book would not seem to be well adapted for use as a class text in American colleges.

A. D. COLE

BOTANICAL NOTES

MORE ELEMENTARY BOTANY

FOR a long time there have been many school-men who have wished to unite the study of living things (plants and animals) into one subject, hence we have had "biology" in the curricula, and "biological" teachers, "biological" departments, as well as "biological" books. The present writer has not felt that such a fusing of two sciences is necessary, nor has he felt that it has ever been done successfully. In fact, the pupil in "biology" studies either *plants* or *animals,* unless he devotes himself to the few organisms that are on the border line between the two kingdoms, *e. g.,* the slime organisms (*Mycetozoa*), or the *Volvocineae.* This of course is never done. What is done is to take parts of the two related sciences, botany and zoology, and match them together in some fashion, and call the result "biology."

This is what has been done in the "Essentials of Biology," prepared by George W. Hunter (American Book Co., New York, 1911). In a prettily illustrated, well printed and well written book the author has attempted the impossible task of combining some study of plants and some study of animals into a consistent, single presentation. The botanical part of the book treats of flowers, fruits, seeds, roots, stems, leaves, forests, various forms of plants (only 13 pages), the modifications of plants, beneficial plants, relations of plants to animals, which is distinctly the old way of looking at plants. The zoological part begins with protozoa and takes up in succession worms, crayfishes, insects, mollusks, fishes, amphibians, reptiles, birds and mammals (and man). In the botanical part the pupil goes from higher plants to lower, while in the zoological part he goes from lower to higher.

There is much that is good in the botanical part, in fact the work seems to be good in the details, but the sequence is all wrong, and the author has been hampered by the attempt to unite into one, two totally different conceptions of living things—plants and animals.

Accompanying this book is another designed as a companion volume, entitled "A Laboratory Manual for the Solution of Problems in Biology," by R. W. Sharp, a colleague of the author of the "Essentials of Biology." Here the same criticisms hold as to the general plan of the book. However, in each chapter the work is well done, and no doubt the book will be helpful to many a teacher of botany and zoology.

A NEW MANUAL OF BOTANY

FOR so many years we have been accustomed to looking to the well-known botanical masters for general systematic manuals that we were surprised when we picked up Dr. George T. Stevens's "Illustrated Guide to the Flowering Plants of the Middle-Atlantic and New England States" (New York, Dodd, Mead & Co., 1910). The author has not been known to the botanical fraternity as one of their number, and there was doubtless some rubbing of eyes when the book first appeared. But an examination of the book shows that the author has a good acquaintance with the systematic botany of the portion of the country which his book covers and this gives him the right to add his book to the list of manuals we already have.

Opening it, one finds a pleasantly written preface in which we observe that "the classification adopted in this work is, in the main, that of Professor Adolph Engler in his Syllabus der Pflanzenfamilien." Further he says: "In the preparation of the work I have made use of my very large private herbarium, a collection which has been the work of many years, but I have had constantly before me the works of the latest German, French and English authorities and I have as constantly consulted the American works of Professor Wood, Dr. Asa Gray and that of Messrs. Britton and Brown." He gives especial credit to the work of Britton & Brown.

Before the descriptive portion of the manual is entered upon there are about fifty

pages of general matter covering the main facts of external morphology. The manual proper opens with a general synopsis of the flowering plants followed by an artificial key. Both of these are illustrated with many small figures. In the portion which is descriptive the usual treatment is followed and if one were to open the book at almost any page he would scarcely know that he was consulting a distinctly new book. The descriptions of species are considerably simplified, technical terms being rather rarely used. The species are illustrated rather fully, the illustrations being massed upon full-page plates which are interspersed among the pages of the text. These while rather roughly done are in many cases sufficiently good so as to constitute a good help especially for the student who is attempting to do the work by himself. The printing is good and the type well selected with perhaps the exception that here and there some portions of the type are quite too large and black. The species are partly decapitalized, capitals being retained only where the species is based upon a personal name. The introduction of the comma between the specific name and the name of the author is a backward step which we regret, but this can be corrected in a later edition. All in all the present reviewer is favorably impressed with the work which Dr. Stevens has accomplished, and there is no doubt that it will find a useful place in the literature of botany, especially for the non-technical student.

ROCKY MOUNTAIN BOTANY

IN 1885 Professor John M. Coulter brought out a very handy manual under the title of "Manual of the Botany of the Rocky Mountain Region," and many of us by its aid identified the plants we collected in our occasional outings in the western mountains. Somewhat over a year ago a new edition was issued under the title "New Manual of Botany of the Central Rocky Mountains" (American Book Co., New York, 1909) under the joint authorship of John M. Coulter and Aven Nelson. From the preface we learn that the labor of revision (or rather of writing the new book) fell to Dr. Nelson, the accomplished professor of botany in the University of Wyoming. The area covered is practically the same as that attempted in the earlier edition, namely Colorado and Wyoming, the most of Montana, southern Idaho, eastern Utah, northern New Mexico and Arizona, with an eastern fringe including the Black Hills of South Dakota and the higher portions of the Great Plains.

