

well be doubted. By the time the last appears the first will be at least fifteen years old, and scientific works age very rapidly. The division of the handbook into several volumes for each of which one or more experts should be responsible would appear to be a better plan.

### Human Physiology.

*Human Physiology.* By Prof. Luigi Luciani. With a preface by Prof. J. N. Langley. (In five volumes.) Vol. 5. *Metabolism—Temperature—Reproduction, etc.* Edited by Prof. M. S. Pembrey. Pp. viii+422. (London: Macmillan and Co., Ltd., 1921.) 30s. net.

THIS, the fifth and final volume of Luciani's notable "Human Physiology," is as full of interest and originality of treatment as any of the previous volumes. Messrs. Macmillan deserve every credit for having borne the cost of translation and production of probably the last great attempt by a single individual to deal with physiology in full detail. It is true that for exhaustiveness of treatment we must resort to works prepared by several authors, or to the still fuller monographs. Undoubtedly we get a more complete account written by a specialist in the particular section, but it is questionable if the light and shade are so good as in the old-fashioned single-author type of book. Too often the little section, no doubt an important part of the whole, is almost dragged from its context and set in the full glare of the limelight. For specialists in the subject this is perhaps of no great moment, as they can perform the necessary correction, but for the average intelligent worker who desires information in a subject perhaps cognate to his own this triumph of specialism may be neither suitable nor very enlightening. Granted that the great chance of failure in the one-man book lies in the fact that the author has a bias, nevertheless this very deficiency lends a colour and virility which are frequently absent from the more scientific and coldly critical monograph—indeed, provided the author is broad enough in his views, this bias may be regarded as a definite asset.

Luciani's work, despite its defects, is a living, stimulating book written by a physiologist with a broad and sane outlook. It is a work which the professional physiologist, the ordinary medical practitioner, and the medical student can read with pleasure and profit. Its great value—and the present volume is no exception—is the amount of space which is devoted to sections of physiology which are, as a rule, but shabbily treated in other text-books. On the other hand, sections

which might merit more complete treatment in the light of modern interest and research are, on the whole, less thoroughly done than in many smaller books. Thus, in the volume under review the question of the accessory food factors is confined to a brief note by the editor.

As regards the present volume, the first three chapters deal with different phases of metabolism. These chapters give a most excellent historical survey of the development of the subject. The account of the gradual appreciation of the fact that all proteins are not of equal value, gelatine being taken as the example, is particularly interesting and valuable, and, in view of the modern trend of ideas, very suggestive. A good deal of space is also devoted, with propriety, to the much-neglected subject of mineral metabolism. Luciani's final conclusion as regards metabolism in the exchange both of matter and of energy, whether of each tissue or of the organism as a whole, is of interest, as he believes that the regulation is "the fundamental function of the nervous system considered as a whole and a unit, and not of one or other part or segment."

The next three chapters are devoted to a full discussion of reproduction. These chapters are full of valuable information—perhaps not quite so detailed as in the original—much of which is very difficult to find elsewhere. The fact, too, that parturition is dealt with in considerable detail as a purely physiological phenomenon is excellent. These chapters are followed by a suggestive and stimulating chapter on the stages of life and death. Apart from Dastre's book—and in some respects this single chapter even excels that striking work—it would be impossible to refer to a more complete source for out-of-the-way details in many varied aspects of physiology. It has also the merit of being eminently readable philosophy. Like Luciani's sane pronouncement on the rival claims of vitalism and materialism in an earlier volume, his closing sentence to this chapter, and incidentally to his own part of the work, is personally illuminating:—

"In order to ensure ourselves this ideal *euthanasia*, we have but to convince ourselves that *materialism* is utterly unable to afford any explanation of the most ancient problems of man and the universe; belief in *philosophy*, in the spiritualistic or even the idealistic hypothesis, is all that is needed to enable us to estimate life aright and to look death in the face, if not with a smile on our lips, at all events with calm resignation and confidence based upon hope."

The final chapter, as Luciani states in a footnote, was prepared by his assistant, Prof.

Baglioni. It gives a rapid summary of ethnology and anthropology—good in its way, but, owing to shortage of space, too compressed to be of real value. The point is emphasised that modern sociology shows a marked tendency to state and solve its various problems in terms of physiology.

