which its thickness varies, is it not more probable that the same denudation which has produced in North Wales the numerous escarpments of Lower Carboniferous rocks, has also cleared away the Millstone Grit and part of the Limestone at Pentre Celyn ?

It did occur to me that the Pentre Celyn marls and shales might be some part of the Coal Measures; but, on the other hand, it appeared less likely that a break should occur (implied by the erosion of the Millstone Grit) between the Coal Measures and the Lower Carboniferous rocks, than between the Permian and the Carboniferous series; and the close mineralogical resemblance of the strata at Pentre Celyn to the Permians in other localities seemed to warrant the conclusion expressed in my letter to the Magazine.

Since it was published, I have again visited Pentre Celyn, and was fortunate in meeting with a number of plant impressions in the marly shales found in Mr. Edward's pits. Mr. Etheridge has kindly examined them for me, and states '*they are Permian or Lower New Red species, differing in all respects from Carboniferous.*' The fact is interesting, not only as affording evidence of a great erosion of the Carboniferous rocks before the deposition of the Permians, but as illustrating the possibility of the conformity of strata separated by an interval of denudation.

Similar strata to those at Pentre Celyn intervene between the Bunter Sandstone and Carboniferous Limestone in several localities along the east side of the vale of Clwyd, as in the wood above Llandibr Farm (between Llandibr and Llangynhapal) and at Rhiw Bibbil, opposite Denbigh, &c. Is it possible that the beds Mr. Davies noticed crossing upon the western side of the vale, between the Limestone and the Sandstone in the cuttings of the Rhyl and Denbigh Railway, and supposed by him to be Coal measures, were Permian, similar to the strata on the east side of the vale of Clwyd ?

—I remain, dear Sir, very truly yours, GEORGE MAW.

BENTHALL HALL, BROSELEY, *Oct.* 7, 1865.

GLACIAL STRIÆ IN THE COUNTY OF LONGFORD.

To the Editor of the GEOLOGICAL MAGAZINE.

SIR,—In the last number of the GEOLOGICAL MAGAZINE there was an illustrated paper by Mr. A. H. Green, describing some supposed ice-scratches on a Limestone rock in Derbyshire. Mr. Green states that the Limestone is 'studded with dark red patches of chert, which have been polished down to a smooth surface, and scored over with grooves and scratches.'

A similar instance occurs in Co. Longford, Ireland. On the northern slope of Slievegalry (a hill some five miles SSE. of Longford town, and 650 feet above the sea), there is a considerable exposure of Conglomerate (Old Red), dipping N 30 W at about 8°. It consists of numerous pebbles and small boulders of quartz, and occasionally jasper, firmly cemented together in a base of coarse yellowish or reddish white sand.

The pebbles have been worn and polished down to a flat surface,

and are sharply scratched and scored by striæ which bear N 30 W and S 30 E. It is a most singular-looking rock-surface, and well worth a visit. Its exact situation is in the townland of Lisduff, at the south side of the road leading from Moydow to Ardagh, a little to the south of the letters I and S in 'LISDUFF,' 6-inch ordnance sheet, Longford 19. There can be little doubt as to the glacial origin of the striæ, as they coincide in direction with other striæ seen in several parts of the Longford district.

It is probable, too, that the ice-current came from the NW., or up the slope of the hill. We have no actual proof of this at Slievegalry; but about ten miles to the westward a very remarkable erratic is traceable to its parent rock. It is a hard, homogeneous, amorphous, blood-red jasper rock, and occurs *in situ* near the summit of Slievebawn Hill, 857 feet above the sea. A large block of this rock may be seen perched on a drift-covered hill at Rathcline, on the east shore of Lough Ree, somewhat less than six miles in a direction of S 30 E from the summit.

The ridges also, whether of rock or drift, and the stream-courses in this part of the country, exhibit a general parallelism in this direction, as also do most of the observed striæ, so that there is strong evidence that the district was at one period covered by an ice sheet moving from N 30 W to S 30 E. F. J. Foot.

Geological Survey of Ireland.
Boyle, Ireland: *Oct.* 11, 1865.

PRIMARY AND SECONDARY STRIÆ.

To the Editor of the Geological Magazine.

Sir,—I am glad to find by Mr. Green's paper in your last number, that he also has remarked the *Primary* and *Secondary* striæ. In this neighbourhood I have observed three sets; the general bearing of the oldest being about N 30 E., of the second N 30 W., and of the newest nearly E and W. The first have a similar bearing to the axis of the 'dressed hummocks' of rock, and also the primary striation in the rest of Galway and Clare; the second agree with the general bearing of the valley now occupied by Lough Corrib; while the newest are perpendicular to the mouth of the valley that lies between Oughterard and Cliften, and also to the east slopes of the hills.

I would therefore *suggest*, that the first were made by the movement from NE. to SW. of the ice-field which is supposed once to have covered Ireland—that as the land sank, local systems of glaciers were formed, one of which occupied the valley of Lough Corrib, while its branches came down the different mountain-valleys. This glacier of Lough Corrib formed the second set of striæ; and as the land was still sinking it gradually melted away, while the glacier in the Oughterard valley remained longer and formed the third set of striæ. Would Mr. Green look at the features of the country in which he has remarked the striæ, and see if he could account for them in a similar way? J. Henry Kinahan.

Oughterard: *Oct.* 3, 1865.