Preface

In the past two decades, the zebrafish, *Danio rerio*, has become an established and a widely accepted model for the study of embryonic development, and for understanding the cellular basis of various human diseases. One of the features of this model that has been widely publicized is the optical clarity of the embryos, and the potential for high-resolution microscopy of fixed as well as live samples. However, this salient feature has until recently, been rather underutilized. In order to highlight recent advances using real-time imaging in zebrafish, in this book, we bring together some outstanding examples of state-of-the-art imaging in the context of development, as well as infection and disease.

The first few chapters describe imaging of cell migration in the nervous system, both central as well as peripheral. The use of cell-type specific transgenes, new inducible expression systems, and novel enhancer/promoter cassettes are described in these chapters, with particular emphasis on expression in neuronal cells, oligodendrocytes, and glia. The chapter on fluorescence correlation spectroscopy describes this still very novel methodology, and one for which the zebrafish is particularly suitable. This technique allows real-time imaging and quantification at the single-molecule level, and has the potential to give biophysical insights into the formation of morphogen gradients and ligand-receptor interactions in living embryos. Another area that the zebrafish is now beginning to be appreciated for is its use in understanding organ physiology and function, and this is described in

the chapter on imaging digestive physiology. The last chapter covers imaging in the context of infection and wound healing.

We hope that readers working with the zebrafish in areas of developmental biology, cell biology and disease modeling will benefit from the methodologies and tools described in the book, and that it will be a valuable resource for students and researchers alike.

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