

classification, as passage-beds between the Baggy or Marwood bed and the Pickwell Down Sandstone; though to do this they must be transported bodily at least one mile to the south. I may also notice the misapplication of the term Baggy and Marwood *slates*—this bed consisting principally of sandstone; the thin intercalated beds of olive slates and shale being the exception.

In the Morthoe group I am not aware of any “purplish” slates. Their real colour is a silvery grey. The purplish slates included by Professor Phillips in the then undivided Morthoe group lie *above* the Pickwell Down Sandstone, and form the passage between it and the *Cucullæa* zone.

The suggestion as to the Foreland Sandstone being Upper Silurian must be taken for what it is worth; as with a few most indefinite traces, which may be attributed to organic remains, it is impossible to fall back upon palæontological evidence.

Another objection to Professor Hull’s explanation of the North Devon section is, that he seems to ignore altogether the existence of Upper Devonian fossils. The Ilfracombe group with its limestones undoubtedly belongs to Middle Devonian age, and if both the Pilton beds and the *Cucullæa* zone are transferred to the Lower Carboniferous, he leaves no fossiliferous bed whatsoever of Upper Devonian age; but has evidently trusted that “Drayton and Slade” might serve to fill up the gap, or that an unconformity might exist at the base of Pickwell Down to account for it.

PILTON, BARNSTAPLE, Dec. 16, 1878.

TOWNSHEND M. HALL.

#### MIOCENE FLORA IN ARCTIC REGIONS.

SIR,—Voluminous and elaborate writings have issued from the press, in almost every possible form, to account for the existence of a Miocene flora in Arctic regions, without, I need scarcely say, any satisfactory result. I venture in a few lines to suggest an element of change, or rather a new application of one, which seems to have escaped notice. It consists in the transfer of water by the Gulf Stream from Equatorial to Polar Regions. This is incessantly in progress, and it would be difficult to ascertain the immensity of the volume of water which is thus transferred, simply through the agency of the sun. It would be equally difficult to ascertain the enormous quantity of ice which is amassed annually by the congelation of this water. It is the fact of its being so warmed which leads to its being conveyed nearer to the North Pole than it could be under other known causes, but the point must be reached when its fluidity, in great part at least, must cease.

Now, it appears to me, that, owing to this cause, there must be such an accumulation of ice as would tend, if the pressure were equally circumpolar, to depress the Equator; and, if it were lateral, as under circumstances it must be, to produce an obliquity of poles, in proportion to the bulk of the ice and its nearness to the Pole. With reference to this obliquity, I might merely add Q. E. D., and submit the problem to the public in the naked simplicity of truth, reserving to myself the privilege of defence or explanation as occasion may

require. I will only remark that an interesting analogy may be traced between the evaporation of the water of the ocean and the impulsive motion of the Gulf Stream, both alike due to solar heat; only the vapour is liable to be converted into snow much nearer home; but the Gulf Stream rolls on till its heat is expended and it is converted into ice, and so its function in the economy of Nature is discharged, which may not at present have been fully appreciated.

25, PRINCE OF WALES ROAD, NORWICH,  
January 15, 1879.

JOHN GUNN.

#### THE HITCHING STONE.

SIR,—In the British Association Report for 1874, page 196, the "Hitching Stone" on Sutton Moor, near Keighley, is described as a boulder. As I surveyed that country, I may perhaps be allowed to say that in my opinion the Hitching Stone is not a boulder. It is simply a block of Millstone Grit, weathered in place, the rest of the layer having, in the immediate neighbourhood, been removed by denudation. In a broad sense, it forms part of the massive grit of which Hitching Stone Hill is composed. The stone stands on the escarpment of this grit, the base of which is marked by Hitching Stone Spring, about 30 feet below. This bed of grit is considered by my colleagues and myself, on stratigraphical grounds, to be a portion of the Rough Rock. Hanging Stone Quarry is in the grit of Earl Crag, which is the principal bed of the Third Grit Series.

The most remarkable thing about the Hitching Stone is that it is perforated by a large hole, out of which a tree, a *Lepidodendron* as far as I remember, has weathered. A vertical section across the hole is of an oval shape, measuring  $15\frac{1}{2}$  inches by 12, the longer axis horizontal or rather along the bedding plane: thus we see the flattening produced by the weight of the overlying sand on the decaying trunk; and we also see that the stone is standing in its original position in the bed of grit of which it formed a part.

BRIDLINGTON QUAY.

J. R. DAKYNS.

#### OBITUARY.

THOMAS SOPWITH; M.A., F.R.S., F.G.S.

BORN 1803. DIED 1879.

WE regret to announce the death of Mr. Thomas Sopwith, F.R.S., at Westminster, on the 16th January last. He was born in 1803, at Newcastle-on-Tyne, and was for nearly 50 years extensively engaged as a civil engineer in mining, railway, and other works, both in this country and on the Continent, and was the author of several works on architecture, isometrical drawing, and mining. In 1838 he was appointed Commissioner for the Crown under the Dean Forest Mining Act, and in the same year a communication made by him to the British Association led to the establishment of the Mining Record Office. He was a member of many of the leading scientific societies, and one of the early members of the Institution of Civil Engineers.—*Daily News*, Jan. 17, 1879.

ERRATUM. In Mr. Dakyns' letter in the *GEOL. MAG.* January, 1879, p. 46, line 11 from bottom, the words *river base* should have been *river Ouse*.