

the present day. Fig. 2 represents impressions of this kind upon the sandstone of Connecticut river in America, which have been reproduced from the block itself by photography. In a depression of the granitic rocks of Massachusetts and Connecticut, the red sandstone occupies an area of a hundred and fifty miles in length from north to south, and from five to ten miles in breadth. "On some shales of the finest texture," says Sir Charles Lyell, "impressions of rain-drops may be seen, and casts of them in the argillaceous sandstones." The same impressions occur in the recent red mud of the Bay of Fundy. In addition to these, the undulations left by the passage of the waters of the sea, over the sands of the primitive world, are preserved by the same physical agency. Traces of undulations of this kind have been found in the neighbourhood of Boulogne-sur-Mer, and elsewhere. Similar phenomena occur in a still more striking manner in some sandstone-quarries worked at Chalindrey (Haute-Marne). The strata there present traces of the same kind over a large area, and along with them impressions of the excrements of marine worms. One may almost imagine oneself to be standing on the sea-shore while the tide is ebbing.

#### CHEMICAL AND NEBULAR HYPOTHESES OF THE GLOBE.

Among the innumerable hypotheses which human ingenuity has framed to explain the phenomena which surround the globe, the two which have found most ready acceptance have been termed respectively the CHEMICAL, and the NEBULAR or mechanical hypothesis. By the first the solid crust is supposed to have contained abundance of potassium, sodium, calcium, magnesium, and other metallic elements. The percolating waters, coming in contact with these substances, produce combinations resulting in the conversion of the metals into their oxides—potash, soda, lime, and magnesia—all of which enter largely into the composition of volcanic rocks. The second hypothesis involves the idea of an original incandescent mass of vapour, succeeded by a great and still existing central fire.

This idea of a great central fire is a very ancient hypothesis: admitted by Descartes, developed by Leibnitz, and advocated by Buffon, it is supposed to account for many phenomena otherwise inexplicable; and it is confirmed by a crowd of facts, and adopted, or at least not opposed, by the leading authorities of the age. Dr. Buckland makes it the basis of his *Bridgewater treatise*. Herschel, Hind, Murchison, Lyell, Phillips, and other leading English astronomers and geologists give a cautious adhesion to the doctrine. The following