The observations of Coquand and Delaouë have led them to conclude that dolomites have, in many cases at least, been formed by the precipitation of carbonate of magnesia mingled with carbonate of lime. It was, however, still necessary to the solution of the problem of the origin of dolomites to show, first, the conditions under which carbonate of magnesia could be found and deposited; and, secondly, how it could be made to unite chemically with carbonate of lime to form the double salt dolomite.

In the Report of the Geological Survey of Canada, for 1857 (see also Am. Jour. of Science (2), vol. xxxvi. 110), I have shown two processes by which sediments of magnesian carbonate may be formed. First, by the action of solutions of bicarbonate of soda on basins of sea-water, which precipitate all the lime as carbonate, and then give rise to a soluble bicarbonate of magnesia; and, secondly, the action of bicarbonate of lime on solutions containing sulphate of magnesia. I have found that the presence of this salt greatly increases the solubility of bicarbonate of lime in water—bicarbonate of magnesia and sulphate of lime being formed by double decomposition. By adding alcohol to such a solution, or by evaporating it at a gentle heat, gypsum is deposited, leaving the more soluble bicarbonate of magnesia in solution.

In the same way, alcohol separates gypsum from a mixed solution of bicarbonate of lime and sulphate of soda—an alkaline bicarbonate remaining dissolved.

The subsequent evaporation in shallow lakes, or basins, of solutions of bicarbonate of magnesia, formed by either of the above mentioned processes, must give rise to deposits of hydrated carbonate of magnesia more frequently mingled with carbonate of lime, supplied by springs containing either bicarbonate of lime or chloride of calcium. The hydrated carbonate of magnesia, at 160° C. (and perhaps at a lower temperature), under pressure to prevent the loss of carbonic acid, is converted into magnesite or anhydrous carbonate of magnesia; but if carbonate of lime be present, the two combine to form a double carbonate, which is dolomite, and may be separated from intermixed carbonate of lime by the action of dilute acetic acid, at 32° F., which readily dissolves the latter, but attacks the dolomite more slowly.

I have found this union of the two carbonates to take place alike in the presence of earthy and alkaline chlorides, sulphates, and car-