

line schists, in common with most of the older massive rocks, by the agency of water, without the aid either of pressure or of increased temperature. During the years 1826-28, Studer and Élie de Beaumont made the observation in the Swiss and Savoy Alps that gneiss and micaceous schists repose upon unaltered sedimentary strata, and that in certain crystalline schists fossils are present which prove them to belong to relatively young geological epochs. This discovery was a very great blow to the geologists who upheld the hypothesis of the Archæan or pre-Cambrian age of all gneisses and schists. Studer suggested some time later (1855) that the transformation of these schists had proceeded not outward from the lower horizons to the upper, but possibly inward from younger and outer horizons of rock to deeper crust-levels. Hoffmann, who had in 1830 observed crystalline schists interbedded with conglomerates and coarse grits of the "transitional" series, advocated the view that the stratified grits and conglomerates represented unaltered patches, and the gneiss and schists represented altered portions of one and the same geological formation.

Lyell accepted the Huttonian hypothesis in its essential features, and the wide circulation of his principles gave Hutton's teaching greater currency abroad. In addition to heat and pressure, Lyell thought electrical and other agencies might have combined to render the sedimentary structures semi-fluid, the rock material having then been re-arranged; traces of organisms disappeared, but the bedding-planes for the most part persisted. Lyell taught that gneiss and micaceous schist represented sandstones which had been altered by contact with eruptive rocks, argillaceous schists had been originally shales, and marble represented limestone that had been rendered crystalline. In accordance with the Huttonian doctrine that the high temperature had acted outward through the crust, the lowest schists and gneisses were said by Lyell to be those which had suffered the greatest degree of metamorphism. At the same time, under certain circumstances comparatively young deposits might be metamorphosed, and it could by no means be assumed that all crystalline schists must belong to the fundamental or Archæan rocks. It was Sir Charles Lyell who gave to the group of gneiss and crystalline schists the name of "metamorphic" rock, and the name was rapidly adopted in the special literature of geology and in text-books.