Dr. J. W. Dawson-Canadian Pleistocene.

submarine accumulation by the unoxidized and unweathered condition of its materials. The striæ beneath it, and the direction of transport of its boulders, show a general movement from N.E. to S.W., or up the St. Lawrence Valley from the Atlantic. Connected with it, and apparently of the same age, are evidences of local glaciers debuding into the valley from the Lawrentian highlands. The Boulder-clay of the basins of the great lakes, and of the western plains, and of the Missouri Coteau and its northern extensions, seems to be of similar character. The basins of the lakes are parts of old Pliocene valleys dammed up with Pleistocene debris.1 The Missouri Cotean and its extensions, probably the greatest moraine in the world, and the "terminal moraine" of the great continental glaciers of some American geologists, appears to be the deposit at the margin of a sea laden with vast fields of floating ice.²

The Lower Leda Clay (d) seems in all respects similar to the deposits now forming under the ice in Baffin's Bay and the Spitzbergen Sea. The Upper Leda Clay represents a considerable amelioration of climate, its fauna being so similar to that of the Gulf of St. Lawrence at present, that I have dredged in a living state nearly all the species it contains, off the coasts on which it occurs. Land plants found in the beds holding these marine shells are of species still living on the north shore of the St. Lawrence, and show that there were in certain portions of this period considerable land surfaces clothed with 'vegetation. The Upper Leda Clay is probably contemporaneous with the so-called inter-glacial deposits holding plants and insects discovered by Hinde on the shores of Lake Ontario.³ On the Ottawa it contains land plants of modern Canadian species, insects and feathers of birds, intermixed with skeletons of of Capelin and shells living in the Gulf of St. Lawrence.

The changes of level in the course of the deposition of the Lcda Clays must have been very great; fossiliferous marine dcposits of this age being found at a height of at least 600 feet, and sea-beaches at a much greater elevation, while at other times there must have been large land areas and even fresh-water lakes. Littoral gravels and sands of this period may also be undistinguishable, except by their greater elevation, from those of the Saxicava sand. I have recently described the bones of a large whale (Megaptera longimana) from gravel north of the outlet of Lake Ontario and 420 feet above the level of the sea, which is not improbably contemporaneous with the Leda Clay of lower levels, and much higher than deposits near Lake Ontario regarded as of lacustrine origin.4 These changes of

¹ Newberry, Reports on Ohio; Hunt, Canadian Reports; Spencer, Aneient Outlet of Lake Erie, Ann. Phil. Society, 1881. ² Report on 49th Parallel, G. M. Dawson.

³ Proceedings of Canadian Institute, 1877. Dr. Hinde in this paper incorrectly states that the Leda Clay belongs to the "close of the Glacial Period," and that boulder drift is not found above it. In truth, as Admiral Bayfield, Sir Charles Lyell, and the writer have shown, boulder-drift is still in progress in the Gulf and River St. Lawrence, though in a more limited area than in the Post-Pliocene period : but any considerable subsidence of the land might enable it to resume its former extension. 4 Canadian Naturalist, vol. x. No. 7.

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