

## ดiction

### A

|                                      |                             |
|--------------------------------------|-----------------------------|
| Abducens nerve                       | 230                         |
| Accessory ganglion                   | 230                         |
| Accessory nerve                      | 230                         |
| Acoustic ganglion                    | 157, 181, 208, 230          |
| acrosome                             | 1                           |
| adhesive gland                       | 73                          |
| alecithal egg                        | 3, 205                      |
| allantoic artery                     | 210                         |
| allantoic stalk                      | 181, 210, 232               |
| allantoic vein                       | 209, 210, 231               |
| allantois                            | 179, 181, 183, 206          |
| amniocardiac vesicle                 | 118, 119, 133               |
| amnion                               | 155, 159                    |
| amniotic cavity                      | 210                         |
| amniotic fold                        | 155, 159, 206               |
| animal pole                          | 49                          |
| anterior (cranial) amniotic fold     | 155                         |
| anterior cardinal vein               | 74, 159, 180, 183, 235      |
| anterior (cranial) intestinal portal | 117, 119, 131, 132, 182     |
| anterior neuropore                   | 51, 117, 131, 155           |
| antrum                               | 5                           |
| anus                                 | 74                          |
| aortic arch                          | 74, 158, 180, 181, 208, 234 |
| apical bronchus                      | 231, 234                    |
| archenteron                          | 22, 50                      |
| arch of aorta                        | 234                         |
| area opaca                           | 106, 118, 132               |
| area pellucida                       | 106                         |
| area vasculosa                       | 132                         |
| area vitellina                       | 132                         |
| arytenoid cartilage                  | 231                         |

|                        |                   |
|------------------------|-------------------|
| arytenoid fold         | 231               |
| ascending aorta        | 209, 233, 234     |
| atrial septum          | 209, 233          |
| atrioventricular canal | 233               |
| atrium                 | 74, 131, 158, 209 |
| auditory placode       | 131, 133          |
| axial filament         | 2                 |
| axial mesoderm         | 52                |

### B

|                            |                        |
|----------------------------|------------------------|
| basilar artery             | 234                    |
| bicuspid valve             | 233                    |
| blastocoel                 | 21, 50, 205            |
| blastocyst                 | 205                    |
| blastoderm                 | 21, 50, 106            |
| blastodermic vesicle       | 205                    |
| blastomere                 | 21, 49                 |
| blastopore                 | 22, 50                 |
| blastula stage             | 21, 50                 |
| blastulation               | 21, 50                 |
| blood island               | 118, 132               |
| Bowman's capsule           | 232                    |
| branchial arch             | 74, 180, 207, 208, 231 |
| branchial cleft            | 207                    |
| branchial groove           | 155, 157, 180, 208     |
| brain vesicle              | 51                     |
| bulbus cordis (arteriosus) | 131, 158               |

### C

|                        |          |
|------------------------|----------|
| calyces of metanephros | 233      |
| cardinal vein          | 180      |
| caudal artery          | 74       |
| caudal flexure         | 179, 207 |
| central blastomere     | 106      |
| cervical sinus         | 207      |
| centrolecithal egg     | 4        |
| cerebral hemisphere    | 179, 182 |

|                                   |                    |
|-----------------------------------|--------------------|
| cervical flexure                  | 155, 207           |
| chorion                           | 155, 159, 206      |
| chorionic placenta                | 206                |
| chorionic villi                   | 206                |
| chromosome                        | 1                  |
| cleavage                          | 21                 |
| cleavage cell                     | 21                 |
| clitoris                          | 229, 232           |
| cloaca                            | 183, 210, 211, 232 |
| cloacal membrane                  | 183                |
| closing plate                     | 157                |
| coelom                            | 118, 132, 159      |
| collecting tubules of metanephros | 233                |
| colon                             | 232                |
| common cardinal vein              | 74, 159, 183, 235  |
| common iliac artery               | 235                |
| copula                            | 231                |
| corpus luteum                     | 7                  |
| cranial (anterior) amniotic fold  | 155, 179           |
| cranial flexure                   | 155, 206           |
| cranial ganglion                  | 181, 207           |
| cranial nerve                     | 230                |
| cumulus oophorus                  | 7                  |

