THE FUNGI

GÄUMANN

THE FUNGI

A DESCRIPTION OF THEIR MORPHOLOGICAL FEATURES AND EVOLUTIONARY DEVELOPMENT

BY

ERNST ALBERT GÄUMANN

DIRECTOR OF THE INSTITUTE OF APPLIED BOTANY
ZURICH, SWITZERLAND

Translated from the German and arranged
as an American text by

FREDERICK LYLE WYND

PROFESSOR OF BOTANY AND PLANT PATHOLOGY,
MICHIGAN STATE COLLEGE

With 440 figures

HAFNER PUBLISHING COMPANY

NEW YORK—LONDON

1952

ORIGINAL TITLE:
DIE PILZE, GRUNDZÜGE IHRER ENTWICKLUNGSGESCHICHTE UND MORPHOLOGIE
PUBLISHED BY VERLAG BIRKHÄUSER AG., BASEL

COPYRIGHT, 1952
BY
HAFNER PUBLISHING COMPANY, INC., NEW YORK

PRINTED IN SWITZERLAND

PREFACE

The authors have attempted to describe the significant morphological features of the fungi, and to show how certain of these features suggest the evolutionary history of this complex group of plants. The task has not been an easy one, for this group of organisms is vast in magnitude, and the existing knowledge of many forms is meager and often fragmentary.

It is important that the diligent student of Mycology should know the complexity of the fungi as well as their more apparent general features, and for this reason the authors have not hesitated to present detailed descriptions of a large number of species, and to discuss relationships which are controversial and even problematical. An effort has been made, however, to avoid discussions which might unnecessarily confuse the student in his attempt to perceive the probable evolutionary origins and the developmental trends of the living fungi.

No attempt has been made to show the historical background of the science of Mycology, and only the general aspects of current theories are discussed. The bibliography has been selected especially to guide the student to more detailed discussions of special groups. The bibliography is not complete in the historical sense, as only the more recent literature is cited.

HEINZ KERN and ERNST LEHMANN prepared the original figures appearing in the text. Besides these careful and painstaking workers, the authors wish to thank Dr. A. ROHN, President of the Board of the Swiss Federal Institute of Technology for a contribution which made it possible to illustrate the book with particular care.

March 15, 1951

ERNST ALBERT GÄUMANN
Director of the Institute of Applied Botany, Swiss Federal Institute of Technology, Zurich, Switzerland

FREDERICK LYLE WYND
Professor of Research, Department of Botany and Plant Pathology, Michigan State College, East Lansing, Michigan

TABLE OF CONTENTS

此为试读,需要完整PDF请访问: www.ertongbook.com

THE FUNGI

A DESCRIPTION OF THEIR MORPHOLOGICAL FEATURES AND EVOLUTIONARY DEVELOPMENT

BY

ERNST ALBERT GÄUMANN

DIRECTOR OF THE INSTITUTE OF APPLIED BOTANY
ZURICH, SWITZERLAND

Translated from the German and arranged
as an American text by

FREDERICK LYLE WYND

PROFESSOR OF BOTANY AND PLANT PATHOLOGY,
MICHIGAN STATE COLLEGE

With 440 figures

HAFNER PUBLISHING COMPANY

NEW YORK—LONDON

1952

PREFACE

The authors have attempted to describe the significant morphological features of the fungi, and to show how certain of these features suggest the evolutionary history of this complex group of plants. The task has not been an easy one, for this group of organisms is vast in magnitude, and the existing knowledge of many forms is meager and often fragmentary.

It is important that the diligent student of Mycology should know the complexity of the fungi as well as their more apparent general features, and for this reason the authors have not hesitated to present detailed descriptions of a large number of species, and to discuss relationships which are controversial and even problematical. An effort has been made, however, to avoid discussions which might unnecessarily confuse the student in his attempt to perceive the probable evolutionary origins and the developmental trends of the living fungi.

No attempt has been made to show the historical background of the science of Mycology, and only the general aspects of current theories are discussed. The bibliography has been selected especially to guide the student to more detailed discussions of special groups. The bibliography is not complete in the historical sense, as only the more recent literature is cited.

HEINZ KERN and ERNST LEHMANN prepared the original figures appearing in the text. Besides these careful and painstaking workers, the authors wish to thank Dr. A. ROHN, President of the Board of the Swiss Federal Institute of Technology for a contribution which made it possible to illustrate the book with particular care.

