

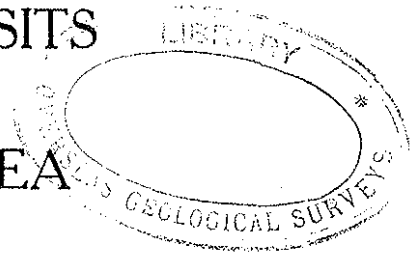


UNION OF SOUTH AFRICA

DEPARTMENT OF MINES

GEOLOGICAL SURVEY

THE GEOLOGY
AND
MINERAL DEPOSITS
OF THE
OMARURU AREA
South West Africa



An Explanation of Sheet No. 71 (Omaruru, S.W.A).

BY

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THE GEOLOGY AND MINERAL DEPOSITS OF THE OMARURU AREA, SOUTH WEST AFRICA.

CHAPTER I.

INTRODUCTION.

The area described in the following pages is situated between 15° and 16° east longitude, and 21° and $21^{\circ} 30'$ south latitude. Omaruru, which is on the narrow-gauge railway line between Usakos and Grootfontein, lies in the eastern part of the area, and forms the major social centre. Okombahe in the west is a mission station in the Damara Native Reserve while Omajette in the north is the headquarters of the Native Commissioner for the Damara and Herero Native Reserve. The area was geologically surveyed in 1927 and 1928 by Drs. S. H. Haughton, T. W. Gevers and H. F. Frommurze. During 1936 Messrs. C. M. Schwellnus and P. J. Rossouw were commissioned to revise the area, paying special attention to the portions of economic significance. Reference is frequently made in these pages to the Erongo and Karibib districts, which lie south of the area and were surveyed by Drs. T. W. Gevers and H. F. Frommurze in 1928 and by Mr. P. J. Rossouw in 1937.

The initials in brackets at the end of paragraphs or under headings refer to the contributions of the different writers of this publication.

ACKNOWLEDGEMENTS.

The writers wish to acknowledge the services of Mr. Schroeder, the Acting Mining Authority of the South West Administration, and also Mr. Linde of his office who always willingly supplied information about the situation and claim plans of the various properties. We gratefully acknowledge the help and assistance of various senior officials of the Administration for advice and guidance regarding various factors in the area.

We also wish to tender our thanks to mine-owners such as Messrs. Ortner (Kranzberg), Ganschow (Humdigams), Waldron and Simpson (Crystal tin mine), Wiedow and Burns (Paukuab); mine managers such as Messrs. Bucker (Neineis), Weber (Kohero), Grünschloss (Thelma), and various prospectors such as Messrs. Weber (Tjirundo), Oosthuizen (Kompaneno), Stoeckle (Kohero), Bremer (Okandjou), Irle (Omaruru). These gentlemen conducted us around their mining areas and helped in every way to make the survey pleasant and successful. We wish to express our appreciation to the wives of Messrs. Ortner and Ganschow who cordially welcomed us in their homes.

Discussions with Dr. W. P. de Kock, the previous Mining Authority, proved very helpful.

To Mr. Bovie, magistrate at Omaruru, and Captain Heyn, Superintendent of the Native Reserve at Omajette, we extend our thanks for advice regarding the area in general. We appreciate the help of many others as, for example, Messrs. Pesch, Bachmann, Komanns, Denecke, Brown and Etemba-Schmidt who, in one way or another, helped to make our stay in the area a pleasant one.

We acknowledge the help of Mr. F. C. Partridge, Mineralogist to the Geological Survey, for various identifications. Due mention of this officer is made in the text.

Special mention must be made of the assistance rendered by Dr. H. Merensky who placed at our disposal a special account and large scale plans, prepared for him by Drs. Korn and Martin, of the Kranzberg tin and wolfram deposits, and who gave full permission for the incorporation of part or of the whole of this work in the present report. Full use has been made of Dr. Merensky's generosity in this regard. (C.M.S. & P.J.R.)

CHAPTER II.

PHYSIOGRAPHY.

MORPHOLOGICAL FEATURES.

The area embraces two very distinct types of country, there being a marked difference between the western and eastern portions. The eastern part is densely clad with bush; the western portion is an arid desert. A stretch of country of variable width exhibiting intermediate characters separates the east from the west. In the surroundings of the Erongo mountains the eastern bush-clad type of country protrudes for a considerable distance into the transition belt, owing to the higher rainfall induced by the mountains.

