

Part II
Specific Methods

12. Introduction

The presentation of detailed directions for specific subjects must be prefaced by certain reservations and precautions. Reactions of plants vary with their age, degree of differentiation, degree of turgor, and perhaps many intangible physiological factors. Each step in the processing involves a time factor, the duration of that particular treatment. The numerous successive operations, each with a variable time factor, offer innumerable combinations of treatment. This is complicated by variations in the purity of reagents, fluctuations of room temperature, failure of oven thermostats, and just plain blunders by the worker. The possibilities of influencing the finished product are obvious. Therefore the author of a research paper or a manual is reluctant to present a set of written directions with any assurance of success to his readers. However, a study of the general principles of collecting, killing, and processing, as outlined in Chaps. 1, 2, and 3, will enable the reader to use the following directions with reasonable assurance of success.

This section of the manual should be regarded as closely linked with Part I. The general methods of collecting and processing described in Part I will now be supplemented by specific recommendations as to suitable plants for illustrating various topics and the techniques of processing these plants. The reader should refer back frequently to pertinent portions of Part I.

Plants selected for study not only should show the desired structural features to best advantage but also should have the virtue of familiarity to the student and availability. Why use *Vanilla*, a rare orchid, to illustrate the anatomy of the monocot root when the common garden asparagus yields instructive slides? Some of the slides used for teaching should be of species other than those illustrated in the official textbook. This demands more critical study of the slides by the students and minimizes the copying of text figures. The plants

recommended here are available in most parts of the country or can be grown in the greenhouse or even in a window box. The local florist shop and commercial green houses are fruitful sources of materials, especially exotics. Algae, fungi, and bryophytes can be found in abundance when one has learned where to look. Such local foraging and field trips afford a wealth of material.

The sequence in which specific recommendations are arranged in this manual takes cognizance of the customary arrangement of topics in textbooks of botany. Laboratory courses in general botany, anatomy, and histology are oriented around topics and fundamental problems that cut across taxonomic lines. The leaf, for example, is studied as a functional and structural unit, a food-making organ. A comprehensive study of the leaf from this point of view necessitates a comparison of leaves of a wide range of vascular plants and perhaps even of mosses. The stem and root are likewise studied as organs having structural diversity and functional modifications but nevertheless having some fundamental pattern. In addition to that elusive entity, the *typical* organ, it is essential to examine variations and modifications of the basic pattern. A comprehensive study of vascular anatomy thus embraces vascular plants from *Lycopodium* to *Orchis*.

From the standpoint of technique each organ presents its characteristic problems. For example, broad leaves of plants in widely separated taxonomic groups have in common such problems as collecting, subdivision in sampling, and orientation in sectioning. If we were to consider in its entirety some one species, like an oak, we would find that its root tips, embryo sac, and old stem present very different problems of technique.

These considerations have led to the arrangement of Part II, in which categories of organs as well as taxonomic position are used as major chapter topics.