

NOTICES OF MEMOIRS.

I.—GEOLOGICAL SURVEY OF IRELAND.

Explanation to accompany Sheet 95 of the Map of the Geological Survey of Ireland, including the country around Headford and Oughterard, illustrating parts of the counties of Galway and Mayo. By G. H. KINAHAN, and J. NOLAN, 1870. 8vo. pp. 71.

THE authors first draw attention to the Physical Geography of the area. A considerable portion of it is occupied by Lough Corrib, the second largest sheet of fresh-water in Ireland. This is only twenty feet above the mean sea-level in Galway Bay. The southern portion of Lough Mask enters the map at the north-west, its surface is thirty-six feet higher than that of Lough Corrib, into which it flows by subterranean passages. The "rock basins" in which these lakes lie, present appearances which suggest their having been excavated at the same time, and by similar denuding agents.<sup>1</sup>

The area is in general hilly, the highest point, Benlevy, reaches 1,370 feet. The rivers in the low country east of the lakes were formerly, for a great part, subterranean, but some years since artificial cuts were opened that now carry off the greater part of the drainage, although in no case has the water ceased to flow in the subterranean channels.

The formations noticed in the area under consideration consist of:—

Alluvium, Bog, and other superficial coverings.

Drift or Glacial deposits.

Carboniferous Limestone.

Carboniferous Sandstone.

Upper Llandovery.

Igneous and metamorphic rocks are also met with. The former include Greenstone, Hornblende rock, Felstone, and intrusive Granite; the latter comprise Quartzites, Gneiss, Crystalline Limestone, Schist, and Serpentine.

The authors<sup>2</sup> give a brief general description of the rocks, and then proceed to describe in detail the geological structure of the country, dividing it for convenience into four districts, namely, the Oughterard district, the Headford and Cong district, the island in Lough Corrib, and the Benley and Kilbride district. The drift and other superficial deposits are noticed in a separate section, and after them the Mines and Mineral Localities.

The Irish Granite has been divided by the Rev. Prof. Haughton into two distinct classes—intrusive and non-intrusive. All the granite in this area seems to be intrusive, it is termed the "Oughterard Granite," from its being so largely developed in the neighbourhood of that town. Its usual constituents are quartz, orthoclase, white and black mica, and frequently iron-pyrites. It is occasionally traversed by mineral lodes, particularly lead lodes.

<sup>1</sup> See paper by G. H. Kinahan "On the Formation of the 'Rock-basin' of Lough Corrib," *GEOLOGICAL MAGAZINE*, Vol. III., 1866, p. 489.

<sup>2</sup> The parts furnished by both authors are specified in the 'Explanation.' The country was surveyed chiefly by Mr. Kinahan.

Attention is directed to the foliation of the metamorphic sedimentary rocks, which seems to have been predisposed to follow the most marked structure in the original rocks. Simple or parallel lamination, apparently, was the principal structure of the ancient rocks of the district, so generally the foliation is parallel to the bedding. Curled or spheroidal foliation likewise is present, which in some cases seems to have been caused by the original rock containing nodules. Other forms of foliation are pointed out.

The Silurian rocks, supposed to be the equivalents of the Llandovery beds, consist of green and grey grits, sandstones, and shales, many of which are fossiliferous; with, near the base of the formation, red and purple shales, sandstones, and conglomerates.

The Carboniferous rocks are also described, and their fossils noticed, in the account of the districts where they occur.

The Drift-deposits seem to belong to three distinct classes; the first being the true Boulder-clay, a slightly sandy clay, in which are embedded beautifully polished, scratched, and rounded blocks and fragments of rock; the second, Boulder, or Moraine-Drift, consisting of broken and sub-angular fragments and blocks of local rocks (rarely polished), mixed with sandy clay; and the third, Esker-Drift, or "Post-Drift" gravels and sands. The first and third occur on the low country west of the lakes, and the last seems to be the Boulder-clay washed or sifted, as it is found merging into a Rocky-drift, or half-washed Boulder-clay, and from that into the Boulder-clay itself. The second occurs principally in the valleys, or on the slopes of the mountainous district. A similar drift in Wales, is supposed by Professor Ramsay to have been formed by the glaciers that once existed in its mountain valleys. That such glaciers did also exist here appears probable, as will be seen in the table of ice-*striæ* given in this "explanation."