1. *The Namib*.—The portion west of Neineis and Humdigams (B, 1) is part of the coastal desert of South West Africa, generally known as the Namib. Although the Namib desert is practically devoid of rainfall and derives its moisture almost entirely from heavy mists which creep far inland, the interior parts of the desert are not infrequently refreshed by episodic downpours. The most common plants are the Bushman's Candle (*Sarcocaulon burmanni*), Narra (*Acanthosicyos horrida*) and various species of *Mesembrianthemum*. In the eastern transitional zone, in which the Namib merges by almost imperceptible gradations into the shrub and grass-steppe of the interior, xerophytic plants like the milk-bush (*Euphorbia candelabra*) are frequently found in great abundance as, for instance, around Neineis, Nobgams, and Humdigams (B, 1). Shrubs and acacia trees grow along the dry river courses. Herds of springbuck thrive on the desert grass which has a high food value.

The Namib everywhere rises fairly rapidly towards the interior and, in the area under review, has the character of a gently-sloping waste-floored plain, surmounted by occasional ranges of hills of characteristic jagged outline, half smothered in their own debris, and by isolated eminences of "inselberg" type. Long dark ridges of diabase as, for example, the one at Paukuab (B, 2) stand out above the waste-plains.

The eastern portion of the Namib, along the edge of which a number of tin fields such as Neineis, Humdigams, and Tsomtsaub (B, 1) are situated, is characterised by wide expanses of almost level country. Sand, surface limestone, rubble, detritus and, more seldom, barren rock form the surface. Wide, shallow depressions mark the courses of dry sand-filled river beds.

2. *The Transitional Belt.*—This area is characterised by a gradual increase of vegetation. Outcrops of the underlying rocks become more numerous and the superficial covering of sand, surface limestone and debris does not attain such a thickness as further west. The sand-covered depressions marking the positions of dry river beds are fairly well covered with bush and smaller acacia trees. In years of good rainfall grass is abundant.

The transition zone consists of wide expanses of undulating shrub-steppe with zones of thicker vegetation. Bigger trees include *Acacia albida*, *A. horrida*, *A. giraffae*, *Tamarix austro-africana*, *Euclea pseudebenus* and *Zizyphus mucronata*.

Numerous tors, chiefly made up of granite domes, dominate the bush-clad plains. Ridges of diabase, porphyrite and crystalline limestones are numerous south of Okombahe (B, 2). The schists along the banks of the Omaruru river are deeply dissected by gorges and gullies.

The eastern limit of the transitional zone may be taken roughly as an imaginary line drawn from Omajette (A, 3) to Okombahe Kop (B, 2). (See page 12, plate 1.)

3. *The Plains of Northern Damaraland.*—These consist of vast expanses of almost level bush and tree steppe, broken by numerous isolated eminences of the inselberg type, one of the highest of which is Omaruru Kop (B, 4) (4,875 feet) just east of the town of the same name. Kranzberg (B, 4) on the southern border of the map and about 14 miles south-west of Omaruru (B, 4) reaches a height of 5,564 feet (see plate X). The berg is an outlier of the Erongo sediments and melaphyres. The Kompaneno-Tjirundo (A, 4) mountains, some 12 miles north of Omaruru (B, 4), are the most important mountain ranges in the area. Their structure is that of a compound dome of complex nature, made up of marbles, schists, and intrusive granites. Particularly prominent in this mountain range is a narrow belt of highly aplitic, weather-resisting granite, which forms the highest eminence, viz., Okongue Peak (A, 4) (5,800 feet).

The Marble horizons of the Fundamental Complex usually form conspicuous ridges. In the great plains north and west of the Erongo

mountains, marble ridges, though still marked by elevated ground, have mostly been planed down. In the area south of Tsomtsaub and Neineis (B, 1) and west of Okombahe (B, 2) increased erosion by tributary streams of the Omaruru river has led to a remodelling of the surface and a renewed prominence of the Marble horizon.

PLATE I.



Photo by]

[C. M. Schwellnus

FIG. 1.—The flat sandy bed of the Omaruru river just east of Okombahe. A prolific growth of Ana-trees (acacia) is in the background. The view is taken eastwards.

