

GEOLOGICAL EXPLORATION

Northern Frontier District and Jubaland.

By THE EDITOR

Mr. John Parkinson, F.G.S., in 1915, carried out what is believed to be the first attempt at a rapid geological survey of the above area, the journey being undertaken at the request of the Government with the object of obtaining information regarding the water supply of the region. His results may prove of interest to future travellers and prospectors who wish to visit that part of Africa.

Upon his return to England he read a paper before the Geological Society of London, and the following abstract has been published by that Society. His paper was termed 'Observations on the Structure of the Northern Frontier District and Jubaland Provinces of the East Africa Protectorate.'

He reports the discovery of a floor of gneisses and schists, among which the Turoka series (recorded from Magadi Railway line) of metamorphosed sedimentary rocks were found at several places; this mass of metamorphic rocks is overlain on the western side by lavas, including those arising from the volcanos Kulal, Assi ('Esie' of the maps), Hurri, Marsabit, &c., and by probably older lava-fields, which together extend as far as long. 39° E. On the south, it was found that the lavas north of Kenya reached the Guaso Nyiro, leaving *Inselberge* of the crystalline rocks in their midst, but that a high gneiss country extended north-westwards from lat. 1° N. and long. 38° E. to within a short distance of Lake Rudolf. Eastwards the coastal belt of sediments proved to be of Upper Oxfordian Age and to extend to long. 40½° E. (west of Eil Wak), and these were lost southwards under the great alluvial plain of Jubaland.

At intervals throughout the alluvial plain, and lying in hollows in the Jurassic rocks, disconnected exposures were

found of soft calcareous sandstones or limestones (Wajhir, Eil Wak), the age of which cannot now be definitely fixed.

Evidences of the desiccation of the country were, it was thought, shown (1) by the "laks" or water-channels characteristic of Jubaland, which contained surface water only during the rainy season, and then extremely rarely, if ever, throughout their length; (2) by the presence of freshwater molluscs in the scarcely consolidated beds of such laks and at other places where now no surface water is present (Buna and near the Abyssinian frontier); and (3) by the presence of wells along fault-lines and in other places where, but for the previous presence of springs, it appears improbable that the natives would have begun sinking.

The region between Lake Rudolf and Marsabit was pointed out as one of exceptional interest, which the speaker had so far not been able to investigate.

The depression between the Mathews and associated ranges and the Abyssinian frontier on which the Marsabit and Hurri volcanoes were situated, and the origin of the Kuroli Desert (Elgess), were the outstanding features of the district that required further elucidation.

Mr. G. C. Crick stated that the Cephalopoda submitted to him by the lecturer consisted chiefly of crushed ammonites from dark-grey shales at Kukatta on the Juba river (lat. $2^{\circ} 8'$ N.), there being also a belemnite preserved in a yellowish-brown rock-fragment from Serenli on the same river and somewhat north of Kukatta. He regarded all the ammonites as referable to *Perisphinctes* and its section *Virgatosphinctes*, and to species which had previously been described from the neighbourhood of Mombasa. From this assemblage of forms he concluded that the shales of Kukatta were of Upper Oxfordian (Sequanian) Age. He stated that the belemnite from Serenli indicated the presence there of a slender sulcate form, similar to those previously recorded from British Somaliland on the north and from the neighbourhood of Mombasa on the south; but, although of Jurassic age, it was too imperfectly shown in the rock-fragment for accurate determination.

Mr. R. Bullen Newton said that he had examined a small series of non-marine Kainozoic molluscan remains belonging

to recent species, and associated with hard and soft limestones, calcareous sandstones, and conglomerates, which had been collected by the lecturer, and he had determined them as follows:

Ampullaria ovata (?) (Olivier).—Locality—Lak Buna.

Distribution—Recent: Victoria Nyanza, Tanganyika, Nile. Post-Pliocene: Egypt. Miocene: Victoria Nyanza.

