

of thinly bedded limestones dolomites, &c., cut through by great massive intrusions of gabbro, diorite and granite. Detailed and critical examinations over the whole area have led to the belief that in the Grenville Series we have a more highly metamorphosed portion of the Hastings Series. This extreme alteration in the case of the Grenville Series is accounted for by the intimate presence of much greater volumes of the associated irruptives and their relatively much more acid character. In many of the previous geological descriptions of this and neighboring Archæan districts, it has been customary to refer in a rather positive manner to the existence of conglomerates as an evidence of the clastic origin not only of the Hastings and Grenville Series but also of the enclosing Laurentian gneisses. Localities were cited and descriptions given of such coarse clastics, and the often perfectly rounded character of the contained fragments was referred to as a certain indication of the wearing action of running water.

The fallacy of arguing the sedimentary origin of the whole series because of the presence of such comparatively insignificant inclusions of clastic material, has been clearly shown by recent Archæan work and is now very generally conceded. It is not however so widely known that many of the conglomerates so-called and described have no existence as such but are in reality autoclastic* rocks or dynamic breccias which have resulted in the main from the complex folding and stretching occasioned by the operation of the strong orogenic forces prevailing so intensely in pre-Cambrian times. Murray in 1853 and Macfarlane in 1866 refer to the presence of these coarse beds in the Archæan of Hastings County, while on page 31 of the *Geology of Canada* (1863) conglomerates are referred

* The term "autoclastic" originally proposed by H. L. Smyth (see *Geology of Steep Rock Lake*, *Am. Jour. Sci.* XI.11, p. 331) is very applicable used as its author defines to rocks "which have formed in place from massive rocks by crushing and squeezing without intervening processes of disintegration or erosion, removal and deposition." Van Hise (see *Principles of North American Pre-Cambrian Geology*, 16th Ann. Rep. U. S. Geol. Surv. p. 679. 894-95) explains the use of the term, describes the method of formation of these rocks and the means of distinguishing them from basal conglomerates.