
Preface

The interaction between fungi and their environment is central to many natural processes that occur in the biosphere. The hosts and habitats of these eukaryotic microorganisms are very diverse; fungi are present in every ecosystem on Earth. The fungal kingdom is equally diverse, consisting of seven different known phyla. Yet detailed knowledge is limited to relatively few species. The relationship between fungi and humans has been characterized by the juxtaposed viewpoints of fungi as infectious agents of much dread and their exploitation as highly versatile systems for a range of economically important biotechnological applications. Understanding the biology of different fungi in diverse ecosystems as well as their interactions with living and nonliving is essential to underpin effective and innovative technological developments.

The tools and techniques of molecular biology, once reserved for mammalian and bacterial systems, have been adapted and optimized for the analysis of fungal species at the molecular level. Rapid screening techniques based on screening specific regions in the DNA of fungi have been used in species comparison and identification and are now being extended across fungal phyla with the ultimate goal being the assembly of the “Fungal Tree of Life” by the US National Science Foundation. Within a decade after the Human Genome Sequence was published, genome sequencing technology has been adapted to yield the complete genome sequences of not only fungi of commerce and medical relevance, but other more isoteric species. Post-genomics approaches and systems biology are now also being applied to understanding the details of fungal biology and the interactions between fungi, their hosts, and their environment. The majority of fungi are multicellular eukaryotic systems and therefore may be excellent model systems by which to answer fundamental biological questions. A greater understanding of the cell biology of these versatile eukaryotes will underpin efforts to engineer (e.g., “humanize”) certain fungal species to provide novel cell factories for production of proteins for pharmaceutical applications. Finally, renewed interest in all aspects of the biology and biotechnology of fungi may also enable the development of “one pot” microbial cell factories to meet consumer energy needs into the twenty first century. To realize this potential and to truly understand the diversity and biology of these eukaryotes, continued development of scientific tools and techniques is essential.

This publication aims to provide a detailed compendium of analytical methods used to investigate different aspects of mycology, including fungal

biology and biochemistry, genetics, phylogenetics, genomics, proteomics, molecular enzymology, and biotechnological applications, in a manner that reflects the many recent developments of relevance to scientists investigating the Kingdom of Fungi.

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