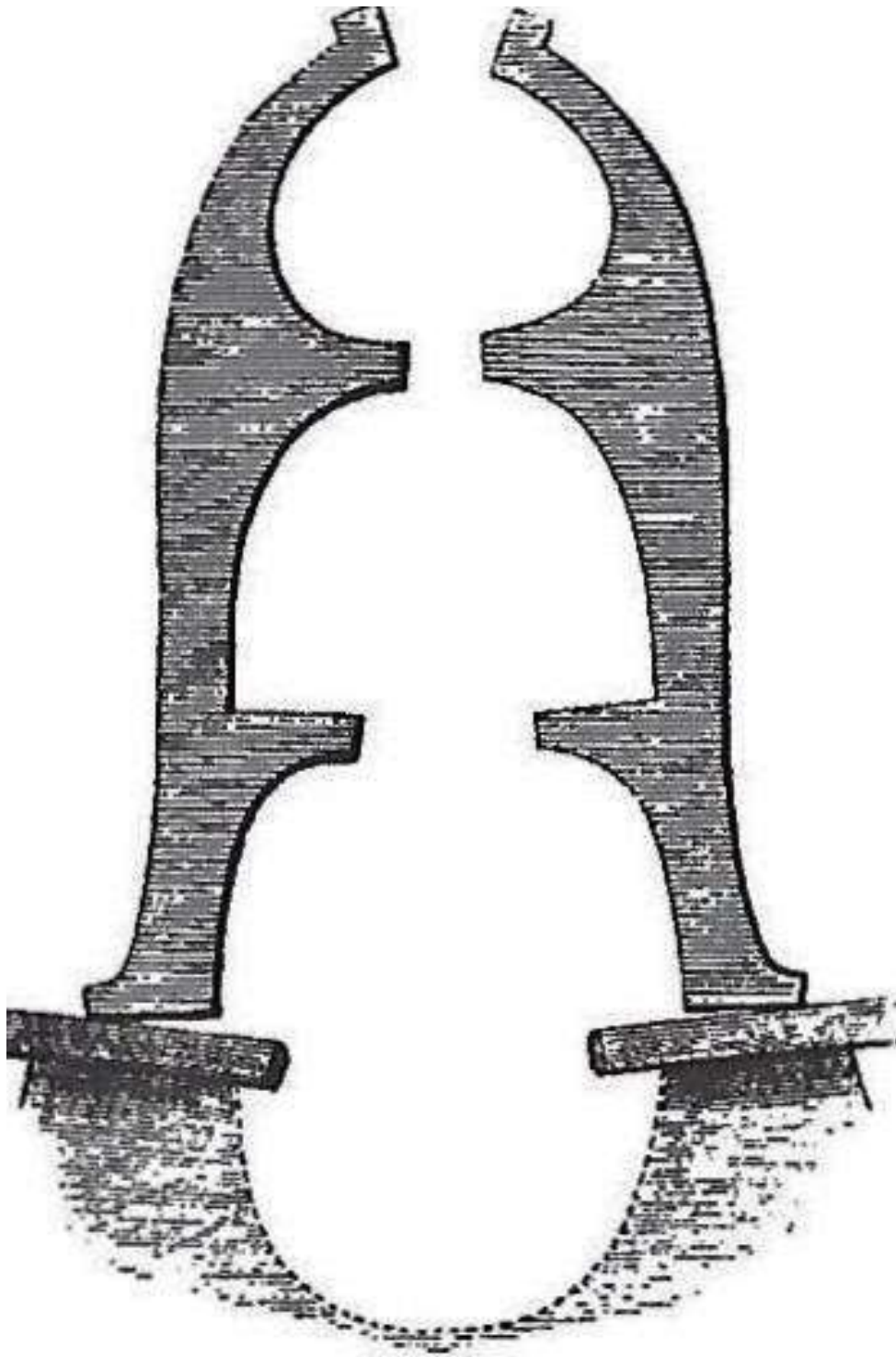


Figure 5. Sketch of a traditional smelting kiln as used at Hofret en Nahas.
Source: Schweinfurth (1874).

magnetometric survey was an inappropriate tool to establish the presence of copper ore (Afia and Widatalla, 1961;20). In 1954 a person named Maxwell McGuiness

applied for a licence to explore the mine but this was refused and in 1956 a Geological Commission from the German Democratic Republic made some observations



Figure 6. Life-size, head and shoulders of von Slatin in his Dervish dress commissioned by Queen Victoria. Portrait by Heinrich von Angeli (1840-1925) who was paid £263 5s for the portrait on 4 December 1895. Signed and dated 1895. Source: Royal Collection Trust <https://www.rct.uk/collection/405919/rudolf-von-slatin-pacha-1857-1932>.

on the Hofret deposit using a Geiger counter which indicated a high level of radio activity but made no

estimate of either radioactive material or of copper reserves (Afia and Widatalla, 1961:3,20).



Figure 7. Map of Sudan circa 1905 showing journeys undertaken by Lieutenant French-Comyn. Source: loose insert in Comyn's book "Service and Sport ..." [First Edition in author's collection].

