

Review of MEDICAL EMBRYOLOGY



BEN PANSKY, Ph.D., M.D.

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This book is dedicated to my mother and father, **Leah** and **Abraham**, who supplied the initial gametes that made me human, and who nurtured the embryo, fetus, and offspring into manhood; to my wife, **Julie**, who helped the man mature and grow, and who kept the spark of life alive with her love and understanding; and to my son, **Jon**, who carries the genes, old and new, into the next generation.

Review of Medical Embryology

Text and Illustrations by

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Preface

Review of Medical Embryology has been written for medical students, physicians, and others who require a visual comprehension and understanding of the fundamentals of human development. The material is presented in a simplified, concise, and outline form, which emphasizes applications to medicine and biology, rather than theoretical aspects of the subject. For example, the very early stages of embryo formation (embryogenesis), the mechanisms of uterine implantation, and the correlated changes of the mother's reproductive organs are important in obstetrics, gynecology, and pediatrics. The advanced stages in the formation of organs (organogenesis) are helpful in understanding the "body plan" and find their correlation in anatomy, medicine, and even surgery, where repair mechanisms may serve to alter embryonic and fetal malformations. And knowledge about histogenesis of major organs provides a basis for understanding and dealing with organ architecture, as seen in microscopic anatomy and pathology.

Throughout the text, every effort has been made to present and illustrate developmental processes as a sequence of dynamic events. Sections interpreting functional significance of relations are interspersed with descriptions of developmental morphology, in order to highlight correlations and to enhance learning and understanding.

In a subject such as embryology, in which the interrelations of a number of growing parts are of critical significance, well-planned illustrations can provide a three-dimensional visualization of what is taking place. Thus, with this fact in mind, the book has been written around its pictures rather than having its pictures planned around the text. Over 1000 original line-cut illustrations, most of which appear on right-hand pages, give a clear, concise view of what is taking place amid the intricacies of human development. To facilitate the rapid location of each of the major units within the text, gray tabs and black-stripe tabs are printed in the margins of left-hand pages.

Appendixes at the end of the book, which summarize some of the more general concepts of embryology, include sections on correlated human development, germ layer derivatives, critical periods of human development, teratogens known to cause human malformations, physiologic development of the central nervous system, and prematurity. In addition, a list of general references appears at the end of the book.

The author is indebted to the Medical College of Ohio for providing him with the intellectual atmosphere and facility that permitted the book to be completed; to Dr. Liberato J. A. DiDio, Professor and Chairman of Anatomy, for his encouragement and support; and to Ms. Joan C. Zulch, Editor-in-Chief, Medical Books Department, Macmillan Publishing Co., Inc., for her enthusiasm, guidance, advice, and encouragement, without which the book could not have been prepared.

B. P.

Contents

PART I. EMBRYOGENESIS

1. Terms of Description 2-3
2. The Male Reproductive System 4-5
 - Microscopy of the Male Testis (Figure 1) 6
 - Electron Micrographs of Sperm (Figure 2) 7
3. Gamete (Germ Cell) Formation, or Gametogenesis: Spermatogenesis 8-9
 - Mitosis and Meiosis (Figure 3) 10
 - Human Spermatozoa and Spermiogenesis (Figure 4) 11
 - Electron Micrographs of Spermatocytes and Spermatogonium (Figure 5) 12
 - Electron Micrographs of Spermatids, Sertoli Cells, and Leydig Cells (Figure 6) 13
4. Gametogenesis: Oogenesis 14-15
 - Micrographs of Pronuclear Stage, First Cleavage Division, and Two-Cell Embryo (Figure 7) 16
 - Micrographs of Four-Cell Embryo, Morula, and Blastocyst Stages (Figure 8) 17
5. Anomalies (Abnormalities) of Gametogenesis 18-19
6. The Adult Female Uterus 20-21
7. The Adult Uterine Tubes (Oviduct, Fallopian Tube, or Salpinx) 22-23
8. Reproductive Cycles: The Ovarian Cycle and Ovulation 24-25
9. Reproductive Cycles: The Ovarian Cycle and the Corpus Luteum 26-27
10. Reproductive Cycles: The Menstrual (Uterine) Cycle 28-29
11. Germ Cell Viability and Movement and Abnormal Implantation Sites 30-31
12. Fertilization 32-33
13. Implantation and Its Preparation: General Concepts 34-35
14. Week 1 of Embryonic Development: Ovulation to Implantation 36-37
15. Week 2 of Development: Bilaminar Germ Disk Embryo 38-39
16. Week 2 of Development: Days 10 to 14 40-41
17. Review of Week 2 and Abnormal Development 42-43
18. Week 3 of Development: Trilaminar Germ Disk Embryo Formation and Gastrulation 44-45
19. Week 3 of Development: The Notochord, Neural Tube, and Allantois 46-47
 - Transverse, Horizontal, and Sagittal Sections of Early Embryogenesis (Figure 9) 48
 - Neural Tube Development (Figure 10) 49
20. Week 3 of Development: Intraembryonic Mesoderm, Somite Development, and the Intraembryonic Coelom 50-51
 - Development of the Yolk Sac and Coelomic Cavities (Figure 11) 52
 - Somite Differentiation (Figure 12) 53