The relations between the form of the ground and its internal structure are alluded to. At least three great periods of disturbance and denudation are considered to have affected the country from early geologic times down to the Glacial epoch. The most ancient of these was that which affected the metamorphic and granitic rocks, as on the east of Benlevy the Silurian rocks were deposited in places against a cliff over 200 feet in height. The second was that during which a great part of the Silurian rocks and also parts of the older rocks were carried away. The third period of denudation was that in which so much of the Carboniferous rocks was excavated and carried away, as to leave the features of the country to a great extent as it is now found. This may have been partly due to marine action, but the last great agent at work would seem to have been ice, as all the rock-surfaces which are protected from the "meteoric abrasion," now in progress, are well polished, planed, and striated; moreover on the exposed surface of the country, the authors have noted the rounded flowing outlines which are now universally recognized as the result of ice-agency. Since the ice has disappeared the existing denuding agencies have been, and are daily, at work, slowly and gradually changing the features of the country. Adjoining the lakes,

they remark, the weathering seems to be much more rapid than elsewhere. They mention that on the granite near Oughterard the decay, since the Glacial period, appears to be from half to one and a half inch, judging from the height the unweathered veins, traversing the granite, stand up above the mass of the rock.

The authors give an account of the Mines, more particularly those of Glan, Oughterard, and Glengowla; they also mention the ores obtained from them.

The "Explanation" is illustrated with several woodcuts, and it has moreover the advantage of a good index.

## II.—THE CARBONIFEROUS FORMATION OF SCOTLAND.

AT the Meeting of the North of England Institute of Mining and Mechanical Engineers, held at Glasgow, and extending over four days, August 9 to 12, Mr. JAMES GEIKIE, District Surveyor of the Geological Survey of Scotland, read a paper on the Geology of the Carboniferous formation of Scotland. The author described, first, the Calciferous Sandstone series, which, when typically developed, consists of two groups of strata, the lower pointing to the prevalence of marine conditions during the deposition of the Red Sandstones and conglomerates, and the upper showing that, during its accumulation, marine and brackish water conditions alternated with the occasional appearance of land surfaces. Volcanos were somewhat prevalent during the deposition of both groups. Secondly, he noticed the Carboniferous Limestone series, consisting of a lower group indicating marine conditions and occasional old land surfaces; a middle group indicating frequent land surfaces, and alternate brackish water and marine conditions; and an upper group pointing chiefly to marine conditions, with occasional brackish water-deposits and a few old land surfaces. Both submarine and subaerial volcanos were active during the deposition of this series. Thirdly, he drew attention to the Millstone Grit, which was deposited under almost exclusively marine conditions. Fourthly, he described the Coal-measures, which show a prevalence of brackish or freshwater conditions, with abundant land-surfaces, and with evidence also of occasional inroads of the sea. Mr. Geikie then pointed out that there were intrusive rocks of three classes, namely, some referable to the close of the Coal-measures; bosses or pipes of tuff or agglomerate, probably of Permian age; and dykes of Dolerite of Miocene Age. Two systems of faults of different ages were indicated, the older striking north-east and south-west, the other a double-set, striking approximately east and west, and north and south. In conclusion Mr. Geikie referred to the exceeding richness of the variety shown by the phenomena of the Scottish Carboniferous formation, and said he had no hesitation in affirming that, when the palæontological and geological histories of these rocks was thoroughly worked out there would be prepared one of the most important chapters in the physical history of the country.—*Nature*, 25th August, 1870.