

his blundering way. *Gerris*, as Mr. Belloc says, would sink if he stopped to meditate about the surface film, and he might get no nearer the truth than Prof. Paton does when he affirms that phosphene yields chlorine in the lungs. Knowledge helps practice truly enough, but to ask that practice shall stand still while a particular sort of intolerant knowledge gropes to a rationale will meet no national need whatever.

Prof. Dendy's interesting account of the ravages of weevils in stored grain and the means of preventing them tells, on the other hand, an excellent tale of practical empiricism. Prof. Dendy found, as on general grounds he expected to find, that the weevils soon perished if infested grain was shut up in air-tight receptacles in which the metabolism of the seeds soon replaced most of the oxygen by carbon dioxide, and he shows with a variety of experiments that air-tight storage is the practical method which is wanted: which appears to have been known from time immemorial and is expressed in the habit of Indians, Maltese, and others in storing their harvested grain closely in covered underground pits in face of the opinion that it was "absurd to hold that weevils require a free play of air or that free access of air is favourable to their existence," given by the entomological expert—doubtless a mere morphologist.

Natural man, indeed, as Dr. Pembrey argues in his breezy plea for the wild life, is apt to go right: "A sturdy growth of children is not to be obtained by the intelligent selection of the quality or quantity of their diet, but by the natural process of muscular activity in the open air, the appetite with its likes and dislikes acting as the guide in questions of food" (p. 158), which is not quite what the editor seems to say (p. 23). But the discrepancy is only on the surface: Sussex is not the Marylebone Road, and it is when civilisation interferes that trouble comes. Western refinements in rice polishing gave the East beriberi; a world trade in wheat gave the weevils their chance; mean and restricted lives brought in physical exercises instead of games. The truly physiological procedure, says Dr. Pembrey, is to put people where they can live a natural life by accumulated experience and to let them live it. "Bread and cheese" off the hedges is an older remedy than orange juice, and even scientific opinion has been taught by Prof. Leonard Hill that there is something to be said for our primitive open fires.

The book as a whole is extraordinarily interesting from many different aspects, as much perhaps for the questions it asks as for those it answers.

NO. 2636, VOL. 105]

"Physiology" is conceived in no narrow spirit; it is hygiene, pathology, bacteriology, and pharmacology, as well as itself. And in this generous field everyone will find a good many things worth thinking about.

A. E. B.

Service Chemistry.

Service Chemistry: Being a Short Manual of Chemistry and Metallurgy and their Application in the Naval and Military Services. By the late Prof. Vivian B. Lewes and Prof. J. S. S. Brame. Fifth edition. Pp. xvi+576+vii plates. (London: Edward Arnold, 1920.) Price 21s. net.

THE late Prof. Vivian Lewes, of the Royal Naval College, Greenwich, an excellent teacher and an admirable lecturer, conferred a great benefit on the Service of which he was a member by the compilation of this manual. In the early days of the history of the college, the relation and importance of physical science to the business of the naval officer were but dimly appreciated by the authorities at Whitehall, and the scheme of instruction at Greenwich went but little beyond the standard of a public school which sought to develop its modern side. Prof. Debus, the first professor of chemistry, although a sound and remarkably well-informed chemist, carried with him to the college merely the traditions and methods of Clifton. The scope of his instruction of the naval lieutenant was practically that which had served him for years past in the several public schools to which he had been attached. He continued to teach chemistry simply as a branch of a liberal education, with no very direct reference to the life-work of those whom he addressed. It may be that at the outset of the career of the college no other course was open to him. The preliminary education of a naval officer at that period afforded no opportunity for him to acquire even the most elementary knowledge of science, and hence his teacher had of necessity to restrict himself to the kind of instruction which a well-ordered school system ought to have supplied.

