

rate of 60 or even 72 feet annually. On the coast of Cornwall, in England, similar effects have taken place. These dunes are common on the coast of the United States, especially on Cape Cod, in Massachusetts, where strenuous efforts have been made to arrest their progress, and to prevent the destruction of villages and harbors that are threatened. Upon the south shores of Lake Superior they are also found.

Aqueous agencies act mechanically and chemically. Mechanically, in the form of glaciers, avalanches, icebergs, frost, snow, ice, landslips, rivers, tides, waves, and oceanic currents, they are continually abrading the ledges and re-arranging the materials, particularly under water. Chemically, water dissolves portions of rocks, and deposits them again by evaporation or precipitation.

## GLACIERS.

Glaciers are rivers of ice, descending from the regions of perpetual frost, to levels below the usual snow line. They are inclosed in valleys; or are suspended upon the flanks of mountains. They are properly streams filled with the overflow or *waste* of the vast snow fields occupying the higher regions. These may be aptly compared to a sheet of ice descending from a tin-covered roof. In the Alps the glaciers terminate sometimes as high as 7,000 or 8,000 feet above the ocean; but some descend to 3,400 feet, while the usual snow line does not descend below 8,600 feet.

Glaciers are found among the Himalayahs, the Caucasus, and Altai mountains, in Asia; among the Alps, where they have been most studied, in Norway, Iceland, and Spitzbergen, in Europe; in Patagonia in South America, and within both frigid zones. There are 400 glaciers among the Alps, covering about 1,400 square miles of surface. They are divided into two groups—the glaciers of Mont Blanc, and of the Finster Aarhorn districts. The most important glaciers have received distinct names, as Bossons, Aletsch, and Viesch, among the Alps, and the great Humboldt glacier in Greenland, described by Dr. Kane, and figured in our *Frontispiece*.

The elevated crests and plateaux above glaciers are more or less covered with snow. These vast fields of powdery and crystalline snow are termed *mers de glace*, or seas of ice. In its descent this snow becomes more granular, and forms the *névé* (French), or *firn* (German). Additions are made to the *névé*, or the upper part of the glacier, every year, so that the mass is stratified.

The *névé* gradually changes into the *blue compact ice*, which forms the true glacier. The latter is permeated by a delicate structure, similar to the cleavage of slaty rocks, or vertical ribbons