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## **1. Principles of development in biology**

### **1. Developmental biology: The anatomical tradition**

The Questions of Developmental Biology  
Anatomical Approaches to Developmental Biology  
Comparative Embryology  
Evolutionary Embryology  
Medical Embryology and Teratology  
Mathematical Modeling of Development  
Principles of Development: Developmental Anatomy  
References

### **2. Life cycles and the evolution of developmental patterns**

The Circle of Life: The Stages of Animal Development  
The Frog Life Cycle  
The Evolution of Developmental Patterns in Unicellular Protists  
Multicellularity: The Evolution of Differentiation  
Developmental Patterns among the Metazoa  
Principles of Development: Life Cycles and Developmental Patterns  
References

### **3. Principles of experimental embryology**

Environmental Developmental Biology  
The Developmental Mechanics of Cell Specification  
Morphogenesis and Cell Adhesion  
Principles of Development: Experimental Embryology  
References

### **4. Genes and development: Techniques and ethical issues**

The Embryological Origins of the Gene Theory

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Evidence for Genomic Equivalence

Differential Gene Expression

RNA Localization Techniques

Determining the Function of Genes during Development

Identifying the Genes for Human Developmental Anomalies

Principles of Development: Genes and Development

References

## **5. The genetic core of development: Differential gene expression**

Differential Gene Transcription

Methylation Pattern and the Control of Transcription

Transcriptional Regulation of an Entire Chromosome: Dosage Compensation

Differential RNA Processing

Control of Gene Expression at the Level of Translation

Epilogue: Posttranslational Gene Regulation

Principles of Development: Developmental Genetics

References

## **6. Cell-cell communication in development**

Induction and Competence

Paracrine Factors

Cell Surface Receptors and Their Signal Transduction Pathways

The Cell Death Pathways

Juxtacrine Signaling

Cross-Talk between Pathways

Coda

Principles of Development: Cell-Cell Communication

References

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## **2: Early embryonic development**

### **7. Fertilization: Beginning a new organism**

Structure of the Gametes

Recognition of Egg and Sperm

Gamete Fusion and the Prevention of Polyspermy

The Activation of Egg Metabolism

Fusion of the Genetic Material

Rearrangement of the Egg Cytoplasm

Snapshot Summary: Fertilization

References

### **8. Early development in selected invertebrates**

An Introduction to Early Developmental Processes

The Early Development of Sea Urchins

The Early Development of Snails

Early Development in Tunicates

Early Development of the Nematode *Caenorhabditis elegans*

References

### **9. The genetics of axis specification in *Drosophila***

Early *Drosophila* Development

The Origins of Anterior-Posterior Polarity

The Generation of Dorsal-Ventral Polarity

References

### **10. Early development and axis formation in amphibians**

Early Amphibian Development

Axis Formation in Amphibians: The Phenomenon of the Organizer

References