

gravity, the latter being somewhat extensively applied, including Guldinus's rules and mensuration problems. The concluding chapters relate to forces and jointed frames in two and three dimensions, with examples of roof and bridge trusses and cranes.

The general plan of the book is good, the endeavour being to "lay stress on the practical utility of the science" rather than on "rigour of deduction." In carrying out this very laudable idea, the authors, through lack of practical experience, sometimes err by giving drawings like that of the safety-valve on p. 242, in which the constructional details are almost offensively crude, or by giving examples like No. 16, p. 140, where the efficiency of a Weston differential pulley-block is stated to be 80 *per cent.*, or like No. 38, p. 77, in which a rail, supported at the ends and loaded as a beam at the middle, is said to be bent into a *circular arc*. In spite of these minor defects, however, the book can be recommended as affording an excellent introduction to statics.

(3) The general character of this work places it somewhere between the engineering pocket-book and the college text-book. The methods, formulæ, and appliances which a student encounters during a good college course in mechanical engineering are here, not demonstrated, but collected and described, systematically, and applied to such practical examples as are likely to occur in an engineering workshop. In section i. the subject-matter comprises arithmetical, graphical, and mechanical computations, by modern abbreviated methods, and includes technical mensuration, the use of the slide-rule and the planimeter, and mathematical tables. In section ii. we have laboratory experiments and calculations relating to machines, acceleration, momentum, force, work, energy, and power. Section iii. relates to boilers and heat engines, considered both from the thermodynamical and constructional point of view, with a chapter on the cost of motive power. These three sections are well adapted for students who have passed from college to practical work, in helping them to recall their theoretical knowledge as occasion may require. A good collection of examples will be found for practice. The style is perhaps somewhat diffuse, and there are a few minor defects, but this portion of the book will be appreciated in many quarters.

The fourth and concluding section, however, is of most interest and value. It deals with the business side of engineering, a branch that is beyond the usual college course, yet of paramount importance to the young aspiring engineer. The subjects discussed are the commercial aspects of engineering; the qualifications and duties of the works manager; the calculation of weights and the preparation of estimates and bills of costs; and the bonus and premium systems of wages. The authors give some most striking examples of the great value of squared-paper work in the systematic plotting of variable quantities in all branches of a manufacturing establishment, and the lessons to be learnt therefrom. This section is extremely suggestive, and will well repay the careful study of all practical engineers.

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#### MULTUM IN PARVO.

- (1) *Die Tierwelt des Mikroskops (die Urtiere)*. By Dr. Richard Goldschmidt. Pp. iv+100; 39 figures. (Leipzig: B. G. Teubner, 1907.) Price 1.25 marks.
- (2) *Das Süsswasser-Plankton*. By Dr. Otto Zacharias. Pp. iv+130; 49 figures. (Leipzig: B. G. Teubner, 1907.) Price 1.25 marks.
- (3) *Befruchtung und Vererbung im Pflanzenreiche*. By Prof. K. Giesenhagen. Pp. iv+132; 31 figures. (Leipzig: Quelle and Meyer, 1907.) Price 1.25 marks.
- (4) *Das Werden und Vergehen der Pflanzen*. By Prof. P. Gisevius. Pp. 132; 24 figures. (Leipzig: B. G. Teubner, 1907.) Price 1.25 marks.
- (5) *Das Schmarotzertum im Tierreich und seine Bedeutung für die Artbildung*. By Prof. Ludwig von Graff. Pp. iv+132; 24 figures. (Leipzig: Quelle and Meyer, 1907.) Price 1.25 marks.
- (6) *Die Mechanik des Geisteslebens*. By Prof. Max Verworn. Pp. iv+104; 11 figures. (Leipzig: B. G. Teubner, 1907.) Price 1.25 marks.

IT was Leibniz who said that the more science advances the more it will be expressed in little books. If that is so, the recent abundant crop of primers may be regarded as a healthy sign—especially when we find that many of them are very good. It need hardly be said that an introduction to the study of parasitism by von Graff, or to the study of fresh-water plankton by Zacharias, cannot fail to be useful and stimulating. There is also an economic side to the phenomenon presented by the bundle of primers before us. It seems as if the great encyclopædias, which were relatively costly, were being replaced by these cheap booklets. Instead of saving up to purchase the huge volume P, containing much that he does not want, the student can buy at a shilling each three little treatises on parasitism, plankton, and protozoa. This expresses a democratisation of scientific literature, with its familiar analogue in the popular "sixpennies."

(1) In a clear and precise way, Dr. Richard Goldschmidt tells the story of the Protozoa—how they came to be known, where they are found, how they live, what part many of them play in the economy of the sea, what they have done in building up chalk cliffs and the like, and how they come into close quarters with man in malaria and sleeping sickness, and other diseases. With the aid of excellent figures, most of which are familiar, and some of which, like Max Schulze's *Polystomella*, could hardly be improved upon, the author introduces the student to the rhizopods, the infusorians and Sporozoa, and although the book will not, of course, enable the observer to identify many of the Protozoa which he may discover, it will help him to understand them and to realise how many problems even the common amœba still raises in a reflective mind.

