covering that part of the slit through which the light of the umbra passes. It is obvious that a large image of the sun will be required in this work.

The spectroheliograph can be applied to other studies of absorption. The H_1 flocculi, for example, are reduced in brightness near the sun's limb much more than the H_2 flocculi, presumably because the latter lie at a higher level. These differences can be studied photometrically on spectroheliograph plates made for the purpose. Since it is a question just what level is represented by the background (between the flocculi) in calcium, hydrogen or iron photographs, the instrument should be arranged so as to permit photometric comparisons with the light of the photosphere, of practically the same wave-length as the calcium, hydrogen or iron line employed.

These new applications of the spectroheliograph have only recently occurred to me, and are mentioned because of their suitability for use with instruments containing prisms of ordinary height, capable of photographing only narrow zones of the solar image. Numerous other problems might be mentioned, such as the comparative study of H_1, H_2 and H_3 photographs, and of calcium, hydrogen, and iron images; the distribution of the flocculi in latitude and longitude, their varying area, as bearing on the solar activity and on terrestrial phenomena, and their motion in longitude, as measuring the solar rotation. But limitations of time forbid more than a mere reference to work and methods, the details of which are discussed elsewhere. My purpose has been accomplished if I have shown that with comparatively simple instrumental means any careful observer may secure important results. In much of this work it is desirable that investigators occupied with similar problems should cooperate with one another. The International Union for Cooperation in Solar Research was organized with this end in view. It has already inaugurated solar studies, on a common plan, in several different fields, and is preparing to extend the range of its activities in the near future.

HAROLD JACOBY,
For the Council

SCIENTIFIC BOOKS

Rock Minerals, their Chemical and Physical Characters and their Determination in Thin Sections: JOSEPH P. IDDINGS. Wiley and Sons, New York. Pp. xii + 548, with numerous figures in text.

In presenting this work the author and publishers have won the gratitude of every American student in petrography, and of every teacher as well. Heretofore, the only systematic and comprehensive treatises available have been the 'Mikroskopische Physiographie' of Professor Rosenbusch or Professor Iddings's condensed translation of the same, and the works of Fouque and Levy. While no one would for a moment wish to disparage the work of one who has fairly earned the title of father of modern petrography, yet, as may readily be comprehended, the manner of presentation in the first-named publication, as well as the language in which it is presented, is German, and not always easy of comprehension to the average American student.

There have been, it is true, other works on the subject, in English, as Professor Luquers's 'Minerals in Thin Sections' and Harker's 'Petrology for Students,' but such make no pretense at completeness, and it has remained for Professor Iddings to give us a book as comprehensive and systematic as those of the German and French writers noted.

Within the limits of some 550 pages Professor Iddings includes not merely a description of the optical properties and methods of determination of all the ordinary rock-forming minerals, but also chapters on their chemical and physical characters. The critical chapter of the book is undoubtedly that relating to the optical properties of minerals, and it is apparently in recognition of this that the author has devoted upwards of 100 pages

to a discussion of the theory of light, its reflection, refraction and polarization, the manner in which it is acted upon by isotropic, uniaxial and biaxial crystals, and finally how these properties may be made of determinative value by means of a properly constructed microscope, the various appliances and method of application of which are fully explained. Pages 201–526, inclusive, are devoted to detailed discussions of the characteristics of the individual species of the rock minerals. Here the author is at his best, and has left little to be desired in the way of clear and exhaustive treatment. Each mineral is considered with regard to its chemical composition, alteration, crystal form, optical properties, color, inclusions, mode of occurrence, resemblances and laboratory reproduction, in the order here given. The arrangement of the minerals, on a chemical basis, strikes one, however, as a trifle illogical, since the methods of determination are almost wholly optical and one who has worked with the book of Rosenbusch will at first find it awkward. Pages 527–541 are devoted to tables giving these optical characters. The book is illustrated by upwards of four hundred figures—mostly crystal outlines—in the text. Many will miss the plates of micrographs of thin sections found in the work of Rosenbusch, but it is possible that Professor Iddings, as a teacher, wished to guard the student against the danger of relying too much upon the appearance of a mineral rather than upon its optical properties. The adoption of a new system of numbering with each change of subject, though the same as that used by Dana in his system of mineralogy, is a little confusing to one turning the leaves at random, but inasmuch as each figure occurs on the page of text in which reference to it is made, no serious confusion is likely to arise.

The book is of good size and form for convenient use, well printed and bound, and that it is essential to every student and teacher must be self-evident. George P. Merrill

The Human Mechanism, its Physiology and Hygiene, and the Sanitation of its Surroundings. By Hough and Sedgwick. Boston, Ginn & Company.

This book adds another to a series of very useful text-books on the subject of physiology designed for secondary schools. It is, however, rather unique among the series in several respects, the more distinctive of which the present review will endeavor to point out.

