earth's rotation, which tends to deflect it to the right in the northern hemisphere, but to the left in the southern."

To illustrate fully the effects occasioned by the rotation would require volumes. A few only are presented in the following brief account of tides, oceanic currents and temperature, winds and climates.

## THE TIDAL WAVE.

The great tidal wave, due to the attraction of the sun and moon, is a wave-movement in the ocean to its bottom. It goes westward because of the earth's eastward rotation, with consequently the same rate of progress, or 1000 miles an hour at the equator; and 12,000 miles (half the earth's circumference) is the length of a single wave. The Pacific is too narrow to contain over half of the wave-curve; and the Atlantic can contain transversely but a quarter of it. After leaving the Pacific its course is northwesterly in both the Indian Ocean and the Atlantic. The height of the wave can be measured only on islands in the open ocean, since shelving shores and bays increase its elevation and its power as a geological agent. At the prominent American headlands in the north Atlantic, the height of the tide is only one to two feet; being at Cape Hatteras two feet after traversing some miles of coast region under 600 feet in depth, and only one foot at southeastern Nantucket. But the actual height of the tide, according to G. H. Darwin, is only one third of an inch.

The dynamical effects of the tidal wave come up for consideration under the head of The Ocean.

## OCEANIC CURRENTS AND TEMPERATURE.

(1) Oceanic currents. — The general system of oceanic currents is simple. In the tropical portion of the ocean, either side of a narrow equatorial belt, the great movement or current is westward, corresponding with the course of the trade-winds; as if it were a consequence chiefly (as many physicists believe) of the propelling winds. Reaching the continent that lies to the westward, the moving waters are turned poleward. Having passed the parallel of 35° or 40°, the flow diverges more and more from the continent, and crosses the ocean eastward to its eastern continental border; and there, if there were no great passage-way in the ocean basin opening toward the polar regions, all would be forced to turn southward toward the region of the trades, there to start anew in the great elliptical circuit.

The north Pacific has the polar regions nearly shut off from it, for Bering Sea is shallow, and Bering Strait has a depth of only 150 feet, so that the circuit is here of the normal kind. But the north Atlantic has a broad open way into the Arctic seas, and the shallow region over which it passes — the Scandinavian plateau — has a depth on it of 1500 to 3000 feet. Consequently, only part of the waters turns southward along the submerged European border — a large part keeping on its course northeastward, along by Great Britain, and northward, by Iceland, into the polar seas.