

record of our general knowledge of the subject, exhibiting a tolerably complete grip of all the circumstances attending these phenomena. It does not show much originality, perhaps, but it does show very extensive reading, accurate observation, and power of condensation.

The third book mentioned is scarcely of the kind that compels one to sit down and read off-hand. It is precisely what it professes to be—a collection of the many weather proverbs which possibly the wit of one, rather than the wisdom of many, has perpetuated. If these adages did contain the results of long-sustained and well-directed observation of the habits of birds, animals, and insects, they would possess a distinct value, though it is difficult to see how the information so gleaned could indicate the severity or the mildness of the coming season; but it is to be feared they too frequently record the opinion of one who is capable of a jingling rhyme, or of one whom his comrades consider to be wise in such matters.

There are also quotations from the poets, ancient as well as modern, and all bearing on the subject of weather prediction. The hope of the author is that the perusal of such a collection may induce students to take more intelligent notice of meteorological conditions, and to avail themselves of accurate instrumental means, rather than to rely upon hackneyed quotations. A somewhat similar collection of "wise saws" was published by the United States Signal Service, but we fail to see any reference to this work in Mr. Inwards's introduction. A study of these sayings would probably furnish some additional quotations, and as the compiler aims at greater completeness in the next edition, we would refer him to this source. The book is well printed and admirably "got up," and will no doubt be welcome to many interested in folk and weather lore.

PHYSICO-CHEMICAL MEASUREMENTS.

Hand- und Hilfsbuch zur Ausführung physiko-chemischer Messungen. Von W. Ostwald. (Leipzig: W. Engelmann, 1893.)

THIS manual must be regarded as the only guide to measurements in physical chemistry which has yet been published. The book is not intended to completely cover this field of investigation, but has evidently been devised with the primary object of assisting Prof. Ostwald in his course of instruction at Leipzig. It is not an introduction to the subject, as the detail supplied, both in connection with apparatus and methods, is insufficient for the requirements of the beginner; nor is it a treatise wherein a representative collection of methods may be consulted. The book is rather to be viewed as an aid to the teacher, or as indicating to the chemist or the physicist methods which for the most part the author has found to be of service in his own laboratory.

The information contained in the opening portion of the volume is of the kind usually met with in a physical text-book: modes of calculating results, the influence of errors, the use of corrections, the measurement of length, the balance and weighing, and the measurement and regulation of temperature. Succeeding chapters

take up the more common operations in glass-working, the measurement of pressure, the measurement of the volume and density of solids and liquids, and the ordinary methods of measuring vapour density. Here it may be noted that Perkin's modification of Sprengel's pyknometer, which is perhaps the most useful of all the various patterns, is not included among those described. Kopp's pyknometer also is rendered more serviceable if a short mm. scale instead of a single mark be etched on the neck.

The thermal properties of liquids are next briefly considered. Modes of determining expansion and molecular volume at the boiling-point are given with a moderate amount of detail. The determination of the boiling-point itself is, however, described in the most meagre way. Of the various methods of measuring vapour pressure the dynamical process introduced by Ramsay and Young alone finds a place. Critical temperature and critical pressure are determined in separate pieces of apparatus in the manner recently described by Altschul. No general method is indicated whereby the relation between pressure and volume may be determined under varying conditions of temperature, and no practical method can thus be given for estimating critical volume, although the principle of the new method due to Mathias is mentioned.

Calorimetry is now dealt with, and short accounts are given of the simpler methods of estimating specific heat and the thermal changes accompanying vaporisation, dissolution, combustion, and reactions in dilute solution.

Descriptions of optical measurements relating to refractive indices, spectroscopy including spectrum photometry, calorimetry, and rotatory polarisation are now introduced, and are followed by a chapter on viscosity and surface tension. In connection with viscosity, the apparatus represented is only adapted for obtaining relative values, and is quite unsuited for investigating the effect of temperature. What appears to be the correct value of the kinetic energy correction used in calculating viscosity coefficients is ascribed to Finkener and Wilberforce, whereas the first published account of the mode of deducing it is due to Couette. None of the methods given for measuring surface tension are free from the objection that air is in contact with the liquid surface.

The remaining chapters are devoted to measurements on solutions. Methods of estimating the solubility of solids, liquids, and gases, and of determining molecular weights from the freezing-points and boiling-points of solutions are given at considerable length. At still greater length, and thus in marked contrast with the treatment elsewhere, electrical measurements are next set out. Here are found accounts of the methods of measuring electromotive force and conductivity, dissociation constants, the basicity of acids, &c. The last chapter takes up elementary problems in chemical dynamics relating to the velocity of chemical change, the catalysis of methyl acetate and the inversion of cane-sugar by dilute acids being given as examples.

From what has been said it is evident that the operations dealt with in the book are only such as are frequently performed, or which at the present time are considered to be of importance. Some of these even are

occasionally omitted; no mention is made, for example, of the ordinary methods of obtaining melting-points.

