The sandal with the loops around the edges may be compared with a specimen figured in 'Wiener's Peru,' made of hide fitted around the foot and slashed around the border to receive the lacing.

It may be also compared with sandals of vegetal material in collections from northern Japan and the Aino country.

Yours truly, O. T. Mason.

U. S. National Museum.

THE PIGNUTS.

There is some question as to the exact distribution of the common Pignut (*Carya porcina* or *Hicoria glabra*) and the related *Carya* or *Hicoria microcarpa*, and the undersigned will be grateful for herbarium specimens, and especially nuts with their husks, representing both. In the recently published seventh volume of Professor Sargent's Silva, the range of *glabra* is given as southern Maine to southern Ontario, through southern Michigan to southeastern Nebraska, southward to the shores of the Indian River and Peace Creek in Florida, and to southern Alabama and Mississippi, through Missouri and Arkansas to eastern Kansas and the Indian Territory, and to the valley of the Nueces River in Texas. *H. microcarpa* (treated in the Silva as a variety of *glabra*, under the varietal name *odorata*) is said to occur in eastern Massachusetts, Connecticut, eastern and central New York, eastern Pennsylvania, Delaware, the District of Columbia, central Michigan, southern Indiana and Illinois, and Missouri. William Trelease.

St. Louis, Mo.

SCIENTIFIC LITERATURE.

A Students' Text-book of Botany: By Sidney H. Vines, Sherardian Professor of Botany in the University of Oxford. First half pp. x., 1–430, Fig. 279. 1894. Second half pp. xvi., 431–821. 1895. London, Swan, Sonnenschein & Co. New York, Macmillan & Co. 8vo.

The completion of this, the best general text-book of botanical science yet published in any language, and just now the only adequate presentation in compact form of the subject-matter within its scope, is an event of more than ordinary interest in the annals of book-making. It is not too much to say that in this work Dr. Vines has surpassed even the high expectations of his friends. The volumes in hand have all the admirable literary quality and firm grasp of recent research that characterized so notably the *Lectures on the Physiology of Plants* by the same author, which appeared in 1886 and immediately took its place among the leading authoritative manuals in its line. The later work gains, perhaps, over the earlier in its somewhat more concise and transparent style and in its more perfect subjection of the material to the logical classification adopted at the outset. Certainly nothing could be better than the chapters on the general morphology of the members, on the tissues and on the general physiology. It is a great gain to botanical teaching in England and America to have the modern point of view in anatomy and physiology thus brought forward without the confusion and archaisms that diminished in a degree the availability of older texts in common use.

In general, it should be said that the perspective of the work is most admirable. About the right relative amount of space is given to each of the four principal subdivisions—Morphology, Anatomy, Taxonomy (here called *anglicè*, the 'Classification of plants') and Physiology. As has been pointed out by previous reviewers, it might seem that the third division has been somewhat unduly extended at the expense of the fourth. Doubtless this is a natural result of Dr. Vines having specialized in physiology, for under such conditions he would possibly desire to err rather on the side of understating than of overstating the prom-

inence of his particular field, and again, in a department of the subject where his investigations and research have been so voluminous, it might seem to him a more hopeless task than elsewhere to present more than an abstract within the limits he had decided upon.

A point of peculiar excellence in this work is the terminology. Indeed, the reviewer has but one complaint to make, and that is that a somewhat too wide implication is permitted to the term 'spore.' It would seem advisable upon theoretical as well as upon practical grounds to limit zygotes, oöspores or oösperms under another name, which should indicate their sexual origin. But the conservatism apparent in Dr. Vines' use of 'spore' in the general sense is more than atoned for by his splendid development of the Schwendener-Van Tiéghem terminology of the vascular and stelic tracts, by his masterly treatment of conjunctive and cortical tissue, by his illuminating explanation of secondary increase in thickness and in the special portion by his thorough and adequate separation of sporophytic from gametophytic terminology. This latter becomes a trifle less perfect in handling when the angiosperms are taken up, but even here, if one makes a slight mental alteration in the sequences, there is no trouble in gaining an accurate idea of the homologies. For an exactly logical presentation of life-histories, it is not clear that Dr. Vines would not have served his purposes as well by always discussing the gametophyte in detail before passing to the sporophyte. In point of fact, the gametophyte is given prior treatment until the Pteridophytes are reached, and then, in the ascending order, the sporophyte is given its handling before the gametophyte. This is, of course, in deference, perhaps unconscious, to the ancient notion that the larger or more potent in vegetation of the two alternating forms is *the plant*, while the other is to a degree subsidiary. It is not apparent that it would not on the whole have been better to give the phylogenetically older gametophyte its proper precedence in all cases from Oedogonium to Angiospermæ.

