

(b) When water freezes, it crystallizes in the hexagonal system: either in slender prisms; in compact aggregations of prisms, making a mass of ice; in small 6-rayed stars, as in snow; or in feathery forms, as in the frost over windows and pavements in winter. In the thick crusts made over water in cold seasons, the prismatic structure is vertical except in a thin upper layer: a fact proved by means of polarized light.

(c) The *density* of water is greatest at 39.2° F. = 4° C. From this point, it decreases, or the water expands, as the temperature falls to 32° F., the freezing-point, and as the temperature rises above 39.2° F. The specific gravity of ice, relatively to water as the unit, is 0.9178; and hence 11 volumes of ice make about 10 of water.

(d) The increase of bulk of water when it becomes vapor, which it may at any temperature, is, under ordinary pressure, 1700 times; and hence 1 cubic *inch* of water yields about 1 cubic *foot* of steam or vapor. The density of vapor at 212° F., taking air as 1, is 0.6235.

In the further consideration of the subject of water as a mechanical agent, the natural subdivisions adopted are:—

1. FRESH WATERS; including especially Rivers, Lakes, and Subterranean Waters.
2. The OCEAN.
3. FROZEN WATER, or Ice, Glaciers, Icebergs.

I. FRESH WATERS.

The several topics are the following:—

1. Gathering of water into rivers and lakes.
2. Working-power of rivers.
3. Methods and results of denudation.
4. Transportation and deposition.
5. Special points in fluvial history.
6. Subterranean waters.

GATHERING OF WATER INTO RIVERS AND LAKES.

The fresh waters of the land come from the vapors of the atmosphere, and these chiefly from the ocean, but largely also from the waters and moisture of the land and its vegetation.

The conditions favoring the making of large streams are as follows:—

1. *Large drainage areas, with high mountains on their borders.*—The cold summits of mountains are condensers of moisture, and sometimes perpetual condensers, when the country below is dry; and their elevation gives force to the descending waters. Long slopes and combinations of those of different mountain ridges and ranges make the great rivers. In the Americas the mountain chains of the opposite sides of the continent contribute toward the Mississippi, St. Lawrence, Mackenzie, Amazon, and La Plata; and so it is in the Orient. Short slopes hurry off the waters to the sea and make small drainage areas.