rock. M. Renard has found that the Belgian whet-slate is full of minute crystals of garnet.<sup>122</sup> Some of the more crystalline varieties (phyllite) are almost wholly composed of minute crystalline particles of mica, quartz, felspar, chlorite, and rutile, and form an intermediate stage between ordinary clay-slate and mica-schist.

A distinction has been drawn by some petrographers between certain rocks (phyllite, Urthonschiefer) which occur in Archæan regions or in groups probably of high antiquity, and others (ardoise, Thonschiefer) which are found in Palæozoic and later formations. But there does not appear to be adequate justification for this grouping, which has probably been suggested rather by theoretical exigencies than by any essential differences between the rocks them-That the whole of the series of argillaceous rocks, selves. beginning with clay and passing through shale into slate and phyllite, is of sedimentary origin is indicated by the organic remains, false bedding, ripple-mark, etc., found in those at one end of the series, and by the insensible gradation of the mineralogical characters through increasing stages of metamorphism to the other end. Some microscopic crystals may possibly have been originally formed among the muddy sediment on the sea-floor (see p. 770). Others may have formed part of the original mechanical detritus that went to make the slate. But, for the most part, they have been subsequently developed within the rock, and represent early stages of the process which has culminated in the production of crystalline schists. The development of crystals of chiastolite and other minerals in clay-slate is frequently to be observed round bosses of granite, as one of the phases of contact-metamorphism.

A number of varieties of Clay-slate are recognized. Roofing slate (Dachschiefer) includes the finest, most compact, homogeneous and durable kinds, suitable for roofing houses or the manufacture of tables, chimney-pieces, writing-slates, etc.; it occurs in the Silurian and Devonian formations of Central and Western Europe. Anthracitic-slate (anthracite-phyllite, alum-slate), dark carbonaceous slate with much iron-disulphide. Bands of this nature sometimes run through a clay-slate region. The

<sup>&</sup>lt;sup>122</sup> Acad. Roy. Belgique, xli. (1877). See also his paper on the composition and structure of the phyllades of the Ardennes, Bull. Mus. Roy. Belg. iii. (1884), p. 231.