It is noteworthy also that processes relating to the purification of substances for physical study are not touched upon. Accounts of the best systems of fractionation, either by distillation or crystallisation, or of distillation under reduced pressure, &c., have, it seems to us, a better right to a place in a book of this kind than, say, the chapter on glass-blowing. Again, no particular notice is taken of methods which have to be used when only a small quantity of material is available. It frequently happens that a substance can only be obtained sufficiently pure in but small quantity, and if methods of obtaining boiling-point, density, refractive index, &c. in such cases were more widely known, physical constants would no doubt be more generally estimated in the course of ordinary chemical investigations.

It is needless to state that the book is full of useful hints both on methods and apparatus, and will be indispensable to those for whom it is specially designed. It is also worthy of special recognition as being yet another effort on the part of Prof. Ostwald to place physical chemistry on a level with other departments of experimental investigation.

J. W. RODGER.

OUR BOOK SHELF.

Handbook of British Hepaticæ. By M. C. Cooke, M.A., LL.D. 1 vol. 8vo. 310 pp. 7 plates. 200 woodcuts. (London: W. H. Allen and Co., 1894.)

PROBABLY no group in the British flora has received so little attention as the Hepaticæ. This is due partly to the ordinary botanical text-books describing merely the life history of the ubiquitous *Marchantia polymorpha*, and ignoring or passing over with but scanty reference the foliaceous group. But chiefly it is due to the want of a handbook by which beginners could identify their plants and obtain references to the literature of the subject. Sir W. J. Hooker's magnificent monograph, which appeared in 1816, contained plates with copious descriptions of all the British species then known; but it is now scarce, costly, and having all the species described under one generic name, *Jungermannia*, it becomes necessary, after identifying a plant by it, to refer to some other source to ascertain the now accepted name. Hooker's "English Flora," vol. v., in dealing with the same group, divides the frondose group into several genera, but retains the generic name of *Jungermannia* for the whole of the foliaceous group.

In 1865 Dr. M. C. Cooke published, as a supplement to *Science Gossip*, a catalogue with outline figures of all the British species. This is now out of print. Since then notes scattered through various journals have formed the whole of the British literature upon the subject, except the commencement of a monograph by the late Dr. B. Carrington.

Dr. M. C. Cooke has now filled up the gap by producing a "Handbook of the British Hepaticæ," containing full descriptions of all the species, about two hundred in number, known to inhabit the British Islands. The volume opens with an introduction of 20 pp., describing the position, structure, reproduction, and subdivisions of the group. This is followed by a detailed account of the species, each arranged upon the same plan. First come the diagnostic characters, followed by copious synonymy, then the habitat, and finally a full description. Each species is also represented by an outline figure, either in the text or in one of the seven plates at the end of the

volume. A bibliography and index complete the work. The size and clearness of the type will be appreciated by those who use the book, as it should be, in conjunction with microscopical examination of specimens. Altogether a very useful work has been produced, which ought to fill a gap already too long vacant.

C. H. W.

The Royal Natural History. Edited by Richard Lydekker. Parts 1 and 2. (London: Frederick Warne and Co., 1893.)

YET another "Natural History." There is certainly a demand for such, and without doubt there is a supply. The work is to be in six volumes, and the parts, published monthly, will complete the series in three years. The paper and typography leave nothing to be desired. The illustrations are in almost every instance, so far as our knowledge of the published parts goes, excellent; many of them are as artistic as they are accurate; and when we add that the editor of the series is an able and well-known zoologist, there can be no doubt but that the reader or purchaser will get full value for their expenditure of time or money.

In noticing a work of this nature, when the facts are as above stated, there is but little room for criticism, and despite the shock which the first blazing sound of its advent conveyed to our senses, despite the fact that "it is not compiled or translated from foreign sources," and that "the co-operation of the Bibliographic Institutes of Leipsic and Vienna" has been secured so as to obtain "all that is best and newest among the productions of the greatest natural history publishers of Europe," we yet most heartily recommend the work to all our readers, and we anticipate that most of those who take any interest in zoology will place it on their book shelves.

Of the six volumes, as was to be expected in a work of this kind, the larger number (five) is to be devoted to the backboneed animals, and but one to the boneless crew; and of the first five volumes, two and a half will relate to the mammals, one and a half to the birds, and but one to the reptiles, amphibians, and fish. It is not at all a fair division, but then the mammals are thought to be the most generally interesting class, and we are promised a lot of information about "the larger game." The first two parts are devoted to the monkeys, and we have an account of nearly all the known species, accompanied with an immense number of illustrations. One suggestion occurred to us while reading over the account of the habits of the baboons; that when plants are referred to they should, when their scientific names are used, be quoted specifically as well as generically; thus a "very remarkable kind of West African plant" is mentioned as the "welwitschia," but the editor would never think of quoting the Anubis baboon as the "cynocephalus." We hope it will be a long time before *Welwitschia mirabilis* will be exterminated by the baboons. From a natural history stand-point there is really no such plant as an "ixia," but there are several species of the genus *Ixia*, upon the bulbous stems of which it would appear these baboons feed.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

The Origin of Lake Basins.

I WELCOME the criticism of my article on the glacial origin of a certain class of lakes by an experienced geologist like Mr. Oldham, because it probably embodies the strongest argument that can be adduced on the other side—at all events as regards