long, which rush down as *avalanches* (Lawinen), sweep away trees, soil, or rocks, and heap them up in the valleys.[220] Besides the destruction caused by the avalanche itself, sometimes much damage arises from the sudden violent wind to which it gives rise.[221] *d.* Another indirect effect of snow is seen in the sudden rise of rivers when warm weather rapidly melts the mountain snows. Many summer freshets are thus caused in Switzerland. It is to the melting of the snows, rather than to rain, that rivers descending from snowy mountains owe their periodical floods. Hence such rivers attain their greatest volume in summer. *e.* A curious destructive action of snow has been observed on the sides of the Rocky Mountains, where the drifting of snow-crystals by the wind in some of the passes has damaged and even killed the pine-trees, wearing away the foliage, cutting off the bark, and even sawing into the wood for several inches.[222]

Glaciers[223] **and Ice-sheets.** — Glaciers are rivers of ice formed by the slow movement and compression of the snow, which, by gravitation, creeps downward into valleys descending from snow-fields. The snow in the higher regions is loose and granular. As it moves downward it

---

[220] An avalanche near Ormons Dessus, Canton Vaud (Dec. 1882), piled up a mass of ice and snow 200 feet thick (some of the ice-blocks being 18 feet long), and covered 3 square km. of ground. Nature, xxvii. p. 181. Streams may be thus blocked up, as the Inn was at Süs in 1827. For accounts of avalanches, see J. Coaz, "Die Lawinen in den Schweizeralpen," Berne, 1881.

[221] Geol. Mag. 1888, p. 155.

[222] Clarence King, Exploration of 40th Parallel, i. p. 527.

[223] On glaciers and their geological work, see De Saussure, "Voyages dans les Alpes," § 535; Agassiz, "Études sur les Glaciers," 1840; Rendu, "Theorie des Glaciers de la Savoie," Mem. Acad. Savoie, x., translated into English, 1875; J. D. Forbes, "Travels in the Alps," 1843; "Norway and its Glaciers," 1853; "Occasional Papers on Glaciers," 1859; Tyndall, "Glaciers of the Alps," 1857; Mousson, "Gletscher der Jetztzeit," 1854; A. Heim, "Handbuch der Gletscherkunde," Stuttgart, 1885; E. Richter, "Gletscher der Ostalpen," Stuttgart, 1888.