

probability that these minerals have been derived from the disintegration of rocks found at the surface of the continents. These determinations rely not so much upon any isolated characters, as upon the union of a variety of conditions, such as geographical position, size and form of the grains, specific nature of the minerals, characters indicating the mode of transport, and especially the lithological and mineralogical associations.

After these general remarks we may give an enumeration of the principal species of minerals which are considered as having a terrigenous origin, along with some of their most striking peculiarities. It must be remembered, however, that these characters are not absolute, and that their value is important only when taken along with associated rocks and minerals.

AMPHIBOLE, *Common Hornblende*, generally greenish, rarely brownish, more or less distinctly prismatic, fibrous structure, rarely zonary or containing inclusions, cleavage planes not well marked nor very shining, associated with debris of crystalline or schisto-crystalline rocks. *Actinolite*, found as columnar or fibrous aggregates, associated with large fragments of actinolite-schists. *Glaucophane*, small prismatic fragments, pronounced violet-blue colour, associated with land debris and fragments of mica-schists and gneissic rocks. *Apatite*, although mineralogically no distinction possible from apatite derived from volcanic rocks, the larger grains of this mineral, often elongated or rounded fragments, occur associated with debris of older rocks. *Calcite*, fragments of compact limestones. *Chlorite* cannot be determined by its proper characters as originating from older rocks, but frequently occurs with debris of schistose rocks, with amphibolic or schistose fragments, also as coatings of some continental rocks and minerals. *Chromite*, with debris of olivine rocks. *Dolomite*, as fragments of dolomitic limestones and dolomitic rocks, with blocks and gravel of older eruptive and sedimentary rocks transported by icebergs. FELSPARS (a) *Mono-clinic, Orthoclase*, generally fragments bounded by cleavage planes following P and M, often altered grains, no glassy habit, dull and milky, no glass inclusions, some liquid inclusions, intergrowth with quartz or with triclinic felspar, decomposition into kaolin or muscovite, no zonary structure nor fissures as in sanidine, associated in the deposits with debris of crystalline schists, and principally with older eruptive rock fragments. (b) *Triclinic, Microcline*, always associated with debris of continental origin. *Plagioclase*, dull and cloudy, generally altered, associated with debris of older eruptive rocks. *Garnet*, although mineralogically no distinction possible, must be of continental origin when coated with green chloritic or serpentinous substance or phyllitic matter, and occurring with fragments of schisto-crystalline rocks. *Glaucosite*.<sup>1</sup> *Magnetite* cannot be distinguished from the same mineral in the recent volcanic rocks and particles, but often associated with land debris. MICA, *White Mica*, always associated with older eruptive rocks and continental debris; *Sericite*, associated with fragments of schistose

<sup>1</sup> See Chemical Deposits, Chapter VI.