independently of other masses of this lateritic rock. On account of the limited extent of each of these masses of rock, their different elevation, their want of horizontal bases, and the numerous cases in which the rock contains residual angular fragments of other rocks, most geologists would probably prefer to consider these occurrences as distinct from the masses of typical laterite occurring in horizontal sheets, often of considerable extension, and free from included fragments of rock different in character from the laterite. For this reason I propose to refer to these occurrences under the name of *lateritoid* to indicate their similarity to laterite. It is to be noted that, were they to be designated 'laterite', they would by their position come into the high-level laterite division. From what I have written above it is evident that my view of the origin of these masses of lateritoid and their included manganese-ores is practically identical with Maclaren's theory of the origin of laterite in general. He bases his theory particularly on the occurrence at Talevádi in Belgaum. I have visited this occurrence myself, and although the sections were no longer so good as when Maclaren went, yet I saw sufficient to make me agree with his description of the occurrence. Although the occurrence was in an area where the laterite seemed to occur as a large spread, yet I could not see any difference between the mode of occurrence of the manganese-ores here and those in the lateritoid deposits. From this it will be seen that the Talevádi occurrence may be regarded as a connecting link between the lateritoid caps containing manganese-ores and the large spreads of high-level laterite usually free from manganese-ore. I think, however, it is more closely related to the lateritoid occurrences than to the large spreads of high-level laterite in which bauxite is so often found."

(*To be concluded in the next Number.*)

NOTICES OF MEMOIRS.

I.—Jurassic in the Western Caucasus.

[Translated from the Russian by Felix Oswald, D.Sc., B.A., F.G.S.]

ALTHOUGH Jurassic strata reach a very extensive development in Daghestan and in the Central Caucasus, it is only within recent years that Russian geologists (N. I. Vorobiev in 1906, I. P. Tolmachev and M. Volosatov in 1907) have definitely proved the existence of Middle Jurassic beds in the western part of the Caucasus, viz. in the valley of the Little Laba, in the Psebai district (Maikop division of the Kuban province), where they overlie the Triassic strata described in the Geological Magazine, Dec. V, Vol. VI, No. 538, pp. 171–3, April, 1909. The fossils (now in the Peter the Great Museum at St. Petersburg) have been determined by B. Rebinder in a paper written in Russian ("Trav. Mus. géol. Pierre le Grand, St. Petersb.," ii, pp. 53–60, 1908), which I have translated and briefly summarized in the following abstract.

The Jurassic of the Little Laba valley extends for 3 miles below Psebai, forming the line of the Gernegem Heights, which are traversed and partly dissected by the Little Laba and its small tributaries. The valleys of these tributary streams are named in successive order from north to south: Lazaret, Marin, Sushkov, Vorov or Razboinich, and Solen. The general slope of the country roughly coincides with the north-east dip of the Jurassic strata, and hence the limestones rise to increasingly greater heights when traced southwards towards Psebai, so that in the southernmost of the tributary valleys, viz. Lazaret, the underlying series of shales with sphærosiderite nodules is exposed beneath the limestones, which form craggy heights, liable to

slip over the clays. In the more northern valleys the limestones occur in the bed of the valleys, and are there overlain by a very thick series of clays with gypsum, apparently of Miocene age. Above Psebai the Little Laba cuts through a thick series of sandstone (with plant-remains) underlying the shales and resting upon Triassic limestones.

The Jurassic succession of the Little Laba valley may be thus tabulated from Rebinder's lists:—

1. *Oxfordian and Sequanian.*—Light brownish grey limestones, very fossiliferous, with an assemblage in which Oxfordian forms predominate, but there is a sprinkling of Lower Sequanian species such as *Zeilleria pseudolagenalis*, *Terebratula Zieteni*, and *Balanocrinus pentagonalis*, *Phylloceras*, sp. ind., *Peltoceras* cf. *arduennense*, d'Orb., *Perisphinctes bernensis*, Lor., *P. consociatus*, Buk., *P.* cf. *lucingensis*, Favre, *P. mazuricus*, Buk., *P.* cf. *Michalski*, Buk., *P.* cf. *tizianiformis*, Choff., *P.* aff. *plicatilis*, d'Orb., *P.* aff. *biplex*, *Dentalium*, sp. ind., *Ceromya excentrica*, Boem.,* *Lima Escheri*, Moesch, *Hinnites velatus*, Gf.,* *Plicatula*, sp. ind., *Terebratula Rollieri*, Haas, *T.* cf. *Zieteni*, Lor., *Zeilleria pseudolagenalis*, Moesch, *Waldheimia*, sp. ind., *Dictyothyris*, sp. ind., *Rhynchonella lacunosa*, Qu.,* *Holectypus*, sp. ind., *Pentacrinus cingulatus*, Münst., *P.* cf. *Marcousanus*, d'Orb., *Balanocrinus pentagonalis*, Gf., *Millericrinus* cf. *icaunensis*, Lor., *M. Escheri*, Lor.,* *Serpula*, sp. ind., and sponge-fragments. Those marked with an asterisk pass also upward into the Sequanian.