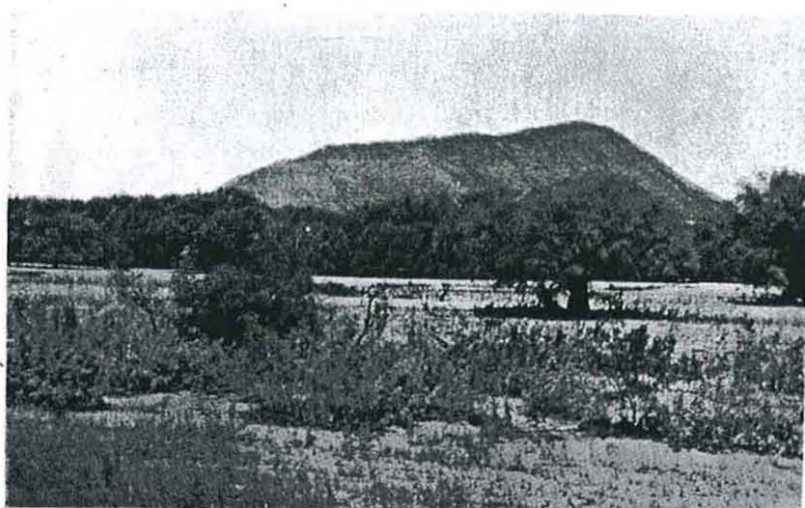


Photo by]

[C. M. Schwellnus

FIG. 2.—The broad dry course of the Omaruru river near Okombahe with the Okombahe "Berg" in the background as viewed from the north-west.

DRAINAGE.

The area is drained by the Omaruru river and its tributaries. The rivers are not perennial streams and flow only after a substantial rainfall. For the rest of the year the rivers are dry sandy water-courses. (See Plate IV.)

RAINFALL.

The rainfall of the eastern portion of the area is fair, but is considerably less towards the west. Proceeding from the east to the west along the Omaruru river, the average annual rainfall at Omaruru (B, 4) for the last 15 years, omitting torrential rains in 1924-25 and 1933-34, is 206.6 mm. and at Okombahe (B, 2) (40 miles west) 108.2 mm. Still more interesting are the figures for the northern parts of the area. Thus at Weissenfels (A, 4) the average annual rainfall is 281.7 mm. (1926-1936), at Etendero (A, 4) 236.2 (1920-1936), at Molkenhof (A, 3) 245.2 mm. (1920-1935) and at Omajette (A, 3) 165.3 mm. (1932-1936). Great fluctuations in the rainfall frequently occur. In the rainy season of 1933-34 it amounted to 858.2 mm. at Omaruru (B, 4), while for the previous season the corresponding figure was 117.9 mm. and for the following season 255.2 mm. Over a period of 15 years (1922-1936) the maximum annual rainfall at this locality was 858.2 mm. and the minimum 90.7 mm. The rainy season is very short and lasts from November to April.* (T.W.G. & H.F.F.)

WATER-SUPPLY.

In spite of the absence of surface water, except for short periods, the beds of the Omaruru river and its tributaries are wide and filled with sand and gravel of considerable thickness. On account of the porous nature of the sand and gravels they contain large quantities of underground water at shallow depths even during times of drought. Numerous springs occur at intervals in the bed of the Omaruru river. Open water is invariably connected with the presence of natural barriers such as diabase and pegmatite intrusions in the river bed as at Omaruru (B, 4), Okombahe (B, 2), and Aubinhonis (B, 1). Powerful springs with flowing water occur south-west of Neineis (B, 1) where the broad river bed suddenly narrows and cuts through marbles and granites, thus forcing the groundwater to the surface. Water is also obtained from wells sunk along the banks of the Omaruru river. Thus Humdigams (B, 1) draws the supply of water required for the dressing tables of a plant connected with a six-stamp battery from a single well dug at little cost into the sand bed of the Omaruru river. (T.W.G., P.J.R. & C.M.S.)

Water is very often associated with granite "banks". This term is applied to prominent cupolas or low outcrops of granite rising above the thick covering of sand. These banks occur especially in the western part of the area, as at Amasbank (A, 1), Jakobsbank (B, 1), Wolfsbank (B, 2), and Kaukausib (B, 1). Frequently waterholes

* Extract from data obtained by the Meteorological Department, Windhoek.

occur in the sand-filled clefts of these banks. The clefts usually go down to levels considerably lower than the surrounding sand-covered plain. The water-holes of this nature are generally not permanent but dry up rapidly after the rainy season. (T.W.G. & H.F.F.)

