**FUNDAMENTALS
OF
BOTANY
SERIES**

**REPRODUCTION,
HEREDITY,
AND SEXUALITY**

**FUNDAMENTALS
OF
BOTANY
SERIES**

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THE PLANT CELL

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REPRODUCTION, HEREDITY, AND SEXUALITY

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NONVASCULAR PLANTS: FORM AND FUNCTION

William T. Doyle, Northwestern University

VASCULAR PLANTS: FORM AND FUNCTION

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PLANTS AND CIVILIZATION

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UNIVERSITY OF OREGON

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Macmillan Education

MACMILLAN AND COMPANY LIMITED,
ST. MARTIN'S STREET, LONDON, W.C.2.

also

BOMBAY, CALCUTTA, MADRAS, MELBOURNE.

First published in the U.K. 1964.

©1964 by Wadsworth Publishing Company, Inc.,
Belmont, California.

ISBN 978-0-333-02199-6 ISBN 978-1-349-00155-2 (eBook)
DOI 10.1007/978-1-349-00155-2

FOREWORD

Because of the immensity and complexity of the field of botany, the great diversity of plants, and the many methods of plant study, the problem of how to present to the student the highlights of botanical knowledge gained over centuries is not easy to solve. The authors and editors of the volumes in this series believe that an understanding of plants—their parts, their activities, and their relationship to man—is of fundamental importance in appreciating the significance of life. To stress this concept, the form and function of plants, tissues, and cells are treated together. At all levels of organization, in each volume, information gathered by morphologists, physiologists, cytologists, taxonomists, geneticists, biochemists, and ecologists is combined.

Thus, in the volume on *The Plant Cell* by William A. Jensen, the structure and function of the various cell parts are discussed together—for example, mitochondria and respiration, photosynthesis and chloroplasts. The volume by Stanton A. Cook, *Reproduction, Heredity, and Sexuality*, combines the principles of genetics with the means of reproduction in the various plant groups. *Nonvascular Plants: Form and Function*, by William T. Doyle, and *Vascular Plants: Form and Function*, by Frank B. Salisbury and Robert V. Parke, cover the major plant groups and discuss the plants in terms of morphology, physiology, and biochemistry. The relation of plants, particularly vascular plants, to their environment and to each other is covered in *Plants and the Ecosystem* by W. D. Billings. The form and distribution of plants of the past and their relation to the concepts of evolution are considered by Harlan Banks in *Evolution and Plants of the Past*. Herbert G. Baker, in *Plants and Civilization*, discusses the importance of plants to man's social and economic development and the equally important consideration of man's role in the modification and distribution of plants.

In a series such as this, the editors are faced with the task of dividing a broad field into areas that can be presented in a meaningful way by the authors. There must be logic in the entire scheme, with few gaps and a minimum of overlap. Yet an instructor may not want to use

the series of volumes in the sequence and manner preferred by the editors. Consequently, each volume must be usable alone and also in any sequence with the others. To achieve such a high degree of versatility is difficult, but we believe the series exhibits these features.

A concerted effort has been made by the authors and editors to maintain a consistent level of presentation. However, each author has been encouraged to approach his subject in his own way and to write in his own style in order to provide variety and to exploit the uniqueness of the individual author's viewpoint. Finally, while presenting the principles of botany we have tried to communicate the excitement of recent developments as well as the joy that comes with the extension of knowledge in any field.

This volume considers the questions of why organisms must reproduce, how their development and mode of reproduction is related to their environment, how like begets both like and unlike, and what sex in botany means. The framework is constructed from knowledge at all levels: molecule, cell, organism, and population. Chapters 2 through 6 deal with genetics—the transmission of characteristics and control of development. Chapters 7 through 10 are concerned with the adaptive and evolutionary significance of various systems of reproduction. Thus, the book goes in two directions: toward the lower levels of molecular genetics, and toward higher levels of adaptation of populations. It examines the forests as well as the trees that make them up, and thus attempts to escape the paradox we are said to be caught in—of learning more and more about less and less as science advances.

CONTENTS

1. Fundamental Concepts	1
2. The Nature of Inheritance	3
3. Complications of Inheritance	17
4. Hereditary Matter: The Chromosome	23
5. Hereditary Matter: Inheritance and Development— The Gene	41
6. From Gene to Character: The Mode of Gene Action	55
7. Reproduction and Fitness	75
8. Asexual Reproduction or Apomixis	81
9. Recombination and Sexual Reproduction	87
10. Control of Recombination and Evolution of Genetic Systems	94
<i>Suggestions for Further Reading</i>	107
<i>Glossary</i>	109
<i>Index</i>	115