March 15, 1951

ERNST ALBERT GÄUMANN
Director of the Institute of Applied Botany, Swiss Federal Institute of Technology, Zurich, Switzerland

FREDERICK LYLE WYND
Professor of Research, Department of Botany and Plant Pathology, Michigan State College, East Lansing, Michigan

ORIGINAL TITLE:
DIE PILZE, GRUNDZÜGE IHRER ENTWICKLUNGSGESCHICHTE UND MORPHOLOGIE
PUBLISHED BY VERLAG BIRKHÄUSER AG., BASEL

COPYRIGHT, 1952
BY
HAFNER PUBLISHING COMPANY, INC., NEW YORK

PRINTED IN SWITZERLAND

此为试读,需要完整PDF请访问: www.ertongbook.com

TABLE OF CONTENTS

INTRODUCTION

The fungi are those thallophytes which do not possess chlorophyll. The bacteria and Myxomycetes, although they also are thallophytes without chlorophyll, usually are excluded from the fungi because of certain features of their structure and life history. The bacteria are excluded because they do not possess a true nucleus containing chromosomes. The Myxomycetes also are excluded because their vegetative cells are not enclosed by a cellulose or chitinous cell wall. If the fungi are defined so as to exclude the bacteria and Myxomycetes, they are called Eumycetes. However, the use of the term Eumycetes in this sense is not without objections because sometimes this term is used also to designate only the higher fungi which possess septate hyphae. If the term is used in this latter sense, only the Ascomycetes and Basidiomycetes would be called Eumycetes.

The fungi do not embrace a single, phylogenetically related group. The Archimycetes and the true fungi differ fundamentally in the structure of their vegetative thalli (figure 1).

The cells of the vegetative thallus of the Archimycetes are naked and they never form a well defined mycelium (figure 13 *1*). The development of these fungi attains only a comparatively primitive level. In most instances, the Archimycetes probably represent degenerate flagellates which have become parasitic. They are included in discussions of the fungi mainly because of their importance as the causal agents of many plant diseases.

The hyphae of the true fungi are enclosed normally by cell walls. This group probably is polyphylogenetic, and the various types originated in all likelihood from such autotrophic algae as the Flagellates and Siphonales. Their evolutionary descent from the green algae was accompanied by the loss of chlorophyll which led them to a parasitic or saprophytic mode of life. Many types also lost their ability to synthesize growth hormones and other physiologically important substances when their photosynthetic processes were interrupted by the loss of chlorophyll. This heterotrophy of the fungi in respect to carbohydrates and growth factors is also characteristic of the nutritional physiology of animals.

The evolutionary development of the fungi resulted from disturbances of the nutritional physiology of their algal ancestors. After this original step in their evolution had been attained, the fungi continued to evolve to a greater or less degree along many independent lines. The most important evolutionary trend of the fungi has been toward the development of specialized sexual organs and toward the ultimate separation of plasmogamy from karyogamy. These sexual

