

enne, and in the Jurassic and Eocene shales of the Alps.⁴³ Just as shales graduate into true cleaved slates, so slates by augmentation of their superinduced mica pass into phyllites, and these into mica-schists. The structure of districts with cleaved rocks is described in Book IV. Part V.

(4.) **Deformation.**—Further evidence of the powerful pressures to which rocks have been exposed is furnished by the way in which contiguous pebbles in a conglomerate have been squeezed into each other, and even sometimes have been elongated in a certain general direction. The coarseness of the grain of such rocks permits the effects of compression or tension to be readily seen. Similar effects may take place in fine-grained rocks and escape observation. Daubr e has imitated experimentally indentations produced by the contiguous portions of conglomerate pebbles.⁴⁴

In discussing the cause of these indentations it must be remembered that imprints of pebbles upon each other, particularly when the material is limestone or other tolerably soluble rock, may have been to some extent produced by solution taking place most actively where pressure was greatest (p. 523). But there are indubitable evidences of crushing and deformation, even in what would be termed solid and brittle rocks. Of these evidences, perhaps the most instructive and valuable are furnished by the remains of plants and animals occurring as fossils, and of which

⁴³ Jannettaz, Renevier and Lory, *Bull. Soc. Geol. France*, ix. p. 649.

⁴⁴ *Comptes Rendus*, xlv. p. 823; also his "Geologie Experimentale," part i. sect. ii. chap. iii., where a series of important experiments on deformation is given. For various examples and opinions, see Rothpletz, *Z. Deutsch. Geol. Ges.* xxxi. p. 355. Heim, "Mechanismus der Gebirgsbildung," 1878, vol. ii. p. 31. Hitchcock, "Geology of Vermont," i. p. 28. *Proc. Bost. Soc. Nat. Hist.* vii. pp. 209, 353; xviii. p. 97; xv. p. 1; xx. p. 313. *Amer. Assoc.* 1866, p. 83. *Amer. Jour. Sci.* (2) xxxi. p. 372. Sorby, *Rep. Cardiff Nat. Soc.* 1873, p. 21. H. H. Reusch, "Fossilien-f hrender Kryst. Schiefer," p. 25.