

ments of the general ice-cap were somewhat quickly brought to an end by the submergence of the still ice-covered country in the sea. I have made a similar suggestion as explanatory of the wonderfully little moraine matter (distinct from pinnel or possible iceberg droppings) to be met with in the Lake District (*Geol. Mag.*, Sept. 1872).

Nothing perhaps is more calculated to teach young geologists to hesitate before pronouncing a drift-mound to be a moraine, than the fact that the "practised eye" of a very great Glacialist, many years ago, led him to regard the intensely marine-bedded sand and gravel knolls around Carnforth as moraines.

In the above remarks the term moraine is used in its customary or Swiss acceptation, and not as including deposits of Boulder-clay, Till, or Pinnel.

D. MACKINTOSH.

#### AMERICAN LAKE BASINS AND ARCTIC CURRENTS.

SIR,—While I am much gratified by the not unfriendly review of my Post-Pliocene Geology of Canada in your January Number, I may perhaps be permitted to explain briefly one point of some geological importance which I appear not to have stated with sufficient clearness. I refer to the apparently contradictory statements that the basins of the great American Lakes were cleaned out by cold Arctic currents, and that these basins are parts of old valleys communicating with the sea, and which may have been excavated by subaerial denudation. There is really no contradiction; and as the nature of our lake-basins is often misunderstood abroad, it may be well to put the facts of the case plainly.

It is well known, and may be seen by a mere glance at Sir William Logan's beautiful Geological Map of Canada, that the basins of the Great Lakes of the St. Lawrence are hollows of denudation, excavated in the softer members of the Silurian and Devonian rocks. But until attention was directed to the matter by Newberry and Hunt, it was not so generally known that they are connected with each other and with the sea by deep valleys, now filled up with Post-pliocene deposits, and which have not been re-opened by the modern rivers. Nor has sufficient attention been directed to the fact that the old Post-pliocene filling remains on the "lee" or south-west side of the Adirondacks and Laurentide ridge, while it has been cleaned out, if ever deposited to the same extent, opposite the gap of the St. Lawrence valley, and the depression north of the Laurentides, leaving the basins of the five great lakes in their present form.

These facts imply that the original rock excavation is of "pre-glacial" date, and in part at least referable to the epoch of continental elevation in the Tertiary period; and that the subsequent partial cleaning out of the sediment or preservation of the basins in an unfilled state, was due to oceanic currents flowing from the north-east, and having the same powers of erosion and deposition now possessed by the Arctic currents off the American coast.

In short the original rock excavation may have been a process of atmospheric denudation, finished in the Pliocene period. The subsequent filling and cleaning out belong to that action of the northern

currents which, in conjunction with the disintegrating power of frost and the oscillations of the northern land, has been operating since the dawn of geological time in the great and continuous transference of sediment from the arctic towards the temperate and tropical regions, and which has been so largely instrumental in building up the successive formations of our continents, and has been equally efficient in the distribution of the materials of Post-pliocene clays and gravels, and of the sand-stones and conglomerates that make up Palæozoic mountains.

With reference to the erosive power of the modern Arctic currents I may state that my inferences from the materials obtained by soundings on the American banks, have been confirmed by the recent dredgings undertaken under the auspices of the United States Government, as reported by Prof. Verrill in *Silliman's Journal* (advance sheets of February number). With reference to the St. George's Bank, for example, he says that the bottom on the edge of the bank is composed of sand or gravel and broken shells, and that the former, while boreal, is identical with that found in the Bay of Fundy, in regions swept by strong currents.

Perhaps I should add that I by no means deny the existence of *local* glaciers in the hills of Eastern America in the Post-pliocene period; but I find no evidence of a continental glacier covering the plains.

J. W. DAWSON.

McGILL COLLEGE, *January, 1873.*

#### FOREST OF WYRE COAL-FIELD.

SIR,—In a paper on the Correlation of the Carboniferous deposits of Cornbrook, Brown Clee, and Coalbrookdale, published in the *GEOLOGICAL MAGAZINE*, Vol. VIII. No. 8, Aug., 1871, I endeavoured to show that at Harcott, near Kinlet, there was a patch of the older coal-measures containing workable and good coals allied to the lower beds of the Coalbrookdale coal-field, underlying the Upper Coal-measures of that part of the Forest of Wyre coal-field. The extent of this underlying patch of older coals is a matter of some importance in these days of scarce and dear coal. It can only be ascertained by actual proof by sinking or boring, since its boundaries are all covered over by the Upper Coal-measures. I do not expect that it is more than an old island, so to speak, of older coal-measures, as are the coal patches of Brown Clee, Shirlot, and Cornbrook, but it may be an island or patch spared from denudation of many hundred acres in extent, and I have every reason to believe that it extends under the whole of Kinlet Park. I am favoured with a communication from Mr. William Birchley, of Billingsby, from which it appears that he has reached these older coals at about 250 yards east of "The Cape of Good Hope" Inn, Billingsby, at a depth of 160 yards. I expect full details of this section in due time, which I shall be happy to communicate for the benefit of your readers. Mr. Birchley says, "At no great depth we came upon a white rock, very hard, and containing streaks of crystal-like substance, which the sinkers call 'Later.' This rock was about 29 yards thick, and under it clunch