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## PLEISTOCENE GLACIATIONS OF THE NORTHERN HEMISPHERE<sup>1</sup>

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As this has been announced to be a centenary year for glacial geology a few words of explanation may be needed. The relevancy of 1928 as a centenary of glacial geology is based on the fact that two important investigations of glaciers date from the year 1828. That year marks the beginning of glacial studies by Jean de Charpentier, who with Louis Agassiz took high rank in early investigations and who led Agassiz to take up glacial studies. His most important work, "Essai sur les Glaciers," was not published until 1841, but for several years previous he had presented the results of his investigations before Swiss scientific societies. In 1828 also occurred the first publication by F. J. Hugi, a bold mountaineer, of results of his studies of Alpine glaciers, entitled "Beobachtungen in den Alpen."<sup>2</sup> His studies brought out many facts about the structure and condition of the snow, neve and ice at different heights, and observations on fissures and crevasses, and the rock material carried on and in the ice. He continued studies and publications for nearly twenty years, an important paper by him in 1846 being entitled, "Das Wesentlichste über die Gletscherfrage."

Scientific studies and publications on glaciers were begun at a much more remote time than 1828, some of which were of considerable importance. What appears to be the oldest scientific paper on glaciers was prepared by an Iclander, Theodor Vidalin, and published in 1695.<sup>3</sup> He explained the cause of the movement of glaciers by expansion due to freezing of water and a movement down the valley due to gravitation.<sup>4</sup>

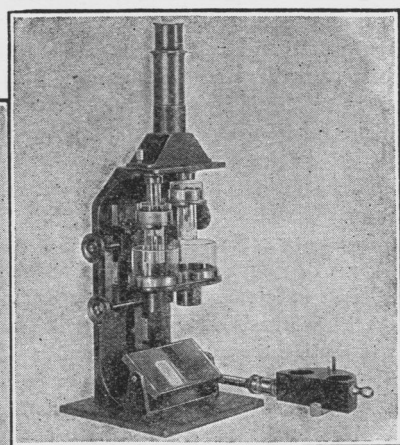
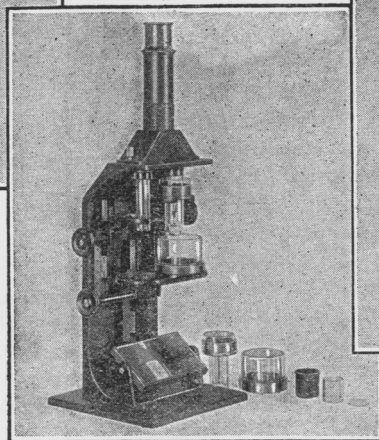
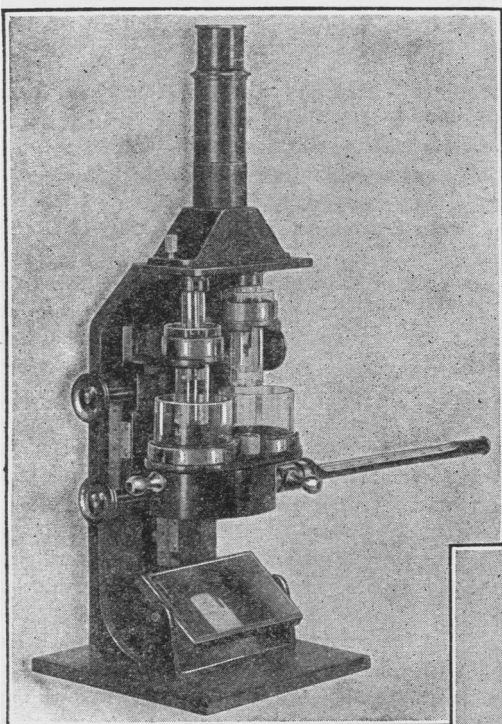
<sup>1</sup> Paper presented at the symposium on the occasion of the celebration of the glacial theory, at a joint session of the Geological Society of America and Section E of the American Association for the Advancement of Science, December 27, 1928. Published by permission of the director of the U. S. Geological Survey.

<sup>2</sup> *Leonard Zeitschrift für Mineralogie*, Heidelberg, 1828, pp. 81-103; 117-213.

<sup>3</sup> "Dissertationcula de Montibus Islandia Chrystal- lines," Skaltholt, 1 July, 1695. Translated in *Hamburgisches Magazin*, Hamburg and Leipzig, 1754, pp. 9-27, 197-218.

<sup>4</sup> This paper is cited and reviewed by Hans Reck in an important paper on the glacial studies of the recent and ancient glaciated districts of Iceland in the *Zeitschrift für Gletscherkunde*, Band V, 1911, p. 241.

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