

sediments. It is only in very recent years that the possibility of the derivation of a portion of the schists of the Archean from volcanic rocks has been looked into and the important rôle played by volcanic agencies in building up the older rock series has been appreciated.* There are, however, not a few geologists who continue to advocate the extreme plutonic view that the whole of the Archean is of igneous origin and represents the first-formed crust of the earth. Hunt's crenitic hypothesis, also, is a challenge to the metamorphic theory.

In deference to these and other anti-metamorphic schools of thought, in which for the most part theory seems to crowd out fact, it becomes necessary, with the accumulation of evidence of recent years, to point out the great additional strength acquired by the theory of metamorphism as applied to the Archean, by the recognition of the volcanic origin of much of the material upon which metamorphic agencies have operated, and by the limitation of its application to the upper division of the Archean; the rocks of the lower division, or Laurentian, being susceptible of an entirely different explanation. The lack of discrimination between the essentially different characters of the upper and lower Archean and the lumping of the whole complex together as having necessarily the same origin and development has been the great mistake alike of the metamorphic and the extreme plutonic schools. Just as the metamorphic theory, properly limited, affords the explanation of the development of the rocks of the upper Archean from normal formations, so by a similar limitation of the plutonic theory and the introduction of some modifying considerations we will find in the latter a rational and consistent explanation of the origin of the rocks of the Laurentian.

RELATIONS BETWEEN THE TWO DIVISIONS.

The General Relations.—The full significance of the sharp separation of the Ontarian system, as a bedded assemblage of prevailingly schistose and otherwise altered normal rocks, from the Laurentian, as a non-bedded assemblage of more or less foliated plutonic igneous rocks, will appear from an inquiry into the relations in space and in time between these two great systems, which it is the object of this paper to institute.

That portion of the Ontarian system which for some years has been somewhat loosely referred to as Huronian, from its supposed equivalence with the rocks of Lake Huron, now held to be possibly post-Archean, presents in many parts of central Canada contacts or lines of junction with the Laurentian. The nature of this contact has been a subject of discussion. The question has ever been raised whether these rocks are conformable or un-

*The first suggestions of volcanic admixtures in the upper Archean rocks of central Canada were thrown out by G. M. Dawson in his description of the agglomerates of the Lake of the Woods in the Report on the Geology and Resources of the 49th Parallel, 1873, p. 52.