he recognised numerous minute foreign bodies and inclusions. But these authors failed to make sufficient impression upon contemporary thought. Petrography continued to be conducted for the most part along the old lines; in Germany the best known teachers of petrography were Rose, Cotta, Naumann, and Rath; in France, Delesse, Durocher, and Fournet. Naumann's *Lehrbuch* contains an admirable representation of the state of petrography in 1850. But, instead of the subdivisions then customary, Naumann differentiated rocks chiefly according to their origin as crystalline, clastic, hyaline, poriform, zoogene, and phytogene.

In the following decade, the interest of petrographers was chiefly directed to the chemical side. Until that time, geology had troubled little about chemistry. The foundations of geology had been laid without the assistance of chemistry; among the leading geologists of the heroic period, only Hutton and De Saussure were learned in chemistry, and they had not seemed to find much use for their intimate knowledge of that branch of science. Cordier had in 1815 applied hydrochloric acid for the determination of certain constituents of rocks, and Gmelin in 1828 had made an analysis of phonolite, separating the elements that were soluble in hydrochloric acid from those that were insoluble. But a purposeful chemical investigation of rocks was first attempted by Bischof and Bunsen.

Gustav Bischof (*ante*, p. 217), the founder of Chemical Geology, was much more a chemist than a geologist, and although his lack of sound geological knowledge could not affect his experimental chemical researches on rocks, it proved detrimental when he came to draw generalisations from his results. In the first volume of his *Text-book of Chemical and Physical Geology*, Bischof begins with the consideration of the water on the surface of the earth and in internal cavities and joints; after a detailed description of springs, he turns his attention to their temperature, their chemical ingredients, etc., and to the chemical changes which are set up in the rocks when water is brought into contact with them. The second volume is a complete chemical mineralogy and petrology, in which the mode of origin of the rocks receives a large share of attention. When he reviews his facts, Bischof arrives at conclusions of an ultra-Neptunistic tendency and quite erroneous. The work is of high value on account of the