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DEPARTMENT OF MINES AND INDUSTRIES

GEOLOGICAL SURVEY

THE GEOLOGY

OF THE

MAJOR PORTION OF EAST
GRIQUALAND

An Explanation of Cape Sheet No. 35 (Matatiele)

BY

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The Geology of the Major Portion of East Griqualand.

I.—AREA.

THE territory embraced in the accompanying Map consists of part of the Division of Mount Fletcher, the whole of Matatiele, most of Mount Currie and small portions of Mount Frere, Mount Ayliff, and Umzimkulu—a region currently spoken of as "East Griqualand." Bounded on the north-west by Basutoland and on the north by Natal, it covers 3,257 square miles. About two-thirds of this tract has been cut up into farms, though there are several large unsurveyed native locations in Matatiele, but the remainder is still undivided, which has necessitated the making of a topographical map on a scale of 800 Cape rods to the inch (about an inch to the mile), based on the beacons of the Secondary Triangulation.

II.—PHYSICAL FEATURES.

Outstanding is the great mountain barrier made by the Drakensberg, "The Berg," that constitutes the boundary between East Griqualand and Basutoland. It trends a little east of north to a point just beyond Ongeluks Nek, where it bends sharply to a course a little north of east, curving beyond that in a north-easterly direction. In the south the crest is fairly regular and never falls below 8,000 feet above sea-level, the following heights having been accurately measured thereon:—Lehana's Pass 9,258 feet, Thatsana 9,675 feet, Ongeluks Nek 9,508 feet, and Draken's Rock 8,941 feet. Beyond this the general level falls considerably and the crest is more serrated, with several passes leading over into Basutoland. As prominences we have the Twins 8,818 feet, Makomering 8,453 feet, Nquatsha's Nek 7,115 feet, Montai 8,157 feet, and Mount Fred 8,257 feet. Beyond this spot sedimentary rocks are mainly responsible for the escarpment, which has a more even sky-line; on it are situated Hlangweni North 7,869 feet, Thule 8,323 feet, and Watershed 8,184 feet.

Long narrow spurs extend out from the Berg with fairly even crest-lines seldom falling below 6,000 feet, which are parted by gorges that are frequently narrow and difficult of access. The most important of such spurs is the ridge stretching in a southerly direction through Sibi's Location almost to Matatiele and terminating in the flat-topped Mungunnung, 6,540 feet, with precipices overlooking the Cedarville Flats.

South of Matatiele rises a fine precipitous mountain block cut off by the deep valley of the Kenigha River from the Lady Kok Range, culminating in the Jumbla, 7,518 feet, and sending out two long

narrow rugged arms, with the Mvenyane Valley in between. The southern one terminates just beyond Alartfontein, 6,076, but the western one joins up with the Inungi Range that separates the Mvenyane from the Umzimvulu River, and across it the road from Cedarville to Mount Frere has to climb. The gabbro forming the Inungi Range is practically continued into the Nolangeni, 6,610 feet, for the narrow ravines of the Umzimvubu and Umzimhlava that cut through it are almost unnoticeable even at a short distance. Between Kokstad and Cedarville rises an isolated block of mountains some dozen miles in width culminating in Mount Currie, 7,296 feet, and the Bokberg, 7,096 feet, composed of intrusive rock. Another rugged mass lies to the north of Franklin and constitutes the water-shed between the Umzimvubu and the Indowana Rivers, the highest point being the dolerite-crowned Zwartberg, 7,615 feet.

Unique indeed is it to find in the midst of this extremely broken ground the Cedarville Flats forming the only considerable extent of plane country in the Transkeian Territories. Speaking roughly, they cover about 90 square miles and are hemmed in by ranges on the south and east and by small hills on the west and north. On the north-east a broad but low sandstone divide cuts them off from the flat-floored swampy valley of the Umzimhlava River, which, between Zwartberg and Franklin, flows in numerous crinkles southwards towards Kokstad. South of New Amalfi down to the road bridge near Cedarville the Umzimvubu winds across this broad plain in remarkable loops with numberless "cut-offs" that have developed into pools and marshes. A tongue of the flats extends westwards to within a few miles of the town of Matatiele, which is situated in a gap through the mountains, while shortly beyond, almost as its continuation, is found the broad alluvial plain of the upper Kenigha, and the Mabele River stretching westwards for 20 miles to the very foot of the Drakensberg.

These physiographical peculiarities suggest an old drainage system that extended from Ongeluku's Nek past Matatiele, Cedarville, and Franklin, dismembered by quite recent crustal warping.

The rainfall varies from 30 to 40 inches per annum and the country is nearly all grassland, but thornbush characterises the very lowest ground, such as along the lower parts of the Kenigha and Mvenyane Valleys. Small patches of valuable forest flourish along the southern and eastern faces of a number of the ranges away from the Berg, e.g. Jumbia, Mvenyane, Inungi, Mount Currie, Insikeni, and Umgano. Some of the higher sandstone ridges towards, and also well in below, the Drakenberg support considerable numbers of Proteas, which are valuable for fuel. The face of the Berg is practically devoid of timber, and even grass is scanty in its upper section, which is not at all surprising since the mountains are frequently decked with snow during the winter months.

III.—GEOLOGICAL STRUCTURE.

