

GEOLOGICAL SOCIETY OF GLASGOW.—December 1st, 1870.—Mr. John Young, Vice-President, in the chair.

BITUMINOUS STRIPED SANDSTONE.—The Chairman exhibited a block of Carboniferous sandstone from Gilmorehill quarry, about nine inches in thickness, showing in that space thirty-two well-defined alternate white and dark-brown stripes, which gave the specimen a beautifully stratified appearance. Mr. Young stated that the brown stripes were due to the particles of sand having become mixed with bituminous matter previous to their deposition. It was perhaps not easy to explain the alternation, so oft repeated, of these white and coloured bands, but he thought the stripes could not have been so clear and distinct if the sand had been impregnated with the colouring matter *after* deposition. The layers of white and brown sand had evidently been deposited as such, at irregular intervals, over the area in which this striped sandstone is found, and which, he might mention, is of very limited extent in the quarry he had named. He then referred to other bituminous sandstones found in the coal-measures near Glasgow, and said he believed the bitumen by which they had become impregnated had been driven off by heat from other bituminous strata in their neighbourhood, and in some cases had been mixed with the sand during the deposition of the bed; in others, had been carried into it at a later period by infiltration. As regarded the specimen before them, the former, as he had already indicated, was the more probable hypothesis. All these bituminous sandstones, on being burnt, lose their bitumen, and return to their normal colour.

CARBONIFEROUS FOSSILS.—Mr. Thomas Naismyth exhibited several drawers of fish remains, principally from the coal-fields around Glasgow, upon which Mr. Young offered a few remarks illustrative of their generic characters and their range in the Carboniferous strata. The collection contained a number of fine large teeth of *Rhizodus Hibberti*, from the ironstone pits at Possil; jaws, scales, and teeth of *Megalichthys Hibberti* and *Megalichthys rugosus*, besides a number of fin-spines and other fragments of fishes, from the Airdrie coal-field. Among the specimens were also to be noticed a few fragments of reptilian remains, consisting of portions of crania, vertebrae, etc., which had been found near Airdrie, and at Quarter, near Hamilton.

Mr. James Thomson, F.G.S., said the specimens exhibited by Mr. Naismyth were of considerable interest, especially the reptilian. These belonged to two new species of *Labyrinthodon*, of which he had already found remains in strata of the same geological horizon.

OIL SHALE.—Mr. D. C. Glen, C.E., laid before the meeting several slabs of oil shale from near Collingwood, on Lake Huron, Canada; and also some samples of the petroleum distilled from it. The slabs were from the Silurian formation, which is of great extent in North America, and remarkable for the regular succession of its strata. When examined, these blocks of shale were found to be stratified horizontally with layers of Trilobites, Entomostraca, and other marine organisms. The oil shown was distilled from the shale in the usual manner, by heated retorts. The pure, clear spirit is taken from the oil, leaving a thick residuum, which is used for tarring outside work, and also for burning in steam-boiler and other furnaces. Another sample of oil on the table was pumped up from a bored well at Bothwell, C.W., where the oil occurs at a depth of from 100 to 500 feet from the surface. When pumped out, it is mixed with three or four times its bulk of salt water. It is then allowed to settle in large tanks, and when the water is drawn off from below it leaves the oil in very much the same state as that distilled from the shale. In all probability, therefore, this oil is derived from a similar stratum, impregnated with organic animal matter.

CORRESPONDENCE.

SPORE-COAL; FLINT, AND PROTOZOA.

SIR,—I am an elderly amateur of Geology, and have suffered many disappointments, on finding that what my scientific guides had, at one time or another, told me to accept as the definite cause and explanation for this or that fact or problem, on which I sought their opinion, was rotten or could not hold water. Indeed,

I scarcely hesitate to disbelieve in a new theory, and to discredit an asserted discovery, unless the former holds good through several editions of a manual, and the latter survives the discordant statements of opposite parties for the term of at least three sessions, exclusive of the British Association Meeting when it was first promulgated. I shall not, however, have time to believe in any of the advanced facts and notions of to-day if these rules of mine remain unbroken. Will you be pleased, Mr. Editor, to serve as strainer to my curds and whey, and tell me what is the cheese, when I shall have put the collected matter of my reading before you?

