

evidence of the importance of analysis, which is too often regarded with contempt among the unscientific, that Laplace's perfect theory of tides has enabled us, in our astronomical ephemerides, to predict the height of spring-tides at the periods of new and full moon, and thus put the inhabitants of the sea-shore on their guard against the increased danger attending these lunar revolutions.

Oceanic currents, which exercise so important an influence on the intercourse of nations and on the climatic relations of adjacent coasts, depend conjointly upon various causes, differing alike in nature and importance. Among these we may reckon the periods at which tides occur in their progress round the earth; the duration and intensity of prevailing winds; the modifications of density and specific gravity which the particles of water undergo in consequence of differences in the temperature and in the relative quantity of saline contents at different latitudes and depths;* and, lastly, the horary variations of the atmospheric pressure, successively propagated from east to west, and occurring with such regularity in the tropics. These currents present a remarkable spectacle; like rivers of uniform breadth, they cross the sea in different directions, while the adjacent strata of water, which remain undisturbed, form, as it were, the banks of these moving streams. This difference between the moving waters and those at rest is most strikingly manifested where long lines of sea-weed, borne onward by the current, enable us to estimate its velocity. In the lower strata of the atmosphere, we may sometimes, during a storm, observe similar phenomena in the limited aërial current, which is indicated by a narrow line of trees, which are often found to be overthrown in the midst of a dense wood.

The general movement of the sea from east to west be-

* The relative density of the particles of water depends simultaneously on the temperature and on the amount of the saline contents—a circumstance that is not sufficiently borne in mind in considering the cause of currents. The submarine current, which brings the cold polar water to the equatorial regions, would follow an exactly opposite course, that is to say, from the equator toward the poles, if the difference in saline contents were alone concerned. In this view, the geographical distribution of temperature and of density in the water of the ocean, under the different zones of latitude and longitude, is of great importance. The numerous observations of Lenz (*Poggendorf's Annalen*, bd. xx., 1830, s. 129), and those of Captain Beechey, collected in his *Voyage to the Pacific*, vol. ii., p. 727, deserve particular attention. See Humboldt, *Relat. Hist.*, t. i., p. 74, and *Asie Centrale*, t. iii., p. 356.