The following is the succession, and since the strata have a general though very low dip towards the Drakensberg and the latter overtops the country lying towards the south-east, the several divisions, of the Karroo system form belts running nearly parallel

particularly is this the case on the eastern side of the river. Much of this is indeed a yellow sand that has apparently been blown out from the bed of the Umzimvubu, as can be deduced, for instance, near the road-bridge; it tends therefore to conceal the solid geology along the eastern borders of the plain. Yellow drift sands of this nature, though fixed by grasses, occur along the main road below the great mass of the Bok Berg and also on Bad Fontein to the north of the railway.

Alluvial soils, brownish or blackish in colour, are extensively developed about the headwaters of the Kenigha River; especially along the Mabele, where they are much cultivated.

XIII.—SPRINGS.

Since the region possesses a high rainfall, the larger rivers are perennial and most of their tributaries carry water during the greater portion of the year. The natural supplies have hence been adequate for farming, though during the past five years a certain amount of boring has been done to provide permanent contributions at desired spots.

The large dolerite masses intersected by many joints, with their aprons of fallen dolerite boulders and débris, constitute ideal formations for storing up the rainfall, and many of the small streams arising in such country have strong flows all the year round. The beautiful town supply of Kokstad forms a good example. That of Cedarville is a spring issuing on the eastern side of a dyke descending the mountain behind the town, which is flanked by two similar intrusions.

The area is, however, noteworthy for several springs, from which water issues at more than normal temperature. The well-known sulphur spring at Kenigha Drift emerges close to the left bank of that river with a temperature of 29.2° C. (84.6° F.) (May, 1914), the water being rich in sulphuretted hydrogen, though not much mineralized. It appears alongside a prominent dolerite dyke that can be traced for many miles, and is located apparently on the western extremity of the big fault coming from Weltevreden, as would seem to be indicated by a zone of coarsely crystalline yellowish calcite nearly ten feet in width, alongside which the warm water issues. A second spring emerges along the same dyke on the same bank of the Kenigha just below the church at Bethesda and has the same peculiarities. A third bubbles up in the river bed a few yards above the road drift at Kenigha and, though mixed with stream water, has a temperature of about 24° C.; no rock is exposed along the channel at this point.

On the farm Inungi, at three localities in the bed of the Umzimvubu River, warm chalybeate water bubbles out. At the Wagon Drift it issues at 12° C. from a tiny crater and deposits ferric hydrate.* One and a half miles farther downstream, over a distance of fully 100 yards, bubbles of gas rise from joints in the dolerite bed, while gas and water issue from hollows on the right bank; the temperature of the principal spring is 24.8° C. Orange-coloured mud

* *Union Geol. Survey, Annual Report for 1913*, p. 101: The analysis of the water is given by Rindl. *S.A. Journal Science*, Vol. XIII, p. 528, 1917.

is being formed on the right bank, while on both sides, though principally on the left, there is a hard calcareous, and in places ochreous spring deposit in course of formation.

On Nooitgedacht, near new Amalfi, three springs issue within a circle 60 feet across on the left bank of the Umzimvubu. The water is a trifle warmer than that of the river and is slightly mineralized, while the gas therefrom contains a little sulphuretted hydrogen.

XIV.—ECONOMIC GEOLOGY.

Up to the present it unfortunately happens that the prosperity of the country remains entirely dependent upon its agricultural pursuits, which are by no means inconsiderable; no mineral discoveries of any note have yet been made in it.

On the farm Nahainkwe a seam of coal has been opened up showing the following section:—*Coal* 9 inches, sandstone 3 inches, *Coal* 12 inches, compact carbonaceous "splint" or torbanite 14 inches, resting on carbonaceous shales. The lower coal gave on analysis 25 per cent. of volatile hydrocarbons and the same proportion of ash, while the torbanite yielded the equivalent of about 25 gallons of oil to the ton. Another occurrence, very probably on the same horizon, opened up at the head of the Inyonga River, shows an 8-inch layer of impure coal in carbonaceous shales, while there are indications that this band may also be present behind the homestead on Kingston. It is rare that this horizon—just below the Indwe Sandstone—is naturally exposed in this region, and there is hence scope for prospecting, though it must not be overlooked that Natal coal can now be delivered by rail into the heart of the area at a fairly reasonable price.

The kimberlite of East Griqualand has so far not been proved to carry diamonds in payable amounts, while much of the blue ground in the several pipes is undoubtedly a very refractory hardbank. There is, however, no reason why a productive mine should not be discovered in the district.

Building stone is abundant, while the sandstones of the various Karroo sub-divisions are extensively quarried to provide fencing posts, an important matter in an area frequently swept by grass fires. Limestone is rare, but the calcareous tufa on the farm Inungi has been locally used for lime. Sands suitable for concrete are unknown in the eastern part of the area, though obtainable from streams draining tracts of Molteno Beds. Some of the crumbly-weathering dolerite has proved a satisfactory substitute, when the rock is not too highly decomposed; a preliminary screening and washing of the material is of advantage, however.

Road metal is abundant owing to the ubiquity of dolerite, the partially weathered dykes furnishing the most satisfactory dressing. For the same reason water can generally be obtained at relatively shallow depths by boring, advantage being taken of such barriers to the flow underground. The argillaceous nature of the Upper Beaufort Beds and Red Beds is, however, adverse to large supplies being cut. Much boring nevertheless is likely to be needed in the near future, mainly for domestic or stock purposes.