# **Brief Contents**

## I Patterns and Processes of Becoming: A Framework for Understanding Animal Development

- CHAPTER 1 Making New Bodies: Mechanisms of Developmental Organization 1
- CHAPTER 2 Specifying Identity: Mechanisms of Developmental Patterning 29
- CHAPTER 3 Differential Gene Expression: Mechanisms of Cell Differentiation 45
- CHAPTER 4 Cell-to-Cell Communication: Mechanisms of Morphogenesis 95
- CHAPTER 5 Stem Cells: Their Potential and Their Niches 143
- II Gametogenesis and Fertilization: The Circle of Sex
  - CHAPTER 6 Sex Determination and Gametogenesis 181
  - CHAPTER 7 **Fertilization:** Beginning a New Organism **217**

### III Early Development: Cleavage, Gastrulation, and Axis Formation

- CHAPTER 8 
  Rapid Specification in Snails and Nematodes 251
- CHAPTER 9 The Genetics of Axis Specification in Drosophila 277
- CHAPTER 10 Sea Urchins and Tunicates: Deuterostome Invertebrates 311
- CHAPTER 11 Amphibians and Fish 333
- CHAPTER 12 Birds and Mammals 379
- IV Building with Ectoderm: The Vertebrate Nervous System and Epidermis
- CHAPTER 13 
  Neural Tube Formation and Patterning 413
- CHAPTER 14 Brain Growth 439
- CHAPTER 15 Neural Crest Cells and Axonal Specificity 463
- CHAPTER 16 Ectodermal Placodes and the Epidermis 517
- V Building with Mesoderm and Endoderm: Organogenesis
  - CHAPTER 17 
    Paraxial Mesoderm: The Somites and Their Derivatives 539
  - CHAPTER 18 Intermediate and Lateral Plate Mesoderm: Heart, Blood, and Kidneys 581
  - CHAPTER 19 Development of the Tetrapod Limb 613
- CHAPTER 20 The Endoderm: Tubes and Organs for Digestion and Respiration 653

#### **VI** Postembryonic Development

- CHAPTER 21 Metamorphosis: The Hormonal Reactivation of Development 671
- CHAPTER 22 
  Regeneration 693
- CHAPTER 23 Aging and Senescence 723

### VII Development in Wider Contexts

- CHAPTER 24 Development in Health and Disease: Birth Defects, Endocrine Disruptors, and Cancer 735
- CHAPTER 25 Development and the Environment: Biotic, Abiotic, and Symbiotic Regulation of Development 763
- CHAPTER 26 Development and Evolution: Developmental Mechanisms of Evolutionary Change 785