21. Week 3 of Development: Cardiovascular System Development 54–55
22. Week 3 of Development: Trophoblast and Villus Development 56–57
23. Weeks 4 to 6 of Development: The Embryonic Period 58–59
24. Embryonic Period: Weeks 7 and 8 and External Embryo Appearance 60–61
25. Germ Layers and Their Derivatives 62–63
26. Embryonic Folding and Flexion of the Embryo 64–65
Embryonic Folding and Flexion: Transverse and Sagittal Sections (Figure 13) 66
Sections of Flexed Embryo Caudal and Cephalic to the Umbilicus (Figure 14) 67
27. General Mechanisms of Normal Development 68–69
28. The Fetal Period: Weeks 9 to 20 of Development 70–71
29. The Fetal Period: Weeks 21 to Term 72–73
30. Multiple Pregnancies 74–75
Monozygotic, Genetically Identical Twin Pregnancies (Figure 15) 76
Conjoined Twins (Figure 16) 77
31. Congenital Malformation and Their Causes 78–79
Turner's and Cri-du-chat Syndrome Karyotypes (Figure 17) 80
Down's and Klinefelter's Syndrome Karyotypes (Figure 18) 81
32. Congenital Malformations and Their Causes: Human Malformations 82–83
33. The Fetal Membranes 84–85
34. The Amnion, Allantois, and Yolk Sac 86–87
35. The Umbilical Cord 88–89
36. Uterine Growth During Pregnancy and Parturition 90–91
37. Fetal-Maternal Incompatibility 92–93
38. The Placenta: General Discussion 94–95
39. The Placental Villi 96–97
40. The Placenta: Decidual Formation 98–99
41. Placental Physiology 100–101
42. Placental Circulation 102–103
43. Hormonal Balance and Tests for Pregnancy 104–105

PART II. ORGANOGENESIS

Unit One. BODY CAVITIES AND MESENTERIES

44. Body Cavities: Coelomic Divisions 110–111
The Mesenteries in Cross-Section (Figure 19) 112
Continuity of Pericardial Portion of Coelom with Paired Coelomic Chamber of Midbody Area (Figure 20) 113
45. Body Cavities: Pleuropericardial and Pleuroperitoneal Membranes 114–115
46. Body Cavities: The Lesser Peritoneal Sac (Omental Bursa) and Dorsal Mesogastrium 116–117

47. Development of the Mesenteries 118–119
 Transverse Sections of Mesentery Development (Figure 21) 120
 Cross-Sections of Mesentery Development (Figure 22) 121
48. Development of the Diaphragm 122–123
 Development of the Diaphragm (Figure 23) 124
 Congenital Diaphragmatic Defects and Normal Diaphragmatic Parts and
 Relations (Figure 24) 125

**Unit Two. THE BRANCHIAL APPARATUS: The Face,
 Pharynx, and Related Branchial Derivatives**

49. The Branchial Apparatus: The Branchial (Pharyngeal) Arches 128–129
 The Branchial (Pharyngeal) Arches and Associated Nerves
 (Figure 25) 130
 The Oral Cavity and Pharynx (Figure 26) 131
50. The Pharyngeal Clefts and Pouches 132–133
51. Malformations Related to the Branchial Apparatus 134–135
52. Branchial Arch Derivatives: The Thyroid Gland 136–137
53. The Branchial Apparatus: The Floor of the Pharynx—Tongue and
 Associated Structures 138–139
54. The Face 140–141
55. Development of the Palate 142–143
56. Congenital Malformations of the Lip and Palate 144–145

