
Preface

Dictyostelium discoideum is a member of the amoebozoa, one of the six kingdoms into which eukaryotes are currently partitioned. Its natural habitat is deciduous forest soil and decaying leaves, where the amoebae feed on bacteria and yeast and grow as independent single cells. In the laboratory cells can be grown in liquid culture or on solid substratum in the presence of bacteria such as *Klebsiella aerogenes*. Upon starvation a developmental program is triggered in which up to 100,000 cells aggregate by chemotaxis. Development proceeds via a number of morphological states and culminates in the generation of a fruiting body. This structure is composed of several cell types and holds a ball of spores on top of a thin stalk that is built of vacuolated dead cells. Spores are highly resistant against adverse environmental conditions.

Dictyostelium offers unique advantages for studying fundamental cellular processes. The organism can be easily grown in large amounts and is amenable to diverse biochemical, cell biological, and genetic approaches. Throughout their life cycle *Dictyostelium* cells are motile and thus are perfectly suited to study random and directed cell motility with the underlying changes in signal transduction and the actin cytoskeleton. *Dictyostelium* is also increasingly used for the investigation of human disease genes and the cross talk between host and pathogen. As a professional phagocyte it can be infected with several human bacterial pathogens and used to study the infection process. The availability of a large number of knockout mutants renders it particularly useful for the elucidation and investigation of host cell factors. Furthermore, the completed genome sequence paved the way for a number of genome-wide analyses. The availability of the genome sequence at a mouse click together with a whole range of supporting information at DictyBase, the Dicty Stock Center and a powerful armory of molecular genetic techniques that have been continuously expanded over the years, considerably enhanced the experimental attractiveness of *D. discoideum* in recent years.

The chapters of this book focus on four major areas, each incorporating the most recent developments in the respective field. Chapters 1–6 provide an introduction to the amoebozoa, the organism, and community resources. The completion of the *Dictyostelium* genome sequence in 2005 marked a new era for research because now large-scale methods are possible. These genome-wide analyses are described in Chapters 7–11. Chapters 12–20 are dedicated to molecular genetic techniques, cell biological, biochemical, and biophysical methods. Finally, Chapters 21–26 describe the use of *Dictyostelium* as a model system to study vesicle formation, trafficking, and infection by bacterial pathogens. The book chapters were contributed by leading *Dictyostelium* scientists and describe useful and innovative techniques to study a whole range of fundamental biological processes in this attractive model organism.

Köln, Germany
Hull, UK

Ludwig Eichinger
Francisco Rivero

<http://www.springer.com/978-1-62703-301-5>

Dictyostelium discoideum Protocols

Eichinger, L.; Rivero, F. (Eds.)

2013, XII, 479 p. 110 illus., 55 illus. in color., Hardcover

ISBN: 978-1-62703-301-5

A product of Humana Press