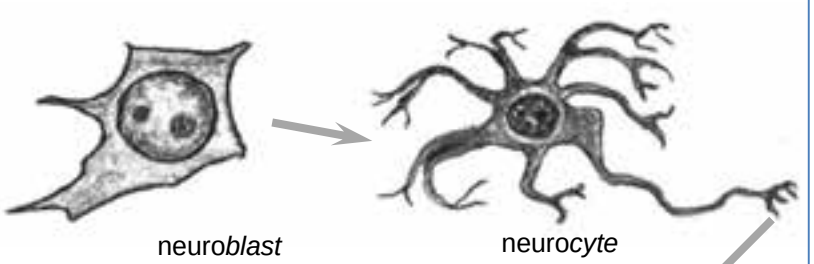
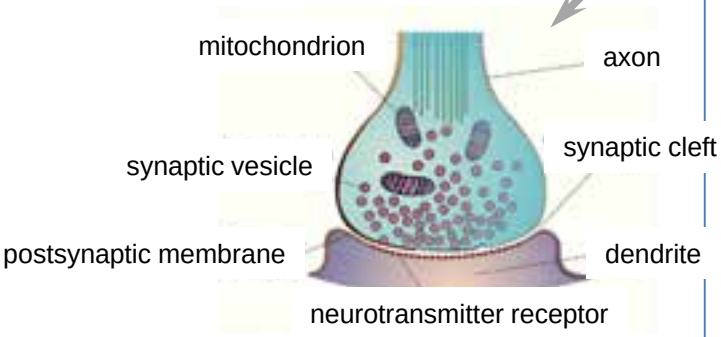
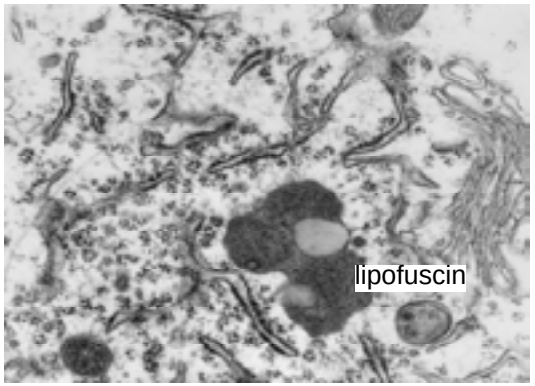
CELL DIFFERENTIATION. HISTOGENESIS. EMBRYOGENESIS

Department of Histology, Cytology, and Embryology of the General Medicine Faculty

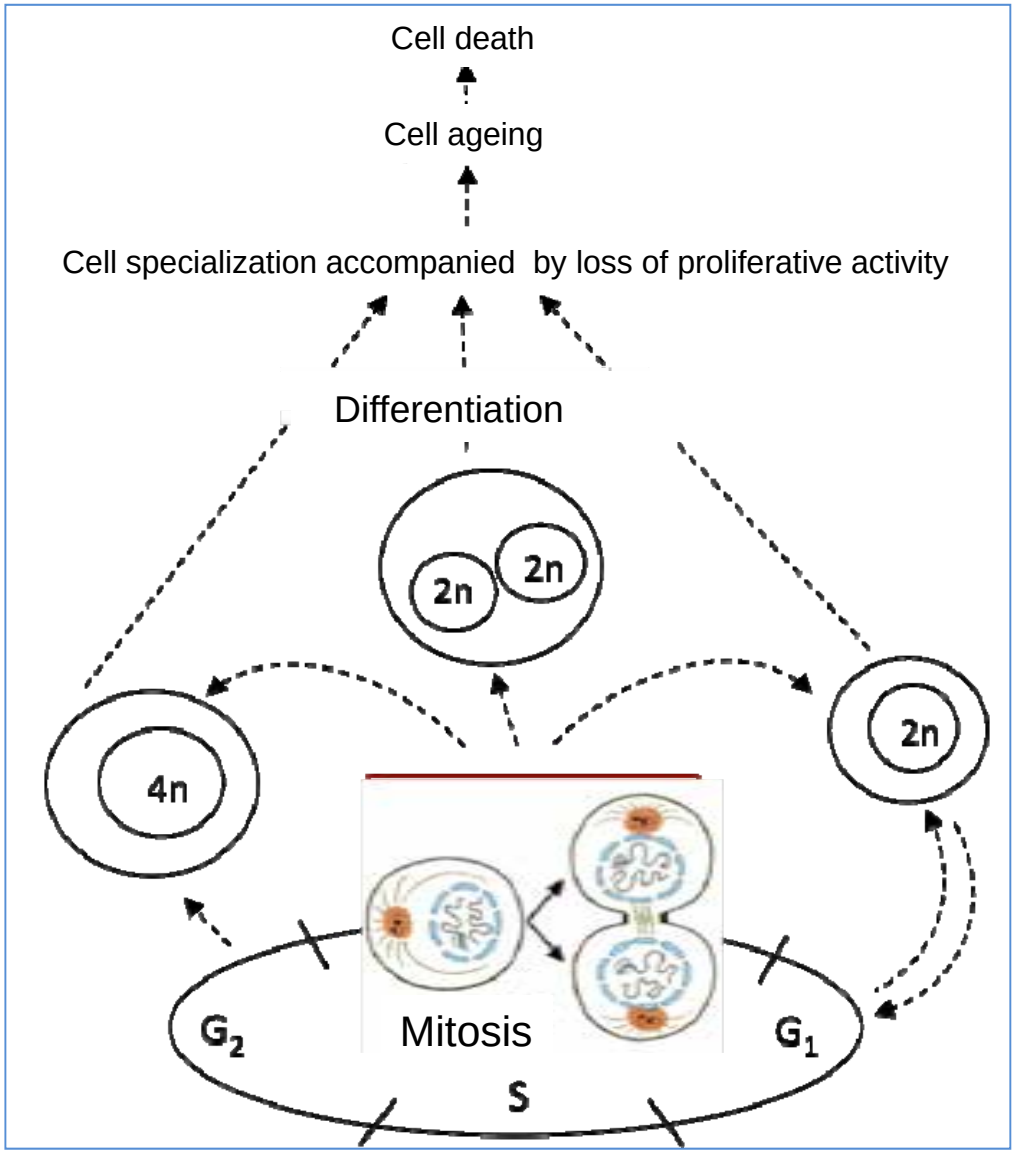
CELL CYCLE



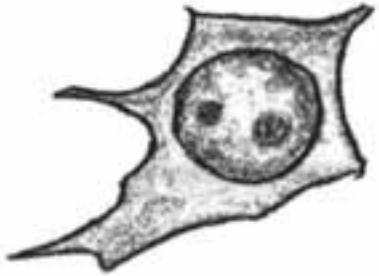




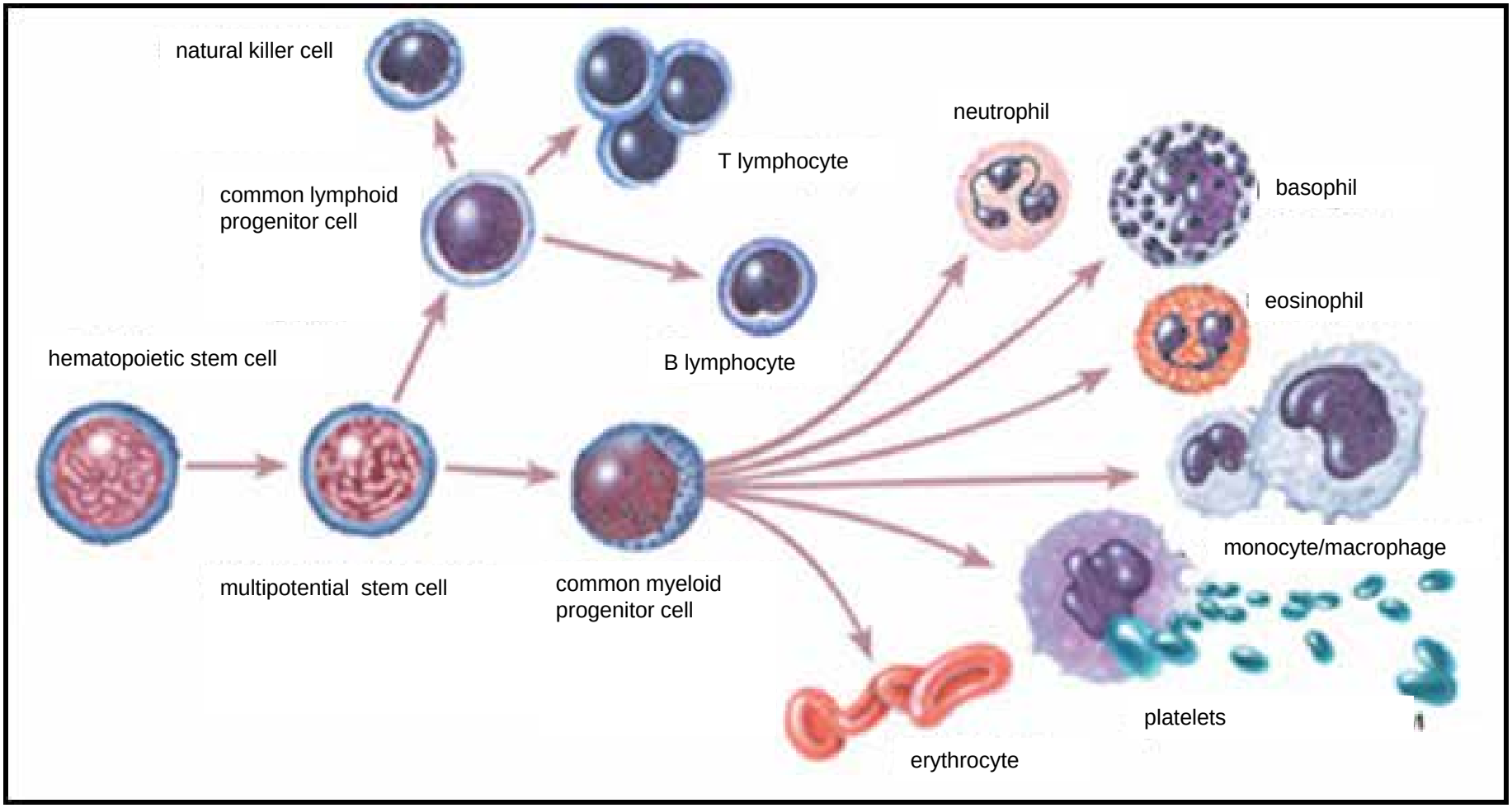
Types of cell populations:
- ✓*Static*
- ✓*Stable*
- ✓*Renewing*



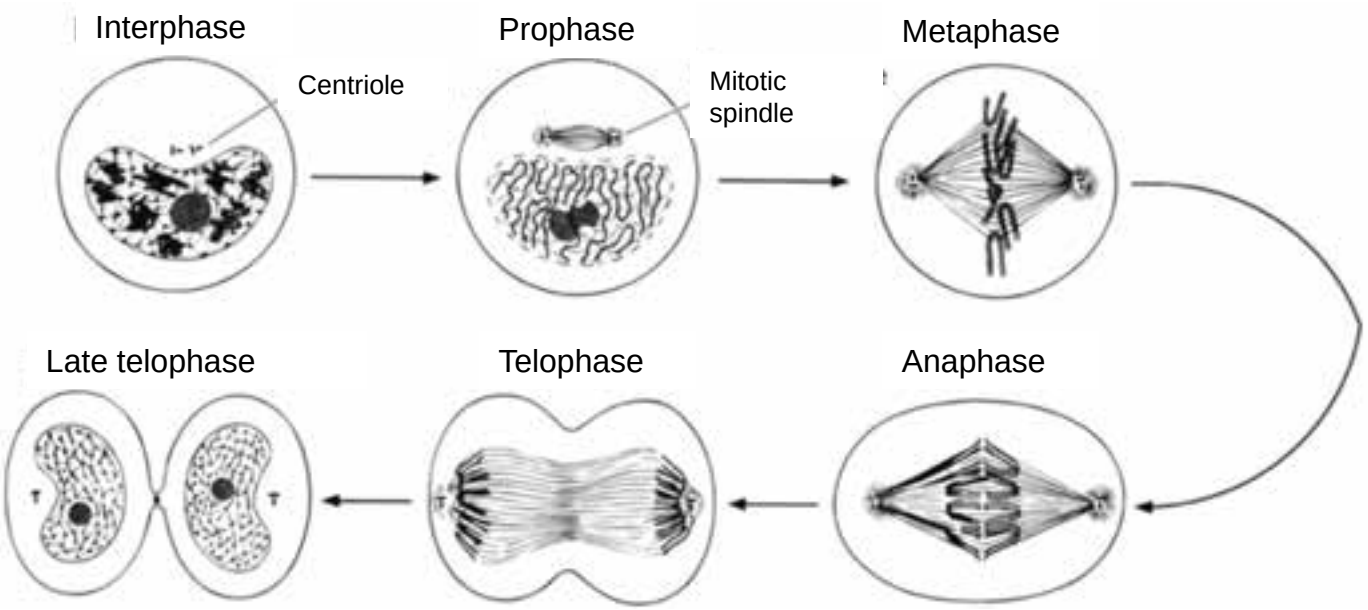
NUCLEUS/CYTOPLASM RATIO MAY REFLECT A DEGREE OF CELL DIFFERENTIATION

	Undifferentiated cells	Differentiated cells
Blood cells		
Nerve cells		

CELL CYCLE

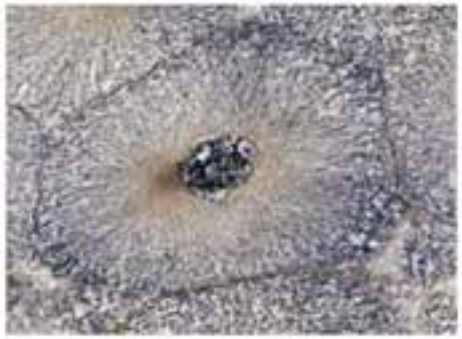

natural killer cell
T lymphocyte
neutrophil
basophil
common lymphoid progenitor cell
eosinophil
B lymphocyte
hematopoietic stem cell
monocyte/macrophage
multipotential stem cell
common myeloid progenitor cell
platelets
erythrocyte

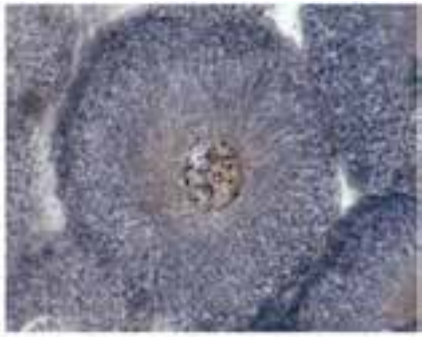
MITOTIC CYCLE

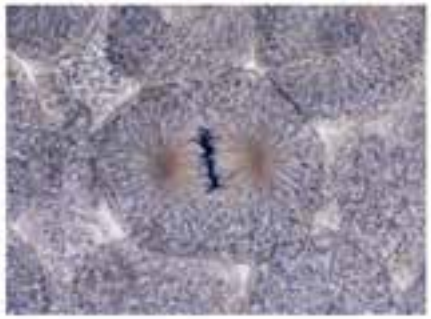


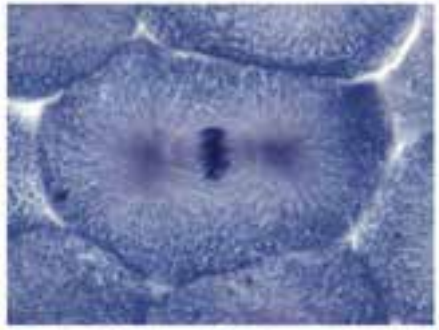
Mitotic phases in an animal cell

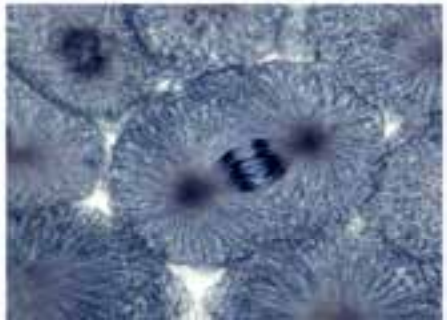
MITOTIC PHASES IN AN ANIMAL CELL

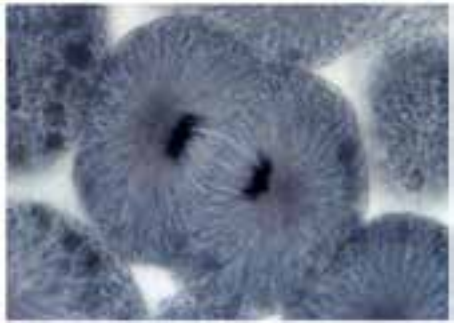


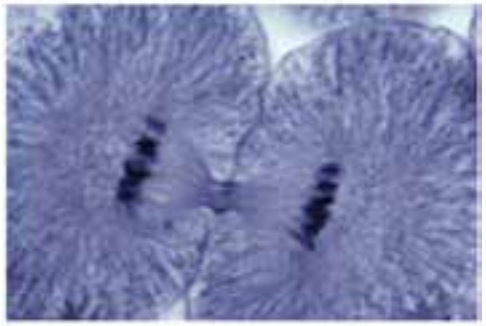




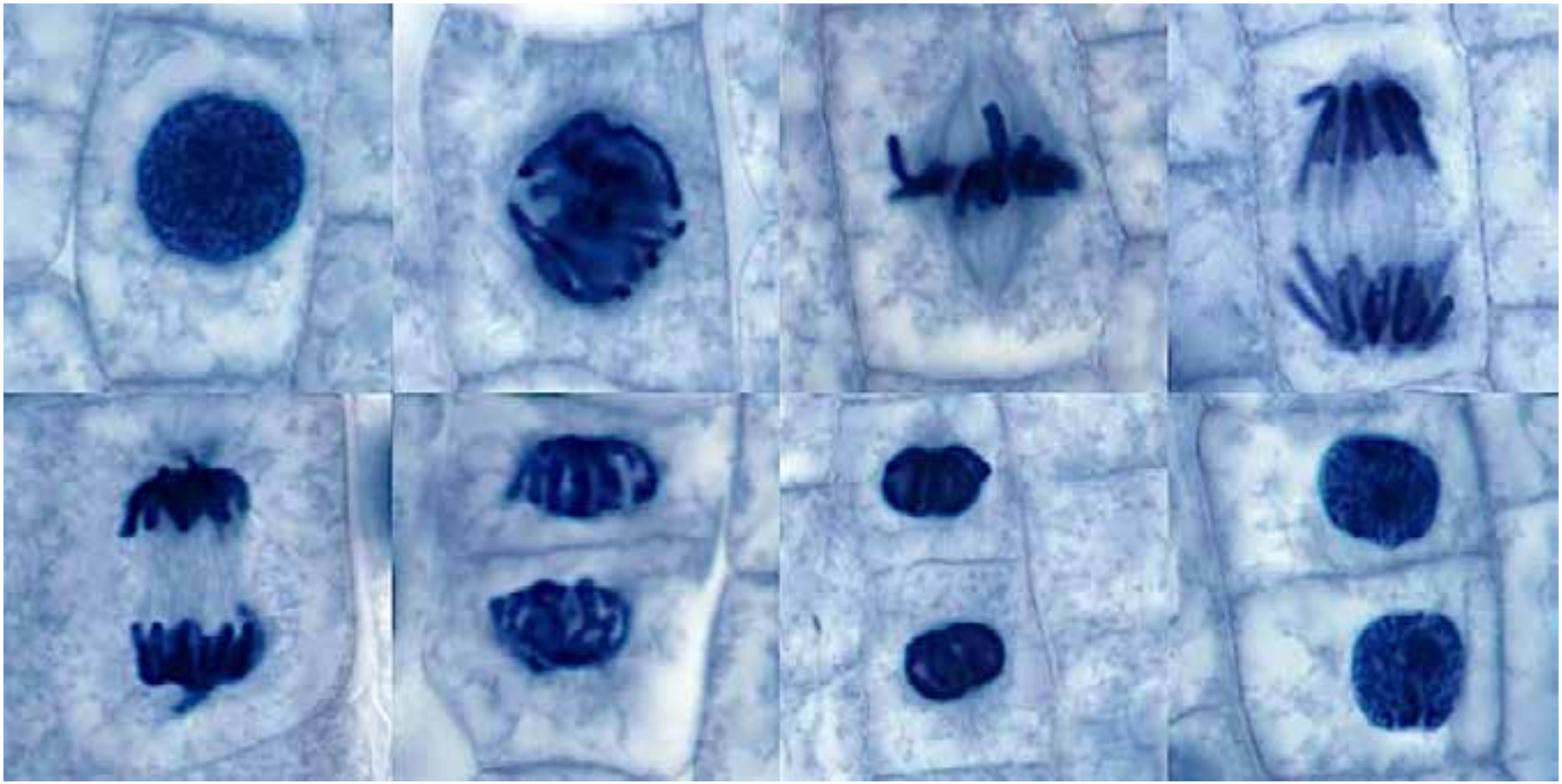




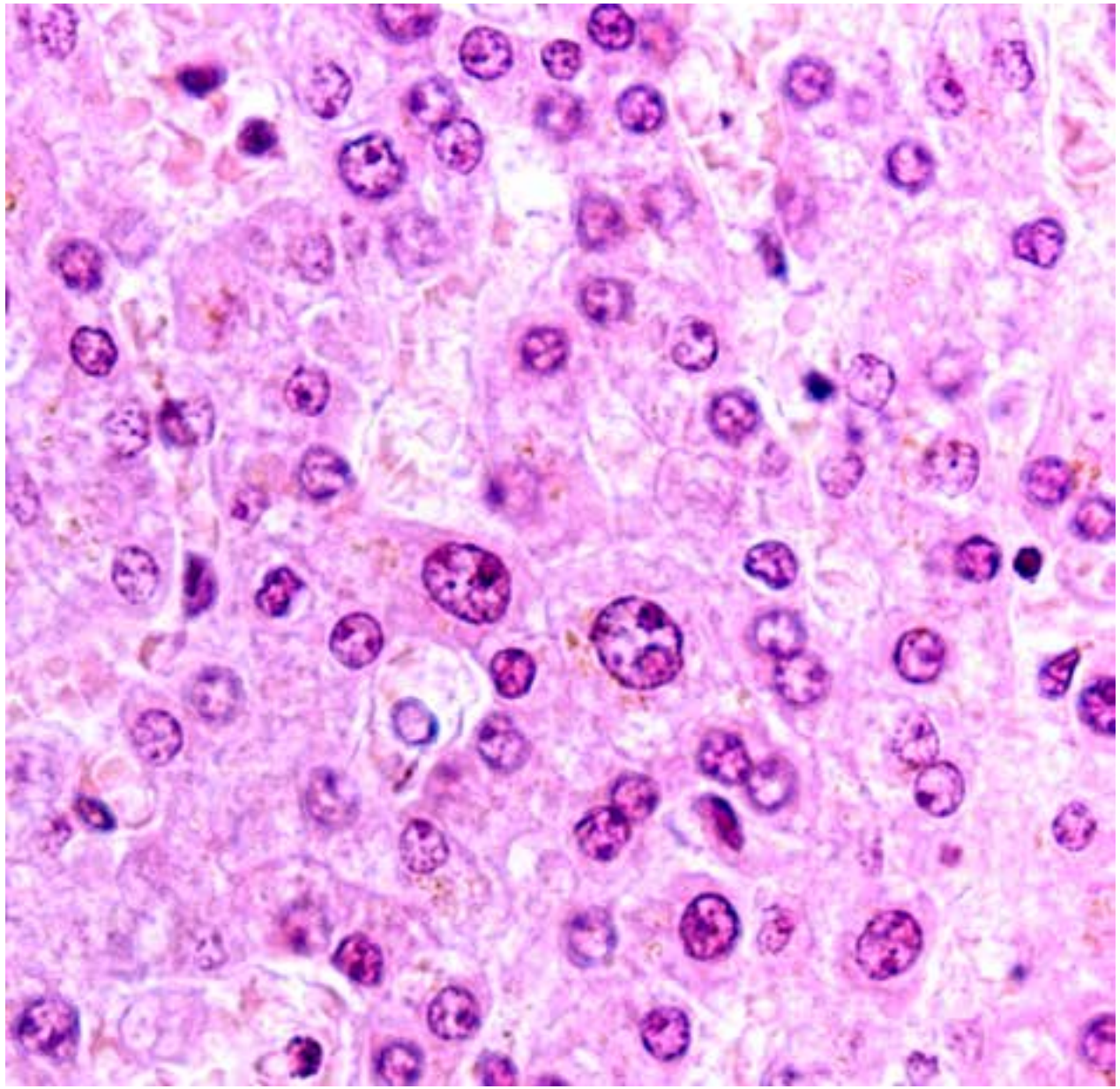




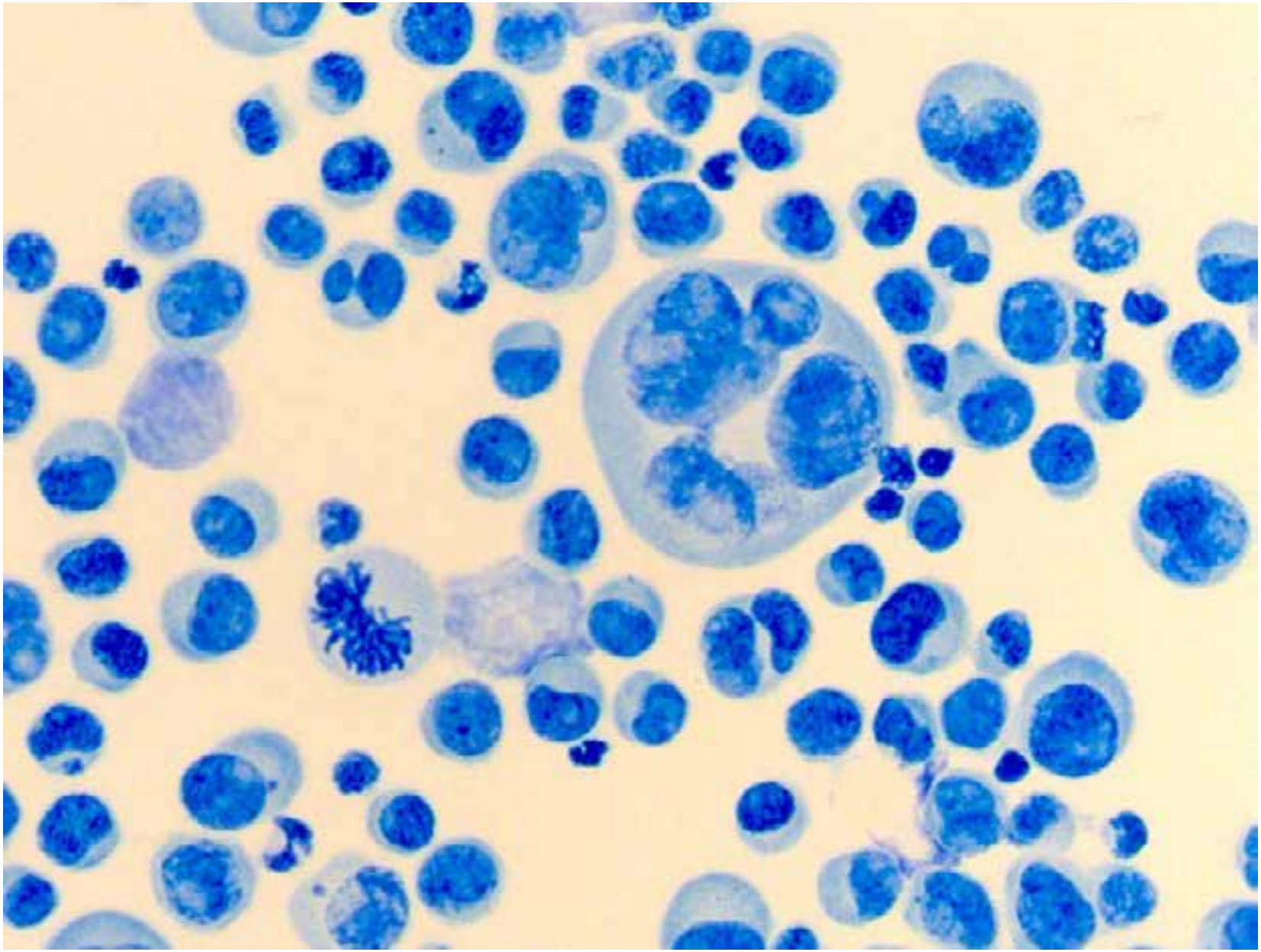
MITOTIC PHASES IN A PLANT CELL

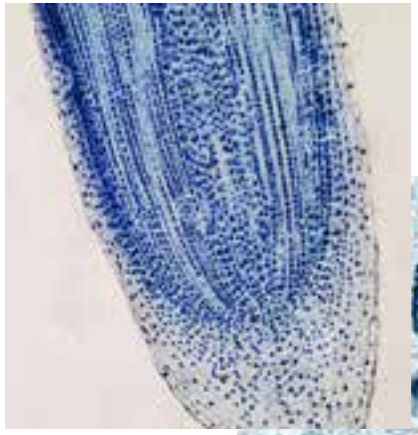


POLYPLOIDY. INTERPHASE NUCLEI IN HEPATIC CELLS

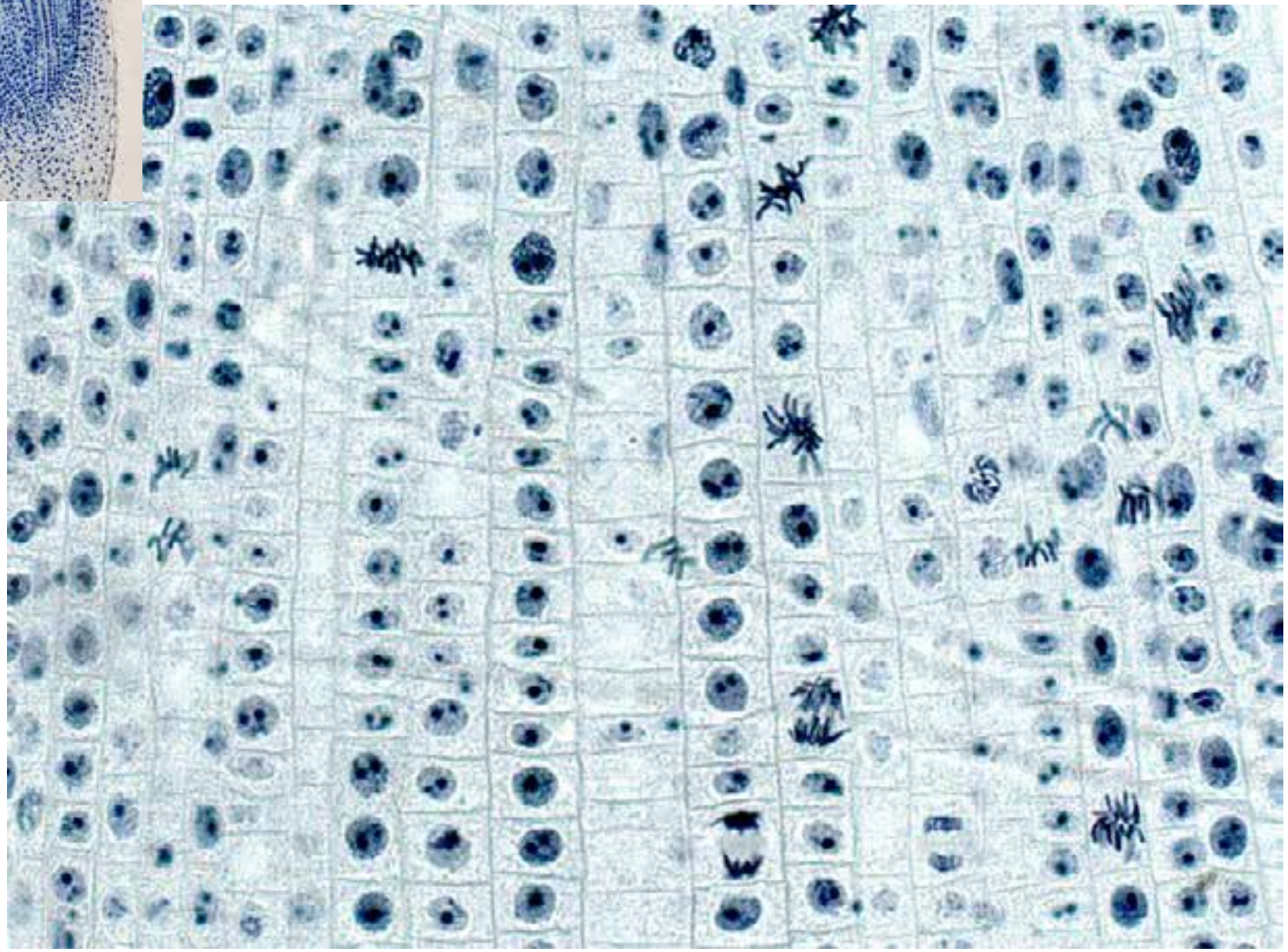


ABERRANT MITOSES IN TUMOR CELLS

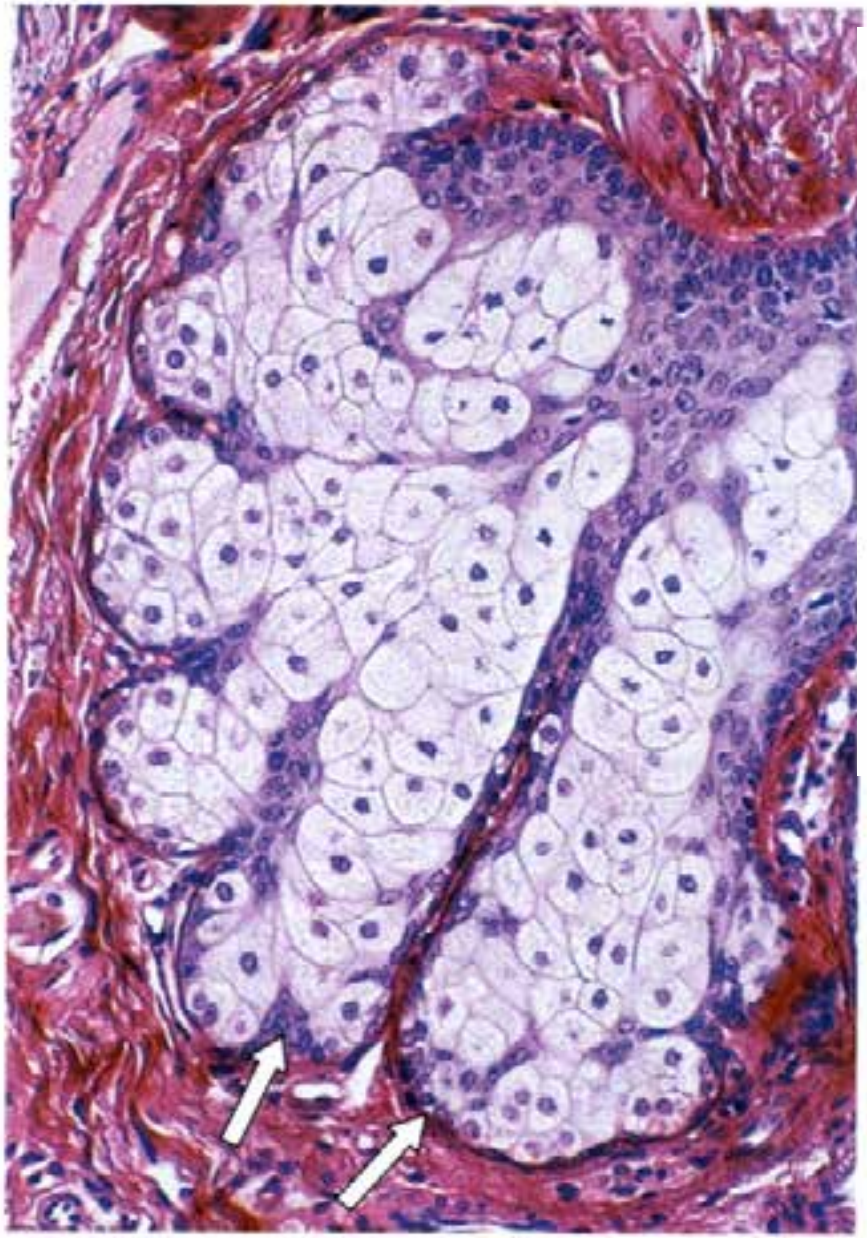




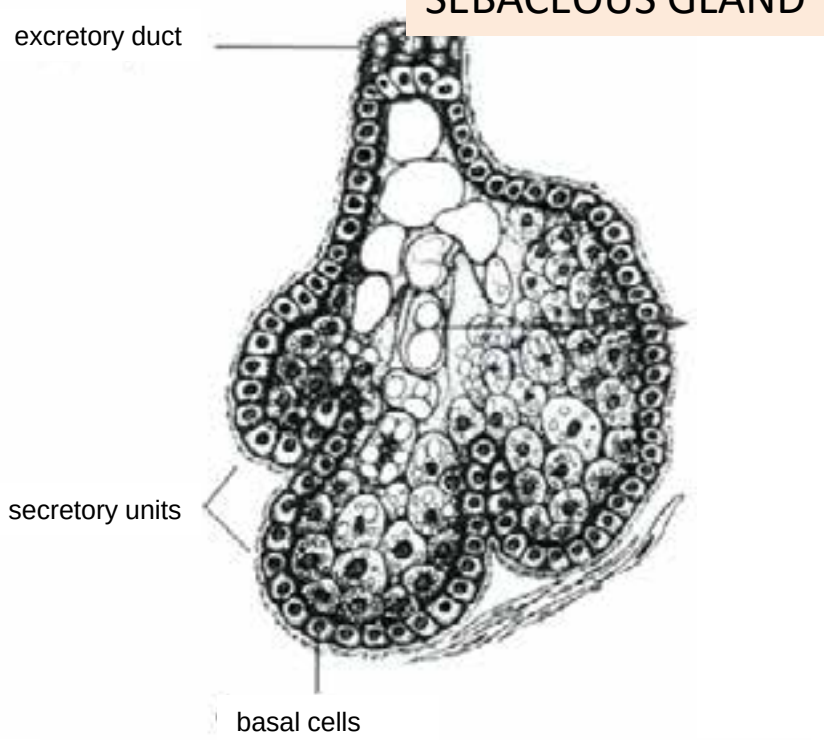
Slide № 21 «Mitoses in plant cells»
Stain: iron hematoxylin