**Unit Three. THE RESPIRATORY SYSTEM: Nasal Cavities,
 Larynx, Trachea, Bronchi, and Lungs**

57. Development of the Nasal Cavities 148–149
58. Development of the Lower Respiratory System: Larynx and
 Trachea 150–151
59. Development of the Lower Respiratory System: The Bronchi and
 Surrounding Structures 152–153
60. Development of the Lower Respiratory System: The Lungs and Terminal
 Respiratory Tubes 154–155
61. Development of the Lower Respiratory System: Surfactant and
 Respiratory Movements 156–157
62. Malformations of the Lower Respiratory Tract 158–159

Unit Four. THE MUSCULAR SYSTEM

63. Development of the Muscular System 162–163
 General Body Muscle Groups (Figure 27) 164
 Branchiomic and Adjacent Myotomic Muscles (Figure 28) 165

Unit Five. THE SKELETAL AND ARTICULAR SYSTEMS

- 64. Development of the Skeletal and Articular Systems: Cartilage and Bone Histogenesis 168–169
 - Endochondral Bone Growth (Figure 29) 170
 - Transformation of Cancellous to Compact Bone (Figure 30) 171
- 65. Bone Histogenesis: Secondary Ossification Centers and Joint Development 172–173
- 66. Development of the Axial Skeleton 174–175
 - Vertebral Development (Figure 31) 176
 - Development of the Sternum and Ribs (Figure 32) 177
- 67. Appendicular Skeleton and Skull Development 178–179
 - Viscerocranial Cartilage Derivatives and Epiphyses and Diaphyses of the Extremities (Figure 33) 180
 - Skull Development (Figure 34) 181
- 68. Congenital Malformations of the Skeletal System 182–183
- 69. Development of the Limbs 184–185
- 70. Dermatone and Cutaneous Innervation of the Limbs 186–187
- 71. Malformations of the Appendicular Skeleton (the Limbs) 188–189

Unit Six. THE INTEGUMENTARY SYSTEM: The Skin, Cutaneous Appendages, and Teeth

- 72. Development of the Integumentary System: Ectodermal Derivatives 192–193
- 73. Congenital Malformations of the Integumentary System 194–195
- 74. Development of the Hair and Associated Structures 196–197
- 75. Development of the Nails 198–199
- 76. Development of the Mammary Glands 200–201
- 77. Development of the Teeth 202–203
- 78. Tooth Eruption and Malformations of the Teeth 204–205

Unit Seven. THE DIGESTIVE SYSTEM

- 79. The Digestive System: General Introduction 208–209
- 80. The Foregut: Esophagus and Stomach 210–211
- 81. The Foregut: The Omental Bursa and Duodenum 212–213
- 82. The Foregut: The Liver and Biliary Apparatus (Gallbladder and Ducts) 214–215
- 83. The Foregut: The Pancreas and Spleen 216–217
- 84. Development of the Midgut: General Introduction 218–219
- 85. The Midgut: Fixation, the Cecum and Appendix 220–221
- 86. Development of the Hindgut 222–223

87. Congenital Malformations of the Digestive System: Foregut Malformations 224–225
Congenital Anomalies and Malformations of the Biliary Apparatus (Figure 35) 226
Annular Pancreas and Heterotopic Pancreatic Tissue (Figure 36) 227
88. Congenital Malformations of the Digestive System: Midgut Malformations 228–229
Anomalies of the Small Intestine and Colon (Figure 37) 230
Atresia, Stenosis, and Meckel's Diverticulum (Figure 38) 231
89. Midgut Malformations 232–233
90. Congenital Malformations of the Digestive System: Hindgut Malformations 234–235

Unit Eight. THE URINARY SYSTEM

91. The Urinary or Excretory System: Intermediate Plate, Nephrogenic Cord, and Pronephros 238–239
92. The Urinary or Excretory System: The Mesonephros 240–241
Developing Mesonephros (Figure 39) 242
Relationship of Mesonephros to Surrounding Developing Structures (Figure 40) 243
93. The Urinary or Excretory System: The Metanephros 244–245
94. The Urinary or Excretory System: The Definitive Kidney 246–247
95. The Urinary or Excretory System: The Urinary Bladder and Urethra 248–249
96. Malformations of the Urinary System 250–251
97. Malformations of the Urinary System 252–253

