

In the "Survey of Great Britain" (vol. i.), Professor Ramsay has shown that the missing beds, removed from the summit of the Mendips, must have been nearly a mile in thickness; and he has pointed out considerable areas in South Wales and some of the adjacent counties of England, where a series of primary (or palæozoic) strata, not less than 11,000 feet in thickness, have been stripped off. All these materials have of course been transported to new regions, and have entered into the composition of more modern formations. On the other hand, it is shown by observations in the same "Survey," that the palæozoic strata are from 20,000 to 30,000 feet thick. It is clear that such rocks, formed of mud and sand, now for the most part consolidated, are the monuments of denuding operations, which took place on a grand scale at a very remote period in the earth's history. For, whatever has been given to one area must always have been borrowed from another; a truth which, obvious as it may seem when thus stated, must be repeatedly impressed on the student's mind, because in many geological speculations it is taken for granted that the external crust of the earth has been always growing thicker, in consequence of the accumulation, period after period, of sedimentary matter, as if the new strata were not always produced at the expense of pre-existing rocks, stratified or unstratified. By duly reflecting on the fact, that all deposits of mechanical origin imply the transportation from some other region, whether contiguous or remote, of an equal amount of solid matter, we perceive that the stony exterior of the planet must always have grown thinner in one place whenever, by accessions of new strata, it was acquiring density in another. No doubt the vacant space left by the missing rocks, after extensive denudation, is less imposing to the imagination than a vast thickness of conglomerate or sandstone, or the bodily presence as it were of a mountain-chain, with all its inclined and curved strata. But the denuded tracts speak a clear and emphatic language to our reason, and, like repeated layers of fossil nummulites, corals or shells, or like numerous seams of coal, each based on its under clay full of the roots of trees, still remaining in their natural position, demand an indefinite lapse of time for their elaboration.

No one will maintain that the fossils entombed in these rocks did not belong to many successive generations of plants and animals. In like manner, each sedimentary deposit attests a slow and gradual action, and the strata not only serve as a measure of the amount of denudation simultaneously effected elsewhere, but are also a correct indication of the rate at which the denuding operation was carried on.

Perhaps the most convincing evidence of denudation on a magnificent scale is derived from the levelled surfaces of districts where large faults occur. I have shown, in fig. 87, p. 63, and in fig. 91, how angular and protruding masses of rock might naturally have been looked for on the surface immediately above great faults, although in fact they rarely exist. This phenomenon may be well studied in those districts where coal has been extensively worked, for there the former relation of the beds which have shifted their position may be determined with great ac-