

I am indebted to Mr. H. A. Allen for naming the specimens. The list is of interest as containing several species not previously recorded from the Cowstone beds.¹ In this district Selbornian ammonites are rare, consequently the occurrence of *Amm. rostratus*, the zonal fossil, is interesting. The same can be said of *Necrocarcinus tricarinatus*, the crab, whose horizon is now fixed. *Hoploparia longimana*, Sow., had previously been found by De Rance in the Cowstone beds below the roadway between Charmouth and Lyme.² *Crioceras* has not hitherto been recorded amongst the local fossils.

NOTICES OF MEMOIRS.

I.—THE DISCOVERY OF TRIAS IN THE CAUCASUS.

Translated from the Russian by FELIX OSWALD, D.Sc., F.G.S.

IN a preliminary communication by Dr. Th. Černyšev, Director of the Geological Committee of Russia and Foreign Correspondent of the Geological Society, in April, 1907, to the Imperial Academy of Sciences of St. Petersburg,³ an important addition has been made to the geology of the Caucasus by the announcement of the discovery of beds of Upper Triassic age. Pending the publication of fuller details, which will be published in the *Memoirs of the Geological Museum of the Imperial Academy of Sciences*, the following abridged translation, which I have made from the Russian of the original article, may help to render this discovery more widely known. It is of special interest to find that on the one hand the fossils are in many cases identical with those of the Upper Trias of Balia Maden in Western Asia Minor, and that on the other hand in the nearest occurrence of Trias to that of the Caucasus, viz. that of Julfa on the Araxes in Armenia, the Upper Trias is altogether wanting, and only the lower division of the Trias is present, overlying Permian.

Dr. Černyšev stated that in 1903 W. I. Worobiev conducted an expedition into the Kuban territory of the Caucasus for the purpose of geological and mineralogical research, especially in the district between the Rivers Laba and Bielaya. Since W. I. Worobiev unfortunately lost his life on the Dzitak glacier the results of his journey have not been published. His collections, journals, and maps were, however, fortunately recovered by N. I. Worobiev in an unharmed condition, and are now in the possession of the Geological Museum of the Academy. Even a cursory examination of Worobiev's collection showed that it would cause a fundamental and essential alteration in the geological map of the Caucasus, and that in particular it would affect the composition, as hitherto known, of part of the Central Caucasus range. The most remarkable discovery, however, made by Worobiev was his finding beds of undoubted Triassic age, which are

¹ See Jukes-Browne, *Cretaceous Rocks of Britain*, 1900, vol. i, p. 187; and H. B. Woodward & W. A. E. Ussher, *Geology of the Country near Sidmouth and Lyme Regis*, 1906, p. 43.

² *Geol. Mag.*, 1874, pp. 247, 253.

³ *Bull. Acad. Imp. St. Petersb.*, ser., vi pp. 277-80.

characteristically represented in his collection; and an entirely new contribution to the geology of the Caucasus results from that part of Worobiev's materials, which has been worked out by Dr. Cernyšev, who described the Brachiopods, and by A. A. Borisiak, his colleague on the Geological Committee of Russia, who identified the Pelecypods.

The starting-point of Worobiev's expedition was from Psebai, on the Little Laba River, whence he proceeded to the source of the Khods River (a left tributary of the Little Laba), where he pitched his first camp. From this place he made a series of excursions in different directions, resulting in an interesting collection of Triassic material.

On the very first excursion, which was undertaken along the Khods River, 3 versts from the camp, in the Mietok Ravine, Worobiev found a small exposure of limestone crowded with valves of *Pseudomonotis ochotica*, Keyserling; and again lower down the gorge, in the same limestone, he observed great quantities of *Terebratula pyriformis*, Suess, *Waldheimia cubanica*, n.sp. (somewhat recalling *W. norica*, Suess), *W. (Cruratula) labensis*, n.sp. (near to but undoubtedly distinct from *W. (C.) Beyrichi*, Bittn.), and *Amphiclinodonta Katzeri*, Bittn.

