

sumed relations are adopted which lead to Euclidean geometry. In this respect the author is appealing to the attention of elementary schools, where no geometry other than the practical geometry of our world has a right to be taught.

The first chapter deals with the first group of assumptions, the assumptions of association. Thus, the first assumption is that *two distinct points determine a straight line*. This associates two things called points with a thing called a straight line, and is not a definition of the straight line. The definition of a straight line as the shortest distance between two points involves at once an unnamed assumption, the conception of distance, which is a product of our physical senses, whereas the rational development of geometry seeks the assumptions which underlie and are the foundations of our physical senses. In the higher court of pure reason, the testimony of our physical senses has been ruled out, not as utterly incompetent, but as not conforming to the legal requirements of the court. However, there is no objection to shortness in names, and a straight line is contracted into a *straight*, a segment of a straight line, to a *sect*, etc.

In the second chapter we find the second group of assumptions, the assumptions of betweenness, which develop this idea and the related idea of the arrangement of points. In the next chapter we have a third group, the assumptions of congruence. This chapter covers very nearly the ordinary ground, with respect to the congruence of angles and triangles, and all the theory of perpendiculars and parallels which does not depend upon Euclid's famous postulate. This postulate and its consequences are considered in chapter IV.

All the school propositions of both plane and solid geometry are eventually developed, although there is some displacement in the order of propositions, due to the method of development. Numerous exercises are appended at the end of chapters, which are numbered consecutively from 1 to 700.

Undoubtedly the enforcement upon logic of a blindness to all sense perceptions introduces

some difficulties which the ordinary geometries seem to avoid, but as in the case of our conception of a blind justice, this has its compensation in the greater weight of her decisions. It seems as if the present text-book ought not to be above the heads of the average elementary students, and that it should serve to develop logical power as well as practical geometrical ideas. Doubtless, some progressive teachers will be found who will venture to give it a trial, and thus put it to the tests of experience. At least, the work will appear as a wholesome contrast to many elementary geometries which have been constructed on any fanciful plan of plausible logic, mainly with an eye to the chance of profit.

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A Treatise on the British Freshwater Algæ.

By G. S. WEST, M.A., A.R.C.S., F.L.S.
Cambridge, The University Press. 1904.

Certainly there is no book upon any phase of cryptogamic botany for which there has been so much need, and for which the demand, in recent years, has been so great, as one dealing comprehensively with the fresh-water algæ. It is nearly twenty years since any work of the kind has appeared in English, and whatever may have been said in favor of the works of Cooke and Wolle when they were published, there can be no question about their having been out of date for a long time. Indeed, the tremendous strides made in algology during the last ten years has made it difficult for any one but the specialists to keep informed regarding the physiology, phylogeny and morphology of this group, to say nothing of the new genera and species. Of the fresh-water algæ alone, approximately one fourth of the genera now recognized have been described since the appearance of Engler and Prantl's classification in 1890. Consequently, nearly all of the important literature upon the algæ has been in periodicals and separates, often difficult to obtain, the result being that the general student of botany has, of necessity, been many years behind in his ideas regarding this most important and interesting group of plants.

G. S. West is well known as a contributor to journals upon algological subjects, notably the Conjugateæ, and for many reasons the author of 'British Freshwater Algæ' is particularly well qualified to write such a book. One can not but regret, however, that he saw fit to confine himself to British species. A treatise of this kind, so long waited for, should be as complete as possible, and when one looks in vain for *Pleodorina*, *Platydorina* and many other important genera which fit in so perfectly with the forms previously described, it leaves this treatise upon the fresh-water algæ in an unsatisfactory condition that hardly seems necessary. The fact that none of the *Temnogametaceæ* or *Pyxisporeæ* have been found in Great Britain seems a poor reason for excluding a discussion of these important groups in a book by West. Perhaps it is ungrateful to criticize a book which contains so much more than any previous one of its kind, for not containing all upon the subject, but the satisfactory way in which the included forms have been discussed makes it the greater pity that the plan of publication or other considerations made it necessary to confine the scope of the book to the British forms alone.

A good general discussion of the methods of multiplication and reproduction in algæ, together with a reference to the question of polymorphism and a rather full exposition of the particular theories of the author regarding phylogeny, precedes the specific treatment of the six classes, *Rhodophyceæ*, *Phæophyceæ*, *Chlorophyceæ*, *Heterokontæ*, *Bacillariæ* and *Myxophyceæ*. These classes, with their included genera, constitute an arrangement very different from that found in the average textbook or even in more pretentious publications, and offers a wide field for discussion. While in the main following the suggestions of Borzi, Blackman, Bohlin and others, there are certain divergences for which there does not always seem to be justification. On the other hand, long experience with certain groups has enabled Professor West to adopt what seems to be a more natural and satisfactory disposition of some forms than that followed by either Bohlin or Blackman and Tansley. On the whole, the classification is based upon the re-

sults of careful observations of the plants themselves, rather than a mere theoretical arrangement. Whether the author is justified, by the evidence at hand, in including the rather heterogeneous *Syngeneticeæ* under the *Phæophyceæ*, or whether the *Conjugateæ* may not after all be regarded as a unicellular order which has come from the *Volvocaceæ*, with other disputed points, will probably require more facts before they can hope to be definitely settled. Nevertheless, it would be difficult to produce a system of classification which in the present state of our knowledge would be more satisfactory to a large number and at the same time recognize at least most of the investigations of recent years calculated to throw light upon the subject.

Attempts to revise the nomenclature for the purpose of putting the names of the principal genera upon a more stable and satisfactory basis have been made, not always, however, with success. That is, the rules adopted at one place seem to have been disregarded in another, resulting in a lack of consistency which can not but weaken any attempt to modify the names of well-established genera and species.

The book is fully illustrated and too much can not be said for the successful effort to secure new and accurate drawings of not only the more recently described genera, but for the older forms as well. It certainly is refreshing to be able to look through a book of this kind without seeing all of the old cuts of algæ that have done service since there began to be any literature upon the subject.

The need for a treatise upon the fresh-water algæ has been referred to; that this book will come as near to filling such a need as one of its scope, written by one man, could possibly be expected, is all that is necessary to say regarding its worth.

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SCIENTIFIC JOURNALS AND ARTICLES.

THE December number (volume 11, number 3) of the *Bulletin of the American Mathematical Society* contains the following articles: Report of the October Meeting of the