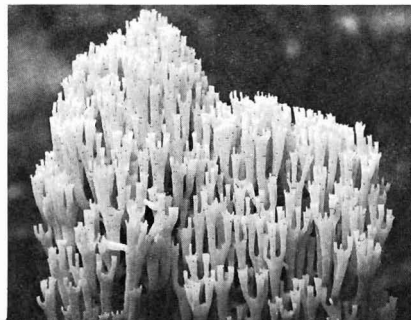
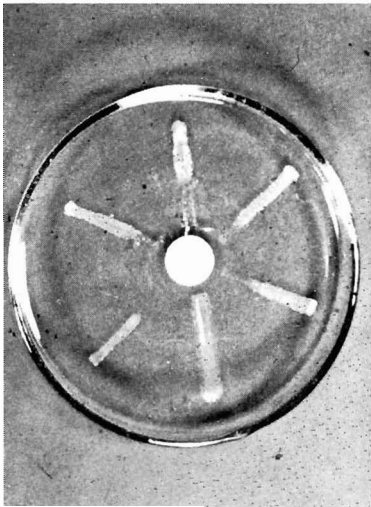




A CAREER IN

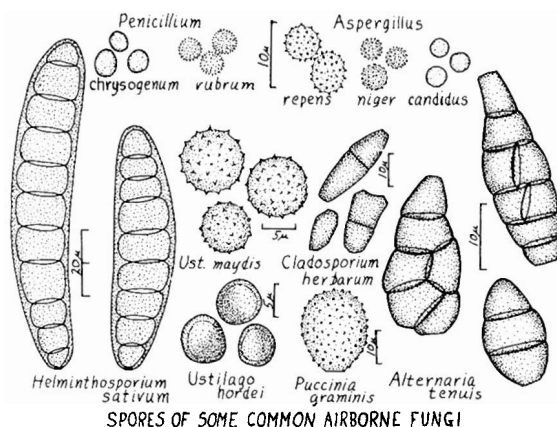
# Mycology



Second  
Edition



# A CAREER IN Mycology



## WHAT MYCOLOGY MEANS

Mycology is the study of fungi — the molds, mildews, yeasts, mushrooms, and related organisms — which, along with bacteria, algae, and lichens, make up the most primitive group of plants. Like bacteria, they lack the green coloring matter, chlorophyll, found in most plants and must therefore live as saprophytes on inanimate organic matter or as parasites of other living organisms. Consequently, the study of fungi includes their destructive and beneficial properties as decay organisms and their role as parasites. In many instances the products or by-products of fungus metabolism are of great importance to man. These include antibiotics such as penicillin, organic acids, enzymes, cortisones produced from steroids, alcohol, beer and wine, and certain cheeses.

Mycology encompasses the study of fungi from the standpoint of their life processes, their morphology and development, cytology and genetics, physiology, and their distribution and classification. Fungi are widespread, occurring all over the world wherever there is organic matter to support their growth. They are found abundantly in soil and water, on dead wood and humus, on foods, textiles, and lumber, and as parasites of plants and animals. Their spores are common in the air around us. At a time when the majority of higher plants have been described and classified, there is still a great opportunity for important new taxonomic discoveries among the fungi. In large areas of the world there have been no intensive studies of the fungus populations, and many new and interesting species await discovery. Some mycologists believe that the majority of fungi as well as many of their metabolites yet remain to be discovered.

In the field of basic research, fungi have been among the most rewarding organisms studied. For example, no other group of organisms has added more to our knowledge of heredity and the nature of the gene — knowledge that is applicable to all other organisms, in-

cluding man. At present, exciting pioneering discoveries that are having far-reaching effects upon the gene theory are being made with fungi and other microorganisms. Certain phases of this and other research studies on these organisms are contributing to the comprehensive data bearing on the problem of cancer and will no doubt contribute much to the eventual solution of this problem. Some of the reasons why fungi are such useful research subjects are readily apparent. They have a relatively simple life cycle and often may be cultured easily in the laboratory, where they may complete their life cycle in a few days. Also, they are more readily analyzed genetically than are most other organisms, and many generations may be studied in the time required to complete one generation of a higher organism. The versatility of fungi most certainly will open up new fields of basic research to investigators who apply themselves diligently to the study of them.

