SCIENCE

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X-RAYS AND CRYSTALLINE STRUCTURE[1]

Two years have gone by since Dr. Laue made his surprising discovery of the interference effects accompanying the passage of X-rays through crystals. The pioneer experiment has opened the way for many others, and a very large amount of work, theoretical and practical, has now been done. As the preliminary exploration of the new country has proceeded, our first estimate of its resources has grown continuously; we have learned many things which help us to a better understanding of phenomena already familiar, and we have seen avenues of enquiry open out before us which as yet there has been little time to follow. The work is full of opportunities for exact quantitative measurements, where precision is sure to bring its due reward. There is enough work in sight to absorb the energies of many experimenters, and there is sure to be far more than we can see. When we consider the wideness of the new field, the quality and quantity of the work to be done in it, and the importance of the issues, we are scarcely guilty of over-statement if we say that Laue's experiment has led to the development of a new science.

The experiment itself—to put it very briefly—constitutes a proof that X-rays consist of extremely short ether waves. In order to appreciate the value of this demonstration, we must bear in mind the present conditions of our knowledge of the laws of radiation in general. Let us consider very shortly how the whole matter stood when the new work was begun.

When X-rays were first discovered eighteen years ago it was soon pointed out that they might consist of electro-magnetic disturbance of the ether analogous to those supposed to

[1] Read before the weekly evening meeting of the Royal Institution of Great Britain, June 5, 1914.

in general simply described, in some cases difficult technique is passed over with a few words of description, so meager as to make it almost impossible for the student to follow them without very close supervision on the part of the instructor. For example, it is doubtful whether a student could ever obtain a pure culture of yeasts by the method described without having an instructor at hand to show him every detailed step. The numerous experiments also imply the possession on the part of the instructor of a large amount of material commonly not at hand in a bacteriological laboratory, especially in the way of cultures of various organisms, and no direction is given as to how these may be obtained.

In a little book of this kind not all laboratory methods can be included, and some omission may be well excused. Some of the omissions are a little unfortunate. For example, in describing the detection of nitrites, the method that is commonly used, of inoculating bacteria into nitrate broth is not given at all, the only method given depending upon synthetic media. The common use of nitrate broth, included in the standard methods, should certainly have been among the methods given in this little manual. On the whole, the manual is useful, and can be recommended as an up-to-date reference book of laboratory methods.

H. W. CONN

WESLEYAN UNIVERSITY

The Elements of Psychology. By DAVID R. MAJOR. Revised Edition. Columbus, R. G. Adams & Co. 1914. Pp. 413.

Much difficulty has been experienced in recent years in preparing a satisfactory text for introductory college courses in psychology. Possibly the difficulty arises from the fact that the customary elementary course in psychology—unlike that in other sciences—aims less to initiate the student into the use of a set of special methods and a body of knowledge obtained by their application, than to interpret and rationalize what everyone is more or less acquainted with from common experience. Evidently more tact and literary skill are required to treat what is already familiar in a profitable way, than to launch out into what is new to the student. However this may be, there have certainly been a large number of attempts to meet the felt need for an elementary text, and few of the attempts have given much satisfaction. The present book is another experiment in this direction, and appears likely to prove unusually successful. If it makes no great claim to originality of teaching, and has no special axe to grind, and if it lacks somewhat in incisiveness, these are defects which the student can readily overlook in view of its well-sustained effort to meet him on his own ground. Granted that the introductory course is to be kept within its traditional bounds, this text should make a very satisfactory guide.

R. S. WOODWORTH

COLUMBIA UNIVERSITY

SCIENTIFIC JOURNALS AND ARTICLES

Terrestrial Magnetism and Atmospheric Electricity for December contains the following articles: "The Free and Forced Vibrations of a Suspended Magnet" (concluded), H. F. Reid; "Magnetic Declinations and Chart Corrections obtained by the *Carnegie* from Bahia, Brazil, to St. Helena, May 20 to June 22, 1913," L. A. Bauer and W. J. Peters; "On Certain Matters relating to the Theory of Atmospheric Electric Measurements," W. F. G. Swann; "Investigation of Certain Causes Responsible for Uncertainty in the Measurement of Atmospheric Conductivity by the Gerdien Conductivity Apparatus," C. W. Hewlett; "Magnetic Declinations and Chart Corrections obtained by the *Carnegie* from Hammerfest, Norway, to Reykjavik, Iceland, and thence to Brooklyn, New York, July to October, 1914," L. A. Bauer and J. P. Ault; Letters to Editor: "Principal Magnetic Storms recorded at the Cheltenham Magnetic Observatory, July–September, 1914," O. H. Tittmann; "Umbau an dem Schulze'schen D-Variometer des Observatoriums in Tsingtau," B. Meyermann.