UNION OF SOUTH AFRICA

DEPARTMENT OF MINES AND INDUSTRIES

GEOLOGICAL SURVEY

THE GEOLOGY

OF THE

COUNTRY SURROUNDING VRYHEID

An Explanation of Sheet No. 102 (Vryheid)

BY

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Coal :—

Schaapkopje No. 194	4,800	feet.
Nooitgedacht No. 388	4,800	,,
Hlobane	4,240	,,
Veelsgeluk No. 71	4,000	,,
Mooiklip No. 238	4,250	,,
Tochgevonden No. 33	4,100	,,
Riversdale	4,330	,,

(*c*) Heights obtained from aneroid readings, based upon the altitude of Vryheid East Railway Station (L.J.K., 1931) :—

Inyate Mountain (Trig. beacon)	5,400	feet.
Hlobane Mountain	5,350	,,
Shongololo Mountain	5,050	,,
Ngotshe Mountain (Trig. beacon)	±4,700	,,
Louwsberg	4,200	,,
Manzimhlope River in central part of Fortuin No. 491	2,500	,,
Leeuwnek (nek)	4,400	,,
Tshoba River drift on Vaalkop No. 21	3,600	,,
Lenjane Hotel	3,100	,,
Bridge over Sandspruit (Insegeni River) on Goedgedacht No. 273	3,250	,,
Bridge over Black Umfolosi on Ekuhlengeni No. 701	1,900	,,
Drift across Hloyan River on Ekuhlengeni	1,850	,,

3. Drainage.

The main drainage basins are those of the Pongola River in the north of the sheet and the Black and White Umfolosi in the southern portion. Breaking up the central watershed is the basin of the Umkuzi which is a river of less magnitude than either of these. In the south-western corner of the sheet the Blood River drains a portion of the area. It belongs to the basin of the Buffalo River.

The Pongola River itself lies wholly to the north of the sheet, but its principal tributary, the Pivaan, flows in an easterly direction across the north-western portion of the area. It joins the Pongola some 5 miles north of Doornkraal No. 504, which is situated on the northerly edge of the sheet. The Pivaan valley is picturesque and somewhat broken, although the portion of it falling within the sheet is neither rough nor inaccessible. Its principal tributary on the south is the Manzaan River, which rises in the Zoenguin Mountains. It receives affluents from the northern slopes of Hlobane and Shongololo and runs through rocky and precipitous gorges in its lower reaches, joining the Pivaan on Dipka No. 590, Vryheid.

A good deal of water is carried down to the Pongola by the Itala River which rises on the northern slopes of Gobeni and of Ngotshe

Mountain, and joins the Pongola a few miles below its junction with the Pivaan. The basin of this tributary is open and gently swelling in character.

To the east of the Itala River only the upper reaches of the tributaries of the Pongola fall within the limits of the sheet. They descend from the high ground of Ngotshe and Nyalisa, with a very steep gradient, the northern edge of this high ground consisting of kranzes formed by the dolerite sheets which are interbedded with the shales and sandstones of the Karroo system developed over this portion of the area.

The streams forming the headwaters of the Umkuzi River take their rise on the eastern slopes of Hlobane and the northern side of Ngwibi. They flow through wide undulating valleys over rocks of the Natal Coal Measure Series. These valleys get gradually deeper and more broken until in the neighbourhood of the junction of the two main rivers on Ontevreden No. 124 (Ngotshe). Here the valley becomes considerably deeper and bush makes its appearance. To the north of Enhlomohlome the river enters a series of rocky defiles through which it emerges into the lowveld.

The Umkuzi River carries a considerable flow of water, receiving perennial streams from the slopes of Ngwibi and Ngome Mountains on the south, while Ngotshe furnishes several tributaries carrying a constant supply on the north. The most considerable tributary east of Ontevreden No. 124 is the Manzimhlope, which joins it on the farm Mooiplaats No. 255 (Ngotshe).

In the area under consideration the White and Black Umfolosi Rivers form two distinct drainage areas, only joining their forces considerably to the south-east of the area. The Black Umfolosi rises on the southern slopes of Mt. Ngwibi, and the north-easterly face of the Inyatiberg. It receives affluents from the south-eastern slopes of Thabankulu. Its upper waters flow in an easterly direction through a shallow valley until they reach the dolerite kranzes on the farm Mademoiselle No. 123 (Vryheid), where a series of falls bring the river almost down to the level of lowveld. To the east of Thabankulu the valley of the river is wide and spreads fan-like up into the mountains. It becomes contracted again as it passes to the south of Ceza and so out of the area.

The Isikwebesi forms part of the drainage area of the Black Umfolosi. It occupies a low and deeply eroded valley between the Ngome and Ceza Mountains. It joins the Black Umfolosi immediately after leaving the eastern boundary of the area.

