

often determine the differences existing between minerals which greatly resemble each other. This, as is observed more at large in the following 'Introduction,' is fully exemplified in the differences discovered by means of the reflective goniometer, between the measurements of the primary rhomboids of carbonate of lime, carbonate of lime and magnesia, and carbonate of iron; minerals which often so greatly resemble each other, that the difference between them can only be ascertained by a resort to chemistry, or the reflective goniometer. The utility of a close attention to this instrument has been further manifested since the foregoing was written, and in a very remarkable manner:—A mineral which has always been considered as bitterspar from the Tyrol, and of which the primary crystal is a rhomboid not distinguishable by the unassisted eye from that of either of the foregoing, was found by the reflective goniometer to afford measurements differing from them all; the cause of this became manifest by a resort to analysis, which proved it to be a new compound, namely, a carbonate of magnesia and iron. The reflective goniometer is moreover of great use to the geologist, who finds those rocks which are termed primitive, and many of those which are called transition, or the oldest secondary, to consist, not of one homogeneous mass, as is often the case with those of a newer origin, but of two or more minerals, so intermixed and associated that a reference to the chemist is of little avail to him: by such means he may indeed become informed whether a particular earth or alkali is to be found in the mass, but the various substances of which it is compounded are often too minute, and therefore too intimately associated with the others, to allow of a determination as to which of the component substances may contain the earth or the alkali so discovered. Hence structure, if it exist, becomes a character of essential importance; for it will be found that fragments far too minute for analysis will often afford brilliant planes, well adapted to the use of the reflective goniometer. A knowledge of Structure, therefore, and of the measurements of the primary forms of minerals, is very important to the geologist; but where structure does not exist, the examination of the various external characters of the minute portions forming the aggregate of the rock are often of singular advantage; and hence the geologist should become intimately acquainted with the external characters of at least all such substances as are found entering into the composition of rocks. Mineralogy, therefore, is in reality essential to the geologist; it is the very *alphabet to the older rocks*, and it is probably to be attributed in great measure to the want of due preparation for the study of these rocks, by an intimate acquaintance with minerals in the *simple* state, that the primary

angles should become an impediment to the study of the rocks.