## D

|                          |                   |
|--------------------------|-------------------|
| dermatome                | 159, 210, 230     |
| descending aorta         | 234, 235          |
| diencephalon             | 73, 75, 79, 131   |
| differentiation          | 1, 22, 51         |
| diploid ( $2n$ )         | 1, 21             |
| discoidal cleavage       | 105               |
| distal centriole         | 2                 |
| dorsal aorta             | 74, 158, 180, 183 |
| dorsal lip of blastopore | 50                |
| dorsal mesentery         | 182, 210, 231     |

|                   |                         |
|-------------------|-------------------------|
| dorsal mesoderm   | 107, 118                |
| duct of Cuvier    | 74, 159, 180            |
| ductus arteriosus | 234                     |
| ductus venosus    | 158, 183, 209, 231, 235 |
| duodenum          | 182, 209, 232           |

## E

|                          |                  |
|--------------------------|------------------|
| ectoderm                 | 22, 50, 107      |
| egg                      | 2                |
| egg albumen              | 105              |
| egg capsule              | 49               |
| ejaculatory duct         | 232              |
| embryo                   | 1                |
| embryo cell              | 205              |
| embryonic disc           | 205              |
| embryonic endoderm       | 205              |
| endocardial cushion      | 209, 233         |
| endocardium              | 133              |
| endoderm                 | 22, 51, 106, 107 |
| endolymphatic duct       | 180, 229         |
| endometrium              | 205              |
| ependymal layer          | 230              |
| epiblast                 | 107              |
| epiboly                  | 50               |
| epidermal ectoderm       | 52               |
| epididymis               | 232              |
| epiglottis               | 231              |
| epimyocardium            | 133              |
| epiphysis                | 75, 179          |
| esophagus                | 157, 209         |
| external auditory meatus | 229              |
| external carotid artery  | 234              |
| external genitalia       | 229              |
| extraembryonic area      | 132              |

|                                     |          |
|-------------------------------------|----------|
| extraembryonic coelom               | 159, 206 |
| extraembryonic ectoderm             | 205      |
| extraembryonic endoderm             | 205      |
| extraembryonic membrane (structure) | 155, 206 |
| extraembryonic mesoderm             | 206      |

## F

|                        |                      |
|------------------------|----------------------|
| Facial nerve           | 230                  |
| falciform ligament     | 231                  |
| female pronucleus      | 49, 105              |
| fertilization          | 1, 21                |
| fertilization cone     | 21                   |
| fertilization membrane | 21                   |
| fertilized egg         | 21, 49, 105          |
| first branchial arch   | 156, 157, 182, 207   |
| first meiotic division | 1                    |
| first polar body       | 2                    |
| first visceral arch    | 157                  |
| flagellum              | 2                    |
| flexion                | 155                  |
| follicle cell          | 5                    |
| fore brain             | 73                   |
| fore gut               | 51, 73, 79, 117, 131 |
| fore leg bud           | 207                  |
| frontal section        | 75                   |
| Froriep's ganglion     | 230                  |

## G

|                     |                    |
|---------------------|--------------------|
| gall bladder        | 232                |
| gamete              | 1, 233             |
| gametogenesis       | 1                  |
| gastrocoel          | 22, 50             |
| gastrula stage      | 22, 50             |
| gastrulation        | 22                 |
| Geniculate ganglion | 157, 181, 208, 230 |

|                        |          |
|------------------------|----------|
| genital ridge          | 233      |
| genital tubercle       | 229, 232 |
| germinal disc          | 105      |
| germinal ridge         | 233      |
| germinal vesicle       | 6        |
| germ layer             | 22       |
| gill                   | 74       |
| gill plate             | 73       |
| glomerulus             | 232      |
| Glossopharyngeal nerve | 230      |
| glottis                | 231      |
| golgi apparatus        | 1        |
| gonad                  | 1        |
| graffian follicle      | 5        |
| gray crescent          | 49       |
| greater omentum        | 231      |