A detailed survey of the copper deposits at Hofret was carried out by the Geological Survey Department of the Sudanese Ministry of Mineral Resources starting in 1957 (Afia and Widatalla, 1961). None of the local population had any memory of the mine being worked but many slag heaps confirmed the earlier workings. The survey proved the existence of over ten million tonnes of ore down to 500 feet containing an average of 2.78 per cent copper. It was estimated that 16 groups of former workings at the mine contained 185 377 tonnes of dumped material from earlier diggings with an average copper content of 1.53% (0.47 to 3.2% depending on the group) equivalent to 2843.68 tonnes of copper (Afia and Widatalla, 1961:114). Based on the results of 15 boreholes drilled to a depth of between 60 and 160 m by the survey the area contained 10.182 million tonnes of ore at an average copper content of 7.36% (1.318 to 8.400% in individual bores) for a total copper yield of 283 420 tonnes (Afia and Widatalla, 1961:120). Copper ores were also located over

a distance of 18 miles (29 km) in a strike running northeast to southwest.

Hofret en Nahas continued to receive mentions throughout the second half twentieth century but this was often in a political rather than a mineral production context. The authoritative USGS publication *Minerals Yearbook for 1997* (as cited in Mobbs (1997)) has only a very small section on Sudanese minerals with no mention of copper. There was slightly more information for 1999 where it is stated that a British company was exploring for copper in the Hofret en Nahas area (Mobbs, 1999).

TWENTY-FIRST CENTURY

In the middle of the second decade of the twenty-first century attempts were made to characterize and process the copper sulphide ore of Hofret en Nahas. Mineralogical examinations indicated that chalcopyrite

was the main valuable copper mineral present with associated worthless minerals including pyrite, feldspar, quartz and calcite. A flotation feed that assayed 2.7% copper produced a concentrate that assayed about 23.5% copper at a recovery of 91.5% was obtained after only one roughing and one cleaning stage (Seifelnasr et al., 2017).

A statement in the 2018 report by the Ministry of Environment of the Republic of South Sudan, that copper is being exploited at Hofret en Nahas (UNEP, 2018:252) is probably wishful thinking. The same document indicates that copper-gold ore at Hofret en Nahas, as prospected by several companies, indicates reserves in the region of 40-60 million tonnes with an indicated chemical analysis of 1-5% of copper and up to 3 g of gold per tonne and that these ores are sometimes associated with radioactive minerals (UNEP, 201:253).

The annual reports in Minerals Yearbook of the USGS fluctuate to a considerable extent in their treatment of copper resources. Thus in some years copper is mentioned whereas in others it is not. With two exceptions (Yager, 2004; Taib, 2019) in the series from 1997 to 2019 Hofret en Nah as receives no recognition with most attention being given to the cop per deposits in Red Sea Province.

A recent conference presentation which describes a newly discovered geological feature puts Hofret en Nahas firmly in South Sudan (Master et al., 2016). This geographical reference underlines the main problem of the twenty-first century and the major reason that Hofret en Nahas is often in the news. The so-called Kafia Kingi Enclave was part of Bahr el Ghazal province when then Anglo -Egyptian Sudan gained its independence as the Republic of Sudan on 1 January 1956.

In 1960, however, the area was transferred to Darfur province, Under the terms of the Comprehensive Peace Agreement (CPA) the border between north (Republic of Sudan) and south (Republic of South Sudan) Sudan is defined as the boundary line at independence (Lavergne, 2012; Thomas, 2013). Thus, as clearly provided for by writ of the CPA the Kafia Kingi Enclave, including Hofret en Nahas, should be returned to the civilian administration of Western Bahr el Ghazal state in South Sudan. In addition, the 1972 Addis Agreement defined the "Southern Provinces of Sudan" as they were at independence and thus mandated a return to the South. The size of the Enclave with its (potential) rich mineral wealth will almost certainly ensure its continued occupation by the northern Republic of Sudan. Khartoum continues to grant concessions for exploration and development of Hofret's mineral resources that are taken up by major international mining companies including the Canadian giant Billiton and companies from Qatar that have established enterprises registered in northern Sudan to ensure administrative support (Saudi Gazette, 2013).

DISCUSSION

The mine at Hofret en Nahas has been known as a source of copper ore for several centuries. Its copper was greatly valued as a cultural and economic item in western Sudan and farther afield. It was used as an object of trade as early as the sixteenth century and Hofret copper was to be found far to the west. In spite of its multiple values it has never been exploited systematically and has been subject to extraction only spasmodically by traditional and primitive techniques. There appears to have been no exploitation at all since the very beginning of the twentieth century. The mine is regularly in part involved in (and partly the cause of) local conflicts by various factions inhabiting the surrounding areas (Giraffe Conservation Foundation, 2020).

Hofret en Nahas aroused interest as a curiosity in some early European explorers from the middle to the end of the nineteenth century and was visited and inspected by officials of the Sudanese government in the first decade of the twentieth century. Serious consideration of the possibility of commercial exploitation was pursued in the 1920s but constraints to its economic development – the nearest railhead at El Obeid 200 miles (320 km) away, extremely poor access by primitive tracks for only a few months of the year, the lack of a local labour force and the feeding of any such force – were paramount and assumed primacy over any nebulous economic benefit.

In recent years political conflict and the question of "ownership" of the geographical area and thus of the copper resource itself between the (northern) Republic of Sudan and the (southern) Republic of South Sudan have prevented any possibility of rational exploitation. The northern government is keen to increase the contribution of the mining sector to the national economy to which end it has granted concessions to national and international companies and conglomerates but these have preferred to put their expertise and their money in more accessible areas and away from potential international conflict. It is unlikely that the undoubtedly valuable resource that is the ore at and around Hofret en Nahas will be exploited in the foreseeable future.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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