

**A LABORATORY  
MANUAL OF HIGH  
SCHOOL BOTANY**

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A Laboratory Manual of High School Botany by Frederic E. Clements & Irving S. Cutter

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OF  
HIGH SCHOOL BOTANY

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BY

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## PREFACE

THE present work is intended solely as a laboratory guide in connection with lectures or a text-book. The matter has, in consequence, been presented in the briefest and most compact form consistent with this purpose. The aim is to put the student to work quickly and to keep him at work intelligently. Explanation has been added only when it seemed essential to the proper handling of the laboratory work. The material and the teacher have been regarded as the two important facts in the work. The laboratory directions, it is hoped, will bring the student into direct contact with the material, and will relieve the teacher of a large amount of drudgery, thus giving him time for real teaching.

The Manual is an authoritative expression from the Department of Botany of the University of Nebraska upon the kind and amount of elementary botany that should be taught in the accredited schools and colleges of the state. It has been written with the idea of making it possible for schools to give at the same time the proper preparation in botany to those intending to go to college, and a broad and scientific view of plants to those who stop at the end of the high school. In consequence, it can not be used in part, if the best results are desired. The completion of the entire work as outlined gives two credit points. In those

schools which are not yet prepared to give the subject the full amount of time, a credit of one point will be given for a prescribed amount of work done in the different divisions. The amount of work required for one credit point may be learned by communicating with the Department of Botany.

University of Nebraska, August 1, 1900.



## CONTENTS

General Directions .....	7
Plant Structure or Histology .....	31
Structure and Classification .....	55
Phytogeography .....	78
Synopsis of the Larger Groups of the Vegetable Kingdom .....	80
Physiology .....	85
Appendix .....	101
Glossary .....	102

required of them than to buy one or two high-priced microscopes which are altogether out of place in an elementary laboratory. The following microscopes are recommended by the Department of Botany for use in the high schools and colleges. Bausch & Lomb OA microscope with two oculars, one containing a micrometer,  $\frac{1}{8}$ ,  $\frac{1}{8}$  objectives and double nose-piece, costing approximately \$23. Leitz, Stand IV, with No. 2 and 3 ocular, No. 3 and 7 objectives, and double nose-piece, \$22.50. The latter may be obtained of William Kraft, 411 West 59th St., New York. In the case of high schools, it is preferable to buy from Bausch & Lomb, simply for the reason that it is not necessary to wait for importation, as is the case with the Leitz instruments. There is practically no difference between the two makes of instruments.

#### LABORATORY EQUIPMENT

Each laboratory table should be supplied with a set of drop bottles containing the following reagents: alcohol, glycerin, iodine, potassium hydrate, sulphuric acid conc., anilin sulphate, safranin, gentian violet, methyl green, hydrochloric acid. Probably all of these may be obtained from the local druggist, with the exception of the last four which may be bought of Bausch & Lomb. The salts used in making experiments with nutrient solutions should be obtained from this company also.

Satisfactory laboratory work is impossible without good tools. For this reason it is unwise to use odds and ends in the way of razors, scalpels, tweezers, etc.

No work should be attempted without good dissecting sets, each set being assigned to as few students as possible. At the end of each working period, the teacher should see that the set is returned in perfect condition. A good hone and strop should be provided, and the students thoroughly instructed in their use and care. The botanical dissecting sets, yellow Belgian hones, and good strops may be obtained of Bausch & Lomb.

Bessey's "Essentials of Botany," 7th ed., and Pound and Clements' "Phytogeography of Nebraska," 2d ed., should be constantly at hand as reference books or as texts. In addition, every botanical laboratory should have a copy of each of the following:

MacDougal's "Experimental Plant Physiology," \$1.

Sachs' "Text-book of Botany," The MacMillan Company, 66 Fifth Av., New York, \$5.

Strasburger's "Text-book of Botany," The MacMillan Company, \$4.50.

Bennett and Murray's "Cryptogamic Botany," Longmans, Green and Co., 15 E. 16th St., New York, \$4.15.

Britton and Brown's "Illustrated Flora of the Northern United States," Charles Scribner's Sons, New York, 3 vols., \$9.

Zimmermann's "Botanical Microtechnique," Henry Holt & Co., New York, \$2.60.

"Flora of Nebraska," Parts I and II. Botanical Seminar, University of Nebraska, Lincoln, \$2.

Webber's "Catalogue of the Plants of Nebraska"