

between the different sections and individual papers, the unity of the whole would have been such as to make the four volumes of the *Arbeiten* an excellent special treatise on physical chemistry.

Although this would undoubtedly have increased the value of the work to outsiders, it is perhaps rather antagonistic to its *raison d'être*, since it is primarily the collected published papers from the physico-chemical laboratory of the University of Leipzig. As such it is not only a welcome souvenir to those who have worked in the old laboratory, but it should be in the hands of all who are interested in physical chemistry. JOHN SHIELDS.

OUR BOOK SHELF.

Archives of the Roentgen Ray. Vol. ii. No. 2. *Radiography in Marine Zoology*, being a Supplement to the *Archives of the Roentgen Ray*. The British Echinodermata. By R. Norris Wolfenden, M.D. Cantab. (London: The Rebman Publishing Company, 1897.)

To deal with the above-named publications in inverse order, it may be remarked that Dr. Wolfenden's treatise of fifteen quarto plates and six pages of letterpress is the outcome of the radiography, by means of a 10-inch spark-coil, of a collection of Echinodermata dredged in the Orkney Seas during 1896-97. The author claims that it has been his endeavour "to show that the new method of radiography may be made of considerable service in zoology, as an accessory to dissection and description." The plates are mostly inartistic and of no practical value to the zoologist—at best but poor examples of the radiographer's art. While they betoken a laudable desire on their originator's part to develop the new light of physical science, they partake of the nature of mere experimental memoranda such as are usually made a basis for fuller investigation and allowed to pass unpublished.

Of the *Archives* it may be noted that with the number under review the title is changed from that "of Skiagraphy" to that "of the Roentgen Ray." The seventeen pages before us are chiefly conspicuous as containing a full report of the inaugural meeting of the Röntgen Society of London, a combination of a conversation, a trade exhibit, and a concert, set around a presidential address. The latter, reported *in extenso*, deals with the history, development, and application of the Röntgen discovery, to the invoking of Shakespeare. Special stress is laid upon the advantages likely to accrue to the medical profession by the employment of the X-ray tube; and since the members of that profession seem likely to profit both by its use and its user, they ought for the future to be among its foremost advocates. It is thus but appropriate that the body of the *Archives* should be devoted to a brief description of five plates mainly illustrative of the osteological phenomena of "acromegaly"—which we would remark is now more correctly known as megalacria. Beyond this there are a few desultory notes of a practical order, but we are unable to detect anything which might not have been communicated in the customary form to one or other of the established scientific societies. We fail to see the justification for the foundation of a new society, and shudder at the assertion that there are already "three journals established for the publication of observations and discoveries connected with the Roentgen rays," not to say at the suggestion of rivalry in the wording of the cover of the issue under review. Concerning the zoological departure, however, a good purpose will have been served, in the awakening of the mind of the physicist to the fact that animals exist and have a form and symmetry capable of scientific treatment.

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Practical Electricity and Magnetism. By John Henderson, B.Sc. (Edin.), A.I.E.E. Pp. xv + 388. (London: Longmans, Green, and Co., 1898.)

THIS little volume, the second of a series of laboratory manuals at present being brought out by Mr. Henderson in conjunction with Mr. Joyce, has certainly many points about it which are not only original, but which should also render it of the greatest value in the physical laboratory.

It is designed "to provide a course of instruction for carrying out a progressive series of experiments in electricity and magnetism," and, though it is written, not for technical students, but for students of science, one is nevertheless struck with the author's extremely high ideal of laboratory experimental work. The student receives at the outset a preliminary admonition which cannot be described as other than most excellent and to the point. He is assumed to have plenty of time at his disposal, and not to be engaged in getting through a certain set of experiments in a given time: conditions which can hardly be expected of students preparing themselves for any practical examination, or even in every case of students engaged in original research. The writer's effort to inculcate an almost impossible ideal is none the less a most praiseworthy feature of the book.

