

The Ascent of Sap.

The Physiology of the Ascent of Sap. By Sir Jagadis Chunder Bose. (Cossimbazar Endowment Publication.) Pp. xv + 277. (London: Longmans, Green and Co., 1923.) 16s. net.

THE author supplies in this book further ingenious experimental devices in which use is made of automatic recording methods and of various methods of magnifying small movements. The rate of ascent of sap is measured by a mechanical method recording the re-erection of a drooping tissue as sap enters it, and by an electrical method in which a quadrant electrometer is used to determine change of electro-motive force between two points, one of which changes in turgor. By placing one electrode, carefully insulated save at the point, upon a graduated micrometer screw movement, the instrument becomes an electric probe by which the most vigorous changes in turgor are traced in the Dicotyledon stem to the living tissues in the region between inner cortex and vascular tissue.

The usual simple potometer experiment is modified into a recording potograph, whilst an ingenious bubbling method is introduced to measure the absorption of water by a cut shoot, and thus indirectly its transpiration, under varying conditions.

Many interesting observations are recorded in this account of work in the Indian climate, notably the report upon the exudation of sugar solution from cut surfaces in the stem apex or the inflorescence of the palm. This exudation is shown to be quite independent of any direct supply of sap from the absorbing system of the root.

The author's attempt to reinterpret the phenomena of the ascent of sap in the light of his new experiments is not convincing. As the result of a discussion of earlier work, mainly based apparently upon the English translations of the text-books of Haberlandt, Jost and Pfeffer, it is concluded that transpiration from the leaf and exudation from the root do not provide an adequate mechanism for the ascent of sap, whilst the rôle of osmosis is dismissed in two paragraphs. As opposed to this inadequate mechanism is advanced "a theory of cellular pulsation according to which the liquid is injected by the living cells into the wood-vascular tissue."

Later, the role of the xylem vessel seems practically to disappear—"The uni-directional propulsion of sap depends upon a sequence of pulsation from cell to cell. The sap expelled during the contraction of any one cell is absorbed by a cell higher up during its phase of expansion. There is then a propagation of a wave of contraction, preceded by one of expansion, in consequence of which the sap is, as it were, squeezed forward.

A succession of such waves maintain the continuous ascent of sap." Though this may be clear to the author, the reviewer feels himself no nearer an understanding of the actual movement of sap in the plant. The demonstration of this mechanism rests upon experimental evidence that temperature, poisons, and various other external factors affect similarly sap movement and the pulsating mechanism, and upon a demonstration of electro-motive forces in tissues which are assumed to be manifestations of changes in cell turgor.

The experimental evidence is, however, not employed critically; thus it is argued that transpiration is not essential to the ascent of sap because the author's mechanical method shows a rapid rise of sap in a partially wilted chrysanthemum shoot when the cut end is placed in water, although the surface, both stem and leaf, had previously been coated with vaseline.

A Metric Campaign.

World Metric Standardisation: An Urgent Issue. A Volume of Testimony urging World-wide Adoption of the Metric Units of Weights and Measures—Meter-Liter-Gram. Compiled by Aubrey Drury. Pp. 524. (San Francisco: World Metric Standardisation Council, 1922.) 5 dollars.

FOR several years an intensive propaganda has been carried on by the "World Metric Standardisation Council" on both sides of the Atlantic in furtherance of the objects indicated in the title of this book. Apparently self-appointed, its executive includes a number of men prominent in politics, commerce, and engineering, mainly resident in the United States, but representing also Canada and Great Britain, and the council has members and correspondents in almost all countries. It is under the direction of this body that the volume before us has been compiled, bringing together a vast amount of information and data regarding the "master standards" of the world, and aiming, of course, to promote their adoption in the United States and the British Empire for all commercial transactions. It is pointed out in the introduction that far less opposition has been raised to the adoption of the litre and gram than to the metre, which is very much more closely related to industrial processes than the units of mass and volume; but on the other hand, it is not proposed to impose the use of metric measures upon production—only upon distribution.

A large proportion of the work consists of quotations from the reports of committees which have investigated the subject at various times, the writings and speeches of individuals, and Bills which have been introduced into Congress and Parliament, as well as resolutions