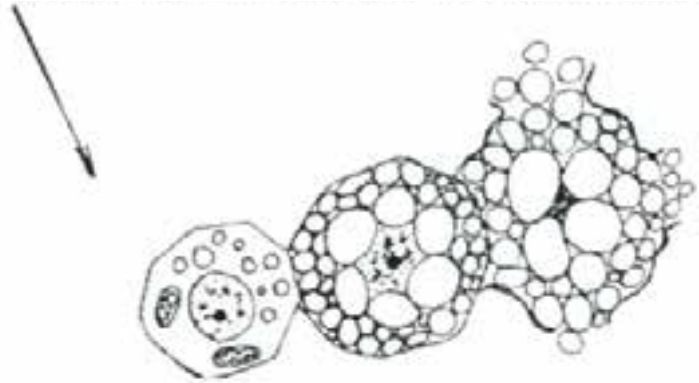
LIFE CYCLE OF A CELL. Cells on different stages of the life cycle



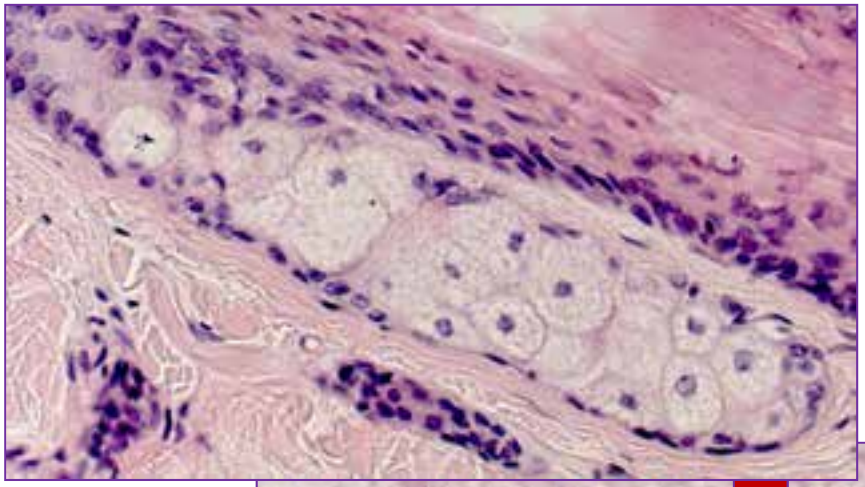
SEBACEOUS GLAND



sebocytes at progressive stages of sebaceous lipid production

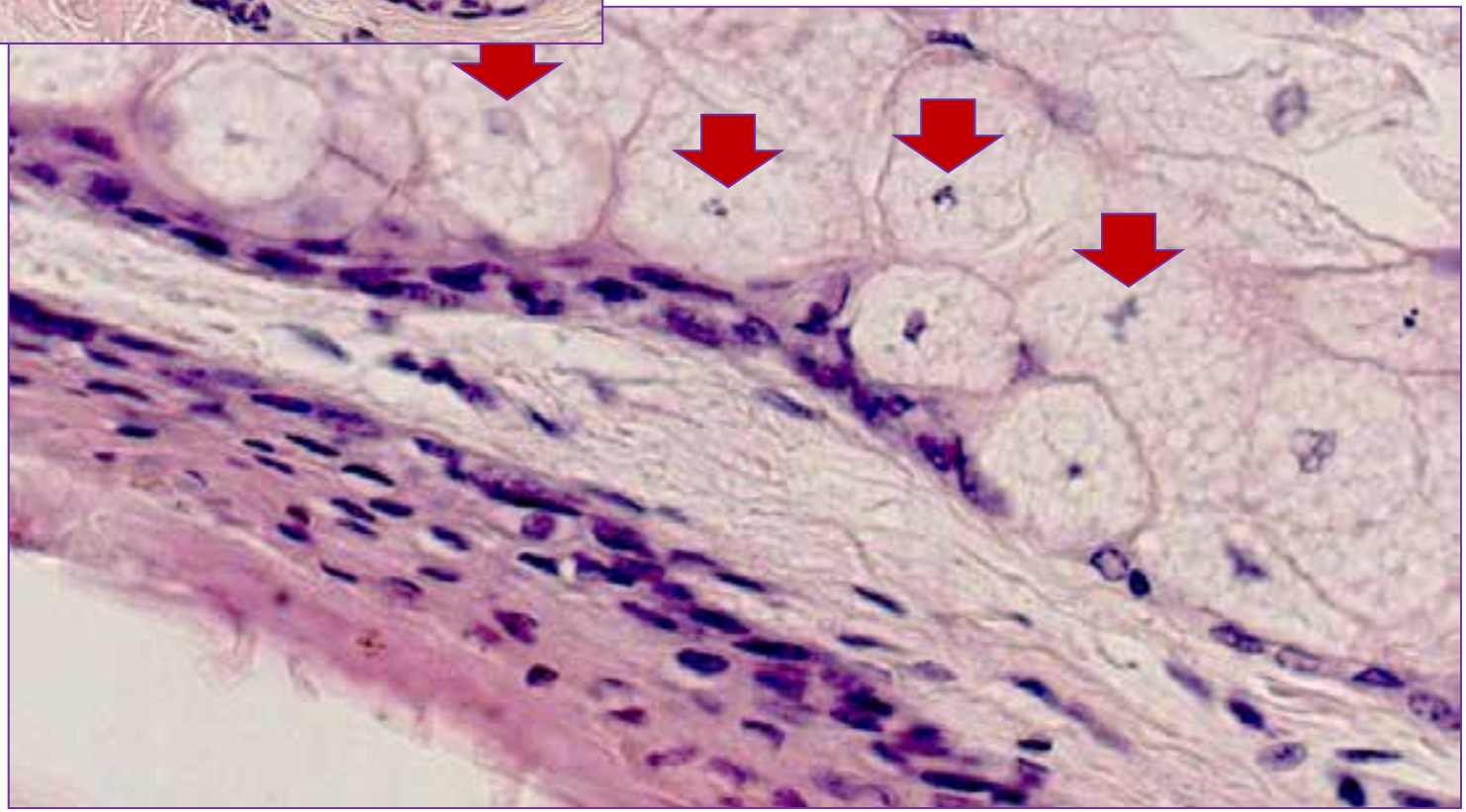


LIFE CYCLE OF A CELL. Cells on different stages of the life cycle

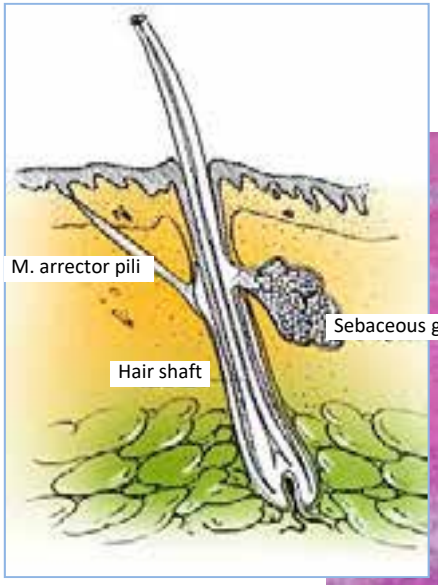


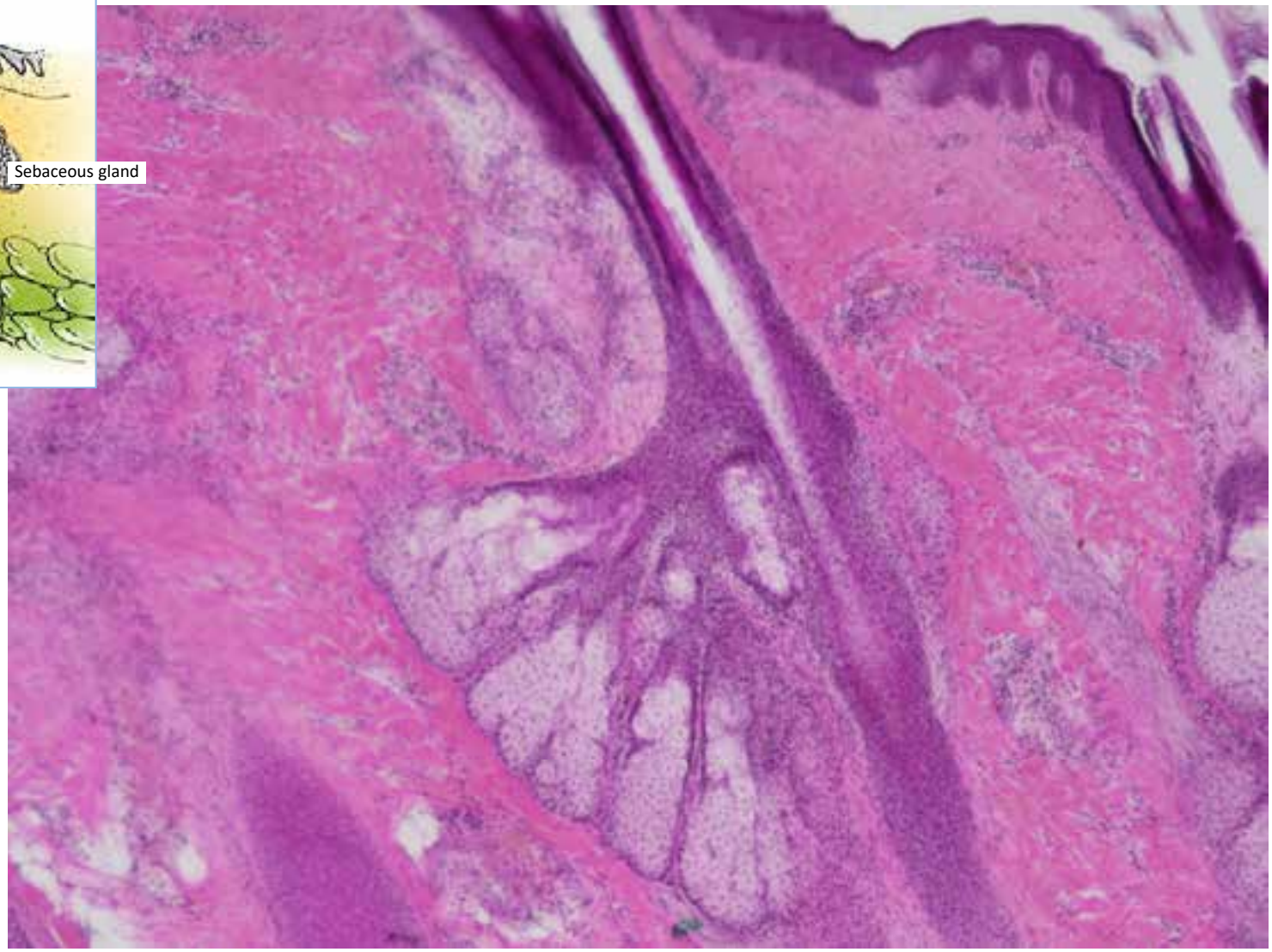
Karyopicnosis **– irreversible condensation of chromatin accompanied by nuclear shrinkage**

Karyorhexis **(*karyolysis*) – destruction of the nucleus by fragmentation**

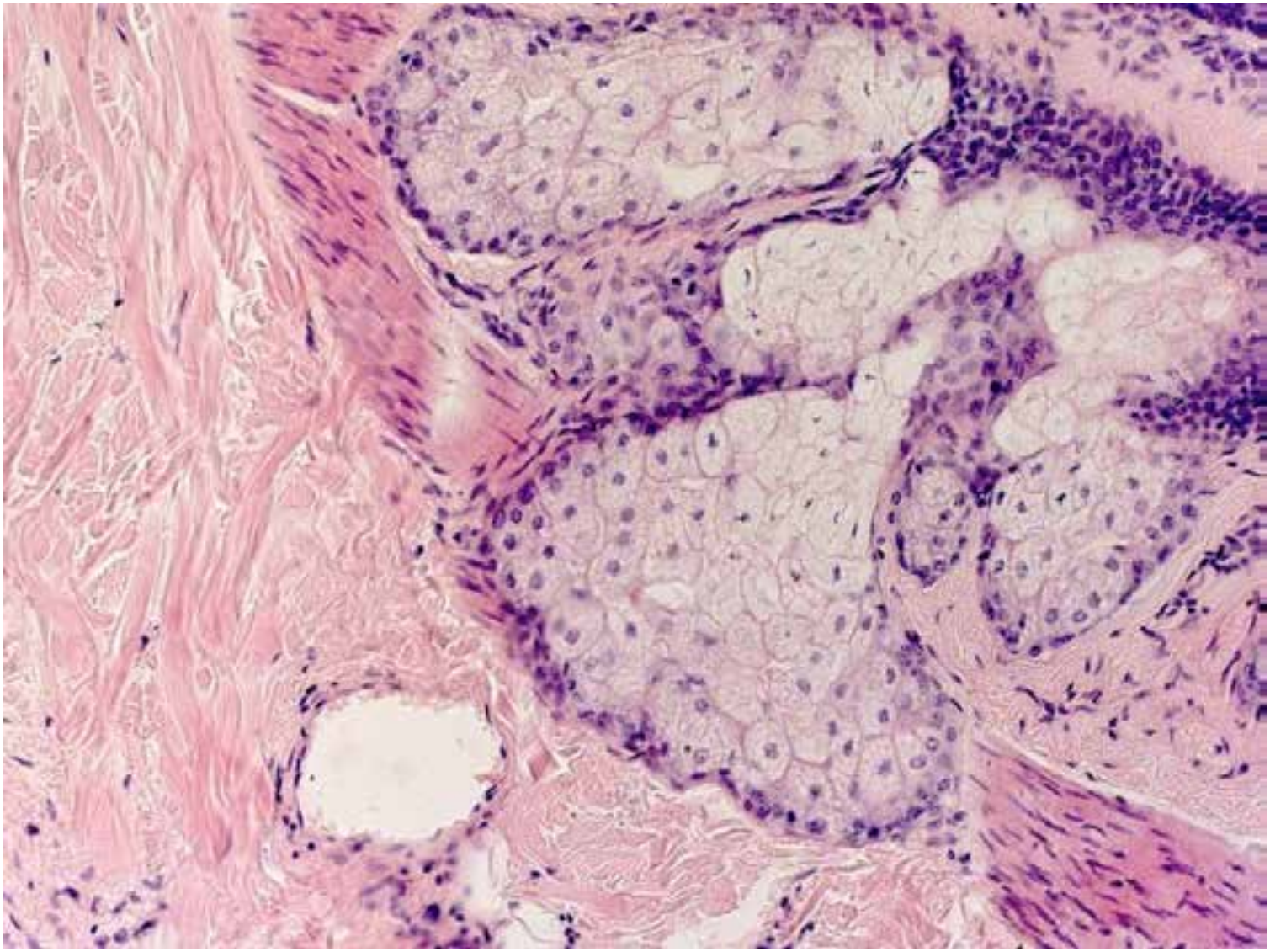


***Slide № 51* «Cells on different of life-cycle phases. Sebaceous gland»**
Stain: hematoxylin-eosin

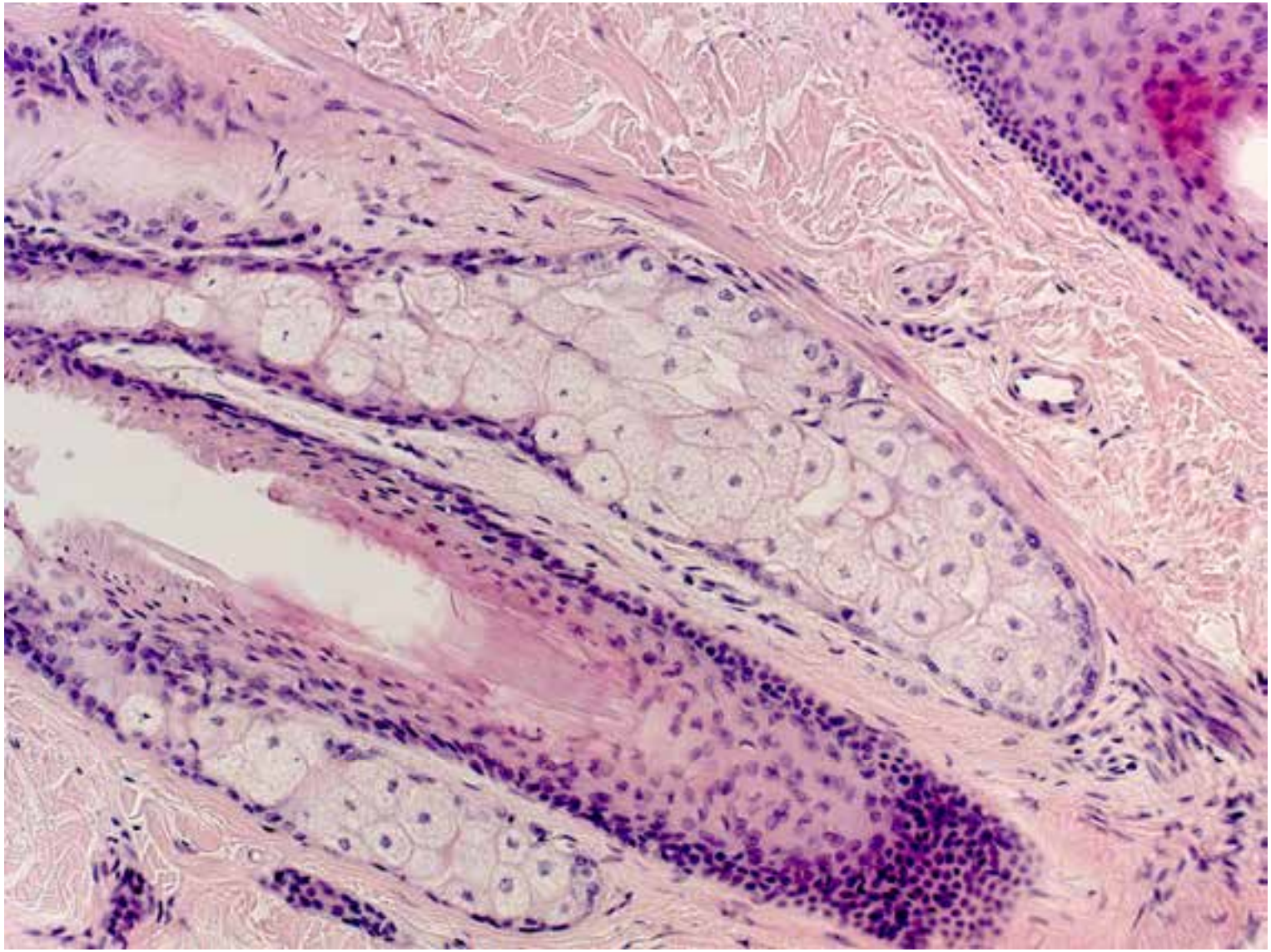




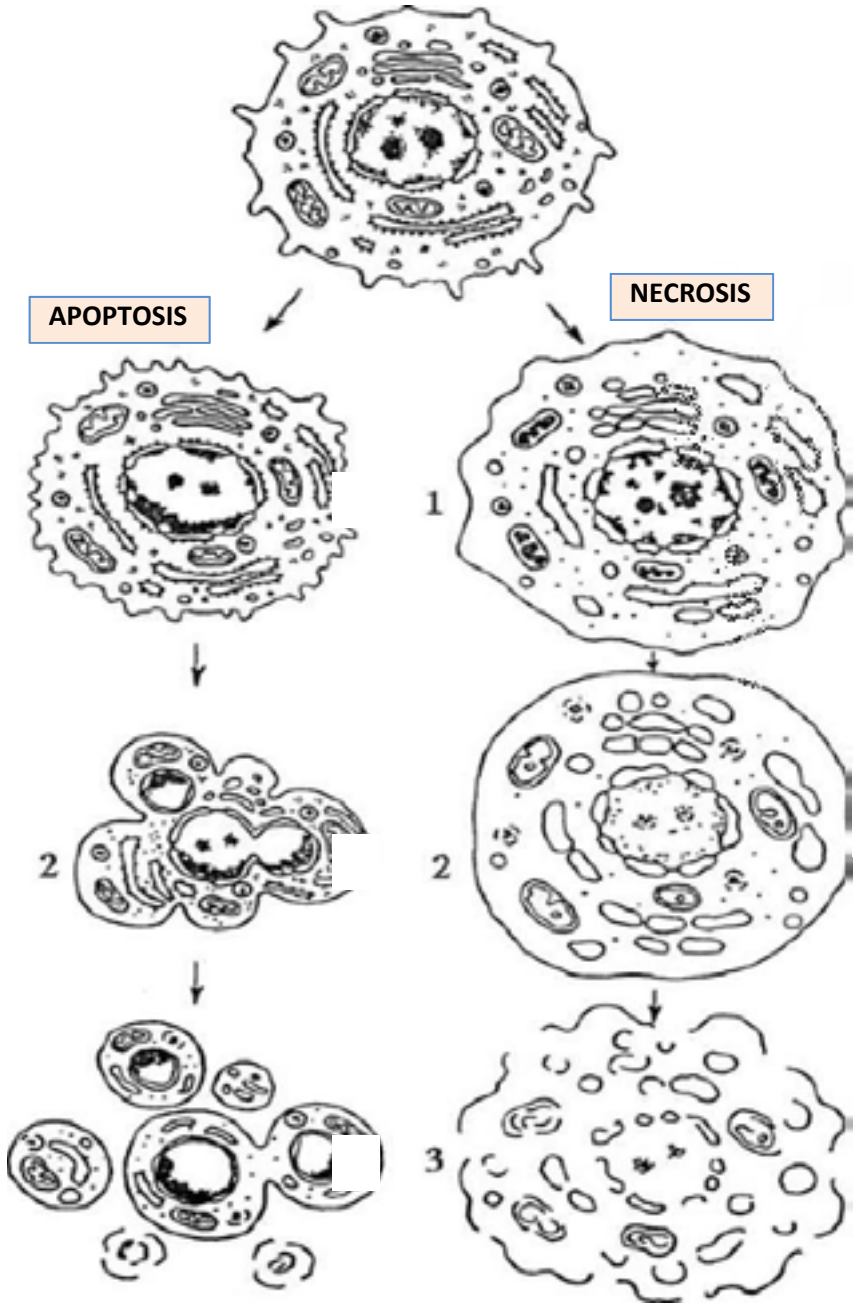
Slide № 51 **«Cells on different of life-cycle phases. Sebaceous gland»**
Stain: hematoxylin-eosin



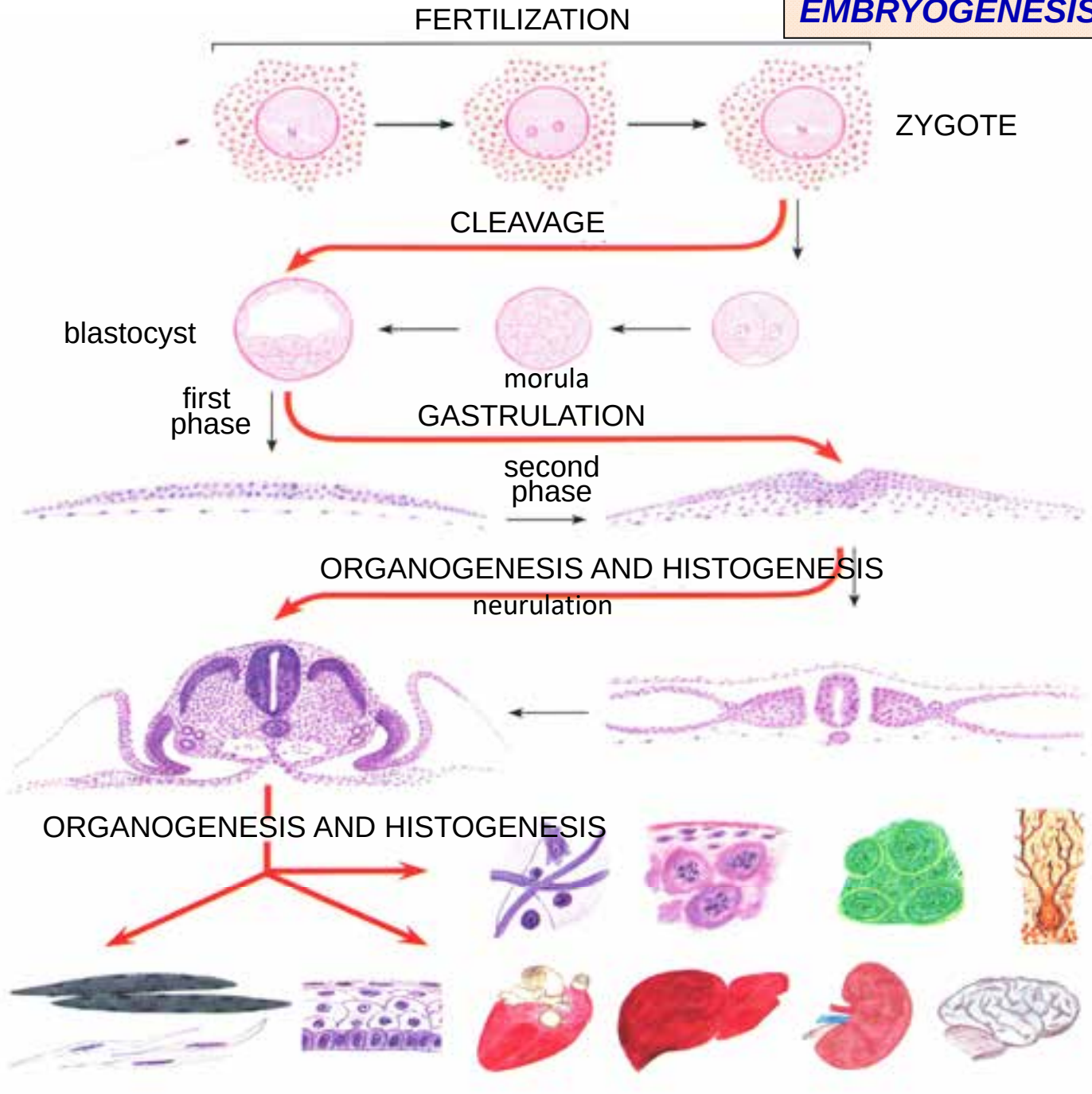
Slide № 51 **«Cells on different of life-cycle phases. Sebaceous gland»**
Stain: hematoxylin-eosin



