
PREFACE

Building on the foundation of our first (1999) and second (2004) editions of *Methods in Cell Biology: The Zebrafish*, Monte, Len, and I are pleased to continue this Third Edition with *Methods in Cell Biology* Volume 104, *Genetics, Genomics, and Informatics*. In this volume, our contributors present the latest technical advances that have appeared since the second edition. One theme that clearly emerges from these chapters is that the zebrafish is the preeminent vertebrate model for *genetic*, *transgenic*, and *genomic* studies of developmental processes *in vivo*.

Genetics, Genomics, and Informatics covers new technologies under five sections: Forward and Reverse Genetics, Transgenesis, The Zebrafish Genome and Mapping Technologies, Informatics and Comparative Genomics, and Infrastructure. Under Section 1, Forward and Reverse Genetics, new advances in transposon-mediated transgenesis, gene trapping, and enhancer trapping in zebrafish are described, and mutagenic strategies using zinc finger nucleases and retroviral insertion are presented. Reverse-genetic approaches employing target-selected gene inactivation and caged morpholino oligonucleotides are also outlined. Section 2 introduces new transgenic protocols for zebrafish that are based on Cre or phiC31 recombinases or on nuclear transfer. The third section covers new genomic and mapping technologies in zebrafish, including SNP panels for rapid positional cloning of genes, molecular cytogenetics and a BAC probe panel for genome analysis, automated procedures for detection of conserved syntenies among vertebrate genomes, and an update of the Zon laboratory positional cloning manual. Section 4, Informatics and Comparative Genomics, explores ZFIN as a portal for data extraction, transformation, and dissemination, provides protocols for analysis of chromatin structure, DNA methylation, and epigenetic regulation during zebrafish development, describes methods for evaluating the roles of micro RNAs in development, and outlines techniques for sequencing-based transcriptional profiling. Infrastructure, Section 5, reviews zebrafish facilities suitable for small or large laboratories and concludes with a chapter on zebrafish husbandry that emphasizes the importance of standardizing zebrafish lines and genetic backgrounds for cross-comparison of experimental results.

The Third Edition will also introduce *Disease Models and Chemical Screens*, two rapidly emerging and compelling applications of the zebrafish. We trust that the Third Edition will prove valuable both to seasoned zebrafish investigators as well as to those who are newly adopting the zebrafish model as part of their research armamentarium.

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