The book has been modernized by the adoption of the Engler and Prantl sequence of families, and a nomenclature that conforms "as far as practicable" to that sanctioned by the Vienna Congress. Thus we have a moderate amount of decapitalization of specific names, and the consistent use of double citation of authors' names when necessary. In this connection we note with pleasure not only the citation of authors' names, but also in every case the citation of the original paper or publication in which the name first appeared. Of course in following the Vienna rules the author discards names which are identical for the genus and species, as *Taraxacum taraxacum*. The book has thus a vein of conservatism in spite of the fact that the author is fairly radical in the subdivision of some of the genera.

The handy summary shows that the author has "accepted" 2,733 species and 186 varieties in his treatment and regarded as synonyms of some of these 1,788 more, making a total of 4,707 "species" as they are regarded by some botanists.

The book will probably prove as useful to tourists and more serious collectors in the Rocky Mountain region as its predecessor, and both the earlier and the later authors are to be congratulated upon the new life of usefulness which will be accorded the new book.

BOTANICAL NOTES

AMONG recent papers may be noted the following:

"The Conditions of Parasitism in Plants," by D. T. MacDougal and W. A. Cannon (Carnegie Institution, 1910), discusses briefly dependent nutrition in seed plants, the root

habits and parasitism of *Krameria canescens,* xeno-parasitism (experimental production of parasitism), and the origination of parasitism, the latter a most suggestive philosophical discussion.

"Some Contributions to the Life History and Cytology of the Smuts," by B. F. Lutman (*Transactions Wisconsin Academy of Sciences,* 1910), adds materially to our knowledge of the development of these plants.

"A Catalogue of the Flowering Plants and Ferns of Connecticut," by a committee of the Connecticut Botanical Society (Geological and Natural History Survey, 1910), attempts to give "an accurate and authoritative catalogue of all the plants known to grow without cultivation in Connecticut," and it appears to have accomplished this purpose so far as the flowering plants and ferns are concerned. In the summary we learn that there are included in the catalogue 74 species of pteridophytes (all native) and 1,407 native spermatophytes, with 461 introduced species.

In passing we should notice favorably Wettstein's "Handbuch der Systematischen Botanik" (Leipzig, Franz Deuticke, 1910–11), a thick volume of over nine hundred pages. Seven great phyla ("Stamme") are recognized, viz., *Myxophyta* ("conventionally" placed here), SCHIZOPHYTA, ZYGOPHYTA (including *Peridinieae, Bacillarieae* and *Conjugatae*), PHAEOPHYTA, RHODOPHYTA, EUTHALLOPHYTA (including *Chlorophyceae* and *Fungi*) and CORMOPHYTA (including *Archegoniatae* and *Anthophyta*). The work will prove a most helpful one for the student of systematic botany, and merits translation into English.

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SPECIAL ARTICLES

ON THE STEREOTROPISM OF EMBRYONIC CELLS

IN a former paper, describing the development of nerve fibers in foreign media, the hypothesis was advanced[1] that the fibers require some form of solid support in order to carry out the growth process, which, as was shown, is a form of protoplasmic movement. The present communication presents in brief form the results of some experiments on the movement of embryonic cells, which show beyond doubt that the hypothesis holds true for the cells of the mesoderm and the medullary tube of the frog embryo. With reference to the outgrowing nerve fibers, however, the observations are too few to warrant any more definite statement about them at present.

In the previous experiments the solid support was given in the form of a fibrin network, derived from the clotting of fresh lymph. In the present study spider web was used to support the small pieces of transplanted tissue immersed in various fluid media. The object of the investigation being to compare the behavior of embryonic cells in the same medium, with and without solid support, two sets of preparations were made; one in which the tissue was placed in a simple hanging drop in a moist chamber, the other in which the drop was supported from below by a closely woven spider web. The moist chambers were made by sticking glass rings to object slides by means of vaseline and sealing to the ring a cover slip with the culture drop. The spider webs were tightly spanned over the upper surface of the glass rings prior to fastening the latter to the slide; the pieces of tissue to be studied were then transferred in very small drops of fluid to the web, and the preparations immediately covered by cover slips, also coated with the web, so that the pieces of tissue remained supported between two layers of the fabric.

The fluid media which were employed were purposely varied considerably; physiological salt solution, Locke's solution and Ringer's solution (without sugar) of full strength and diluted, and also defibrinated frog's serum, were all used. The best results were obtained with the defibrinated serum, but some positive results were obtained with all the inorganic solutions used, showing, in agreement with the work of M. R. and W. H. Lewis,[2] compatibility of wide range between tissue and medium.

[1] *Journ. of Exp. Zool.,* Vol. 10, 1910.

[2] *Anatomical Record,* Vol. 5, No. 6, June, 1911.