To Prof. Pembrey is due hearty congratulations for the judicious and careful way in which he has edited the volume. It must have required endless patience and time. The translation is good, and the number of actual errors detected but few. The publishers have produced a book of pre-war standard in paper, printing, illustrations, and binding. It is a pity, however, that a complete index for the five volumes was not incorporated in this concluding volume.

E. P. C.

### Principles of Electrical Engineering.

*Electrical Engineering.* By Dr. T. F. Wall. Pp. xi+491. (London: Methuen and Co., Ltd., 1921.) 21s.

A SURVEY of the principles of electrical engineering intended for students in universities and the advanced classes in technical schools is given in this book. The author's treatment of the subject can be commended, although in places the condensation will make it difficult for the uninitiated to follow his reasoning. He begins by a careful discussion of electrostatic theory, proving, in some cases by novel methods, the capacity formulæ which are used by engineers. He describes how the dielectric is sometimes graded in high-tension cables, and shows how the requisite calculations to find the electric force in the dielectric can be made. No mention is made, however, of the severe limitations imposed on the use of intersheath methods of grading by the large capacity current which flows in the sheath. The corona effect is mentioned, but the formula given is not so accurate as that due to F. W. Peek. The formulæ for the sparking voltages between spheres are not given.

On p. 194 it is stated that the standard values for the resistance of copper at present in use are those found by Matthiessen. This is not the case. Electricians use the international standard of resistance for copper given in Publication No. 28 of the International Electrotechnical Commission. They also find it advisable to use three temperature coefficients: the "constant-mass" temperature coefficient, the volume resistivity and the mass resistivity temperature coefficients.

On p. 202 Newton's law of cooling is given as if it applied to radiation instead of to convection.

It is deduced that the melting current of a fuse wire varies as the 1.5th power of the diameter instead of the 1.25th power, which follows from more accurate theory. On p. 381, l. 11, we take it that "two-thirds" is a misprint for "three-halves," as the capacity between two wires is obviously increased by bringing a third wire into the neighbourhood.

The author attacks the problem of practical harmonic analysis in the proper way. He takes the Fourier solutions for  $a_n$  and  $b_n$ , the coefficients of the cosine and sine components of the Fourier series, and computes their values by mathematical quadrature. Taking  $m$  ordinates for the half-wave, he writes:—

$$a_n = \frac{2}{m} \left[ y_1 \cos n \frac{\pi}{m} + y_2 \cos n \frac{2\pi}{m} + \dots + y_m \cos n \frac{m\pi}{m} \right],$$

and a similar formula for  $b_n$ . Taking  $m=10$ , he finds the first, third, and fifth harmonics for a given curve, and suggests that a similar analysis will give the higher harmonics. It should have been stated that more ordinates would have to be measured if the higher harmonics are to be determined accurately.

In our opinion the first and third harmonics are best determined by dividing the base of the positive half of the wave into twelve equal parts and then applying Weddle's rule. To make reasonably certain of finding the fifth harmonic accurately it would be necessary to divide the base into eighteen, or better twenty-four, equal parts, and draw the ordinates at the points of division. If we apply the author's method to a rectangular wave of height unity, we get  $b_1=1.263$  and  $b_3=0.393$ . The true values, 1.273 and 0.424, are given by Weddle's rule.

A. R.

### Semi-popular British Botany.

*A New British Flora: British Wild Flowers in their Natural Haunts.* Described by A. R. Horwood. Vol. 3, pp. xi+251+plates 18-31; Vol. 4, pp. xi+257+plates 32-49; Vol. 5, pp. xi+234+plates 50-64; Vol. 6, pp. xix+232. (London: The Gresham Publishing Co., Ltd., 1919.) 12s. 6d. net each vol.

THE first two volumes of this work were reviewed in NATURE of April 21 last, p. 232. Vol. 3 deals with flowers of the woods and copses, roadsides and hedges, while the fourth volume presents the flowers of "mountains, hills, and dry places," "lakes, rivers, ditches, and wet places," "waste places, gardens, refuse-heaps, village greens, farmyards, etc." While thoroughly unbotanical in that it scatters