## H

|                          |             |
|--------------------------|-------------|
| haploid (n)              | 21          |
| hatching tadpole         | 74          |
| head (skin) ectoderm     | 118         |
| head fold                | 117         |
| head-folded stage        | 108         |
| head mesenchyme          | 117, 118    |
| head process (notochord) | 107         |
| head process stage       | 107         |
| heart                    | 74, 118     |
| heavily telolecithal egg | 3, 105      |
| Hensen's node            | 107         |
| hepatic portal vein      | 232, 235    |
| hind brain               | 73, 131     |
| hind gut                 | 51, 73, 156 |
| hind leg bud             | 207         |
| holoblastic cleavage     | 49          |

|                              |                    |
|------------------------------|--------------------|
| holoblastic equal cleavage   | 205                |
| holoblastic unequal cleavage | 49                 |
| hyoid arch                   | 156, 157, 181, 207 |
| hyomandibular cleft          | 181, 207, 229      |
| hypoblast                    | 107                |
| Hypoglossal nerve            | 230                |
| hypophysis                   | 73, 75, 131        |

## I

|                            |                                  |
|----------------------------|----------------------------------|
| immature egg               | 21                               |
| implantation               | 205                              |
| inferior vena cava         | 209, 231, 235, 236               |
| infundibulum               | 75, 131, 133, 156, 179, 208, 230 |
| infundibulum of oviduct    | 105                              |
| inner cell mass            | 205                              |
| inner shell membrane       | 105                              |
| interatrial foramen        | 233                              |
| intermediate layer         | 230                              |
| intermediate mesoderm      | 107, 118, 133, 159               |
| internal carotid artery    | 232                              |
| intersomitic furrow        | 118                              |
| interventricular foramen   | 233                              |
| intestinal loop            | 210, 232                         |
| intraembryonic circulation | 180                              |
| intraembryonic coelom      | 159                              |
| invagination               | 22, 155                          |
| involution                 | 50, 107                          |
| isolecithal egg            | 3                                |
| isthmus                    | 155, 208                         |
| isthmus of oviduct         | 105                              |

## J

|                  |                    |
|------------------|--------------------|
| Jugular ganglion | 157, 181, 208, 230 |
|------------------|--------------------|

## L

|                        |                    |
|------------------------|--------------------|
| larva stage            | 22                 |
| laryngotracheal groove | 157, 181, 182, 209 |

|                           |                       |
|---------------------------|-----------------------|
| larynx                    | 231                   |
| lateral amniotic fold     | 155, 179              |
| lateral body fold         | 159                   |
| lateral bronchus          | 231, 235              |
| lateral lip of blastopore | 50                    |
| lateral (plate) mesoderm  | 52, 79, 107, 118, 159 |
| lateral nasal process     | 229, 230              |
| lateral swelling          | 231                   |
| leg bud                   | 179                   |
| lens placode              | 79, 155               |
| lens vesicle              | 181, 230              |
| lesser omentum            | 231                   |
| liver diverticulum        | 51, 74, 158, 182      |
| liver sinusoids           | 231, 235              |
| local thickening          | 51                    |
| lower jaw                 | 229                   |
| lung bud                  | 181, 182, 209         |

## M

|                      |                         |
|----------------------|-------------------------|
| macromere            | 49                      |
| male pronucleus      | 49, 105                 |
| mammary ridge        | 229                     |
| mandibular arch      | 156, 157, 181, 182, 207 |
| mandibular process   | 156, 157, 182, 207, 209 |
| mandibular ramus     | 230                     |
| mantle layer         | 230                     |
| marginal blastomere  | 106                     |
| marginal layer       | 230                     |
| maturation           | 1                       |
| mature ovum          | 21                      |
| maxillary process    | 156, 157, 182, 207, 209 |
| maxillary ramus      | 230                     |
| median nasal process | 229, 230                |
| medullary plate      | 51, 107                 |
| meiosis              | 1                       |

|                             |                            |
|-----------------------------|----------------------------|
| meroblastic cleavage        | 105                        |
| mesencephalon               | 75, 131, 179, 207, 229     |
| mesoderm                    | 22, 50, 51, 107, 117,<br>3 |
| mesolecithal egg            |                            |
| mesonephric duct            | 183, 209, 232              |
| mesonephric kidney region   | 229                        |
| mesonephric tubule          | 209, 232                   |
| mesonephros                 | 183, 207, 209, 232         |
| metamorphosis               | 22, 75                     |
| metanephric duct            | 233                        |
| metanephrogenic mesenchyme  | 233                        |
| metencephalon               | 131, 207                   |
| microlecithal egg           | 3                          |
| micromere                   | 50                         |
| mid brain                   | 73, 131                    |
| mid gut                     | 51, 73, 158, 182           |
| mitochondria                | 2                          |
| mitosis                     | 1                          |
| moderately telolecithal egg | 3                          |
| morula                      | 21, 50                     |
| mouth                       | 180, 208                   |
| myelencephalon              | 131, 180, 208, 229         |
| myotome                     | 159, 210, 230              |

