tions are two which are here reproduced by permission of the publishers. One shows a "sadd" sufficiently solid to check the flow of the river and form a lagoon; in the other both steamers and sailing boats have been brought up by a more compacted barrier of the same kind.

Khartoum is fully described, and the scientific work carried on at the Wellcome Laboratories is referred to. So many points of scientific interest are alluded to, having a bearing on various branches of knowledge, that we can only regret that the results have not a wider circulation and greater accessibility than is afforded by the annual official reports. The founder of the Wellcome Laboratory renders the results of its staff available, but in forestry, hydrography, and also in all that concerns the native races of the Sudan those who are working there are gaining data which have a value and importance beyond their own region. The illustrations greatly assist in forming an idea of the country described, but the map is not so satisfactory; it would be of more use if the modern place-names were correctly given and a consistent orthography employed.

H. G. L.

THE STRUCTURE OF HAUSALAND AND ITS NEIGHBOURHOOD.[1]

IF there is one point more than another which calls for the attention of the geologist in West Africa it is the position and age of the older sedimentary series, *i.e.* the beds between the presumably Archæan gneiss and the Cretaceous strata.

Such information as is available about these rocks, quartzites and argillites, grits and phyllites, is fragmentary, and obtained from a variety of sources throughout West Africa, often from localities where no recognised survey has taken place, and where the relations of the component rock groups are unknown.

On the western side of northern Nigeria we have such a sedimentary series frequently exposed, and with this Dr. Falconer, in his book, "The Geology and Geography of Northern Nigeria," has dealt at length. He regards these rocks as the scarcely altered representatives of a group of schists and sedimentary gneisses, termed the "softer" gneisses, because of their relatively low capacity for resisting erosion, and believes that they were deposited upon a surface of Archæan gneiss—the "hard" gneiss—and affected thereafter (*a*) by regional metamorphism, and (*b*) by folding.

It can scarcely be doubted that the quartz-schists and quartz-muscovite-schists of Kabba and Ilorin are the same as those of the Central Province of southern Nigeria, a correlation which can probably be extended to the rocks of the Eastern Province, and possibly—for the general character of these schists is exceedingly constant—to other parts of West Africa.

Dr. Falconer, who states his case with great fairness, has accordingly advanced an hypothesis of considerable importance, but it would have greatly aided the reader and enhanced the value of the work as a book of reference if some plates had been included showing the minute structure of the rocks.

The book is technical and solely for the geologist, and, though one would be loth to lose any of the excellent photographs with which the author has embellished his work, one ventures to think that in some instances microscopy might have taken precedence.

The granite intrusions (see Fig. 1) are pre-Cretaceous in age, and fall into two subdivisions: an older foliated, and a younger non-foliated group, which includes soda-granites. The pneumatolytic modification of some of these granites, as at Bukuru, has as a distinguishing feature cassiterite and sulphides of copper, zinc, and lead.

The Cretaceous beds, confined to parts of the valleys of the Benue and its tributary, the Gongola, fall into an upper and a lower series of grits and sandstones, divided by a limestone-shale series of Turonian age. It is interesting to note the presence of salt in the lower grit series, and of veins of galena and blende at Arofu, doubtless connected with a small inlier of granite near the town.

