

large number of careful rock analyses, which show the relative admixture of the different rock-forming substances. By careful chemical analyses, Robert Bunsen succeeded in distinguishing between two volcanic magmas exuded from different vents in Iceland—the one, a normal trachytic or acid magma, the other a normal pyroxenic or basic magma,—and showed that from the combination of these all possible transitional varieties of eruptive rock might take origin. After the publication of Bunsen's paper in Poggendorff's *Annalen* in 1851, geologists were so zealous in the chemical investigation of rocks, that almost a thousand chemical and mechanical analyses of rocks were forthcoming ten years later when Justus Roth prepared his tabular list of rock analyses.

In the year 1850, Henry Clifton Sorby published a short communication on the Jurassic Calcareous grit, whose structure he elucidated by applying Nicol's methods of examining thin rock-slices by transmitted light. In two further treatises in 1853 and 1856 Sorby tried to solve the problem of cleavage by similar means of examining thin sections of cleaved rock. These earlier writings of Mr. Sorby were the precursors of his famous memoir in 1860, which revolutionised the teaching of petrography. Independently of Sorby, Oschatz in Berlin had recognised the importance of preparing thin slices of rock for microscopic examination. On the 7th January 1852, Oschatz exhibited a collection of fifty microscopic slides of mineral sections at a meeting of the German Geological Society, and again in 1854 at a Scientific Congress in Göttingen, but he did not succeed in arousing any great interest.

The turning-point was Sorby's classic paper on the microscopical structure of crystals, published in the *Quarterly Journal of the Geological Society* in 1858. This paper demonstrated the structure of rock-forming minerals with unprecedented accuracy; it compared the natural mineral crystals with crystals artificially produced, and finally drew definite conclusions regarding the origin of the different rocks. Sorby was able to deduce from the presence of fluid, gaseous, crystalline, vitreous, and slaggy inclusions in crystals, the aqueous or volcanic origin of certain rocks, and thus brought to an end questions which had been for many years matters of dispute, and which could never have been solved without a precise knowledge of the mineralogical elements and ground-