

only advance from above to below, but also extend laterally, expanding from beneath by encroaching on their banks.

We now arrive at the consideration of one of the most characteristic features of the glaciers—that is to say, the *Moraines*.

All the glaciers carry on their surface and propel before them the débris of rocks, frequently of colossal size, detached from the mountain declivities by the action of the atmosphere, the fall of avalanches, and also by the very movement of the glacier. Composed of granite and porphyry—rocks pre-eminently liable to change—the sharp Alpine summits, exposed to the constant influence of atmospheric action, are incessantly broken up, and reduced into fragments of greater or lesser dimensions, which fall on the surface of the glacier. In their movement of progression the glaciers carry away these débris. New rocks, falling at the same point, place

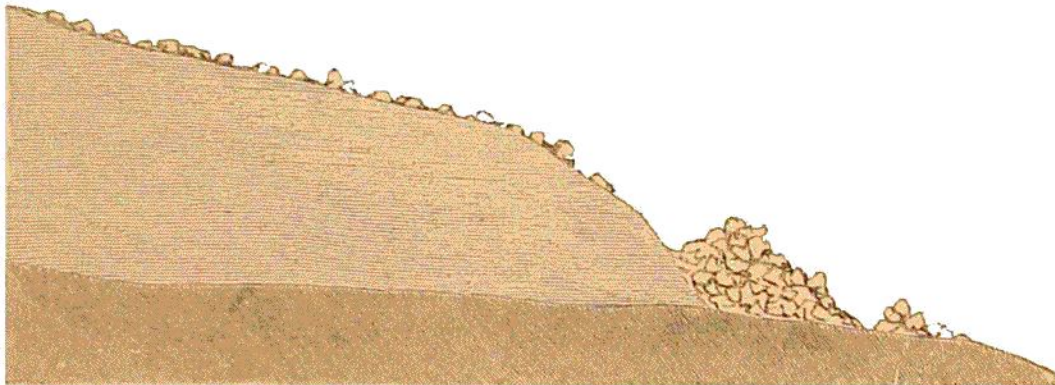


FIG. 104.—LONGITUDINAL SECTION OF A GLACIER, EXHIBITING A FRONTAL MORAINE.

themselves in the rear of the former, and march in their track. In this manner certain longitudinal ridges have been formed, which the mountaineers of Switzerland have named *moraines*. When the débris fall simultaneously from the two mountain ramparts which shut in the glacier, the moraines eventually arrange themselves in two parallel belts, which may be likened to the wheel ruts of a cart filled in with stones.

To give an example, taken from nature, of a simple and well-defined moraine, we represent in the subjoined illustration (Fig. 106) the glacier of Zermatt, in Switzerland.

The moraines conspicuous in this glacier are called *lateral*.