Unit Nine. THE GENITAL OR REPRODUCTIVE SYSTEM

98. The Genital or Reproductive System: The Primitive Genital System 256–257
99. Development of the Testis 258–259
100. The Genital or Reproductive System: Primitive Genital Tracts and Sex Discrimination 260–261
Stages in Development of the Definitive Male Genitourinary System (Figure 41) 262
Differentiation and Development of the Male Excretory System (Figure 42) 263
101. Differentiation of the Male Genital Tracts and Auxiliary Glands 264–265
102. Development of the Male External Genital Organs 266–267
103. Inguinal Canal Development and Testicular Migration 268–269
104. Development of the Female Genital System: Ovarian Differentiation 270–271

105. Differentiation of the Female Genital Tracts: Uterus, Vagina, Auxiliary Glands, Mesenteries 272–273
Development of Uterus and Vagina (Figure 43) 274
Migration of Ovaries and Ligaments of the Uterus, Ovaries, and Uterine Tubes (Figure 44) 275
106. Development of the Upper and Lower Portions of the Female Genital Tract 276–277
107. Development of the Female External Genital Organs 278–279
108. Sexual Anomalies of Genetic and Hormonal Origin 280–281
109. Genital Malformations in the Male 282–283
Hydrocele, Inguinal Hernia, and Cryptorchid Testes (Figure 45) 284
Anomalies of the Male and Female Reproductive Tracts (Figure 46) 285
110. Uterovaginal Malformations of the Female 286–287
111. Adult Derivatives of Embryonic Urogenital Structures 288
Differential Diagnosis of Patients with Ambiguous External Genitalia 289

**Unit Ten. THE CIRCULATORY SYSTEM:
CARDIOVASCULAR AND LYMPHATIC SYSTEMS**

112. Hematopoiesis and General Development of the Circulatory System 292–293
113. Cardiovascular Circulatory and Lymphatic Systems: Early Development 294–295
114. Development of the Heart: Cardiac Tube Development 296–297
Longitudinal Sections: Changes in Position of the Heart and Pericardial Cavity Due to Head Folding (Figure 47) 298
Coronal Sections: Changes in Position of the Heart and Pericardial Cavity Due to Head Folding (Figure 48) 299
115. Development of the Heart: Formation of the Heart Loop 300–301
116. Pericardial Cavity Development and Primitive Heart Circulation 302–303
117. Atrioventricular and Interatrial Septation and Development 304–305
Partitioning of the Primitive Atrium (Figure 49) 306
Formation of the Septum in the Atrioventricular Canal (Figure 50) 307
118. Development of the Sinus Venosus and Associated Veins 308–309
119. The Right and Left Atrial Walls and the Venous Valves 310–311
120. Septation of Ventricles, Truncus Arteriosus, and Conus Cordis 312–313
121. The Cardiac Valves and Conducting System 314–315
Conduction System and Fibrous Skeleton of the Heart (Figure 51) 316
Development of the Atrioventricular Valves, Chordae Tendineae, and Papillary Muscles (Figure 52) 317
122. The Primitive Circulatory Network 318–319
123. Development of the Arterial System 320–321
Development of the Arteries of the Upper Extremity (Figure 53) 322
Development of the Arteries of the Lower Extremity (Figure 54) 323
124. The Aortic Arches 324–325
125. Development of the Venous System: Primitive Venous Network and Superior Vena Cava 326–327

126. Development of the Venous System: The Inferior Vena Cava 328–329
127. Development of the Venous System: The Portal System and Pulmonary Veins 330–331
128. Development of the Lymphatic System 332–333
 - Development of a Lymph Node (Figure 55) 334
 - Development of the Tonsils, the Thymus, and the Spleen (Figure 56) 335
129. The Circulatory System Before and After Birth 336–337
130. Adult Derivatives of Fetal Structures 338–339
131. Malformations of the Cardiovascular System 340–341
 - Aortic Arch Abnormalities (Figure 57) 342
 - Abnormal Development of the Superior and Inferior Venae Cavae and Pulmonary Venous Drainage (Figure 58) 343
132. Malformations of the Heart and Great Vessels 344–345
 - Interatrial Septal Abnormalities (Figure 59) 346
 - Interatrial Septal Abnormalities (Figure 60) 347
133. Malformations of the Heart and Great Vessels 348–349
 - Failure of Separation of Aortic and Pulmonary Trunks (Figure 61) 350
 - Transposition of the Great Vessels and Pulmonary Stenosis (Figure 62) 351
134. Complex Cardiac Malformations 352–353
 - Valvular Atresia and Stenosis (Figure 63) 354
 - Abnormalities in the Development of the Lymphatic System (Figure 64) 355

