NOTES OF A GEOLOGIST IN IRELAND DURING AUGUST AND SEPTEMBER, 1857.

By THE REV. W. S. SYMONDS, F.G.S.,

Rector of Pendock, President of the Malvern Natural History Field Club.

As the summer approaches, many of the readers of the GEOLOGIST will be preparing for their vacation-rambles; and should any think of visiting our Sister Isle—"Old Erin"—the following notes may be of service.

We started on a bright August morning of last year for the meeting of the British Association for the Advancement of Science, held in Dublin, and with the intention of travelling over as much country, breaking as many stones, gathering as many plants, and catching as many salmon as time and circumstances would permit. We were fortunate in our combination of naturalist and sportsman, but as these notes are intended solely for the naturalist, we leave our "salmon struggles" unrecorded—at least in the pages of the GEOLOGIST.

We travelled by Conway and Bangor to Holyhead, and as it was blowing a gale of wind when we arrived, we determined to wait until the sea was calmer, and, in the meanwhile, to visit the Cambrian rocks of Anglesea.

We never saw a more instructive example of contortion and twisting of rocks than is displayed at the South Stack Lighthouse, of which a good sketch is given in Sir R. Murchison's "Siluria." It is indeed a rugged coast; and the terrible Bay of Caernarvon to the south has been the locale of more shipwrecks than any other in the British Isles. We visited the grand quarries of quartzite, worked on a gigantic scale for the great breakwater. Here, as the geologist approaches the quarry from Holyhead, is a greenstone-dyke traversing the quartzite with a singular vein of pink decomposing felspathic rock. We were astonished at the magnitude of the works for the breakwater—eight, and, we believe, ten tons of gunpowder have been used in the quarries for a single explosion; and at one blast more than 100,000 tons of quartzite have been hurled downwards from the mountain-side, while upwards of six millions of tons of the rock have been buried beneath the waves that wash the shores of Holyhead. Mr. Robert Mallet read a paper afterwards at Dublin, on earth-waves caused by earthquakes;

and he had noted the effect of the explosion of eight tons of gunpowder in these quarries. The shock was so great as to be felt at the distance of two miles, and even threw crockery off the shelves of houses situated at that distance. In connection with this subject, Mr. Mallet mentioned that at Rio Gambia, during an earthquake, where the shock was perpendicular and not lateral, people were shot upwards more than two feet.

The scenery of Dublin Bay is bold and beautiful. It is backed by the Sugar Loaf and Lugnaquilla Hills; and, seen for the first time, under a bright sunshine, few persons would forget such a view. The Geological Section, at the Dublin meeting, was below its usual mark, owing probably to the absence of the most renowned of our English geologists—Lyell, the philosopher of his science, was travelling in Italy or Switzerland; Murchison was in Germany; and the veteran Sedgwick *hors de combat* with the gout; nevertheless there were some excellent papers by Professors Hennessey, Jukes, Haughton, and Harkness, Dr. Kinahan, Mr. Du Noyer, and many others; also an admirable paper on India, by Professor Oldham. The Museum of Irish Industry is a credit to Dublin, and to the gentlemen connected with that institution. It is a most instructive collection of the manufactures, the raw materials, the geology, and the mineralogy of Ireland. The stranger-geologist and naturalist wants to see Irish fossils and minerals; and here, thanks to the labours of the Geological Surveyors, he can do so without being, in any way, incommoded by boots, harps, South Sea canoes, Chinese slippers, and cobwebs. We would acknowledge the ready kindness and information we received from Professor Jukes, Mr. Du Noyer, and Mr. John Kelly, a working geologist on the staff of Dr. Griffiths when geology was more tedious and difficult than in these days of accumulated knowledge, maps, and sections. Mr. Du Noyer was good enough to point out to us one of those ancient marine worms, from the Cambrian deposits of Ireland, which was actually fossilized in its burrow! This old relic of life from the oldest known sedimentary rocks, is named by its discoverer, Dr. Kinahan, *Histioderma Hibernicum*. These "trumpet-shaped membranous tubes of a tentaculated worm" may be found both at Bray and Howth. There is also a fine series of that early zoophyte (or bryozoon, according to some), the *Oldhamia*,

of which two species have been determined. Among the fossils from the Upper Silurian rocks of Dingle Promontory, the most western land of Europe, we recognized an old friend, the *Pentamerus Knightii*, of the Aymestry division of the Upper Ludlow series.

The visitor to the Museum in St. Stephen's Green should especially inquire for the case containing the fossils and plants of the yellow and red sandstones, which lie beneath the lower carboniferous limestone, and are extensively quarried in many parts of Ireland. Here we saw, for the first time, that apparently freshwater mussel of the lower carboniferous epoch, the *Anodon ? Jukesii;* also the fossil plant named *Knorria*, and that beautiful fossil fern, *Cyclopteris Hibernica*, which has lately been found near Waterford with its fructification preserved. This fossil fern has its fructification developed somewhat after the fashion of the recent and well-known *Osmunda regalis*, or flowering fern, so abundant in the neighbourhood of Killarney.

My friend, Dr. Melville, writing me a description of this discovery, says that, "in the fertile fronds of the *C. Hibernica*, the pinnules of the primary pinnæ are divided into capillary segments, subclavate at their extremities; but the intermediate pair of pinnules, the peculiar characteristic of the fern, are uncut, and the terminal pinnules of the primary and secondary rachides do not exhibit the capillary segmentation."

