

of lime, while a few with calcite shells, such as *Ostrea*, *Nerita*, etc., are well preserved. Many of the casts are worn and often have oysters and *Plicatulae* growing upon them, showing that the shells were removed while the specimens rolled on the shore.

Echinoderms, crustacea, polyzoa, corals and sponges, all have a fair proportion of species. But nearly everything is mineralized and infiltrated with the phosphate, though small brachiopods, serpulæ, polyzoa and cirripedes have escaped.

The only evidence of vegetable life on land is found in balls of resin, of four or five different kinds, which burn with pungent fumes, some of them having a plum-like smell.

Such is the Cambridge Greensand in its aspect as a rock, a consideration of which may pave the way for explaining how it came to have its peculiar fauna; for a knowledge of the origin of rocks is the very hornbook of biology, both recent and fossil.

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## NOTICES OF MEMOIRS.

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### I.—PHOSPHATIC NODULES.

AT a recent meeting of the "Bath Natural History and Antiquarian Field-club," the President, the Rev. L. Jenyns, M.A., F.L.S., F.G.S., delivered a lecture on the Phosphatic Nodules obtained in the eastern counties for agricultural purposes. He treated the subject both in its geological and economic points of view. Phosphatic nodules, erroneously called "coprolites," are worked most extensively in the counties of Cambridge and Suffolk. The application of them to Agricultural purposes is due to the scientific acumen of the late Professor Henslow, who, while on a visit at Felixtow, in 1842, noticed the occurrence of certain nodules or concretions in the Red Crag (which is largely developed there), and in a communication, read before the British Association in 1845, he suggested the uses to which they might be put in agriculture.

The phosphatic nodules of Cambridgeshire occur in the Upper Greensand, forming a stratum generally from six to nine inches in thickness, and extending over many miles in the vicinity of Cambridge, they sometimes form an even layer on the Gault, but are not unfrequently found in cavities hollowed out here and there on its surface.

The Suffolk nodules, obtained from the Red Crag, are of rather less value than those of Cambridgeshire, as they contain a smaller percentage of phosphate of lime. They are similar to nodules occurring in the London clay, from which deposit they have been derived. The Eocene nodules contain from 50 to 60 per cent. of lime, while those from the Crag average about 53 per cent. of it, with 13 per cent. of phosphate of iron as well as carbonate of lime and volatile matter.

With regard to the nodules from strata in other counties, Mr.

Jenyns stated, on the authority of Mr. Charles Moore, F.G.S., that phosphatic nodules are found in the Upper Greensand, which is very continuous at the base of the Chalk escarpment throughout the counties of Wilts, Dorset, Somerset, and Devon, it is, however, seldom opened, and when opened the phosphatic nodules, though present, are not so abundant as at Cambridge, and together with the fact that they are more silicious and consequently contain less phosphatic matter, Mr. Moore thought it doubtful whether the beds in the south-west of England would ever repay the cost of working.

## II.—Eozoön in Bohemia and in Bavaria.

By Messrs Hochstetter and Gümbel,

[UEBER DAS VORKOMMEN VON Eozoön IM KRISTALLINISCHEN KALKE VON KRUMMAU IN SÜDLICHEN BÖHMEN. VON Prof. Dr. FERDINAND VON HOCHSTETTER. 8vo. 1866. UEBER DAS VORKOMMEN VON Eozoön IM OSTBAYERISCHEN URGEBIRGE; mit 3 Tafeln. VON C. GÜMBEL. 8vo. 1866.]

### I.

AFTER noticing the discovery of *Eozoön* in Canada and Ireland, and its geological importance, Dr. Hochstetter, in his paper (read before the Vienna Academy of Sciences), briefly explains the relations of the gneiss of Southern Bohemia. This consists of two great series of gneissose and granitic rocks, great infoldings of which form the mountain-range of the Böhmerwald. The lower (1) is Gümbel's "Gojic Gneiss," and the upper series (2) is his "Hercynian Gneiss;" this latter contains (like the Laurentian Gneiss of Canada) beds of graphite and of serpentinous marble. Pebbles of quartz in it, and its bituminous odour when struck with a hammer, had already satisfied Dr. Hochstetter of the sedimentary character of the marble; and he sent some of the green variety (from Krummau) to Dr. Carpenter, who determined the presence of *Eozoön* in it.