Prof. Debus exercised a very salutary influence at the Royal Naval College. He was personally popular, and, in spite of certain little mannerisms, his quiet dignity and personal bearing enabled him to keep an effective control over a class of young men whose sense of humour is proverbially always acute and occasionally irrepressible. But to the budding Nelson, keen on his job, there must have been much in the professor's teaching that made no appeal. It probably seemed to him to have no possible relevance to the work of his pro-

fession. Prof. Lewes, who acted as chief assistant to Prof. Debus for some years and eventually succeeded to his chair, was no doubt fully conscious of this fact. At all events, his intimate association with the young officers in the laboratory must have afforded him abundant opportunities of learning it. When his turn came he entirely remodelled the course of chemical teaching. During the years of his assistantship he had been brought into frequent contact with Service and dockyard problems, in which his chemical knowledge and practical aptitudes could be turned to account. Prof. Debus was essentially the philosophic student; Prof. Lewes, with no pretensions to the academic attainments of his predecessor, was more a man of affairs, with a keen appreciation of the value of science to practice, and he could bring his experience to bear upon the character and style of his teaching.

The book before us was written to aid and supplement Prof. Lewes's instruction. It was unique of its kind. It bore directly upon what he conceived to be the true function of his chair. In one sense it is more restricted in scope than the ordinary text-book of pure chemistry, which seeks to cover more or less fully every department of the science, with no special reference to its practical application; in another sense it is wider, inasmuch as its subject-matter is intended to lead up to the far-reaching problems with which modern Service conditions deal.

A book based upon such principles can continue to be of value only so long as it has regard to the constant changes and increasing complexity of these conditions. Each successive edition bears witness that such regard has been held. The four previous editions of the work were issued under the direction of the original author, the fourth having appeared in the year before the outbreak of the war.

The present edition—the fifth—is due to Prof. Brame, Prof. Lewes's successor at the Royal Naval College. The plan of the work has not been altered in any essential particular. But the text has been carefully revised, and certain new features have been introduced. Greater attention has been paid to the applications of organic chemistry, especially in relation to fuels, explosives, and oils, mineral and vegetable. Also, the sections on boiler waters, corrosion, pigments, etc., have undergone considerable alteration.

It has become a truism to say that the great war through which Europe has recently passed was a chemist's war. Whether that is wholly true is a matter of opinion. But it is at least universally acknowledged that chemistry entered more largely into it than into any previous war. That

fact alone adds interest and value to a book of this kind. Both arms of the Service now recognise that the operations of modern warfare are largely dependent upon chemical principles. That dependence is bound to increase in the future, and should therefore lead to a wider recognition of the importance of chemical instruction to all who may be concerned in the conduct of war, whether afloat or ashore. The book before us makes mention of many chemical applications and adaptations which the war originated; but the complete story has yet to be told, and in the present unsettled state of the world some time must elapse before it can be published. When, however, it is made generally known, it will constitute a triumph for the knowledge, skill, and resourcefulness of British chemists. That fact is already appreciated in the Naval Service, and by no section more warmly than by those who owe their chemical knowledge to the instruction they have received at the Royal Naval College.

T. E. THORPE.

Euclid's Elements.

Euclid in Greek. Book I. With Introduction and Notes. By Sir Thomas L. Heath. Pp. ix+239. (Cambridge: At the University Press, 1920.) Price 10s. net.

THE editor of this text expresses the hope that it may be read by boys in the higher forms of schools. We hope so too, although the price of the book is rather prohibitive. At any rate, a copy should be obtained for the school library.

The text is accompanied by an introduction and a set of explanatory and critical notes; each of these is a model of its kind. In the introduction we have a summary of the contents of the elements, all the facts known about Euclid's life and works, and a full account of the principal translations and editions of the elements. The notes are extremely valuable in various ways. In the first place, the author is both a competent Greek scholar, and also a student imbued with the unadulterated spirit of Greek geometry. This makes his translations of technical terms eminently apt and trustworthy. As an example of his critical ability, we may take his discussion of the very difficult phrase *ἐξ ἑσθ* in Euclid's definition of a straight line. He shows, we think conclusively, that the intention of the definition is to express that if any point on the (indefinite) line be taken, what we may call the aspect of the line therefrom is an "indifferent" one, with no bending one way or the other; in fact, we have an attempt at expressing in abstract terms the Platonic test—that a straight viewed "end