

which have boiled up, elevating linear ridges (mountain-ranges,) when they could not pierce through, but actually piercing through where their force could overcome the resistance, and, when cooled, remaining the magnificent crags and summits of the loftiest mountains. It must also be understood, as a matter of the clearest *sensible demonstration*, that these processes have occurred several times, at various and distant intervals; producing among the strata many varieties of direction, inclination, contortion, cleavage, conformity, and nonconformity in reference to each other. If all the strata could be placed, or, for illustration sake we may say replaced, upon each other, to what thickness or depth would they amount? It is commonly said five miles: Dr. Buckland, who is so eminently qualified to make an estimate, gives his authority to the supposition of ten miles. With respect to the actual surface of the earth, the greatest height from the lowest valley-bottom to the top of the highest mountain, may be taken at five miles. This height, compared to the diameter of the earth, may be fairly represented by the thickness of a *fine* thread laid upon the surface of a twelve-inch globe.

All these things being considered, the inquirer may be able to conceive the appearance of the accessible end, or denuded cross-cut, of a stratum or several strata. The observer sees that the whole has been deposited from water, either as a mere precipitate from a mixture, or as separated from chemical solution. Hence, the variety of rocks, siliceous, clayey, limestone, marly, and all these in various compounds. The eye also perceives, in many cases, the lower portion of a stratum to contain pebbles, the water-worn fragments of the older rocks to which they can be traced; higher up, the coarser sandstone; and towards the top, the finer sediment. Moreover, the separations of the distinct strata are often presented to view; the bounding surfaces of the formations.

Now we want a *measure* for the rate of deposition. A *perfect* rule for this is beyond the present reach of science; but there is an ample sufficiency of *ascertained facts*, to prove that *the whole series of deposits has occupied untold ages*. This letter has grown to so alarming a length, that I can only hint at the phenomena which furnish the grounds for this approximative estimate. They are observations upon the rates of deposit, in all kinds and in all circumstances, as it is continually going on in ponds, lakes, river-beds, estuaries, deltas, flat shores, siliceous and limestone springs of water, and conclusions analogical but most powerfully supported, concerning the deposits in the depths of the ocean.

This may give some idea of the processes of observation and reasoning by which we are brought to the conclusion which I have men-