## N

|                     |                    |
|---------------------|--------------------|
| naked filament      | 2                  |
| nasal pit           | 179, 182, 229, 230 |
| nasal placode       | 80, 157, 179, 208  |
| nasolacrimal groove | 229                |
| nervous layer       | 157, 181, 230      |
| nervous system      | 51                 |
| neural canal        | 133, 181, 207      |
| neural ectoderm     | 51                 |
| neural fold         | 51, 117, 118       |
| neural groove       | 51, 118, 118       |

|                                 |                         |
|---------------------------------|-------------------------|
| neural plate                    | 51, 107, 117, 119       |
| neural tube                     | 51, 117                 |
| neurocoel                       | 133, 181, 207, 229      |
| neuromere                       | 181, <b>207, 229</b>    |
| neurula stage                   | <b>51</b>               |
| <b>Nodose ganglion</b>          | <b>230</b>              |
| notochord (notochordal process) | <b>52, 74, 107, 117</b> |
| notochordal process stage       | 107                     |
| nucleolus                       | <b>5</b>                |

## **0**

|                          |                                   |
|--------------------------|-----------------------------------|
| Oculomotor nerve         | <b>230</b>                        |
| Olfactory pit            | 179, 182, 207, 230                |
| olfactory placode        | <b>79, 157, 179, 208</b>          |
| omental bursa            | 231                               |
| omphalomesenteric artery | 158, 180, 183                     |
| omphalomesenteric vein   | <b>132</b>                        |
| oogenesis                | <b>12</b>                         |
| oogonia                  | <b>2</b>                          |
| ootid                    | <b>2</b>                          |
| <b>ophthalmic ramus</b>  | <b>230</b>                        |
| optic cup                | <b>79, 155, 157, 208, 230</b>     |
| optic stalk              | <b>79, 157</b>                    |
| optic vesicle            | <b>73, 131, 133, 155</b>          |
| oral plate (membrane)    | 75, 118, 157, 180                 |
| organogenesis            | 22, 51                            |
| otic placode             | <b>131, 133, 155</b>              |
| otic vesicle (otocyst)   | <b>73, 79, 155, 157, 180, 229</b> |
| outer shell membrane     | <b>105</b>                        |
| ovarian sac              | <b>4</b>                          |
| ovarian wall             | <b>4</b>                          |
| ovary                    | <b>2, 233</b>                     |
| oviduct                  | <b>105</b>                        |
| oviposition              | 106                               |

ovulation

2

ovum

2

**P**

pancrease

182, 209, 232

partial cleavage

105

pelvis of metanephros

233

penetration

21

penis

229, 232

pericardial cavity

75, 118

peritoneum

4

perivitelline space

21

Petrosal ganglion

230

pharyngeal membrane

118, 180

pharyngeal pouch

73, 157, 180, 208

pharynx

74, 180, 182, 208

pigment

49

pigmented layer

157, 181, 230

pineal gland

75, 179

pituitary gland

75, 131, 156, 179

placenta

205

plasmalemma

2

pleural cavity

182, 209, 231

polylecithal egg

3

post anal gut

183

postbranchial body

231

posterior cardinal vein

74, 158, 180, 183, 209, 235

posterior (caudal) intestinal portal

156, 158, 183

prehatching stage

73

preoral gut

132, 180, 208, 231

primary bronchus

209

primary follicle

5

primary oocyte

2

primary spermatocyte

1

|                      |                    |
|----------------------|--------------------|
| primitive fold       | 107                |
| primitive groove     | 107                |
| primitive gut        | 22, 50             |
| primitive heart      | 118                |
| primitive knot       | 107                |
| primitive pit        | 107                |
| primitive streak     | 107, 117, 205, 206 |
| primordium germ cell | 1, 233             |
| proamnion            | 107                |
| pronephric duct      | 80, 159            |
| pronephric tubule    | 80, 159            |
| pronephros           | 73, 74, 80, 159    |
| prosencephalon       | 73, 131            |
| proximal centriole   | 2                  |
| pulmonary aorta      | 233                |
| pulmonary artery     | 234, 235           |
| pulmonary vein       | 234                |

