

the simple minerals which characterize the more generally diffused Plutonic and erupted rocks, as well as those on which they have exercised a metamorphic action, have been produced in a crystalline state, and with perfect identity, in artificial mineral products. We must, however, distinguish here between the scorïæ accidentally formed, and those which have been designedly produced by chemists. To the former belong feldspar, mica, augite, olivine, hornblende, crystallized oxyd of iron, magnetic iron in octahedral crystals, and metallic titanium;* to the latter, garnets, idocrase, rubies (equal in hardness to those found in the East), olivine, and augite.† These minerals constitute the main constituents of granite, gneiss, and mica schist, of basalt, dolerite, and many porphyries. The artificial production of feldspar and mica is of most especial geognostic importance with reference to the theory of the formation of gneiss by the metamorphic agency of argillaceous schist, which contains all the constituents of granite,

* In scorïæ, crystals of feldspar have been discovered by Heine in the refuse of a furnace for copper fusing, near Sangerhausen, and analyzed by Kersten (Poggend., *Annalen*, bd. xxxiii., s. 337); crystals of augite in scorïæ, at Sahle (Mitscherlich, in the *Abhandl. der Akad. zu Berlin*, 1822-23, s. 40); of olivine by Seifström (Leonhard, *Basalt-Gebilde*, bd. ii., s. 495); of mica in old scorïæ of Schloss Garpenberg (Mitscherlich, in Leonhard, op. cit., s. 506); of magnetic iron in the scorïæ of Chatillon sur Seine (Leonhard, s. 441); and of micaceous iron in potter's clay (Mitscherlich, in Leonhard, op. cit., s. 234).

[See Ebelmer's papers in *Ann. de Chimie et de Physique*, 1847; also *Report on the Crystalline Slags*, by John Percy, M.D., F.R.S., and William Hallows Miller, M.A., 1847. Dr. Percy, in a communication with which he has kindly favored me, says that the minerals which he has found artificially produced and proved by analysis are Humboldtite, gehlenite, olivine, and magnetic oxyd of iron, in octahedral crystals. He suggests that the circumstance of the production of gehlenite at a high temperature in an iron furnace may possibly be made available by geologists in explaining the formation of the rocks in which the natural mineral occurs, as in Fassathal in the Tyrol.]—*Tr.*

† Of minerals purposely produced, we may mention idocrase and garnet (Mitscherlich, in Poggend., *Annalen der Physik*, bd. xxxii., s. 340); ruby (Gaudin, in the *Comptes Rendus de l'Académie de Science*, t. iv., Part i., p. 999); olivine and augite (Mitscherlich and Berthier, in the *Annales de Chimie et de Physique*, t. xxiv., p. 376). Notwithstanding the greatest possible similarity in crystalline form, and perfect identity in chemical composition, existing, according to Gustav Rose, between augite and hornblende, hornblende has never been found accompanying augite in scorïæ, nor have chemists ever succeeded in artificially producing either hornblende or feldspar (Mitscherlich in Poggend., *Annalen*, bd. xxxiii., s. 340, and Rose, *Reise nach dem Ural*, bd. ii., s. 358 und 363). See, also, Beudant, in the *Mem. de l'Acad. des Sciences*, t. viii., p. 221, and Becquerel's ingenious experiments in his *Traité de l'Electricité*, t. i., p. 334; t. iii., p. 218; and t. v., p. 148 and 185