TYPES OF CELL DEATH

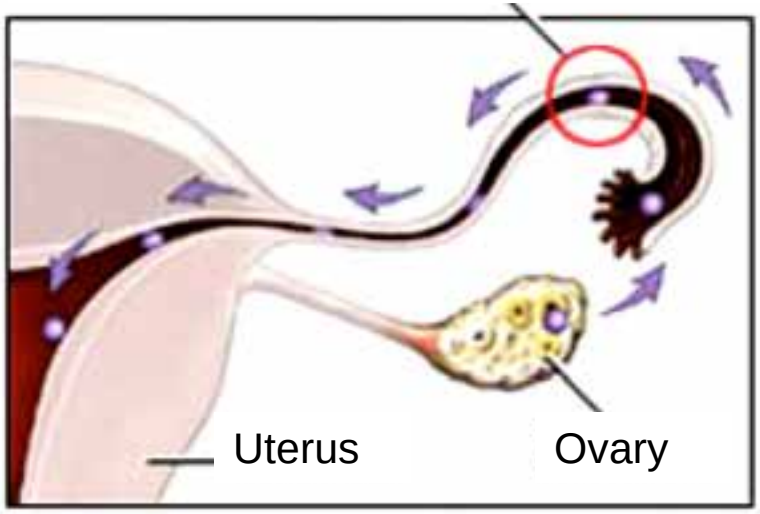


EMBRYOGENESIS. HISTOGENESIS

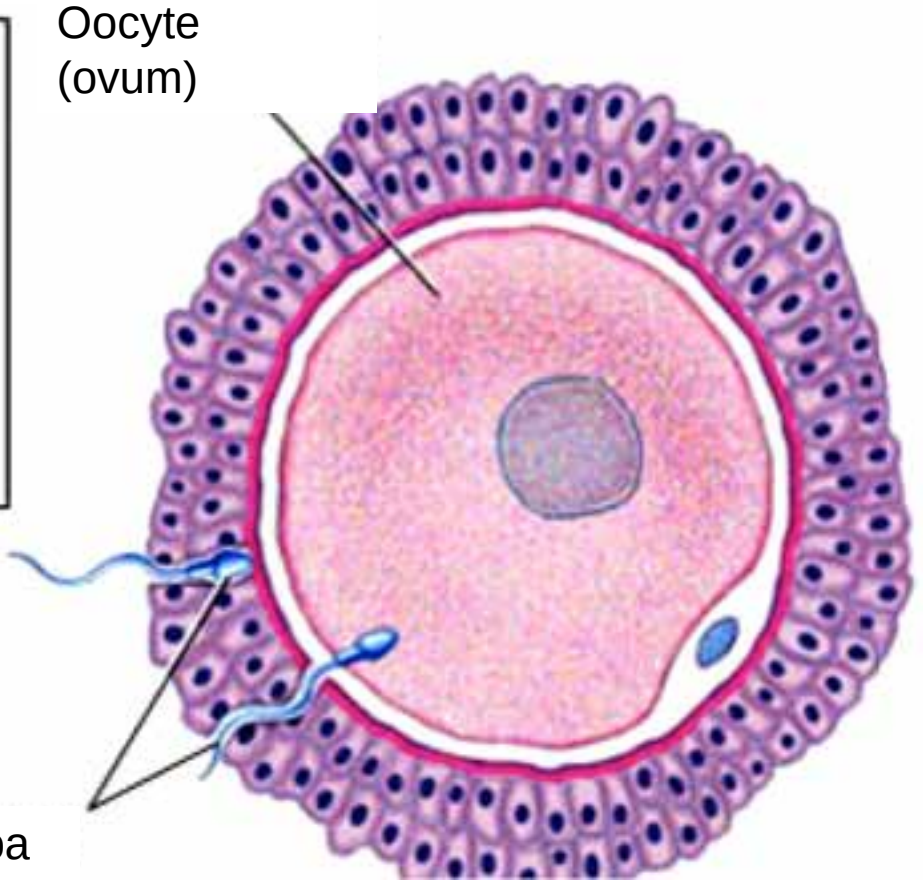


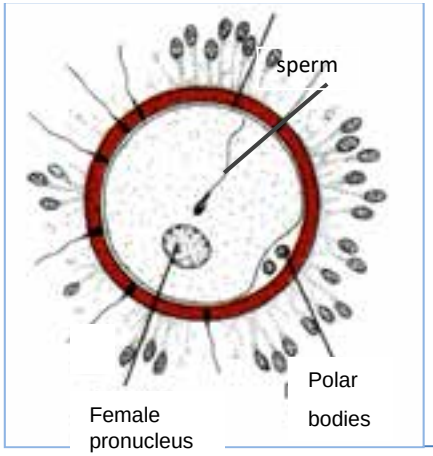
FERTILIZATION

Fertilization takes place
in the uterine tube



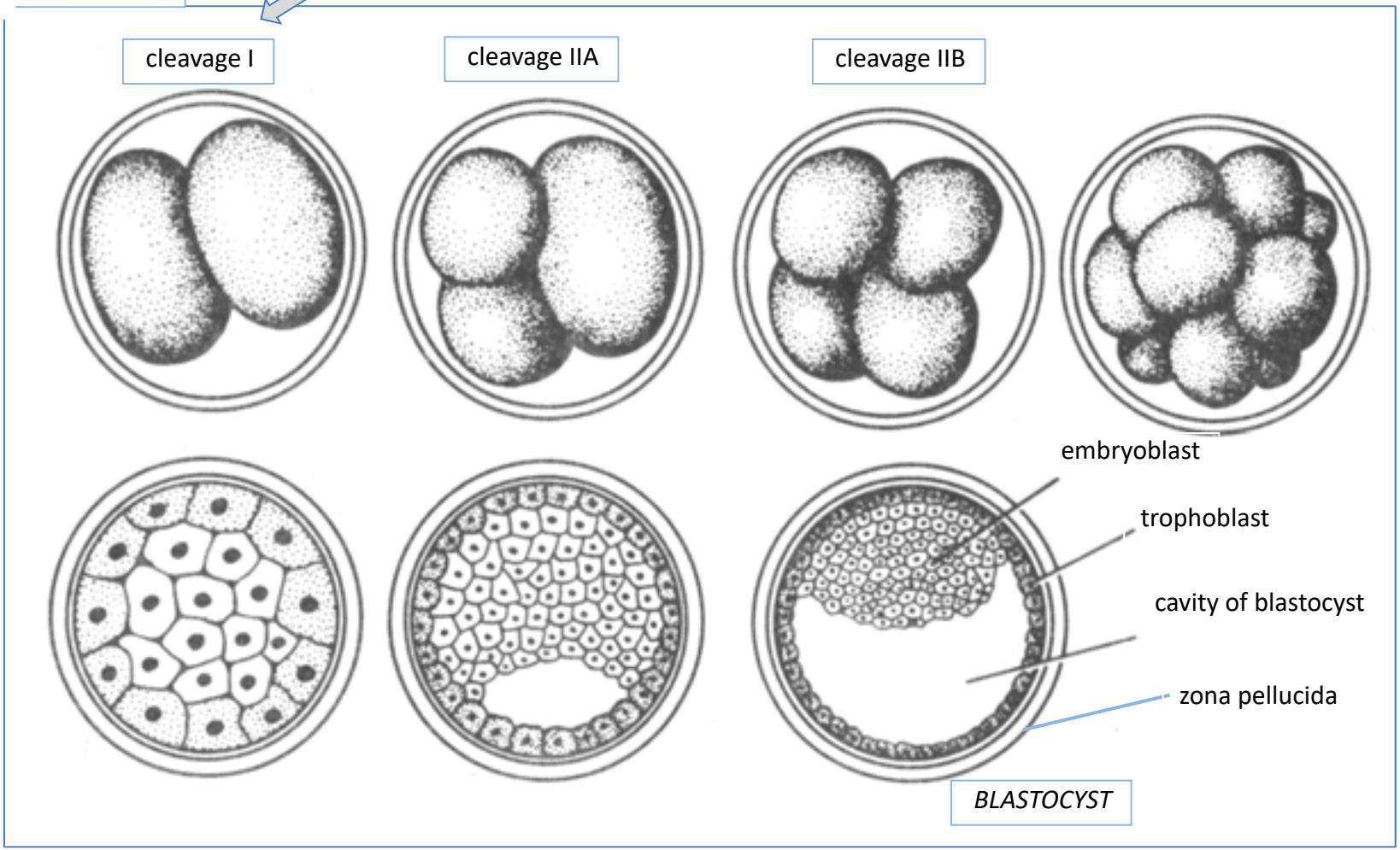
Enlarged view



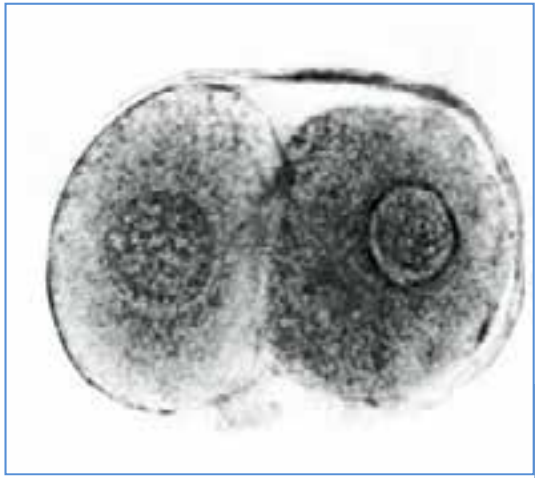


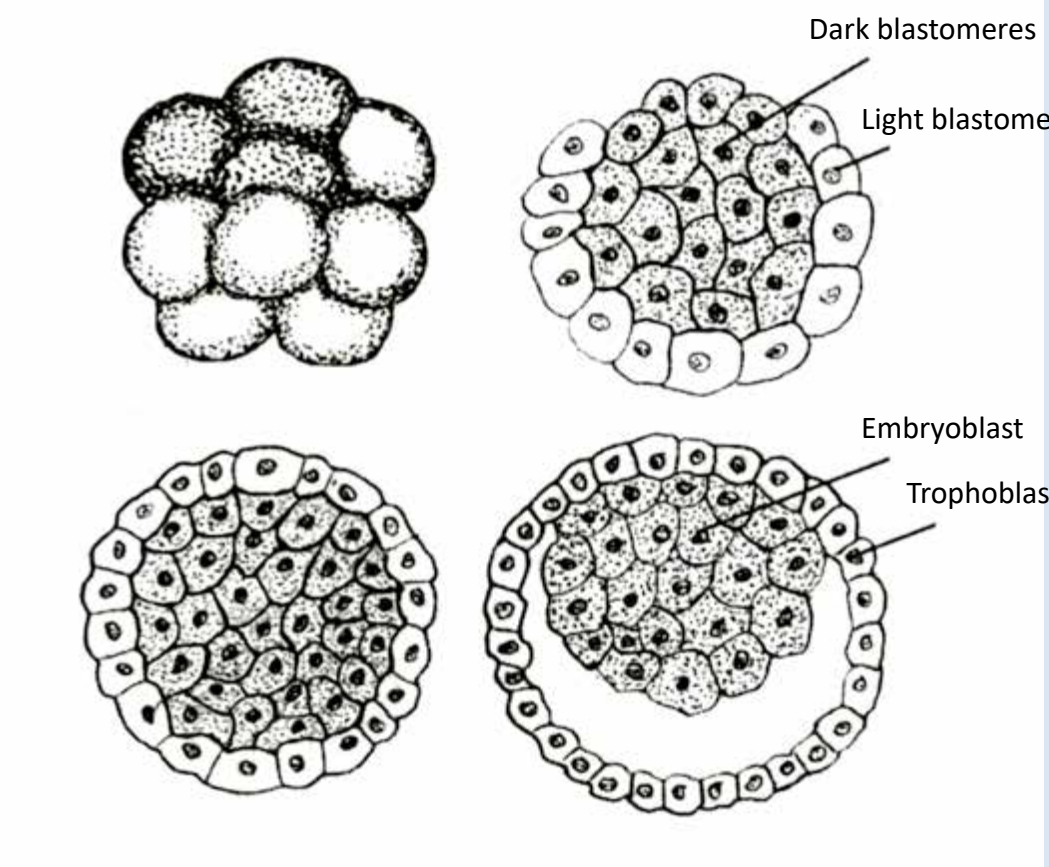
CLEAVAGE

- *full*
- *asynchronous*
- *asymmetric*



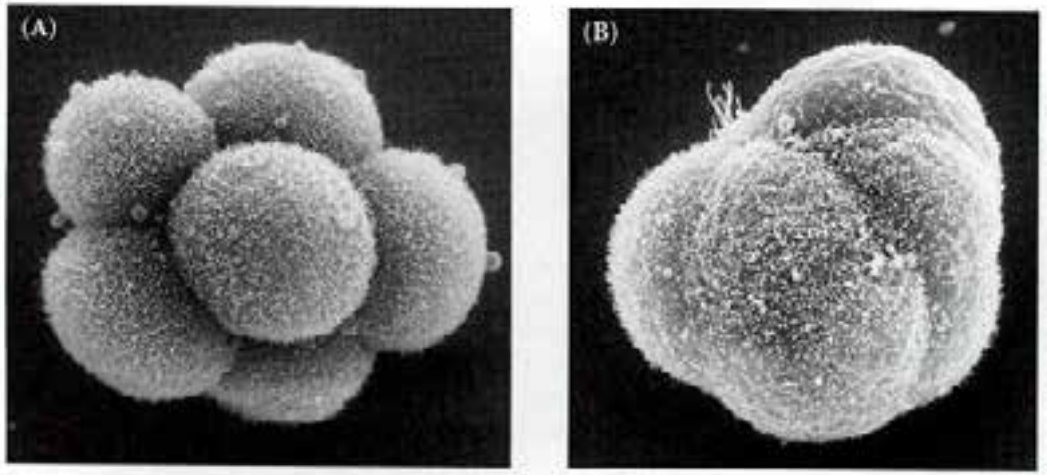
CLEAVAGE



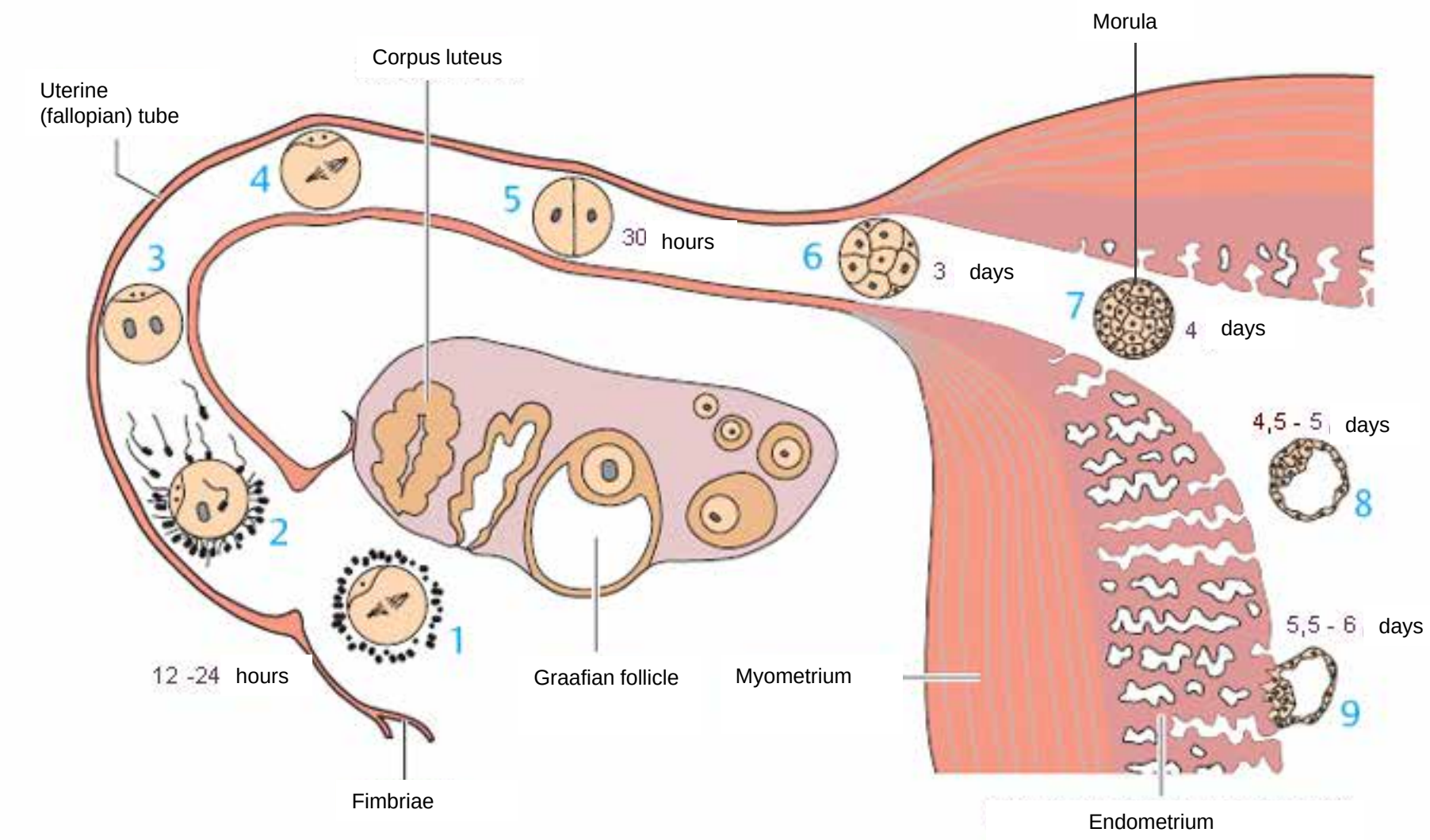

Dark blastomeres
Light blastomeres
Embryoblast
Trophoblast

CLEAVAGE

Compactization (stage of eight blastomeres)



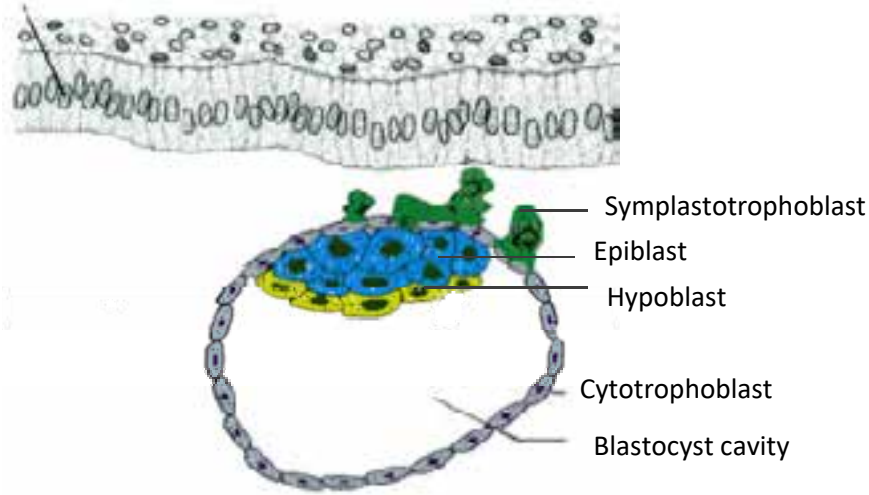
CLEAVAGE. IMPLANTATION

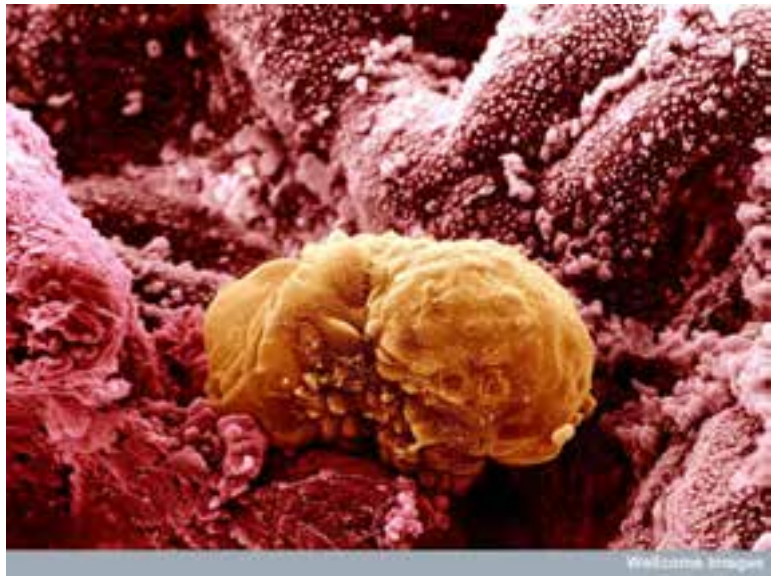


IMPLANTATION

- ✓ ***Adhesion*** *(6-7 days)*
- ✓ **invasion**

Uterine wall

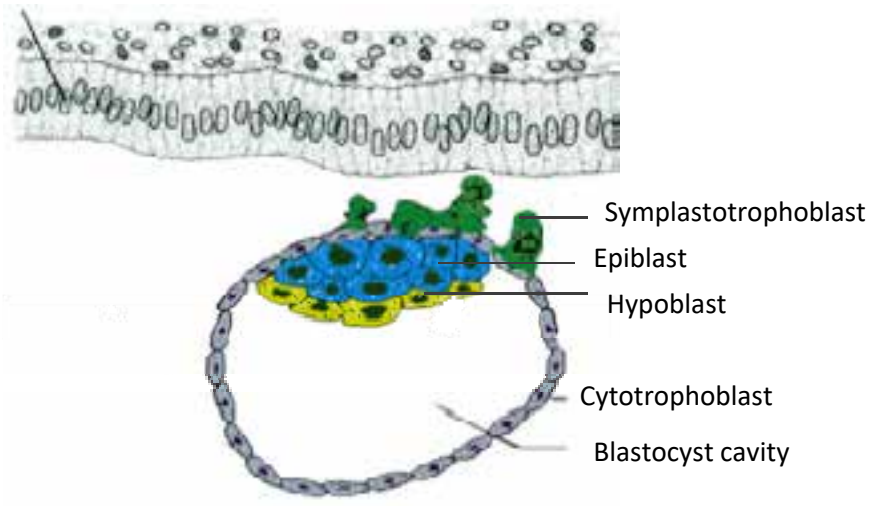


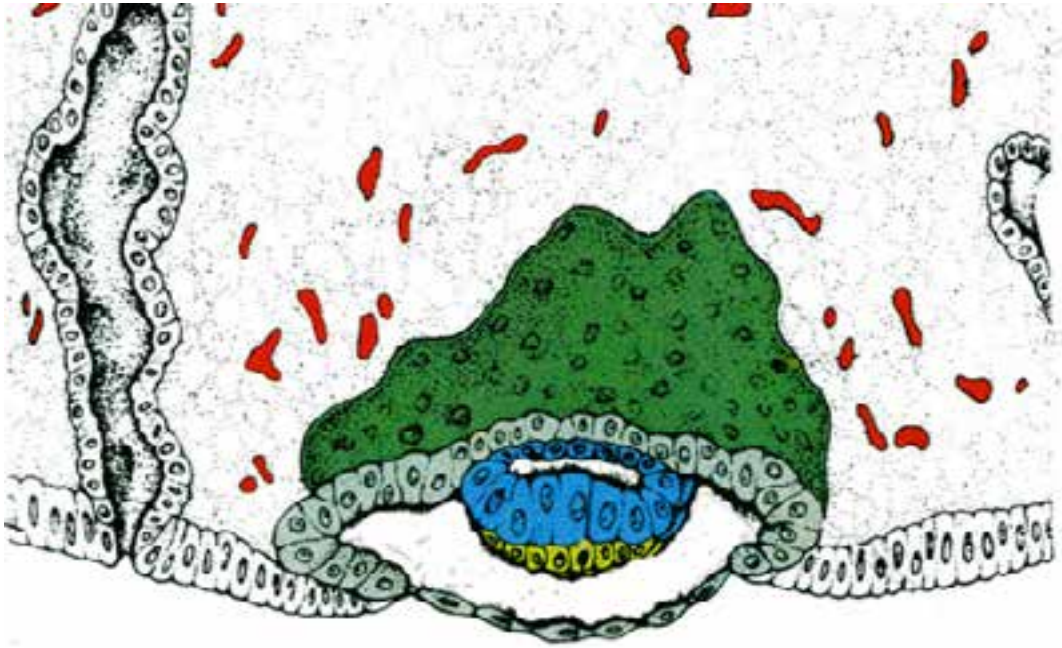


IMPLANTATION

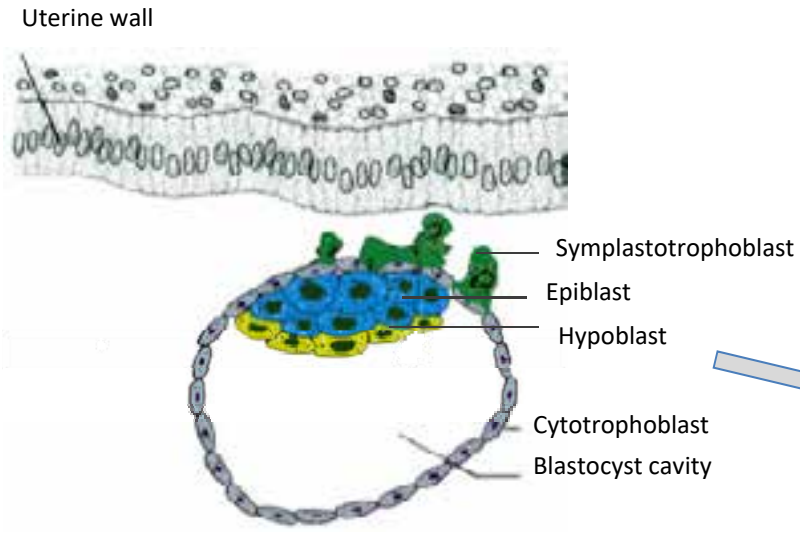
- ✓ Adhesion
- ✓ ***Invasion***

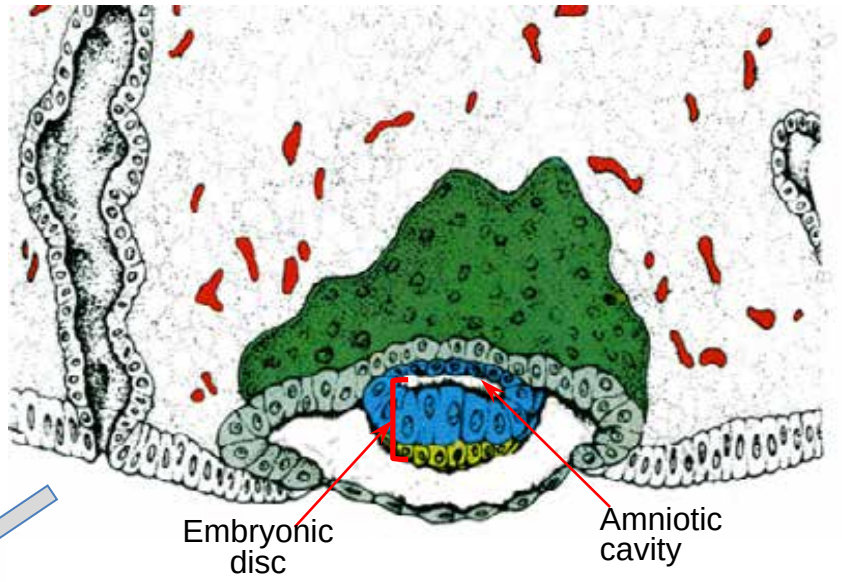
(lasts about 40 hours,
repair of epithelium to 12 day)

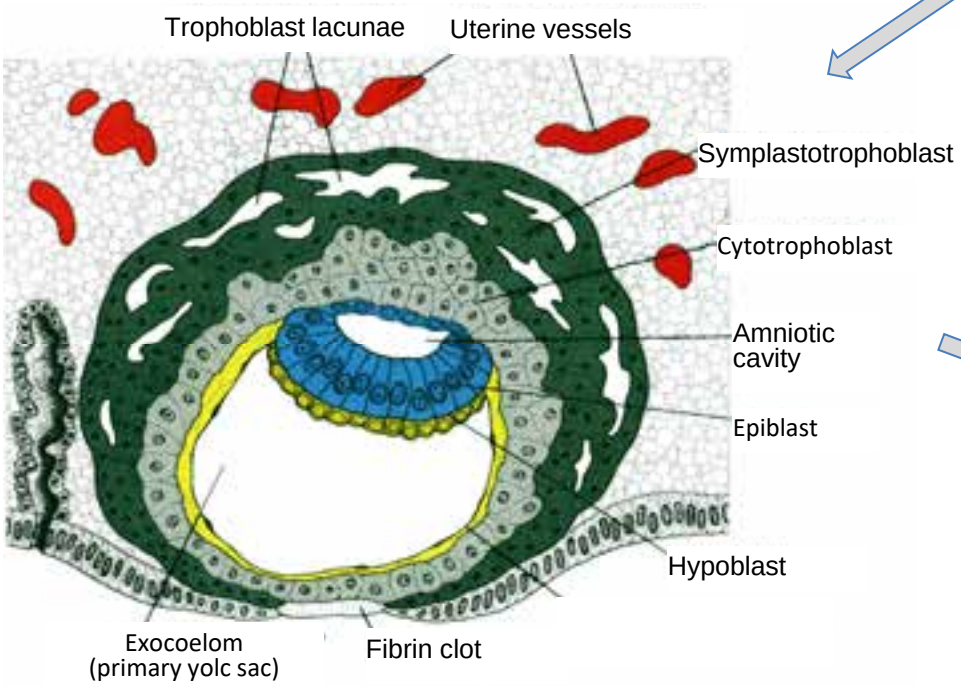


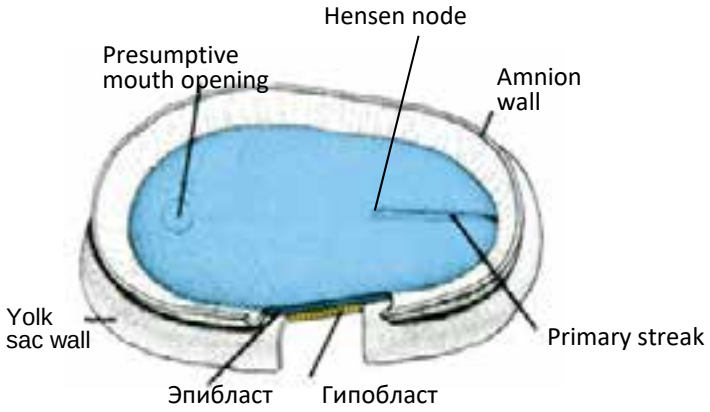


PROVISORY ORGAN FORMATION



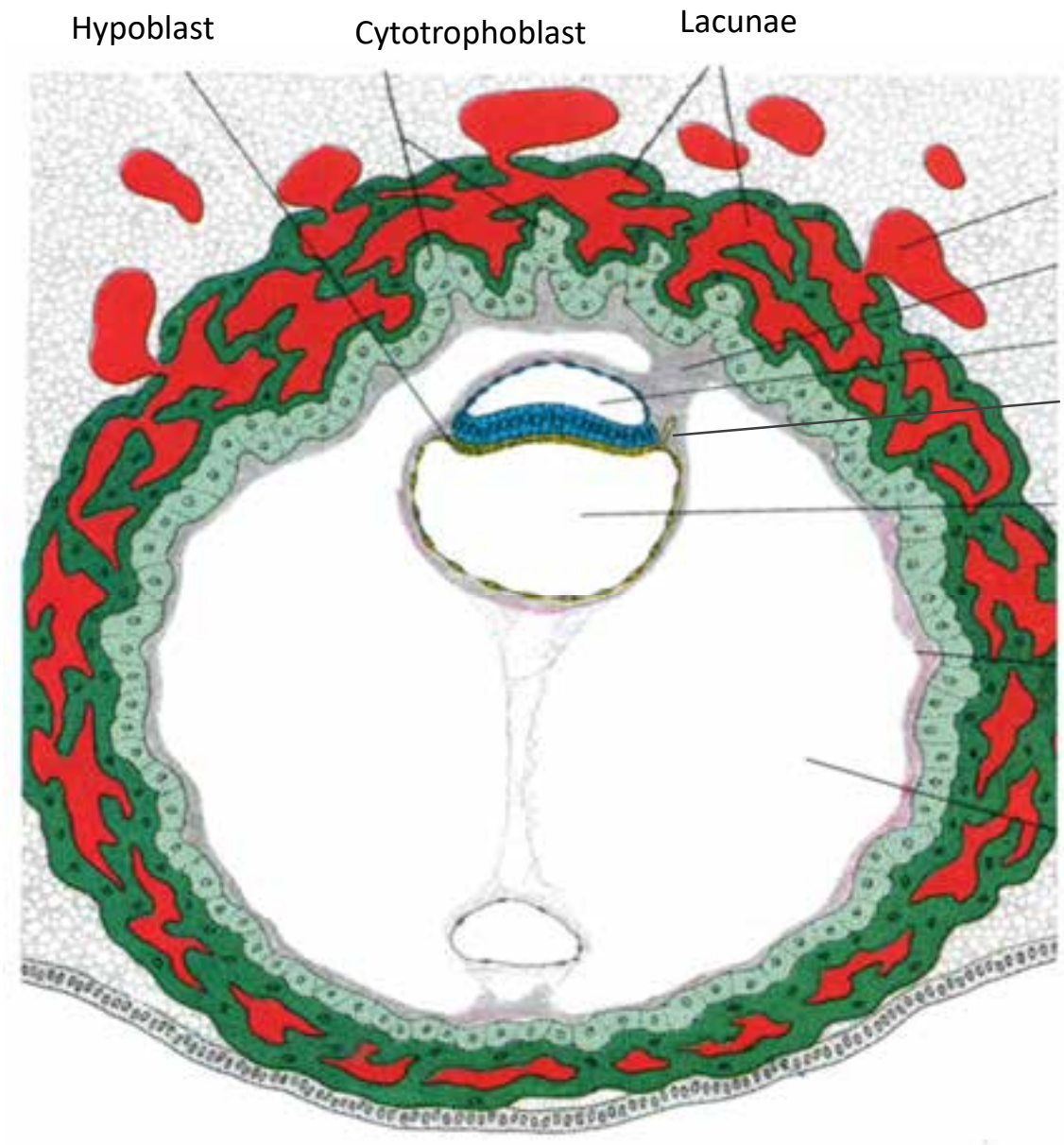






PROVISORY ORGAN FORMATION

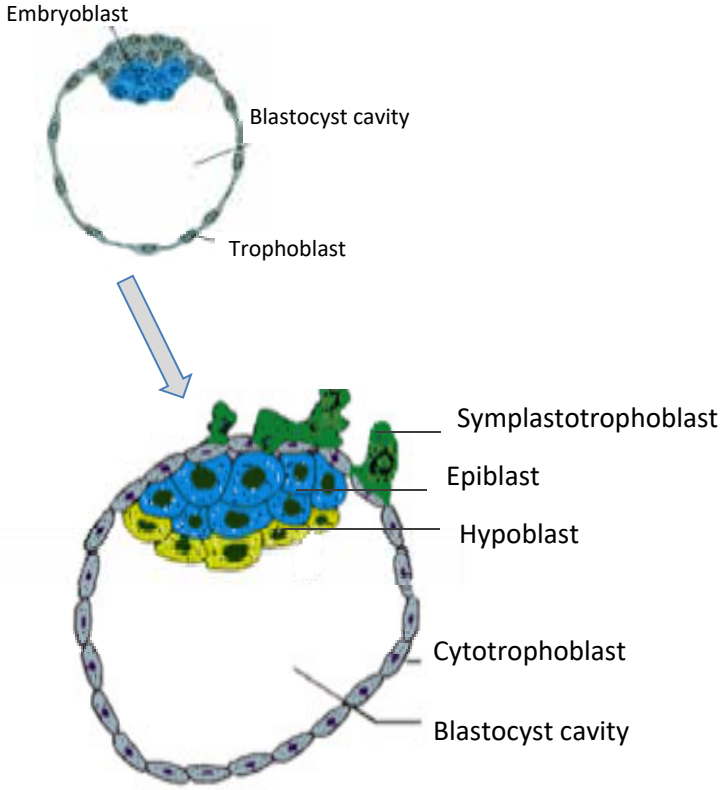
- *Amnion*
- *Chorion*
- *Yolk sac*
- *Allantois*

