

fully borne out by the evidence. For at the time when the Old Red sandstone originated, the metamorphic strata may have formed islands in the sea, as in fig. 703, over which the breakers rolled, or from which

Fig. 703.



torrents and rivers descended, carrying down gravel and sand. The plutonic rock or granite (B) may even then have been previously injected at a certain depth below, and yet may never have been exposed to denudation.

As to the time and manner of the subsequent protrusion of the coarse-grained granite (No. 2), this rock may have been thrust up bodily, in a solid form, during that long series of igneous operations which produced the trappean and plutonic formations (Nos. 5, 6 *a*, and 6 *b*).

We have shown that these eruptions, whatever their date, were posterior to the deposition of all the fossiliferous strata of Arran. We can also prove that subsequently both the granitic and trappean rocks underwent great aqueous denudation, which they probably suffered during their emergence from the sea. The fact is demonstrated by the abrupt truncation of numerous dikes, such as those at *c*, *d*, *e*, which are cut off on the surface of the granite and trap. The overlying trap also ceases very abruptly on approaching the boundary of the great hypogene region, and terminates in a steep escarpment facing towards it as at *f*, fig. 702. When in its original fluid state it could not have come thus suddenly to an end, but must have filled up the hollow now separating it from the hypogene rocks, had such a hollow then existed. This necessity of supposing that both the trap and the conglomerate once extended farther, and that veins such as *c*, *d*, fig. 702, were once prolonged farther upwards, prepares us to believe that the whole of the northern granite may at one time have been covered by newer formations, under the pressure of which, before its protrusion, it assumed its highly crystalline texture.

The theory of the protrusion in a solid form of the northern nucleus of granite is confirmed by the manner in which the hypogene slates (No. 1), and the beds of conglomerate (No. 3), dip away from it on all sides. In some places indeed the slates are inclined towards the granite, but this exception might have been looked for, because these hypogene strata have undergone disturbances at more than one geological epoch, and may at some points, perhaps, have their original order of position inverted. The high inclination, therefore, and the quinquiversal dip of the beds around the borders of the granitic boss, and the comparative horizontality of the fossiliferous strata in the southern part of the island, are facts which all accord with the hypothesis of a great amount of movement at that point where the granite is supposed to have been