First among them is the point of view from which the authors approach the subject, namely, as implied in the title, The *human body* as a *mechanism.* This conception the authors regard as "not only the sure foundation of physiology, hygiene and sanitation, but is also surprisingly helpful in the solution of many questions concerned with intellectual and moral behavior."

A second feature upon which emphasis is placed is the conception of the mechanism *as a whole.* "Avoiding that form of physiology which looks chiefly at the organs and overlooks the organism, we have constantly kept in view the body as a whole, in order that physiology may become the interpreter of the common physical phenomena of the daily life and find in hygiene and sanitation its natural application in conduct." In this view there will doubtless be general concurrence.

Still a third feature, more or less distinctive, is the large consideration given to problems of *sanitation,* both domestic and public. So far as the reviewer is aware, this is the only text-book designed for schools in which this aspect of physiology has received the degree of attention it deserves. Just how far this may properly come within the scope of the average school course will doubtless be a matter of divided opinion; as may likewise be the further query as to how far details of sanitary principles come within the intelligent apprehension of the average pupil of the grades likely to be affected. But allowing for such debatable differences, it would seem that provision should be made for some insight into this increasingly important subject. To the vast majority of pupils of the high school this will be about the only opportunity for such insight, and it is the reviewer's conviction that the authors have done well to put it well to the front in their book.

There is another point, however, mainly a pedagogical one, which seems open to some

criticism, namely, whether in the vast body of admirable and trustworthy information, which makes the book a veritable cyclopedia, the essentially didactic and disciplinary aspects of the subject have not suffered an undesirable and unnecessary eclipse. If the primary aims of physiology in the schools be informational, and the importance of this will not be questioned, then some subordination of those methods of observation and experiment so distinctive of science may in measure be justified. But even in that case it may well be questioned whether these very methods do not afford a *distinctive type* of information, more vital and impressive, and at the same time incomparably more abiding; and this the reviewer believes to be the case. It is much to be regretted, therefore, that at least some provision had not been made in the body of the text and throughout for pertinent experiment and demonstration. The almost total absence of anything savoring of laboratory directions is hardly atoned for in the brief prefatory statement that varying facilities in different schools made this less imperative. The very presence of such directions would have served to promote a larger and more uniform system of judicious laboratory practise.

Upon the whole, the book is easily among the very best now available, and indeed far and away superior to the average text-book of similar scope. It marks a decided step in advance, and will doubtless find a wide and growing field of usefulness, both in the upper years of the high school and beginning courses in college.

In its typography and other mechanical aspects the book seems exceptionally free from glaring defects, and maintains the high repute of the publishers in this line of book-making.

C. W. H.

SCIENTIFIC JOURNALS AND ARTICLES

The American Naturalist for March contains but three papers, though these are of considerable length. The first, 'Studies on the *Ophioglossaceæ*,' by D. H. Campbell, deals mainly with the morphology of the peculiar, fertile leaf segment, or sporophyll. R. W. Shufeldt discusses 'Polygamy and Other Modes of Mating among Birds,' the object being avowedly to throw some light on the question of mating among mankind. A large number of statements are made, the bearing of which is to be given in another paper. Outram Bangs writes 'On the Wood Rails, Genus Aramides, occurring North of Panama,' describing as new one form from Mexico to which the name *Aramides albiventris mexicanus* is given.

The American Museum Journal for March has illustrated articles on the mounting of 'The African Lion Hannibal,' 'The Naosaurus, or Ship-Lizard,' and 'A New Eskimo Exhibit,' and contains the lecture schedule for the month. The mounted lion, and the bizarre skeleton of Naosaurus are respectively triumphs of the taxidermist and preparator of fossils.

The Museums Journal of Great Britain for February has various articles on museum cases; the first, by H. Bantry White on 'Some Improvements in Museum Cases,' describes methods of making iron cases by which their cost has been greatly reduced. F. A. Lucas gives briefly his ideas relative to 'The Structure and Arrangement of Museum Cases,' finding a lack of effect in iron cases and emphatically endorsing the bay system of arrangement. 'The Liverpool Museum Extension' deals with the rearrangement of the zoological and anthropological collections in a consecutive, educational plan. The view of the zoological hall impresses one with the idea that it is a little too narrow for the best results.

THE Springfield Museum of Natural History has issued a 'leaflet' entitled 'Bird Migration,' giving the dates of arrival of one hundred species of birds found within ten miles of Springfield, during the springs of 1901 to 1906, with spaces reserved up to 1910. The list is arranged chronologically for 1901, although there is considerable variation in the dates of arrival of the species subsequently.

The Bulletin of the Charleston Museum for March is mainly devoted to an excellent article by Mrs. Paul M. Rea on 'The Relation of the Museum to the Schools.'