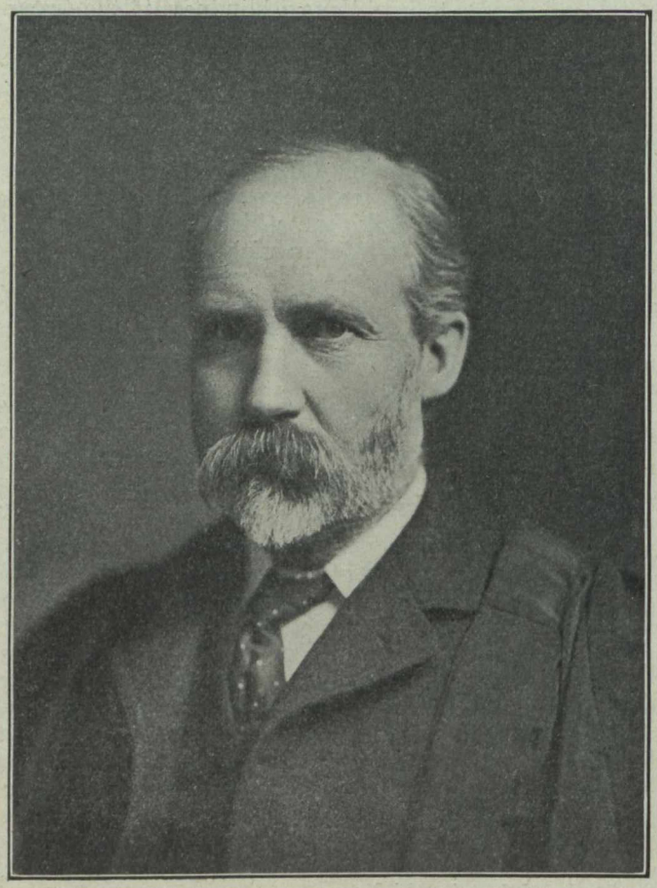
blue green color, partly covered with rocky debris, and its volume diminishes downward by thawing until at a definite point the whole is melted and flows away as a river of water instead of ice. The lower end is sometimes called the "tongue" or "snout" or "foot" of the glacier—a bad case of mixed metaphors.

Remembering that ice is a hard and brittle solid, it comes as a surprise to find that it can flow like a plastic body under the pull of gravity; but this can be easily proved. A row of stakes or of metal plates put across a glacier gradually gets out of line, the middle parts moving fastest as in a river; but the motion is very



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slow, even in the middle, seldom more than a few inches a day in our mountain glaciers, though some of the great Alaskan and Greenland glaciers are reported to move several feet a day and in one or two cases as much as 60 or 70 ft.

At a sudden descent, where a river would leap as a waterfall, a glacier simply breaks across in what are called "*crevasses,*" fissures which may be several feet wide and hundreds of feet long, going down to blue black depths appalling to the inexperienced climber. As the glacier advances these crevasses are bent out of shape and may be crossed by fresh crevasses, splitting up the ice into wild lumps and pinnacles called "*seracs.*" Seen from a distance across some valley such an ice fall looks like a cascade or a violent rapid covered with breakers. Below these steep descents the crevasses and seracs disappear by the pressure of the moving ice and the glacier becomes a solid mass again. Small glaciers hanging from cliffs may send down avalanches of ice which combine to make a lower glacier, the masses being welded together once more. It is evident that one cause of glacier motion is the power which ice has to break and then to freeze together again.

Since glaciers are often the easiest way up a mountain, climbing parties make use of them, starting at dawn so as to have a long day and following up the rough and rigid slope, zigzagging round crevasses and avoiding regions of seracs. Toward the upper end there may be fresh snow bridging the crevasses and the party should be roped together and travel in single file, the leading guide thrusting his ice axe into the snow at every step to make sure of safe going.

When the sun shines warmly on the glacier melting begins and water trickles down the ice ridges, and towards afternoon torrents of pale blue water are racing downwards in ice channels, here and there plunging into a crevasse. This becomes hollowed into a tube like the penstock of a water power and the foamy torrent springing into the blue chasm is called a "moulin," or mill. In this way the waters thawed from the surface reach the bottom and there roar along through an ice tunnel to the end of the glacier, bursting into daylight as a full fledged river.

Glacial streams are capricious. On a frosty morning scarcely any water flows and one can go far into the ice cave, but in the late afternoon there is a raging torrent loaded with mud and stones spreading into half a dozen channels on the broad floor ground. On a rainy or snowy day when the sun is hidden the glacial river almost goes out of business, but comes to life again when the clouds vanish and the sun shines. At those heights with a clear sky the heat of the sun may be intense though it is freezing a few feet away where some rock casts a shadow.

The Work of Glaciers.—One of the most interesting points in a glacier is its carrying power. Though it is in motion like a plastic substance it is solid and strong enough to support any weight loaded upon it. Debris quarried by frost from the mountain side buries its edge so that often one may walk 50 yards out before the ice can be seen. This fringe of broken rock carried on the edge of the glacier is called a marginal moraine. When two glaciers join, the marginal moraines between them unite to form a medial moraine, and when several tributaries combine to make a large glacier the dark lines of the medial moraines can be followed by the eye for long distances upwards to rocky peaks rising out of the *neve*, the source from which the train of rocks was derived.

Blocks even as large as cottages now and then roll down upon the ice and are transported without trouble. Medium sized blocks a few feet across called "glacier tables" are left standing on pedestals of ice, as thawing goes on all round them, since they protect the ice beneath from the sun.

The whole mass of stony material is carried steadily onwards until the end is reached where melting is complete and no more burdens can be borne. Then a terminal moraine is piled up, a steep and rugged crescent of loose blocks by no means easy to scramble over.

Work just as important is going on out of sight beneath the glacier, where fragments of stone frozen into the bottom of the ice form tools for gouging, carving and scouring the rocky floor, both tools and rock being ground up into the "rock flour" that makes the glacier streams so milky and opaque. The ground up material mixed with stones of all shapes and sizes without any assortment is left behind when the glacial thaws as "boulder clay." A little search in this clay shows stones with polished and striated surfaces, well worn tools, often called "soled boulders" and the rock surface beneath the boulder clay is seen to be rounded, smoothed and grooved in a very striking way.

The Retreat of Glaciers.—Our glaciers, like those of other countries, are now almost all in retreat, either