2. *Bathonian and Callovian.*—Yellow-grey to rusty-brown sandy limestones, yellow-grey oolitic limestones with geodes of limonite, and sandstones, sometimes argillaceous, with the following Bathonian forms occurring in the limestones: *Belemnites* aff. *canaliculatus*, Schl., *B.* cf. *würtembergensis*, Opp., *B.* aff. *Jacquoti*, Terq. & Jourdy, *Pleuromya donacina*, Röm., *Pseudomonotis*, sp. ind., *Gervillia*, sp. ind., *Rhynchonella varians*, Sow., var. *spathica*, Desh., *Terebratula* aff. *sphæroidalis*, Sow., *T. sphæroidalis*, Sow., mut. *balinensis*, Szajn., *T.* cf. *ventricosa*, Hartm., *Cidaris filograna*, Ag.

In this series the presence of Callovian (*Macrocephalus* zone) is clearly indicated by the following fossils: *Stephanoceras coronatum*, Brug., *Quenstedticeras*, sp. ind., *Pecten fibrosus*, Sow., *Cyclocrinus macrocephalus*, Qu.

3. *Bajocian.*—(i) Dark-grey shales with nodules of sphærosiderite (up to 0·20 m. in thickness), which frequently contain ammonites. The following fossils were obtained from this series: *Belemnites giganteus*, Schloth., *B.* aff. *paxillosus*, Qu., *Parkinsonia Parkinsoni*, Sow., *Pœcilomorphus* aff. *macer*, Buckm. (ii) Sandstones with plant-remains, overlying Triassic strata. A seam of lignite, 7 inches thick, has been recorded from these beds, in the Kizilovaya valley near Psebai.

The entire palæontological succession is closely parallel to that of Khod near Alagir on the north slope of the Central Caucasus, about 80 miles to the south-east.

Rebinder expresses strong doubts as to the presence of Kimeridgian in the Jurassic of the Little Laba, for in his lists the only species which range so far upwards are *Ceromya excentrica*, *Terebratula* cf. *Zieteni*, and *Zeilleria pseudolagenalis*, but these are all more characteristic of a lower horizon. Moreover, it would indeed be a matter for surprise

if Kimeridgian fossils had been discovered, for the Kimeridgian was not a period of deposition in the Caucasian area but one of earth-movements and folding of strata. It is one of the sharpest distinctions between the stratigraphy of the two slopes of the Caucasus that whereas on the south slope the interruption takes place only after the Sequanian and lasts until the Neocomian, on the north slope on the other hand Tithonian beds are well developed and rest discordantly on Lower Sequanian.

II.—The Glacial Period and Climatic Changes in North-East Africa.[1]

By W. F. Hume, D.Sc., F.R.S.E., and J. I. Craig, M.A., F.R.S.E.

1. *Southerly Shift of the Wind-systems in Glacial Times.*—The effect of the seasonal decrease of temperature in the Northern Hemisphere is to cause a seasonal displacement of the system of westerly moist winds southwards by several degrees, and not improbably decrease of temperature below its normal is also associated with a similar displacement. It is inferred that the decrease of temperature of the Glacial Period would be correlated with such a displacement of the westerly winds, which now barely touch the north coast of Egypt in the winter, that they would impinge on the loftiest portion of the Red Sea mountain range.

Geological and topographical evidence points conclusively to the existence of such a westerly moist current at no very distant period. The current was westerly, for the principal erosion occurred on the western slopes, and this erosion is evidenced by the gravel terraces, which attain a remarkable development near the town of Qena. These consist of materials which could have come only from the highest portion of the Red Sea Hills, distant some 40 to 50 miles to the east or north-east. The precipitation was most active where the range is highest, and decreases towards the north where the mountains are lower. The decrease towards the south is to be attributed more probably to an approach to the southern limit of the moist current.

