

believe, the parts of these rocks are not individually *crystals* (as mica and felspar are in granite), *nor envelop crystals* (as quartz often envelops the other substances in granite), nor are in a state of *crystalline aggregation*, as the grains and plates of most primary limestone, but are parts of crystallised bodies fragmented and worn in various degrees, aggregated in laminae under the influence of water (perhaps in a peculiar state), and subsequently consolidated, but not melted, nor re-crystallised, by the application of heat.

It is, however, thought by some geologists that the whole mass of the primary schistose rocks is to be viewed as metamorphic; as transformed from some other sort of sedimentary rock—*grauwacke*, for instance—and rearranged into a *crystalline rock* of granitic aspect and affinity. We must therefore pay attention to some of the evidence which is adduced in support of this important hypothesis.

Metamorphic Slates.

As containing examples of metamorphic rocks, on a considerable scale, and of interesting if not remarkable variety, the district of the Cumbrian mountains may be advantageously quoted. In connection with the granite of the Caldew occurs the remarkable mass of chistolitic and hornblendic slates, which form the base of the clay slate system of Cumberland; and it is thought that these rocks are, at least in part, metamorphic, similar combinations being found in analogous situations elsewhere. Dr. Macculloch ascribes a metamorphic origin to hornblende schist, viewing this rock as the extreme term of a series of changes commencing with clay or shale, and passing through siliceous schist or Lydian stone. Argillaceous schist, when in contact with granite, is sometimes (as in Shetland) converted into hornblende schist.

The hornblende schist of the Cumbrian granitic district is in places similar to that which adjoins