

Round the granite bosses of Devon and Cornwall, already referred to (ante, p. 946), the Devonian and Carboniferous formations have undergone remarkable changes, which have long been cited as classic examples of contact-metamorphism. Fine graywacke and slate have been converted into mica-schist and varieties of gneiss (cornubianite). In some cases the slates become indurated and dark in color, and new minerals (schorl, chiastolite, etc.) are developed in them. The volcanic bands intercalated with the sedimentary series likewise undergo alteration, the "greenstones," in particular, becoming much more coarsely crystalline as they approach the granite. Each boss of granite is surrounded with its ring of metamorphism, which varies greatly in breadth and in the intensity of alteration.²¹

In the Lake District of the north of England excellent examples of the phenomena of contact may be observed round the granite of Skiddaw. The alteration here extends for a distance of two or three miles from the central mass of granite. The slate, where unaltered, is a bluish-gray cleaved rock, weathering into small flakes and pencil-like fragments. Traced toward the granite, it first shows faint spots, which increase in number and size until they assume the form of chiastolite crystals, with which the slate is now abundantly crowded. The zone of this chiastolite-slate seldom exceeds a quarter of a mile in breadth. Still closer to the granite, a second stage of metamorphism is marked by the development of a general schistose character, the rock becoming more massive and less cleaved, the cleavage-planes being replaced by an incipient foliation due to the development of abundant dark little rectangular or oblong spots, probably imperfectly crystallized chiastolite, this mineral, as well as andalusite, occurring also in large crystals, together with minute flakes of mica (spotted schist, Knotenschiefer). A third and final stage is reached when, by the increase of the mica and quartz-grains, the rock passes into mica-schist—a light or bluish-gray rock, with wonderfully contorted foliation, which is developed close to the granite, there being

²¹ De la Beche, "Report on Geology of Devon and Cornwall," Mem. Geol. Survey, 1839, p. 268. See also Forbes, Trans. Geol. Soc. Cornwall, ii. p. 260, and Boase, op. cit. iv. 1832, p. 166. The microscopic structure of the unaltered slates of Cornwall has been described by Allport, Q. J. Geol. Soc. xxxii. 1876, p. 407, and that of the greenstones by J. A. Phillips, op. cit. xxxiv. 1878. Some interesting observations on the metamorphism of Cornish and other slates are given by Sorby in his Address to the Geological Society, op. cit. xxxvi. 1880, p. 81 *et seq.*