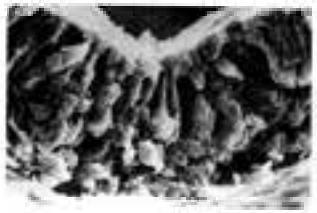


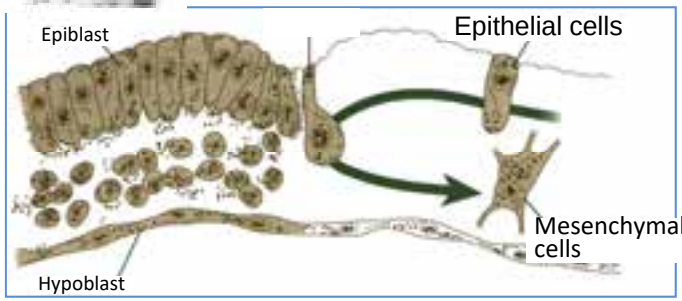
GASTRULATION

- ✓ *delamination*
- ✓ *immigration*

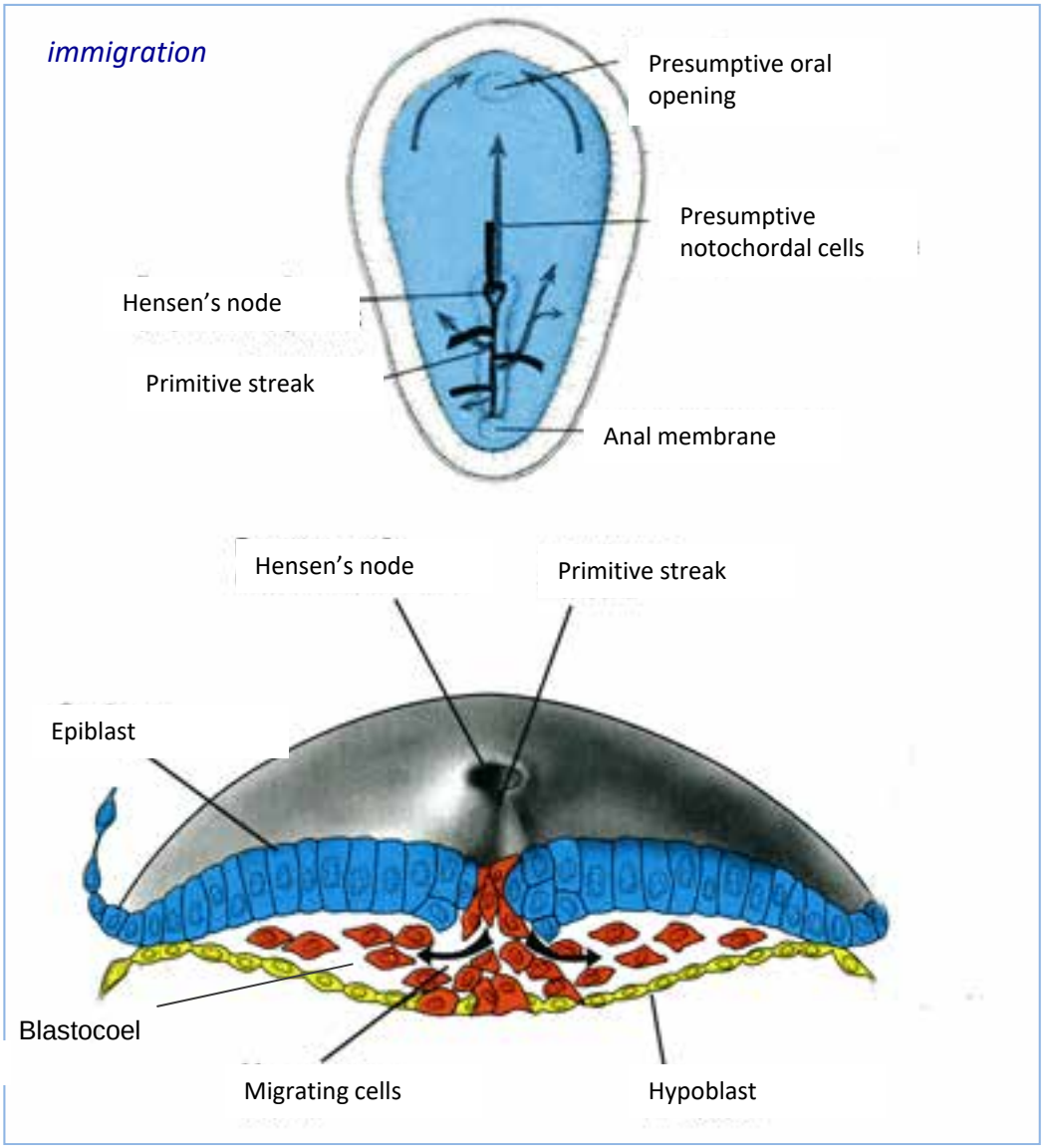
delamination



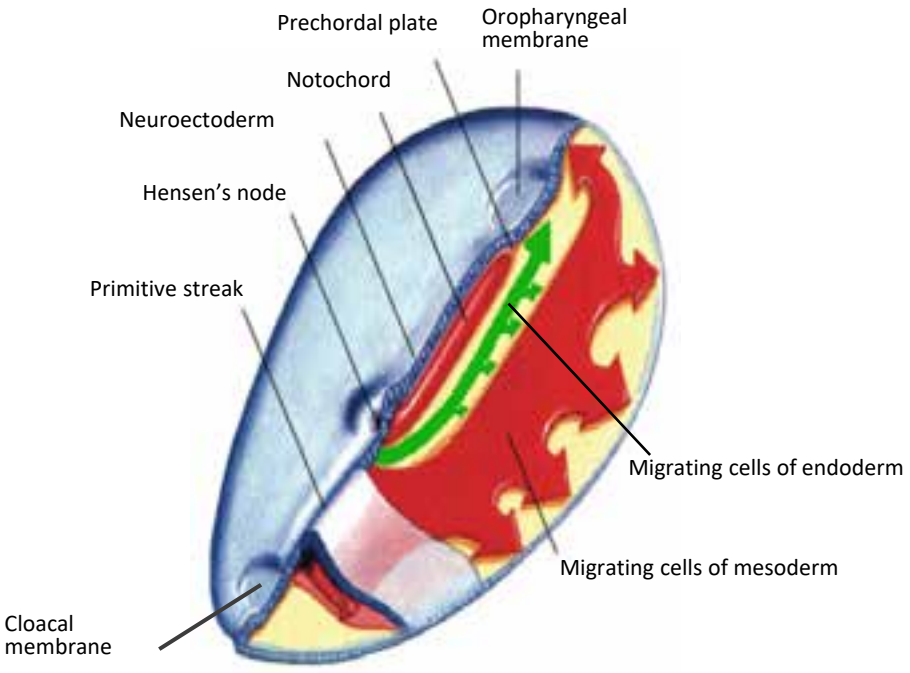


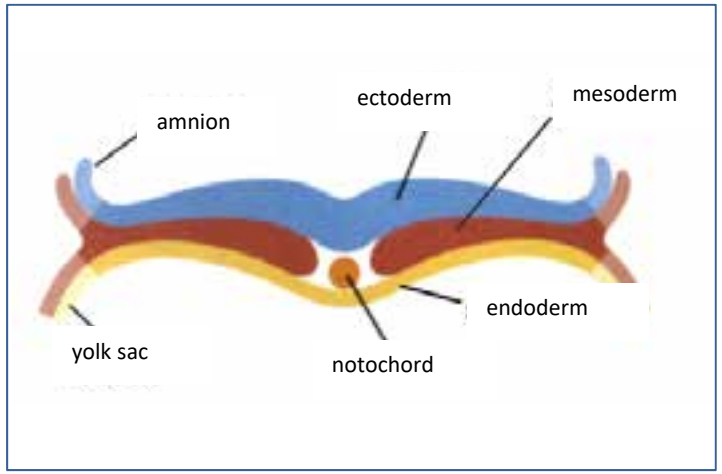


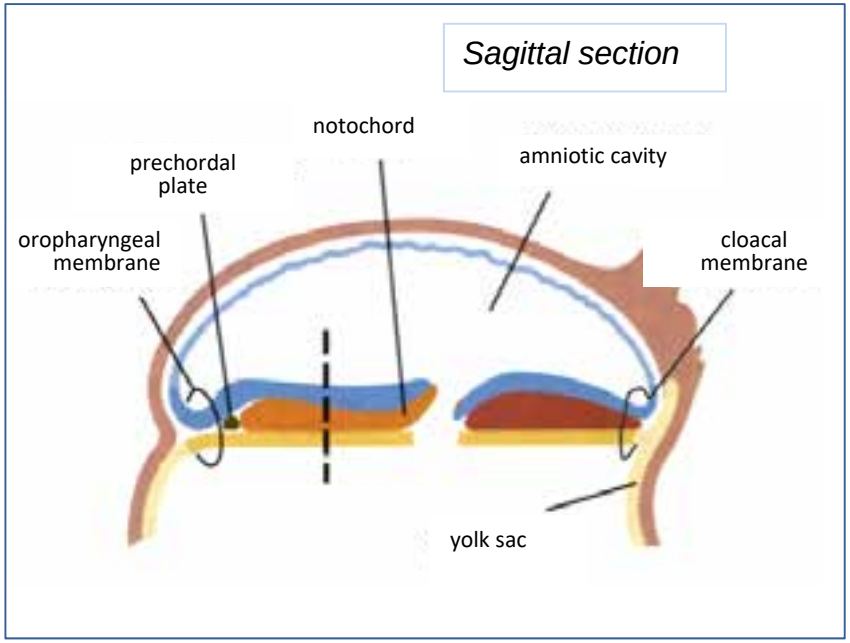
immigration



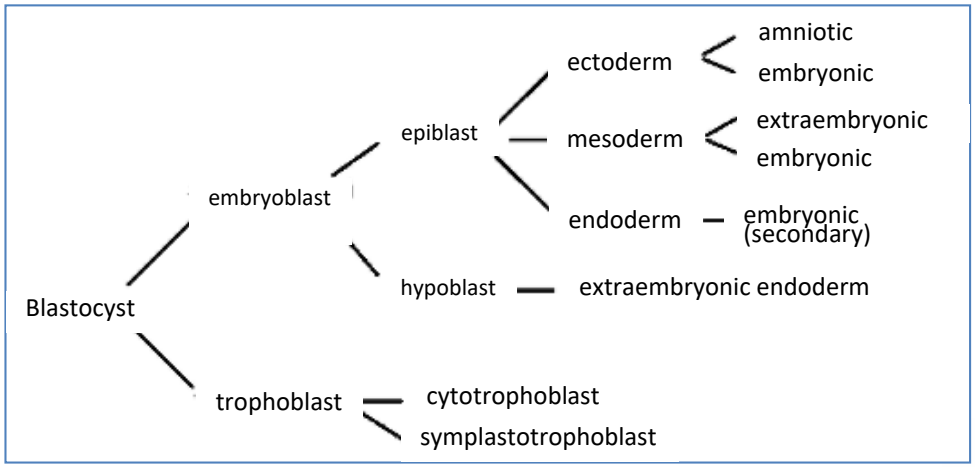
GASTRULATION

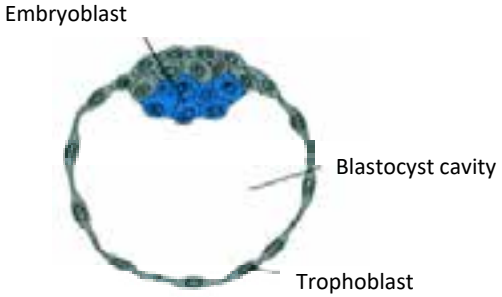


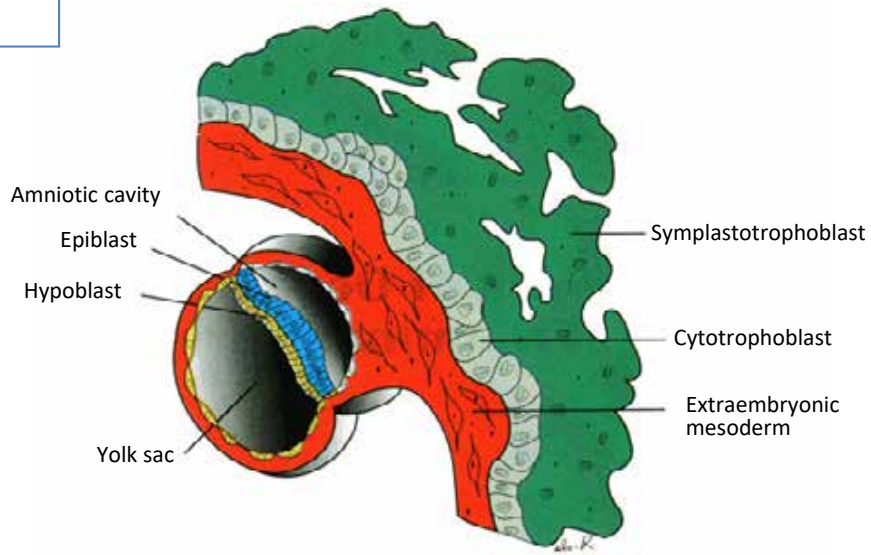


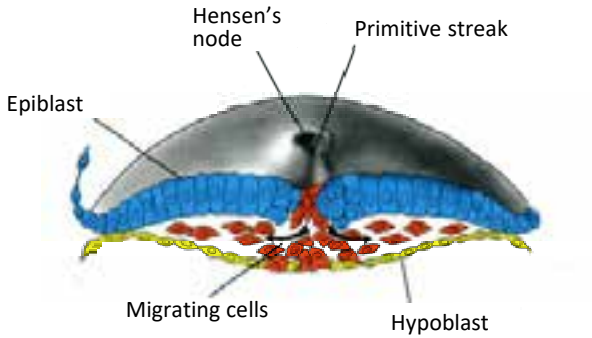


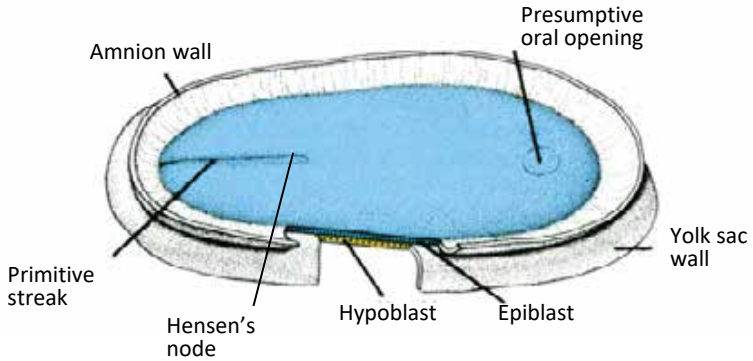
GASTRULATION



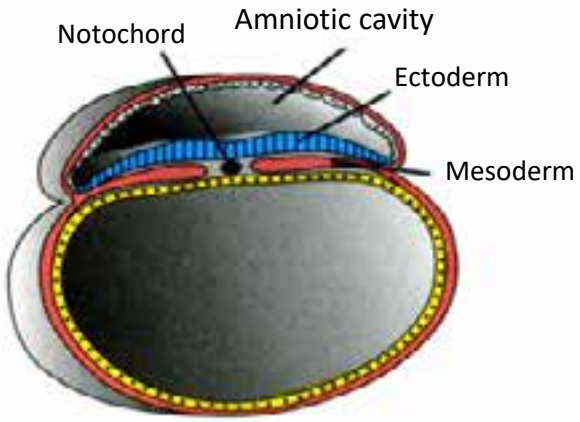


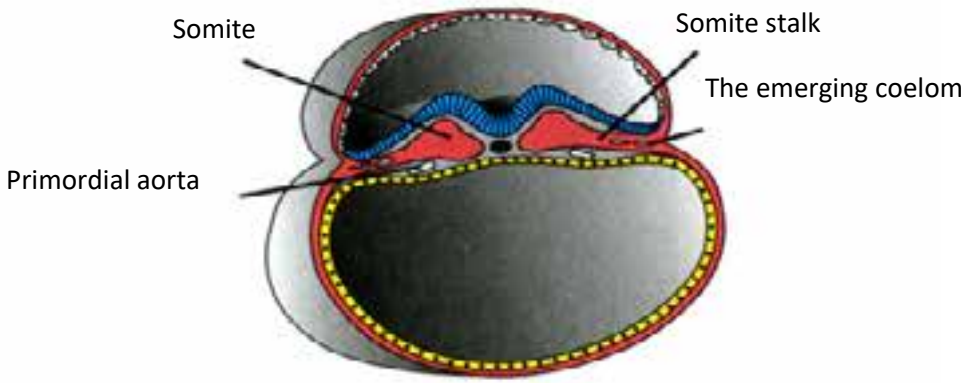


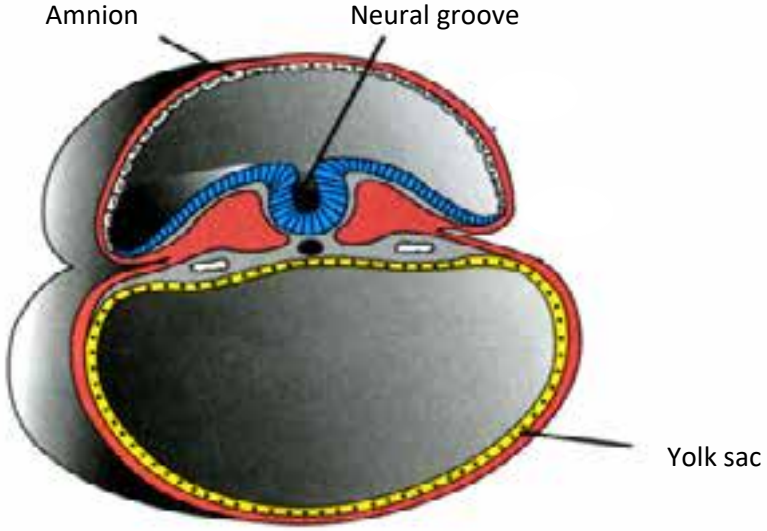


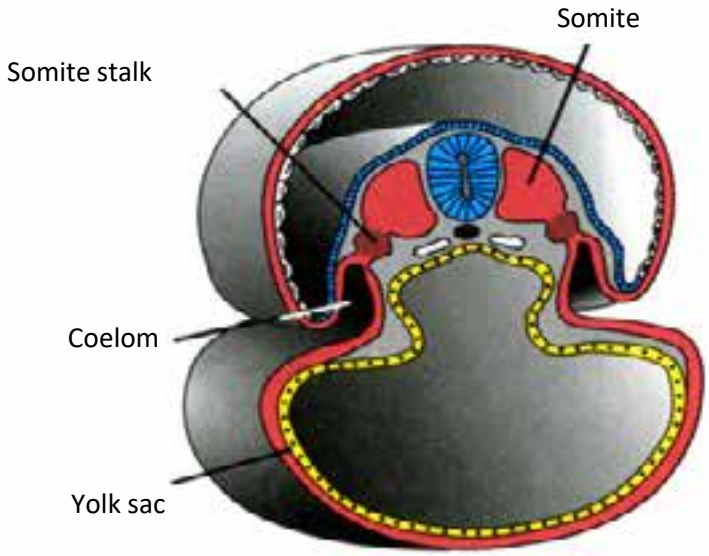


ORGANOGENESIS AND HISTOGENESIS

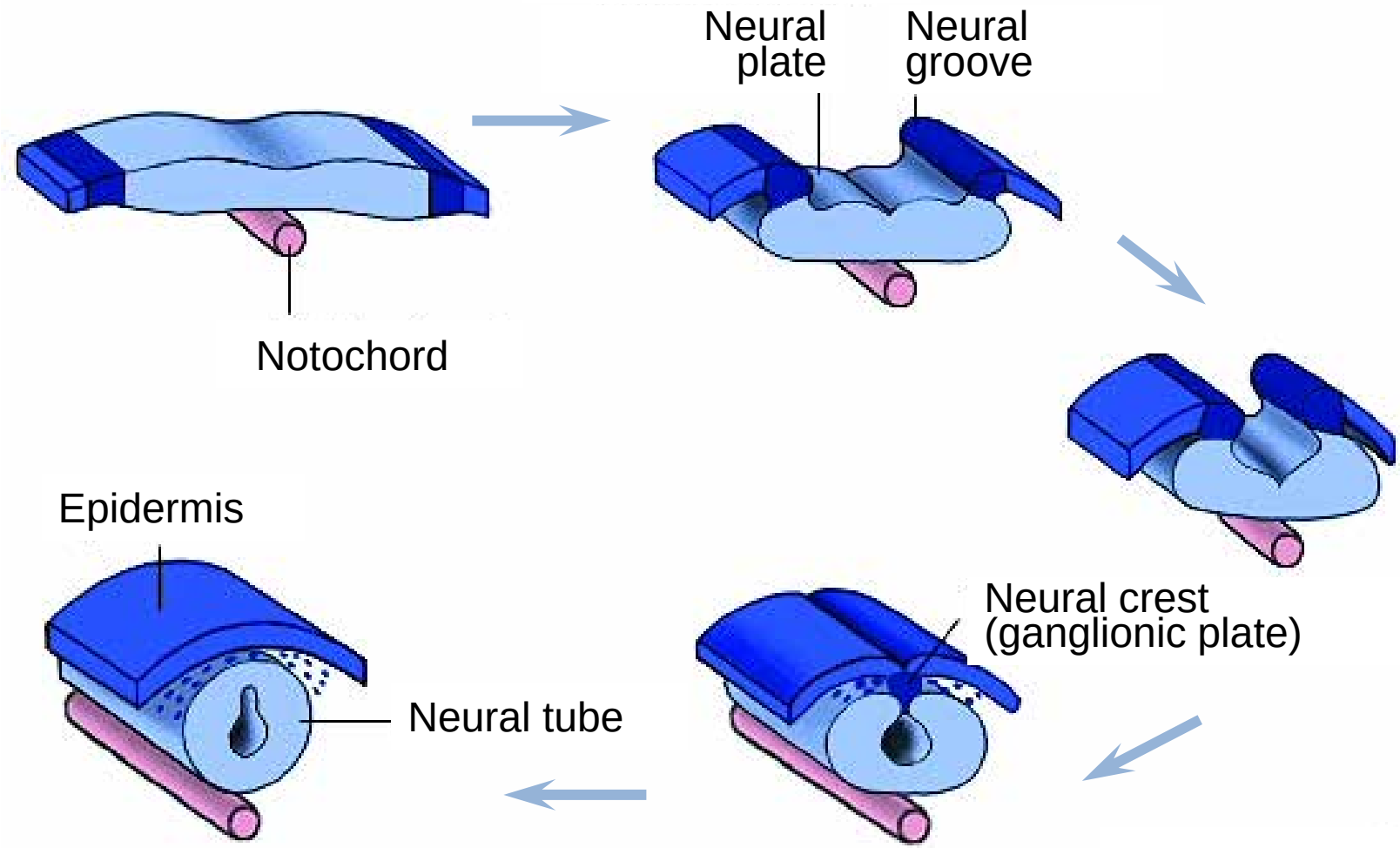








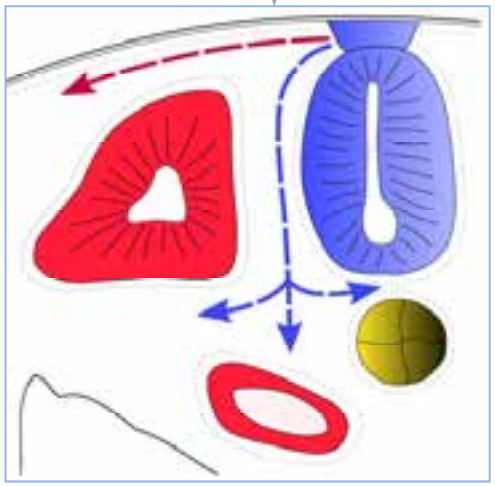
NEURULATION

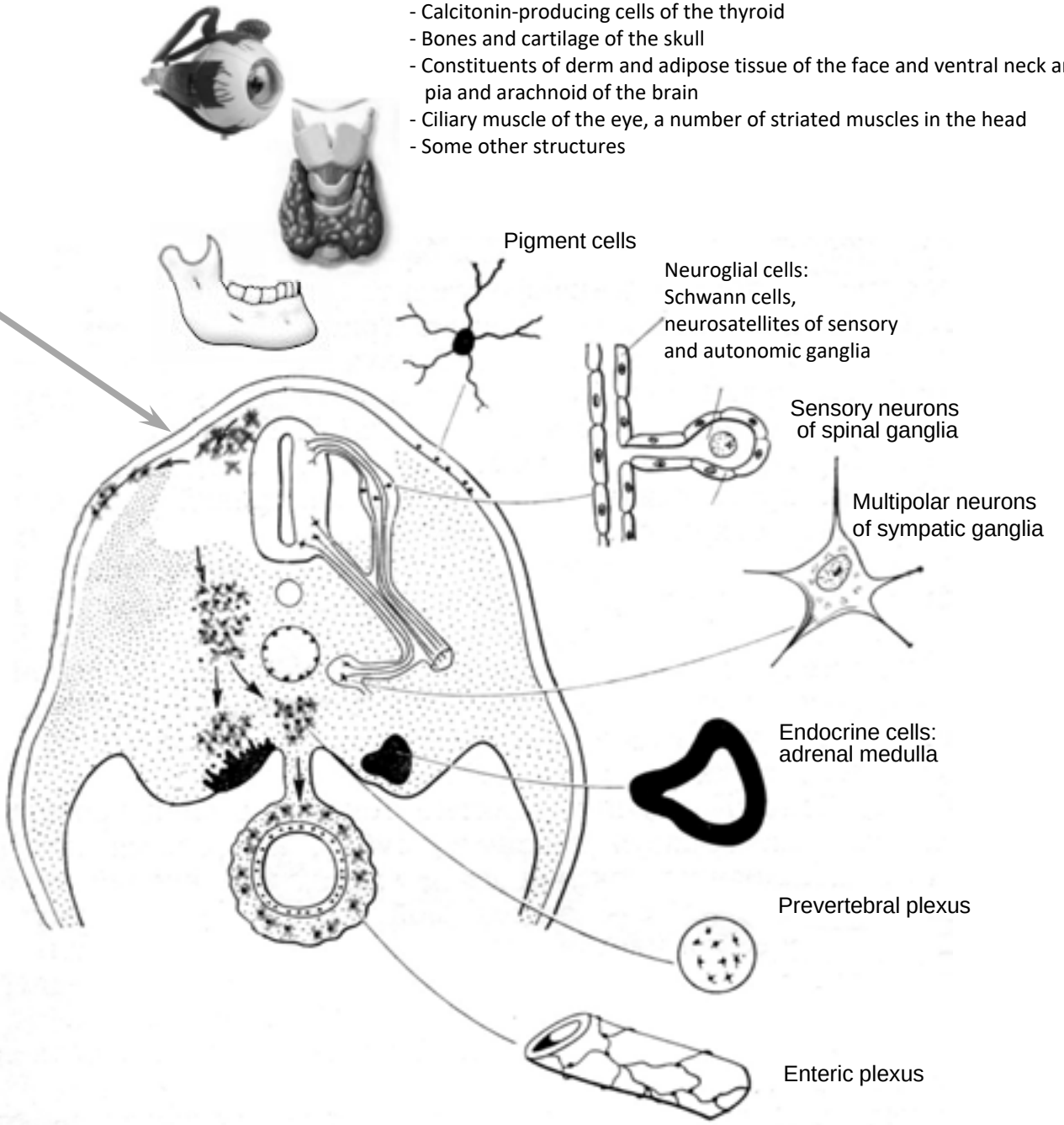


NEURAL CREST DERIVATIVES

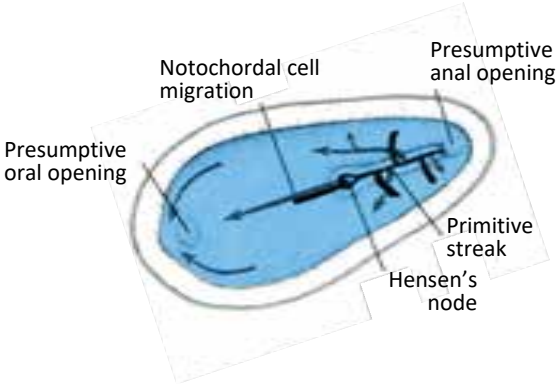
- Neurons of and of spiral, vestibular, and cranial nerve ganglia
- Calcitonin-producing cells of the thyroid
- Bones and cartilage of the skull
- Constituents of derm and adipose tissue of the face and ventral neck area, pia and arachnoid of the brain
- Ciliary muscle of the eye, a number of striated muscles in the head
- Some other structures

