they can wander at pleasure far away from water, and even defy the powerful heat of a tropical sun. Perhaps no stratum affords greater abundance of long-tailed forms (Lobsters) than the Lithographic Limestone of Solenhofen, so well worked out by Dr. Oppel of Munich, the species of which are closely represented in the Lias and Oolite of England.*

The top of the Chart is devoted to a small series of *Recent Typical Forms*, placed for comparison with the less perfect fossil remains. Short descriptions of each group have been prepared and added to the Catalogue, which, it is hoped, will increase its usefulness, and enhance the value of Mr. J. W. Lowry's beautiful engravings.

On the Metamorphic Rocks and the Green Marbles of Connemara.† By Prof. Harkness, F.R.S.

THE author showed, by sections and maps, that the green marbles of Connemara were a local and peculiar development of light-grey subcrystalline limestone which lies on the north side of the gneiss rocks of the south of the Bens of Connemara. This limestone dips conformably under these gneissic rocks. It is superposed conformably on quartz-rocks; and these quartz-rocks, with their superposed deposits, are thrown into numerous contortions in the Connemara country. Where they are most curtailed, the limestones have opened out in their lines of lamination, and into these openings the serpentinous matter, to which the green marble owes its colour, has been introduced. The metamorphic strata in the Connemara country appertain to the Lower Silurians. They are the equivalents of the Quartz-rocks, Upper Limestone, and Upper Gneiss of the Highlands of Scotland, described by Sir R. I. Murchison. It has been stated that *Eozoön Canadense* occurs among the green marbles of Connemara. The structure which has given rise to this opinion is purely mineral, and has resulted from the deposition of Serpentine upon Tremolite and asbestiform minerals.

CORRESPONDENCE.

EXPLORATION OF THE 'HOYLE'S MOUTH' CAVE, NEAR TENBY.

To the Editor of the Geological Magazine.

Sir,—In an 'outlier' of the Carboniferous Limestone, running at right angles to the 'saddle-back' of Old Red Sandstone called the 'Ridgeway,' is a picturesquely situated cavern, well known to visitors at Tenby by the name of 'Hoyle's Mouth.' Some interesting discoveries of the remains of extinct and other animals have lately been made here by W. A. Sanford, Esq., and myself. As your readers

* The author stated, at the British Association at Birmingham, that he had determined six genera and sixteen species from the Lias alone, which nearly resemble oolitic forms from Bavaria.

† The 'Reader,' Sept. 16th.

may think a record of these discoveries not unsuited to your pages, we forward you a short account for insertion.

'Hoyle's Mouth' consists of a lofty arched entrance, extending about 24 feet into the limestone hill. A tortuous passage, about 79 feet long, connects this with a small chamber 8 feet in diameter; another narrow passage, about 32 feet in length, leads into a second chamber, which is dome-shaped, about 11 feet in diameter, and has a funnel-shaped roof.

In this last-named chamber, which is at present the farthest part of the cave accessible, we found, beneath a mass of undisturbed breccia, the right and left femur, the os innominatum, some vertebræ, and other portions of the great Cave-bear: these were extracted in a very perfect state. Near them were the radius of *Hyæna spelæa*, and several loose bones and teeth of Fox, Deer, and Ox. In the passage about 32 feet from this, just where it leaves the small chamber above mentioned, were fragments of bones and an incisor of *Hyæna*; also, in the breccia, the bones of some large bird, and, what is of special interest, a worked flint, apparently of the 'barb' type. All these latter remains were below the level of the old stalagmitic floor, which had been partly broken through at this point. It is but a fair inference to draw, therefore, that they were contemporary with the animals of the Pleistocene—in fact, of the Mammoth Period.

It is worthy of remark, that there is evidence of the entrance of the sea at two distinct periods into the interior, as the bones in the last chamber were accompanied by rolled pebbles of various rocks; and on the sides of the first passage leading from the entrance were deposits of sea-shells—*Mytilus*, &c.—imbedded in a thin coating of stalagmite, exactly in the position in which such animals would have lived.

At the entrance, excavations were made in concert with the Rev. G. N. Smith, of Gumpeston, which confirmed in a remarkable manner the latter gentleman's previous discoveries relative to the antiquity of Man. Here we turned up a large quantity of worked flints of two different types; and in a layer of soil, which there is every reason to believe was perfectly free from previous disturbances, we found, in juxtaposition with these flints, an upper molar of *Megaceros*, together with teeth of Ox and Horse. Near this spot Mr. Smith had previously found a canine tooth of the great Cave-bear, an animal strictly contemporary with the *Megaceros*. Some of these worked stones were not flint, but of a stone not at present traceable to this neighbourhood. It appears to be a semi-vitrified trap, or semi-obsidian, of a dull green colour, with whitish specks and translucent edges, having precisely the same concoidal fracture as flint.

Though many flint-pebbles can be found on the sea-beaches in the neighbourhood, we have failed to discover any pebbles or blocks of this description of greenstone, though we have diligently searched for them from here to St. David's Head.

Finally, remains of Man were not absent; for, about 40 feet from the mouth of the cave, below the level of the stalagmitic floor, and

under a broken shelf of the same, we found a portion of a human lower jaw, together with a human calcaneum. These latter remains from their position *may be* of the date of the worked flints, or they may be of any date greater or less than a few hundred years since.

The determination of the bones is due to Mr. Sanford.

TENBY: *August* 22, 1865. H. H. WINWOOD.

GLACIATION IN DEVON AND ITS BORDERS.

To the Editor of the GEOLOGICAL MAGAZINE.

SIR,—I do not know whether anything has been published about ice-marks on the rocks of Exmoor, Dartmoor, or the other hills of the West of England. Perhaps, therefore, you will allow me to put on record a case of glaciation which I met with yesterday, as striking as any in the Killarney or Glengariff country in the south-west of Ireland. It is on the banks of the river Exe, about a mile and a half north-east of this little town, and about a quarter of a mile north of the ruins of Barlynch Abbey. The Exe runs rapidly down a beautifully wooded glen some 400 feet deep, and makes a sharp turn at the point indicated, where a mass of hard grits in the upper part of the true Old Red Sandstone juts out to the west, dipping south, and showing a steep little escarpment looking north up the valley. At the extreme point of this crag, where the valley is contracted to a quarter of its usual width, part of the face of the rock, 20 yards long and 20 feet high, looking up the river, is grooved, polished and scratched in parallel lines, nearly horizontal, but slightly inclined towards the bed of the river. It looks like a gigantic cornice-moulding, some of the more prominent ribs about 2 or 3 feet apart, others only 6 or 8 inches, but all undercut with a sharp symmetrically-rounded fluting to a depth of from 3 to 4 inches. The surfaces between the most prominent cornices are more slightly fluted, with lesser ribs, and the whole smoothed over with parallel rubbing-marks, exactly as may be seen at the sides of a modern glacier wherever a projecting crag intrudes itself into its course.

The absence of anything like boulder-clay, and the rarity of far-transported boulders, are circumstances in which this district also resembles the Killarney and Glengariff country, as well as in the identity of the rocks and character of the scenery.

DULVERTON: *Sept.* 19. J. BEETE JUKES.

PRIMARY AND SECONDARY GLACIAL STRIÆ.

To the Editor of the GEOLOGICAL MAGAZINE.

SIR,—It is rather remarkable that none of the writers on Glacial Phenomena have mentioned *Primary* and *Secondary* sets of Striæ as having been observed in the localities of which they have given descriptions; and that they do not occur would appear to me rather remarkable, as in all the places in Ireland that I have *carefully* examined I found them.

The *Primary Striæ* and *Grooves* in this country have a general