Chemistry and Mineralogy,[1] he again draws attention to his term *vicarious* (*vicarirende*), which undoubtedly expresses the nature of the general law afterwards established by Mitscherlich in 1822.

But Fuchs's conjectural expression was only a prelude to Mitscherlich's experimental discovery of isomorphism. Till many careful analyses had given substance and signification to this conception of vicarious elements, it was of small value. Perhaps no one was more capable than Berzelius of turning to the best advantage any ideas which were current in the chemical world; yet we find him,[2] in 1820, dwelling upon a certain vague view of these cases,—that "oxides which contain equal doses of oxygen must have their general properties common;" without tracing it to any definite conclusions. But his scholar, Mitscherlich, gave this proposition a real crystallographical import. Thus he found that the carbonates of lime (calcspar,) of magnesia, of protoxide of iron, and of protoxide of manganese, agree in many respects of form, while the homologous angles vary through one or two degrees only; so again the carbonates of baryta, strontia, lead, and lime (arragonite), agree nearly; the different kinds of felspar vary only by the substitution of one alkali for another; the phosphates are almost identical with the arseniates of several bases. These, and similar results, were expressed by saying that, in such cases, the bases, lime, protoxide of iron, and the rest, are *isomorphous*; or in the latter instance, that the arsenic and phosphoric acids are isomorphous.

Since, in some of these cases, the substitution of one element of the isomorphous group for another does alter the angle, though slightly, it has since been proposed to call such groups *plesiomorphous*.

This discovery of isomorphism was of great importance, and excited much attention among the chemists of Europe. The history of its reception, however, belongs, in part, to the classification of minerals; for its effect was immediately to metamorphose the existing chemical systems of arrangement. But even those crystallographers and chemists who cared little for general systems of classification, received a powerful impulse by the expectation, which was now excited, of discovering definite laws connecting chemical constitution with crystalline form. Such investigations were soon carried on with great activity. Thus, at a recent period, Abich analysed a number of tessular minerals, spinelle, pleonaste, gahnite, franklinite, and chromic iron oxide; and

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[1] Munich, 1820. [2] *Essay on the Theory of Chemical Proportions*, p. 122.