CHAPTER XXXIV.

ON THE DIFFERENT AGES OF THE PLUTONIC ROCKS.

Difficulty in ascertaining the precise age of a plutonic rock — Test of age by relative position—Test by intrusion and alteration—Test by mineral composition—Test by included fragments—Recent and Pliocene plutonic rocks, why invisible—Tertiary plutonic rocks in the Andes—Granite altering Cretaceous rocks — Granite altering Lias in the Alps and in Skye — Granite of Dartmoor altering Carboniferous strata — Granite of the Old Red Sandstone period — Syenite altering Silurian strata in Norway—Blending of the same with gneiss — Most ancient plutonic rocks — Granite protruded in a solid form — On the probable age of the granites of Arran, in Scotland.

WHEN we adopt the igneous theory of granite, as explained in the last chapter, and believe that different plutonic rocks have originated at successive periods beneath the surface of the planet, we must be prepared to encounter greater difficulty in ascertaining the precise age of such rocks, than in the case of volcanic and fossiliferous formations. We must bear in mind, that the evidence of the age of each contemporaneous volcanic rock was derived, either from lavas poured out upon the ancient surface, whether in the sea or in the atmosphere, or from tuffs and conglomerates, also deposited at the surface, and either containing organic remains themselves, or intercalated between strata containing fossils. But all these tests fail when we endeavour to fix the chronology of a rock which has crystallized from a state of fusion in the bowels of the earth. In that case, we are reduced to the following tests; 1st, relative position; 2dly, intrusion, and alteration of the rocks in contact; 3dly, mineral characters; 4thly, included fragments.

Test of age by relative position. — Unaltered fossiliferous strata of every age are met with reposing immediately on plutonic rocks; as at Christiania, in Norway, where the Newer Pliocene deposits rest on granite; in Auvergne, where the fresh-water Eocene strata, and at Heidelberg, on the Rhine, where the New Red sandstone, occupy a similar place. In all these, and similar instances, inferiority in position is connected with the superior antiquity of granite. The crystalline rock was solid before the sedimentary beds were superimposed, and the latter usually contain in them rounded pebbles of the subjacent granite.

Test by intrusion and alteration. — But when plutonic rocks send veins into strata, and alter them near the point of contact, in the manner before described (p. 567), it is clear that, like intrusive traps, they are newer than the strata which they invade and alter. Examples of the application of this test will be given in the sequel.

Test by mineral composition.—Notwithstanding a general uniformity in the aspect of plutonic rocks, we have seen in the last chapter that