

the President of the Institute of Civil Engineers. If we were directly seeking for coal, the question would evidently be one for the adjoining landowners. If it were simply an ordinary scientific experiment, it might be left to those specially interested in the subject; but our object is to obtain information which, while it must certainly increase our scientific knowledge, may confer an incalculable benefit on large areas in which mineral wealth is at present an unknown quantity. None of our supporters have subscribed with the idea or intention of any personal gain whatever; and it is to minds thus constituted,—who will give ‘hoping for nothing again,’—that we must look for help to finish our work.

“The Diamond Company have consented ‘at less than half their published tariff’ to endeavour to bore 200 feet more at £2 a foot, solely on the ground that it is a scientific, and not a commercial, undertaking. And, by the aid of their superior machinery and appliances, we have now a better prospect of boring 2,000 feet than we had of boring 1,000 under the old system.”

### III.—TRANSACTIONS OF THE GEOLOGICAL SOCIETY OF GLASGOW. Vol. IV. Part 3. 1874.

THIS part contains brief notices of the proceedings of the Society for the year 1872–3, with an account of the *Conversazione* held in December, 1872, at which a fine collection of geological specimens were exhibited by different members; abstracts of three papers, including the President’s Address for 1874; and nine papers printed in full, most of which bear upon some interesting points of the geology and palæontology of the west of Scotland. Of the non-local papers, Mr. J. Geikie contributes a “Note on the Occurrence of Erratics at Higher Levels than the Rock Masses from which they have been derived,” and considers an explanation of this curious problem may be eventually found in certain phenomena which have been observed in Alpine glaciers, such as stated by the late Prof. J. Forbes, “the tendency of glaciers to reject impurities, and the undoubted fact that stones are always found near or upon the surface of the ice.” “It is enough to know,” says Mr. Geikie, “that stones introduced into the body of a glacier, whether from above or below, tend to rise upwards in the ice, as the glacier flows on its way. Let us suppose a mountainous country, such as Scotland, covered with a wide ice-sheet, or series of confluent glaciers, and endeavour in imagination to follow the course of some hypothetical boulder which has been introduced by friction into the ice at the bottom of some valley in the interior of the country. As the ice creeps outwards, the stone gradually rises, the path which it follows sloping at a less angle than the bed over which the ice flows. Did no obstruction intervene, it is evident that the boulder, while it rose through the body of the ice, would be at the same time travelling gradually to lower levels than the point from which it originally set out. . . . But then we know that countless obstacles intervened to impede the flow of the massive ice-sheets of the Glacial epoch; and with every such obstruction the glacier masses must

have been forced to bulge upwards by the intense *vis a tergo*; and such upward movement of the ice, being again and again repeated, imprisoned boulders and *débris* would be compelled just as often to rise to higher and higher levels."

In the note by Mr. D. Robertson, "On the Precipitation of Clay in Fresh and Salt Water," it is shown there is a great difference between the two—fresh-water holding the clay in suspension for a considerable time; while water only slightly brackish has the power of precipitating it much more rapidly. "Keeping in view the large quantities of earthy matter annually carried down by rivers, a large proportion of which is precipitated as soon as it comes in contact with the water of the sea, we can easily understand how the courses of rivers, within the influence of the tide, diverge into various branches by the precipitated mud silting up the river-bed at one place, and the obstructed water forming a new channel at another; and hence throwing a new light on the formation of deltas at the mouths of rivers." The paper, "On the Geology of the North-Eastern District of Yorkshire," by Mr. T. M. Barr, is not, as the author justly states, anything like a systematic or exhaustive study of its geology, and is therefore only a general account of this valuable iron-ore bearing district. The "top seam," alluded to at page 298, does *not* belong to the *top* of the Upper Lias series, but belongs to the "Dogger" or Inferior Oolite, which is situated between the Upper Lias and the Great Sandrock above. This *seam* has been worked at Grosmont, and formerly in Glazedale. But it is in Rosedale, in the very centre of the great moorland district, that the Dogger and its associated beds have yielded the greatest results to mining enterprise. The celebrated Rosedale magnetic ore occurs as an enormous boss or local swelling in the Sandrock below the Dogger, about 600 yards long, by 150 feet wide, and 80 feet high. There is nothing like it in all this district, and it may fairly be described as the richest ore in North Yorkshire, a perfect nugget of iron-stone on a bare hill-side, 700 feet above the sea.<sup>1</sup>

