

TABLE OF CONTENTS

- Cover image
- Title page
- Table of Contents
- Copyright
- Contributors
- Fish as model systems
-
- **Section 1. Zebrafish (Danio rerio)**
- Chapter 1. Biology and research applications
- The biology of the zebrafish
- The history of the zebrafish as laboratory model
- The zebrafish as a model for development and pathology
- **Chapter 2. Housing and maintenance of zebrafish, new technologies in laboratory aquatic systems and considerations for facility design**
- Introduction to the model
- Aquatic concepts
- Establishing biofiltration
- Husbandry
- **Chapter 3. Breeding and larviculture of zebrafish (Danio rerio)**
- Introduction
- Should we mimic nature, or should we ignore it in laboratory breeding and husbandry of zebrafish: theoretical considerations from the perspective of experimental biology
- Zebrafish in nature
- Preparing zebrafish for breeding
- The breeding tank
- Raising zebrafish juveniles is not as easy as often stated
- Hatching the eggs and caring for the larvae
- Caring for young juveniles
- Standardization of breeding and larviculture practices: the question of replicability and reproducibility
- **Chapter 4. Health monitoring, disease, and clinical pathology**
- Introduction
- Controlling and monitoring population health
- Pathogens and diseases to monitor
- Fish and environmental samples
- Diagnostic assays
- Determining the number of samples
- Introduction of zebrafish colonies and biosecurity
- Conclusion
- **Chapter 5. The welfare of zebrafish**
- Introduction
- Measuring welfare in zebrafish
- Husbandry
- Refinements in regulated procedures
- Conclusion: the state of zebrafish welfare today

- **Chapter 6. Analgesia, anesthesia, and euthanasia in zebrafish**
- Analgesia
- Anesthesia
- Euthanasia
- Conclusions
- **Chapter 7. Transgenesis, mutagenesis, knockdown, and genetic colony management**
- Introduction
- Ethical issues in genetic manipulation of laboratory fish
- Generation and management of morphants and CRISPRants
- Conclusions
- **Chapter 8. Sperm cryopreservation, in vitro fertilization, and embryo freezing**
- Introduction
- Materials and methods
- Conclusion
-
- **Section 2. Other small freshwater fish**
-
- **Chapter 9. Medaka as a model teleost: characteristics and approaches of genetic modification**
- Medaka
- Basic approaches of generation of transgenic/knockout medaka
- Introduction of new transgenic methods
- **Chapter 10. Integrated analyses using medaka as a powerful model animal toward understanding various aspects of reproductive regulation**
- Medaka as a powerful model animal for research fields of reproduction
- Mechanisms of reproductive systems clarified by histological and physiological analyses
- Histological studies using medaka
- The present scheme of HPG axis regulation clarified by multidisciplinary analyses in vertebrates
- Endocrine studies using medaka
- Neurophysiological studies using medaka: patch clamp recording and calcium imaging
- Medaka provides clues to the understanding of general mechanisms of reproduction in teleosts and even in vertebrates
- **Chapter 11. The African turquoise killifish (*Nothobranchius furzeri*): biology and research applications**
- Introduction
- Large-scale husbandry (including water systems and water parameters)
- Breeding strategies for genome engineering, including egg collection and incubation
- Efficient genome engineering approaches
- Fish dissection
- The African turquoise killifish: available toolbox
- Summary and future perspectives
- Materials
- **Chapter 12. Challenges in keeping annual killifish**
- Introduction

- Available strains and species
- Housing and breeding
- Embryo development
- Diet
- Diseases
- Summary of the challenges
- **Chapter 13. Mexican tetra (*Astyanax mexicanus*): biology, husbandry, and experimental protocols**
- Biology and natural history
- Husbandry
- Colony management
- Animal welfare and health management
- Procedures
- **Chapter 14. The housing, care, and use of a laboratory three-spined stickleback colony**
- Introduction
- Supply, quarantine, and disinfection
- Basic husbandry
- Establishing and maintaining a successful colony
- Procedures
- Conclusion
- **Chapter 15. Goldfish (*Carassius auratus*): biology, husbandry, and research applications**
- Taxonomy and phylogeny
- Morphology/anatomy
- Geography and natural habitat
- Behavior
- Husbandry
- Goldfish in biomedical research
- **Chapter 16. *Danionella translucida*, a tankful of new opportunities**
- Biology and ecology of *Danionella translucida*
- Neuroscience
- Development and evolution
- Animal husbandry: early larval stages
- Animal husbandry: early stages to adulthood
- Breeding
- Supplementary data
- Supplementary data
- Section 3. Databases
- **Chapter 17. Fish inventory databases**
- Introduction
- Fish characterization and grouping
- Record browsing and spatial tracking
- Performing actions and monitoring parameters
- Statistics and reporting
- Advanced features
- Examples of current solutions
- Future of fish databases
- **Index.**