

careous sandstone (*Macigno*), which contains algæ found in the northern Apennines, often assume a new and more brilliant appearance after their metamorphosis, which renders it difficult to recognize them. The theory of metamorphism was not established until the individual phases of the change were followed step by step, and direct chemical experiments on the difference in the fusion point, in the pressure and time of cooling, were brought in aid of mere inductive conclusions. Where the study of chemical combinations is regulated by leading ideas,* it may be the means of throwing a clear light on the wide field of geognosy, and over the vast laboratory of nature in which rocks are continually being formed and modified by the agency of subterranean forces. The philosophical inquirer will escape the deception of apparent analogies, and the danger of being led astray by a narrow view of natural phenomena, if he constantly bear in view the complicated conditions which may, by the intensity of their force, have modified the counteracting effect of those individual substances whose nature is better known to us. Simple bodies have, no doubt, at all periods, obeyed the same laws of attraction, and, wherever apparent contradictions present themselves, I am confident that chemistry will in most cases be able to trace the cause to some corresponding error in the experiment.

Observations made with extreme accuracy over large tracts of land, show that erupted rocks have not been produced in an irregular and unsystematic manner. In parts of the globe most remote from one another, we often find that granite, basalt, and diorite have exercised a regular and uniform metamorphic action, even in the minutest details, on the strata of argillaceous slate, dense limestone, and the grains of quartz in sandstones. As the same endogenous rock manifests almost every where the same degree of activity, so, on the contrary, different rocks belonging to the same class, whether to the endogenous or the erupted, exhibit great differences in their character. Intense heat has undoubtedly influenced all these phenomena, but the degree of fluidity (the more or less perfect mobility of the particles—their more viscous composition) has varied very considerably from the granite to the basalt, while at different geo-

* See the admirable researches of Mitscherlich, in the *Abhandl. der Berl. Akad.* for the years 1822 and 1823, s. 25-41; and in Poggend., *Annalen*, bd. x., s. 137-152; bd. xi., s. 323-332; bd. xli., s. 213-216 (Gustav Rose, *Ueber Bildung des Kalkspaths und Aragonits*, in Poggend., *Annalen*, bd. xli., s. 353-366; Haidinger, in the *Transactions of the Royal Society of Edinburgh*, 1827, p. 148.)