Of the district papers, Messrs. Robertson and Crosskey continue their descriptions of the Post-Tertiary beds of the West of Scotland, which, when completed, will be of great value, for Mr. Robertson's intimate acquaintance with the estuarine and marine fauna of the Clyde, and his extensive collections (personally acquired) of recent British species, and those from the Post-Tertiary deposits, not only around the Clyde, but from Sweden, Norway, etc., will enable the authors to infer more clearly the conditions under which these strata were deposited.

Mr. J. Young contributes three papers: 1. "On the Probable Source of Certain Boulders in the Till of the Glasgow District," in which the origin of the Limestone blocks is chiefly treated. We trust this author will fully describe the fine section recently exposed at the extensive excavations for the Stobcross Docks, with its numerous and varied boulders, which could only have been brought together here from a wide extent of country lying in several different directions.

<sup>1</sup> The Yorkshire Oolites. By W. H. Huddleston, F.G.S. Proc. Geol. Asso., 1874, vol. iii. p. 305.

2. "On the Occurrence of *Saccamnina Carteri*, Brady, in the Lanarkshire Coal-field." This Carboniferous foraminifera, previously found in the Limestones of the N. of England and E. of Scotland, is interesting as being closely allied to a living species, *S. spherica*, which appears to be common at great depths in the Atlantic. 3. In conjunction with Mr. J. Armstrong, a paper, "On the Fossils of the Carboniferous Strata of the West of Scotland."<sup>1</sup> This is the first of a series of papers (No. 1, Robroystone), which the authors intend to prepare, of the fossils found in each particular group of strata in the various localities where they occur, so as to compare them, and thus arrive at "a correct notion of the alternate change of condition under which the flora and fauna of the Carboniferous period existed."

More than 130 species are enumerated, chiefly Invertebrata, some of them new, and mostly obtained from a shale-bed associated with the Robroystone or Upper Limestone series. The Carboniferous shales of the West of Scotland appear to be very fossiliferous, which may be due to the abundance of life during their deposition, or to the greater facility with which the fossils weather out than in the associated harder limestones. We have been shown by Mr. Robert Craig, of Langside, a bed of shale about three feet thick, in his quarry, belonging to the Lower Limestone series, in which he has found 50 per cent. of the known fossils of the Beith district of Ayrshire.

In the last paper "On the Glaciation of the West of Scotland," Mr. D. Bell shows that the diverging striae and trains of boulders in the neighbourhood of the Firth of Clyde must have been produced by a great sheet of land-ice, extending from the higher grounds, and entirely filling up the present estuary of the Clyde; while the branching Lochs, as Holy Loch, Loch Long, and Gare Loch, which form so striking a feature of the west coast, are simply old glacier channels, down which in various directions this great outflow of ice found its way from the frozen and snow-clad interior of the country; and he cites as evidence the numerous blocks of schistose, gneissose, and granitic rocks found along the eastern shore and to some height on the hill-sides above, in the vicinity of Greenock and Gourrock, directly opposite the opening of the 'Lochs' above referred to.

We have noticed, in a recent visit to Gourrock, the number of very large and small boulders of the rocks above mentioned along shore (as alluded to by Mr. Bell), from Kempoch Point to below the Cloch Light House, in a district consisting either of Old Red or Lower Carboniferous Sandstones and conglomerates, with intercalated and intrusive porphyry and trap rocks,—a district well worthy of careful examination for its interesting geological structure. Mr. Bell further states, that while the general glaciation of the Clyde valley is from W. to E. (or N.W. to S.E.), there have lately been observed instances of cross-striation, especially at Possil, where the N.W. striae were considered to be the older, and the N.E. the newer of the two sets. This cross-striation is one of considerable interest to students of this department of geology. •

J. M.

<sup>1</sup> See the excellent general catalogue, by the same authors. Trans. Geol. Soc. of Glasgow, vol. iii. Supplement. 1871.