

is constantly confounded with it, is the result of the alteration *in situ* of sedimentary rocks consisting of quartz with feldspathic or argillaceous matters, the debris of pre-existing rocks. Moreover, it is demonstrable that these stratified sediments have been softened, and while in such a condition, displaced or extravasated, and have thus taken the form of exotic or eruptive rocks. Having by this or other means lost the mechanical evidences of their former stratified condition, they are called granites. The same view is, according to me, applicable to dolerites, diorites and trachytes. Modern lavas have no other origin, but take a different form, because they come to the surface and are rapidly cooled, instead of being slowly solidified under the pressure of superincumbent strata. The fact that every eruptive or exotic rock (with the exception of certain rapidly cooled lavas) has its mineralogical equivalent among indigenous crystalline rocks, that is to say among sedimentary strata of chemical or mechanical origin, is a powerful argument in support of the view here put forward. In connection with this, I have shown that a combination of chemical and mechanical agencies naturally and inevitably leads to the division of aqueous sediments into the two great types to which lithologists refer all eruptive rocks, namely, the acid, granitic or trachytic, and the basic, doleritic groups, which are supposed to form the two zones of igneous rock imagined by Phillips, and since insisted upon by Durocher, Bunsen and Forbes. As all of these crystalline rocks are, according to my hypothesis, ancient sediments, it follows that water has been present among them from their first deposition, and during all the subsequent processes of their heating, softening, crystallization and ejection — a view constantly insisted upon by me, and in accordance with the ideas maintained by Scheerer and subsequently by Sorby. This theory of igneous rocks, although suggested by Keferstein in 1834, and by Sir J. F. W. Herschel in 1837, has been elaborated by me in various papers for the past ten years.

See Theory of Igneous Rocks and Volcanos, *Canadian Journal*, March, 1858; some Points in Chemical Geology, *Quar. Jour. Geol. Soc.* Nov. 1859; Chemistry of the Earth, *Comptes Rendus*, June 9th, 1862; Chemistry of Metamorphic Rocks, *Dublin Quar. Jour.*, July, 1863; Contributions to Lithology, Part I, *American Jour. Science*, March, 1864.

In view, then, of my theory of the derived and sedimentary origin of all eruptive rocks, what does Mr. Forbes mean when he inquires whether I am aware of the immense masses "of volcanic