Essential Fungal Genetics

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Preface

Our intention in writing this book is to provide a text that offers a succinct but comprehensive account of the genetics of Kingdom Fungi. We do not pretend that this is a monographic textbook, nor do we intend it to be a laboratory manual. Rather, we hope that it will be a user-friendly guide that can be used as a supplement to general genetics texts.

Most genetics textbooks deal adequately with plant and animal genetics. Even at an elementary level, a description of Mendel's experiments with peas is rapidly followed by the description of Morgan's experiments with the fruit fly. Thus, right from the start plant and animal work is well integrated in the learner's mind.

This treatment unfortunately leaves the student ignorant of an entire kingdom of organisms. There are three major kingdoms of eukaryotes on Earth: plants, animals, and fungi. For the most part, fungi feature regularly in only two areas of traditional genetics teaching. On the one hand, we can find the ascus segregations that contributed so much to developing an understanding of the mechanism of recombination in the 1960s. On the other hand is the contribution work on yeast (as a model eukaryote) is currently making to understanding "cell cycle control" and its genetic regulation. As a result, most introductory genetics texts will leave the reader/student with the impression that fungi are of use when peculiarities of their structure or lifestyle suit them to particular experimental approaches, but are not worth mentioning otherwise!

We cannot redress the balance totally, but we hope we have produced a book that displays the genetics of fungi in a way that will be attractive and challenging, comprehensive yet succinct. This book will provide the tools for integrating fungal genetics into current teaching by complementing the major textbooks used in courses on general genetics, general organismal biology, general microbiology, and general mycology.

Our aim is to preserve the concepts that characterize fungal genetics, revealing the mixture of facts, techniques, and experimental approaches that distinguish fungal genetics as a study in its own right. We believe we have incorporated the full range of genetic information so that all aspects

of eukaryote genetics appropriate to fungi are described here in a way that is easily understood and memorable.

Without attempting to be a laboratory manual, this book has an instructional "how to do it" tone and will therefore have a practical value for anyone who has a mind to start genetic analysis of any fungus. Instead of dwelling on technical details like laboratory recipes, this book deals with the details of the ideas and concepts underlying basic approaches to fungal genetics so that these are on record and easily accessible rather than being lost in history, or buried by the great mountains of molecular methodologies.

We have tried to maintain a readable style of presentation, and to that end, there are no reference citations in the text; however, we provide a range of reference materials at the end of each chapter, and the number of references increases in later chapters as we touch on wider topics. We have favored review articles and Websites for these reference lists, so that the interested reader can very quickly penetrate deeper into the literature. More recent publications are also emphasized, but we also recognize the value of the history of the science and give references to some historical publications. For some of us (DM included), "history" is unfortunately deemed to start in about the 1980s. Doesn't time fly!

Another unusual aspect is that the examples we have chosen to illustrate various features tend, whenever possible, to favor basidiomycetes and the less-often referenced fungi. We have done this because it is relatively easy to find information about the main "models," like *Neurospora* and *Aspergillus*, so we prefer to describe other species. Of course, we can't escape "yeast," the ultimate model eukaryote, and the first eukaryote to have its genome completely sequenced. We try to emphasize, however, that no matter how much we learn about *Saccharomyces cerevisiae*, it is not the end of the story. No matter how important it is as a "model," this yeast is not adequately representative of filamentous fungi, nor does it represent other yeasts. When you know everything there is to know about *S. cerevisiae*, you will still be ignorant about fungal genetics. So read on, and get an impression of the full story!

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