



Contents

1. Introduction to the Developing Human	1
Developmental Periods	2
Significance of Embryology	8
Historical Gleanings	9
Descriptive Terms in Embryology	14
<i>Clinically Oriented Problems</i>	14
2. The Beginning of Human Development: The First Week	17
Gametogenesis	18
Uterus, Uterine Tubes, and Ovaries	24
Female Reproductive Cycles	27
Transportation of Gametes	32
Maturation of Sperms	33
Viability of Gametes	34
Fertilization	34
Formation of Blastocyst (Blastogenesis)	41
Summary of the First Week of Development	43
<i>Clinically Oriented Problems</i>	45
3. Formation of Bilaminar Embryonic Disc and Chorionic Sac:	
The Second Week	47
Completion of Implantation and Continuation of Embryonic Development	48
Development of the Chorionic Sac	51
Implantation Sites of the Blastocyst	54
Summary of Implantation of the Blastocyst	58
Summary of the Second Week of Development	58
<i>Clinically Oriented Problems</i>	59
4. Formation of Germ Layers and Early Tissue and Organ Differentiation: The Third Week.....	63
Gastrulation: Formation of Germ Layers	64
Neurulation: Formation of Neural Tube	72
Development of Somites	72
Development of Intraembryonic Coelom	74
Early Development of Cardiovascular System	75
Further Development of Chorionic Villi	77
Summary of the Third Week of Development	79
<i>Clinically Oriented Problems</i>	80
5. Organogenetic Period: The Fourth to Eighth Weeks.....	83
Phases of Embryonic Development	85
Folding of the Embryo	85

Germ Layer Derivatives	87
Control of Embryonic Development	89
Highlights of the Fourth to Eighth Weeks	90
Estimation of Embryonic Age	103
Summary of the Fourth to Eighth Weeks of Development	104
<i>Clinically Oriented Problems</i>	104
6. The Fetal Period: Ninth Week to Birth	107
Estimation of Fetal Age	109
Highlights of the Fetal Period	110
Expected Date of Delivery	118
Factors Influencing Fetal Growth	119
Procedures for Assessing Fetal Status	120
Summary of Fetal Period	123
<i>Clinically Oriented Problems</i>	125
7. Placenta and Fetal Membranes.....	129
The Placenta	131
Parturition (Childbirth)	140
Amnion and Amniotic Fluid	150
Yolk Sac	154
Allantois	154
Multiple Pregnancies	154
Summary of Placenta and Fetal Membranes	162
<i>Clinically Oriented Problems</i>	164
8. Human Birth Defects.....	167
Teratology — Study of Abnormal Development	168
Anomalies Caused by Genetic Factors	169
Anomalies Caused by Environmental Factors	181
Anomalies Caused by Multifactorial Inheritance	195
Summary of Human Birth Defects	195
<i>Clinically Oriented Problems</i>	196
9. Body Cavities, Mesenteries, and Diaphragm.....	201
The Embryonic Body Cavity	203
Development of the Diaphragm	206
Congenital Diaphragmatic Hernia	209
Summary of Development of Body Cavities	212
<i>Clinically Oriented Problems</i>	213
10. The Pharyngeal (Branchial) Apparatus.....	215
Pharyngeal Arches	217
Pharyngeal Pouches	222
Pharyngeal Grooves	225
Pharyngeal Membranes	227
Development of the Thyroid Gland	230
Development of the Tongue	233
Development of the Salivary Glands	235

Development of the Face	236
Development of the Nasal Cavities	242
Development of the Palate	245
Summary of the Pharyngeal Apparatus	253
<i>Clinically Oriented Problems</i>	254
11. The Respiratory System	257
Development of the Larynx	259
Development of the Trachea	261
Development of the Bronchi and Lungs	262
Summary of the Respiratory System	268
<i>Clinically Oriented Problems</i>	269
12. The Digestive System	271
The Foregut	272
Development of the Spleen	283
The Midgut	283
The Hindgut	293
Summary of the Digestive System	298
<i>Clinically Oriented Problems</i>	300
13. The Urogenital System	303
Development of the Urinary System	305
Development of the Suprarenal Glands	319
Development of the Genital System	323
Development of the Inguinal Canals	341
Summary of the Urogenital System	344
<i>Clinically Oriented Problems</i>	345
14. The Cardiovascular System	349
Early Development of the Heart and Vessels	350
Final Prenatal Development of the Heart	358
Anomalies of the Heart and Great Vessels	372
Aortic Arch Derivatives	384
Aortic Arch Anomalies	389
Fetal and Neonatal Circulation	394
Development of the Lymphatic System	398
Summary of the Cardiovascular System	401
<i>Clinically Oriented Problems</i>	401
15. The Skeletal System	405
Development of Bone and Cartilage	407
Development of Joints	411
Development of Axial Skeleton	412
Development of Appendicular Skeleton	420
Summary of the Skeletal System	422
<i>Clinically Oriented Problems</i>	422

16. The Muscular System	425
Development of Skeletal Muscle 426	
Development of Smooth Muscle 428	
Development of Cardiac Muscle 428	
Summary of the Muscular System 430	
<i>Clinically Oriented Problems</i> 430	
17. The Limbs	433
Early Stages of Limb Development 434	
Final Stages of Limb Development 437	
Dermatomes and Cutaneous Innervation of Limbs 437	
Blood Supply to the Limbs 442	
Anomalies of Limbs 444	
Summary of Limb Development 448	
<i>Clinically Oriented Problems</i> 449	
18. The Nervous System.....	451
Origin of the Nervous System 453	
Development of the Spinal Cord 455	
Congenital Anomalies of the Spinal Cord 461	
Development of the Brain 465	
Congenital Anomalies of the Brain 477	
Development of the Peripheral Nervous System 483	
Development of the Autonomic Nervous System 486	
Summary of the Nervous System 487	
<i>Clinically Oriented Problems</i> 488	
19. The Eye and Ear.....	491
Development of the Eye 492	
Development of the Ear 503	
Summary of Development of the Eye 510	
Summary of Development of the Ear 510	
<i>Clinically Oriented Problems</i> 511	
20. The Integumentary System.....	513
Development of Skin 514	
Development of Hair 517	
Development of Nails 519	
Development of Mammary Glands 520	
Development of Teeth 522	
Summary of the Integumentary System 528	
<i>Clinically Oriented Problems</i> 529	
Discussion of Clinically Oriented Problems.....	531
Appendices.....	543
Timetable of Human Prenatal Development — 1 to 6 weeks 544	
Timetable of Human Prenatal Development — 7 to 38 weeks 546	
Critical Periods in Human Development 548	
Index.....	549