

Avogadro's law—the safest foundation on which to build modern chemistry—is directly deducible from the fundamental equation of Clausius:—

$$\phi = \frac{nm c^2}{3v}$$

so that not only does our modern system of chemistry rest on a thermodynamical basis, but the future of chemical generalisation—judging from the tendency of recent research—lies in this direction also. The subject of heat has received great additions; the laborious determinations of the specific heats of solutions by Thomsen furnish material for three pages. The “heat of chemical action” has developed enormously through the labours of Thomsen, Hautefeuille, Ditte, and Marignac. Berthelot has also contributed largely to the subject by his thermochemical researches. In industrial chemistry we find much valuable matter added to the metallurgy of iron, the article bringing us down to the invention of Siemens' rotative furnace for obtaining malleable iron and steel directly from the ore. In light, perhaps the most substantial additions to science are to be found in Gladstone's calculations of refraction equivalents, Christiansen, Kundt, Soret, and Sellmeier's researches on anomalous dispersion, and Rammelsberg's researches on the relations between circular polarisation and crystalline form. The articles on the chemical action of light and spectral analysis, contributed by Prof. Roscoe, are excellent *résumés* of the present state of knowledge in these branches of chemical physics. In the latter subject great progress has been made through the labours of Lockyer (discovery of long and short lines in metallic spectra), Roscoe and Schuster (new absorption spectra of potassium and sodium), and Lockyer and Roberts (new absorption spectra of various metals—suggestions for a possible quantitative spectrum analysis).

Prof. G. C. Foster contributes the article on magnetism, and Prof. Armstrong that on the phenols. Most of the articles on physiological chemistry are from the pen of Dr. H. Newell Martin; and Mr. R. Warington furnishes some valuable articles on subjects relating to agricultural chemistry.

The second supplement exhibits all the care and painstaking conscientiousness of the former volumes, and will be found of invaluable service both to teachers and workers. The names of Mr. Watts and his coadjutors sufficiently guarantee the reliability of the work; the “Dictionary” has in fact justly taken its rank as one of the standard works of reference in this country.

Seeing that the results of chemical research are flowing into the scientific world in a continuous and ever increasing polyglot stream, both professors and students of the science are indebted to Mr. Watts for the laborious task which he has accomplished for their benefit.

For our own part we look with eager interest upon the continuous encroachment of physics upon chemistry, and venture to hope that the time may not be far distant when generalisation may lead to natural classifications, causing the handbooks and dictionaries of the future to be for the same quantity of information somewhat less bulky in volume.

R. MELDOLA

#### HIS ON MORPHOLOGICAL CAUSATION

*Unsere Körperform und das physiologische Problem ihrer Entstehung.* Briefe an einen befreundeten Naturforscher, von Wilhelm His. (Leipzig: Vogel, 1875. London: Williams and Norgate.)

THIS is not, as might perhaps (from its title and from a hasty glance at its contents) be imagined, a popular exposition of the main facts of Embryology as ordinarily understood. Prof. His has been led by his researches to adopt peculiar views concerning the causation of animal forms. These he has explained at some considerable length in his great work on the “Development of the Chick,” and elsewhere, but they have not met with very general acceptance; and the little work we are noticing has for its object a popular and somewhat fuller explanation of these views, and a defence of them against various critics. Among these critics the most conspicuous is Haeckel, whose, to say the least, severe remarks on the author have occasioned a very spirited retaliation. In fact the work, small as it is and popular as it is intended to be, is very largely controversial; and it has always appeared to us a sign of weakness when a scientific combatant brings his quarrel before a general public.

Without going at all fully into the views of our author, we may say that he strives to explain many of the facts of animal morphology by the agency of mechanical causes acting directly on the growing germ or embryo. Thus, for him the large eyes of the young chick are the direct cause, by compression, of the sharp beak of the bird; and more generally the unequal tensions produced by unequal growth in the initial flat blastoderm determine, through the agency of certain folds, the form of the animal which springs from it.

As might be expected, many pages of the book are devoted to an attempt at reconciling these views with a modified theory of descent. Speaking broadly, the views of the author may be said to differ from those generally entertained, chiefly on the question whether it is the horse which pulls the cart or the cart the horse, or perhaps rather on the point which is the cart and which the horse. We very much fear that Prof. His's horse is really the cart.

M. F.

#### OUR BOOK SHELF

*Bristol and its Environs, Historical and Descriptive.* Published under the sanction of the Local Executive Committee of the British Association. (London: Houlston and Sons. Bristol: Wright and Co., 1875.)

It was some time ago announced that a Guide to Bristol was being prepared for visitors to the British Association Meeting. This is now published, and appears as an 8vo volume of 475 pages bound in cloth. In many respects the local committee have made great exertions to make the visit in every way a pleasant one, and this has been pretty well known, but so voluminous a guide as this is certainly a surprise. It is well got up, and is illustrated both with views of the buildings in the town and with diagrams illustrative of the geology of the district. Many pens have been employed in its preparation. “The contributions,” the Introduction states, “are honorary—the several authors have written with pure love of their subject, and for the sake of doing homage to the occasion that has called forth the volume.”