

# Contents

## Developmental Tables xi

Carnegie Stages of Early Human Embryonic

Development (Weeks 1–8) xi

Major Developmental Events during  
the Fetal Period xii

## Part I

### Early Development and the Fetal-Maternal Relationship

- 1 Getting Ready for Pregnancy 2**
  - Gametogenesis 2
  - Preparation of the Female Reproductive Tract for Pregnancy 15
  - Hormonal Interaction Involved with Reproduction in Males 20
- 2 Transport of Gametes and Fertilization 24**
  - Ovulation and Egg and Sperm Transport 24
  - Fertilization 28
- 3 Cleavage and Implantation 37**
  - Cleavage 37
  - Embryo Transport and Implantation 50
- 4 Molecular Basis for Embryonic Development 58**
  - Fundamental Molecular Processes in Development 58
- 5 Formation of Germ Layers and Early Derivatives 75**
  - Two-Germ-Layer Stage 75
  - Gastrulation and the Three Embryonic Germ Layers 76
  - Induction of the Nervous System 80
  - Cell Adhesion Molecules 85
- 6 Establishment of the Basic Embryonic Body Plan 92**
  - Development of the Ectodermal Germ Layer 92
  - Development of the Mesodermal Germ Layer 97
  - Development of the Endodermal Germ Layer 107
  - Basic Structure of 4-Week-Old Embryo 111
- 7 Placenta and Extraembryonic Membranes 117**
  - Extraembryonic Tissues 117
  - Chorion and Placenta 120
  - Placental Physiology 126
  - Placenta and Membranes in Multiple Pregnancies 130
- 8 Developmental Disorders: Causes, Mechanisms, and Patterns 136**
  - General Principles 136
  - Causes of Malformations 141
  - Developmental Disturbances Resulting in Malformations 149

## Part II

### Development of the Body Systems

- 9 Integumentary, Skeletal, and Muscular Systems 156**
  - Integumentary System 156
  - Skeleton 165
  - Muscular System 178
- 10 Limb Development 193**
  - Initiation of Limb Development 193
  - Regulative Properties and Axial Determination 193
  - Outgrowth of Limb Bud 194
  - Morphogenetic Control of Early Limb Development 199
  - Development of Limb Tissues 205
- 11 Nervous System 216**
  - Establishment of Nervous System 216
  - Early Shaping of Nervous System 216
  - Histogenesis Within the Central Nervous System 218
  - Craniocaudal Pattern Formation and Segmentation 222
  - Peripheral Nervous System 226
  - Autonomic Nervous System 231
  - Later Structural Changes in the Central Nervous System 233
  - Ventricles, Meninges, and Cerebrospinal Fluid Formation 244
  - Cranial Nerves 245
  - Development of Neural Function 245
- 12 Neural Crest 254**
  - Developmental History of the Neural Crest 254
  - Major Divisions of Neural Crest 258
- 13 Sense Organs 269**
  - Eye 269
  - Ear 285
- 14 Head and Neck 294**
  - Early Development of Head and Neck 294
  - Establishing the Pattern of the Craniofacial Region 297
  - Development of Facial Region 299
  - Development of Pharynx and Its Derivatives 315
- 15 Digestive and Respiratory Systems and Body Cavities 335**
  - Digestive System 335
  - Respiratory System 359
  - Body Cavities 362
- 16 Urogenital System 376**
  - Urinary System 376
  - Genital System 383
  - Sexual Duct System 394
  - External Genitalia 399

**x** Contents

**17 Cardiovascular System 408**

Development of Blood and the Vascular System 408

Development and Partitioning of Heart 425

Fetal Circulation 434

**18 Fetal Period and Birth 453**

Growth and Form of Fetus 453

Fetal Physiology 453

Parturition 462

Adaptations to Postnatal Life 467

Overview 470

**Answers to Clinical Vignettes and Review**

**Questions 473**

**Index 479**