

veins known to him were intrusive masses of igneous origin.¹

In the Huttonian theory we find the germ of the Lyellian doctrine of metamorphism. Hutton, having demonstrated that granite is not an aqueous but an igneous rock, further showed that the "Alpine schistus," (which included sandstones, shales and slates, as well as crystalline schists), being stratified, could not be original or primitive, but had been deposited like recent sediments, and had been invaded and altered by the granite. A passage from his chapter, "On the Primary Part of the Present Earth" may be quoted in illustration of the sagacity of his judgment on this subject: "If, in examining our land, we shall find a mass of matter which had been evidently formed originally in the ordinary manner of stratification, but which is now extremely distorted in its structure and displaced in its position,—which is also extremely consolidated in its mass and variously changed in its composition,—which, therefore, has the marks of its original or marine composition extremely obliterated, and many subsequent veins of melted mineral matter interjected, we should then have reason to suppose that here were masses of matter which, though not different in their origin from those that are gradually deposited at the bottom of the ocean, have been more acted upon by subterranean heat and the ex-

¹In Playfair's *Illustrations*, however, the successive origin of mineral veins is distinctly affirmed, § 226. Reference is there made to the coincidence between the prevalent direction of the principal Cornish veins and the general strike of the strata, and to the intersection of these by the cross-courses at nearly right angles.