The upper gneiss is succeeded unconformably by (3) mica-schist, here referred to the Upper Laurentian; this by (4) clay-slates; and (5) the "Przibram schists" (with Annelid-marks,—*Fritsch*), which are tabulated together as equal to the Lower Cambrian or Longmynd rocks of Britain, and the Huronian of Canada. In the diagram, however, No. 4 is conformable to No. 3; but there is a violent unconformity between No. 4 and No. 5. The Przibram grauwacke follows next, and, with the "Ginetz beds," (or "Primordial beds" of Barrande), is grouped as the Upper Cambrian of Britain, and the Taconic beds, or Potsdam sandstone, of North America.

II. Herr Gümbel commences his more elaborate memoir (read before the Munich Academy of Sciences) with well-considered remarks on the importance of the discovery of anything like organic remains in metamorphic rocks, especially in those of oldest date;—such discoveries, he says truly, give a new dawn-light to geologists searching out the earth's primæval history. He then proceeds to sketch the chief geological characters of the so-called "primitive rocks" of Eastern Bavaria, and to compare them with Logan's

Laurentian and Huronian systems of Canada, and Murchison's "fundamental gneiss" of Scotland. In Eastern Bavaria Herr Gümbel distinguishes (1) the Hercynian clay-slate; (2) the Hercynian mica-schist (Upper Laurentian); (3) the Hercynian gneiss of Bavaria and Bohemia (comprehending the Donau gneiss, or gneiss of the Danube); (4) the Bojic gneiss (3 and 4 together constituting the "primitive gneiss," equivalent to the Laurentian system).

The *Eozoön* and the serpentinous marble, or ophicalcite, of which it forms part, are then carefully described,—both the Canadian *Eozoön*, after Dawson, Carpenter, and Hunt, and the Bavarian, from Herr Gümbel's own careful researches, assisted by Herrn Reber and Schwager. The gneiss and its associated rocks and minerals are described, especially the limestone and its Eozoöna structure, together with some obscure organic remains, possibly Bryozoa. This marble is equivalent to that of Krummau, treated of by Dr. Hochstetter. There are also bands of marble higher up, in the Hercynian clay-slate, on the south and south-east of the Fichtelgebirge, near Wunsiedel, answering to the Cambrian or Huronian zone; and this marble contains traces of *Eozoön* sufficiently distinct to be termed *Eozoön Bavaricum* by Herr Gümbel. Dr. A. Fritsch has found Annelid-marks in this grauacke at Przibram; and Dr. Reuss has detected Crinoidal and Foraminiferal remains in a limestone equivalent to the above near Reichenstein.

Herr Gümbel finds *Eozoön Canadense* also in the famous pargasite of Finland; traces of *Eozoön* in a piece of coccolite-limestone from New York; in the serpentinous marble of Tunsberg; in the chondritic marble of Boden, Saxony; in a serpentinous blackish marble from Hodrisch, Hungary; and in a serpentine-marble from Reichenbach, Silesia.

Characteristic Eozoöna structures, and some obscure organisms, are very well figured in plate i.; and two specimens of the Eozoön-rock itself, prepared with acid, are nature-printed with colour in plates ii. and iii.

T. R. J.

### III.—ON THE JÖSTEDAL-BRÆ GLACIERS IN NORWAY.

By C. M. DOUGHTY, B.A.

[8vo. London, Stanford, 1866, pp. 14, with a coloured chart.]