The White Umfolosi is the largest river traversing the area being described. It rises on the top of the Schurveberg, descending from its south-easterly face by a fine waterfall on the farm Waterhoek No. 61 (Utrecht). It flows in a south-easterly direction, receiving the Makoti River immediately to the south of Vryheid. Its valley is a fairly wide one, flanked on the south by a range of hills of moderate

height, which separate it from the valley of the Insegeni, its most important tributary, which follows an almost parallel course further to the south. They unite on the farm Vergenoeg No. 570, just outside the limits of the sheet.

The Tshoba River, rising south of Almans Nek between Hlobane and Zoenguin, joins the White Umfolosi on the farm Wiemansrust No. 549 (Vryheid). Just before entering the Umfolosi this stream flows through a very broken tract of country, its upper course being over a wide sandy valley.

The Blood River rises in the high ground to the south-east of Utrecht and enters the area on the farm Weltevreden No. 182 (Utrecht). After leaving the hilly country west of the Schurveberg, it receives two considerable tributaries from those mountains, and continues its course on the sandy plain lying on either side of the railway in the neighbourhood of Blood River Station, meandering in a sinuous course with but little fall, and finally leaving the area to the south-west of Kandi Mountain.

The area is very well watered throughout, all the principal streams and their tributaries having a perennial flow.

4. Mineral Springs. (L. J. K.).

Three well-known mineral springs, warm, tepid, and cold, respectively, occur in close proximity to each other on the banks of the Pivaan River, north of Vryheid. They are highly valued for their supposed medicinal qualities and are visited by many people from the surrounding districts every year, especially during the winter. They were described by Molengraaff as follows :—*

> " The hot springs of the Pivaans River well up through joints in the granite. There are three distinct springs. The first, known as the Pivaans Warmbad, is situated on the farm Koubad No. 191, on the left bank and so close to the river that in times of flood it is quite covered. There a powerful stream of water at a temperature of 42·5° C. (108·5° F.) issues from between large rounded boulders of granite. The second spring, the Pivaans Loubad (tepid bath), lies opposite the first, and at a short distance from the right bank of the river, on the farm Pivaansbad No. 533. The water issues at a temperature of 40° C. The third spring, the Pivaans Koubad (cold bath), is situated on Koubad, at a distance of about 50 metres from the warm bath. Here the water bubbles up in a low-lying more or less swampy spot, and when I visited it the temperature of the water was 18° C. only. The odour of sylphuretted hydrogen was distinctly perceptible at all three springs; their chemical composition is almost identical, as may be seen from the following table showing the results of analyses made by the State Analyst, Dr. Schmidt-Dumont, in which the amounts are given in grams per litre.

* Annual Report, *Geol. Survey S.A. Republic for* 1898, English Translation (1903) p. 19.

	Warmbad.	Loubad.	Koubad.
	Gr.	Gr.	Gr.
KCl	0·1290	0·0885	0·1295
K_2O	0·0320	0·0755	0·0357
CaO	0·0120	0·0110	0·0090
MgO	—	—	—
Al_2O_3	0·0090	0·0130	0·0120
Fe_2O_3	0·00007	0·00002	0·00005
SiO_2	0·09400	0·0820	0·0880
CO_2	trace	trace	trace
H_2S	trace	0·0030	trace

No trace of SO_3, N_2O_5, N_2O_3 or NH_3.

The following information about the two springs on Koubad is given by M. M. Rindl,* who classes both as sulphur springs :—

"The gas emanating from the hot spring was found to consist of :

Carbon dioxide	7·39 per cent.
Oxygen	0·65 ,,
Nitrogen	91·96 ,,

Tables of Ion Equivalents.

HOT SPRING.

Cations.		*Anions.*	
Na	0·285	Cl	0·108
K	0·015	SO_4	0·045
Mg	0·005	CO_3	0·153
Fe	0·0005		
Ar	0·015		
TOTAL	0·3205	TOTAL	0·306

COLD SPRING.

Cations.		*Anions.*	
Na	0·174	Cl	0·131
K	0·111	SO_4	0·028
Ca	0·011	CO_3	0·138
TOTAL	0·296	TOTAL	0·297."

Both these analysis were performed by T. Perrin in 1897. Rindl also observes that the analyses of all three springs included in Molengraaff's report are obviously incomplete, in view of the preponderance of basic over acid ions, and that the absence of sodium in them is remarkable.†

* M. M. Rindl, "The Medicinal Springs of South Africa," *S.A. Assocn. for the Adv. of Science*, Report for 1916, p. 539.

† M. M. Rindl, "The Medicinal Springs of South Africa—Supplement II," *S.A. Journal of Science*, Vol. XXV, 1928, p. 120.