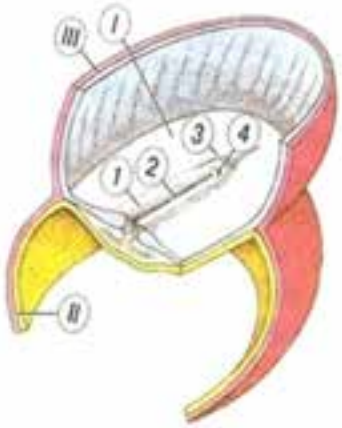
Neural crest cell migration routes

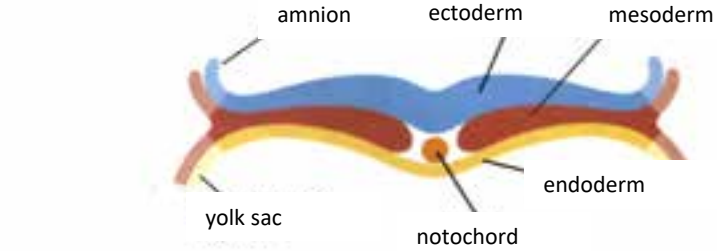


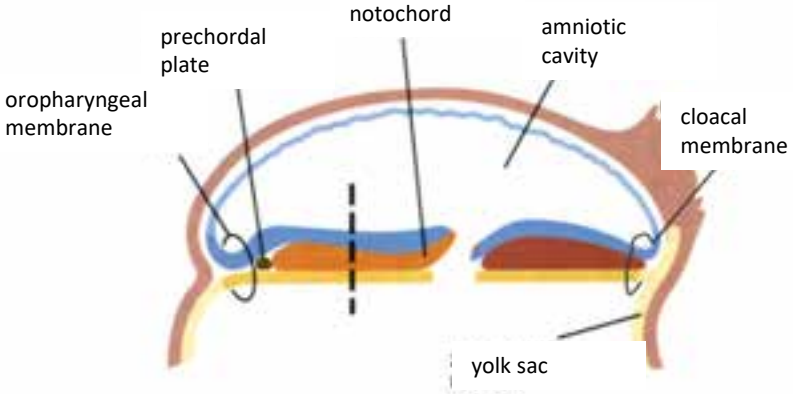


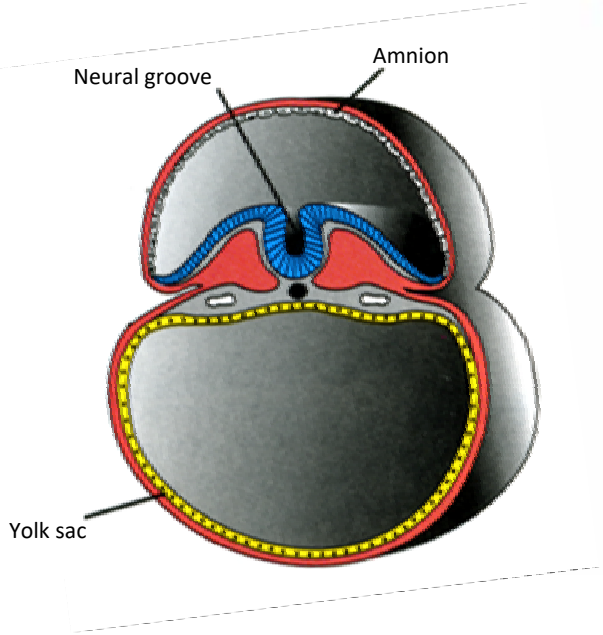
PRECHORDAL PLATE

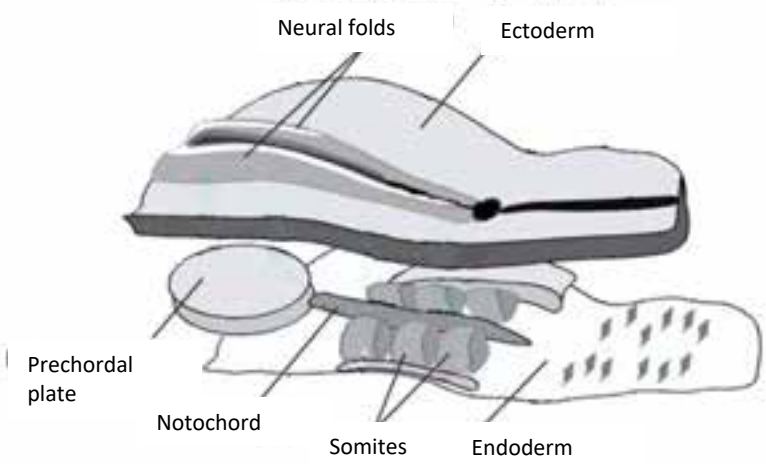




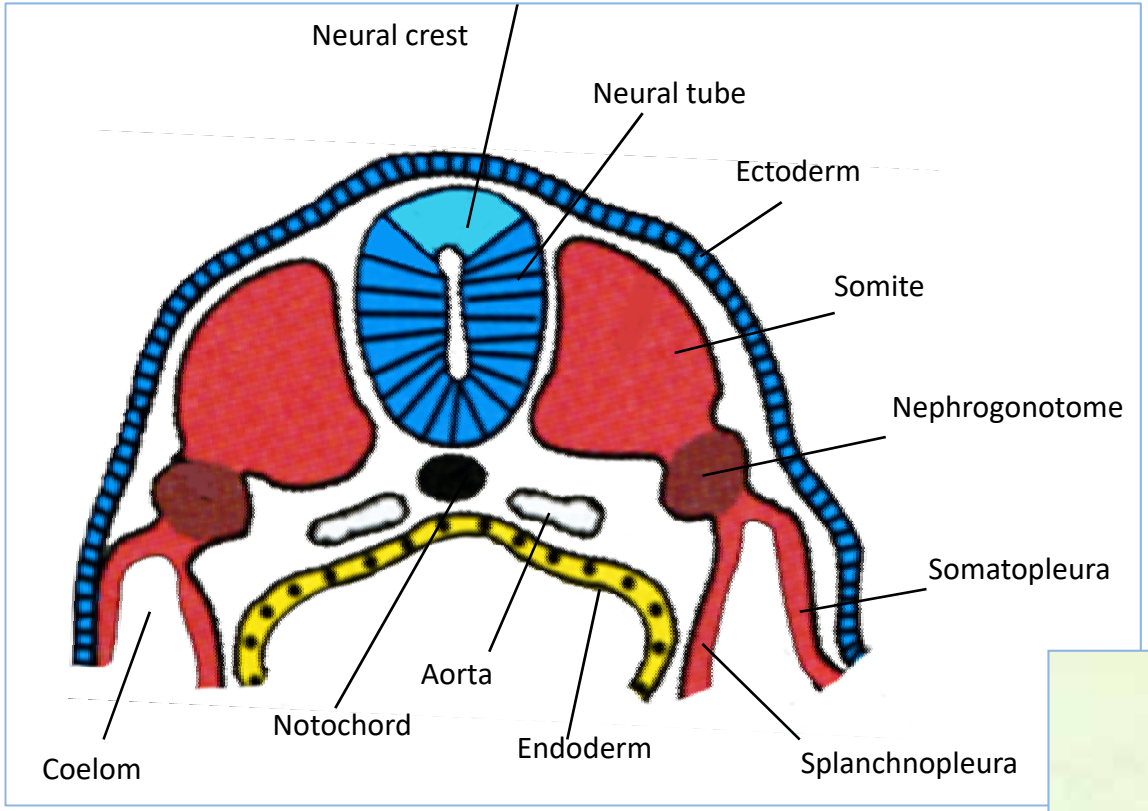


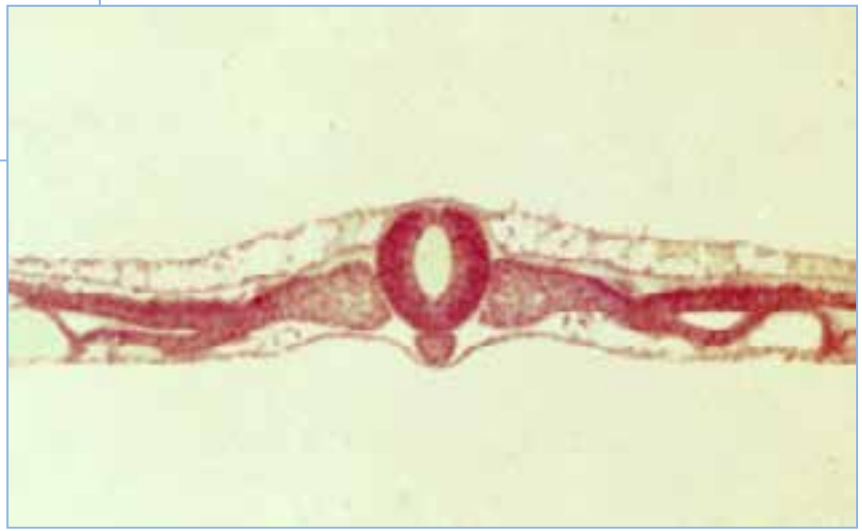




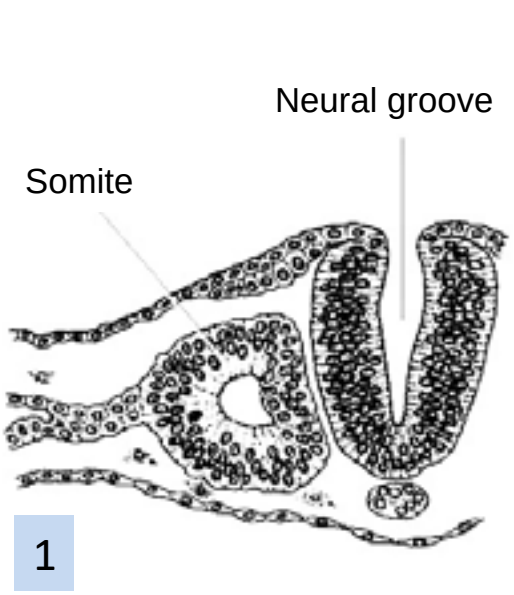


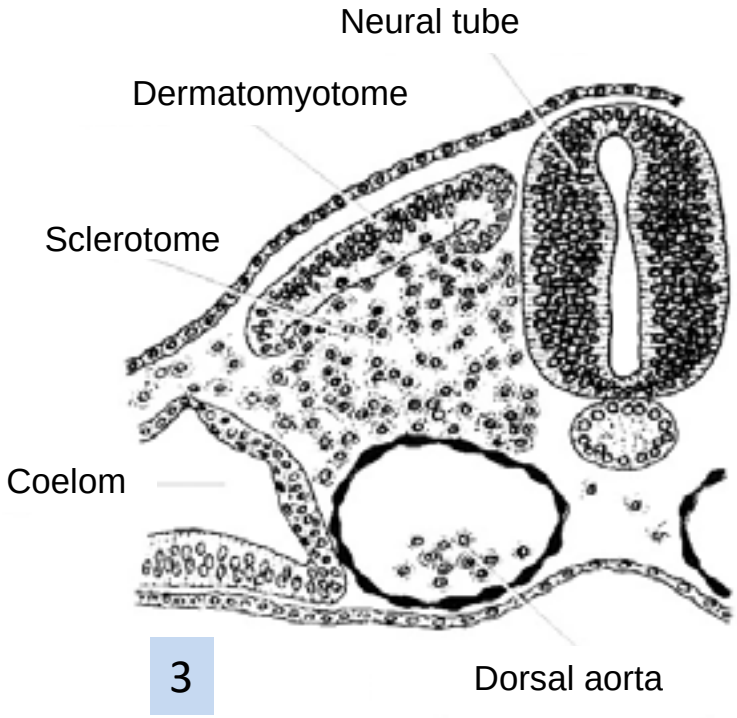
ORGANOGENESIS AND HISTOGENESIS

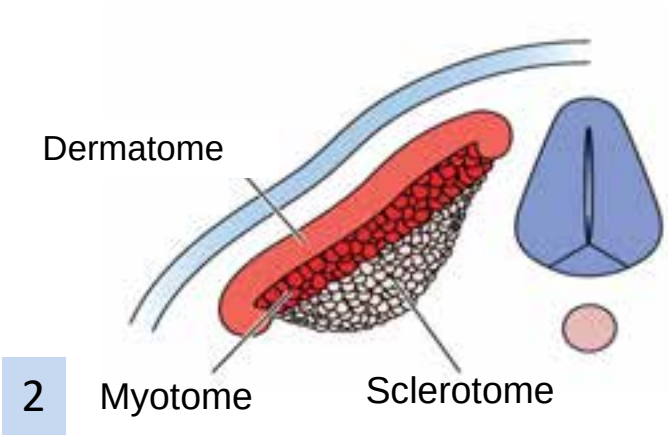


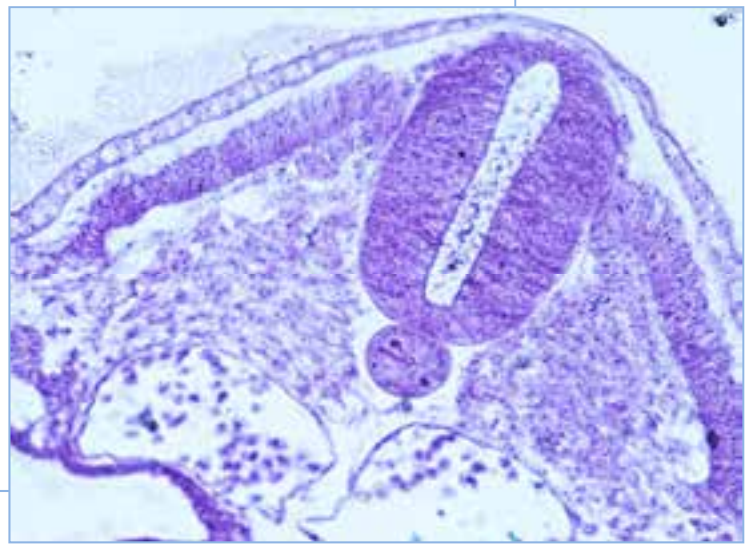


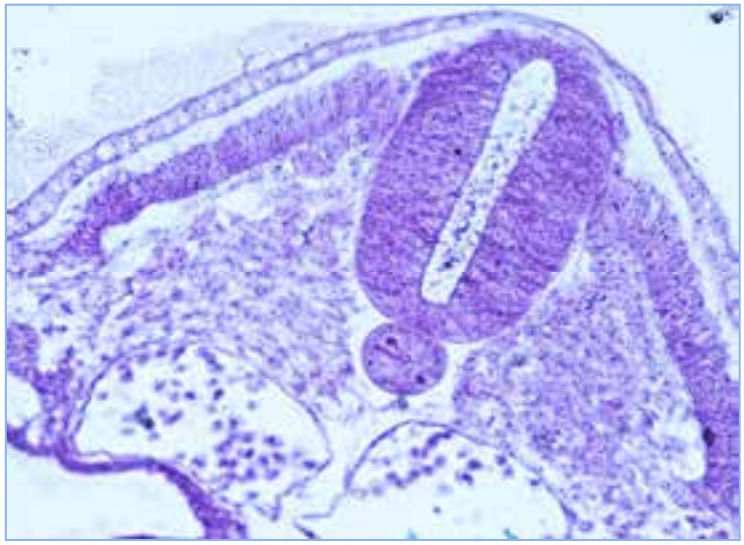
ORGANOGENESIS AND HISTOGENESIS



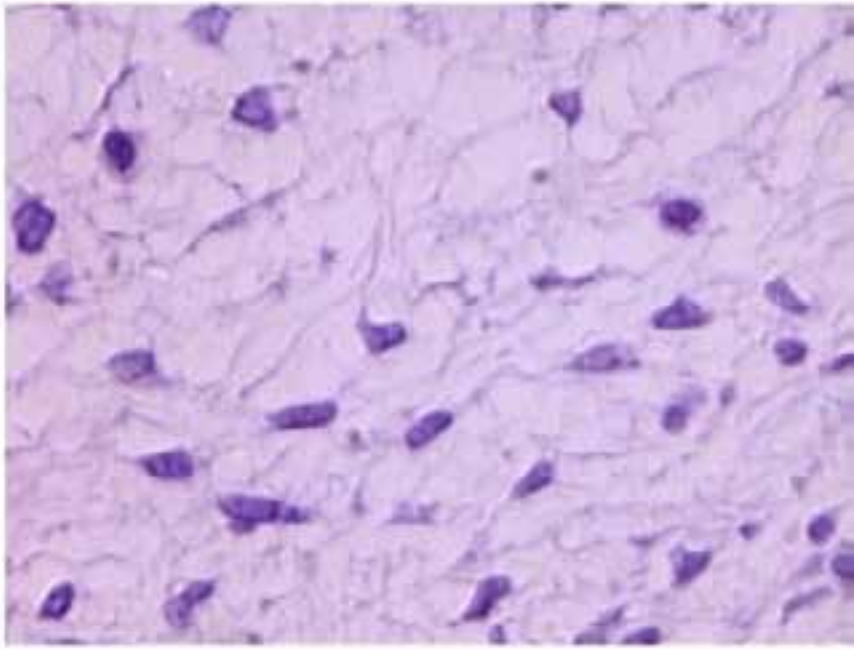




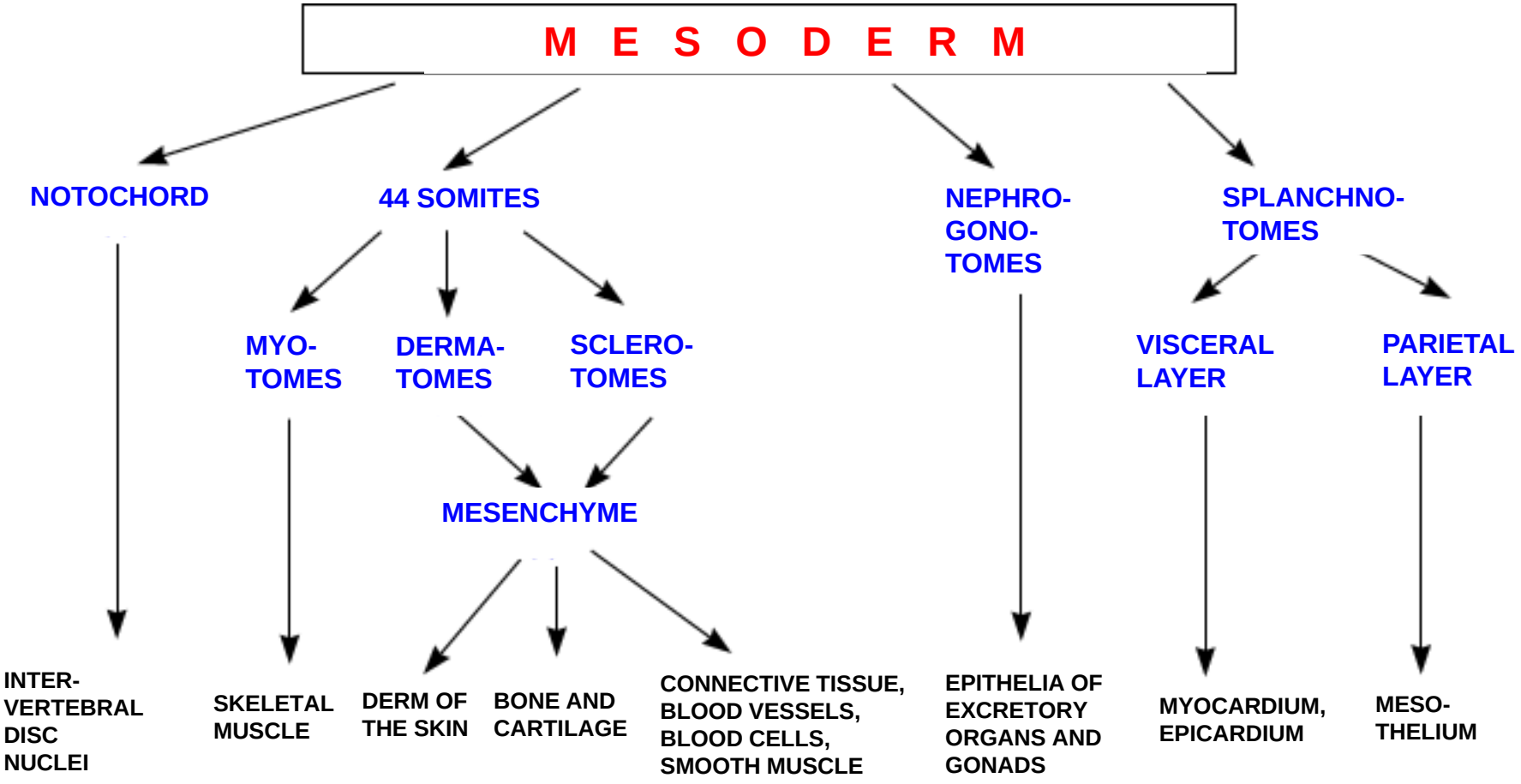




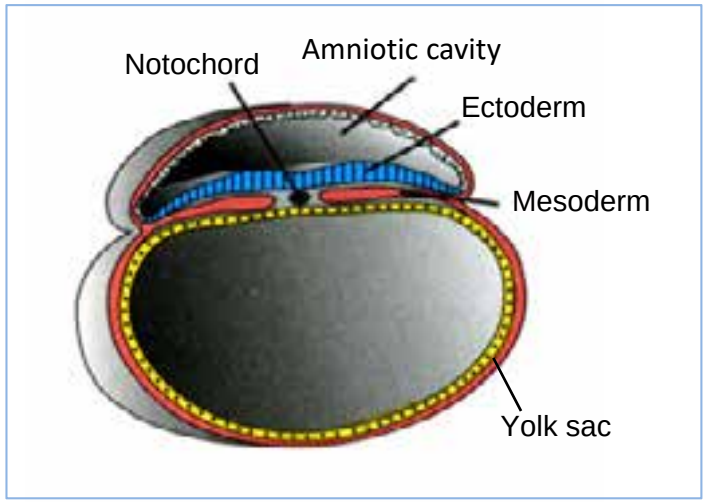
mesenchyme

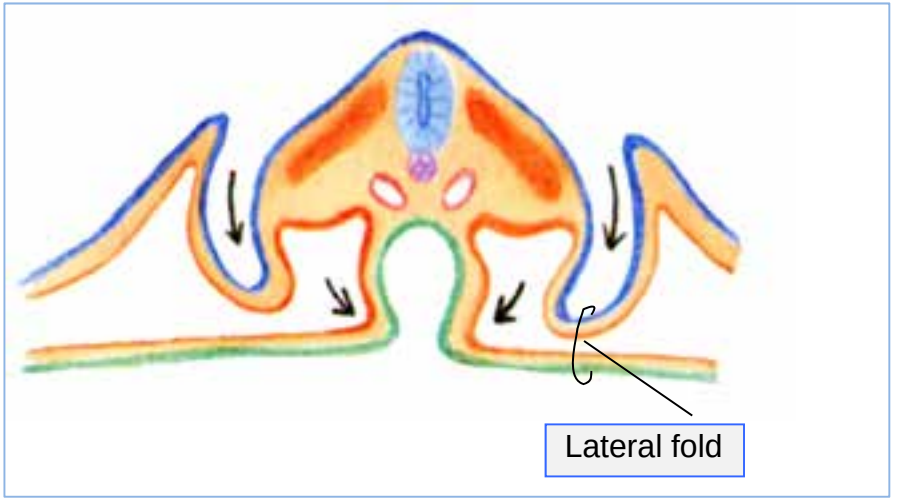


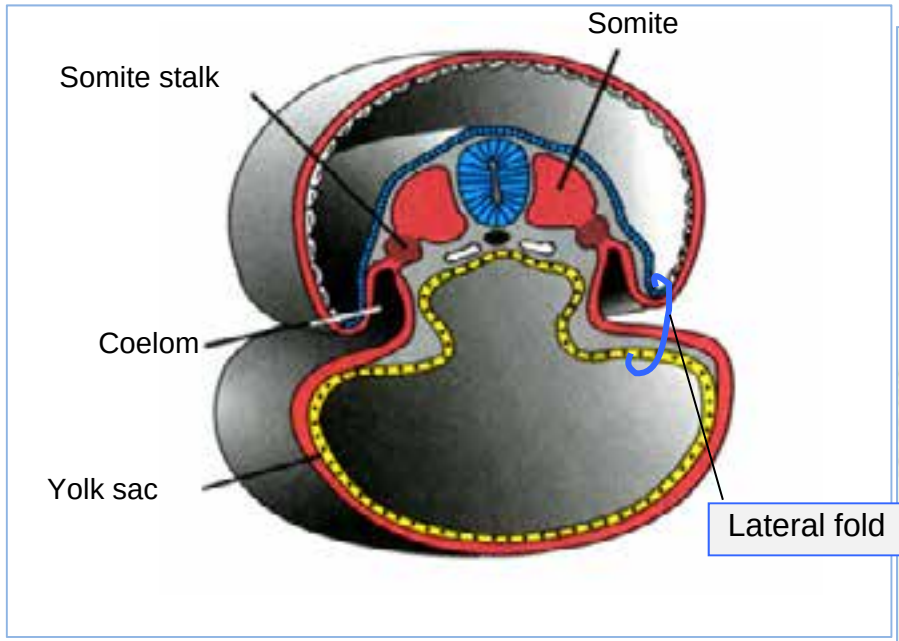
MESODERM DERIVATIVES

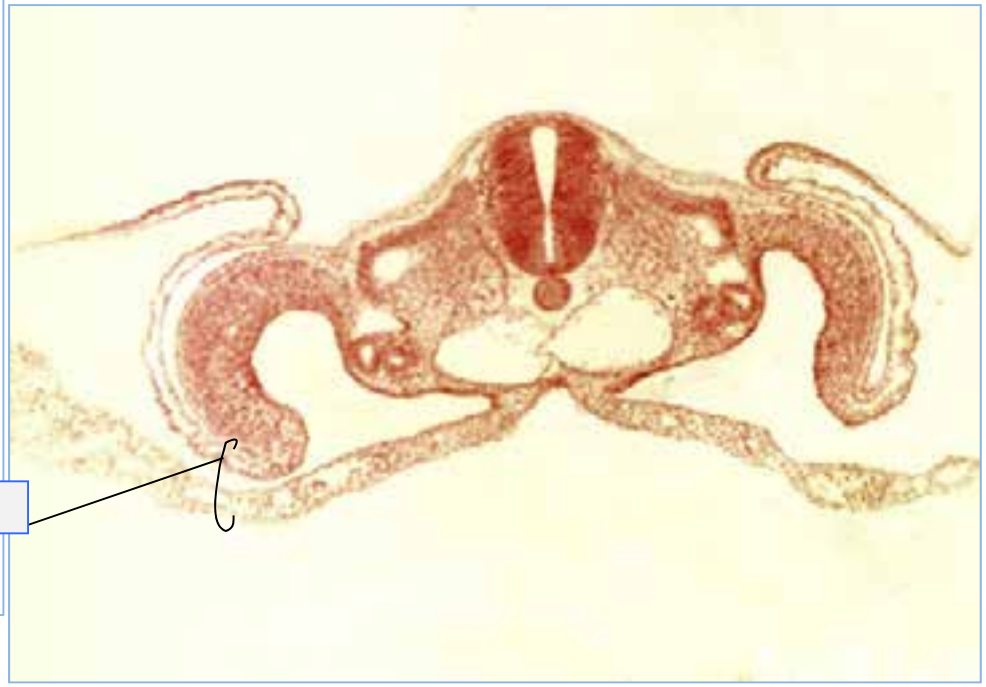


LATERAL FOLDS

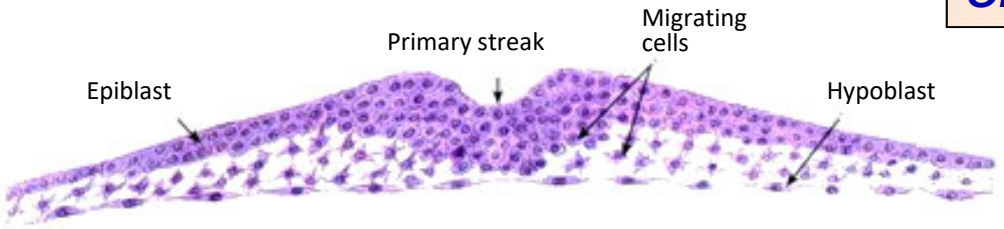


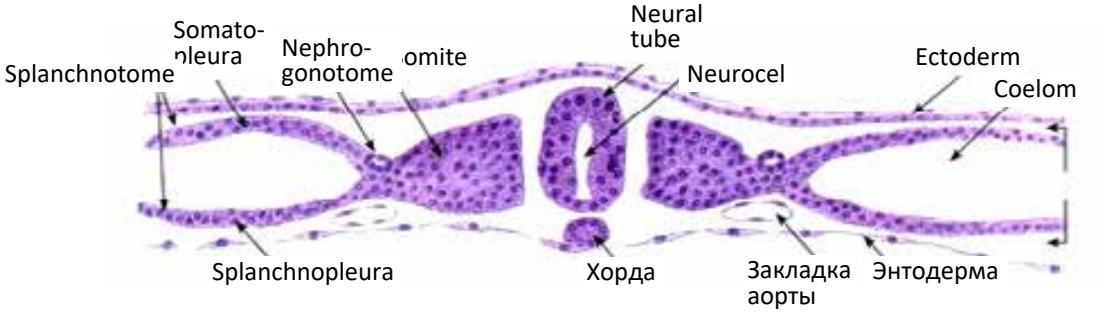


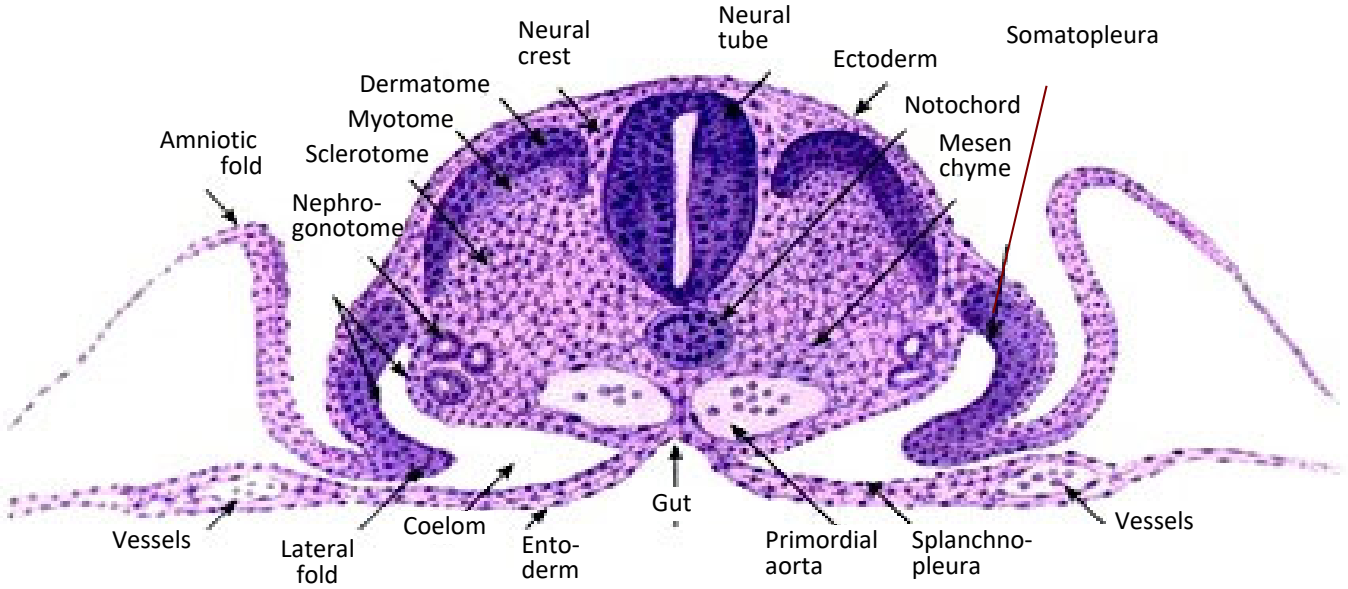




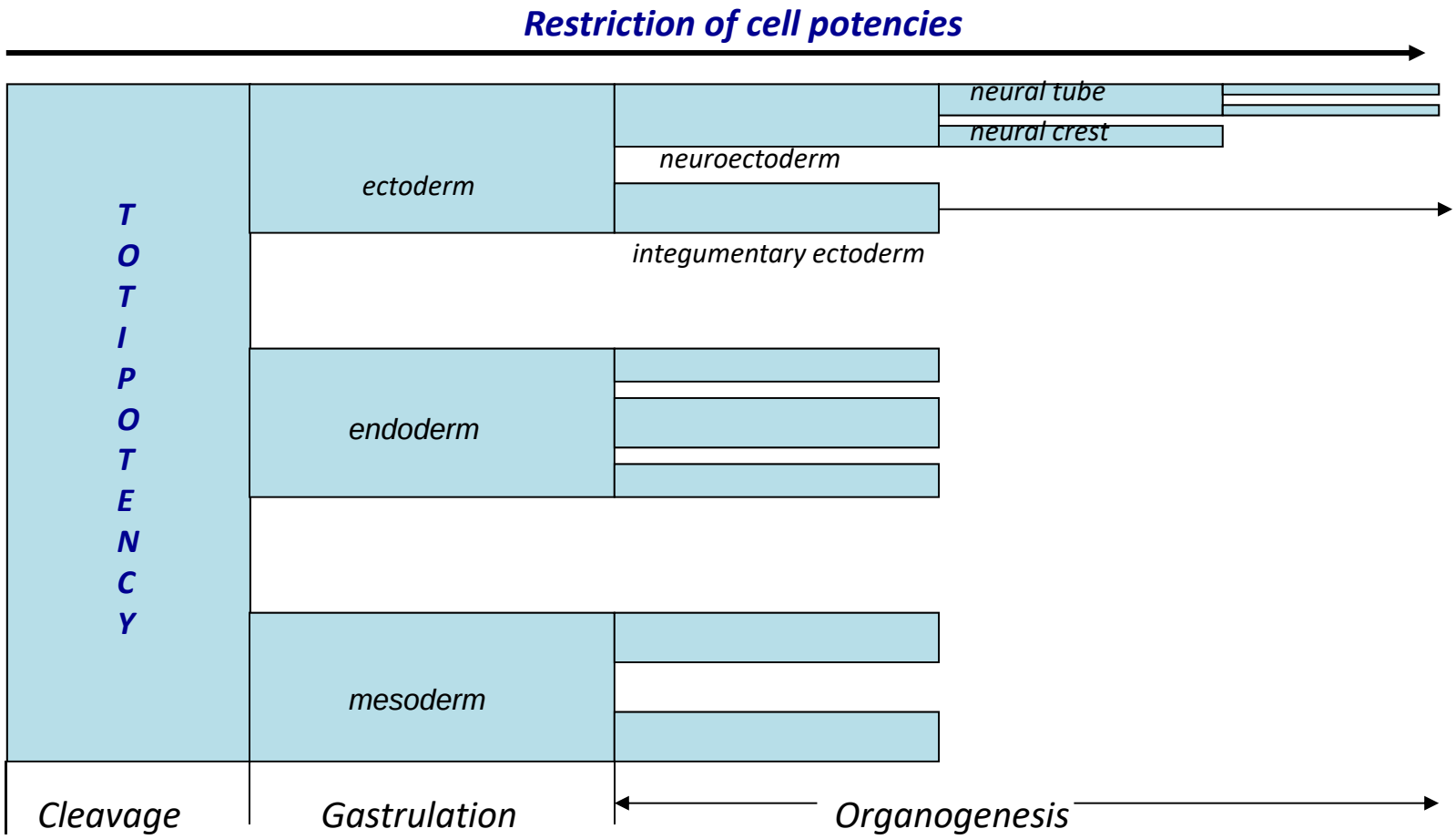
ORGANOGENESIS AND HISTOGENESIS







CELL FATE DETERMINATION. DIFFERENTIATION



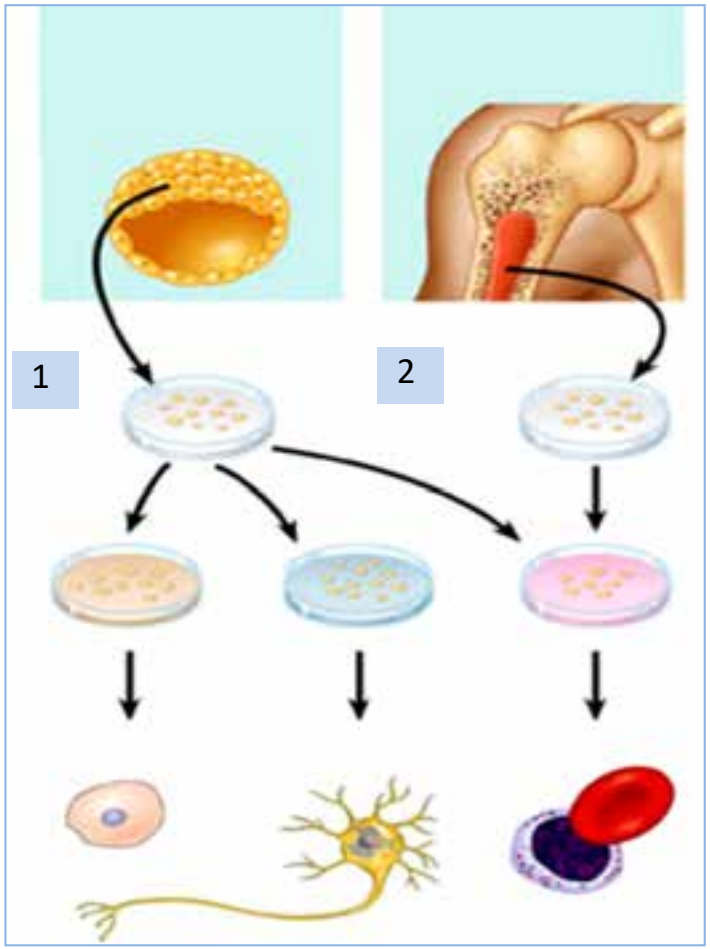
- ***Cell potencies are specified by embryonic layer (pluripotency)***
- ***Labile determination***
- ***Transdetermination is possible***

