

It may deserve notice, that the red sandstone generally occupies the depressions in the more ancient strata, or what were once deep valleys, and also fills up hollows on the surface of ancient rocks, as represented in Plate III. fig 4. *a a*. Now, as these depressions and hollows were, originally, filled up when the surface was under the ocean, and are now raised some hundred feet above its present level, without any apparent disturbance, this fact proves, that there were two elevating causes acting at different epochs,—the first violent and transitory, which tilted up the lower beds; the second, more extensive, but more gradual in its operation, which upheaved the whole country above the ocean, and formed islands and continents.

*Magnesian Limestone.*—The geological position of this rock is over the lowest beds of new red sandstone; but where this is wanting, it lies unconformably over the regular coal formation: see Chap. VIII. It is covered by the middle and upper series of new red sandstone.

The dolomite found in primitive and transition rocks has been before described; it is commonly white, or light grey and granular. That in the secondary strata has generally a dark brown or a yellowish-brown colour: it contains a variable proportion of magnesia, sometimes more than fifty per cent.

The presence of magnesian earth, in the proportion of nearly one half, in certain limestones, is a fact that strongly militates against the theory, which ascribes the formation of all limestone rocks to animal secretion; unless it shall be found that magnesian earth is contained in the shells and exuviae of marine animals. I believe no analyses of shells or coral have yet been made, in order to ascertain the presence of magnesia as one of their constituent elements. Should magnesia be found in the exuviae of certain orders of marine animals, and not in others, it would not only favour the opinion that limestone was of animal origin, but might also explain the cause of the alternation of beds of magnesian limestone with beds of common limestone, in the same mountain. Or should some shells of one species contain magnesia, and others none, it would prove that, under different circumstances, the same animal might form its shell of different constituent parts.

Professor Sedgwick is inclined to derive the magnesian limestone from the debris of beds of mountain or transition limestone which contain magnesia; but many beds of the magnesian limestone, above the coal formation, have as much the character of original rocks as the beds of transition limestone, and the difficulty is not removed by this hypothesis; for it still remains to enquire, from whence did the mountain or transition limestones derive their magnesia? Von Buch ascribes the change of the common limestone into dolomite in the Tyrol, to the action of volcanic rocks and volcanic vapours containing magnesia; but this opinion is not likely to obtain many supporters. Can the magnesia found in some of the chalk rocks in England