

the book deals with the compressibility of liquids and gases; and the phenomena of capillarity, diffusion and viscosity. In discussing these subjects, the molecular theory of matter has of necessity been very freely introduced, but the detailed account of the theory has been reserved for the volume on heat. Among the subjects incidentally discussed in the present volume are Van der Waals's equation for the relation between the pressure and the volume of a gas, reversible thermal effects accompanying alterations in strains, effect of temperature on surface tension, change of vapour-pressure under stress, osmotic pressure, vapour-pressure of solutions, lowering¹ of the boiling point of solutions, lowering of the freezing point of solutions, variation of viscosity with temperature, and explanation of viscosity and diffusion on the kinetic theory. An elementary knowledge of heat may reasonably be expected of the student, but it would seem preferable to have reserved some of these subjects until the kinetic theory and the second law of thermodynamics had been discussed.

It is hardly necessary to say that the book is of a thoroughly practical character, and will commend itself both to the teacher and the student. The book is written from the point of view of the experimental physicist, and the subjects selected for illustration are those most useful and instructive to the student. The mathematical methods employed are generally of a simple character. In many cases, these may appear cumbersome and difficult to the student who possesses a knowledge of more advanced mathematical methods. But even for such fortunate students, there is some compensation in the fact that the more elementary method compels attention to the physical meaning of the processes employed. In the case of many of the subjects discussed, it would be difficult for the student to find an equally concise and clear account of the theory and the experimental methods in any other book at present accessible, and we are confident that the present volume will be found to be a useful addition to the text-books available for advanced students of physics.

H. L. C.

ZITTEL'S TEXT-BOOK OF PALÆONTOLOGY.

Text-book of Palæontology. By Karl A. von Zittel. Translated and edited by Charles R. Eastman. Vol. ii. Pp. viii + 283. (London: Macmillan and Co., Ltd., 1902.) Price 10s. net.

NEARLY three years have elapsed since we received the first volume of the English edition of Prof. Karl A. von Zittel's well-known "Grundzüge der Palæontologie." We therefore open the newly published second volume with some fear lest the long delay in its production be due to a complete remodelling, such as that which we criticised on the last occasion. This new instalment, however, is a welcome surprise; for, while the sections with which it deals have been judiciously edited and somewhat brought up to date, the author's original plan is strictly followed, and it still remains essentially the work of the Munich professor.

¹ This is evidently a misprint for "raising of the boiling point," which is the term used near the end of the section, but the sign of the change is not clearly brought out in the analysis.

The present volume deals with Pisces, Amphibia, Reptilia and Aves, and extends only to 278 pages—a slight increase on the original text from which it is translated. The Mammalia will form a third and concluding volume, to be issued later. This plan of subdividing the text-book into instalments of convenient size for ready reference will be appreciated by all who have been compelled to use the ponderous German edition, which is a volume much too bulky for comfortable handling.

The section on Pisces, occupying 114 pages, has been translated and revised by Dr. Smith Woodward. The author's original classification has only been slightly modified to incorporate Dr. Traquair's recent descriptions of Upper Silurian and Lower Devonian fishes, and the translator's own observations on the Pycnodonts and some of the Teleosteans. These changes are evidently approved by Dr. von Zittel himself. Traquair's figures of *Drepanaspis*, *Birkenia* and *Lasanius* appear for the first time in a text-book and his remarkable discoveries are now made accessible to an elementary student. The revised account of the Teleostei is also the first condensed synopsis of recent discoveries which has been published in a general treatise.

The section on Amphibia, occupying twenty-five pages, has been translated and revised by Dr. E. C. Case. There are no new figures, and the changes consist merely in a few allusions to recent discoveries.

The revision of the section on Reptilia, now occupying 116 pages, was begun by the late George Baur, whose untimely death prevented his accomplishing more than part of the chapter on Chelonia. Most of the present translation has been done by Dr. E. C. Case. The chapters on Squamata and Pterosauria have been revised and extended by Prof. S. W. Williston, who has also contributed notes on Plesiosauria and Chelonia. The chapter on Dinosauria has been brought up to date by Prof. H. F. Osborn, Dr. O. P. Hay and Mr. J. B. Hatcher. Dr. Case himself appears to be responsible for the removal of the Clepsydridæ from the Theromorpha to the Rhynchocephalia. The revision, on the whole, is a distinct improvement on the original work. The supplementary details concerning the fossil reptiles, especially of North America, will prove very useful for reference; while a few new figures of restorations by Williston, Smith Woodward and Hatcher add to the educational value of the book.

The section on Aves has been doubled in extent by Mr. F. A. Lucas and now occupies twenty-three pages. No new figures are given, but the text is well up to date, and it is especially valuable as being a critical summary combined with original observations.

The volume concludes with a good index to the names of genera, and forms the most exhaustive work of reference on the extinct cold-blooded vertebrates and birds which has hitherto been published in the English language. Dr. Eastman and his colleagues are, indeed, to be congratulated on the successful completion of this new instalment of their undertaking, which will prove of the greatest service to all English-speaking students both of geology and zoology.