- ***Unipotency***
- ***Stable determination***

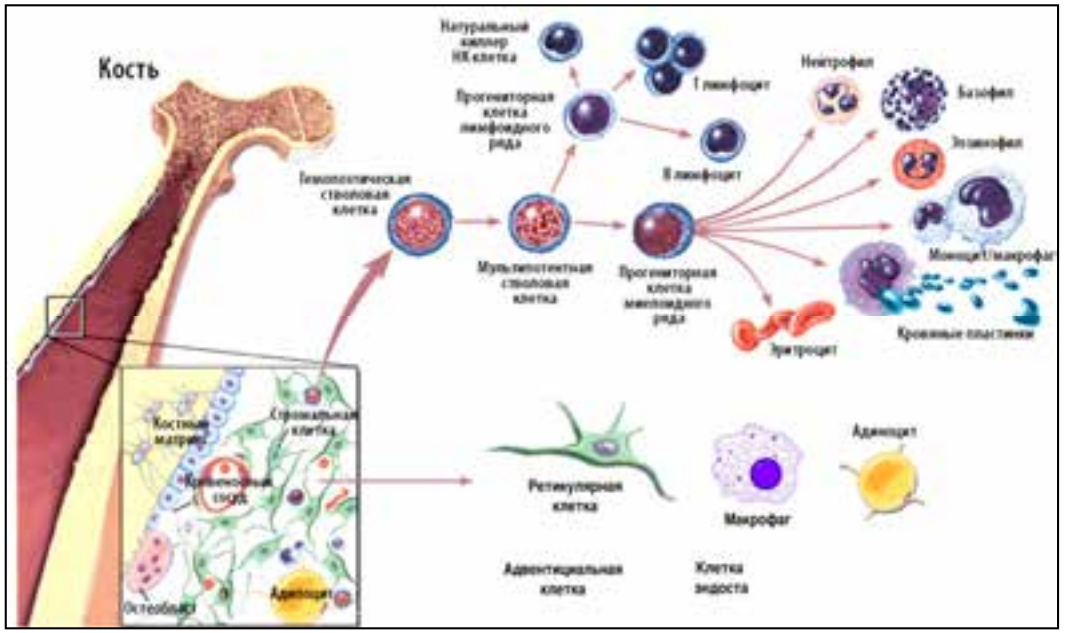
- ***Canalization of development →***

STEM CELLS

- *1- embryonic*
- *2- regional/resident*

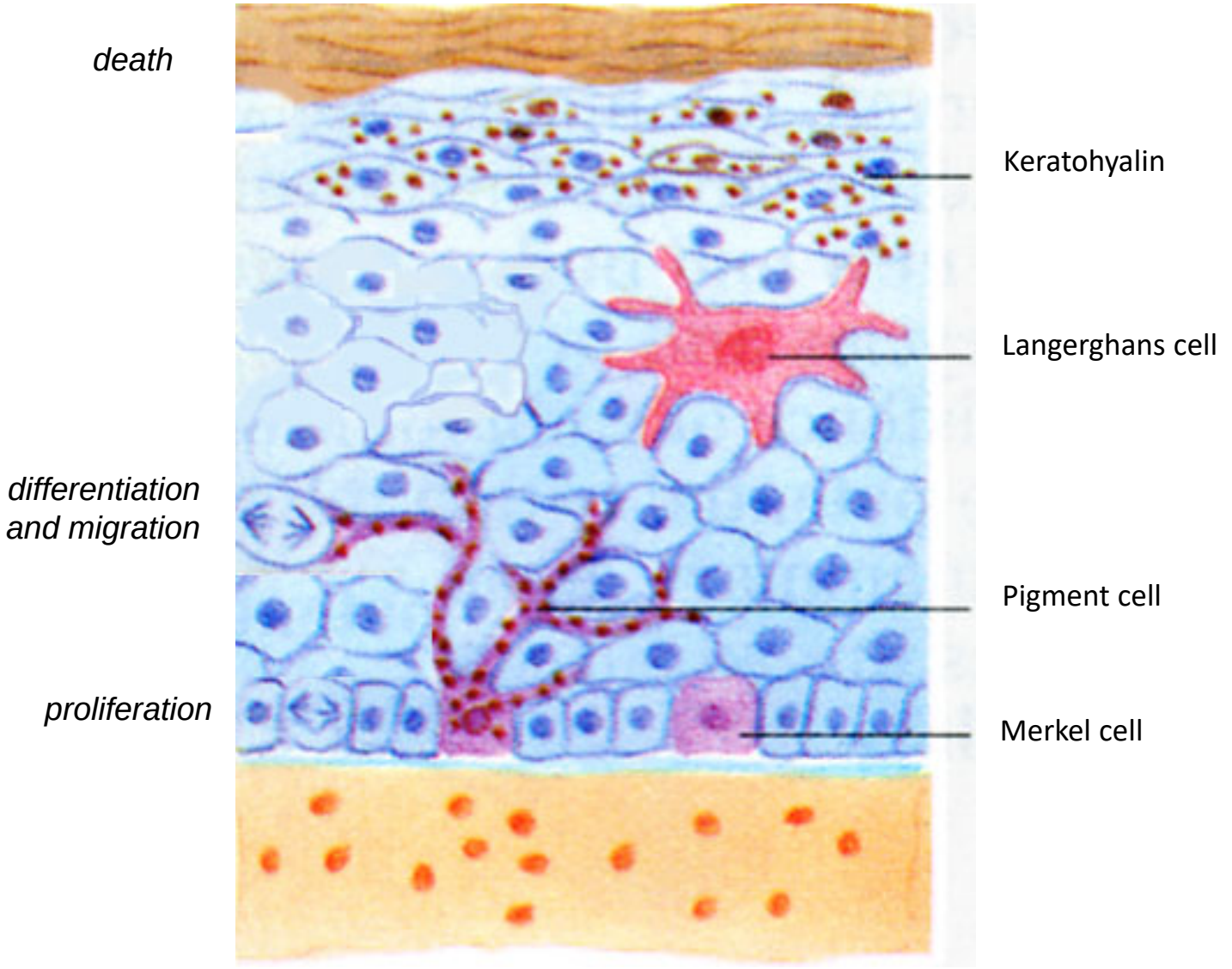


regional resident

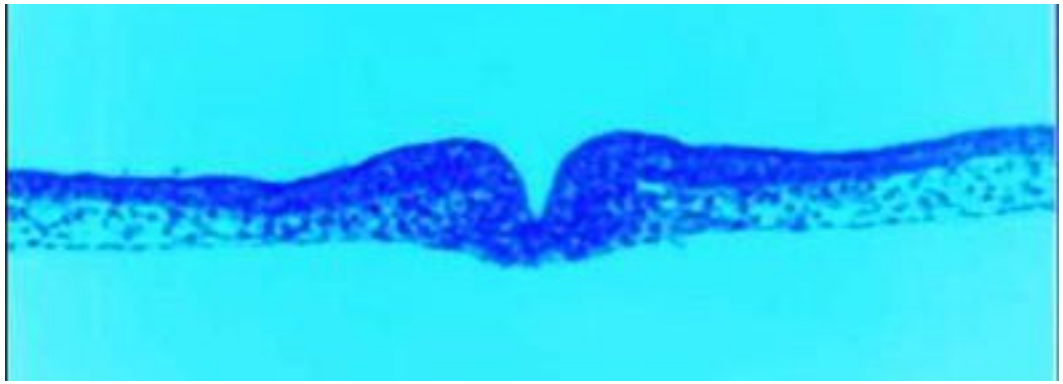


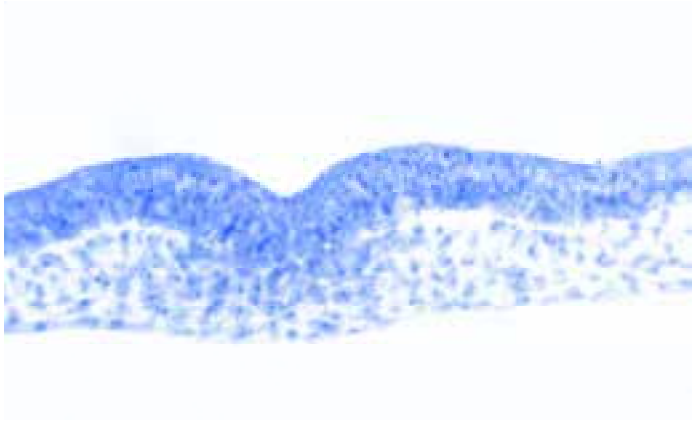
CELL DIFFERON (histogenetic series)

Differons of the epidermis

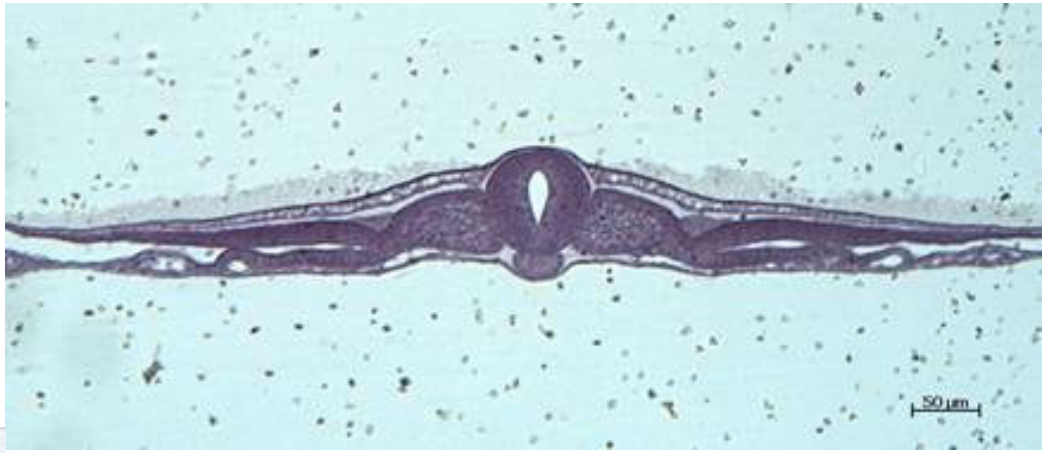


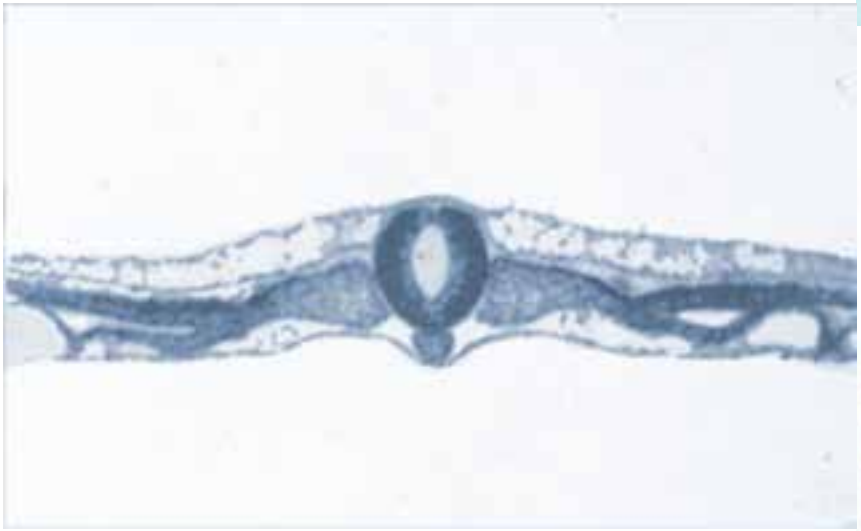
Slide № 37 «Primitive streak in a chick embryo (cross-section)»
Stain: hematoxylin-eosin

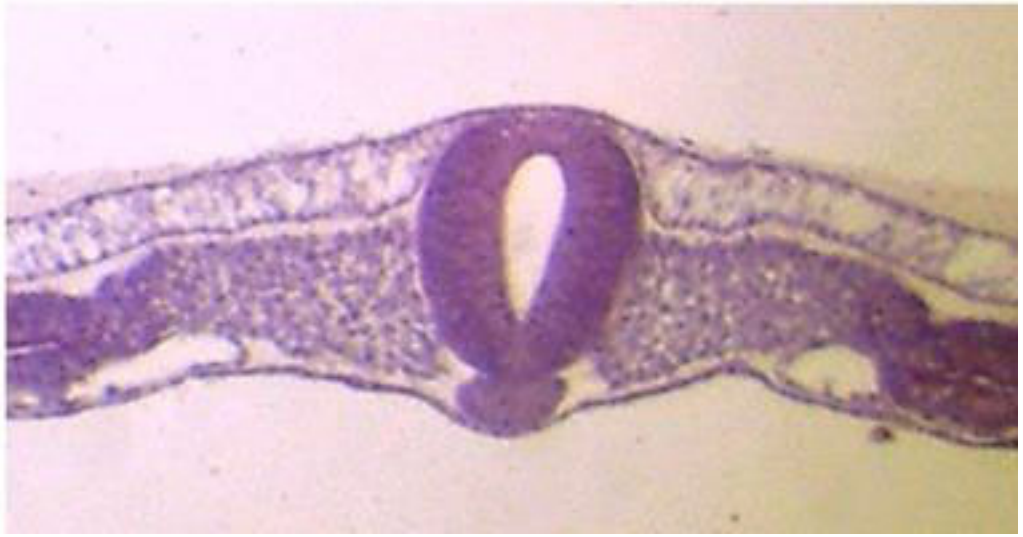




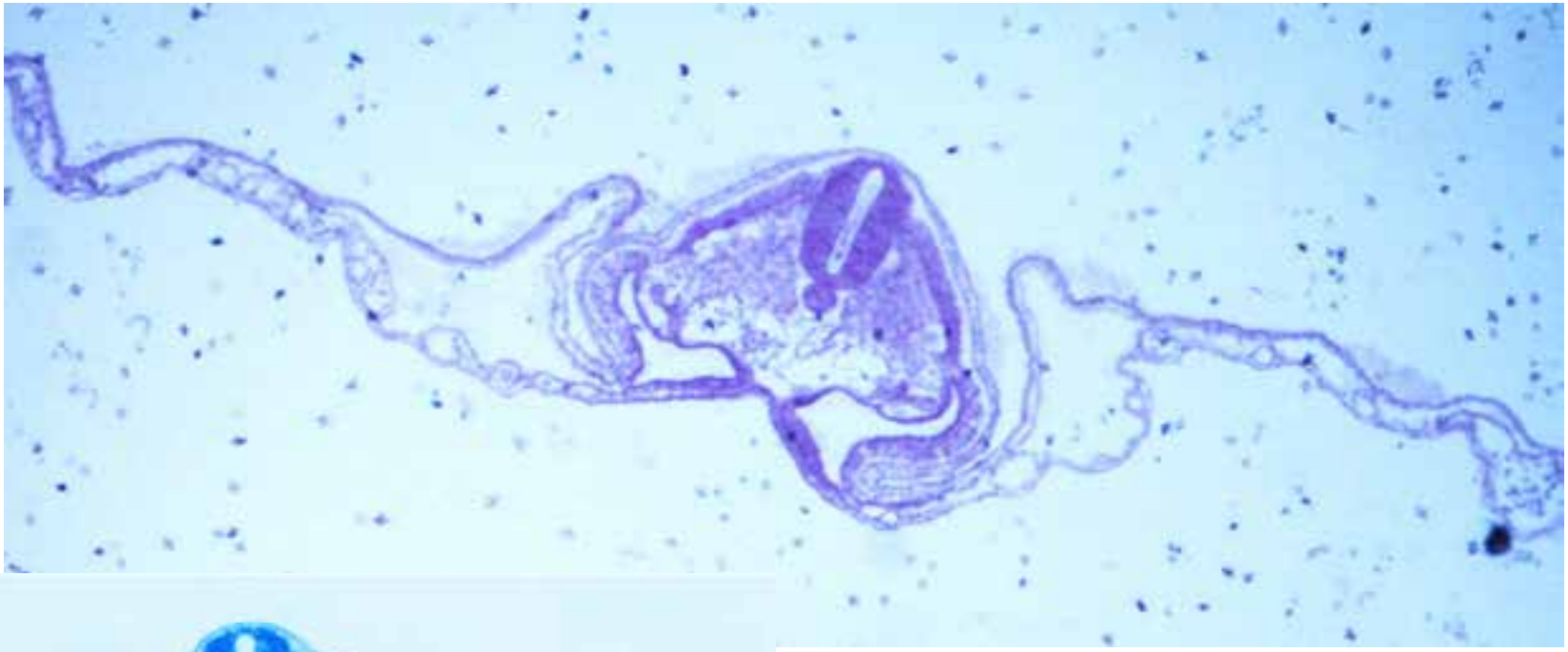
Slide № 38 «Somites, notochord, and neural tube (cross-section of a chick embryo on stage of initial germ layer differentiation and axial organ formation)»
Stain: hematoxylin-eosin



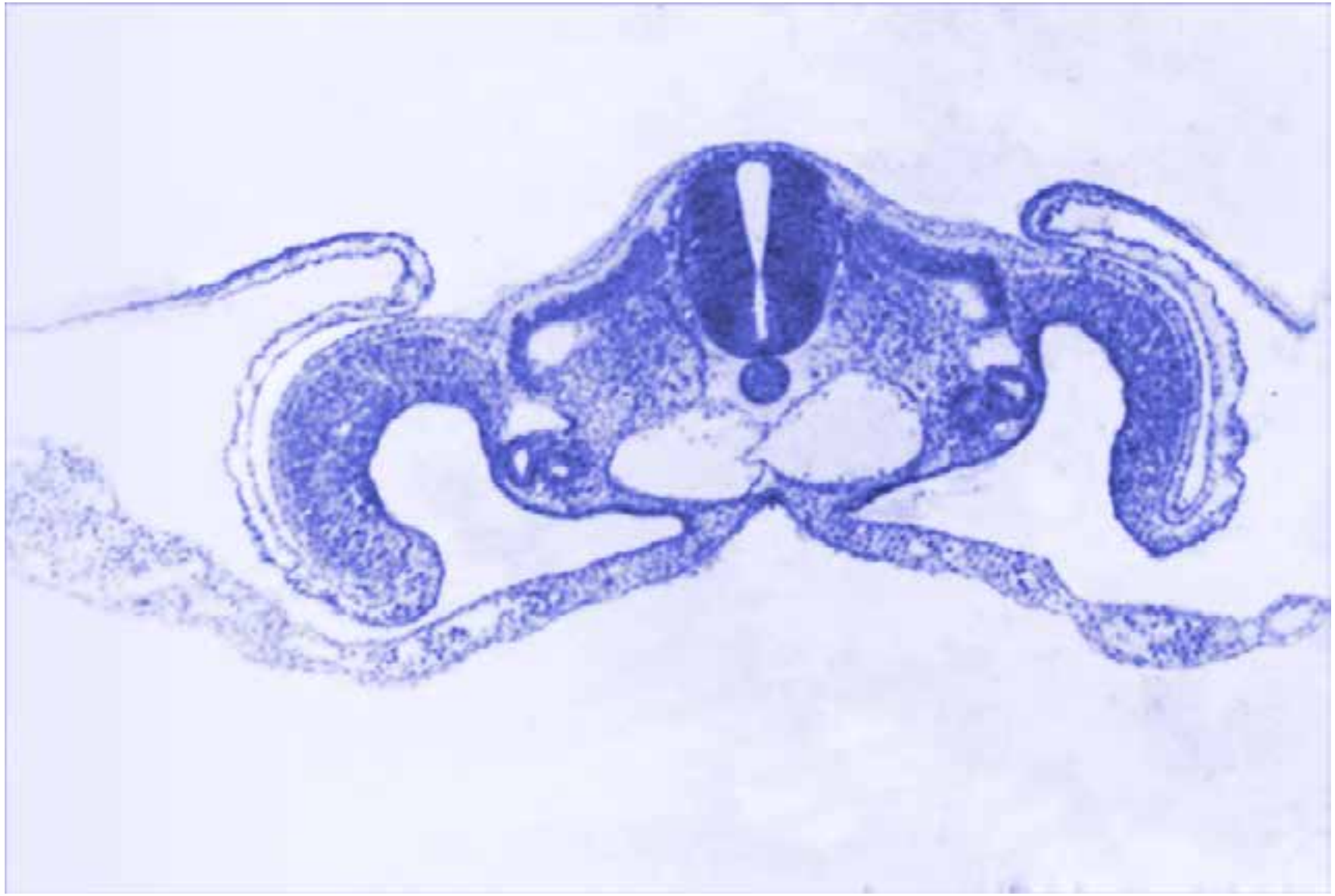




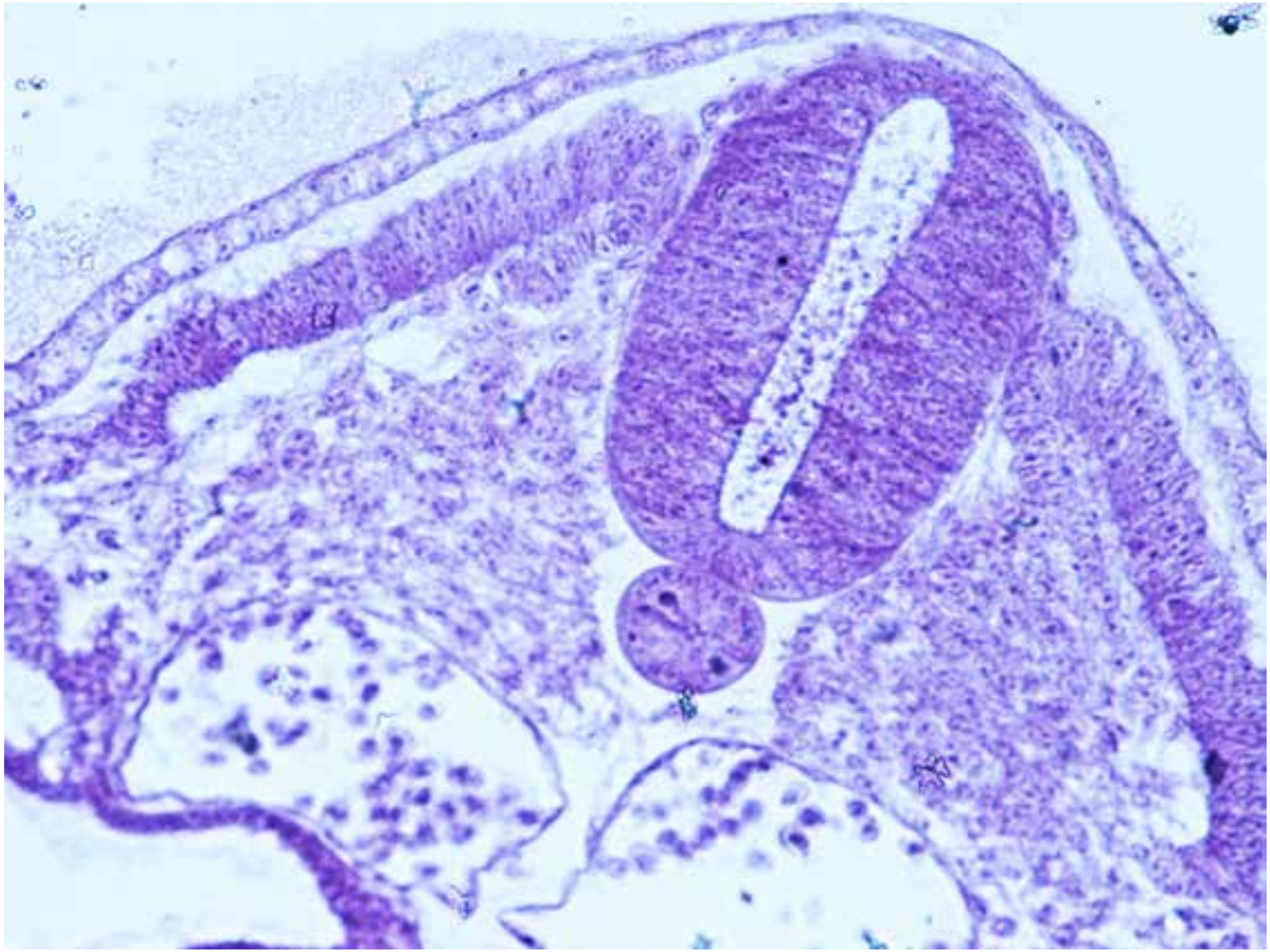
Slide № 39 «Lateral and amniotic folds in chick embryo»
Stain: hematoxylin-eosin



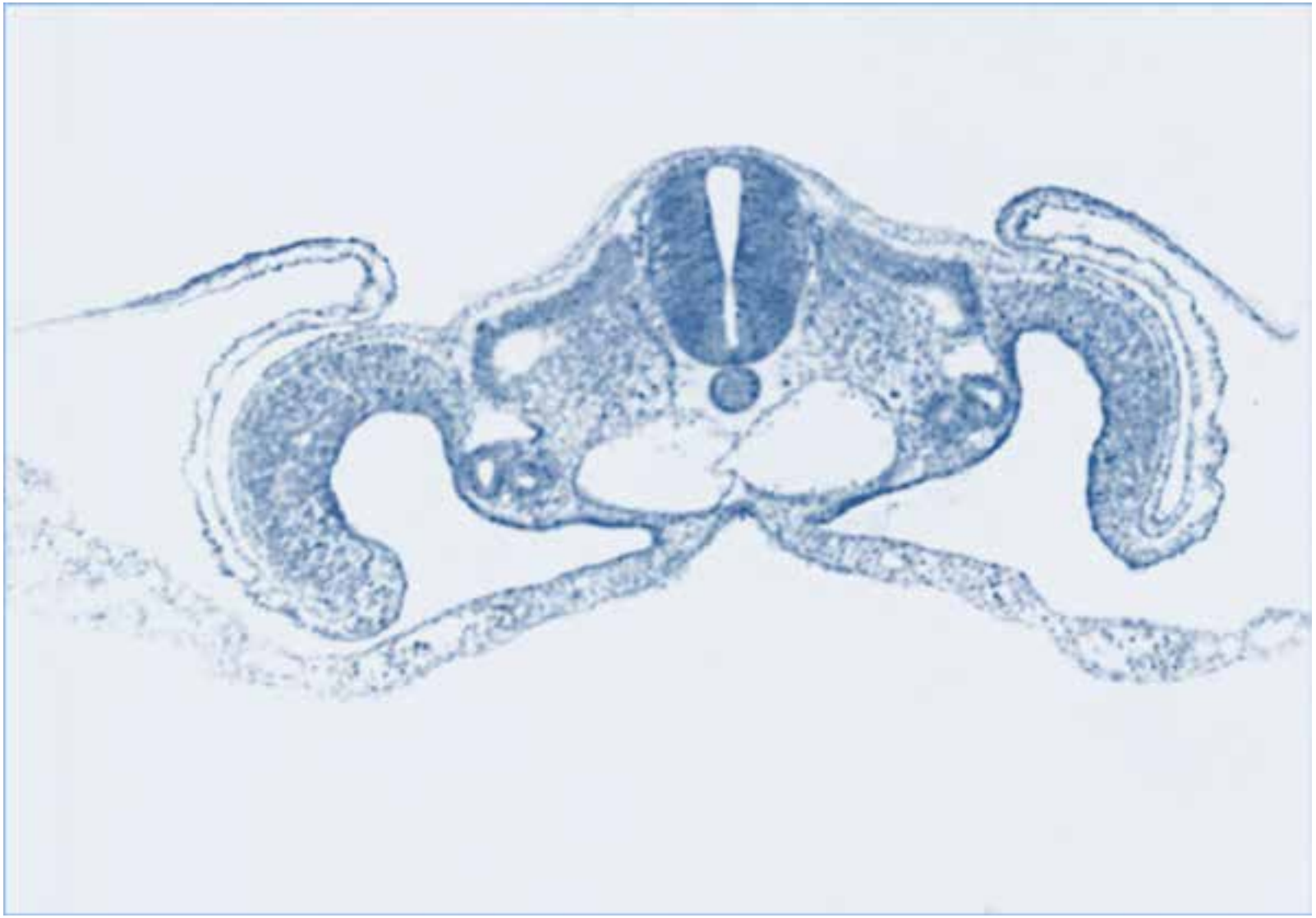
Slide № 39 «Lateral and amniotic folds in chick embryo»
Stain: hematoxylin-eosin

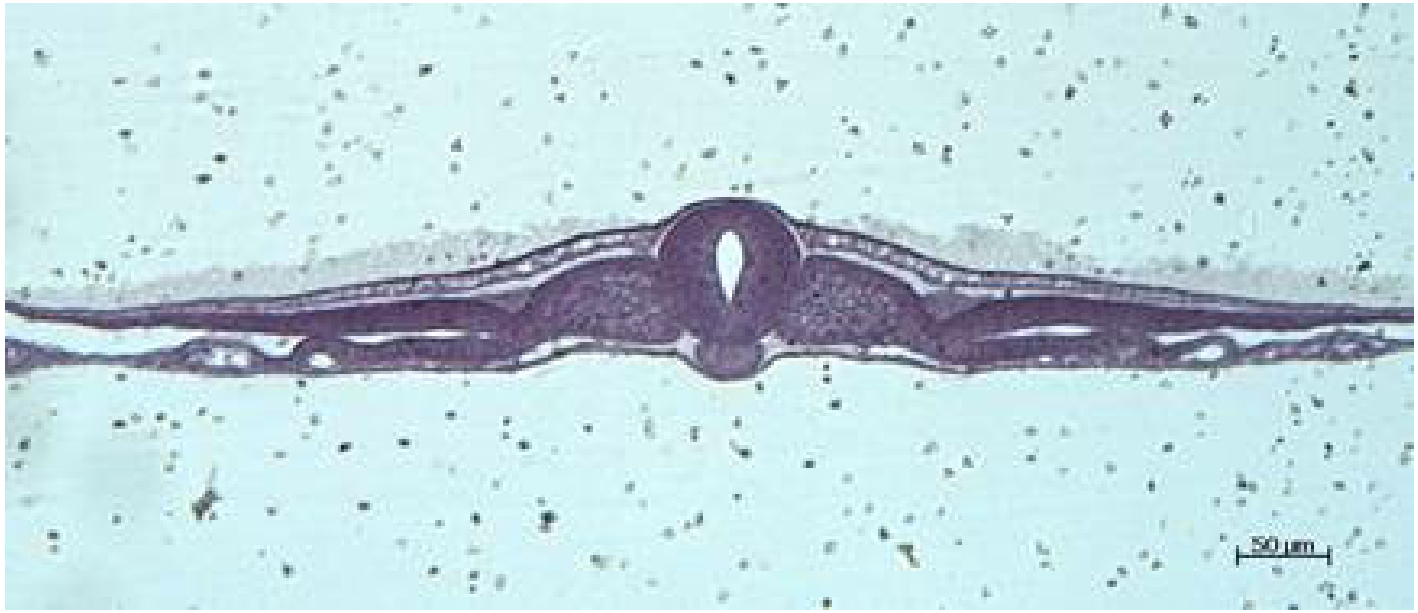


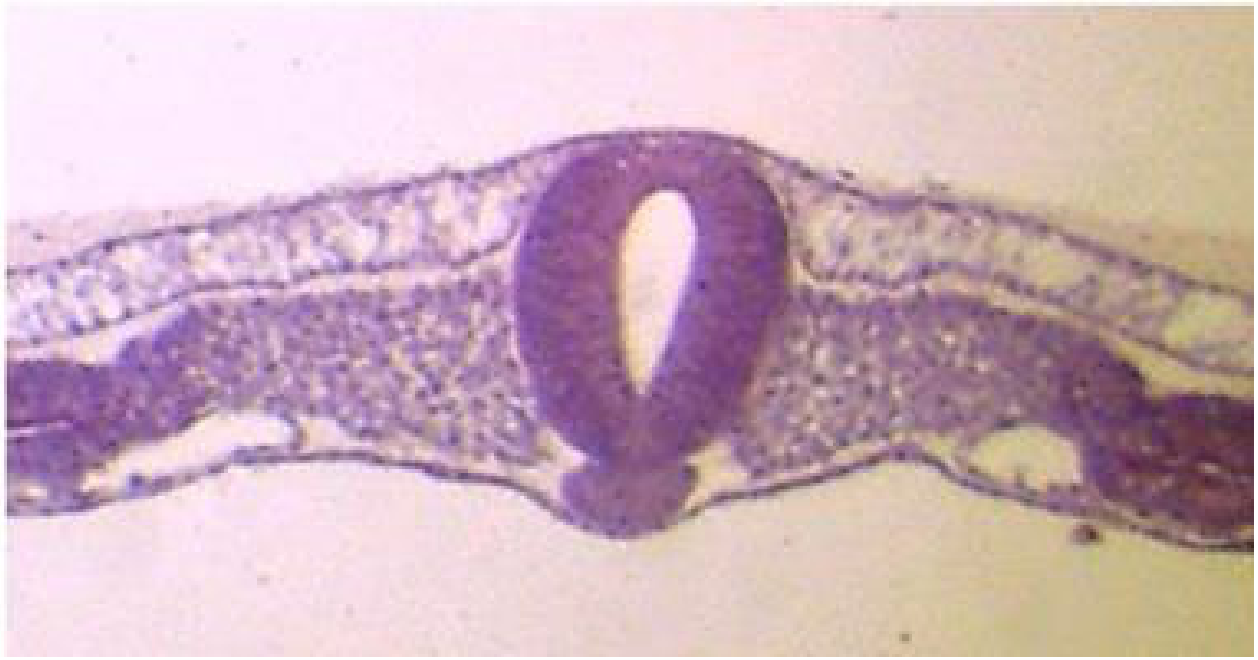
Slide № 39 «Lateral and amniotic folds in chick embryo»
Stain: hematoxylin-eosin

