

**LABORATORY
PRACTICE FOR
BEGINNERS IN BOTANY**

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Laboratory practice for beginners in botany by William A. Setchell

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WILLIAM A. SETCHELL

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BY

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UNIVERSITY OF
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PREFACE

The writer has been frequently asked to express to others his ideas on the subject of the teaching of botany in the schools. He has been led to consider the problem from a number of different points of view and to try a number of different methods in attempting a satisfactory solution. After experimenting with a number of classes of beginners both in the preparatory schools and in the university, he has arrived at the following conclusions : —

Botany in the preparatory schools should be taught —

1. As a science, to cultivate careful and accurate observation, together with the faculty of making from observations the proper inferences; and
2. As a means of leading the mind of the student to interest itself in the phenomena of nature for its own further development and profit.

In order to make the study of botany more effective under the first head, it seems best to bring the student into immediate contact with the object itself, in the laboratory; and not only that, but to avoid interposing apparatus, as far as possible, between the student and the object to be studied.

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For this purpose, the writer has practically confined his attention to the larger plants.

Desiring also to cultivate, as far as possible, the ability to draw correct inferences from exact observations, the writer has deemed it best to consider the subject from a somewhat different point of view from that usually adopted, and has attempted to make the morphological study bear fruit in this direction. The great difficulty in most laboratory work is to make the students realize the significance of the morphological details. They may observe accurately and record their observations carefully, but what of that? The physiological significance is overlooked — even in many cases where experiments are used to illustrate physiological phenomena.

That the plant is a living thing, is a fact that must be borne *actively* in mind, both by teacher and by student. The plant must obtain the materials for its support, and to do this it must compete with other plants; it must protect itself against or seek the aid of animals; it must obtain the energy and materials to reproduce its kind, and endeavor to place its offspring where they may have a proper chance for development; and, destitute of a mind as it is, it exercises an ingenuity, so to speak, that is of no mean order. We must, then, think of the plant as a *living, working, struggling* being with a single object in life, viz, to reproduce its kind; and every variation in structure, be it great or little, is to be examined to determine, if possible, its use or history.

The writer has had the teachers particularly in mind in

arranging the order of study. The seed is taken up first, because it is not only readily obtained, readily studied, and its meaning clear, but it is also one of the most convenient starting-points for a study of the life-history. After a few studies to show how the plants start upon an independent existence, typical stems, roots, and leaves are considered, both as to their structure and as to their usefulness to the plant. Then follows the study of the modification of these organs, especially in plants which store away nourishment, which protect themselves from grazing animals, which climb up above their neighbors for light and air; of plants which are robbers or huntsmen, taking their food from other plants or by capturing animals; and finally, a glance at the different ways in which plants propagate their kind.

If both teacher and student can conceive of the plant in this way, an abundant harvest of interesting and instructive phenomena will be presented to view, and both will have come into far closer communion with nature than is possible in any other way.

In conclusion, the writer wishes to say that this sketch is intended for beginners, either in the higher grades of the primary schools, or in the secondary schools. It is not intended to hamper the teacher with too explicit directions, but to assist in directing attention to certain details and leave the teacher free to suggest farther work and thought upon each subject. In the second appendix, especial hints and suggestions are given to teachers, and references through which the writer hopes to convey to the teacher

the point of view which he himself takes in the particular exercise.

It remains to the writer to thank his colleagues in the University of California for their valuable aid in the preparation of this guide, and especially to Willis L. Jepson, who has made valuable suggestions at every point.

UNIVERSITY OF CALIFORNIA,
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