## **KIND OF TRAINING REQUIRED TO BECOME A MYCOLOGIST**

Although courses in mycology are open to undergraduates in some schools, it is almost essential that the prospective mycologist obtain training at the graduate level if he wishes to be assured of an adequate understanding of the field as well as of his future advancement. Normally, the M.A. or M.S. degree requires from one to two years of graduate study and the Ph.D. degree at least three, more often four years at the graduate level. The student should study not only the available mycology courses but also microbiology and bacteriology wherever possible. It is increasingly important in many modern phases of mycological research that the student have an adequate background of biochemistry, physiology, and genetics. Depending upon his particular interests, he may wish to take fairly extensive work on other subjects such as forestry, plant pathology, entomology, or medicine. Of course, he is also expected to become well acquainted with the field of botany in general, and, naturally, courses in the humanities are not to be neglected, as these are essential to the proper training of scholars in all fields.

In most graduate schools, teaching or research assistantships and fellowships are available to promising students. Most of them require half-time work (the results of which may frequently be used in the thesis) and carry a stipend of from \$800 to \$3200 per year. These are valuable training aids for the future mycologist. At present more assistantships and fellowships are available than there are capable applicants for them.

## OPPORTUNITIES IN MYCOLOGY

Because of the increasing recognition of the importance of fungi in so many fields mycology has become a subject of major interest in universities and colleges, industry, agriculture, medicine, and state and federal government agencies. The role of mycology in these fields is described briefly in the following sections.

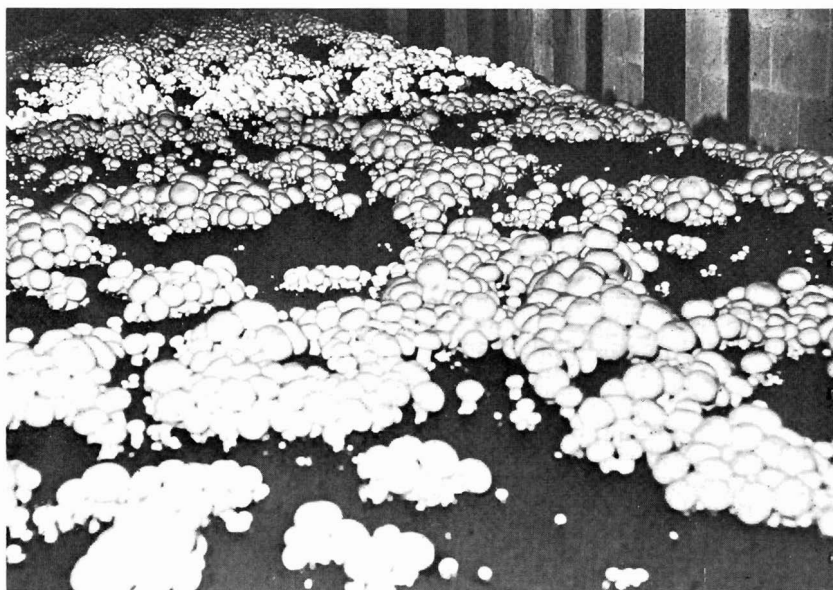
### UNIVERSITY AND COLLEGE



Universities and colleges are the training grounds for future mycologists. In view of the increasing importance of mycology, many educational institutions which formerly had no mycologists recently have employed them. The demand for good teachers and research workers in mycology in the educational field is increasing steadily. Good positions requiring a moderate teaching load and adequate time for research are found in a considerable number of universities and in some colleges. A great deal of the most outstanding basic research in mycology is being done in educational institutions. Salaries are comparable to those received by teachers in other fields of biology, the full professor generally receiving a salary from about \$9,000 to \$16,000 (occasionally more) per year. Other benefits are found in opportunities for travel and research elsewhere during the year and on sabbatical

leave. Also, grants often are available from government and private organizations for support of research projects and travel connected with research.