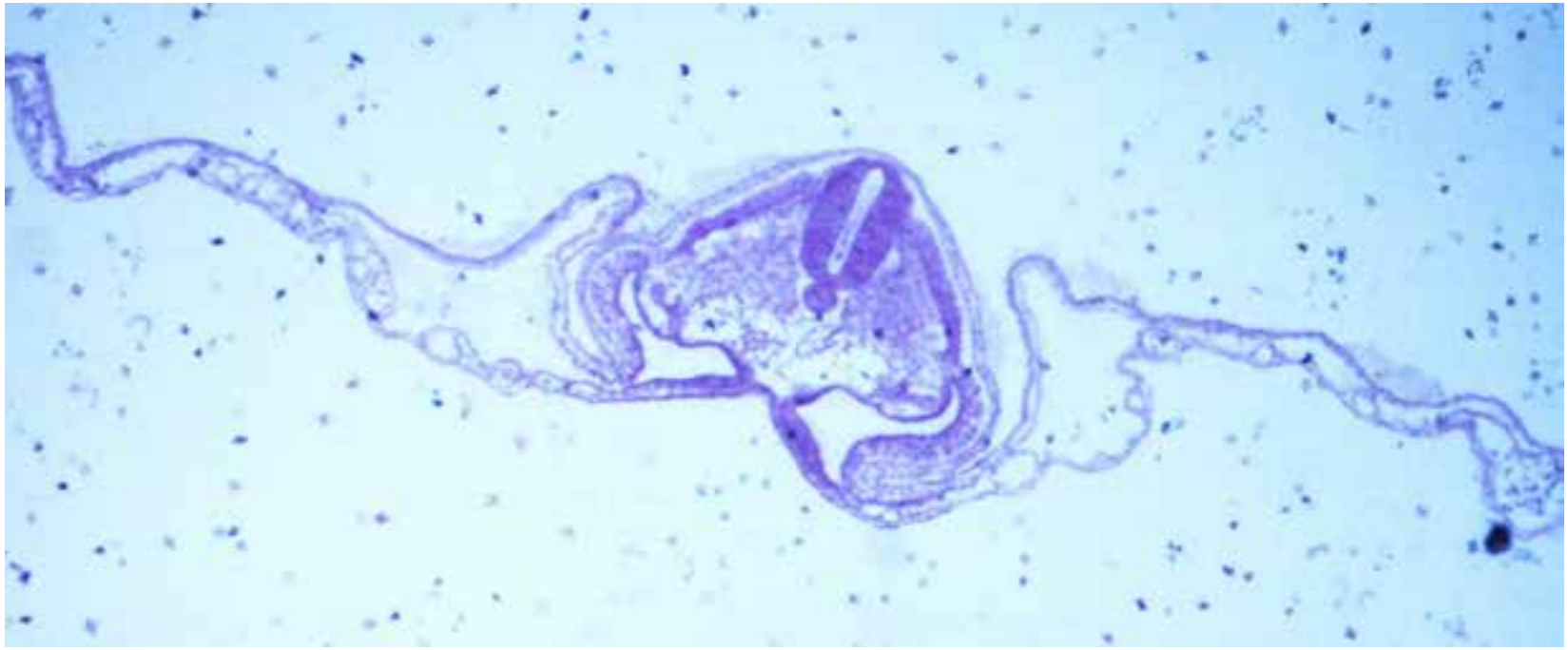


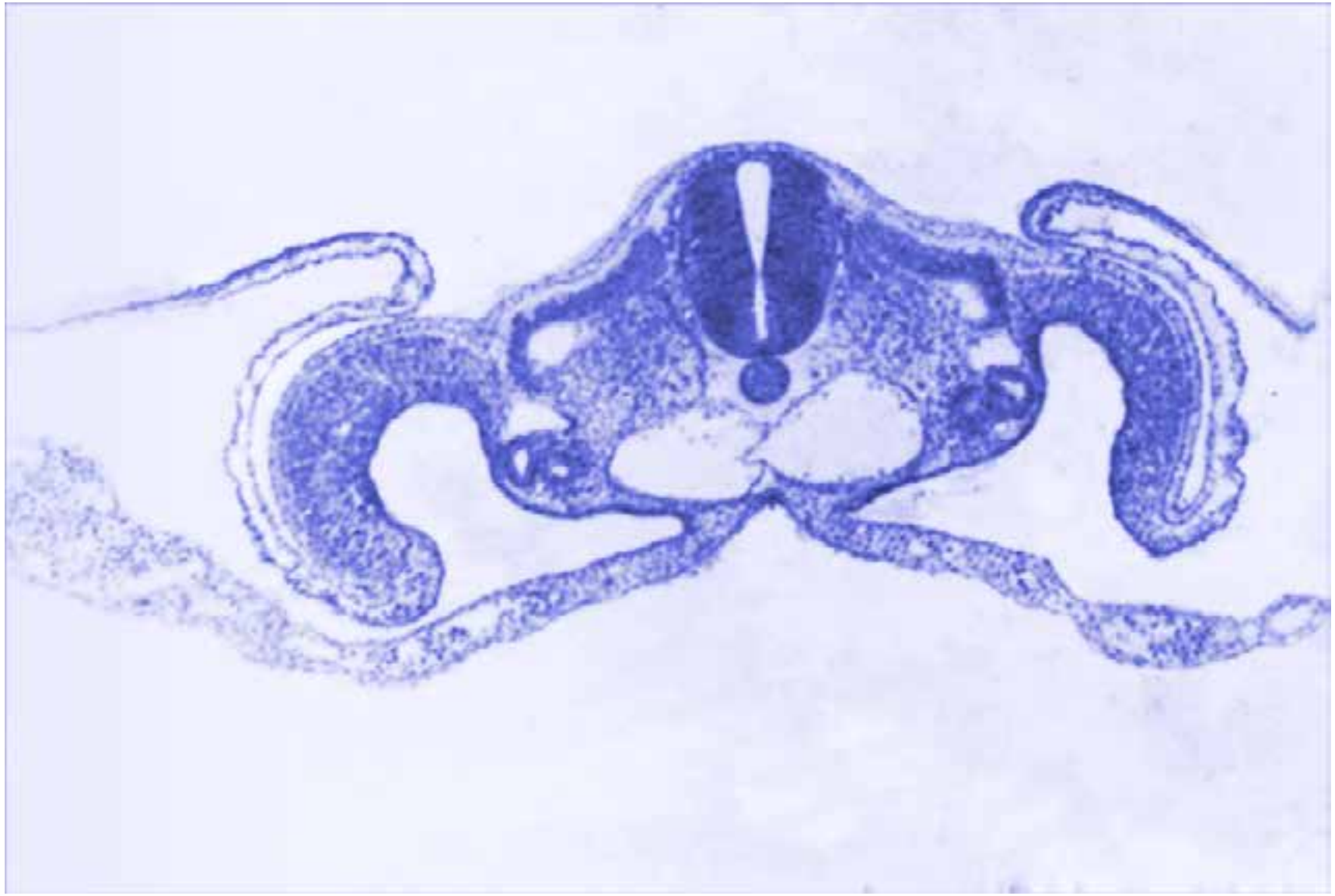
CONTROL QUESTIONS

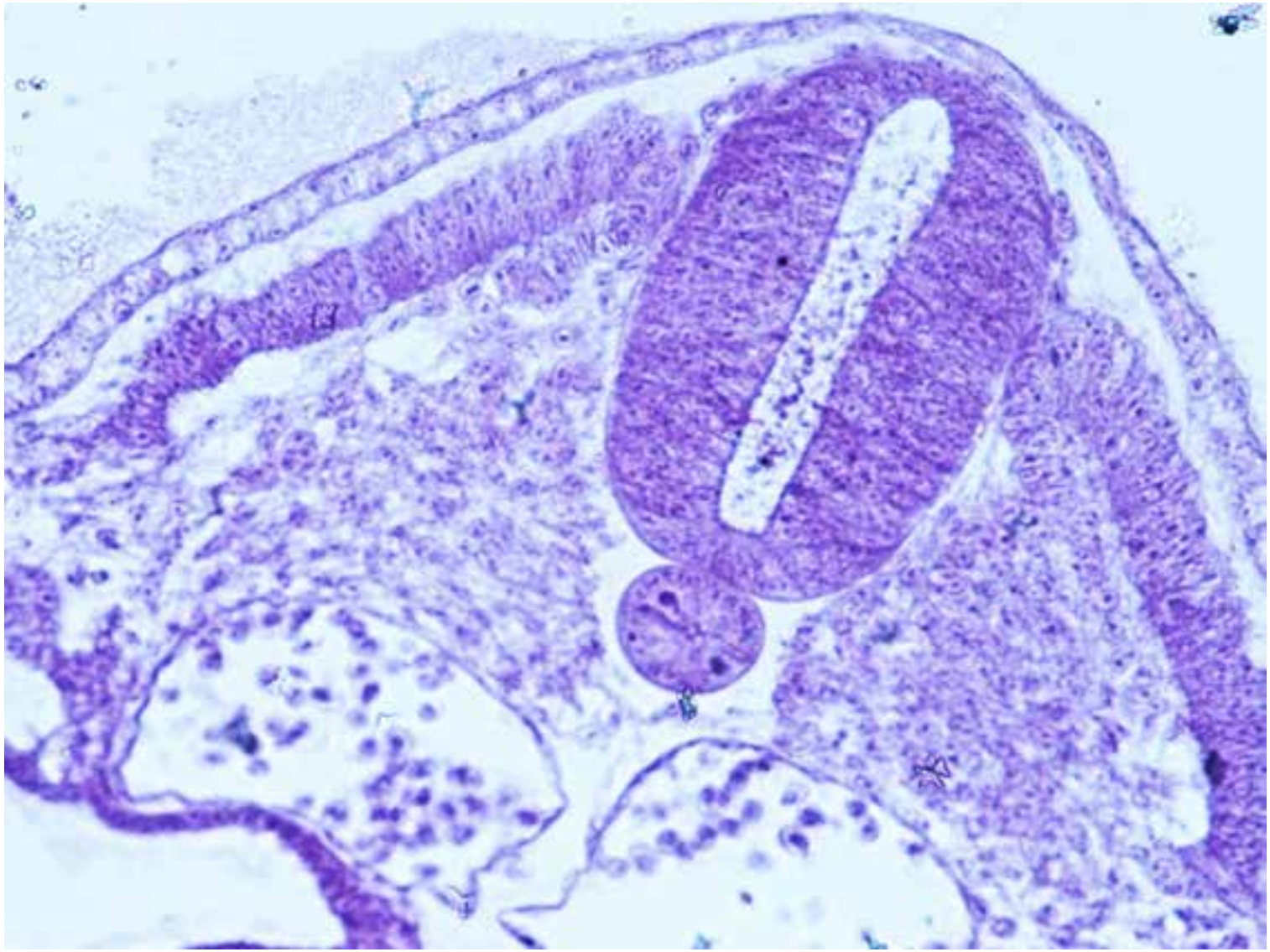


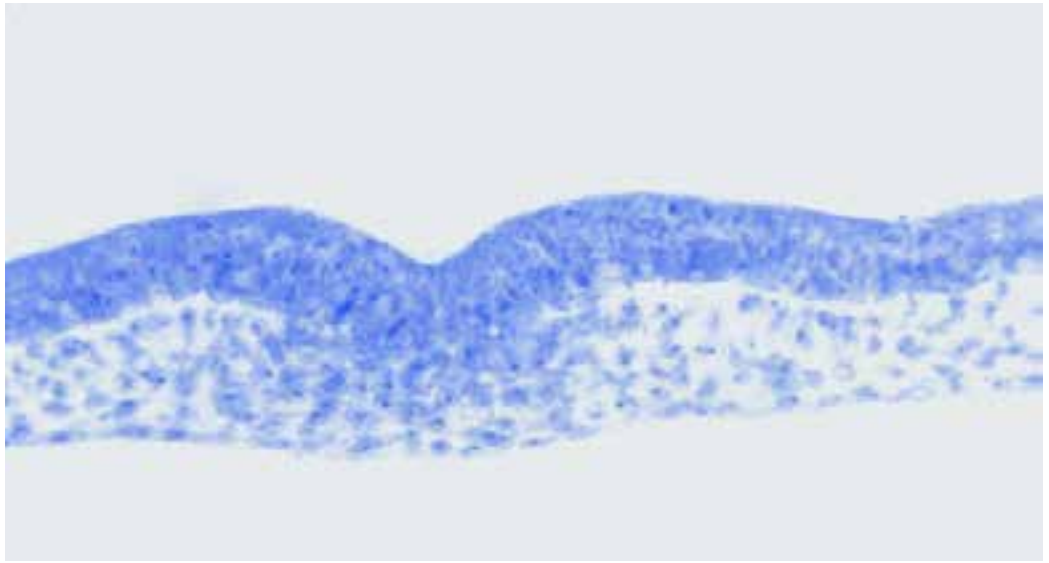

50 µm

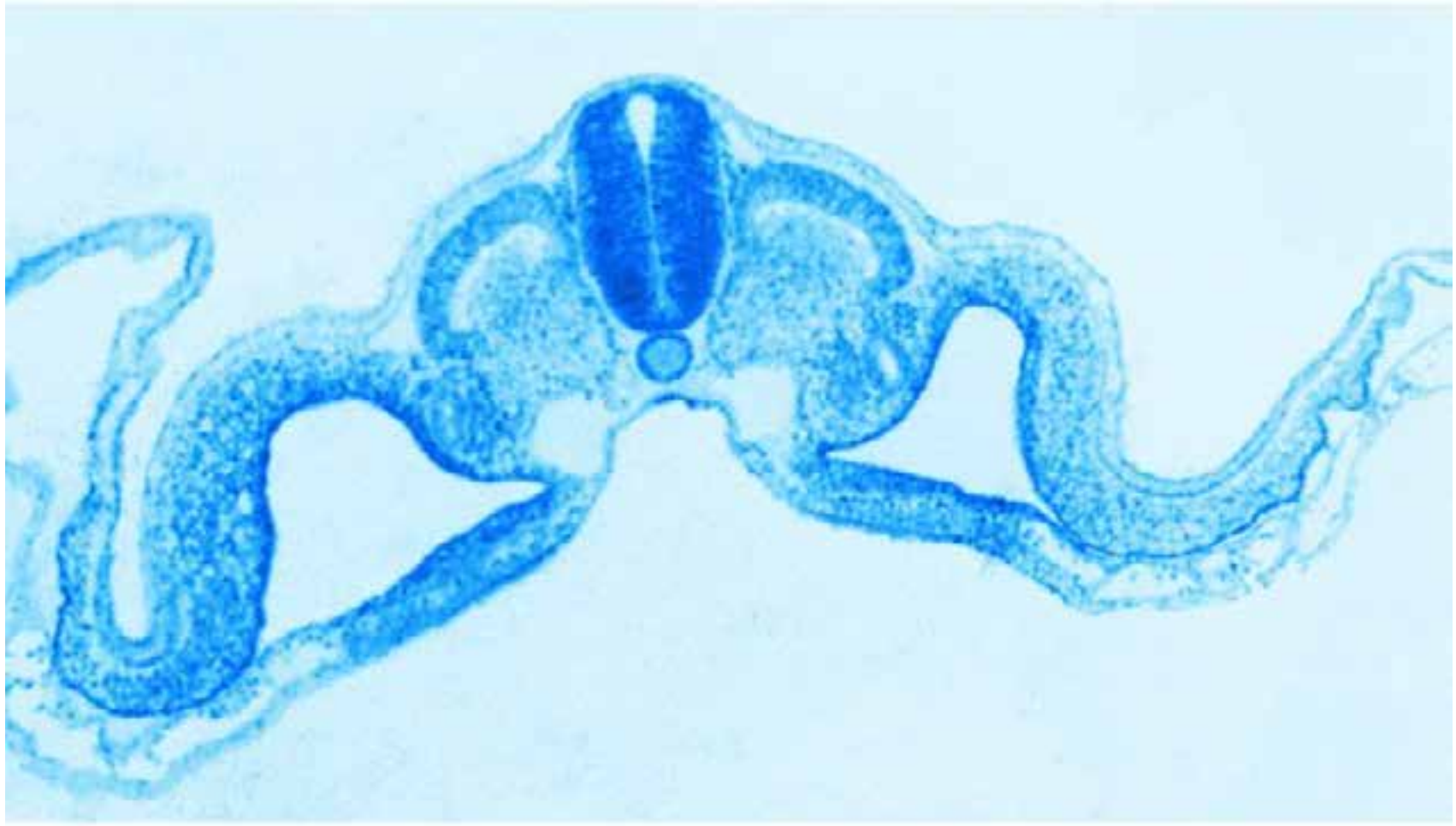


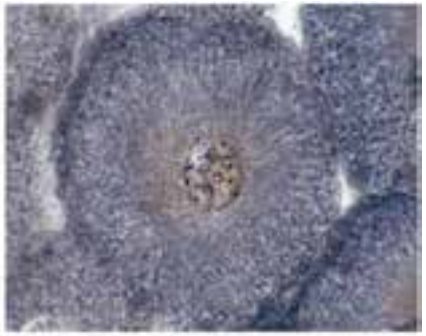


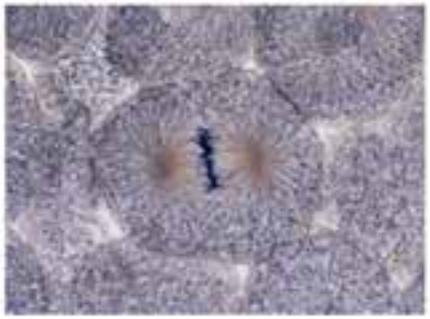


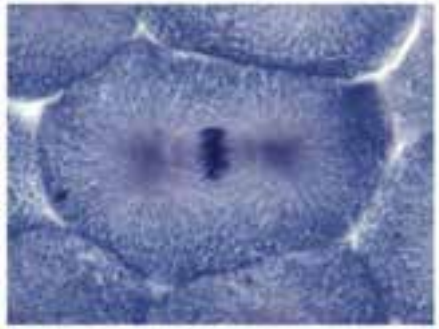


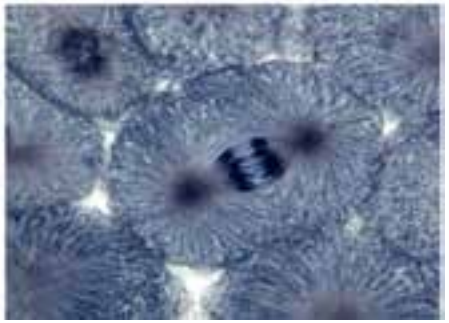


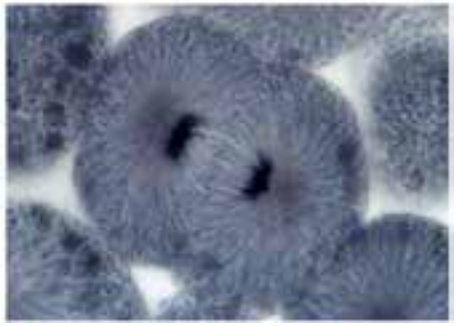


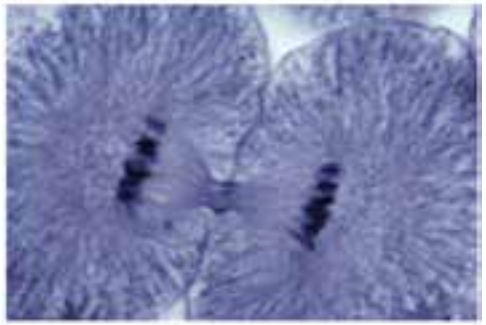


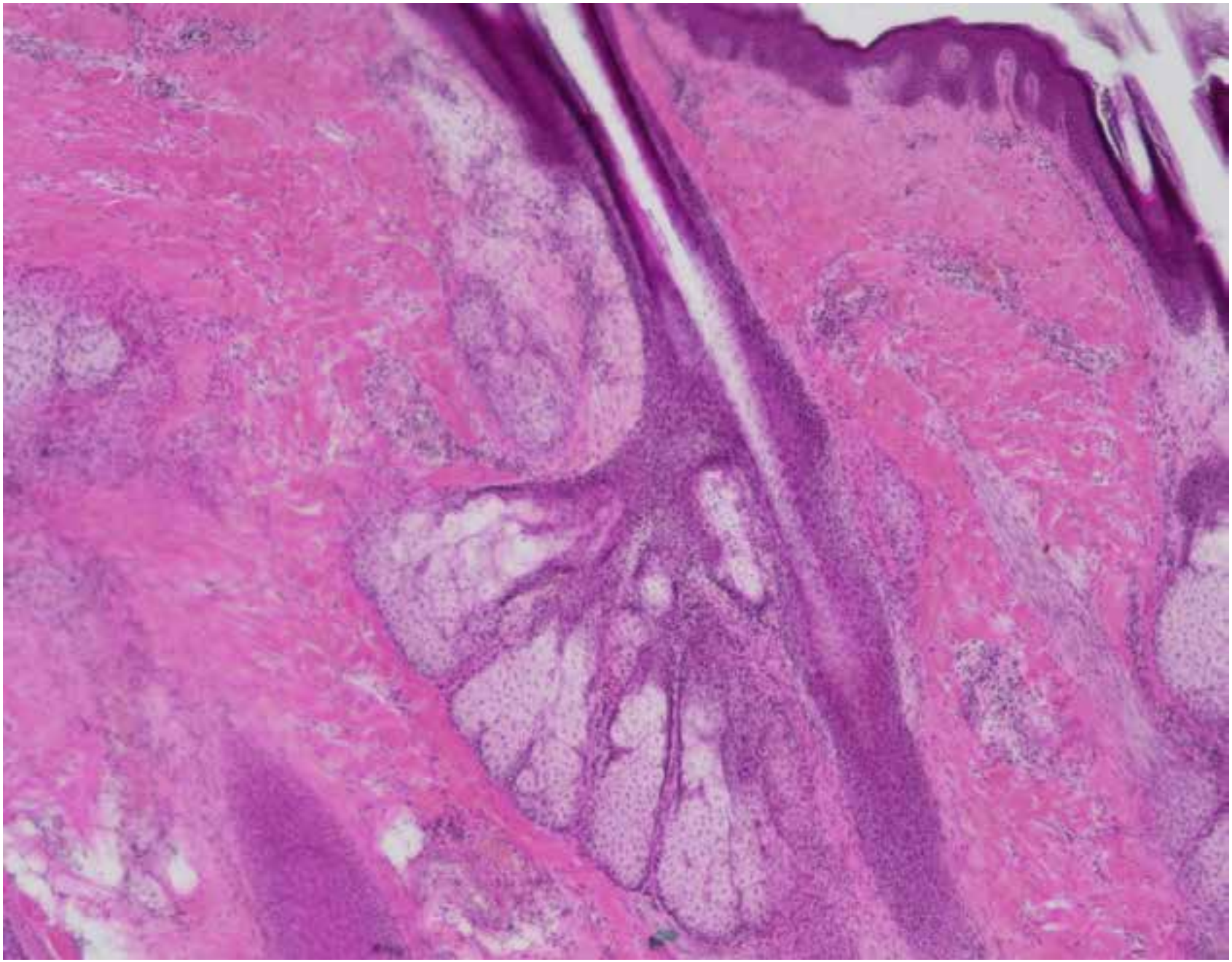


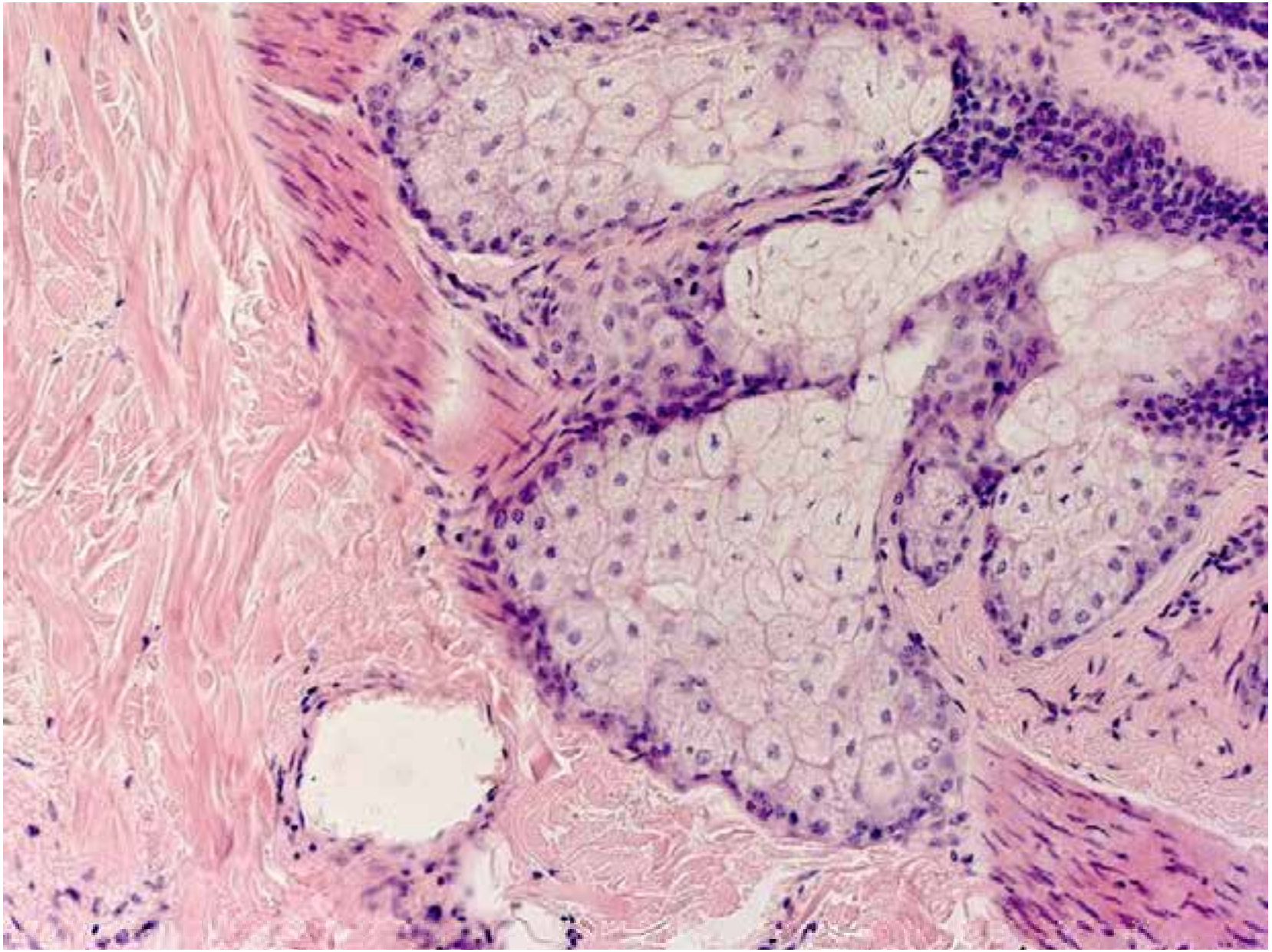


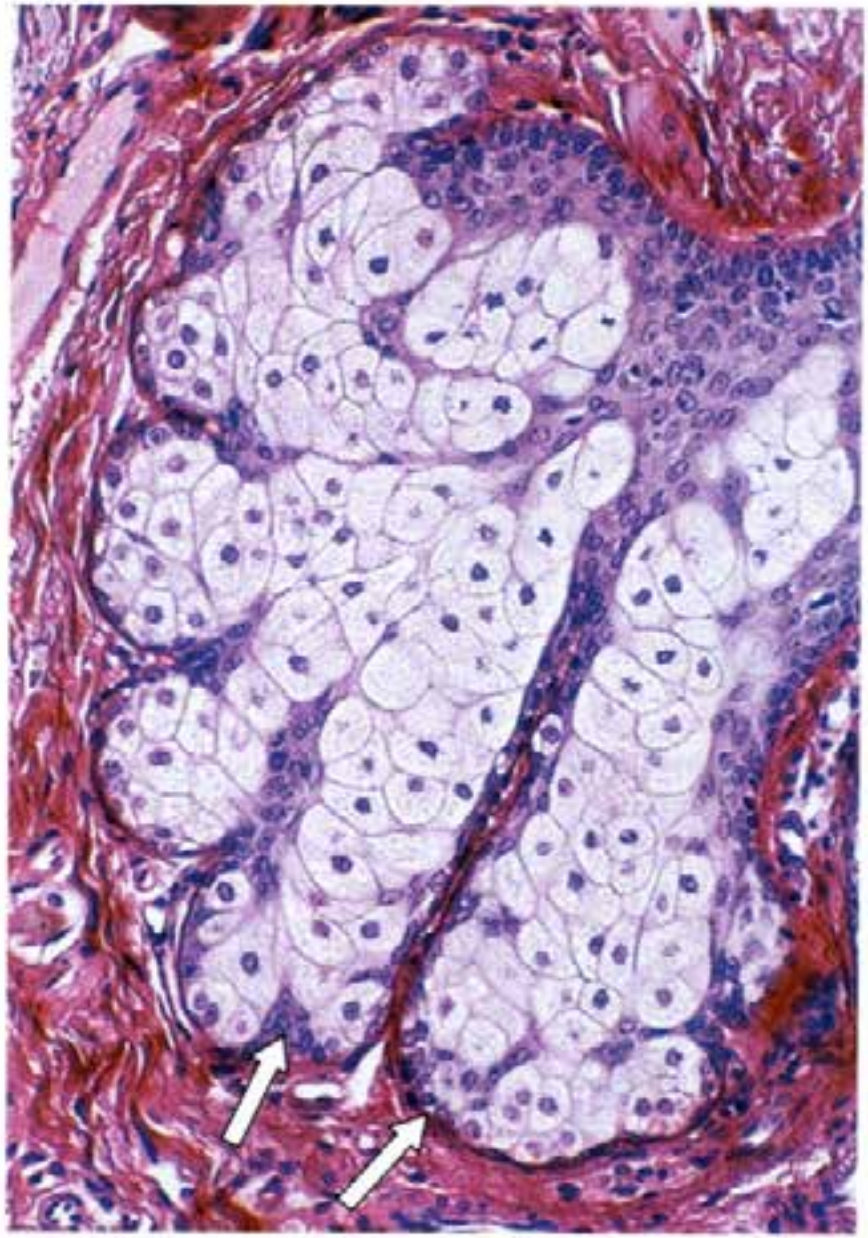


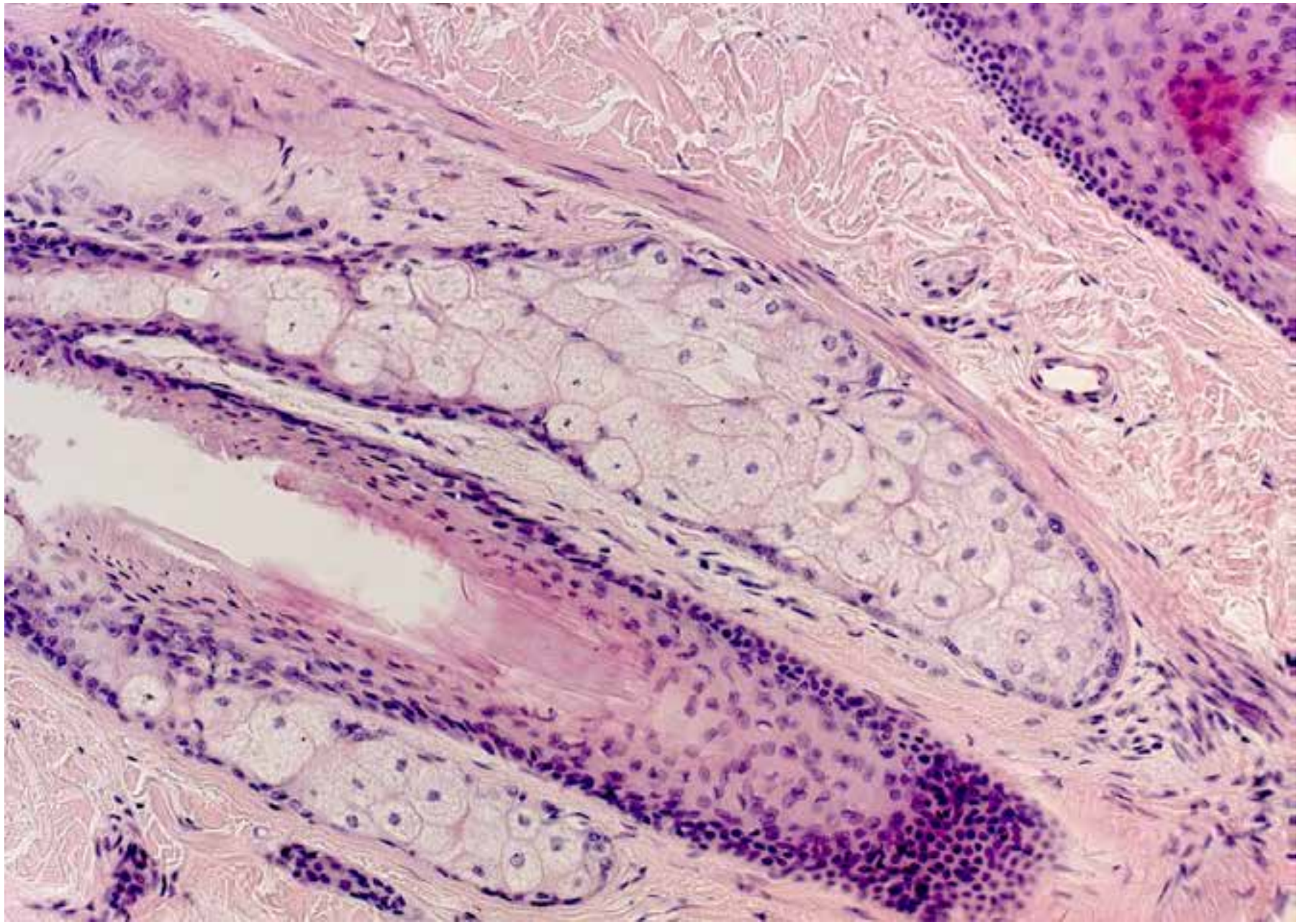


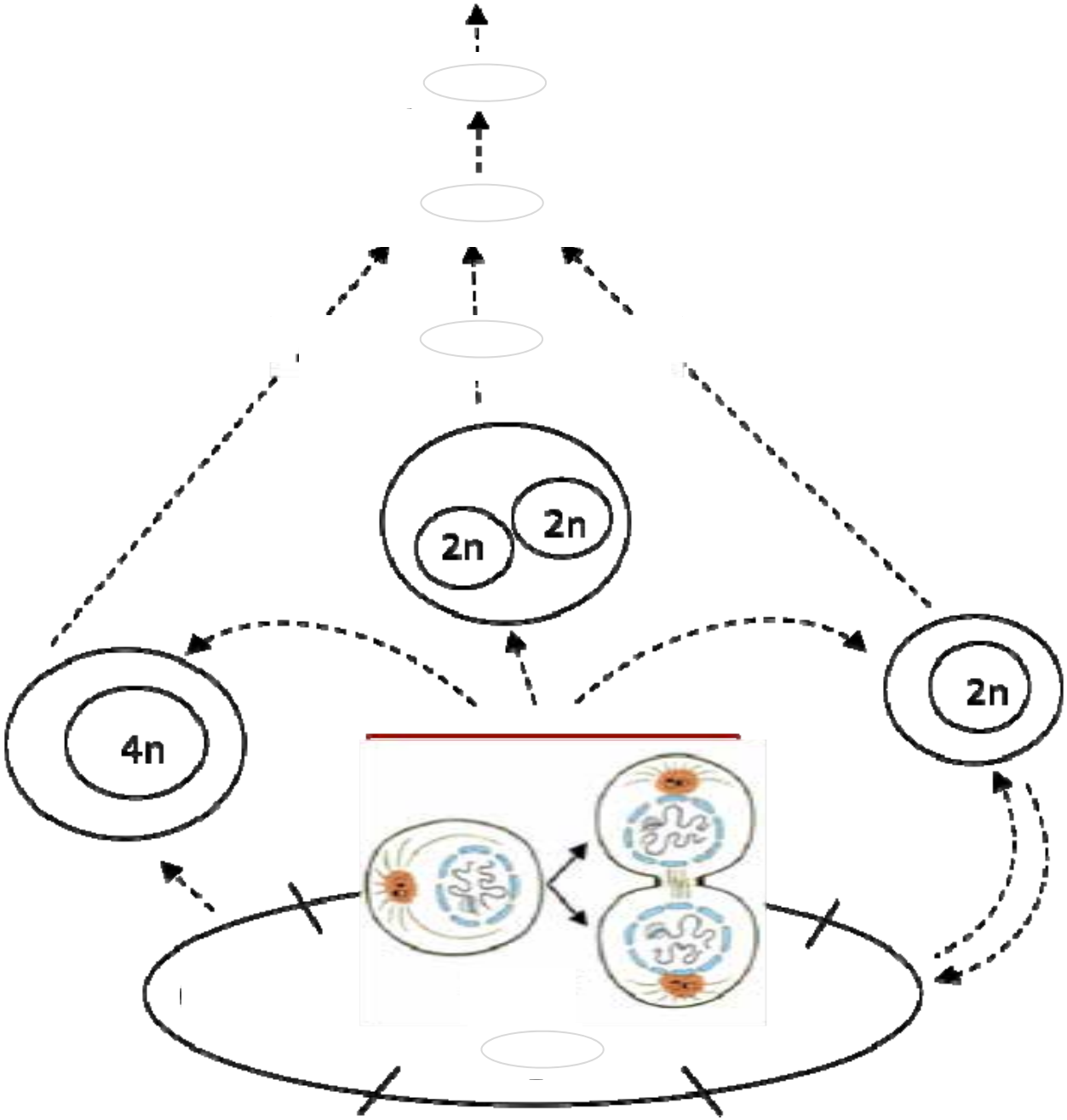