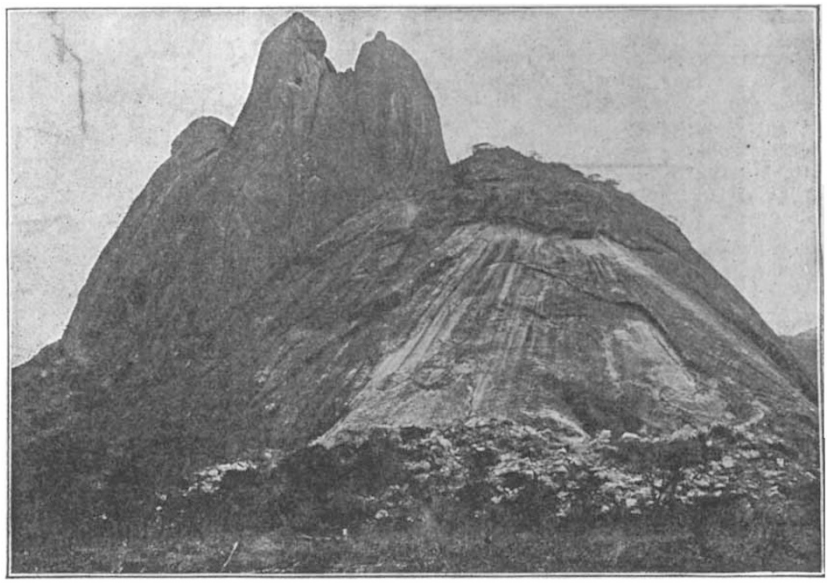

FIG. 1.—Exfoliation in the Kilba Hills. From "The Geology and Geography of Northern Nigeria."

Salt occurs in the north-eastern part of southern Nigeria, as do also galena and blende, which facts, together with the probable existence of Turonian beds in the same neighbourhood, suggest a general similarity in history.

In both Protectorates the Cretaceous beds are pierced by dykes and sills of dolerite.

Dr. Falconer lays some stress on the unconformity which he believes to exist between the Cretaceous and Eocene beds; and is worthy of note, in view of Mr. Kitson's opinion that a passage exists in southern Nigeria between the Mesozoic and Cainozoic.

There are three groups of Eocene beds in northern Nigeria, of which the western only has yielded fossils; the others are correlated with them on petrographical grounds, and on their position as regards the known Cretaceous.

Of these beds the first, especially around Sokoto, where limestones and calcareous clays and shales occur with efflorescences of alum and gypsum, is the most interesting; the beds of other localities consist largely of ferruginous sandstones and grits, types only too prevalent in either of the two Nigerias.

[1] "The Geology and Geography of Northern Nigeria." By Dr. J. D. Falconer, with notes by the late A. Longbottom and an appendix on the Palæontology of the Cretaceous Deposits by H. Woods. Pp. xv+295+24 plates. (London: Macmillan and Co., Ltd., 1911.) Price 10s. net.

These sandstones are unfossiliferous, and an absolute proof of their Eocene age must accordingly be wanting; but, *faute de mieux*, Dr. Falconer makes out an excellent case and presents his facts clearly.

The book concludes with chapters on "The Superficial Accumulations," "Tertiary Crustal Movements," and "Tertiary Volcanic Action," each worthy of the close attention of the student of African geology. Two periods of Tertiary volcanic activity are recognised, respectively middle Eocene and late Pliocene; to the latter are referred some excellently preserved puys (Fig. 2) developed in the Province of Yola, the middle Benue valley and on the Bauchi plateau.

The rocks of the earlier outburst are an interesting series of phonolites and nepheline-basalts, of which the conspicuous stumps of the Tangale Peak and the Wase rock may be taken as typical examples.

In regard to the late earth movements, one conclusion of general interest may be recorded here, viz., that the culmination of the Tertiary oscillation resulted in the formation of the Bauchi plateau and the establishment of the present river system.

