

any difference of opinion regarding the derivation of the rock-material composing stratified deposits—on the one hand from the fragmented and finely triturated products of surface denudation or from the chemical activities of infiltrating water in the crust, and on the other, from the accumulation of organic deposits. But the origin of gneisses and the crystalline schists is still shrouded in mystery; much is known, but far more remains to be discovered. These rocks used to be regarded as the fundamental rock-formation of the sedimentary succession; the lowest member of the group being usually gneiss or coarsely foliated and banded granitic rock, and the uppermost usually phyllite or finely foliated lustrous, slaty rock. In the eighteenth century, three leading hypotheses were promulgated in explanation of the origin of these rocks. One theory (supported by Buffon, Breislak, and others) regarded the gneisses and the crystalline schists as the fundamental rocks of the earth's crust, the product of the first consolidation of molten rock material on the cooling surface of the earth; the Wernerian theory represented them as the oldest chemical precipitates from the primæval aqueous envelope of the earth, possessing a crystalline texture in virtue of the high temperature at the earth's surface in the primæval epoch; Hutton regarded them as normal sedimentary deposits, not necessarily of the primæval epoch, which had been carried to greater depths in the crust after their deposition, and there been melted, metamorphosed, and rendered crystalline by the combined influence of the earth's internal heat and enormous crust-pressure. In his conception of the relation of dynamic agencies to rock-deformation, Hutton was far ahead of his contemporaries, and the nineteenth century was well advanced before Darwin, Poulett-Scrope, Sharpe, and a few of the keenest observers began to apply the principle of dynamic agencies of deformation in the earth's crust. Beroldingen explained gneiss as regenerated granite. Although with certain modifications, each of these hypotheses claims supporters at the present day.

In 1822 Ami Boué, in his geognostic description of Scotland, modified the Huttonian hypothesis in so far as he thought that in addition to subterranean heat and pressure, the action of vapours and gases had played a part in the metamorphosis of sedimentary deposits to crystalline rock. The Norwegian geologist, Keilhau, in the following year advanced his view that a foliated structure had been superinduced upon crystal-