
Preface

Dictyostelium discoideum is a simple but fascinating eukaryotic microorganism, whose natural habitat is deciduous forest soil and decaying leaves, where the amoebae feed on bacteria and grow as independent single cells. Exhaustion of the bacterial food source triggers a developmental program, in which up to 100,000 cells aggregate by chemotaxis towards cAMP. Morphogenesis and cell differentiation then culminate in the production of spores enabling the organism to survive unfavorable conditions. *Dictyostelium* offers unique advantages for studying fundamental cellular processes with the aid of powerful molecular genetic, biochemical, and cell biological tools. These processes include signal transduction, chemotaxis, cell motility, cytokinesis, phagocytosis, and aspects of development such as cell sorting, pattern formation and cell type differentiation. Recently, *Dictyostelium* was also described as a suitable host for pathogenic bacteria in which one can conveniently study the process of infection. In addition, *Dictyostelium* has many of the experimental conveniences of *Saccharomyces cerevisiae* and is probably the best experimentally manipulatable protozoan, providing insight into this diverse group of organisms, which includes some of the most dangerous human parasites.

The recent completion of the *Dictyostelium* genome sequencing project strengthens the position of *D. discoideum* as a model organism. The completed genome sequence and other valuable community resources constitute the source for basic biological and biomedical research and for genome-wide analyses. Together with a powerful armory of molecular genetic techniques that have been continuously expanded over the years, it further enhances the experimental attractiveness of *D. discoideum* and positions the organism on the same level as other fully sequenced model organisms like *S. cerevisiae*, *Caenorhabditis elegans*, or *Drosophila melanogaster*.

This book is divided into four major parts. It provides in the first part for the uninitiated an introduction to the organism, to important community resources and to genome-wide approaches. The second part describes basic methods and available molecular genetic techniques. The third part is dedicated to imaging

and localization methods. The chapters in the fourth part emphasize the unique advantages of *Dictyostelium* as a model system. Throughout the book leading *Dictyostelium* scientists present their most useful and innovative techniques for studying fundamental biological processes in this attractive model organism.

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