THE author describes the chief ice-streams which form the outlets of the southern slope of the great Jöstedal-bræ.<sup>1</sup> Glaciers, he says, may be divided into two kinds—one consisting of a stream and reservoir, like those common in the Alps; and the other forming, as it were, a crust to a large tract of land, and having several streams or outflows, like that at present covering Greenland. The Norwegian Glaciers, for the most part, are certainly of this nature, from the peculiar character of the country—a great Alpine boss, as

<sup>1</sup> The Jöstedal-bræ lies between the parallels of 61° and 62°. It is a ridge of irregular shape, some sixty miles long, but of inconsiderable breadth.

it were, cut up into immense plateaux by the intersecting valleys. On as many of these plateaux as reach the snow line, the snow, which is constantly accumulating, becomes transformed into a compact icy mass, traversed by crevasses, and by its weight the entire mass gradually finds its way to lower levels, both squeezing out its surplus down the valleys as ordinary glacier-streams, and discharging from the cliffs in shoots of ice-blocks.

Mr. Doughty gives accounts of the several glaciers marked on the small plan of Jøstedal, with measurements made by him with a theodolite, in July and August, 1864; and his observations tend to prove the identity of the glacier streams of Norway with those of the Alps. He makes some remarks on the nature of the channels of the ice-streams, and on the moraines, and states that, as specimens of the contemporaneous fauna and flora are being entombed every day in the glacial accumulations, and man occasionally among the rest, very early traces of the human race may be looked for in the deposits of the older glaciers, if man were then in existence and inhabited those parts of the globe.

H. B. W.

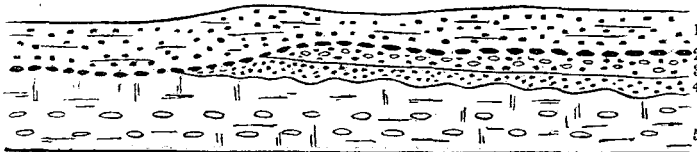
#### IV.—THE FLINT IMPLEMENTS OF SPIENNES IN HAINAUT.

By Professor C. MALAISE, Docteur en sciences naturelles, etc.

[BULLET. DE L'ACAD. ROY. DE BELGIQUE, 2me. série, tome xxi., 1866.]

IN this communication Prof. Malaise records the discovery of a number of worked flints, below the loess (the 'Hesbayan mud' of M. Dumont), near the village of Spiennes, south-east of Mons; they are very rudely shaped, and belong to the "Stone age."

The loess caps two plateaux between which the river Trouille flows before passing Spiennes; it has a varied composition, often argillaceous and of a brownish-yellow colour in the upper part, and calcareous, of a greyer colour, with calcareous concretions containing fresh-water shells, deeper down. Worked flints were obtained *in situ*, just below this deposit of loess, but they were also found scattered over the surface of the plateaux; their position, and the geological structure of the country will be seen from the accompanying section by Prof. Malaise.



SECTION OF THE LEFT BANK OF THE TROUILLE.

1. Loess. 2 Flint Implements. 3. Pebbly-bed. 4. Glauconitic-bed.  
5. Chalk, with Flints.

The flint implements vary both in shape, and in the degree of finish; those found in place differ from those found on the surface

of the country, inasmuch as the latter possess a peculiar superficial alteration, accompanied with traces of oxide of iron, which bespeak their antiquity. The implements are made from the black flints of the chalk. H. B. W.

V.—MINERALOGICAL, GEOLOGICAL, AND PALÆONTOLOGICAL ACCOUNT OF THE "MEULE" (GRINDSTONE) OF BRACQUEGNIES.

By MM. BRIART and CORNET, Civil Engineers.

THE rock, to which the miners of the neighbourhood of Mons have given the name *Meule*, is one of the most interesting of the Cretaceous strata of Hainaut. It is a glauconitic and opaliferous sandstone, attaining sometimes 180 metres in thickness. The hydrated and soluble silica, which it yields abundantly, distinguishes it from all the other Cretaceous rocks. It is placed by Dumont in the upper part of his Hervien system, and is therefore the equivalent of the Gault. Few fossils have hitherto been obtained from it, but the authors now record, from two well-borings at Bracquegnies, 93 species, namely:—41 Gasteropods, 51 Lamellibranchs, and 1 *Serpula*. There is a remarkable absence of Brachiopods and Cephalopods, and this fact, together with the mineralogical character of the rock, (?) point to its formation in deep water, and at a considerable distance from the land.

