

appear to be purely chemical, but in fact it is not; for although the chemical nature of the several substances and the more exact methods employed for their qualitative and quantitative determination are carefully recorded, the whole is looked at always from the purely physiological point of view of animal metabolism.

Dr. Bottazzi deserves special praise for having clearly realised the importance of the application of the more elementary ideas of physical chemistry to physiological and biological problems. He has hence given us here and there throughout this work concise but very clearly written statements of those conceptions of physical chemistry which are essential to the study of the properties of living matter, and which have so far never appeared in any existing text-book of either physiology or physiological chemistry. Thus in chapter ii. (pp. 37-64) he has dealt with the ideas which have led to the establishment of the modern theory of solutions, such as osmotic pressure, vapour tension, freezing-point, electrical conductivity, internal friction and viscosity. In chapter vi. (pp. 392-405) he gives the phenomena and laws of diffusion, dialysis, osmosis, and imbibition. This chapter is, moreover, of peculiar interest as dealing specially with the colloids as a group, and in a way not found in other text-books. This is most valuable when we remember that the animal organism is chiefly composed of colloidal substances, that they possess peculiar physical and chemical properties, due to the nature of their molecular aggregation, independently of those due to their constituent elements, and that these properties, continually making themselves felt, must play an important part in determining the mode of recurrence of vital processes.

The second volume opens with a long chapter (pp. 1-108) on "The chemistry of the living cell," as a suitable connecting link between the general physiological chemistry dealt with in the first volume and the special treatment in the second. In this the author has endeavoured, and with great success, to bring together all the scattered knowledge bearing upon the subject of the cell as the living unit, or, as he says, on the general problems of biological chemistry. This chapter is most instructive, and well worth reading from every point of view. Here again we find excellently clear explanations and applications of the phenomena of surface-tension, diffusion, osmosis in its strictest sense, and diosmosis; of plasmolysis and isotonicity. The succeeding chapters deal consecutively with the special subjects of blood, lymph chyle and serous fluids, the fluids of the organism in general, connective tissue, muscle, nerve, sense-organs, internal secretions, and so forth. The last three chapters treat of the digestive secretions, the liver, kidneys and urine.

In both volumes the several chapters conclude with a copious, well selected and representative bibliography of the subject-matter, carefully quoted in chronological order.

This book is full of good things, clearly stated and discussed suggestively. It would be easy to make a selection of them; but the list would be long, and we refrain from giving it in the hopes that thereby curiosity may be whetted and a desire aroused to read the original.

S. L.

OUR BOOK SHELF.

Flashlights on Nature. By Grant Allen. With 150 illustrations by Frederick Enock. Pp. viii + 312. (London: George Newnes, Ltd., 1899.)

THIS is a bright and amusing account of a number of natural structures and problems. The economy of aphides, shrikes, earwigs, wasps, gnats, spiders and Hessian flies, of the Alpine Soldanella, clover, gorse, and water-weeds in winter is described in lively words and illustrated by figures, which are often both attractive and novel. The drawings of the earwig and Hessian fly are well worth the attention of professed naturalists; those of the gnat contain some small errors. Mr. Grant Allen has banished nearly every one of the technical terms which impede unlearned readers. In this he has done well, though we think that a technical name here and there in a footnote might have guided some few readers to fuller information.

Authors of elementary books do not feel bound to give chapter and verse for all their statements. But Mr. Grant Allen has gone too far in leaving out. He has rewritten Kerner's account of the Soldanella, the frog-bit and the curled pondweed, and adapted Kerner's figures of all three, without one word of acknowledgment.

L. C. M.

Spherical Trigonometry (Theoretical and Practical). Pp. viii + 116. By W. W. Lane. (London: Macmillan and Co., 1898.)

THE author of this book, who is one of the naval instructors on H.M.S. *Britannia*, has brought together the most important rules which are used in the solution of spherical triangles, and, after demonstrating the theory of each, introduces worked-out exercises for illustrating their actual use. The arrangement of the text seems to be well done, the student being led first to understand the geometrical relations between circles of a sphere, their spherical triangles, and after that the geometrical relations between the sides and angles of spherical triangles. Chapter iv. introduces for the first time the trigonometrical ratios, and this is followed by chapters in which the solutions of various types of triangles are dealt with. Throughout these the author makes the solution of the various problems very clear to the student by means of the figures which accompany the text, but the reader is nowhere directly advised to always construct figures for himself.

Although the author demonstrates and illustrates the use of the *L* haversine and tabular versed sine tables (tables which, by the way, are not used at examinations by the Civil Service Commissioners), he assumes that the reader knows the meanings of these terms. Perhaps it would have been more complete if these terms had been again defined. Thus we find that up to the end of the sixth chapter the beginner has been working with sines, cosines, tangents and their reciprocals; but in the next chapter, in the solution of a certain triangle, he is immediately confronted with

$$\text{hav } A = \frac{\text{vers } A}{2} = \frac{1 - \cos A}{2}, \text{ \&c.,}$$

without any previous hint as to what *hav A* or *vers A* means, although a more advanced student could find this out for himself. This, however, is a somewhat minor point, for the author provides other rules independent of these terms. Those, however, for whom this book is intended—namely, students preparing for examinations at the Royal Military Academy, Lieutenant R.N., B.A. London, &c.—will find the present treatise an excellent guide to the solution of spherical triangles, and the large number of well-chosen examples which are appended should prove useful.