the axis of the lake. Granted that Mr. Hinde observed scratches which were parallel with the axis of the lakes, they of necessity would have been at angles with the submerged escarpment. If any glacier could have scooped out the basin of Lake Ontario, it left the summit edges of the Niagara escarpment as sharp as possible, and not planed off. Also if it excavated the deep trough of the lake it left a summit of soft Medina shales over the harder Hudson River rocks of the submerged escarpment, beneath which are Utica shales. From Dundas to the Georgian Bay the face of the escarpment (Niagara) is less abrupt, but even here, there has not been left more than fifty feet of drift at its foot, and this is mostly, if not altogether, stratified (excepting in channels now buried). The observations of Prof. H. Y. Hinde, on the coast of Labrador, are interesting. He has shown pan ice at the present time is polishing the sides of cliffs, and has been continuing its action whilst the coast has been rising several hundred feet. Even under the ledges of overhanging rocks the action is now going on—a phenomenon which, if in the lake region, would be attributed to glaciers. Also, he has seen boulder clay being formed at the present time by the action of pan ice (frozen sea water). This with a thickness of 8 or 10 feet gets piled up by the action of waves and wind, and consequently in the bays of the coast of Labrador, it polishes rock bottoms to a depth of fifteen feet or more below the surface of the water, and grinds off rough surfaces. I have frequently seen, myself, in northern regions, high boulders transported by the ice to which they were frozen in the margin of small lakes. From what has been written, it seems to me that the glacial origin of Lake Ontario does not rest on a single basis further than that ice scratchings, (producible by either glaciers or icebergs, neither of which need be great erosive agents), are seen at various places about Lake Ontario, both above and below the water-level. The remarks applied to Lake Ontario, hold good for the other lakes. Their topography strengthens the proof that their origin cannot be accounted for by glaciers, because we find the islands at the western end of Lake Erie, or northern end of Lake Huron, polished and striated. All the facts appear to point to one series of causes, namely, the lake basins are valleys of subaerial and fluviatile erosion although their outlets to the sea have not been demonstrated.

AGE OF THE RIVER VALLEYS.

The period of the river valleys just described dates far back in geological time. If the explanations brought forward be wholly correct, then the date of the commencement of the valleys should be placed after the close of the Palæozoic Time, as the valley of Susquehanna, and of some of the ancient rivers entering the lake basins are partly excavated out of carboniferous rocks, which had been previously elevated. This would agree with the older portions of the Mississippi river. However, the great river age did not culminate until Middle Silurian Times, as shown by the tributaries of the ancient Mississippi.

ORIGIN OF THE LAKES THEMSELVES.

In the ice ages the outlets of the valleys of the great lakes were closed by drift, apparently assisted by oscilations of the earth's crust, thus producing the lakes. Whether the fillings of the valleys were produced by glacier action by the agency of icebergs, or by that of floating pan ice, a natural explanation might be given, but as this depends upon unsettled glacial geology, I will not here delay to enter into the discussion. However, there appears to be every evidence of an interglacial epoch, when the greater portion of the present Dundas valley, the Niagara river by the old buried channel of St. David's, and many other valleys, everywhere in the lake region, were either re-excavated in the drift or originally opened, and that the second closing or filling of these valleys was not accomplished through any glacier action, but principally through the agency of pan ice and currents.

OSCILLATIONS OF THE CONTINENT IN THE LAKE REGION.

Until lately my investigations bearing on the origin of the great lakes have been mainly based on the hypothesis that the closing of the basins was not occasioned by the elevations of the lake margins by means of the local elevation of the earth's crust. This hypothesis then necessitates the existence of the buried valleys being outlets of the lake basins, which if their continued drifts were excavated, would rest on the preglacial drainage. My recent observations in New York and elsewhere have failed to obtain any proofs of the above supposition.

Outside the region of the lakes in the Red River Valley there are known at least two deep bore holes far apart, where the drift extends to a level below that of Lake Winnipeg and indicates that if the drift was removed from the Red Minnesota Valley that the drainage of some of the great lakes and rivers of the Canadian Northwest Territories would flow to the Mexican Gulf (as first pointed out by General Warren) without the necessity of a local change of level. This