The third excursion was in a southerly direction towards Mt. Tkhach; 2 versts beyond the ford across the Khods River Worobiev investigated limestones extremely rich in Brachiopods; still further on these limestones continued, but without clear exposures. In these Brachiopod limestones he found the following forms:—*Terebratula turcica*, Bittn., *T. pyriformis*, Suess (abundant), *Spiriferina* aff. *kössenensis*, Zugm., *S. Suessi*, Winkler, *Spirigera cubanica*, n.sp., *S. oxycolpos*, Emmr., *Retzia superbescens*, Bittn., *Rhynchonella fissicostata*, Suess, *R. aff. fissicostata*, Suess, *R. aff. anatolica*, Bittn., *R. labensis*, n.sp., *R. Worobieffi*, n.sp., *Amphiclinodonta Suessi*, Hofm., and other less well-preserved forms.

Subsequently his journey was directed towards the upper Sokhra River, belonging to the system of the Bielaya River. At 5 versts from Mt. Tkhach, towards the left feeder of the Sokhra, he met with a complete section of the Triassic limestone, dipping 15°–25° N.E., showing the following downward succession:—

1. Red and grey limestone, with *Pseudomonotis ochotica*, Keyserling.
2. Red, more compact limestone, with *P. ochotica*, Keyserling, and the following Brachiopods:—*T. pyriformis*, Suess, *W. aff. norica*, Suess, *W. (Aulacothyris) aff. frontalis*, Bittn., *W. (A.) reflexa*, Bittn., *Spiriferina Suessi*, Winkler, *Spirigera Worobieffi*, n.sp. (undoubtedly belonging to the same group as *S. oxycolpos* and *S. Manzavini*), *S. oxycolpos*, Emmr., var. *caucasica*, n.var., *Retzia superbescens*, Bittn., *Rhynchonella levantina*, Bittn., *R. Fuggeri*, Bittn.
3. Grey limestone with Crinoid fragments,¹ and the Brachiopods *W. (A.) reflexa*, Bittn., *R. superbescens*, Bittn.

¹ With regard to this Crinoidal limestone it may be of interest to draw attention to the fact that Dr. Radde in one of his journeys in this region of the Caucasus very nearly anticipated by about thirty years Worobiev's discovery of these Triassic strata, for in the Tiflis Museum (*Die Sammlungen des kaukasischen Museums*, iii, Geologie, p. 171) there is a specimen collected by Dr. Radde from this very district, viz., from the "river-bed of the Matchubusta, a tributary of the Khod river, near Mt. Tkhach".—F. O.

4. Grey, extremely hard limestone, enclosing a bed of greenish-grey, argillaceous limestone, with well-preserved specimens of *Spirigera Manzavini*, Bittn., and *S. oxycolpos*, Emmr., var. *caucasica*, n.sp.

In the bed of this rivulet, which flows into the Sokhra, there also occurs a dark-grey, nearly black, arenaceous slate, very micaceous, crowded with valves of *Koninckina Telleri*, Bittn., and also containing well-preserved shells of Pelecypods (*Phanodesmia* sp. and *Nucula* cf. *strigilata*, Goldf.).

Even a cursory examination of the above fauna shows that this formation must belong to the Upper Trias, for some of the forms in the foregoing list have been described by Suess and Zugmayer as typical of the Kössen and Starhemberg Beds, e.g., *T. pyriformis*, Suess, *W. norica*, Suess, *Spiriferina Suessi*, Winkler, *S. kössenensis*, Zug., *Spirigera oxycolpos*, Emmr., *R. fissicostata*, Suess, whilst others are representative of the Dachsteinkalk, e.g., *W. (A.) frontalis*, Bittn., *W. (A.) reflexa*, Bittn., *R. Fuggeri*, Bittn., thus indicating an equivalence with the Rhætic stage of the Alpine Trias. The fauna, which contains new forms peculiar to the Caucasus, also comprises some characteristic Anatolian forms, described by Bittner in Mysia, e.g., *T. tureica*, *Spirigera Manzavini*, *R. anatolica*, *R. levantina*, corresponding to the Rhætic stage of the Alps or only slightly older. In addition to the Brachiopods particular attention may be drawn to the numerous well-preserved bivalves (occurring in the same beds), which A. A. Borisiak, after careful comparison with the original fossils in the Geological Museum of the Academy, referred to *P. ochotica*, var. *densistriata*, Teller.

