

of rocky masses into mud, sand, and pebbles, the transportation of the same to a distance, and their accumulation elsewhere in regular strata, were all assumed to have taken place with a rapidity unparalleled in modern times. This doctrine was modified by degrees, in proportion as different classes of organic remains, such as shells, corals, and fossil plants, had been studied with attention. Analogy led every naturalist to assume, that each full-grown individual of the animal or vegetable kingdom, had required a certain number of months or years for the attainment of maturity, and the perpetuation of its species by generation ; and thus the first approach was made to the conception of a common standard of time, without which there are no means whatever of measuring the comparative rate at which any succession of events has taken place at two distinct periods. This standard consisted of the average duration of the lives of individuals of the same genera or families in the animal and vegetable kingdoms ; and the multitude of fossils dispersed through successive strata implied the continuance of the same species for many generations. At length the idea that species themselves had had a limited duration, arose out of the observed fact that sets of strata of different ages contained fossils of distinct species. Finally, the opinion became general, that in the course of ages, one assemblage of animals and plants had disappeared after another again and again, and new tribes had started into life to replace them.

*Denudation.*—In addition to the proofs derived from organic remains, the forms of stratification led, also, on a fuller investigation, to the belief that sedimentary rocks had been slowly deposited ; but it was still supposed that *denudation*, or the power of running water, and the waves and currents of the ocean, to strip off superior strata, and lay bare the rocks below, had formerly operated with an energy wholly unequalled in our times. These opinions were both illogical and inconsistent, because deposition and denudation are parts of the same process, and what is true of the one must be true of the other. Their speed must be always limited by the same causes, and the conveyance of solid matter to a particular region can only keep pace with its removal from another, so that the aggregate of sedimentary strata in the earth's crust can never exceed in volume the amount of solid matter which has been ground down and washed away by running water. How vast then must be the spaces which this abstraction of matter has left vacant ! how far exceeding in dimensions all the valleys, however numerous, and the hollows, however vast, which we can prove to have been cleared out by aqueous erosion ! The evidences of the work of denudation are defective, because it is the nature of every destroying cause to obliterate the signs of its own agency ; but the amount of reproduction in the form of sedimentary strata must always afford a true measure of the minimum of denudation which the earth's surface has undergone.

*Erratics.*—The next phenomenon to which the advocates of the excessive power of running water in times past have appealed, is the enormous size of the blocks called *erratic*, which lie scattered over