The descriptions of recent experimental work are well up to date, though perhaps such work has received here and there an almost undue prominence. At the end of each section, a list of references to original papers bearing on the subject is given. These lists, which are carefully prepared, will recommend the book to all who are engaged in looking up in detail any particular branch of the subject.

The notation used is not always happily chosen, as, for example, the double meaning of the letter *R* on p. 108-9; and the book is by no means entirely devoid of unfortunate mistakes, as in the table on p. 378, where the mechanical equivalent of heat is given as "42400 grms. per °C" instead of "42400 grm.-cms. per °C." Such faults will, however, no doubt disappear in a second edition.

Much practical and detailed advice on the carrying out of experiments is given, which it would be hard to find in so concise a form elsewhere; and, though the manual is for this very reason not exactly readable, yet this portion of the work, together with the tables of references to original papers already alluded to, and the concluding set of numerical tables and physical constants, combine to make up a most useful work for the physical laboratory.

D. K. M.

La photographie et l'étude des nuages. Par Jacques Boyer. 8vo. Pp. vi + 80. Twenty-one illustrations. (Paris: C. Mendel, 1898.)

AT the International Meteorological Conference at Munich, in 1891, a Committee was formed to consider the question of concerted observations on the direction of motion and the height of clouds, and subsequently various countries were invited to undertake special observations during a year commencing May 1, 1896, a period which was afterwards extended until August 1897. A Committee was also appointed to prepare a Cloud Atlas, based on the classification of Dr. Hildebrandsson and the late Mr. R. Abercromby, and instructions for observing and measuring the altitudes of the clouds by theodolites and photogrameters were prepared by experts in this branch of meteorological science. The present handy little volume is the outcome of this action, and brings into a small compass a considerable amount of useful information which is spread over various publications, some of which are not easily accessible. It is divided into four parts: (1) the history of the subject from the middle of the eighteenth century; (2) classification according to the atlas above referred to, with a number of

illustrations; (3) description of the photographic apparatus employed, and (4) the method of measuring the pictures obtained. The two last chapters will be very valuable for any one proposing to undertake the difficult task of photographing the clouds, and of determining their heights and movements. In referring to the various attempts at cloud classification, we do not find any mention of "Cloudland," by the late Rev. W. C. Ley.

Proceedings of the London Mathematical Society. Vol. xxviii. Demy 8vo, pp. 594. (London: Francis Hodgson, 1897.)

THIS collection of thirty-four original papers on every branch of mathematics affords abundant evidence that English mathematicians are not behindhand in moving with the times. If proof be needed that the younger generation of mathematicians are quite following in the lines of those that have gone before them, it may be sufficient to mention that at least six of the papers are by men who have graduated at Cambridge since the year 1886. As might be expected, "Partitions" and "Groups" occupy a prominent place, seven of the papers being devoted to them. The former of these two subjects is ably introduced by Major MacMahon, F.R.S., in his address on "Combinatory Analysis," delivered on retiring from the office of president; and the publication of the outlines of seven lectures on the "Partitions of Numbers," delivered by the late Prof. Sylvester at King's College, London, in 1859, is another important feature. On the other hand, "hyper-Euclidian geometry" is conspicuous by its absence, and applied mathematics is represented by eight papers only.

During the past year the London Mathematical Society has lost two members in addition to the late Prof. Sylvester: the Rev. Alexander Freeman, who died on June 12, 1897, and Lieut.-Colonel John Robert Campbell, who died on June 23. Colonel Campbell, besides serving on the Council, was a benefactor to the Society, and we understand that had it not been for his munificence it would have been impossible for the Society to issue such large and interesting volumes of *Proceedings* as the one now before us.

First Year of Scientific Knowledge. By Paul Bert. Translated by Madame Paul Bert. Revised and partly re-written by Richard Wormell, D.Sc., M.A.; and Montagu Lubbock, M.D. Pp. vi + 417. (London: Relfe Brothers, Ltd. Paris: Armand Colin and Co.)