Further evidence of such a westerly current is to be found in the existence of calcareous tufas on the border of the eastern scarp of Kharga Oasis and elsewhere, and that the temperature was then several degrees colder is shown by the presence in the tufas of leaf-fragments of *Quercus ilex* and other plants which do not now flourish south of Corsica and Southern France.

2. *Change in Monsoon Effects during the Glacial Period.*—There is evidence of the enormous development of glaciers over Ruwenzori, Mount Kenia, Kilimanjaro, and the Himalayas, during the Glacial Period. The recession of the glaciers in East Africa indicates that the temperature there is now about 10° to 12° F. warmer than during the period of maximum glaciation.

It is known from the investigations of the Meteorological Department of India that an increased snowfall on the Himalayas in spring exercises a measurable prejudicial effect on the Indian monsoon at the

[1] Read before Section C (Geology), British Association, Portsmouth, September, 1911.

present day, and we may infer that the enormously greater ice-covering of the Glacial Period would exercise a much more powerful inhibition on the monsoon of that period. The more extensive ice-sheet of East Africa, by preventing abnormal heating of the land in summer, would act still further in the same direction, and it is extremely probable that the monsoon current partook of the southerly displacement of the wind-system referred to above. The general result would be a decreased precipitation over Abyssinia, and a much reduced Sobat, Blue Nile, and Atbara, which at present account for 96 per cent of the flood proper of the Nile.

The geological history of the Nile entirely accords with the above inferences. One of the chief results of the present monsoon rainfall has been the deposit of finely divided muds brought from the Abyssinian hills, in the Nile valley. To the south of Cairo these deposits are at most of 30 to 35 feet thickness, of which 10 feet have been laid down since the time of Ramses II. If conditions have remained uniform, this would give a date fourteen thousand years ago for the first deposits of alluvial muds in Egypt. Previous to this the mud-laden waters of the Abyssinian Nile system did not reach Egypt, just as the waters of Khor Gash now fail to reach the Nile, and so geology and meteorology concur in indicating a much weaker rainfall in Abyssinia during the Glacial Period.

III.—Index Generum et Specierum Animalium.[1]

Report of the Committee, consisting of Dr. Henry Woodward (Chairman), Dr. F. A. Bather (Secretary), Dr. P. L. Sclater, the Rev. T. R. R. Stebbing, Dr. W. E. Hoyle, the Hon. Walter Rothschild, and Lord Walsingham.

SINCE the 1910 Report systematic search through literature has proceeded up to the letter E. Further, a group of especially troublesome and difficult books have been dealt with, e.g.: Oken's *Isis*, 41 vols., 1817–48; Froriep's *Notizen*, 102 vols., 1821–50; Ersch & Gruber, *Allgem. Encyclopaedie*, 103 vols., 1818–50; and many other volumes have been indexed out of the general order as asked for or required—as, for instance, the works of Jacob Huebner, which are now in Mr. Sherborn's hands in hope that he may obtain some further information as to the dates of their publication.

The search for rare literature continues, and Mr. Sherborn desires to thank Dr. Karpinski for obtaining for him the second volume of the *Trudui* of the St. Petersburg Mineralogical Society, 1831; Dr. Bashford Dean and Mr. O. F. Cook for a complete set of *Brandtia*, 1896–7, both of which works will find a resting-place in the British Museum (Nat. Hist.) when done with. He also desires to thank Mr. Tom Iredale for much valuable help in obscure bird genera.

The following papers have been written in connection with the Index:—

"On the Dates of Publication of Costa's *Fauna del Regno di Napoli*, 1829–86": Ann. Mag. Nat. Hist. (8), v, p. 132, 1910.

"A Collation of J. C. Chenu's *Illustr. Conch.*, and a note on P. L. Duclos' *Hist. nat. gén. et part. coquilles*" (with Mr. Edgar A. Smith): Proc. Malac. Soc., ix, March, 1911.

[1] Read before Section D (Zoology), Brit. Assoc., Portsmouth, September, 1911.

"Note on John Curtis' *British Entom.*" (with Mr. J. Hartley Durrant): Entom. Month. Mag., xlvii, April, 1911.

Your Committee confidently recommend their reappointment, and earnestly ask the Association further to support this valuable work by a renewed grant.[1]

IV.—On some New Rhætic Fossils from Glen Parva, Leicestershire. By A. R. Horwood.[2]

OWING to the impending filling up of the once fine pit at Wigston (Glen Parva), where the Keuper tea-green marl, Rhætic, and Lias formations are all exposed in a fine section of some eighty feet of rock, extraordinary efforts have been made by Messrs. A. J. Cannon and H. Siddons to investigate the contents of the bone-bed and black shales of the Rhætic before this is rendered impossible by the filling up of the pit with water, the brickyard being now closed.

