Sir James Hall, about the year 1790, began an important investigation, in which he succeeded in reducing various ancient and modern volcanic rocks to the condition of glass, and in restoring them, by slow cooling, to a stony condition in which distinct crystals (probably pyroxene, olivine, and perhaps enstatite) were recognizable.[18] Gregory Watt afterward obtained similar results by fusing much larger quantities of the rocks. In more recent years, this method of research has been resumed and pursued with the much more effective appliances of modern science, notably by Mitscherlich, G. Rose, C. Sainte-Claire Deville, Delesse, Daubrée, Fouqué, Michel-Lévy, Friedel, and Sarasin. It has been experimentally proved that all rocks undergo molecular changes when exposed to high temperature, that when the heat is sufficiently raised they become fluid, that if the glass thus obtained is rapidly cooled it remains vitreous, and that, if allowed to cool slowly, a more or less distinct crystallization sets in, the glass is devitrified, and a lithoid product is the result.

A g l a s s is an amorphous substance resulting from fusion, perfectly isotropic in its action on transmitted polarized light (*ante*, pp. 203, 212). Its specific gravity is rather lower than that of the same substance in the crystallized condition. By being allowed to cool slowly, or being kept for some hours at a heat which softens it, glass assumes a dull porcelain-like aspect. This d e v i t r i f i c a t i o n possesses much interest to the geologist, seeing that most volcanic rocks, as has been already described (p. 212), present

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[18] Trans. Roy. Soc. Edin. v. p. 43. Hall's actual products have been microscopically examined by Fouqué and Michel-Lévy. Comptes Rend. May, 1881. For repetitions of his fusion of limestone, op. cit. cxv. (1892), pp. 817, 934, 1009, 1296.