Now you must know that I like to read about *coal*, as well as burn it this cold season; and I have read very many curious things about it. Of course, when I was a boy, coal, I was told, was the accumulated vegetable refuse of the Mosaic deluge, whilst the fossils of the Lias country, which constituted my world at that time, were the defunct Mosaic sea animals. Once I heard a lecture on the origin of coal from pitch-lakes; but whether they were such as those of Trinidad, described by G. P. Wall, or rather like those elsewhere, so well described by A. Dante, J. Milton, and others, I had my doubts. Then I read that coal was the drift timber of pre-historic Mississippi and Orinocos. Then I was informed it was the successive jungles of unknown trees on sinking islands in the former world. Then I learned from Goeppert and others that these trees and herbs could be satisfactorily separated and recognized, even in the coal itself, as well as in the clay-beds among which it lies; and Unger drew Martinesque forests of Sigillarias, Stigmarias, etc., and I presumed all was known. Then Quekett and other histological microscopists (you see I know some hard words) showed the structure of various coals; and their long and short, shaped and shapeless, coloured and discoloured, particles were very interesting; but I could not satisfy myself which way the slices were cut for the microscope, nor which was the top and which the bottom of the piece of coal. Then Dr. Dawson taught me more clearly about the order of the bright and the dull black layers, and explained everything so nicely that I thought we knew the history of the coal, its forests, and all its antecedents. Others had taught me of the spore-made "trubs," of the chemical changes of the hydro-carbons of woody matter, peat, lignite, coal, etc.; and I recognized the difference between the native charcoal, or black touchwood, of the streaky coal, and the anthracite, or coal changed into carbon by loss of its hydrogen, and so on. But, Mr. Editor, now begins my trouble. I have just read Mr. Dawkins's "Science Lecture on Coal" (8vo. pamphlet; Heywood, Manchester), and I find that "bituminous coal" is so called, not because it is mostly convertible into bitumen by heat, but because it *contains bitumen*; and I learn that all this "bitumen" is nothing but sporangia and spores! And that to prove this, none have laboured so successfully as "Professor Morris, Mr. Carruthers, and last, though not least, Professor Huxley"! Of course, I have heard of these spores and spore-cases before; but this seems to me to be a case of sporimania on the

lecturer's part. It may be so with other people too. I cannot think it is with Prof. Huxley, for the lecture on coal given by him at Bradford, December 28, 1869, as reported in "Scientific Opinion," is one of the best lectures I ever read,—unpretending, clear, simple, comprehensive, and indeed perfect; and, however full of information on coal and coal-spores it may be, it does not break out into any wild notion of universal spore-coal, nor supply any jack-o-lantern lights of false science. Nor do I see any symptoms of this spore-madness in Messrs. Morris and Carruthers, if I have read their writings aright. They and their fellow-workers have long ago told us what kind of plants bore the spores that are found here and there in the coal; and they must indeed feel glad to find that the lecturer assures us that he thinks it is not at all difficult to trace some analogy of the extinct Lycopods with a living order of vegetation!

Do tell me, Mr. Editor, how far I may go in for the coal-bitumen and the coal-spore doctrines in my geological conversations next year, when, as usual, I intend to turn over a new leaf; indeed, I think, quite a new branch of anthracology!

Mr. Dawkins has given us the spores of his new theory; but he cuts away the roots of *Lepidodendron* and the leaves of *Sigillaria*. Am I to lay aside the teachings of Dawson and others, and, after reading Dr. Hooker's memoirs of 1848, omit everything till I come to Mr. Carruthers's late excellent papers, and Prof. Huxley's and Dawkins's lectures, with the chapter on coal in Lyell's "Elements" for my *entremets*? If so, I fear I may get the spore-fever too!

Dear Mr. Editor, there are other geological troubles in my mind-life. What am I to do about flints? I will not make a *résumé* of my "Phases of Faith" in Silicification. They might be as heterodox as other people's "Phases." Let me say, however, that I did not heartily believe in Ehrenberg's dissolution of Diatoms for the making of flint. I thought that the decomposed felspars and the many mineral springs would do as well; and I did not believe that the siliceous ever stuck round a sponge like glue on an apprentice's fingers. I did think there had been a pseudomorphism of siliceous after carbonate of lime in every limestone, even on the sides of joints in chalk; and I hoped for some good experiments to back up my fancy. But now I am driven back to the dissolution of diatoms and siliceous spicules, with regenerated siliceous, where never a diatom nor sponge need have been, just because the zoologists have found plenty of diatoms, polycystines, and siliceous sponges in what they are pleased to call the "Chalk-mud" of the deep Atlantic! Further, I am told to believe that Toulmin Smith's membranous *Ventriculites* were once siliceous, but gave up their hypothetical silica in the muddy chalk, to suit, I suppose, the last new idea that zoologists, thinking to benefit geology, have brought up with the sounding-lead! What a uniform consentaneous sacrifice the *Ventriculites* must have made; as neatly plundered of their supposititious silica as the French villas are cleared of lamps and pianos by the Prussians.

The diatom-mania has led us before now through Salpas and Whales' coprolites, to full-grown flints! And with this warning

before me I shall eschew them, and even encourage a Spongiphobia in the matter of silicification, until, Mr. Editor, I am directed to the true light, though it be but a spark, that zoologist, mineralogist, and geologist together have to get out of flint.

