

port, but, unfortunately, neither the boat nor the apparatus could be brought from Scotland in time for the experiments. Professor Pernter demonstrated the formation of vortex-rings on a large scale in the open air by firing a conical cannon, such as is used in some parts of Europe to disperse hail-storms. While the efficacy of the process is doubtful, yet in the Southport experiments the smoke-rings issuing from the cannon, which was placed horizontally instead of vertically, could be both seen and heard in their passage through the air for a distance of several hundred feet.

A visit was paid by the International Committee to the Fernley Observatory in Hesketh Park, established by Mr. J. Baxendell, Sr., and now maintained by the borough of Southport. This observatory, which is one of the best equipped in Great Britain, has an auxiliary station, provided with Mr. Dines' anemometers, situated near the coast. Excursions were made to the Stonyhurst College Observatory, near Whalley, Lancashire, and also to the Physical Laboratory of the Owens College in Manchester. About sixty meteorologists sat down to their annual breakfast, in accordance with a custom inaugurated some thirty years ago. The meeting terminated on September 16 with a brilliant banquet to more than one hundred persons, which was given by the mayor of Southport, Mr. Scarisbrick, at his residence, Greaves Hall, in honor of Sir Norman Lockyer, president of the British Association and Professor Mascart, president of the International Meteorological Committee.

A. LAWRENCE ROTCH.

BLUE HILL METEOROLOGICAL OBSERVATORY,
October 30, 1903.

SCIENTIFIC BOOKS.

Manual of Advanced Optics. By C. RIGBORG MANN. Chicago, Scott, Foresmann & Co. 1902. Pp. 193.

As the author states in the preface, this

manual is the basis of the advanced laboratory course in optics in the University of Chicago, and represents contributions from various instructors. Naturally, it deals rather extensively with interference and the applications of interference methods.

The opening chapter presents, in a very simple manner, the important but generally neglected theory of the limit of resolution of a telescope. Chapter II. extends this theory to the case of two slit apertures before a lens for both single and double line sources. The experimental illustrations make clear the possibility of measuring the angular size of a source and the angular distance between two line sources, but do not suggest the application of this method to astronomical problems. Reference is not made to Rayleigh's theory of, and experiments with, the central stop. The third chapter, on Fresnel's mirrors, contains diagrams, familiar to all of Professor Michelson's students, illustrating the evolution from the earlier forms of interference apparatus to the modern interferometer. The theory and experiments in this chapter and in the following one on Fresnel's biprism take up seventeen pages of the text, relatively a large part when the grating is treated in eight pages.

Chapters V. and VI. contain Michelson's theory of the interferometer and its elegant applications. The presentation is very clear and the contents complete. The gathering together of material from little-used sources bearing upon the interferometer method, probably the most powerful and yet simple method we know in accurate measurement, makes this manual a valuable one to place in the hands of a student.

The arrangement of the material in Chapters VI. and VII. is out of the ordinary. For in the earlier chapter the author deals with a very modern, complex, perhaps forced, method of analyzing an approximately homogeneous radiation, while in the later chapter he presents the well-known prism method of analyzing a spectrum. The theory of Chapter VII. follows the methods of geometrical optics. Rayleigh's simple method of obtaining the dispersive power of a prism is not given.

The chapters on the plain and concave gratings, considering the space given to other parts of the subject, might have been fuller. The next six chapters contain theory and experiments on polarized light, the rotation of the plane of polarization, the laws of reflection from transparent and metallic surfaces and the spectrophotometer.

Two statements seem to be misleading. On page 90 it is stated that 'the slit in a spectrometer is made infinitely narrow by placing it at an infinite distance by means of a lens.' The meaning, of course, is that the divergence of the rays falling on the prism from one point of the slit is made very small by placing it at the focus of a lens. The angular width of the slit is finite, being equal to the width of the slit divided by the focal length of the lens. Again on page 159 it is stated that 'Ordinary photometers * * * may be used to compare the intensities of the total radiations of two sources.' Authors of texts can not be too careful to point out that the luminous part of the radiations are but a small part of the total energy sent out by a source. Indeed, it is to be regretted that the subject of optics is generally viewed in this limited light, that no mention is made of the instruments, bolometers, radiometers, thermoelements, etc., used in measuring the total energy of sources, and no notice taken of the interesting properties of bodies with regard to radiations other than luminous.

These general criticisms have no large value concerning the special purpose for which the book was prepared. As a manual of advanced optics it is admirable.

G. F. HULL.

DARTMOUTH COLLEGE.

SCIENTIFIC JOURNALS AND ARTICLES.

THE October number of *The American Journal of Anatomy* contains the following articles:

JOSEPH MARSHALL FLINT: 'The Angiology, Angiogenesis, and Organogenesis of the Submaxillary Gland.'

RICHARD MILLS PEARCE: 'The Development of the Islands of Langerhans in the Human Embryo.'

ROBERT W. LOVETT: 'A Contribution to the Study of the Mechanics of the Spine.'

J. PLAYFAIR McMURRICH: 'The Phylogeny of the Palmar Musculature.'

Bird-Lore for September-October contains articles on 'The Mystery of the Black-billed Cuckoo,' by Gerald H. Thayer, showing that it is a bird of nocturnal habits; on 'A North Dakota Slough,' by A. C. Bent; 'A Tragedy in Nature,' by William Brewster; 'Nesting Habits of Two Flycatchers at Lake Tahoe,' by Anna Head, and on 'How Birds Molt,' by Jonathan Dwight, Jr., one of the best authorities on this much-mooted subject. There is the sixth series of portraits of *Bird-Lore's* advisory councilors and numerous notes, including an interesting article on 'Mortality among Birds in June,' besides book reviews and the reports of the Audubon Societies.

THE *Museums Journal* of Great Britain for September contains the address of the president of the Museums Association, F. A. Bather, delivered at the Aberdeen meeting of the association and devoted mainly to the subject of the better arrangement of art museums. A plea is made for smaller exhibition halls and the display of a comparatively small number of objects amid harmonious surroundings. Among the notes is announced the coming extension of the British Museum (the older building) at a cost of £200,000, and the coming publication of the first volume of a catalogue of the books, manuscripts and maps in the possession of the British Museum, of natural history.

SOCIETIES AND ACADEMIES.

AMERICAN PHYSICAL SOCIETY.

THE fall meeting of the Physical Society was held at Columbia University on Saturday, October 31. The meeting was well attended and was marked by discussions considerably more extended than have recently been usual at Physical Society meetings. These discussions add so greatly to the interest of such gatherings that the further development of this feature of the meetings is much to be desired.

It was decided to hold the next meeting of the Physical Society in St. Louis during convocation week in connection with the Amer-