

written for those who, without much previous acquaintance with electrical apparatus, are for purposes of practical utility or scientific recreation anxious for theoretical and practical knowledge on the subject, this little book is also replete with useful information and suggestive hints that will not fail to prove of service to more experienced electricians. The volume is methodically arranged and well illustrated; and if there are omissions which might with advantage have been supplied, these are no doubt largely due to the author having been confined to a limited amount of space. So many experiments connected with the electrical discharge in rarefied and dense gases can be performed not only with an induction coil, but equally efficiently with a Wimshurst or other form of electrostatic influence machine, that one cannot but regret that the author has so rigidly confined himself to the application of coils alone. For a similar reason, it seems a pity not to have included some detailed information as to the so-called high frequency coils of Tesla and Elihu Thomson, which, even as an adjunct to induction coils, are not quite so completely abandoned for X-ray work as the author appears to imagine, while they afford a means for many other instructive experiments of comparative novelty and great beauty. It is necessary to say, moreover, that the brief references that do appear in the book to such coils, as also to the use of alternating currents generally, are scarcely as accurate and as lucid as might be desired.

It is to be regretted that the author uses the word *current* in a loose and, sometimes, in a very misleading manner. Notwithstanding these defects, which it is to be hoped the author may be able to remedy in subsequent editions, the book is undoubtedly the best popular and practical work that has yet appeared on the subject of which it treats.

*The Calculus for Engineers and Physicists.* By Prof. Robert H. Smith. Pp. xi + 176. (London: Charles Griffin and Co., Ltd., 1897.)

NOT only is "Integration more useful than Differentiation," the author's opening statement, but the conception of Integration is more tangible and easy to grasp than that of Differentiation, a far more abstract idea.

We recognise the growth of a tree after a few years, although the actual rate of growth is infinitesimal.

For purposes of application, a knowledge of Differentiation must just precede the inverse operation of Integration; but that does not justify our present system of carrying the student through the Differential Calculus before starting on the Integral; the two subjects should be carried out, as far as possible, *pari passu*.

Classified Reference Tables of Integrals form a feature of this work; and the author has also touched upon the useful portions of Differential Equations.

Any analytical difficulty is explained preferably by means of a careful diagram (as might be expected from an author of Graphical Calculus), and by intuitive reasoning, rather than by processions of unconvincing equations and inequalities, employed by schoolmen of the pure orthodox mathematical faith; whose indulgence the author begs in his Preface, asking them to remember that there is arising a rapidly increasing army of men eagerly engaged in the development of physical research, . . . whose mental facilities have been wholly trained by continuous contact with the hard facts of sentient experience, and who find great difficulty in giving faith to any doctrine which lays its basis outside the limits of their experiential knowledge. G.

*Zur Zoogeographie der landbewohnenden Wirbellosen.* Von Dr. Otto Stoll. Pp. 113. (Berlin: Friedländer, 1897.)

THE majority of treatises upon geographical distribution have used as facts and framed their conclusions upon

the range of vertebrated animals only. A few manuals, such as M. Trouessart's excellent book, and Mr. Beddard's "Text-book of Zoogeography" in the Cambridge series of scientific handbooks, have attempted a rather wider survey of the facts of the science, the necessity for which is emphasised by the short essay now before us. The main object of the science of geographical distribution is clearly, we take it, to state the facts; but it is illogical to avail oneself merely of a selected series of facts. This is particularly evident in view of another aspect of the science; for some of its more important inferences deal with the former changes in the relative position of oceans and continents. Birds and mammals being comparatively modern creations, can throw no light upon more distant changes of this kind; and facts drawn from those groups are by no means sufficient to serve as a basis for the view, now so generally becoming accepted, that there was in earlier times a vaster antarctic continent than the shrunken remnant now existing. Dr. Stoll strongly supports this notion, and it is from invertebrate groups that arguments are to be drawn. He is, moreover, against the theory of polar dispersal, which by its ingenuity, if for no other reason, has commanded much attention. Dr. Stoll clearly shows the importance of a consideration of invertebrates in discussing the inferences of geographical distribution, and we could have wished that his little brochure of only 113 pages had been more expanded.

*Transactions of the American Microscopical Society.* Edited by the Secretary. Vol. xviii. Pp. 413. (Buffalo, N.Y.: A. T. Brown, 1896.)

THIS report of the proceedings of the American Microscopical Society at the nineteenth annual meeting, held at Pittsburg in August of last year, is a very creditable publication. Many of the papers are distinctly valuable contributions to science, and the plates which illustrate them are of a high standard of excellence. Among the subjects and authors are the following:—Notes on comparative histology of blood and muscle, by Miss Edith J. Claypole; the character of the epithelium of the peritoneum of the tailed amphibia of the Cayuga lake basin, by Miss I. M. Green; several interesting papers on photomicrography, and on water supply; the red blood corpuscle in legal medicine, by Dr. M. C. White (accompanying this paper are some fine photo-engravings of blood corpuscles of man and various animals, magnified  $\times 10,850, 2560, 840,$  and  $640$  diameters); yeasts and their relation to malignant tumours, by Dr. A. R. Defendorf; the bacteriology of diphtheria, by Dr. C. F. Craig; and an instructive address by the President, Dr. A. Clifford Mercer, on the effect of aperture as a factor in microscopic vision.

*Experimental-Untersuchungen über Elektrizität von Michael Faraday.* No. 86, Series iii. to v., pp. 103; No. 87, Series vi. to viii., pp. 179. Edited by A. J. v. Oettingen. (Leipzig: Wilhelm Engelmann, 1897.)

THESE two volumes are the latest additions to Prof. Ostwald's renowned "Klassiker der exakten Wissenschaften"—a series of edited translations and reprints which has no rival. They contain translations of papers read by Faraday before the Royal Society in 1833-4, upon his electrical researches, the translations being from the *Philosophical Transactions* of those years. A few explanatory notes are added by the editor, Dr. A. J. v. Oettingen.

Complaints are often made of the neglect of foreign scientific literature by German investigators, but it should be remembered at the same time that we have no series of translations of scientific classics to compare with the one in which the two present volumes appear.