The wealth of terminology has by some unthinking reviewers been condemned as making the whole work unnecessarily technical in tone and even giving a flavor of pedantry to the whole. In reply to such criticisms, Dr. Vines might aptly point out that a certain class of botanical textbooks which inform one that the 'spores are the seeds of the fungi,' for example, follow this valuable rule of calling fundamentally different things by the same name. In such cases the terminology is simple, and so is the state of mind of the student who has followed it. Modern botany is scarcely the young person's discipline of floral delectation that it was earlier supposed to be, and it does no harm to have a clear, clean-cut, limitation of different concepts under different names.

In the taxonomic portion of the work there is a conservative tone about the angiosperm arrangement which betokens the persistence of the great influence of Robert Brown, Lindley and Bentham. This is in interesting contradistinction to the firm touch with which the author places Isoëtes in its proper place alongside of Marattia and to his modern grouping of algæ, fungi and bryophytes. It should be taken as evidence, it may be, of the timidity with which the serious student of morphology approaches the antiquated delusions of systematic botanists which, more than any other delusions of botanical science, are embalmed in sumptuous volumes, under the ægis of powerful reputations and upon the foundations of scientific officialism. The cryptogams, so-called, are recognized to be a more modern and plastic group—from the point of view of investigation. Hence, one who trusts to his own good judgment and to the van-

guard of current research when cryptogamic morphology or taxonomy is in question may lean a little on the established order when he sets foot among the angiosperms. While Dr. Vines' treatment of angiospermic taxonomy does not, on the whole, please the reviewer as well as that of Warming or Schimper or of the Engler-Prantl series, nevertheless this is a matter largely of individual opinion.

In conclusion, the Vines text-book is a remarkably strong and well-balanced work. Its peculiar excellences are in the generally modern point-of-view, the transparency of the style, the perfection of the terminology, the firm and logical grouping of the material, the compactness of the treatment—especially in the chapter on physiology—the introduction of exact morphological conceptions to take the place of vague, and the evidence of wide and painstaking research that appears upon almost every page. Students of botany are to be congratulated in the same breath with the author upon the completion of the book.

Conway MacMillan.

University of Minnesota.

Chemical Analysis of Oils, Fats, Waxes and of the Commercial Products Derived Therefrom. From the German of Professor Dr. R. Benedikt. Revised and enlarged by Dr. J. Lewkowitsch., F. I. C., F. C. S., Technical Manager at the Whitehall Soap Works, Leeds, England. Macmillan & Co., New York, publishers. Price, $7.00.

The threefold task of translating, revising and enlarging Dr. Benedikt's work 'Die Analyse der Fette und Wachsarten, 1892,' by Dr. Lewkowitsch has resulted in presenting those interested in the subject the best and most complete work on Fats, Oils and Waxes. It is rarely that one finds the work of the translator so excellently performed. Almost every page bears the evidence of additions and alterations. The little work of the first publication of Dr. Benedikt has now grown into a large volume of almost 700 pages, an evidence of the numerous researches that have been made in this subject. Much of the work that we are accustomed to see in older works is here omitted, and we find it replaced by the results of more modern thought. We cannot accuse Dr. Lewkowitsch of publishing the work from other books, for at the end of almost every chapter the writer gives his experience with the various methods proposed and advises which one should be accepted, showing that this work is the result of many years' investigation. This method is most gratifying to the chemist, for assisted by the advice of such an authority much otherwise needlessly wasted time is saved.

The chapter on Physical and Chemical Properties of Fats and Waxes is very complete. Who is it who will not be thankful to Dr. Lewkowitsch for giving us concisely the result of the many publications on the rancidity of fats? "Rancidity (says Dr. L.) must, therefore, be considered due to direct oxidation by the oxygen of the air, this action being intensified by exposure to light." The table on p. 50 giving the percentages of free fatty acids in oils and fats of vegetable origin is new and is of special interest. Some of the oils, when freshly pressed from the seed, present so small a percentage that we may assume that these fats as well as the animal fats originally exist as absolutely neutral glycerides. Almost all works on fats and oils—as does this one—assert that "Fats can be heated to 250° C without undergoing any change." This I think most men who handle fats and oils practically will be forced to deny. No matter how carefully the fat has been refined to free it from all foreign matter, after being subjected to such heat it no longer possesses its original physical properties.