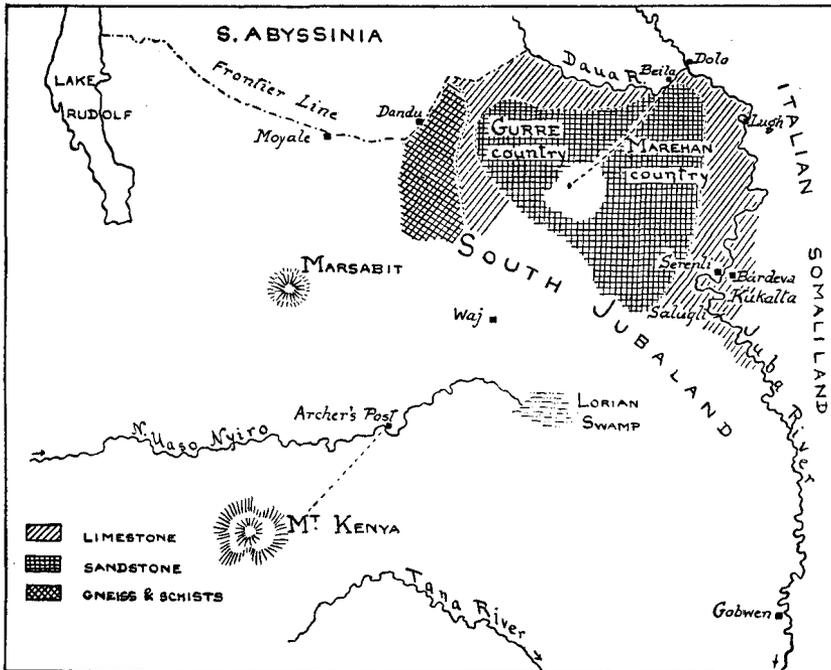


A SHORT ACCOUNT OF THE SEDIMENTARY ROCKS
 FOUND IN THE NORTHERN FRONTIER DISTRICT
 —KENYA COLONY

BY V. GLENDAY, M.A., F.G.S.

The Northern Frontier District proper comprises the country which lies between the left bank of the Northern Uaso Nyiro and the Abyssinian Frontier stretching east-



wards from Lake Rudolf through North Jubaland to the Juba River.

This somewhat remote and turbulent area is of great interest geologically, containing, as it does, Lake Rudolf (part of the eastern arm of the Rift Valley), the great Archean complex of gneisses and schists which form the Abyssinian

escarpment proper, and the volcanic mountain of Marsabit with its circumambient plains of lava.

Not the least interesting feature, however, is the great development of sedimentary rocks which have been found to exist on the eastern portion of the district, and to stretch south-eastwards towards the sea, disappearing before reaching the latter under the alluvial plain of South Jubaland.

As one of the first persons to have the opportunity to study this series, it is my intention to try and give a short account of their extension and mode of occurrence. As, however, all my field notes and specimens are at present in England for the purpose of identification and detailed study, it will be remembered that this account can only be of a general descriptive tentative nature.

To an observer standing on Dandu, one of the eastern points of the Abyssinian escarpment, and looking southwards, a very striking contrast in scenery is noticeable. To the west are to be seen the characteristic 'monadnockic' hills of gneiss jutting out of the bush-clad plains, whilst to the east a low, gently undulating scarp is observed, behind which the country dips gently to the S.E. The latter is approximately the western outcrop of the sedimentary rocks, and occurs on the western section of the Gurre country.

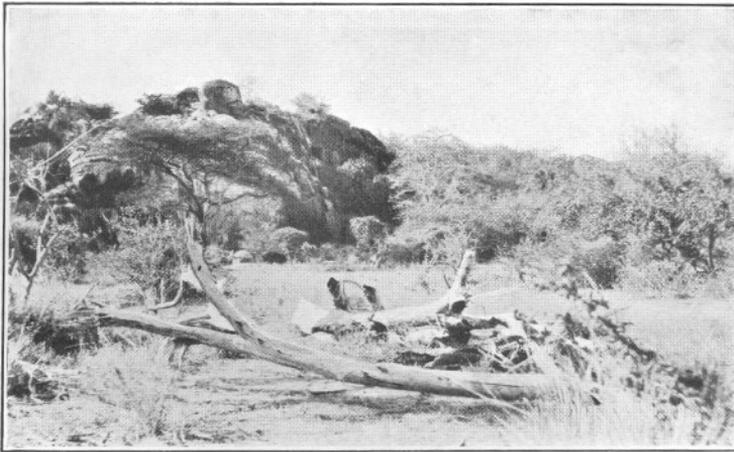
The rocks can be easily divided into a limestone and sandstone series, both of which are generally flat-bedded or dip gently to the S.E.