Unit Eleven. THE NERVOUS SYSTEM

135. Early Development of the Nervous System 358–359
136. Early Nervous System Development: The Neural Tube and Neural Crest 360–361
137. General Development of the Central Nervous System 362–363
 - Primary Brain Vesicles and Neural Tube Flexures: Days 23–30 (Figure 65) 364
 - Major Components of the Developing Brain: Weeks 5–7 (Figure 66) 365
138. Phylogenesis of the Nervous System 366–367
 - Annelid and Worm Nervous Systems (Phyla Annelida and Chordata) (Figure 67) 368
 - Comparative Anatomy of the Chordate Brain (Figure 68) 369
139. Metameric Organization of the Nervous System 370–371
 - Metameric Organization of the Central Nervous System (Figure 69) 372
 - Dermatomes and Cutaneous Nerve Distribution in the Adult (Figure 70) 373
140. General Considerations Related to the Anatomy of the Spinal Cord 374–375
141. The Spinal Cord: Normal Development 376–377
142. The Spinal Cord: Differentiation of Nerve and Glial Cells 378–379
143. The Spinal Cord: Neural Crest Cells and Myelination 380–381

144. Spinal Cord Length and Spinal Meninges 382–383
145. Malformations of the Spinal Cord 384–385
146. Introduction to Brainstem Development 386–387
147. The Brainstem: Myelencephalon (Fifth Vesicle)—Basal Motor Plate 388–389
Brainstem Nuclei and Nerves (Dorsal View) (Figure 71) 390
Basal and Alar Plate Development of Myelencephalon and Transverse Sections of Medulla at Various Levels (Figure 72) 391
148. The Brainstem: Myelencephalon (Fifth Vesicle)—Alar Sensory and Roof Plates 392–393
149. The Brainstem: Metencephalon (Fourth Vesicle) 394–395
150. The Brainstem: Metencephalon (Fourth Vesicle)—The Cerebellum 396–397
Cerebellar Development and Histogenesis (Figure 73) 398
Adult Cerebellum—Components and Terminology of Description (Figure 74) 399
151. The Brainstem: Mesencephalon (Third Vesicle) 400–401
152. The Peripheral Nervous System and Cranial Nerves 402–403
Cranial Nerves (4- to 5-Week Embryo) (Figure 75) 404
Cranial Nerves (Fetal and Adult) (Figure 76) 405
153. The Diencephalon (Second Vesicle) 406–407
154. The Telencephalon (First Vesicle): Phylogenesis 408–409
155. The Brain: Telencephalon (First Vesicle) 410–411
156. The Brain: Telencephalon (First Vesicle)—Lobes and Pallial Development 412–413
157. The Telencephalon (First Vesicle): Development of the Rhinencephalon 414–415
158. Histogenesis of the Cerebral Cortex 416–417
159. Commissures of the Telencephalon 418–419
160. The Coverings and Vascularization of the Brain 420–421
161. Malformations of the Brain 422–423
162. Malformations of the Brain 424–425
163. Malformations of the Brain: Hydrocephalus 426–427
164. The Autonomic Nervous System: The Sympathetic System 428–429
165. The Autonomic Nervous System: The Parasympathetic System 430–431
The Sympathetic Nervous System and Urinary Retention Mechanism (Figure 77) 432
The Parasympathetic Nervous System and Urinary Expulsion Mechanism (Figure 78) 433
166. The Olfactory System 434–435
167. The Eye: Optic Cup and Lens Vesicle, Retina, Iris, and Ciliary Body 436–437
Anatomy of the Mature Eye (Figure 79) 438
Retinal Histogenesis (Developmental and Adult) (Figure 80) 439
168. The Eye: Lens, Choroid, Sclera, Cornea, and Optic Nerve 440–441
169. Congenital Malformations of the Eye 442–443
170. The Vestibulocochlear System: The External Ear and the Eardrum (Tympanic Membrane) 444–445

