

ains by the contact and eruption of augitic porphyry (at Orsk), of dioritic porphyry (at Aufschkul), or of a mass of hypersthene rock conglomerated into spherical masses (at Bogoslowsk). At Monte Serrato, in the island of Elba, according to Frederic Hoffman, and in Tuscany, according to Alexander Brongniart, it is formed by contact with euphotide and serpentine.

The contact and Plutonic action of granite have sometimes made argillaceous schist granular, as was observed by Gustav Rose and myself in the Altai Mountains (within the fortress of Buchtarminsk),* and have transformed it into a mass resembling granite, consisting of a mixture of feldspar and mica, in which larger laminæ of the latter were again imbedded.† Most geognosists adhere, with Leopold von Buch, to the well-known hypothesis "that all the gneiss in the silurian strata of the transition formation, between the Icy Sea and the Gulf of Finland, has been produced by the metamorphic action of granite.‡ In the Alps, at St. Gothard, calcareous marl is likewise changed from granite into mica slate, and then transformed into gneiss." Similar phenomena of the formation of gneiss and mica slate through granite present themselves in the oolitic group of the Tarantaise,§ in which belemnites are

persthene rock, see Rose, *bd. ii.*, s. 169, 187, und 192. See, also, *bd. i.*, s. 427, where there is a drawing of the porphyry spheres between which jasper occurs, in the calcareous graywacke of Bogoslowsk, being produced by the Plutonic influence of the augitic rock; *bd. ii.*, s. 545; and likewise Humboldt, *Asie Centrale*, t. i., p. 486.

* Rose, *Reise nach dem Ural*, *bd. i.*, s. 586-588.

† In respect to the volcanic origin of mica, it is important to notice that crystals of mica are found in the basalt of the Bohemian Mittelgebirge, in the lava that in 1822 was ejected from Vesuvius (*Monticelli, Storia del Vesuvio negli Anni 1821 e 1822*, § 99), and in fragments of argillaceous slate imbedded in scoriaceous basalt at Hohenfels, not far from Gerolstein, in the Eifel (see Mitscherlich, in Leonhard, *Basalt-Gebilde*, s. 244). On the formation of feldspar in argillaceous schist, through contact with porphyry, occurring between Urval and Poïet (Forez), see Dufrenoy, in *Géol. de la France*, t. i., p. 137. It is probably to a similar contact that certain schists near Paimpol, in Brittany, with whose appearance I was much struck, while making a geological pedestrian tour through that interesting country with Professor Kunth, owe their amygdaloid and cellular character, t. i., p. 234.

‡ Leopold von Buch, in the *Abhandlungen der Akad. der Wissenschaft zu Berlin*, aus dem Jahr 1842, s. 63, and in the *Jahrbüchern für Wissenschaftliche Kritik* Jahrg. 1840, s. 196.

§ Elie de Beaumont, in the *Annales des Sciences Naturelles*, t. xv., p. 362-372. "In approaching the primitive masses of Mont Rosa, and the mountains situated to the west of Coni, we perceive that the secondary strata gradually lose the characters inherent in their mode of deposition. Frequently assuming a character apparently arising from a perfectly