THE SANDSTONES

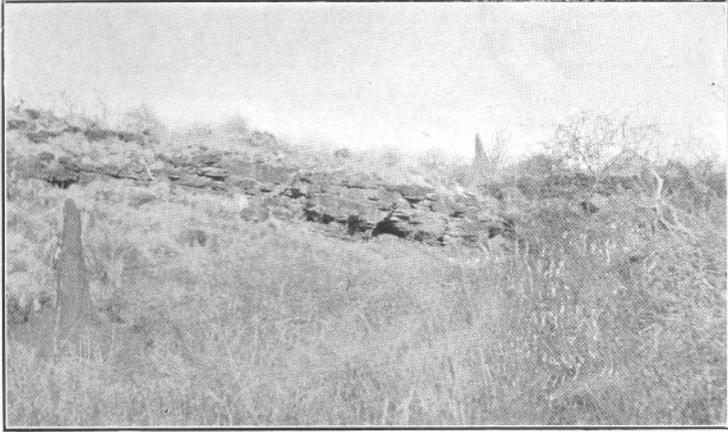
These are massive and fine-grained, of a deep reddish colour, showing occasionally striking patterns of bands of colours varying from black and purple to a light ochre. This is very noticeable at Dakka Dima (meaning red rocks) on the W.N.W. of Eil Wak. They suggest an origin from the decomposition of the ancient gneisses and schists. The sandstones stretch as a broad band across the Gurre country eastwards to the Juba River, thickening to the N.E., but they do not outcrop northwards on the Daua River until Beila is reached. Southwards they extend below Serenli and seem to disappear N.E. of Salugli.



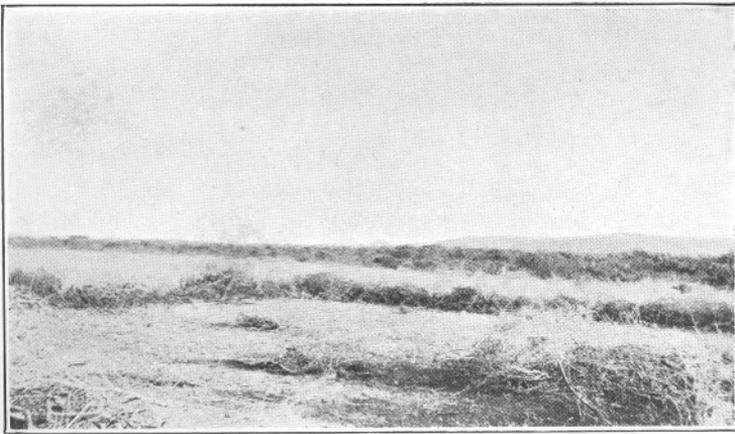
BUNA : TYPICAL MONADNOCK.



TYPICAL SMALL KOPJE OF PINK GRANITOID GNEISS OCCURRING
AS OUTLIER OF ABYSSINIAN ESCARPMENT.



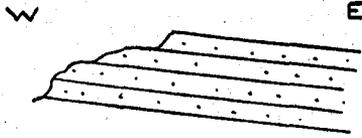
JIMALE : THE UPPER SANDSTONES.



DAVA VALLEY, NEAR MUDDO.

Although a considerable search has been made, off and on, during a period of over three years, very few fossils have been found. A few were found near Jimale on the western outcrop and are at present being identified. The occurrence is worthy of note, and their determination is awaited with interest.

The topography of these rocks is characteristic, as they form typical table mountains, possessing the characteristic



scarps with flat plateau tops; sometimes they are gently inclined and have long dip slopes. These are very noticeable in the Marehan country. Another interesting feature amongst the sandstones is the Eil Wak basin, containing gypsiferous beds. These were first noticed and described by Dr. J. Parkinson. This area consists of a soft, greyish-white calcareous limestone containing numerous spear-shaped crystals of gypsum varying in size to five or six inches long. This is overlain in parts—noticeably to the north—by a hard, unfossiliferous, white limestone. In spite of numerous searches no fossils or even traces of them were found.