Melania tuberculata (Muller) (*curvicosta*, Deshayes).—Localities—Archer's Post, Lak Buna, Chukali Ghofu.

Distribution—Recent: Nile, Rudolf, Nyasa, Tanganyika, India, &c. Post-Pliocene: Egypt and Sahara. Pliocene: Lake Assal, French Somaliland (formerly regarded as Abyssinia). Miocene: Rudolf (Omo river), Greece, North Italy, &c.

Cleopatra bulimoides (Olivier).—Localities—Lak Buna; Chukali Ghofu.

Distribution—Recent: Nile, Rudolf, French Somaliland, Zanzibar. Post-Pliocene: Egypt. Pliocene: French Somaliland. Miocene: Victoria Nyanza.

Bithynia and *Planorbis*, spp.—Locality—Wajhir.

Limicolaria rectistrigata (E. A. Smith).—Locality—Archer's Post.

Distribution—Recent: Rudolf and Tanganyika regions.

Rhachis Rhodotænia (Martens). Locality—Chukali Ghofu.

Distribution—Recent: Victoria Nyanza and Mount Kenya plateau.

Leptospatha spathuliformis (Bourguignat). — Localities — Turbi and Lak Bana.

Distribution—Recent: Rudolf and Zanzibar.

Corbicula fluminalis (Muller) (*saharica*, Fischer).—Localities—Turbi, Lak Buna, and Chukali Ghofu.

Distribution—Recent: Nile, Rudolf, Marguerite, and Abyssinia. Post-Pliocene: Egypt and Sahara. Pliocene: French Somaliland. Miocene: Rudolf (Omo river beds).

Corbicula radiata (*pusilla* ?), Philippi. Locality—Chukali Ghofu.

Distribution—Recent: Nile, Rudolf, Victoria Nyanza, Albert Edward, Nyasa, Tanganyika. Post-Pliocene, Egypt. Pliocene: French Somaliland. Miocene: Rudolf (Omo river beds).

No vertebrates occurred with these shells, hence their age would probably be younger than the Omo river deposits north of Lake Rudolf, that have yielded a somewhat similar molluscan fauna, but with the addition of *Dinotherium* and other vertebrate remains. The presence of that genus as pointed out by Dr. Haug ('*Traité de Géologie*, 1908-11, vol. ii. p. 1727), was indicative of the Pontian or Upper Miocene period. There are, however, some lacustrine beds near Lake Assal, in French Somaliland (formerly regarded as Abyssinia), which contain shells also bearing a resemblance to those collected by Mr. Parkinson in British East Africa, especially *Melania tuberculata*, *Cleopatra bulimoides*, *Corbicula fluminalis*, and *C. radiata*, which are common to both sets of deposits. These Lake Assal beds, which are also without vertebrate remains, have been identified by Aubry (*Bull. Soc. Géol. France*, ser. 3, vol. xiv., 1885, pp. 206-209), and Pantanelli (*Atti Soc. Toscana Sci. Nat. Proc.-verb.*, vol. v., 1887, pp. 204-206, and *ibid.*, vol. vi., 1888, p. 169) as of Pliocene age. If, from these facts, such widely distant beds can be recognised as contemporaneous, then the suggestion may be made that the northern half of British East Africa was probably an extensive freshwater region during Pliocene times, limited on the north by Lake Assal, on the east by Suddidima, on the south by Archer's Post and the Mount Kenya plateau, and on the west by Lakes Rudolf, Stefanie, and Marguerite.

Assistance in the determination of these shells has been kindly rendered by Mr. E. A. Smith, I.S.O.

NOTES ON A COLLECTION OF BIRDS FROM LAMU AND DISTRICT, MADE BY MR. H. J. ALLEN TURNER IN APRIL 1916.

BY V. G. L. VAN SOMEREN, M.B.O.U.

The following is a list of the birds collected by Mr. H. J. Allen Turner during his *safari* to Lamu and district. The collection contains 836 skins, representing 128 species, and was made in April 1916.