## R

|                 |                             |
|-----------------|-----------------------------|
| Rathke's pouch  | 75, 156, 157, 179, 208, 230 |
| rectum          | 209, 210                    |
| retinal layer   | 157, 181, 230               |
| rhombencephalon | 73, 131                     |

## S

|                                  |                    |
|----------------------------------|--------------------|
| sclerotome                       | 159, 210, 230      |
| secondary follicle               | 5                  |
| secondary oocyte                 | 2                  |
| secondary spermatocyte           | 1                  |
| second branchial arch            | 156, 157           |
| second meiotic division          | 1, 51, 105         |
| second polar body                | 2                  |
| secretory tubules of metanephros | 233                |
| segmentation division            | 21                 |
| Semilunar ganglion               | 157, 181, 208, 230 |

|                            |                                       |
|----------------------------|---------------------------------------|
| seminal vesicle            | 232                                   |
| seminiferous tubule        | 4                                     |
| septum transversum         | 229                                   |
| serosa                     | 206                                   |
| sertoli sustentacular cell | 4                                     |
| Sessel's pocket            | 132, 180                              |
| sex cell                   | 1, 233                                |
| sex gland                  | 233                                   |
| shell                      | 105                                   |
| shell gland of oviduct     | 105                                   |
| sinus rhomboidalis         | 117, 156                              |
| sinus terminalis           | 132                                   |
| sinus venosus              | 74, 131, 158, 180, 183, 209, 233, 235 |
| small intestine            | 210, 232                              |
| somatic mesoderm           | 118, 132, 133, 206                    |
| somatopleur                | 206                                   |
| somite                     | 52, 73, 118, 119, 159, 229, 230       |
| sperm (spermatozoon)       | 1, 2                                  |
| spermatid                  | 1                                     |
| spermatogenesis            | 1                                     |
| spermatogonia              | 1                                     |
| spermogenesis              | 1                                     |
| spinal cord                | 51, 131, 133, 208, 210, 230           |
| spinal ganglion            | 230                                   |
| splanchnic mesoderm        | 118, 132, 133, 206                    |
| splanchnopleur             | 206                                   |
| stem bronchus              | 231                                   |
| stomach                    | 73, 74, 75, 156, 157, 182             |
| stomodaeum                 | 158, 182, 209, 231                    |
| subcardinal vein           | 236                                   |
| subcaudal pocket           | 156                                   |
| subcephalic pocket         | 117, 118, 131, 132                    |
| subclavian artery          | 234                                   |
| subgerminal cavity         | 106                                   |
| superior ganglion          | 157, 181, 208, 230                    |

|                            |     |
|----------------------------|-----|
| superior mesenteric artery | 235 |
|----------------------------|-----|

## T

|                      |                             |
|----------------------|-----------------------------|
| 73, 132, 156         |                             |
| tail bud stage       | 73                          |
| tail flexure         | 179                         |
| tail fin             | 74, 80                      |
| tail fold            | 156, 158                    |
| telencephalon        | 131, 207, 229               |
| telolecithal egg     | 3                           |
| tertiary follicle    | 5                           |
| testis               | 1                           |
| theca externa        | 5                           |
| theca interna        | 5                           |
| third branchial arch | 156                         |
| thyroid gland        | 80, 157, 181, 182, 209, 231 |
| tongue               | 208, 231                    |
| torsion              | 155                         |
| trachea              | 157, 209, 231               |
| transverse septum    | 229, 231, 233               |
| tricuspid valve      | 233                         |
| Trigeminal nerve     | 230                         |
| trophoblast          | 205                         |
| trunk                | 207                         |
| tuberculum impar     | 208, 231                    |

