other minerals have been converted into serpentine; pyroxene into rensselaerite, a variety of talc; nephelite into gieseckite; spinel to hydrotalcite. Another change is that of magnetite to hematite; for the great beds of hematite sometimes contain octahedral crystals now consisting of hematite, which, when formed, were octahedrons of magnetite.

In the ore-beds of the Huronian the layers of ore, jasper, or other materials are often much broken and displaced. The grains of apatite are sometimes more abundant along one side of an ore-bed than the other, or have some reference to the depressions in which the ore lies (Browne, 1889). The dioryte underlying the ore-bed has been altered in many places to a soft clayey material, feeling soapy, resembling the fluccan of a vein. The underlying rock is sometimes that of a dike, but whether consisting of dioryte or diabase, it is, in general, probably, as Hunt held, a rock of sedimentary origin. As dioryte and diabase were very abundant rocks, sediments made from them would have then been common. The broken and otherwise displaced condition of the ore-beds, and the rearrangements of the ore in any depressions that were made, would have been a consequence, under the results of wider disturbance, of the important fact that in the change of the carbonate to hematite or magnetite, there is a reduction in the former of *one third in bulk*, and in that of limonite to the same ores, a reduction of *one half or more*, so that large spaces would have been opened, favoring large displacements.

The *subsequent* changes, alluded to above, probably occurred at some later epoch of regional disturbance, in the course of which movement was produced along the plane of the ore-bed. Under the action of the heat from friction siliceous and other solutions would have been formed anew and mineral changes have taken place.

LIFE OF ARCHÆAN TIME.

Although fossils, according to present knowledge, are absent from Archæan rocks, or are of questionable character, the existence during the later part of the Archæan of aquatic life in its simplest forms is rendered almost certain by the fact that the temperature of the waters was favorable to it, and by the occurrence among the stratified rocks of beds of limestone; by the abundance in many limestones, and other rocks, of graphite, which constitutes 20 per cent of some layers in Canada; and the presence in the Huronian of carbonaceous shales or slates containing 40 per cent of carbonaceous materials. The life belonged to that division of Archæan time which is designated, on page 441, the Archæozoic æon; and the Huronian rocks represent the latter part of this æon, if not the whole of it.

PLANTS. — Graphite — crystallized carbon — has been made in many later rocks by the alteration of coal-beds; as at Worcester, in Massachusetts, in Rhode Island, at St. John in New Brunswick, where ferns among the coal-plants have been found in the state of graphite, in Ayrshire, Scotland, and in Bavaria. Even anthracite has been observed in the Archæan rocks of Arendal, Norway. Dawson has remarked that it is scarcely an exaggeration to maintain that the quantity of carbon, in the form of graphite, in the Archæan rocks of Canada is equal to that in similar areas of the Carboniferous system. It is reasonable to conclude, therefore, that although graphite may also be produced by heat, that of the Archæan was largely of organic origin, like that of later rocks. The metamorphism of shales containing carbonaceous materials derived from vegetable, if not also animal, tissues,