

and new combinations of the acid with lime, iron, and manganese are continually in progress.*

Another illustration of the power of subterranean gases is afforded by the stufas of St. Calogero, situated in the largest of the Lipari Islands. Here, according to the description published by Hoffmann, horizontal strata of tuff, extending for 4 miles along the coast, and forming cliffs more than 200 feet high, have been discolored in various places, and strangely altered by the "all-penetrating vapors." Dark clays have become yellow, or often snow-white; or have assumed a chequered or brecciated appearance, being crossed with ferruginous red stripes. In some places the fumeroles have been found by analysis to consist partly of sublimations of oxide of iron; but it also appears that veins of chalcidony and opal, and others of fibrous gypsum, have resulted from these volcanic exhalations.†

The reader may also refer to M. Virlet's account of the corrosion of hard, flinty, and jaspideous rocks near Corinth by the prolonged agency of subterranean gases;‡ and to Dr. Daubeny's description of the decomposition of trachytic rocks in the Solfatara, near Naples, by sulphuretted hydrogen and muriatic acid gases.§

Although in all these instances we can only study the phenomena as exhibited at the surface, it is clear that the gaseous fluids must have made their way through the whole thickness of porous or fissured rocks, which intervene between the subterranean reservoirs of gas and the external air. The extent, therefore, of the earth's crust which the vapors have permeated and are now permeating may be thousands of fathoms in thickness, and their heating and modifying influence may be spread throughout the whole of this solid mass.

We learn from Professor Bischoff that the steam of a hot spring at Aix-la-Chapelle, although its temperature is only from 133° to 167° F., has converted the surface of some blocks of black marble into a doughy mass. He conceives, therefore, that steam in the bowels of the earth, having a temperature equal or even greater than the melting point of lava, and having an elasticity of which even Papin's digester can give but a faint idea, may convert rocks into liquid matter.||

The above observations are calculated to meet some of the objections which have been urged against the metamorphic theory on the ground of the small power of rocks to conduct heat; for it is well known that rocks, when dry and in the air, differ remarkably from metals in this respect. It has been asked how the changes which extend merely for a few feet from the contact of a dike could have penetrated through moun-

* See Principles, *Index*, "Carbonated Springs," &c.

† Hoffmann's *Liparischen Inseln*, p. 38. Leipzig, 1832.

‡ See *Princ. of Geol.*; and *Bulletin de la Soc. Géol. de France*, tom. ii p. 230.

§ See *Princ. of Geol.*; and *Daubeny's Volcanos*, p. 167.

|| *Jam. Ed. New Phil. Journ.* No. 51, p. 43.