2. *Lamellar or straticulate structure of glacier-ice modified by the flow; the "blue bands," or "veined structure."* — The ice of a glacier, as first observed by Guyot (1838), is often vertically laminated parallel to its sides, and sometimes so delicately that the ice appears like a semi-transparent striped marble or agate. The layers are alternations of cellular (or snowy) ice and clear, bluish, solid ice, and an indication of the porosity of a glacier. The melting of the surface sometimes leaves the ledges of the more solid layers projecting. This is well seen either side of the middle portion of the Mer de Glace, and in the Brenva and Aar glaciers. Guyot found the structure in the ice of the summit of the Gries Glacier at a height near 7500 feet. He concluded that the layers were made from the daily driftings, depositions, and hardenings of snow over the *névé* region; that they were originally horizontal or parallel to the surface of the glacier, as in the bedding and straticulation of a shale; and that the various positions assumed, including parallelism to the sides of the valley, were probably a consequence of the flow, and of the greater velocity at middle. The structure is attributed by Tyndall to the pressure to which the ice is subjected in making its way between the walls of a valley; but regions present it that have had no such pressure.

The view that the movement of glaciers was essentially like that of rivers or "softened wax" was announced by Bordier in 1773; and afterward more fully, with a specific recognition of the idea of plasticity in the ice, and of the influence, on the movement, of friction at bottom and along the sides, by Rendu, in a memoir read before the Academy of Sciences of Savoy, in 1841. Hugi, in 1827, built a hut on the Aar Glacier to determine its rate of motion; and found the movement 330′ in three years, and 2354′ in nine years. Guyot made his early observations in 1838, and drew up a paper containing his conclusions; but failed to publish it because of his giving the field up to his friend Agassiz. (See Memoir, U. S. Nat. Acad., 1886; *Am. Jour. Sci.*, 1886; and Smiths. Inst., 1889.) Agassiz commenced in 1841 his grand series of observations on the Aar Glacier, measuring the rate of movement in a section across the glacier; and, on July 4, 1842, his first results, proving the more rapid flow of the middle portion (his 6 poles in the line across having moved severally 160′, 225′, 269′, 240′, 210′, and 120′), were published in the *Comptes Rendus*. His investigations were continued for several years afterward; and in 1847 appeared his first great work, entitled *Système Glaciaire*. Professor Forbes visited Agassiz at his work on the Aar, in 1841, and in the summer of 1842 undertook an independent investigation on the Mer de Glace, near Chamouni; and in October of 1842 his measurements, confirming those of Agassiz, were published. A year afterward, in 1843, appeared his *Travels in the Alps*, in which his various careful observations are given in detail, and the theory of glaciers, on the principle that the ice moves like a viscous fluid, is fully elucidated. His later writings on the subject are contained in a volume entitled *Occasional Papers on the Theory of Glaciers*. Later, Tyndall made a further series of measurements and observations in the Alps, demonstrating the influence of bends in a glacier, and explaining other glacial phenomena. His views are contained in *The Glaciers of the Alps*, 1860, and *The Forms of Water*, 1872.

3. *Rate of flow.* — The *rate of descent* in the mass of a glacier in the Alps varies from one or two inches a day to over 50; it is about half as much in winter as in summer. Ten to twenty inches a day in the warm season is most