

PLANT PHYSIOLOGY

With reference to the green plant

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PREFACE TO THE SECOND EDITION

In the preparation of this edition, various topics have been enlarged or revised to include the investigations and findings that have been made since the publication of the first edition. Certain topics that were overlooked in the preparation of that edition have been added. New material has been presented under appropriate headings.

Although no claim to completeness is made, it has been the effort of the author to present the more important citations relating to each subject. He has tried to present impartially the data that have been reported. He does not feel qualified to speak with authority on a majority of the topics, and his own ideas, if presented, thus would be of little consequence.

In order to conserve space, the questions that concluded each chapter in the first edition have been omitted.

The author is indebted in various ways to several of his associates at the Kansas State College of Agriculture and Applied Science, and he takes this occasion to thank them. He wishes to thank especially Hugh G. Gauch, for his invaluable aid in assembling and typing the bibliographies and other portions of the manuscript, and for aid in editing it; John C. Frazier, for aid in editing the manuscript, for helpful advice, and for unselfish service in many ways; Dr. Fritz Moore, head of the Department of Modern Languages, and Mrs. Irene Moore, for checking, respectively, the German and the French references; and Miss Esther Lewis, for clerical help in preparing the last half of the manuscript.

The author is especially indebted to Professor L. E. Melchers, head of the Department of Botany and Plant Pathology, Kansas State College of Agriculture and Applied Science, for his kindness in allotting clerical and stenographic help for the revision of this text.

EDWIN C. MILLER.

KANSAS STATE COLLEGE OF AGRICULTURE AND APPLIED SCIENCE,
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PREFACE TO THE FIRST EDITION

There has existed for some time a need for an advanced text in plant physiology. The various texts by European investigators and teachers, although summarizing the work that has been done on the Continent, have failed to cover adequately the contributions of American and English plant physiologists. These contributions during the past two decades have been outstanding and dominate in many cases the work along certain lines. A summary of these contributions should be available to students, teachers, and investigators in the field of plant physiology.

It has been the intention of the author to bridge this gap in the literature and to summarize in this book the more important findings of English, American, and Continental plant physiologists. The material has been assembled in such form as to be available as a text for upper-classmen and graduate students and at the same time to be sufficiently comprehensive as a reference book for investigators in plant physiology.

The work has been confined entirely to the physiology of the green plant, as it has been thought that the processes and phenomena of the fungi belong, at present at least, to the province of plant pathology and allied fields. The discussions and summaries of the various investigators have been used freely, and in many cases their phraseology has been altered but little. The author has tried, however, in each instance to indicate the source of the information presented. Some topics are discussed more thoroughly than others. This, however, is to be expected as an author naturally is more familiar with those subjects which are in the field of his research.

With but few exceptions the references cited at the end of each chapter have been mentioned or discussed in the text. It is considered that these references will be of value to those who desire to familiarize themselves more thoroughly with any of the topics than they are herein discussed. The questions following each chapter cover all the topics discussed in that portion of the text. It has been the experience of the author that these are valuable to the student as an aid in guiding him to a mastery of the subject matter.

This text is the outgrowth of twenty years' experience as a teacher of plant physiology in the Kansas State Agricultural College and as plant physiologist of the Kansas Agricultural Experiment Station. The material included herein has been presented to classes composed for the most part of juniors, seniors, and graduate students. The favorable

manner in which the subject matter and its method of presentation have been received in the classroom has prompted the author to present this volume to the public.

I am indebted to many of my associates for assistance in the preparation of this text. Most of the drawings were made by Mr. S. Fred Prince, formerly biological artist at the Kansas State Agricultural College. I am indebted to Miss Nora E. Dalbey, associate professor of botany in the Kansas State Agricultural College, for certain drawings and for helpful suggestions in the arrangement of the illustrations. I wish to thank Dr. Frank M. Schertz of the U. S. Bureau of Chemistry and Soils, Dr. John W. Shive of the New Jersey Agricultural Experiment Station, Dr. W. E. Tottingham of the University of Wisconsin, Dr. F. F. Blackman of Botany School, Cambridge, England, and Professor W. E. Davis of the Kansas State Agricultural College for permission to use certain figures as indicated in the text.

I am grateful to Mr. J. C. Frazier, formerly of the Department of Botany and Plant Pathology, Kansas State Agricultural College, for helpful advice in the preparation of the manuscript and to Dr. R. P. White, formerly of the same department, for criticism and advice in the preparation of Chap. II. I wish to thank Dr. J. V. Cortelyou, professor of modern languages at Kansas State Agricultural College, and Miss Madge Wardell, instructor in French at the same institution, for checking respectively the German and French references. I wish also to acknowledge the most valuable aid and advice of Miss Nellie Jacobs, clerk in the Department of Botany and Plant Pathology, Kansas State Agricultural College, in the preparation of the manuscript.

I am especially indebted to the following of my colleagues in the Kansas State Agricultural College for their constructive criticism in the preparation of the text: S. C. Salmon, professor of farm crops; Dr. P. L. Gainey, professor of bacteriology; R. J. Barnett, professor of horticulture; Dr. H. H. Haymaker, professor of plant pathology; W. E. Davis, professor of plant physiology; Dr. F. C. Gates, professor of taxonomy and ecology; Dr. F. L. Duley, professor of soils; Dr. C. W. Colver, professor of organic chemistry; and Dr. E. L. Tague, associate professor of chemistry. The author alone, however, is responsible for the statements in the text.

EDWIN C. MILLER.

KANSAS STATE AGRICULTURAL COLLEGE,
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