## INDUSTRY



The applications of mycology to industrial needs are many and varied. Jobs are available in industries concerned with obtaining the fermentation products—organic acids, enzymes, antibiotics, alcohol, beer and wine—of fungi. Mushrooms are grown commercially on a large scale in air-conditioned houses or caves. The search for new antibiotics among fungi of all kinds is a continuing endeavor in pharmaceutical laboratories, which are generally the best equipped organizations for the isolation, analysis, and testing of these compounds. A number of industries also are concerned with the testing of various fungicidal chemicals that will prevent the spoilage of manufactured goods by fungi and bacteria. Other industrial laboratories extend their research to the development of chemicals that will protect plants and animals from the ravages of pathogenic species. Mycologists also are needed in certain food production endeavors such as the culturing of yeasts or in research on jet fuel problems.

Good opportunities are available in industry for mycologically trained M.A. (or M.S.) and Ph.D. graduates, the higher salaries and better chances of advancement going to the holders of the Ph.D. degree. In general, salaries are higher than in educational institutions.

## MEDICINE



The study of antibiotic substances produced by fungi and other microorganisms as applied to the prevention or healing of diseases in man is of increasing importance today. The continued isolation and testing of new antibiotics is particularly urgent, especially in view of the appearance of drug-resistant strains of pathogenic bacteria that have become increasingly prevalent in recent years. Several recent discoveries indicate that certain compounds isolated from fungi may prove valuable aids in the treatment of mental disorders in man. Medical mycology, the study of diseases of man caused by fungi, is an important phase of medical research. It is a field in which well-trained mycologists with some medical knowledge are greatly needed. Fungi also are involved in allergy studies, as their spores, which are always found in the air around us, are frequently the causes of respiratory allergies.

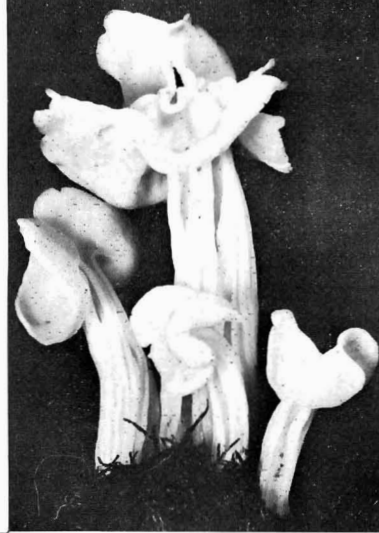
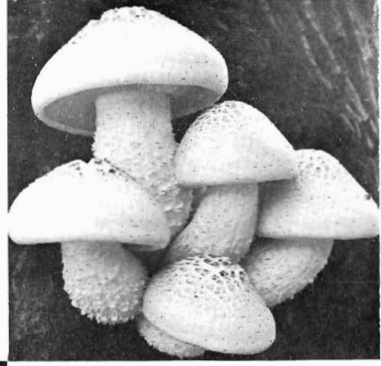
Positions involving the medical application of mycology are to be found in medical schools, where the job may involve research or a combination of teaching and research, in pharmaceutical laboratories, in some medical research organizations, and in public health service.

## AGRICULTURE

One of the most important phases of mycology is found in its application to agriculture. Fungus diseases cause many millions of dollars worth of damage each year to crops in this country. None of our cultivated plants is without fungus diseases of some kind. The study of disease prevention in plants is therefore of the utmost importance in assuring the world of an adequate food supply—a problem that will increase in urgency as the world's population increases. Fungi are the principal agents causing damage to forest trees and shade trees. Increasing numbers of mycologists are beginning to study these problems.



It is necessary that we know more about the relationship between parasite and host—the nutrition of the parasite, the host mechanisms that confer varying degrees of immunity, variation of the host plant and the development of disease-resistant varieties, and variation of the parasite itself that enables it to produce new and more virulent pathogenic strains. The study of resistance and susceptibility, in terms of specific growth substances produced by the host and required by the parasite, as well as in terms of the production of specific substances by the parasite that are injurious to the host plant, are phases of research that are still in a pioneering stage and are in need of trained investigators with a fresh outlook. Recent advancements in the use of radioactive isotopes in biological research have enhanced the possibilities for more precise studies in this field.



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