Fifty-one of the species noticed are well-known forms, and afford material for the comparison of the *Meule* bed with other deposits 5 of these species are found only in the *Tourtia* of Tournay and Montignies-sur-Roc; 8 in the Cenomanian strata of Rouen; 13 in that of Sarthe; and 42 in the Blackdown Beds.

The memoir is illustrated with seven quarto plates of the fossils, drawn by M. Briart, and accompanied with carefully prepared descriptions.—*L'Institut*, May 16, 1866.

VI.—TRANS-CAUCASIAN RESEARCHES BY H. ABICH.

[APERÇU DE MES VOYAGES AN TRANSCAUCASIE EN 1864. PAR H. ABICH. 8vo. Moscow, 1865.]

IN communicating to the Imperial Academy at Moscow the results of his travels in 1864, in the regions south of the Caucasus, M. Abich mentioned that the points he had in view during his last five excursions from Tiflis were chiefly to define the limits and characters of the Tertiary and Secondary Strata of the Southern flanks of the Caucasus,—to study the relationships of the schistose and granitic rocks of the chain, and the trachytes of the extinct volcanos, Elbourouz and Kasbek; also to examine the Tertiary and Quarternary formations of the plain of Colchis, and to finish his special geological map of the canton of Sazéretlo. As a point of geological interest and of practical importance, M. Abich refers to the great extent of the Oxfordian Rocks in the mountains between the Kour and the

Araxes. In the "Carboniferous" rocks, overlying the "Devonian" of Armenia, there appears to be no coal; but it is found in the Jurassic strata there. In the Caucasian isthmus there are Oxfordian grit-beds containing plant-remains and coal, and these are related to the coal-beds of the southern flank of the Caucasus (at Tqirbouly) and to analogous deposits in the Elbourouz of Persia,—constituting, in fact, a grand formation of the Oxfordian period, which stretches, probably, beneath the basin of the Caspian. M. Abich has proof of the Oxfordian strata being well developed also in the mountains crossing the Araxes, between Ordoubad and Migri, where coal of considerable thickness and of Oxfordian age occurs near the village of Bénamptschapour, up the Migri Valley, nearly 3,000 feet above the level of the Araxes. Similar plant-bearing Oxfordian grits M. Abich discovered, in 1862, in the mountains, north of the Lake of Gohtschai, near Daschkesan, and in the valley of Bojan, near Elisabethopol; and in 1864, besides the indications above-mentioned, he found them also on the left bank of the valley of the Terter at the foot of the Mouroudagh.

T. R. J.

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VII.—THE DUBLIN QUARTERLY JOURNAL OF SCIENCE. No. XXII.  
April, 1866.

SOME very interesting papers on Zoology, Meteorology, Comparative Anatomy, and Archæology, form the bulk of this part. There is also an account by the Rev. Dr. S. Haughton of some Meteoric Stones that have fallen in Ireland. One fell at Dundrum, Tipperary, in August, 1865; it consists of Iron, Iron-oxide, Pyrites, Chrysolite, and some other silicate of Magnesia, &c., with Nickel and Chrome. Some aërolites that fell at Killeter, in Tyrone, April, 1864, consist of Iron, Iron-oxide, Pyrites, some Silicates, including hornblendic mineral, near to Anthophyllite, in composition, with a little Nickel and Chrome, and a trace of Cobalt.

T. R. J.

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REVIEWS.

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I.—MEMOIRS OF THE GEOLOGICAL SURVEY OF GREAT BRITAIN AND OF THE MUSEUM OF PRACTICAL GEOLOGY. THE GEOLOGY OF THE COUNTRY AROUND STOCKPORT, MACCLESFIELD, CONGLETON, AND LEEK.—(Sheets 81, N.W., and 81, S.W., of the Map of the Geological Survey of Great Britain.) By E. HULL, B.A., F.G.S., and A. H. GREEN, M.A., F.G.S. List of Fossils revised by R. ETHERIDGE, F.R.S.E., F.G.S. Published by order of the Lords-Commissioners of Her Majesty's Treasury. 8vo. London, 1866.

THE district here described comprises, on the north, the southeastern prolongation of the Lancashire Coal-field,—on the south, the northern apex of the Coal-field of the Potteries, one of the