

PREFACE

Advances in the rapid and voluminous acquisition of gene sequence data have been dramatically reshaping the study of fungal systematics and evolution for more than two decades. The recent increase in availability of genomic, metagenomic, and transcriptomic tools—extending from model to nonmodel fungal species—has brought fungal phylogenetics and systematics research into a new age of “big data,” presenting new challenges in data analysis and enabling tremendous opportunities to reveal new science via creative approaches. This Thematic Volume—the 100th in the *Advances in Genetics* series—contains eight comprehensive reviews laying out recent progress and future challenges in fungal phylogenetics and phylogenomics. Chapter 1 reviews the broad importance of fungal phylogenetics and phylogenomics. It highlights the new role of quantification of phylogenetic power in the resolution of diverse questions in phylogenomics, particularly in addressing the challenge of curating big data when it cannot be handled manually. Chapter 2 reviews the important consequences of genome-scale datasets applied to fungal phylogenetic inferences. Chapter 3 focuses on the important application of genomic and epigenomic data toward understanding evolution and distribution of fungal pathogens. Chapter 4 focuses on the diversity of fungal gene clusters, which are important to fungal pathogenesis and to secondary metabolic biochemistry, reviewing recent discoveries regarding how gene clusters evolve along the fungal phylogeny. Chapter 5 focuses further, revealing recent breakthroughs and prospects in research on the pathogen model *Fusarium oxysporum*, covering evolutionary analyses of phylogenomic and pathogenicity data. Chapter 6 provides a benchmarking comparison of popular approaches in phylogenomics, and capitalizing on that comparison, presents a reconstructed phylogenetic backbone for the Fungal Kingdom based on available fungal genome data. Chapter 7 reviews recent advances of the phylogenetics and phylogenomics of rust fungi, one of largest and most systematically problematic fungal groups, that contains pathogenic species that target diverse

plants. Chapter 8 then reviews how recent developments in fungal phylogenomics have impacted systematic practice for fungi.

We are most grateful to the authors for their excellent contributions, and urge readers—whether fungal biologists, phylogeneticists of any stripe, or otherwise—to engage in thoughtful contemplation of these excellent reviews. It will be time well spent.

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