A great deal of valuable information may also be gained by examining the hand-specimens of rocks and fossils in this collection before starting for the hills and quarries, as the mineralogical character of most of the Irish strata differs very considerably from our English types, whether those strata be Silurian, Old Red, or Carboniferous.

Of course, no one, if he could avoid it, would leave Dublin without visiting the other public places of interest, especially the Irish Academy, with its gold and jewelled ornaments of a by-gone race. We were amazed at those gems, "so rich and rare," evidently the work of artists of exquisite skill and taste. There are torques, or twisted collars of pure gold, as old, probably, as the period of Torquatus, who slew a Gaul in the year of Rome, 393, and afterwards wore the "torc" he took from the body. There are jewelled cups, and vases, and gold ring-money of the ancient Celts; and there are bells of the time

of St. Patrick, with gorgets, bracelets, and brooches. It is recorded that at the Dublin Exhibition of 1853, more than 60,000 objects of antiquity were collected together. There is, also, a model of what might be almost termed a fossil house, discovered beneath Drumkelin bog, in the county of Donegal, with its pathway of flags, and the roots of the trees that sheltered it, and the marks of the woodman's tool on its timbers. Yet all around, above, and within this dwelling was a solid mass of bog; for it was sixteen feet below the surface. There are some magnificent specimens of the majestic, but extinct, Irish Elk, *Megaceros Hibernicus*, to be seen at the College. The antlers of some skeletons of this gigantic deer are more than nine feet in expanse; and these creatures stood, when living, ten feet four inches in height, and their length, in proportion, was ten feet ten inches; while that of the American moose-deer is but six feet.

The Botanic Gardens at Glasnevin are well worth a visit, and we shall long remember the lovely faces we beheld on the occasion of the fête given to the members of the British Association. There are some matchless specimens of the Killarney fern, *Trichomanes radicans*, the property of Mr. Moore, the Curator, which are valued at a fabulous price. The traveller would do well to ask to be allowed to see these specimens, as it is very improbable that he will meet with any at Killarney, the *Trichomanes* having been nearly eradicated by over-selfish collectors.

The geology of the Dublin district is of great interest, and we recommend excursions to Howth, Ireland's Eye, and Lambay Island; but let every geologist first provide himself with a reduced copy of Sir R. Griffith's Geological Map of Ireland, which may be purchased for a few shillings at Forster's, 2 Crow Street, Dublin.

Mr. Du Noyer directed our attention to a remarkable junction of slate and granite at Killiney Hill. Veins of granite and eurite here traverse the granite and slates; but the interstratification of the slates with the granite is merely in appearance, for the slates are caught up in the granite, and are not really interstratified.

On the Irish Cambrian deposits we have a few words to say. We visited Bray Head, with its "Oldhamia schists," in company with several good geologists and pleasant companions, and were conducted by that veteran geologist, Mr. John Kelly, to the best localities for obtaining good specimens of those ancient zoophytes which lie there in thousands, bedded in the rocks, which are mostly covered by the

waves at high tide. A happier party could hardly be met with than the half-dozen hammerers who sat, in the August sunshine, on the sea-shore, and knocked out the Oldhamias from the rocks, or watched the seagulls fishing in the bay.

The Cambrian deposits were long believed to be unfossiliferous, and to represent a period of this planet's history before the introduction of life upon it. Yet we have now contradicting evidence in the presence of zoophytes and sea-worms in the "Oldhamia beds" of a trilobite, annelids, and fucoids, with rain-marks, on the old beach in the equivalent rocks of the Longmynds. Some of us thought that it might be a mis-reading of the geologic records to imagine the creative fiat terminating for ages in sea-worms or Lingulas, or that no other animals lived in the Cambrian epoch because geologists have not yet discovered their remains. Geologists know but little, as yet, of Cambrian deposits and their organisms. Every day the depths of the present seas are yielding new treasures to the dredger; and genera of animals supposed to be extinct appear to overthrow theories and presumptions. We believe it would be wiser to wait a while, ere we talk of "eternal oceans," "wastes of uninhabited shore," "tenantless Cambrian lands," or Cambrian seas inhabited solely by zoophytes, fucoids, sea-worms, and a few trilobites.

As far as the physical geology went, we thought the Bray beds very unsatisfactory, and were obliged to rest content with the assurance that they are seen to underlie unconformably beds which may be the equivalents of our "Lingula-flags," to the west of Bray.

It is impossible to say too much of the rich glow and blending of colour we beheld in the hills of Wicklow during the walk of that afternoon. The hills were purple and gold with the beautiful bell-flowered heath and the yellow blossoms of the gorse. We returned to Dublin by a late train, and, before parting, agreed to make that a "red-letter day" which we passed among the "Oldhamia-schists" and flower-spangled hills of Wicklow. Surely such days should be marked, they are golden hours in a man's life, for which we are to be grateful. He must have a hard heart who can return home, after such a day, cherishing envy or uncharitableness, or who can pass hours among the noble works of creation by the bold sea, the rock of ancient days, under the clear sky and among bright flowers, without a feeling of gratitude towards Him whose wondrous works they are, and who has given us the capability so deeply to enjoy them. As for only philosophers enjoying these things, it is the appreciation of them that elevates the man into the philosopher—the lover of wisdom.

(*To be continued.*) p 297 is placed after 376.