

PREFACE.

THE point of view and the methods of study first advanced in "Research Methods in Ecology" have proved so satisfactory in teaching as to make it desirable to embody them in a text-book. The present text has been based largely upon "Research Methods," though most of the matter is new or rewritten. The manner of treatment is essentially the same, but the subject-matter has been rearranged and broken up into a larger number of chapters. The plant is first considered as an individual, with respect to factor, function, and form, and then as a member of a plant group or formation.

The reasons for regarding ecology and physiology as essentially the same have been given elsewhere, and need not be repeated here. An endeavor has been made to give the various parts of this vast field their proper importance. Since ecology and physiology are merged, it is manifestly impossible to give to either what would be regarded as a complete treatment by a specialist in either line. No attempt has been made to touch all the points in each, but it is thought that nothing really fundamental has been omitted.

The book is intended for use with classes in second-year botany in college and university. In manuscript form, it has been in such use for two years with good results. Although the amount of laboratory and field work is large, it is possible to accomplish all of it in a course requiring 6-8 hours of laboratory time each week.

This can be done only by careful planning on the part of both instructor and student, and for this reason the following suggestions are offered as aids.

The instructor will find it imperative to plan in advance for the experiments for the whole year, in order that plants may be ready as needed. Seeds and fruits

for the study of migration should be collected in the fall. Shade tents, water-content series, and competition cultures must also be prepared early in the year. Types of hydrophytes, xerophytes, etc., should be grown in the plant-house in so far as possible. Students should be instructed to make duplicate plantings of all plants to be used in order to make sure of an adequate supply at all times. It has also been found desirable to teach the students the use of the paraffin method of embedding tissues, thus saving much time and securing better results. The work on adaptation to water and light is best carried on in the form of joint experiments, in which each student is assigned a definite part. In the experiments much use has been made of the common sunflower. This is on account of the ease with which it may be secured and grown, but when a larger choice is possible other plants may often be substituted to advantage.

In just as far as possible, the work of the student should be among plants out-of-doors. This is imperative in the chapters on vegetation, and is very desirable in all cases where it is feasible, even in the study of plant functions. For vegetation work, the knowledge of the more important genera and species of the several formations is indispensable. If the student does not already have this knowledge, the names should be furnished him by any desirable method, without taking the time necessary for identification.

A bibliography has not seemed necessary and has not been given. A fairly full list of the more important works is found in "Research Methods." Apart from the latter, Pfeffer's "Pflanzenphysiologie," MacDougal's "Text-book of Plant Physiology," Sach's "Text-book of Botany," Vines' "Lectures on the Physiology of Plants," and Kerner's "Pflanzenleben" have been frequently consulted in the preparation of the text.

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