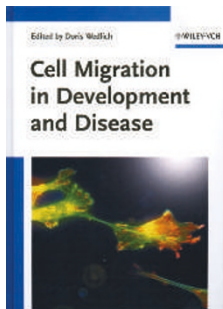


Moving from the dish to the fish



Cell Migration in Development and Disease

Edited by Doris Wedlich

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In multicellular animals, cells may migrate within a tissue or from one tissue to another, to perform their function. These migrations are essential for development in many contexts, but can also be detrimental to the organism, as for example, during tumour metastasis. *Cell Migration in Development and Disease*, a new book edited by Doris Wedlich, aims to bring together different perspectives on the study of cell migration.

A cell needs to adhere to a substrate to migrate whether this is a basement membrane, a coverslip or another cell. The cell must also polarise to ensure that extension and retraction occur on opposite sides of the cell, thus generating net movement, as opposed to stationary ruffling. For directional migration, a cell must detect shallow gradients of chemoattractants, or other cues, and re-direct its migration accordingly. These processes have to be dynamic, for example, substrate adhesion at the front of the cell should be strong enough for the cell to pull itself forward, but must also be easily released so that the rear can be retracted as the cell moves forward. These issues are complex to analyse in the context of a whole organism, but much has already been learned by studying the simple situation of a cell migrating in a tissue culture dish. The initial chapters of the book provide an overview of some of the basic cell biological mechanisms that migratory cells use with chapters covering cell adhesion, cell spreading and microtubule dynamics. The basic concepts of eukaryotic chemotaxis are well explained using *Dictyostelium discoideum* as a model. There is also a chapter describing proteins such as the Armadillo repeat protein family, which not only function in adhesion but also have other functions for example, in the nucleus. Surprisingly, however, there is no chapter dedicated to actin dynamics or regulation of the actin cytoskeleton.

The second section of the book provides a good summary of various models currently used to study cell migration during development. This section contains chapters covering zebrafish gastrulation, convergent extension in *Xenopus laevis*, border cell and glial cell migrations in *Drosophila melanogaster*, chick neural-crest migration, zebrafish germ-cell migration, and the epithelial–mesenchymal transition involved in mouse muscle development. These chapters provide a useful introduction to the various mechanisms used for cell movement during development.

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Cell migration during development often requires precise steering of clusters of cells over long distances, often through complex tissues. The different navigational cues at work during this process are elegantly illustrated in chick neural-crest migration, which relies on several attractive and repulsive cues to guide and shape the tissue as it moves. Zebrafish germ-cell migration also illustrates the principle that although cells may often appear to migrate as a group, they are, in fact, migrating simultaneously but independently of each other.

This book would be useful to students or scientists who are interested in *in vivo* cell migration and perhaps for cell biologists looking for an appropriate *in vivo* system to study the function of a specific protein..

The final section deals with cell migration in a disease context. It begins with a section on the motility of enteropathogenic bacteria and it also includes a brief description of transendothelial migration that elegantly explains the distinct steps leukocytes use to leave blood vessels and enter tissues. Lymph node and spleen development is also described, along with the roles of various cytokines in the organisation of these tissues. The penultimate chapter provides an overview of keratinocyte migration during wound healing. This chapter is also one of the few in the book that discusses the technical approaches available, and their potential advantages and limitations. The final chapter focuses on tumour invasion and metastasis. Unfortunately, despite this being one of the longest chapters, there is little explanation of the steps involved in metastasis. This chapter would have benefited from an expanded discussion on the exact role of cell migration in metastasis and of recent *in vivo* approaches that have been used to analyse this role. The authors instead focus on the different molecules that affect the motility of cancer cells.

This book would be useful to students or scientists who are interested in *in vivo* cell migration and perhaps for cell biologists looking for an appropriate *in vivo* system to study the function of a specific protein, or the relevance of *in vitro* findings. As such, the book would have benefited from a chapter describing *in vivo* imaging techniques, and in general, more discussion of the technical possibilities and limitations of different model systems. As is often the case with review collections, the chapters are heterogeneous, but some nevertheless provide a helpful summary of the field and outline the open questions. One problem, however, is that it is often difficult to describe complex cell migration behaviours in simple diagrams. Therefore, an accompanying CD of movies would have improved the clarity some of the chapters. It is, after all, fascinating to watch migrating cells do their thing.