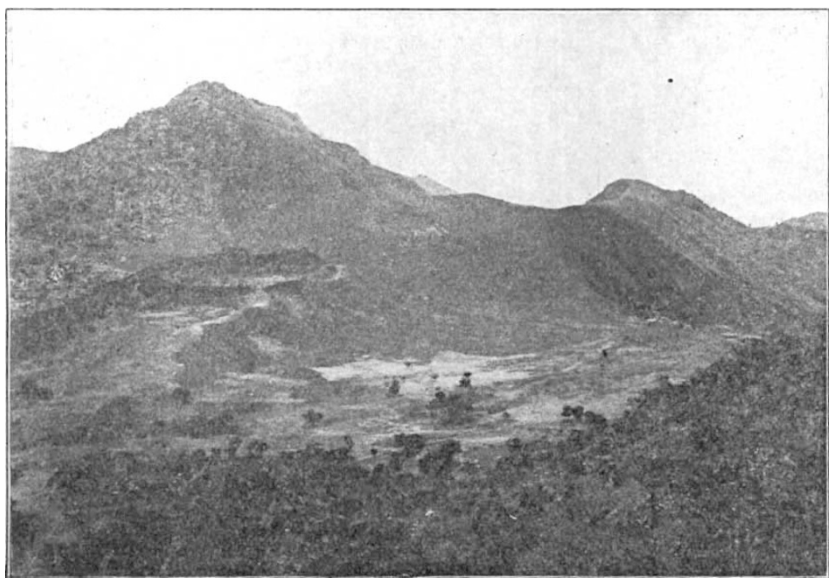

FIG. 2.—Craters in the Mboi Hills. From "The Geology and Geography of Northern Nigeria."

The Bauchi district is inseparably connected with the tin industry, and we could wish that Dr. Falconer had seen his way to more details, put in plain and concise phraseology, of the alluvium-containing cassiterite.

The sudden prominence into which the tin-mining industry has burst in northern Nigeria naturally leads the reader, in such a work as this, to expect authoritative information in a form to be readily assimilated.

Mr. Henry Woods has contributed an appendix on the palæontology, and the book as a whole is full of valuable information to the student; the geological map on a scale of 1 : 2,000,000 is indispensable to those interested in the structure of this part of Africa.

As Dr. Falconer himself readily admits, his work may require some modification in the future, but all who are acquainted with the difficulties of the African pioneer will give him full measure of praise for the results he has attained. In such circumstances to quibble over detail is an ill task, but the first chapter on the "Physical Geography" might be compressed and summarised with advantage to the general reader, and perhaps many will find a too great elaboration of detail throughout the work. JOHN PARKINSON.

DR. HARRY BOLUS.

THE name of Dr. Harry Bolus is closely associated with the story of South African botany for the last forty years. In April, 1874, a letter to Sir Joseph Hooker was read at a meeting of the Linnean Society, of which Bolus had recently been elected a fellow (December 18, 1873), in which he criticised Grisebach's limitation of the Cape and Kalahari floral provinces (see Journ. Linn. Soc., xiv.). This was the beginning of a series of publications embodying the results of his observations on the flora of a peculiarly rich and attractive botanical area. In 1886 Bolus wrote for the official handbook of the Cape of Good Hope a valuable "Sketch of the Flora of South Africa," in which he proposed a series of natural botanical divisions, forming, roughly, successive zones from the coast northwards. From 1881 to 1889 he communicated to the Linnean Society a number of contributions to South African botany, containing critical notes on various genera and species, as well as descriptions of many novelties; but it was to the heaths and orchids that he was especially devoted. The results of his study of the large and intricate genus Erica are found in his monograph (in part of which he had the help of the late Prof. Guthrie) in the "Flora Capensis" (vol. iv., sect. 1, issued in 1905), where the 469 species are described in detail, and arranged under forty-one sections.

In his volumes on South African orchids, Dr. Bolus has established a model of detailed description and illustration; accompanying each species is a plate, drawn by Dr. Bolus himself, in which a judicious combination of outline and colour gives exactly what is wanted by the botanical student. Dr. Bolus had just completed this important work at the time of his death, which occurred on May 25, when on a visit to England. Mention should also be made of the excellent series of specimens illustrating the Cape flora, by the distribution of which to various great herbaria Dr. Bolus brought his collections within reach of a large number of students of systematic botany. An account of his services to botany would be incomplete without a reference to his generous support of the Cape University, which owes to him the foundation of its chair of botany; and Dr. Bolus himself would have wished some acknowledgment to be made of the help which he received in all his later work from his niece and pupil, Miss Louisa Kensit. A. B. R.

NOTES.

THE Croonian lecture of the Royal Society will be delivered on June 15 by Prof. T. G. Brodie, F.R.S., on "A New Conception of the Glomerular Activity."

ON Tuesday, June 13, Prof. Ernst Cohen, of the University of Utrecht, will give an illustrated lecture before the Faraday Society on "Allotropic Forms of Metals." Prof. T. W. Richards, of Harvard College, has been invited to take the chair on this occasion. Applications for tickets should be made to the secretary, 82 Victoria Street, London, S.W.