Some rare and new fossils have been found which may here be briefly mentioned. In the tea-green marls *Orbiculoidea Townsendi* was discovered. This, along with the regular occurrence there of bands of fish scales and teeth in the same beds, and of *Estheria minuta*, allies them palæontologically with the Rhætic beds in which alone the first fossil has hitherto been found.

In the succeeding black shales amongst many plant fragments are some leaves allied to *Podozamites*, which are new. An exceedingly interesting discovery is the impression, unique as such for Palæozoic or Mesozoic rocks, of an annelid which occurs in beds filled with castings allied to *Arenicola*. Among Arthropodous remains are the chitinous body-segments of Crustacea and a scorpion-like creature. That they are not uncommon elsewhere is probable. But the Rhætic fauna is so fragmentary and generally so depauperated and stunted that the most careful search is required.

Ophiolepis Damesii, not definitely found in situ here before, has occurred, and with it some other Echinoderms which may be new. Many fine examples of *Pholidophorus Higginsi* have been secured which exhibit the dermal armature well, and also the fins. Some curious concretionary structures, homœomorphs of orthoceratoid segments, occur here also. The usual fauna already described has been obtained, some fine examples of each species having been collected. It is hoped to describe the new forms very shortly.

V.—On the Discovery of Remains of *Iguanodon Mantelli* in the Wealden Beds of Brighstone Bay, I.W., and the Adaptation of the Pelvic Girdle in relation to an Erect Position and Bipedal Progression. By R. W. Hooley.[2]

THE specimen of which the paper treated was discovered by the author in 1899; it includes the sacrum, lumbar, and caudal vertebræ, bones of the pelvic girdle, and the left femur. The

[1] A further grant of £75 was made at the Portsmouth Meeting, and Dr. W. T. Calman was added to the Committee.

[2] Read before Section C (Geology), British Association, Portsmouth, September, 1911.

characters shown by the fossil prove the remains to belong to *Iguanodon Mantelli*, but all examples hitherto found have manifested this species to be much smaller than *Iguanodon Bernissartensis*, whereas the bones discovered belonged to a reptile equalling, if not exceeding, the dimensions of that species. Among the skeletons of Iguanodons found at Bernissart in 1878, M. Dollo found a small and a large form. The former resembled in all points the type-specimen of *Iguanodon Mantelli*, and he thought that the differences between the two forms were specific and not sexual. This specimen opens the question again, and the author criticized the evidence, and inclined to the opinion that the osteological variations are sexual and that *Iguanodon Bernissartensis* is probably a synonym of *Iguanodon Mantelli*.

The second part of the paper dealt with the adaptation of the Iguanodont pelvis to enable an upright position and progression, and discussed the variations in the Dinosaurian pelvis.

REVIEWS.

I.—Iron Mines and Iron Mining in New Jersey. By William S. Bayley. [Vol. VII of the Final Report Series of the Geological Survey of New Jersey; Henry B. Kümmel, State Geologist. Trenton, N.J., 1910.]

THE object of this Report is to record in one volume the principal facts relating to the distribution and mode of occurrence of the iron-ores in the State. The records scattered through forty volumes of Annual Reports have been examined and utilized wherever expedient. The history of every mine, so far as known, has been briefly mentioned, and practically every iron-working has been visited. The commercial analyses have been tabulated and more complete ones have been added. The volume in short contains a most valuable summary, including much new information, of all that is known of the New Jersey iron-ores, with references also to opinions concerning their origin.

The ores comprise Bog Iron-ores, Brown and Red Hæmatites, and Magnetic Iron-ores. The history of the mining dates back to 1685, soon after English settlers first entered the borders of the State. The Bog Iron-ores were then worked. They comprise impure hydrated oxides, accumulated in bogs and swampy places where iron-bearing solutions were exposed to the action of the atmosphere. It is noted that within recent years the ore has met with some favour as a road metal, "a use to which it is well adapted when properly mixed with sand."

Brown Hæmatites or Limonites have been worked to a small extent, chiefly in the Kittatinny Limestone of the Cambrian, in cracks and in lenticular masses along bedding-planes of the strata, near their contact with the underlying gneisses. At the Edsall Mine the ore appears to be in the white Franklin Limestone of the Algonkian, near its contact with gneisses. Elsewhere it has been found in Cambrian slates and quartzites. It has nowhere been worked to any large extent.

Still less has the Red Hæmatite been worked. It occurs in shaly