## U

|                      |                    |
|----------------------|--------------------|
| Ultimobranchial body | 231                |
| umbilical artery     | 232, 235           |
| umbilical cord       | 232                |
| umbilical vein       | 209, 210, 232, 235 |
| unfertilized egg     | 52                 |
| upper jaw            | 229                |
| ureter               | 233                |
| urogenital sinus     | 232, 233           |

**V**

|                           |                        |
|---------------------------|------------------------|
| vagina                    | 105                    |
| Vagus nerve               | 229                    |
| vasa efferentia           | 232                    |
| vas deferens              | 232                    |
| vegetal pole              | 3, 49                  |
| venous system             | 158                    |
| ventral aorta             | 158, 183, 234          |
| ventral ectoderm          | 118                    |
| ventral lip of blastopore | 50                     |
| ventral mesentery         | 231                    |
| ventral mesoesophagus     | 231                    |
| ventral sucker            | 73                     |
| ventricle                 | 73, 158, 209           |
| ventricular septum        | 209, 233               |
| visceral arch             | 74, 180                |
| visceral groove           | 74, 180, 208           |
| vitelline artery          | 74, 158, 180, 183      |
| vitelline circulation     | 180, 206               |
| vitelline membrane        | 21                     |
| vitelline plexus          | 180                    |
| vitelline vein            | 74, 132, 158, 180, 183 |
| vitelline vessel          | 74, 132                |

**W**

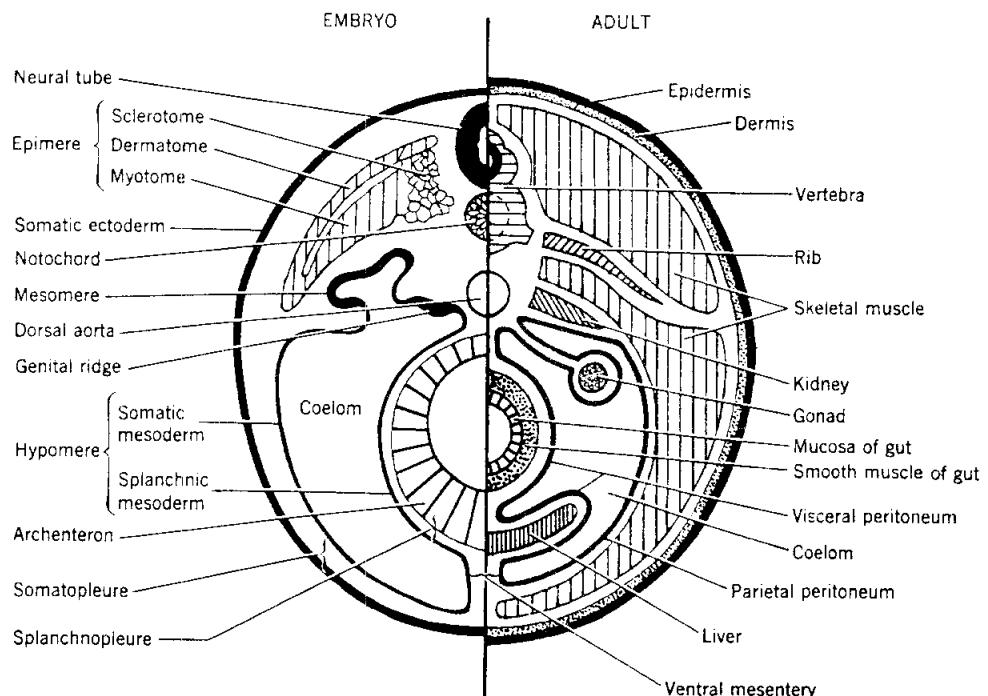
|          |     |
|----------|-----|
| wing bud | 179 |
|----------|-----|

**Y**

|                   |      |
|-------------------|------|
| yolk              | 2, 3 |
| yolk plug         | 50   |
| yolk plug stage   | 50   |
| yolk sac cavity   | 206  |
| yolk sac endoderm | 206  |
| yolk sac placenta | 206  |
| yolky endoderm    | 74   |

**Z**

zona pellucida                            5  
zygote                                    1, 21, 49



Cross-sectional diagram correlating embryonic and adult structure.

