

When 'ice-jams' occur on the St. Lawrence and other Canadian rivers (lat. 46° N.), the sheets of ice, which become packed or forced under or over one another, assume in most cases a highly inclined and sometimes even a vertical position. They are often observed to be coated on one side with mud, sand, or gravel frozen on to them, derived from shallows in the river on which they rested when congelation first reached the bottom.

As often as portions of these packs melt near the margin of the river, the layers of mud, sand, and gravel, which result from their liquefaction, cannot fail to assume a very abnormal arrangement,—very perplexing to a geologist who should undertake to interpret them without having the ice-clue in his mind.

Mr. Prestwich has suggested that ground-ice may have had its influence in modifying the ancient alluvium of the Somme.* It is certain that ice in this form plays an active part every winter in giving motion to stones and gravel in the beds of rivers in European Russia and Siberia. It appears that when in those countries the streams are reduced nearly to the freezing point, congelation begins frequently at the bottom; the reason being, according to Arago, that the current is slowest there, and the gravel and large stones, having parted with much of their heat by radiation, acquire a temperature below the average of the main body of the river. It is, therefore, when the water is clear, and the sky free from clouds, that ground ice forms most readily, and oftener on pebbly than on muddy bottoms. Fragments of such ice, rising occasionally to the surface, bring up with them gravel, and even large stones.

Without dwelling longer on the various ways in which ice may affect the forms of stratification in drift, so as to

* Prestwich, Memoir read to Royal Society, April 1862.