SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

PUBLISHED BY

N. D. C. HODGES,

874 BROADWAY, NEW YORK.

SUBSCRIPTIONS.—United States and Canada.....$3.50 a year.
Great Britain and Europe..... 4.50 a year.

Communications will be welcomed from any quarter. Abstracts of scientific papers are solicited, and one hundred copies of the issue containing such will be mailed the author on request in advance. Rejected manuscripts will be returned to the authors only when the requisite amount of postage accompanies the manuscript. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guaranty of good faith. We do not hold ourselves responsible for any view or opinions expressed in the communications of our correspondents.

Attention is called to the "Wants" column. It is invaluable to those who use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

For Advertising Rates apply to HENRY F. TAYLOR, 13 Astor Place, New York.

MODERN BOTANY.[1]

BY CHARLES R. BARNES, PROFESSOR OF BOTANY IN THE UNIVERSITY OF WISCONSIN.

I VENTURE to say that the ideas conjured up by the words "botany" and "botanists" in the minds of those of you whose school days ceased anywhere from fifteen to twenty years ago, or perhaps even at a later date, will be one which is very widely different from the ideas that those words ought to bring up. To most people the word "botany" recalls something which chiefly means the collecting of flowering plants in the spring; pulling flowers to pieces in an endeavor, too often a vain endeavor, to find out a long, hard name for the plant; an endeavor which is often vain unless they have acquired the very useful trick of looking in the index for the common name. The word "botanist" brings to mind a sort of harmless crank who spends most of his time in wandering about fields and woods and poking into swamps and bringing home arms full or boxes full of plants; perchance drying them and preserving them. Yet these two ideas are so extremely foreign to the subject of botany as it is thought of to-day, that I venture to present to you some hints of what modern botany is, and particularly what modern botany is on its economic side. The study that I have indicated as being the common one is the study of a part only of botany; one to be sure which is not without its value; but it is only the most elementary part of the subject. It was very natural that when people began, in the revival of learning, and at the close of the middle ages, to study plants, they should first turn their attention to the plants which were nearest at hand, and to those plants which attracted their attention most readily on account of their size. So we find that the early studies of plants are almost exclusively an attempt to describe and classify; at first simply to describe the plants which one found about him; later to ascertain what the relations of these plants to each other were. From that day until the present this study and classification of the higher plants has been almost the only subject to which any very great attention has been given. In our own country the people who came to it, if they had had any training at all in botany, had been impressed with the importance of the same ideas. They had come to a new country. It was their first duty to make known to those abroad who were studying plants, what the flora of this country was; and, from the year 1750 on, collections of great number and often of considerable value went across the water.

From 1750 to late in the present century little attention was given to any other department of botany; and it is only within the last ten or fifteen years that descriptive botany has had any competitors for favor. In Germany, however, the matter is widely different; it has been a much longer time since systematic botany, the study of plants as far as their classification is concerned, was the only topic which attracted attention. The reason of this is perfectly evident. People exhausted the subject to a certain degree in that country, and they then naturally turned their attention to some other phase of plant study. Germany and France stand far in advance of this country to-day in the investigations which their botanists have pursued, solely because of the longer time during which they have been at work, and the greater amount of time which each investigator is able to give to his own special subject.

But students nowadays are not expected to collect flowers and find out their names and then congratulate themselves that they have studied botany. They are put to work with the microscope to see the very minutest arrangement of the complicated machinery of plants. They are set to work with the pencil to delineate these arrangements; to record their observation in a way which appeals at once to the eye, without the intervention of words; and, in spite of the repeated assertion that they cannot draw, they are told to do the very thing which they cannot do until they have learned how to do it. They are asked to equip themselves with chemical and physical knowledge, in order that they may be able to study this machinery in action; and when they have attained a sufficient knowledge of other sciences, then, and then only, can they expect to unravel some of the mysteries of plant life, in many ways the least mysterious of organic things.

Now, what is the object and purpose of such training as this? First, it is to develop skill of eye, hand, and brain. It is to bring to them something of those qualities to which the essayist of the evening alluded. It is to enable them to see in the material things around them something more than bits of matter. It is to enable them to gain that breadth of comprehension and grasp of intellect which it is desirable that every educated man should attain. I hope, therefore, that the members of this society will use their utmost endeavor to have this sort of vital and vitalizing study commenced in the schools below the college and university; in what we may call the primary schools as contrasted with the secondary ones. Most of the high schools in the State to-day, I am sorry to say, are studying this subject in the same way in which it was studied twenty-five years ago, and they are doing this work partly because they have had no pull from higher schools to lift them to a higher level, and partly because they know no better way.

On its economic side this sort of training has its chief value, and it is that, I take it, in which the members of this society are mainly interested. Let me select a few topics from the very great number at my disposal in order to illustrate to you, if I can, just what the economic bearing of this

[1] An address delivered before the State Agricultural Society of Wisconsin, Feb. 1, 1892; stenographically reported and published by permission of the secretary in advance of the volume of Proceedings for the year.