- 171.** The Vestibulocochlear System: The Internal Ear—Membranous Labyrinth 446–447
- 172.** The Vestibulocochlear System: The Internal Ear—Bony Labyrinth 448–449
- 173.** The Vestibulocochlear System: Histogenesis of the Internal Ear 450–451
- 174.** The Vestibulocochlear System: The Middle Ear 452–453
- 175.** Congenital Malformations of the Vestibulocochlear System 454–455
- 176.** The Hypophysis (Pituitary Gland): Glandular Primordium 456–457
- 177.** The Hypophysis (Pituitary Gland): Neural Primordium and Portal System 458–459
- 178.** Role of the Hypophysis (Pituitary Gland): Physiology and Pathology 460–461
- 179.** The Paraganglionic System: The Paraganglia 462–463
- 180.** Development of the Adrenal (Suprarenal) Gland 464–465
- 181.** Pathology Associated with the Adrenal Gland 466–467

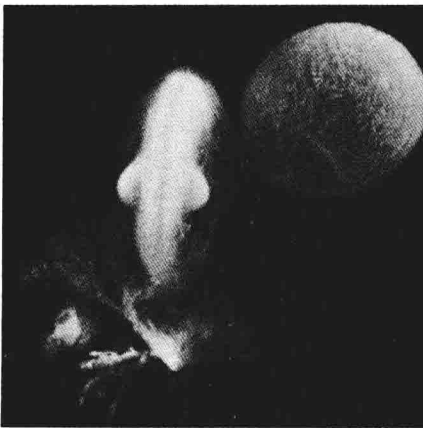
APPENDIXES

- I.** Correlated Human Development 471
- II.** Germ Layer Derivatives 478
- III.** Critical Periods of Human Development (Sensitivity to Teratogens) 480
- IV.** Teratogens Known to Cause Human Malformations 481
- V.** Physiologic Development of the Central Nervous System 483
- VI.** Prematurity 486
- VII.** References 487

Index 491

PART I

Embryogenesis



1. TERMS OF DESCRIPTION

I. Special features of the embryo

- A. THE ADULT: it is assumed that the body is erect, with the arms by the sides and the palms directed forward—the *anatomic position*. The terms *anterior* or *ventral* and *posterior* or *dorsal* describe the front or back of the body or limbs, as well as the relations of structures inside the body to one another. *Superior* and *inferior* indicate the relative levels of different structures
- B. THE EMBRYO is curved (or flexed), therefore a reference position is not as easily defined as in the adult. In the embryo, the terms dorsal and ventral are nearly always used, and *cranial* (*cephalic*) and *caudal* commonly denote relationships to the head and tail ends, respectively
 - 1. The term *rostral* indicates the relationships of structures to the nose
 - 2. The terms *proximal* or *distal* are described as distances from the source of attachment of a structure; e.g., in the upper limb, the elbow is proximal to the wrist and the wrist is distal to the elbow

II. **Planes of section:** the classic planes of space seen in 3 dimensions in the embryo and fetus are the same as described in the adult, only the terminology is special, with the subject described as being in the upright position facing the observer. However, due to embryonic flexion, the reciprocal relationships of the frontal and transverse planes are modified; thus, a section which may be frontal at the level of the head can be transverse at the level of the trunk

- A. THE MEDIAN PLANE is a vertical plane passing through the center of the body. Median sections divide the body into right and left halves. *Lateral* and *medial* refer to structures that are, respectively, farther from or nearer to the median plane of the body
- B. THE SAGITTAL PLANE is any vertical plane perpendicular to the forehead and parallel with the long axis of the nose and the median plane that divides the subject into right and left parts. “Parasagittal” and “median sagittal” are redundant terms
- C. THE TRANSVERSE OR HORIZONTAL PLANE is any plane at right angles to both the median and frontal planes. It is parallel with an imaginary line joining the eyes and divides the subject into superior and inferior or top and bottom parts
- D. A FRONTAL OR CORONAL PLANE is any vertical plane that intersects the median plane at right angles. It is parallel with the forehead and divides the subject into front (anterior or ventral) and back (posterior or dorsal) parts

III. Embryonic sections usually used

- A. A MEDIAN (MIDSAGITTAL) SECTION is cut through the median plane. Longitudinal sections parallel to the median plane, but not through it, are called sagittal sections
- B. A FRONTAL OR CORONAL SECTION is a vertical section through the frontal or coronal plane
- C. TRANSVERSE OR HORIZONTAL SECTIONS are sections through the transverse plane; they also are called *cross-sections*
- D. OBLIQUE SECTIONS are neither perpendicular nor horizontal but are inclined or slanted