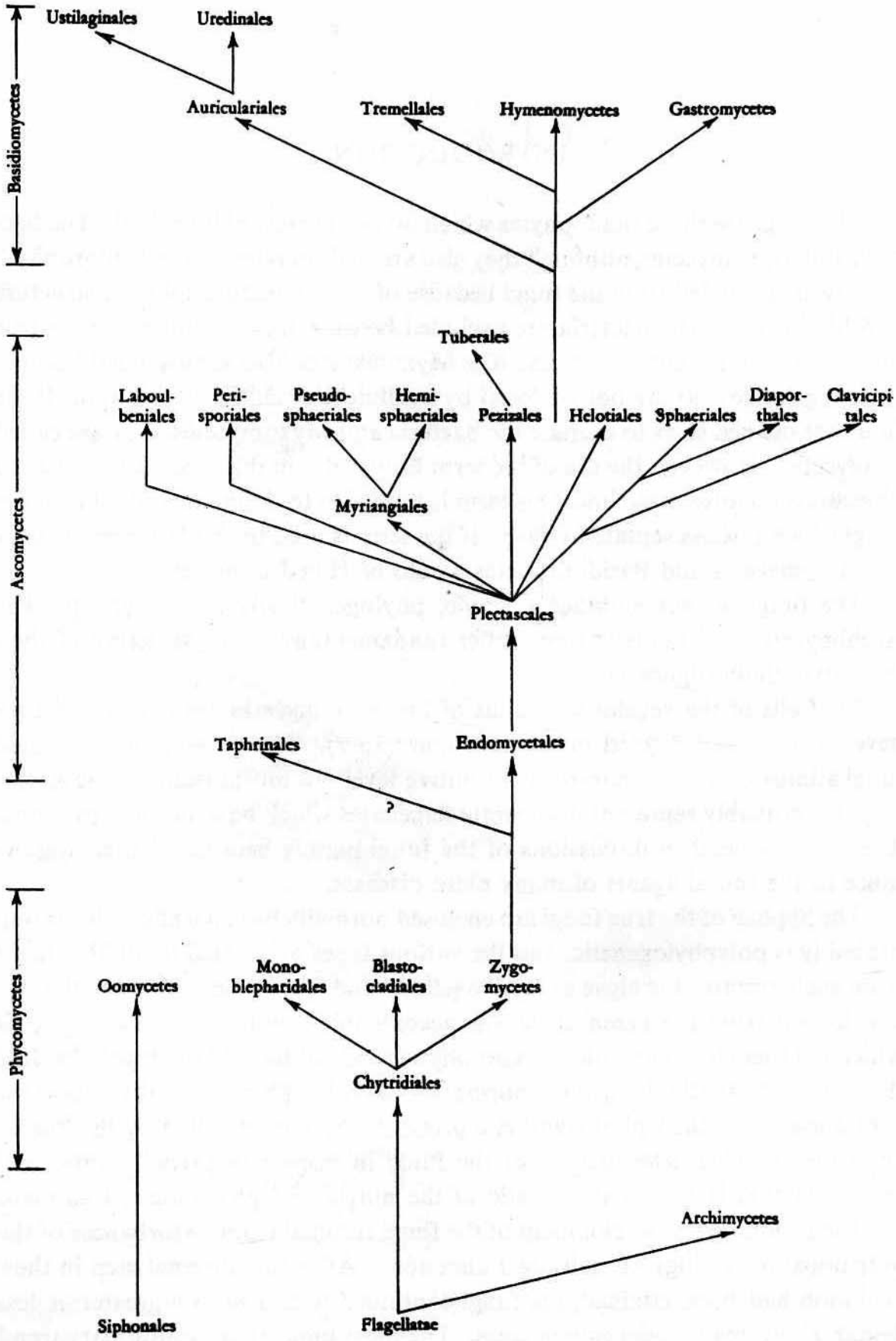

FIG. 1. Probable evolutionary development of the major groups of fungi.

processes occur at different times in the life history of the higher types of fungi—plasmogamy occurring at the beginning of the life of the individual and karyogamy at the end. The morphological specialization of the fungi has been largely toward the increasing complexity of the thallus, which leads ultimately to the production of highly specialized fructifications. The fructifications reach their highest evolutionary development in the Basidiomycetes (figure 343).

The true fungi, when defined to exclude the Archimycetes, may be divided into three major classes, each of which is characterized by the features of its sexual reproduction. These groups are the Phycomycetes, Ascomycetes, and the Basidiomycetes.

Representatives of the Phycomycetes develop the zygote immediately as the result of the fusion of sexually mature cells. Special fructifications usually are lacking.

The sexual process of the Ascomycetes is divided into two separate phases. The first phase, which is called plasmogamy, consists of a union of the cytoplasm of the sexual cells, and the male and female nuclei are brought thereby into close proximity within a single cell. During the second phase, which is separated in both time and place from plasmogamy, the sexual nuclei fuse. This fusion is called karyogamy and it represents true fertilization in the cytological sense. The phase between plasmogamy and karyogamy is called the binuclear or dikaryophase. During this phase, the male and female nuclei exist as a pair of morphologically separate nuclei, but they exhibit a certain unity in their physiological behavior. The asci form at the end of the binucleate phase (figure 141). The ascus may be regarded as the sporangium within which reduction division, or meiosis, takes place. The asci, or sporangia in the morphological sense, usually are imbedded within special fruiting bodies normally formed by the vegetative hyphae (figure 239).

Specific sexual organs are lacking in the Basidiomycetes, although sexual reproduction persists and is carried out by other cells. The binucleate, or dikaryotic, hyphae which are nourished by the haploid mycelium in most Ascomycetes are physiologically independent in the Basidiomycetes. The binucleate hyphae tend to become increasingly important in the life cycle of the Basidiomycetes and they finally form the evident fungal mycelium as well as the fruiting bodies (figure 343). Basidia form at the close of the binucleate stage (figure 320). The basidia represent morphologically the sporangia of the Basidiomycetes within which meiosis takes place. The spores are formed exogenously on the basidium in contrast to their endogenous origin in the ascus of the Ascomycetes.

The fungi may be divided into four classes on the basis of the sexual characteristics described above: the Archimycetes, the Phycomycetes, the Ascomycetes, and the Basidiomycetes.

此为试读,需要完整PDF请访问: www.ertongbook.com