THIS is a revised edition of a work which has had a very successful career, but is constructed upon a plan which has little to commend it. The revision has consisted in bringing the information into line with current scientific knowledge, the plan of the book remaining as in the original. The rudiments of zoology, botany, geology, physics, chemistry, animal physiology, and vegetable physiology are all described in the four hundred pages which constitute the text, so that the book is comprehensive in its scope, if nothing else. The chief fault we have to find is that far too many technical terms are defined and used, so that the unfortunate pupils who are introduced to natural history by this book will be given the idea that science consists chiefly of words of Greek origin, and an unpronounceable terminology.

Who's Who, 1898. Edited by Douglas Sladen. Pp. xviii + 846. (London: A. and C. Black, 1898.)

THIS is undoubtedly the handiest biographical dictionary and compendium of information, referring to prominent persons and their doings, in existence. It contains nearly seven thousand biographies—mostly autobiographies—of the leading men and women of the day, and a large amount of information in addition. Among the general contents of interest to men of science is a list of Royal, National and learned societies, showing

the addresses of the societies, secretaries' names, annual subscriptions and other conditions of membership. We notice also a table of university degrees, with the correct explanation of each, a list of chairs and professors in the great universities of the United Kingdom, arranged alphabetically by their chairs, and a list of Fellows of the Royal Society (most of whom appear among the biographies). The volume is one to be kept on the writing table for ready reference; and it possesses the merit of including in its pages biographical details of more men of science than usually figure in similar reference books, though even now some of the minor literary lights could be struck out with advantage to make room for well-known scientific men who have been omitted.

LETTERS TO THE EDITOR

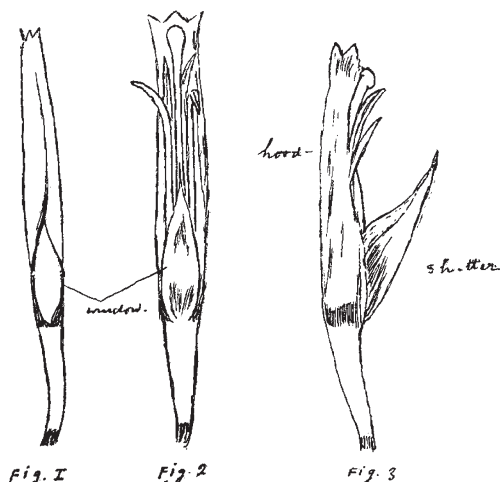
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Mechanism of Self-fertilisation in the Banana.

I PROPOSE to describe here the mechanism of fertilisation in the banana plant.

(1) *Packing of the inflorescence.*—The inflorescence in this plant is packed air-tight in the large red-coloured bracts, whose margins are secured in place by a sort of cement. If we remove one of these bracts and examine the buds within, we find that the reproductive organs are also packed air-tight in the perianth. A closer examination of this packing is necessary to understand its efficiency.

The perianth consists of an outer whorl and an inner whorl; the outer one consists of three sepals, usually united into an elongated concave hood. (Sometimes, instead of the three being united together, only two are united and one is free, which in the bud is partially overlapped by the other. Very rarely the three are quite free. In about fifty examples I examined, I



got only one flower with all the three sepals distinct.) The margins of the hood are folded inwards, so that they overlap each other. There is no fixed rule as to which is the outer, and which the inner, sepal. Sometimes the right overlaps the left, or *vice versa*. This overlapping is not complete throughout their length, and cannot possibly be so. For, to ensure the packing being air-tight, the pectinate inflorescence must necessarily be concavo-convex, *i.e.* convex without and concave within; and obviously any cylindrical tube bent concavo-convexly must necessarily leave a gap or a window at the bottom (see Figs. 1 and 2).

This window would be a very weak point in the packing, and hence most accessible to insects or other injurious agencies if the outer packing became loose by accident. This weak