

Ramsay then wrote a general paper "On the Glacial Origin of certain Lakes in Switzerland, the Black Forest, Great Britain, Sweden, North America, and elsewhere" (*Q. Jour. Geol. Soc.*, 1862). In this paper Ramsay attributed the excavation of many lakes and fiords to the erosive force of moving ice, and Tyndall in the same year gave his opinion that the Alpine valleys had been excavated by the same agency.

During the forty years that have elapsed since that time the erosive force of ice has been a subject of animated discussion, and still there are two distinct parties amongst glacialists, those who oppose and those who support the main issues of Ramsay's discourses. Amongst the supporters or extreme glacialists may be counted in Great Britain such geologists of authority as Sir Archibald Geikie and Professor James Geikie; in Austria, the geographer and geologist, Professor Penck; in Switzerland, Professor Brückner; in Scandinavia, Professor Nansen; while in North America Sir William Logan was a warm supporter.

Geologists who oppose the extreme view of glacial erosion have pointed out that a variety of local causes may give origin to lakes and fiords. Actual cases have been cited where fluvial, or morainic accumulations, or crust movements would sufficiently explain the form of the basins attributed to ice erosion.

Much has been written in physics upon the causes of ice movement. Of great importance were the experiments made by Carnot and James Thomson (1849) on the liquefaction of ice under strong pressure, and the lowering of the melting point below 0° , as well as the discovery made by Faraday (1850) of the re-union or regelation of fragments of ice with moist surfaces. Application of the principle of fragmentation and regelation to the phenomena of glaciers was made by the leading physicists of the day, Tyndall (1857), Helmholtz (1865), and Lord Kelvin, and thus a scientific explanation was secured for the theory of glacier motion which had been originally advanced by Rendu and Forbes. Professor Heim, in his excellent *Handbook of Glacier Phenomena* (1885), summarises the whole field of knowledge of Alpine glaciers. He decides the question of glacier motion in the main in favour of Forbes's theory of plasticity, but he also recognises a gliding movement of the whole mass under the influence of gravity.