

the glaciers, descending from the former into the ocean, sent off icebergs, loaded with blocks, which stranded on the Jura. But both theories admit the former wide extension of the Alpine glaciers.

Mt. Snowden, the highest peak in Wales or England, was a center from which glaciers formerly radiated. Prof. Ramsey proves that these glaciers existed previous to the drift period, which has left its deposits to the height of 2,300 feet above the ocean, and that others have existed since that time. The high mountains of Scotland, Ben Cruachen, Ben Nime, Schiehallien, the Grampians and Ben Nevis, were evidently once the seat of glaciers. There is also evidence to prove the former extension of the glaciers of the Himalayahs, in India, far beyond their present limits.

The traces of former glaciers in the United States have been found upon the Green Mountain range in Massachusetts and Vermont. The eastern slope of this range is twenty miles wide, while its western slope is much more precipitous. Across this eastern slope several rivers have cut deep valleys, opening into the valley of Connecticut river. These streams run nearly east, while the high hills through which they pass show on their summits the striæ and other phenomena of the drift agency. The direction of these striæ is nearly north and south, deflected often toward the east from the south, and to the west from the north, a few degrees. But on the steep sides of the east and west valleys, is another set of striæ, running nearly east and west, formed by a force directed down the valleys, as is proved by the stoss side of the ledges. These could in no possible way have been produced by the drift agency, but they are precisely the effect that would be produced by glaciers sliding down the valleys towards Connecticut river from the crests of the range. The examples in Massachusetts are these: on Westfield river, in Russell; near Huntington; also in Russell, on Westfield Little river; at Sodom Mountain, in Granville; and on Deerfield river and some of its branches. In Vermont these ancient glaciers existed on the headwaters of Deerfield river, in Searsburg; at Windham and Grafton, on Saxton's river; on a branch of West river, in Jamaica; on the Otta Queechee, in Plymouth and Bridgewater; on White river and its branches; at Hancock, on the west side of the range, and elsewhere. It is probable that this range formed a crest from which glaciers descended on both sides, principally before the drift period.

Traces of glaciers in earlier periods have been supposed to exist. In England, striated blocks which can not be distinguished from those marked by modern glaciers have been found in deposits of the Permian period; and geologists have traced out the course of this ancient glacier, and find that its outline agrees with that of modern glaciers, and that its greatest length was fourteen miles.

In this country striæ have been found upon Trenton limestone, in the valley of Lake Champlain, and at Copenhagen, Lewis county, New York, which appear to have been made during the deposition of the rock itself. We should suspect also, from the great size of the fragments, that some of our Mesozoic conglomerates were produced by something like drift agency.

*Distinctions between the marks of Drift and of Glaciers.*—There may be no perceptible difference between the marks of drift and of ancient glaciers in many cases. But generally they may be distinguished from each other; and the following are the most important distinctions:

1. Glacier striæ differ often widely in direction from drift striæ. The drift striæ may be referred to three general directions—to the south, to the south-