naturalist at one end of his master's kitchen table, "whilst the housekeeper was occupied at the other end with the several processes of providing the day's dinner." At the age of seventeen, Williamson wrote an important memoir on a tumulus near Gristhorpe Bay, which called forth a letter from Prof. Buckland praising the article, and prophesying that the author's name would "figure in the annals of British science." Passing from these early days of youthful enthusiasm and the pursuit of natural history in all its branches, and over many years of activity in zoological and medical work, we come to the latter part of Williamson's career. The memoirs on the Coal-measure plants, published in the *Philosophical Transactions*, between the years 1870 and 1893, furnish a splendid record of original work, which will always rank among the most important additions to botanical knowledge during the later decades of the present century. It would be difficult to find a more striking illustration of the continuance of vigorous industry, and the power of adaptability to modern methods, than is afforded by the palæobotanical writings of a man whose early days were spent before modern science began.

Did space permit, one might quote numerous passages in which recollections are given of the "sober-minded quaker John Dalton," and of the first meeting with Joule, "a young and extremely unassuming man." The autobiography gives us an epitome of the advance of scientific thought during the present century, with the added charm and freshness of a personal history of the almost ideal scientific career of a genuine naturalist. "Writing these reminiscences of his life's work, was one of the pleasures of Dr. Williamson's later years"; and we are grateful to Mrs. Williamson for giving us the opportunity of sharing the enjoyment of so fascinating a retrospect.

It is a matter of regret that Dr. Williamson's name does not appear in the title of the book; it would have afforded a better index to the interesting contents.

A. C. S.

OUR BOOK SHELF.

Die Protrophie, eine neue lebensgemeinschaft in ihren auffälligsten erscheinungen. Von Arthur Minks. (Berlin: Friedländer and Sohn, 1896.)

DR. MINKS is already well known as the author of several treatises on the biology and morphology of Lichens, in each of which the ideas set forth are quite original, and at the same time directly opposed to modern views regarding the structure presented by this group of plants. The present contribution must be considered as part iii. of "Contributions to a knowledge of the structure and life of Lichens," of which the previous parts appeared in an Austrian scientific publication (*K. K. zool.-bot. Gesell. zu Wien*). The present, preceded by a digest of the leading ideas embodied (*Oester. Bot. Zeitschr.*, 1896, p. 50) appears as an independent publication. The previo'us parts contain, amongst other new views, the ptatement that many species considered as valid by slichenologists, are the outcome of parasitism between two or more originally distinct species, the product being a pseudo-species, differing in structure and general appearance from the species concerned in its production. In the book under consideration, the contents of which could not be understood without a knowledge of the author's previous views and theories, we are introduced to a second method which, as before, results in the wholesale production of what may be termed pseudo-species, due to the intermingling and gradual changing of the layers of the thallus. This change is said to be due to "Protrophie"; a statement which must be accepted in good faith. The definition given would be next to meaningless in English, hence it is offered in the original language.

"Ich erachte es für statthaft, die Unselbstständigkeit, die nur den Anfang des Lebens betrifft, daher auch nur für diese Zeit der schützenden und unterstützenden Flechte zur Einleitung und Sicherung von dessen hauptsächlicher Dauer in aller Selbstständigkeit bedarf, unter Protrophie zu begreifen und die dazu bestimmten Flechten als Lichenes protrophici zu bezeichnen."

The most remarkable circumstance in connection with these supposed discoveries is the fact that the author was enabled to utilise herbarium specimens for his researches, and had not to resort to the more laborious and exact method of pure cultures. G. MASSEE.

Mathematical Papers read at the International Mathematical Congress held in connection with the World's Columbian Exposition, Chicago, 1893. (New York: Macmillan and Co.)

THIS book, which is an excellent specimen of mathematical printing, constitutes vol. i. of "Papers published by the American Mathematical Society." The 400 pages contain thirty-nine papers. German and American mathematicians are the largest contributors; there are a few pages from France, Italy, Austria and Russia also, but the mathematicians of England are not represented. Papers of great interest are given by Dr. Schönflies, "Gruppentheorie und Krystallographie"; by Dr. Heinrich Burkhardt, "Ueber einige mathematische Resultate neuerer astronomischer Unsuchungen, insbesondere über irreguläre Integrale linearer Differentialgleichungen"; by M. Maurice d'Ocagne, "Nomographie: sur les équations représentables par trois systèmes rectiligues de points isoplèthes"; by E. H. Moore, "A doubly infinite system of simple groups." Prof. Felix Klein, of Göttingen, whose work at the Congress has been already published in a separate volume, is only represented here by two short communications, one on "The Present State of Mathematics," the other on "The Development of the Theory of Groups during the last Twenty Years." They are of the nature of lightning sketches by a master hand.

The book is an evidence of the formation, gradual but sure, of an American school of mathematicians which, at first mainly inspired by Cayley and Sylvester, appears now to be coming under the influence, principally, of modern German methods.

Modern Optical Instruments and their Construction. By Henry Orford. Pp. 100. (London: Whittaker and Co., 1896.)

WHEN a book bearing the title "Modern Optical Instruments" is found to contain nothing about the telescope, merely a reference to the microscope, and but two pages on the spectroscope, it is the duty of a reviewer to declare that the volume is not what it pretends to be. The contents belong almost entirely to ophthalmoscopy; that is to say, to the determination of optical defects by means of the opthalmoscope, and the amelioration of them by means of spectacles. There are, in addition, brief chapters on stereoscopic projection and the optical lantern. As a short work on these matters, the book is not altogether bad (though the illustrations are very coarse), and opticians may find interest in parts of it. But to say the book is "a description of a few of what may safely be termed the more popular optical instruments in use," and to give it the title it has, is to court adverse criticism.

The book as published contains two-thirds text and one-third advertisement.