The experience gained by boring operations carried out by the Irrigation Department of the Administration has shown the schists of the Fundamental Complex to be a very unsatisfactory formation in which to drill for water. While good results have been obtained here and there, the results on the whole have been disappointing. (T.W.G.) In the schists, the marble beds are undoubtedly the best formation for sources of underground water. The majority of boreholes, which are very few in number in this area, are generally on the banks of or in broad sandy river beds. The water from such boreholes seems to represent sub-surface waters connected with the river course and not water pertaining to the formation in general. (T.W.G. & H.F.F.)

On the farms Kompaneno Süd No. 59 (B, 4) and Tjirundo Süd No. 149 (B, 4) boreholes in crystalline limestone yield copious quantities of water. The boreholes are situated on ridges about 500 feet above the level of the nearest dry river course. The borehole on Kompaneno Süd (B, 4) is 108 feet deep and even after the severest droughts no appreciable lowering of the water level has been recorded. (C.M.S.)

It is very probable that better results may be obtained if boring sites be selected at places where synclines in the ancient formations form natural basins in which the groundwater can collect. Good results have been obtained by boring into granites that are well fissured or decomposed to considerable depth, especially if such granites occur in or near the banks of sand-filled river beds. (T.W.G. & H.F.F.)

CLIMATE.

The climate of the area on the whole is healthy, the air being excessively dry. There is a great difference between the temperatures of day and night, the nights being markedly cool. The heat becomes oppressive only in the months of October and November before the rainy season sets in. The arid western portion round Neineis (B, 1) is subject to fogs during late spring and the summer months. The entire area, particularly the west, is rather wind-swept. From May to September a strong and cold east wind may blow uninterruptedly for days or even weeks. (T.W.G.)

CHAPTER III.

DESCRIPTIVE GEOLOGY.

INTRODUCTORY.

Disregarding the superficial deposits, both igneous and sedimentary rocks belong to two widely separated geological periods, for while the majority represent some of the most ancient rocks known in South Africa, the others are, in comparison, very youthful.

GEOLOGICAL FORMATIONS.

The following shows in tabular form, in ascending order of age the various geological formations and intrusive rocks encountered in the area :—

C.	Recent Deposits of Sand and Surface Limestone.	
B. 2.	Intrusive and Extrusive Rocks of the Erongo Succession.	{ Erongo Granite. Dykes of Quartz Porphyrite, Quartz Porphyry and Granite-Porphyry.
		{ Dykes and Flows of Diabase and Dolerite.
	1. Karroo System ?	{ Erongo Sediments.
A.	Fundamental Complex	{ 2. Old Granites intrusive into the Damara System. { Pegmatites. Pegmatitic Granite. Aplitic Granite. Non-porphyritic Granite.
		{ 1. Damara System. { Salem Granite. Khomas Series. Marble Series.

A.—FUNDAMENTAL COMPLEX.

The Fundamental Complex is exposed over enormous areas throughout the whole of South West Africa. It consists of ancient gneissoid and granitic rocks, schists, quartzites, crystalline limestones, and other more or less metamorphosed sediments. The task of unravelling the stratigraphical succession of its sedimentary components presents great difficulties, but they are also usually so completely interfolded that unconformities, which no doubt exist, have to a large extent been obliterated.

Investigations in the region between the Khan and Swakop rivers have proved the existence of at least two groups of ancient rocks : an older one, the Abbabis system, separated by an unconformity from a younger group, known as the Damara system. In the area under discussion the ancient rocks appear to belong mostly to the Damara system,⁽¹⁾ though the possibility of members of the Abbabis system occurring interfolded with the latter cannot be discarded, since similar rock-types are found in both groups. (T.W.G.)

I. THE DAMARA SYSTEM (BEETZ : KARIBIB BEDS).

In this area a great thickness of mica schists forms the highest represented group of the Damara system, and is followed in descending order by the Marble series. The Quartzite series, which is the lowest member of the Damara system, does not occur anywhere in the area, its stratigraphical place being taken by mica schists and greywackes underlying the marble horizon.

(a) Marble Series.

Bands of crystalline limestone are very common in the sediments of the Damara system. Apart from the Marble series they also occur intercalated in the quartzite, and more abundantly still in the Khomas series. The majority, however, including a main band frequently over a thousand feet in thickness, are situated within a definite marble

⁽¹⁾ T. W. Gevers : Comparative notes on the Pre-Cambrian of Fennoscandia and South Africa. Extrait C.R. Soc. géol. Finlande No. 9, 1934.