(2) The indefatigable director of the biological station at Plön deals with a subject to the study of which a great part of his life has been honourably devoted—the fresh-water plankton. His treatment of

it seems to us to be peculiarly successful, as we would expect from one writing out of full knowledge and with strong enthusiasm, and what he has to say may be profitably read by many besides the laity. Besides descriptions of the various constituents of the plankton—crustaceans, rotifers, infusorians, algæ, and so on—Dr. Zacharias gives an account of methods of study, of the relations of the plankton to environmental conditions, of the origin of new species and varieties by isolation, of the inter-relations of plants and animals, of the application of hydrobiology to fisheries, and of the pioneer station at Plön.

(3) Prof. K. Giesenhagen deals with a subject more difficult than those of the two preceding volumes—namely, fertilisation and heredity in the vegetable kingdom. He begins with the phenomena in their simplest terms in the green algæ, and works gradually upwards through moss and fern to phanerogams, not forgetting the by-paths of parthenogenesis and vegetative multiplication. The point about his treatment is that he uses the facts as a basis for a discussion of the deep problems of heredity, such as those raised and in part solved by the discoveries of Mendel and his successors.

(4) Prof. Paul Gisevius has compressed into a small volume what every educated person should know about plants, and there is a flavour of intellectual "pémican" in the result. He deals first with the structure of plants, both inside and outside; he then discusses nutrition and respiration, constructive metabolism, and the migration of material; he leads us from seed and seedling to the flowering, fruiting and withering; he takes a survey of the vegetable kingdom, and throws the light of the past on the present; and he ends up with the phenomena of reproduction and with breeding experiments. It seems to us that he attempts too much, carrying terseness to an extreme, but his work is well done.

(5) Prof. Ludwig von Graff supplies a masterly introduction to the study of parasitism among animals. Without overwhelming us with details, he takes us into the heart of the subject, and the style of the book is a model. Von Graff has much that is extremely interesting to relate—for parasitology has made great advances of recent years—and his discussion of such themes as the origin of the parasitic habit and the influence of parasitism on the parasite is very instructive. Admirable too are the tabular summaries of life-histories. The appalling list of human parasites, based on Braun's well-known treatise, reaches a total of 129, and this number must be greatly increased, since in not a few cases several species are counted as one.

(6) In some ways the most striking volume in this bundle of primers is that in which Prof. Max Verworn deals with "the mechanism of psychical life." It consists of five lectures on the physiological aspects of mental processes, and the author has been well advised to leave them with the vividness of oral discourse. He deals with the relations of mind and body (the dualism of which he regards as a superannuated fiction), with the processes, *e.g.* fatigue-changes, in the nervous elements, with the dissimulatory stimuli that

pass incessantly through the intricate maze of nerve-fibres and ganglion-cells, with the fascinating phenomena of sleep and dreaming, and with the puzzles of suggestion and hypnosis. More, perhaps, than in regard to the other little books which we have noticed is there room here for difference of opinion, but all will agree that the author presents his view of psychical life with masterly clearness. It must be clearly noted that he refrains from giving his facts any philosophical setting, he argues neither for materialistic nor for spiritualistic interpretation, he aims at a physiological analysis of the sequences with which we are all familiar, and he does not conceal that his title expresses a scientific ideal rather than an actual achievement.

J. A. T.

### OUR BOOK SHELF.

*Index of Archaeological Papers* (1665–1890). Edited by G. L. Gomme. Pp. xi+910. (London: A. Constable and Co., Ltd., 1907.) Price 25s. net.

THIS volume is in effect an author-index to the papers of archaeological and kindred character published in the journals of learned societies and elsewhere during the twenty-five years prior to 1891. It includes the contents of some ninety-four periodicals, amounting in all to nearly 20,000 monographs under the authors' names. An appendix supplies a list of the titles which were found to have been omitted from the main classification during its compilation.

The papers of like characters which have appeared from 1891 until the last year or so have already been similarly treated in the annual index, published under the auspices of the Congress of Archaeological Societies in union with the Society of Antiquaries. There is thus placed before the student of to-day, as the editor justly claims, a continuous index from the first publications in the *Philosophical Transactions* of the Royal Society down to the present time. This work is henceforth as indispensable to the student of British archaeology, in particular, as are the tables of logarithms, sines, and cosines to the mathematician. The latter may be calculated, indeed, just as the archaeological papers may be hunted out by individual workers; but those who in the past have wasted hours and days in turning over the pages of twenty-five times ninety-four volumes in search of their own quest will be grateful to Mr. Gomme and his helpers for their patient work, and for the completeness of the result.

This index includes within its scope, not only the archaeology of the British Isles, but archaeological fragments from many countries. Thus we find Evans (A. J.) on Albania, Birch, Budge, Petrie, Poole (R. S.), and Renouf on the problems of Egypt, Hogarth on inscriptions from Salonica, Ramsay on the results of his explorations in Phrygia and western Asia Minor, and so forth. The difficulty of editing such a mass of different material must have been very great, and the work laborious. Here and there we notice the inclusion, whether accidental or intentional, of papers which seem to us to be irrelevant; as, for example, "The Writings and Influence of Coleridge" (Redish), "The Height and Weight of Boys aged Fourteen in Town and Country Schools," and other more or less statistical writings, by Francis Galton. In other cases where folklore is the subject, discrimination is less easy; and we certainly think that the editor has been wise to incorporate writings of philological character in cases where the author's material was archaeological. Thus M. Maspero on various