its essence consists not in any value it may assume, but in our power over it to make it small at will. The advantage of introducing the infinite in connection with the infinitesimal is not availed of; the former notion is, in fact, not defined at all. Similarly, the discussion of infinitesimals of higher order would have been enhanced by mention at least of the complementary topic. The author retains the entire respectable but obsolescent definition of algebraic function, the modern definition of such function as the root of an equation having coefficients rational in the independent variable, being apparently nowhere employed. Continuity is not adequately treated, and this preëminently important subject will doubtless be accorded suitable recognition in the next volume. Numerous examples of discontinuity, such as are given by Kiepert, are well-nigh indispensable aids to the student, whose attention, moreover, might with profit have been *explicitly* directed to the fact that the derivability of a function always implies, though is not implicit in, its continuity. The idea of uniform continuity is introduced, but only on occasion, as in the deduction of the theorem of total differential. On p. 11 the reader is warned against regarding $\frac{dy}{dx}$ as a fraction, and on p. 79, where the differential notation is explained, he is cautioned against 'attempting a magnitudinal interpretation' of du and dx in the 'symbolic equation $du = u_x dx$,' which 'means that the derivative of u as to x is u_x.' The author's view of this critical matter, while not in full accord with that, for example, of Jordan's *Cours*, p. 61, is nevertheless intelligible, consistent and adequate.

The early introduction (Chapter II.) of the notions of integral and integration is attended with obvious advantages. The treatment is good scientifically and pedagogically. A specially commendable didactic feature is the calculation of several integrals by actually making the required subdivisions, forming the corresponding products, generalizing, and throwing the summation into a form suitable for perceiving its limit.

Space is wanting for briefest comment on many interesting sections as those dealing with illusory forms, maxima and minima, geometric interpretation of higher derivatives, change of variable, partial integration, Jacobians, multiple integrals, parametric derivation, and so on.

It remains to say that not the least praiseworthy quality of the book is found in its style. To be scientific it is not necessary to be vulgar. The volume affords another illustration of the compatibility of rigor and austerity of thought with a generous regard for the amenities of expression. To many the book will be distinctly the more attractive because of its human flavor, its dialectic color, its life, an occasional glance at the philosophic phases of the subject. A rare union of conciseness with precision and clearness is characteristic. For judicious accentuation little more could be desired. The reader is taken into confidence, invited to accompany rather than to follow. The work is not a compilation and not a mechanical structure; it is rather an organism, a growth, notable for its merits, though, of course, sharing in a measure the imperfections of its kind.

C. J. Keyser.

Columbia University.

Defective Eyesight; The Principles of its Relief by Glasses. By D. B. St. John Roosa, M.D., LL.D., Professor Emeritus of Diseases of the Eye, New York Post-Graduate Medical School and Hospital; Surgeon to the Manhattan Eye and Ear Hospital; Consulting Surgeon to the Brooklyn Eye and Ear Hospital, etc. New York, The Macmillan Company. 1899. 8vo. Pp. 193.

This work is practically a revised edition of the author's little book 'On the Determination of the Necessity for Wearing Glasses,' published as one of the 'Physician's Leisure Library Series' in 1887, by George S. Davis, of Detroit, Michigan.

The volume has gained much by its revision, has had some excellent illustrated matter introduced and has been considerably enlarged.

The subject is divided into seven parts, all of which are written in the author's well-known easy style, making those who have had the pleasure of personally reading his writings more firmly convinced of his earnestness and erudition.

Considering the subject-matter in its given

order, a most interesting historical notice of the first attempts to accurately estimate the visual power, the invention of the ophthalmoscope and the apparatus required for testing vision opens the volume. This is followed by a comprehensive description of presbyopia, myopia and hypermetropia.

Astigmatism in its various forms is taken up next, under which heading an extended account of ophthalmometry to its minutest detail is given. Asthenopia, particularly that which is found in association with binocular vision, is described in a graphic manner, while a number of useful general remarks as to lenses, spectacles and eye-glasses finish the volume.

A careful perusal of the contents of the work is recommended to any one who may be interested in the subject.

C. A. O.

BOOKS RECEIVED.

German Higher Schools; The History, Organization and Methods of Secondary Education in Germany. JAMES E. RUSSELL. New York, London and Bombay, Longmans, Green & Co. 1899. Pp. xii + 455.

Year-book of the United States Department of Agriculture, 1899. Washington, Government Printing Office. 1899. Pp. 768.

Imperial Democracy. DAVID STARR JORDAN. New York, D. Appleton & Co. 1899. Pp. viii + 293. $1.50.

Eighteenth Annual Report of the United States Geological Survey, 1896-97. CHARLES D. WALCOTT, Director. Part II., Papers Chiefly of a Theoretical Nature. Part IV., Hydrography. Washington, Government Printing Office. 1899.

SOCIETIES AND ACADEMIES.

THE BIOLOGICAL SOCIETY OF WASHINGTON.

THE 306th regular meeting was held April 8th. The first paper entitled 'The Ferns of Hemlock Bluff' by Mr. Wm. Palmer included a preliminary sketch of the geology of Hemlock Bluff, a point on the Virginia shore of the Potomac between Georgetown and Great Falls. The locality is particularly rich in cryptogamic plants, over twenty species of ferns being enumerated.

A recent noteworthy addition to this list is that of *Asplenium pinnatifidum* hitherto unknown from the District of Columbia or the adjacent parts, and supposed to be confined to limestone rocks in mountain regions. The rocks at Hemlock Bluff are, however, gneissic. Mr. Palmer stated that this interesting and beautiful station is threatened with destruction, and expressed the hope that Congressional action would be taken in time to protect the banks of the Potomac from further devastation.

'Notes on the Habits of African Termites' was the subject of the second paper, read by O. F. Cook. On the basis of observations made in Liberia several points in the domestic economy of termites have been established. Among these may be mentioned the fact that some termites regularly collect rotting wood, which they put through a process of curing and then comminute into the pulp used in building the irregularly honeycombed fungus gardens which produce the food of at least the young animals of the colony. The soldiers of these species (*Termes bellicosus* and allies), which sally out from the nest in response to attacks by men or animals, do not return to the nest, but wander about and soon perish from exposure to the outside air. Other soldiers, the so-called *nasuti*, of which the head is produced above into a long beak, eject from this process, which is hollow, a transparent, acrid, malodorous and corrosive fluid, which forms a most effective means of defence against ants and other insect enemies, and renders them distasteful to birds. A third type of soldier can neither shoot nor bite, but the large, unequal mandibles are especially adapted to produce a loud clicking sound which furnishes protection at least against other species of termites. It was also found that the perfect insects associate in pairs when flying over water and that, after dropping their wings, such pairs are able to burrow into the ground, thus suggesting the possible origin of termite communities.

Under the head of 'Biological Characteristics as a means of Species Differentiation' Dr. Erwin F. Smith described in detail the very numerous culture-methods, reactions and other tests now in use in bacteriology. To accomplish all these investigations a species is sometimes carried in the laboratory for two years or longer. The insufficiency of the older and, indeed, of many of the more recent descriptions