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# Preface

Fungi are organisms generally composed of tubes that are invisible to the naked eye. The cells of these tubes are multinucleate and in cytoplasmic continuity. Fungi are among the oldest and largest living organisms, rivaling the mass of a California redwood tree or a blue whale. As the chief agents of decomposition of organic matter, fungi contribute to the sustenance of the carbon cycle. As mycorrhizal partners of roots, they provide the primary mechanism for the capture of nutrients used by plants, thereby contributing to the green cover on earth. Some fungi occur as endophytes in plants or as symbiotic partners with algae, allowing the mutualistic partners to tolerate and grow in harsh conditions that they could not do otherwise. As virulent pathogens of plants, fungi are a constant threat in agriculture and forestry. Since antiquity, fungus has been exploited either unwittingly or intentionally for the conversion of grape juice into ethanol in wine. As producers of antibacterial compounds, fungi are sources of life-saving drugs. They are the only eukaryotic organisms that can thrive at temperatures beyond which no plant or animal can live. Though potentially immortal, a few fungi have a limited life span, providing valuable models for investigating the mechanisms in aging and death. Fungi are now at the forefront of research on mechanisms in gene silencing, biological rhythm, mating processes, biogenesis of intracellular organelles, adaptations to hostile habitats, structure of natural populations and speciation. Because of their small genomes, fungi are being used in "systems biology" to understand the connections between genes, proteins, metabolic and signaling pathways.

This book on fungi is an outcome of my association with graduate students in biochemistry. The majority of these students had little or no previous exposure to fungi and a few not even to biology. I found that students became interested in fungi if an attempt was made to demonstrate fungi in natural situations and how they could be used to understand complex biological questions, in particular if the design of the experiments that were done to obtain information were described. Today's accelerated pace of research, aided by new

instruments and techniques combining the approaches of genetics, biochemistry and cell biology, has changed the character of mycology, necessitating a new approach for the organization of the subject matter and learning about the fungi.

This book should be useful both for a beginning research worker and a professional. The subject matter is divided into six parts, comprising 14 chapters. Each chapter is self-contained and written in a style that enables the reader to progress from elementary concepts to current thinking on a topic. Throughout, attention is drawn to unsolved questions. References are given only to selected publications, primarily for details on the design of experiments that were used to obtain information, and for the identification of some of the key players. Finally, an Appendix gives the principles in naming fungi, estimated to comprise more than 1.5 million species, and of their broad classification. Many authors include the slime molds in the fungi. Since they consist of naked cells, move in amoeboid fashion and ingest particulate food, I have excluded them.

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