Boltzmann's *H*-Theorem

WHEN Boltzmann first published the celebrated theorem now generally known as the *H*-theorem, he used the symbol *E* (presumably as the first letter of *entropy*), not *H*. It has been suggested that when *H* was first used for this theorem it was intended to be the capital Greek letter *eta*: but the first paper known to me in which *H* is used for Boltzmann's entropy function is one by Burbury[1], who seems to have changed Boltzmann's symbol *E* to *H* for no special reason; later Burbury used *B* for an almost identical function, which he called Boltzmann's minimum function[2]. Boltzmann himself wrote *E* so late as 1893[3], but in 1895[4] he used the letter *H*. This use of *H* must have seemed mysterious to many generations of students, and it would be interesting to know whether any reader can account for its use or give an earlier instance of it.

S. CHAPMAN.

Imperial College,
South Kensington.

[1] *Phil. Mag.*, **30**, 301 (1890).
[2] NATURE, **49**, 151 (Dec. 14, 1893). *Phil. Mag.*, **37**, 157 (1894).
[3] *Phil. Mag.*, **35**, 161 (1893).
[4] *Phil. Mag.*, **51**, 414 (1895).

Points from Foregoing Letters

FROM mass-spectrographic measurements of several doublets (atoms and groups of atoms having the same mass/charge ratio), Dr. F. W. Aston has deduced with a greater degree of accuracy the 'packing fractions' and isotopic weights of the atoms of carbon, ^{12}C, oxygen, ^{18}O, and argon, ^{36}A.

The absorption by silver of 'thermal neutrons' (which at a given temperature have energy corresponding to that of thermal agitation of atoms in the surrounding medium) has been determined by Drs. O. R. Frisch, H. von Halban, jun. and Jorgen Koch at several temperatures up to 415°. The authors point out that there is a discrepancy between the observed values and those deduced on the assumption that the absorption is inversely proportional to the velocity of the neutrons. This discrepancy, they consider, may be due to the inhomogeneity of the thermal neutrons, due on one hand to the presence of a certain number with energy greater than the thermal range, and on the other hand to an excess of thermal neutrons of energy less than 0·1 eV.

Drs. J. D. Bernal and I. Fankuchen submit diagrams indicating the structure of the so-called crystalline virus protein prepared by the method of Stanley and Wyckoff. There is a two-dimensional hexagonal regularity at right angles to the long protein molecules, but none in the direction of their length. The molecule is made up of piles of submolecules of dimensions 20 A. × 20 A. × 20 A., somewhat smaller than the normal protein molecule. The structure of the 'crystals' is somewhat like that of the colloidal 'micro tactoids'. The authors also give a table of the inter-molecular distances in several tobacco and cucumber viruses, and suggest that viruses may eventually be classified on the basis of their X-ray patterns.

Methods of preparing an attenuated form of the 'Y' potato virus which affords complete protection to tobacco plants, and partial protection to potato plants against the more virulent form, are described by Dr. R. N. Salaman. To obtain this immunizing preparation, the virus is either passed through a schizanthus plant or is first inoculated into root fibres of tobacco plants, under controlled conditions.

The synthesis of a compound (21-oxy-progesterone) which has activity similar to that of the adrenal-cortical hormone (corticosterone) is announced by M. Steiger and Dr. T. Reichstein. This, the authors state, is the first instance of a substance with high biological activity (tested on dogs and mice from which the adrenal glands have been removed) and brings nearer the final elucidation of the molecular structure of corticosterone.

Sir Napier Shaw directs attention to the fact that our knowledge of the relation between wind and pressure distribution is based on experience in temperate latitudes and is not applicable to equatorial regions. He appeals for further data to enable meteorologists to deal with the latter conditions.

Two-dimensional crystallinity is deduced by N. A. Shishacow in the case of vitreous silica and pumice, from their electron-diffraction patterns, which show well-defined rings. The author gives a table of intensities and Bragg spacings, as deduced from the electron diagrams of some clays and pozzolanes.

When pure nickel wire of diameter $\frac{1}{8}$ in. has been plated with a thin skin of copper and heated to a temperature of 1,030° C. in hydrogen, Dr. T. F. Wall finds that a maximum permeability of 3,250 is attained. When demagnetized from an induction density of 5,150, the coercive force is 0·24 and the remanent induction density is 1,270.

The fine structure of the so-called '3*A*' bands of the carbon monoxide spectrum in the ultra-violet (2200–2600 A. region) obtained by means of a high-intensity discharge between carbon electrodes in neon gas is described by Dr. R. Schmid and Dr. L. Gerö.

The distances between various atoms in the molecule of bromsilicichloroform $BrSiCl_3$, as obtained by means of electron-diffraction measurements, are given by Prof. M. de Hemptinne and J. Wouters. From the nature of the experiments, the accuracy of the determinations is not the same for all atoms, being greater for the distances between chlorine and bromine than between these and silicon atoms.

Details of comparative experiments on fire-walking, under controlled conditions, carried out by an Indian professional and an English amateur are given by Harry Price. Neither suffered injury. Though the professional took four steps to the amateur's three, the slow motion film shows no superiority in walking technique on the part of the professional.

Prof. S. Chapman, referring to the use of the letter *H* by Burbury to designate, in 1890, Boltzmann's entropy function (for which Boltzmann himself had used the symbol *E*), inquires if any reader can account for the use of the letter *H* in this context at an earlier date.