A few words still remain to be said concerning the dark-grey, arenaceous slates, in which there were found abundant valves of *K. Telleri*, Bittn. Since the slates underlie the limestones, and this fossil, which occurs so abundantly, is typical of the Alpine Upper Trias, we may reasonably conclude that the Northern Caucasus possesses a nearly complete series of Upper Alpine Trias.

To judge from some indications given by W. I. Worobiev, the Upper Trias has probably a wide extension on the northern slope of the Caucasus; and a considerable area, which in the absence of palæontological evidence has hitherto been attributed to other formations, may eventually be found to belong to the Upper Trias.

II. BIBLIOGRAPHY OF MEXICAN GEOLOGY.

IN 1898 the Instituto Geológico de México published as Bulletin No. 10, under the title "Bibliographia Geologica y Minera de la República Mexicana", a list of books and papers on Mexican geology and mining consisting of xii + 160 pages, each 13 × 9 inches and containing 1,953 items, arranged alphabetically under authors' names, with an index of localities and a subject-index, the references extending to papers published from 1556 to the end of 1896. This most useful work has now been continued in Bulletin No. 17 (dated 1908) under the same title with the addition "completada hasta el año de 1904". Bulletin No. 17 consists of xiv + 332 pages, 13 × 9 inches, and contains 4,252 items, arranged, as before, alphabetically under authors'

names, with an index of localities and a subject-index, the references including such as were omitted from Bulletin No. 10, and, as far as possible, all papers and books since published up to the end of 1904. Both bulletins have been compiled by Señor Rafael Aguilar y Santillán. As showing how complete the bibliography is, it may be mentioned that the references to Popocatepetl in Bulletin No. 10 are 28 and in Bulletin No. 17 as many as 72 in number; to Meteorites 55 and 208 respectively.

B. HOBSON.

R E V I E W S .

I. — THE GEOLOGY OF THE GOLDFIELDS OF BRITISH GUIANA. By J. B. HARRISON, M.A., C.M.G. Published by the direction of the Governor of British Guiana. London: Dulau & Co., 1908.

IT is nearly five and thirty years since the last Government Report on the Geology of British Guiana, that of Brown and Sawkins, saw the light. Comparing that report with Mr. Harrison's work one cannot fail to be struck with the great progress which gold-mining has made in the colony, and the still greater advance in the methods of geological science as applied to the problems of metamorphic rocks and the genesis of ore deposits. We miss, perhaps, that spice of adventure and exploration which makes the older book so readable, but in return we gain much solid knowledge of the complex geological structure presented by this vast extent of little explored country. The book, it may at once be said, is meant for the geologist and the mining engineer rather than for the prospector, though the route details and mining regulations which it includes will be of use even for the latter class of readers.

The colony is divided naturally into three regions. There is a narrow coastal belt of alluvium, much of which is below high-water mark, and was reclaimed partly by the efforts of the early Dutch settlers by means of an elaborate system of dykes. Practically all the rice, cotton, sugar, and rum, which are the staple products of the country, are raised on these flat lands. Behind them are forest-clad plains and grassy downs, where here and there the live rock peeps out from beneath a dense covering (sometimes 200 feet thick) of rotted rock and lateritic surface deposits. The great hinterland, which makes up eleven-twelfths of the area of the colony, consists of forest-covered ranges of elevated hills and flat-topped, terraced, sandstone mountains.

During the eighteenth century the Dutch were aware of the occurrence of gold in a few spots, and Sir R. Schomburg was able to confirm this by his explorations, but Brown and Sawkins saw little of it, and it was only about the year 1886 that the discovery of some rich placers on the Cuyuni and Essequibo Rivers started a temporary boom. Since then the industry has gone ahead, over seven millions of pounds worth of gold having been extracted within the last twenty years, and it is to be expected that when the latest methods of hydraulicking and dredging are brought to bear