

ever, as Helland states, are *clean*, but "now and then one is seen with boulders upon it; and here and there small bergs that are quite covered with stones and gravel" (1877).

Dr. Kane, describing the great pack of icebergs that occupies the center of Baffin Bay, mentions that some were 300 feet high, and large numbers over 200 feet; 280 of the first magnitude (the most of them over 250 feet) were in sight at one time. Taking the specific gravity of iceberg-ice at 0.886 (Helland), one ninth of the mass by weight is out of water. In the Antarctic, the long ice-barrier observed by Captain Wilkes had a height above the sea of 150 to 200 feet; and some of the bergs were 300 feet high.

(1) Icebergs are a means of transporting stones and earth from one region to another; and those of Greenland make their farthest deposits in the Atlantic about the banks of Newfoundland, or between the meridians of 44° and 52° and north of the parallel of 40° 30'.

(2) When grounded on rocks, they may scratch the surface; but closely crowded and regular scratches, like those of glaciers, over large areas cannot be made. An iceberg "rocked by the swell of the sea, and sometimes turning over," could not be good at scoring submerged rocks. Moreover, rocks over the sea-bottom where icebergs drop their freight of stones would seldom be uncovered.

The following are important works and memoirs on existing glaciers:—

H. B. DE SAUSSURE: *Voyage dans les Alpes*, 4 vols., 1779–1796.

AGASSIZ: *Études sur les Glaciers*, 8vo, Neuchatel, 1840. — *Système Glaciaire, Nouvelles Études et Expériences sur les Glaciers Actuels*, 8vo, with an Atlas of 3 maps and 9 plates, Paris, 1847.

J. DE CHARPENTIER: *Essai sur les Glaciers et sur le Terrain Erratique du Bassin du Rhone*, 8vo, Lausanne, 1841.

J. D. FORBES: *Travels in the Alps of Savoy, etc.*, 8vo, Edinburgh, 1843. — *Occasional Papers on the Theory of Glaciers*, 8vo, Edinburgh, 1859.

J. TYNDALL: *The Glaciers of the Alps*, 8vo, London (and Boston), 1861. — *The Forms of Water* (in Appleton's International Series), 8vo, New York, 1872.

A. HEIM: *Handbuch der Gletscherkunde*, Stuttgart, 1885.

N. S. SHALER and WILLIAM M. DAVIS: *Illustrations of the Earth's Surface; Glaciers*, a quarto volume containing 196 pages of text, with 25 fine plates mostly from photographs, 1881.

The following relate to existing glaciers of the Pacific Coast of North America:—

DAVIDSON, on the first discovery of glaciers on the Pacific Coast—on Mount Rainier (Tacoma), Mount Baker: *Proc. Acad. California*, iv. 161, 1871, and *Am. Jour. Sc.*, III., iv. 156, 1872.

CLARENCE KING: "Glaciers of the Pacific Coast" (on Mount Shasta, Mount Hood, Mount Rainier, etc.), *Am. Jour. Sc.*, III., i. 157, 1871, and "Report 40th Parallel," vol. i. 462, 1878.

JOHN MUIR: "Glaciers in California" (Sierra Nevada), *Overland Monthly*, December, 1872.

JOSEPH LE CONTE: "Ancient Glaciers of the Sierra Nevada" (with notice of existing), *Am. Jour. Sc.*, III., v. 325, x. 156, xviii. 43, 44.

G. F. WRIGHT: *The Ice Age in North America*, 1880, 1891.