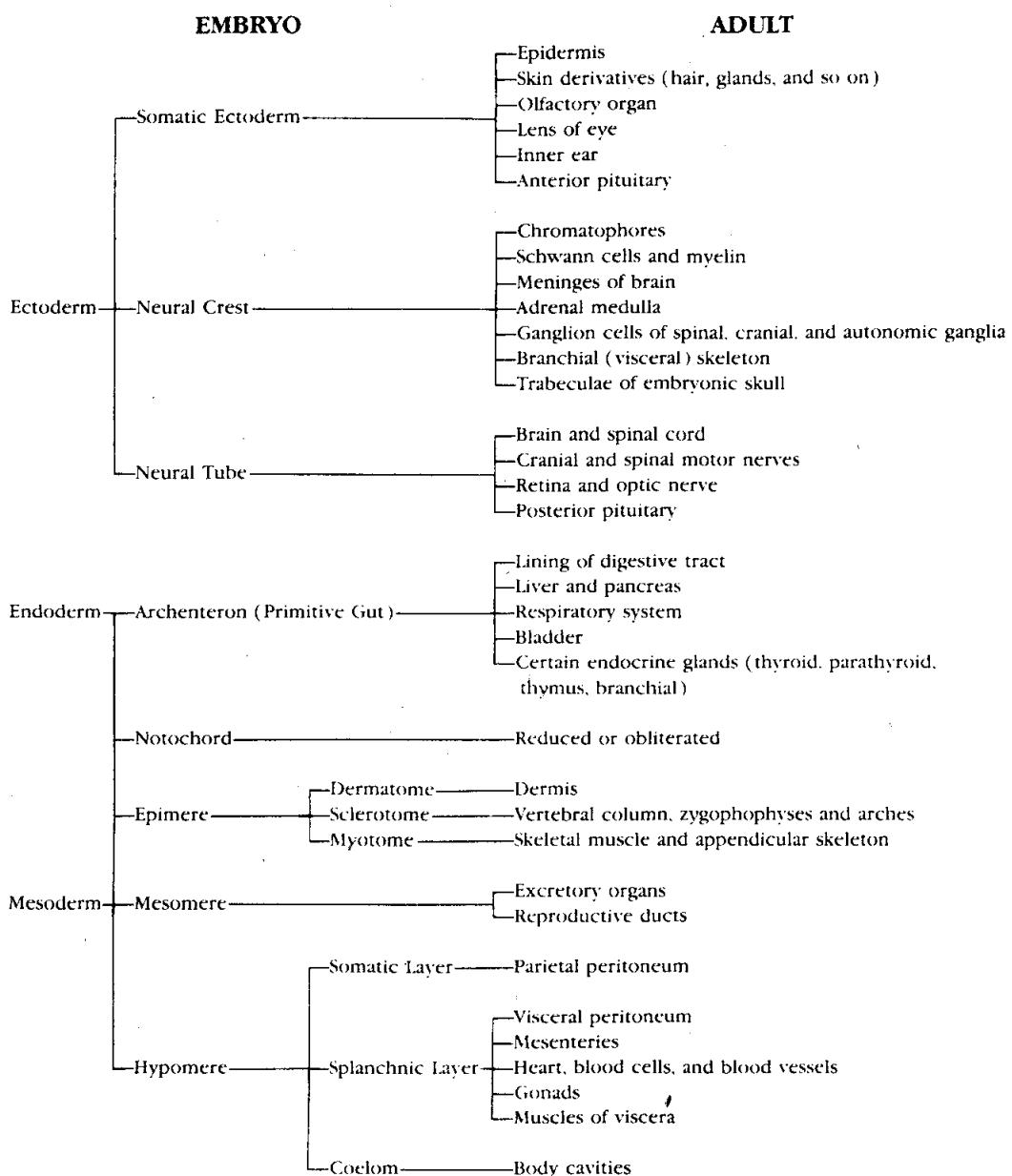
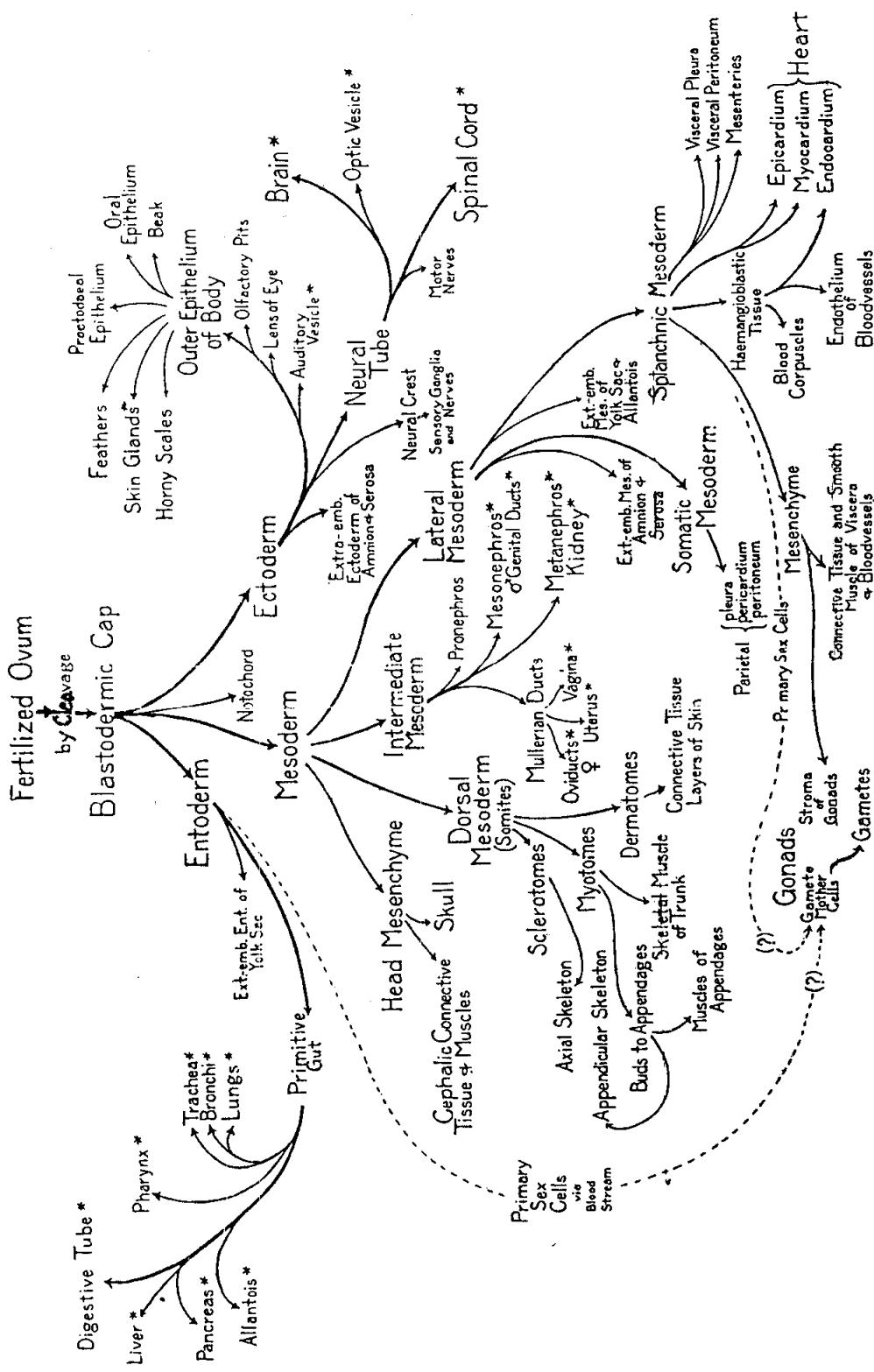


Chart showing the embryonic differentiation of the principal parts of the adult body.



\* Chart indicates origin of epithelial part of organ.  
All starred organs have secondary supporting investment of mesodermal origin.

Chart showing the derivation of various parts of the body by progressive differentiation and divergent specialization. Note especially how the origin of all the organs can be traced back to the three primary germ layers.  
(Patten: Embryology of the Chick. Copyright The P. Blakiston Company)



พิมพ์... สำนักพิมพ์มหาวิทยาลัยรามคำแหง  
**Ramkhamhaeng University Press.**



35244321 7