My next trouble—no—you shall not be bored with that. It is like the others—the result of enthusiastic savants running wild with the one new idea that has, I fear, deluded them, and others before them, with the hope of throwing a flood of light on that obscure but interesting subject which circumstances have led them to take up as a study, or as the text for a lecture. “The intelligent foreigner” that we know of once found, in the lake of Mexico, petrified *Notonecta* eggs so like *oolite* that, being a geologist, he immediately discovered that all oolites are petrified insect eggs! So with the spores;—all flaming coal is spores! So with flint; it is all jelly of diatom-broth and sponge-spicule-soup! And now, dear Sir, please tell me, are these the curds and whey from which genuine cheese is made?—Yours, etc.,

COALHOUSE, FLINTSHIRE,
Christmas Day, 1870.

RUSTICUS EXPECTANS.

POSTSCRIPT.—I am troubled too by what seems to be a Rhizopodal madness among palæontologists, upsetting my old notions, and offering such new ones that a course of reading in the existing manuals does not enable me to digest. In fact, nearly every obscure little thing, and many big things once safely registered among corals and such like, become foraminiferal now-a-days. Indeed, geologists, especially the new ones, have had the *Globigerina*-fever ever since Mr. Sorby explained that some chalk is nearly made up of *Globigerina* shells. The Atlantic mud, in some places, was next found to consist of Foraminifers and Polycystines; and if anything else was wanted in its protozoal character, it was soon supplied with *Coccoliths* and the pervading but almost intangible *Bathybius*, which has permeated ocean-beds and men’s minds after the fashion of Huns and Tatars, Saracens and Prussians, invading broad lands and occupying history until a change comes o’er the spirit of earth’s dream once more. I suppose these Rhizopodal truths are more or less genuine. But are we to admit of sub-Alpine flanks and sub-Himalayan buttresses made of *Nummulites*, and that the Turco-Persian frontiers are marked out by gigantic Foraminiferal *Loftusias*? Are there whole beds of *Parkerias*; and are wide sea-floors coated thickly with siliceous casts of small Forams? Are we to suppose that nearly all the fine-grained limestones belong to the protozoists, and are sealed as theirs by visible *Alveolines*, *Fusulines*, etc., and by microzoa innumerable, known only to the experts? This seems enough for us to believe; but let me ask—did really the big *Stromatopora* enter as a Foraminifer in the race of life? And did the *Eozoon*, known only to the upper ten of palæo-zoology, play as important a part before Canada was, as it has (in books) since Canada became a Dominion? We are overwhelmed with Rhizopods: to say nothing of Sponges, old and new, and other Protozoans.

Can you, Mr. Editor, tell me when the Rhizopodists will cease to

trouble us with such multitudes of these low things? We poor amateurs seem to be so many Pharaohs—to be afflicted in all our quarters with protozoan creatures enough for all four of Egypt's animated plagues!—R. Ex.

MR. CROLL'S HYPOTHESIS OF THE FORMATION OF THE YORKSHIRE BOULDER-CLAY.

Sir,—I submit that Mr. Croll's hypothesis of the formation of the Yorkshire Boulder-clay by a sheet of land-ice, without any intervention of the sea, is at once negatived by the abundant beds of sand and gravel intercalated in it, in one of which occur shells perfect, unrolled, and sometimes double; and that his explanation of the absence of chalk from the purple clay by one arm of his ice-sheet having passed north of, and so escaped, the Wold is equally negatived by the fact of this clay overlying and passing gradually down (through clay with more and more chalk) into the chalky clay along the Holderness coast, viz., at Dimlington cliff, and at the cliff south of Mappleton; for besides this gradual transition, these places could not by any possibility be reached from the direction of Shap without the chalk being crossed.

From the way in which Mr. Croll uses the quotation from a paper of mine as to the origin of the chalk in Boulder-clay, the reader might suppose that, like Mr. Croll, I regarded such Boulder-clay as a deposit of land-ice without intervention of the sea; and I am anxious not to be misunderstood in this respect: for though I regard the material making up the chalky clay, and indeed most of that making up all glacial clay, as the *product* of land glaciation, yet the evidence seems to me unanswerable that such clay, wholly unstratified as it is, has been deposited under the sea; and that moreover to all appearance as tranquilly as many sedimentary deposits.

Were your pages less engrossed with Glacial topics, I should like to discuss with Mr. Croll the evidence bearing upon this subject, as well as upon the hypothesis of an ice-sheet 2,000 feet and more in thickness, which he and Mr. Jamieson insist has passed, regardless of hill and vale, over the higher mountains of Scotland, such as Schiehallion, and the filling up of the North Sea with ice; but until opportunity offers, I must content myself with demurring to all these propositions.

I may mention that Mr. Rome thinks that the Shap blocks are confined to the upper part of the purple clay, and that he ascertained the exact spot (about 15 feet from the top of the cliff) near Saltburn whence one of these boulders had come. Supposing this to be confirmed, it would show that the glacial period had nearly terminated when these erratics came over; and the period arrived when the glacier ice having been lifted out of the straths and valleys, the mountain regions had become an archipelago filled with ice-floes, to the agency of which (and not to that of bergs) both Prof. Harkness and myself refer the transport of the blocks in question—the period, in fact, to which I would refer all the glacial accumulations of the Scottish highlands.

SEARLES V. WOOD, Jun.