The basin has a diameter of approximately twenty miles, and is surrounded by sandstones, with a possible outlet to the S.E. The area is characteristic of a desiccated salt lake, and is probably part of a much larger lake, as suggested by J. Parkinson (cp. *Abs. Proc. Geological Soc.*, No. 980, 1915).

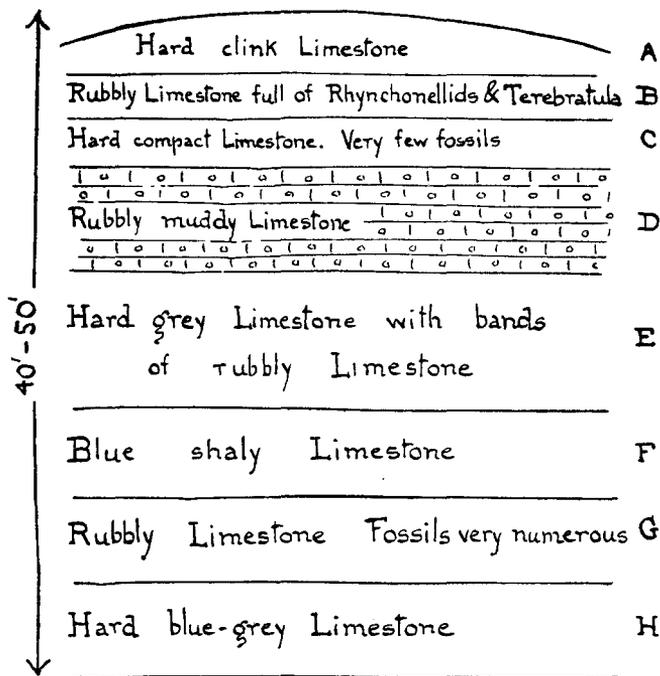
The area is valuable as it contains over 100 wells which are tunnelled down to approximately 30–40 feet deep. The water is highly prized by the Gurre, who own them, owing to its remarkable saline properties.

THE LIMESTONE SERIES

These are characteristically developed on the Daua River, where they consist of hard unfossiliferous limestones intercalated with muddy limestones and shales.

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The first typical section examined was at Muddo Erri on the Daua River and the following sequence was noted.



DIAGRAMMATIC.

This section is of further interest, in that the beds seem to have undergone gentle flexuring, as many of the fossils found showed marked signs of crushing.

In bands B and G many fossils were found which are awaiting identification. The fauna is very suggestive of the Mediterranean facies in Jurassic times.

Further sections were studied in various places, but those found on the Juba, particularly at Salugli, are worthy of brief notice here. The sections are small and contain practically only muddy limestones and shales. In the latter, remains of ammonites were found which are of great interest, as they must be similar to the remains of ammonites found by J. Parkinson on the other side of the river at Kukatta (cp. *Abs. Geol. Soc.*, No. 980, 1915).

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Mention must also be made of the profuse numbers of belemnites to be seen on the caravan track which runs north of Serenli at Mata Warseisa. They are of a sulcate form.

CONCLUSION

On the completion of the identification of the various fossils found, the exact age of this large development of sedimentary rocks should be determined.

For the moment it is submitted that the narrow coastal strip of sediments broadens out and extends to at least $40\frac{1}{2}^{\circ}$ long. E. These run northward across the Daua River, probably without interruption, through Italian Somaliland to British Somaliland. The writer visited the latter place about a year and a half ago and was much struck by the similarity in lithological features of the Bihendula and Daua limestones. There was also a marked similarity in the sulcate ammonites found.

Economically these rocks might prove of value as a source of oil, but this would seem to depend largely on the results of the investigations recently carried out at the Daga Shabell oilfield in British Somaliland. It is noteworthy that the Shabell sandstones have been identified as Jurassic age.

GEOGRAPHICAL VARIATION IN EAST AFRICAN BUTTERFLIES. PART II

BY K. ST. A. ROGERS, F.E.S.

NYPHALIDÆ

Most species of *Precis* are more interesting for seasonal than for geographical variation. It is true that the African forms of *P. orithyia* and *P. hierta* differ to some extent from the Oriental species, and form races of those species which are generally smaller and darker, but that is only to be expected. There is, however, one species, *P. elgiva* in East Africa, which is a form of the western *P. terea* which has some