tremely slight, owing to the constant dissolution of ice in contact with the rocky bottom, and the number of separate fragments into which the glacier is divided by fissures, so that a freedom of motion is imparted to its several parts somewhat resembling that of an imperfect fluid. To this view Professor James Forbes objected, that gravitation would not supply an adequate cause for the sliding of solid ice down slopes having an inclination four or five degrees, still less would it explain how the glacier advances where the channel expands and contracts. The Mer de Glace in Chamouni, for example, after being 2000 yards wide, passes through a strait only 900 yards in width. Such a gorge, it is contended, would be choked up by the advance of any solid mass, even if it be broken up into numerous fragments. The same acute observer remarked, that water in the fissures and pores of glaciers cannot, and does not part with its latent heat, so as to freeze every night to a great depth, or far in the interior of the mass. Had the dilatation theory been true, the chief motion of the glacier would have occurred about sunset, when the freezing of the water must be greatest, and it had, in fact, been assumed by those who favoured that hypothesis, that the mass moved faster at the sides, where the melting of ice was promoted by the sun's heat, reflected from boundary precipices.

A series of beautiful experiments enabled Professor Forbes to determine, for the first time, the true laws of glacier motion, which were found to agree very closely with those governing the course of rivers, their progress being faster in the centre than at the sides, and more rapid at the surface than at the bottom. This law was verified by carefully fixing a great number of marks in the ice, arranged in a straight line, which gradually assumed a beautiful curve, the middle part pointing down the glacier, and showing a velocity there, double or treble that of the lateral parts.* He ascertained that the rate of advance by night was nearly the same as by day, and that even the hourly march of the icy stream could be detected, although the progress might not amount to more than six or seven inches in twelve hours. By the incessant though invisible advance of the marks placed on the ice, "time," says Mr. Forbes, "was marked out as by a shadow on a dial, and the unequivocal evidence which I obtained, that even whilst walking on a glacier we are, day by day, and hour by hour imperceptibly carried on by the resistless flow of the icy stream, filled me with admiration." (Travels in the Alps, p. 133.) In order to explain this remarkable regularity of motion, and its obedience to laws so strictly analogous to those of fluids, the same writer proposed the theory that the ice, instead of being solid and compact, is a viscous or plastic body, capable of yielding to great pressure, and the more so in proportion as its temperature is higher, or as it approaches more nearly to the melting point. He endeavours to show that this hypothesis will account for many complicated phenomena, especially for a ribboned or veined structure

* J. Forbes. 8th Letter on Glaciers, Aug. 1844.