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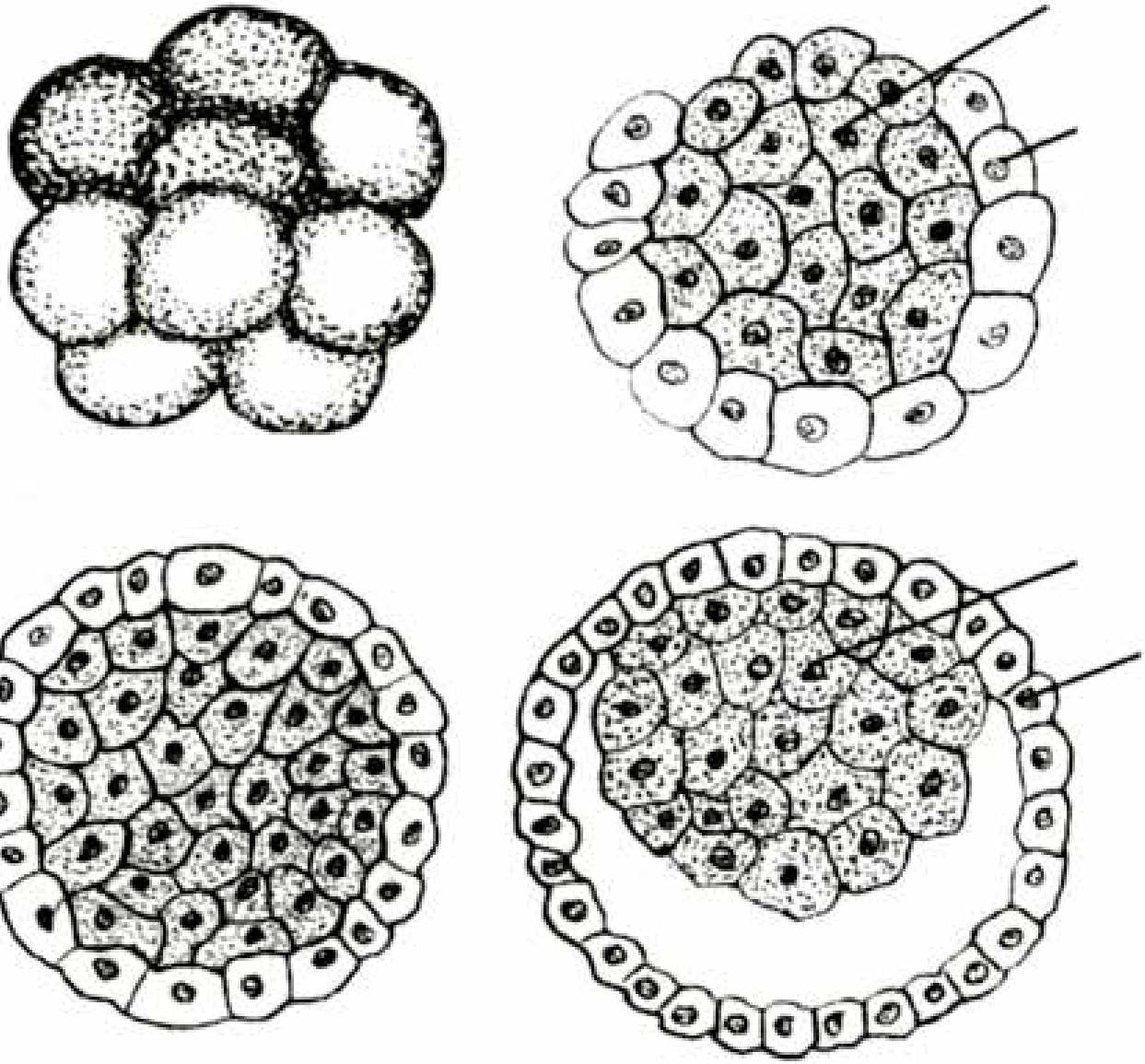
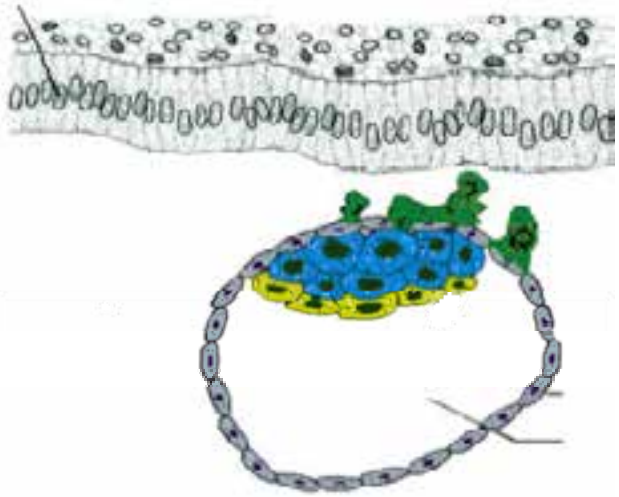
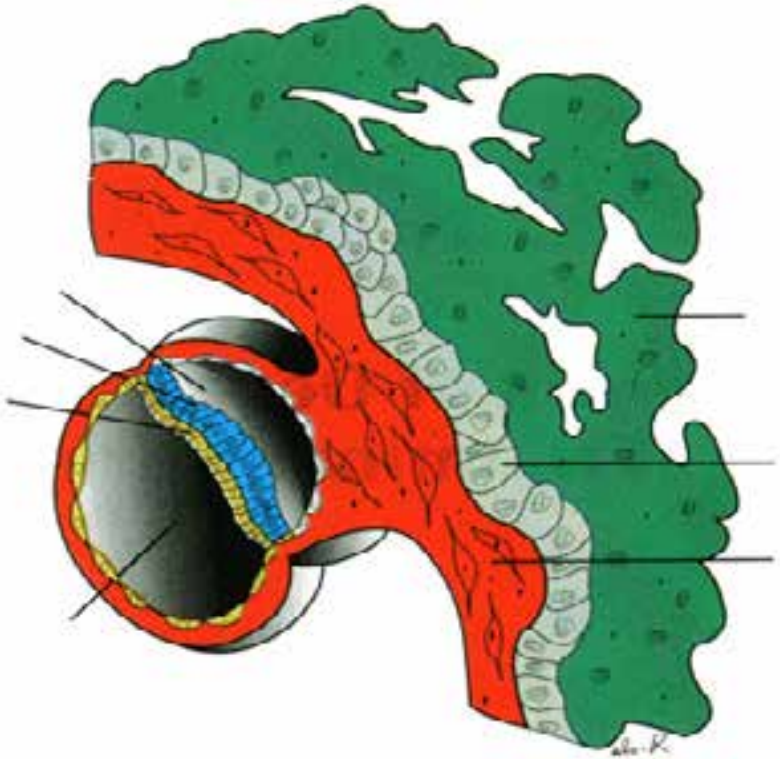
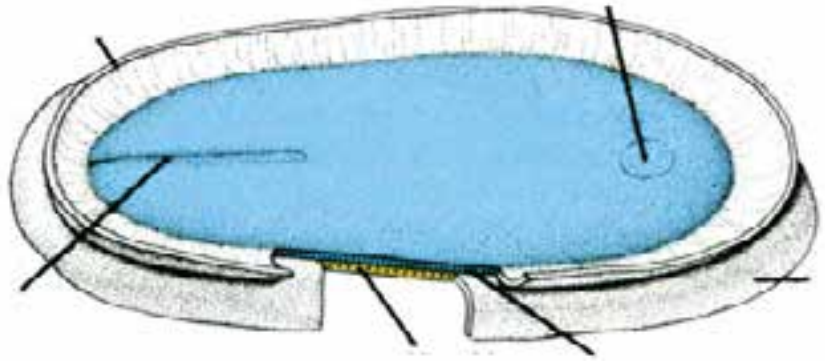
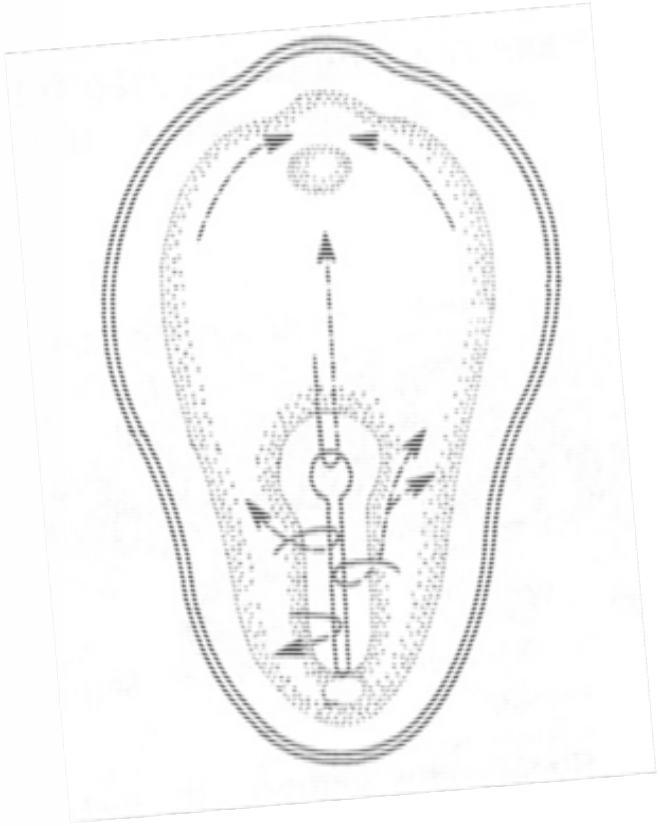
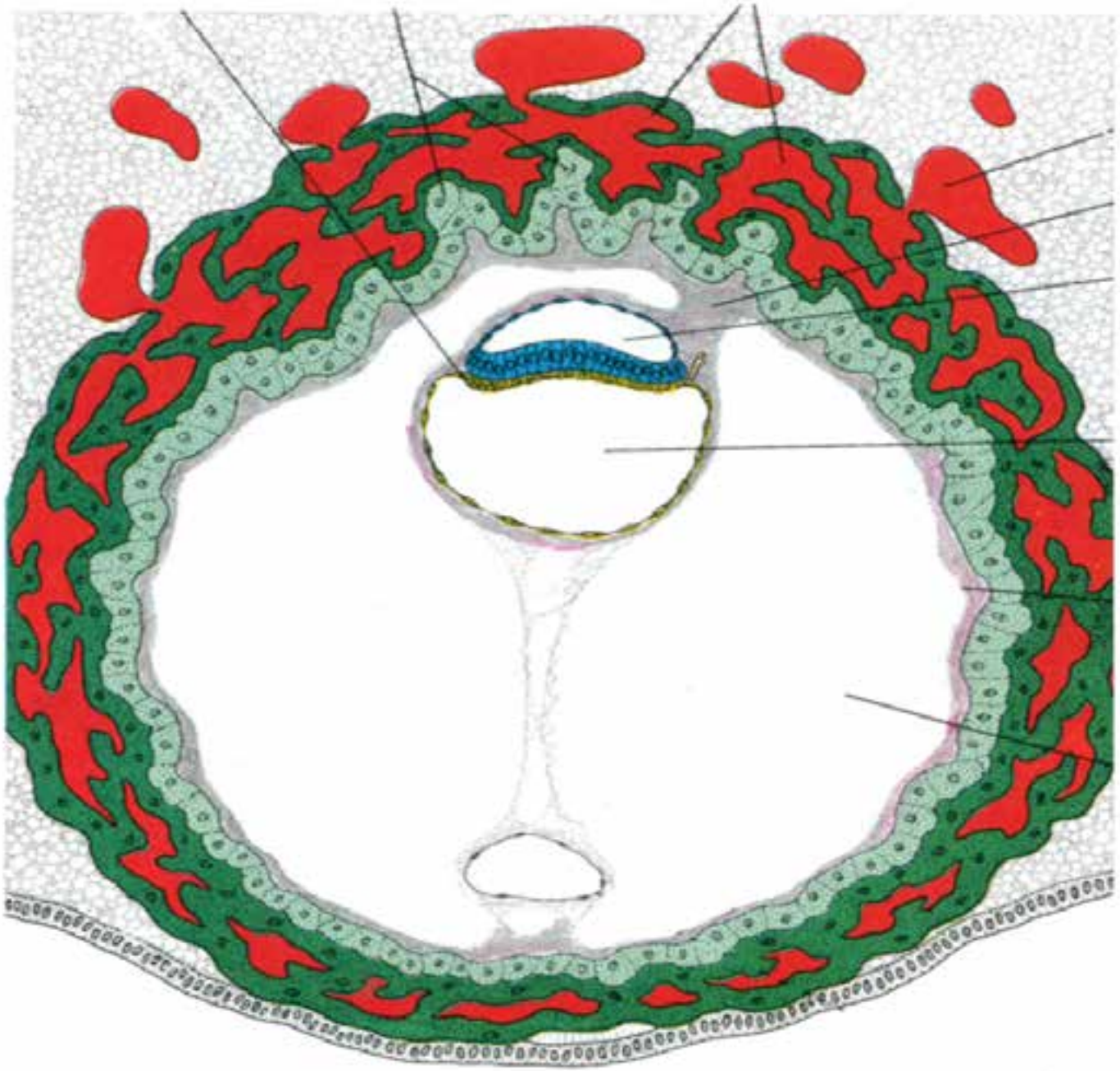


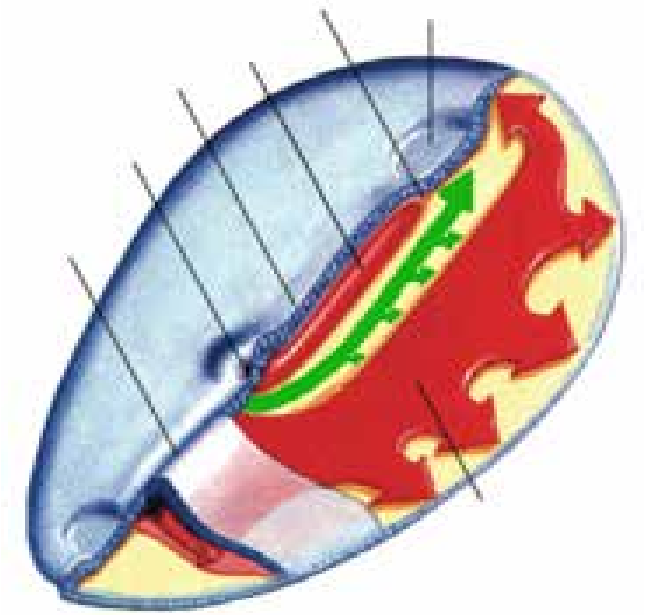


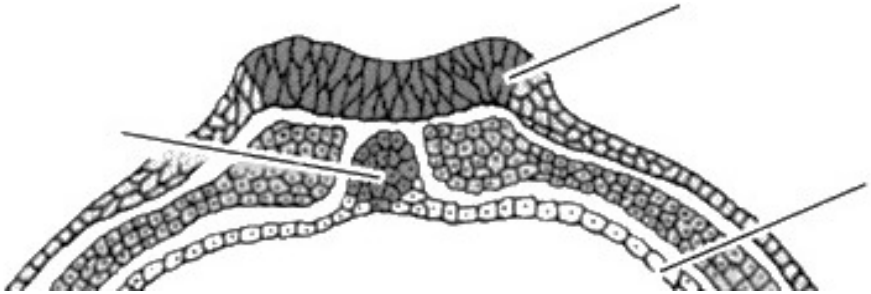


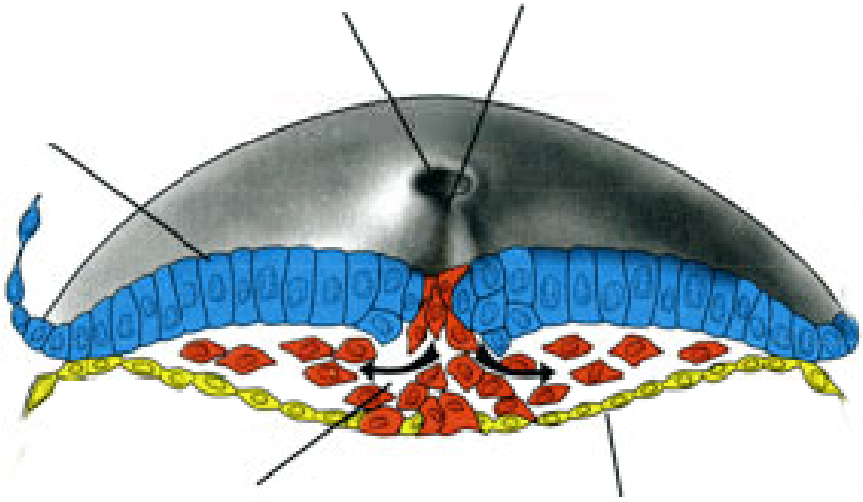


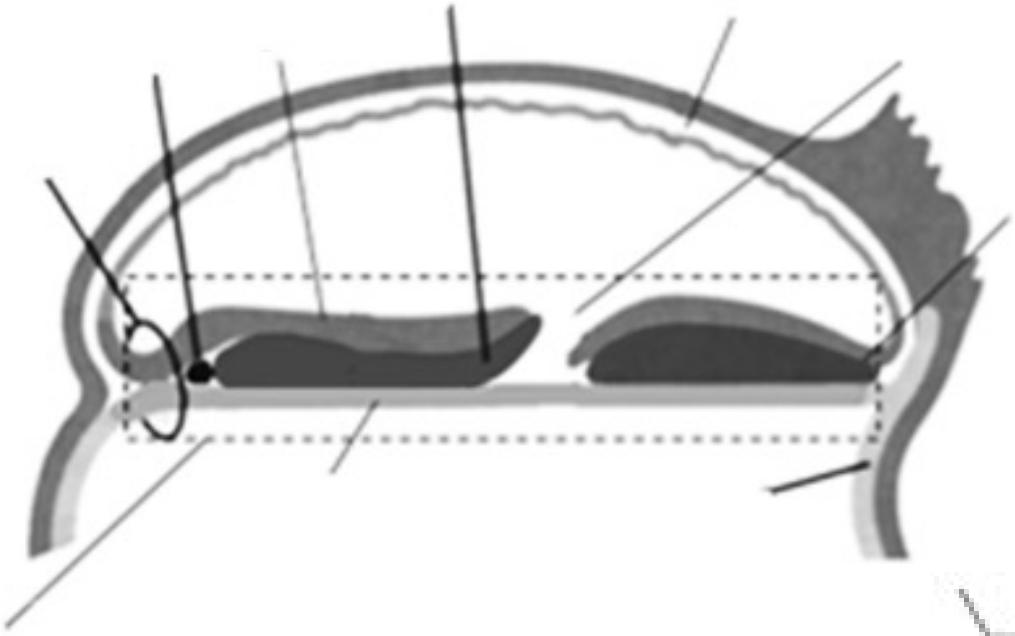


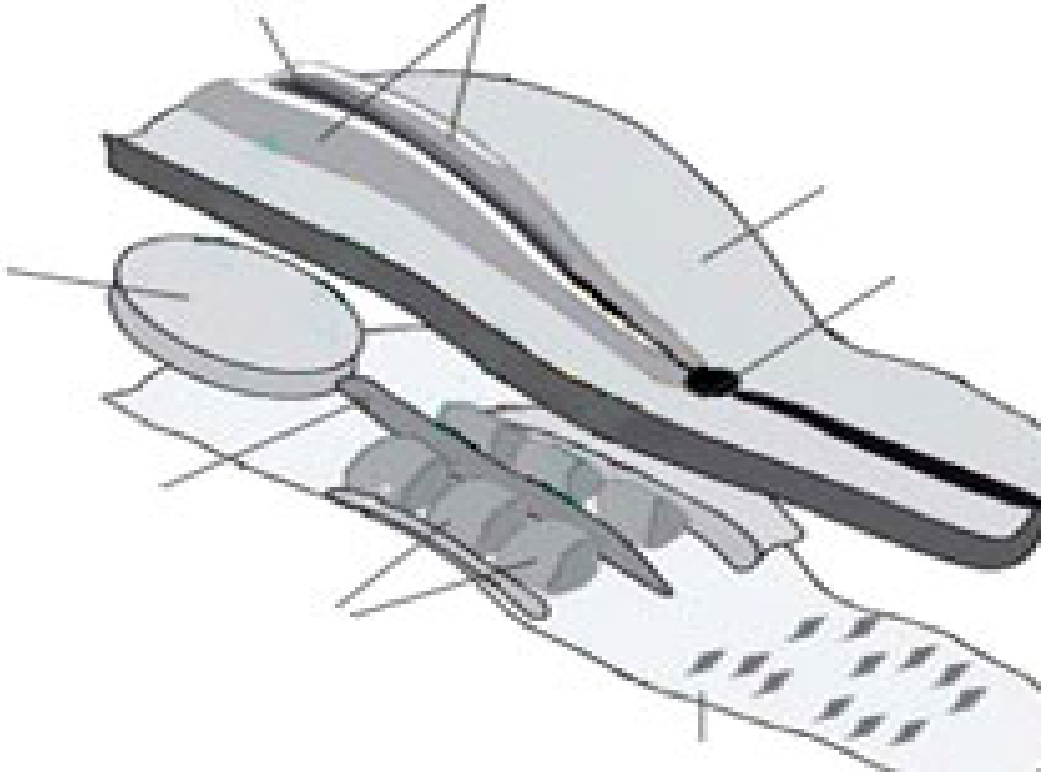


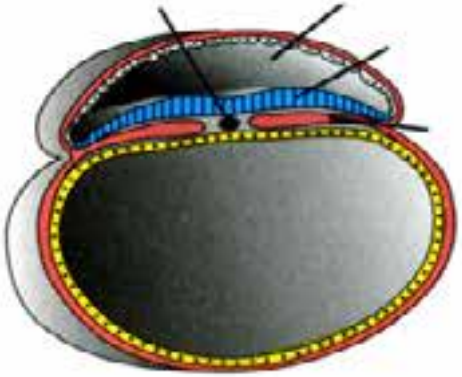


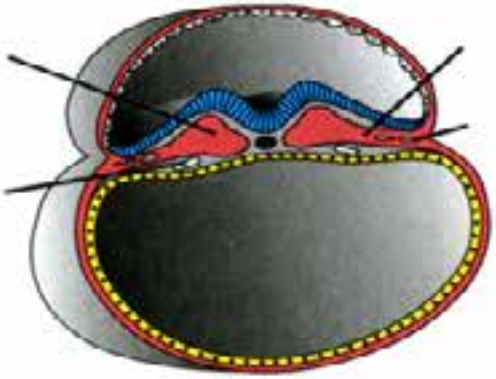


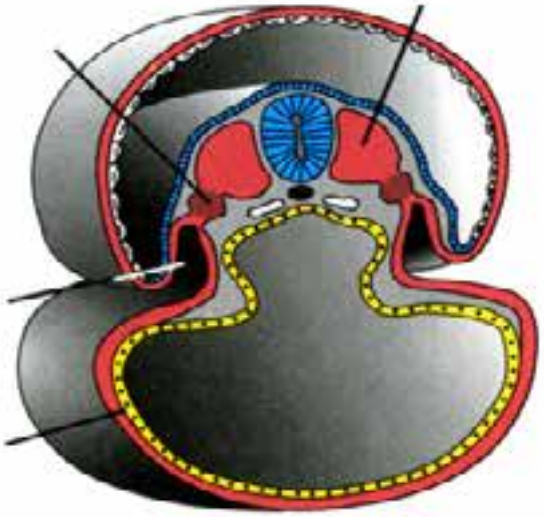


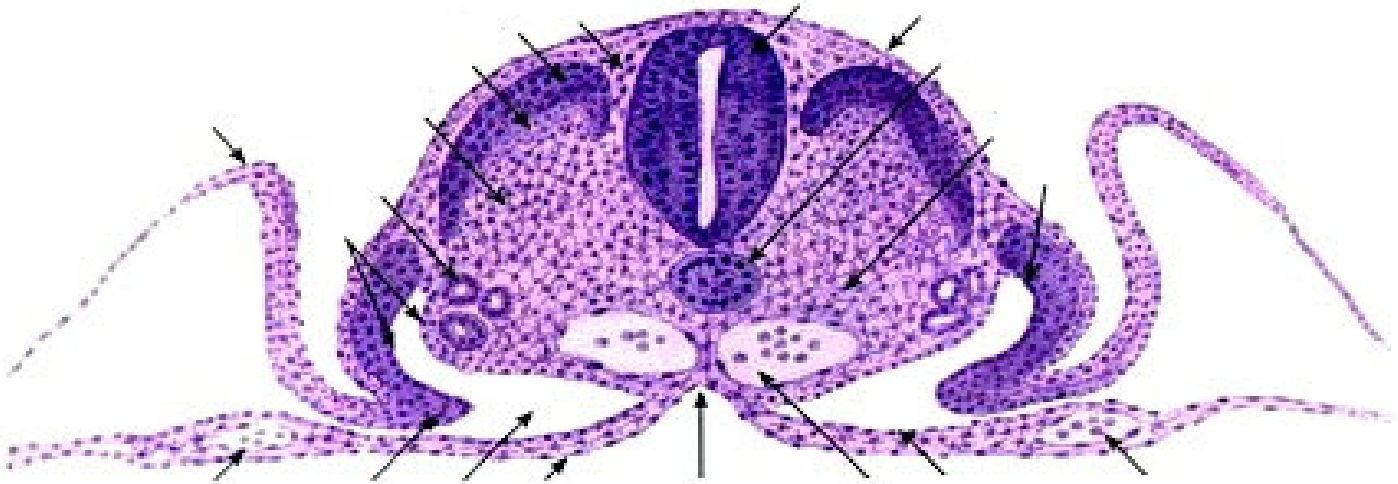


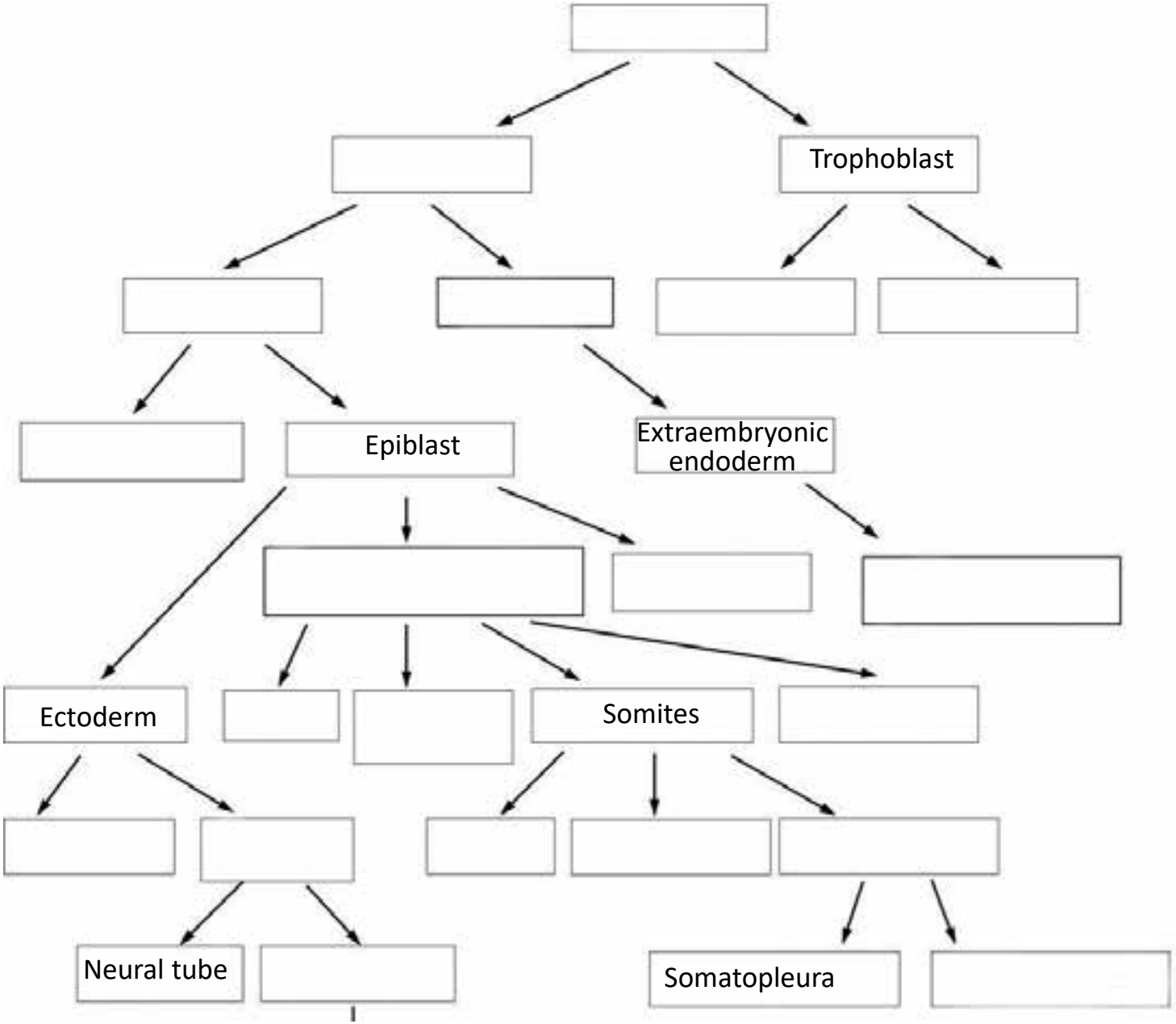


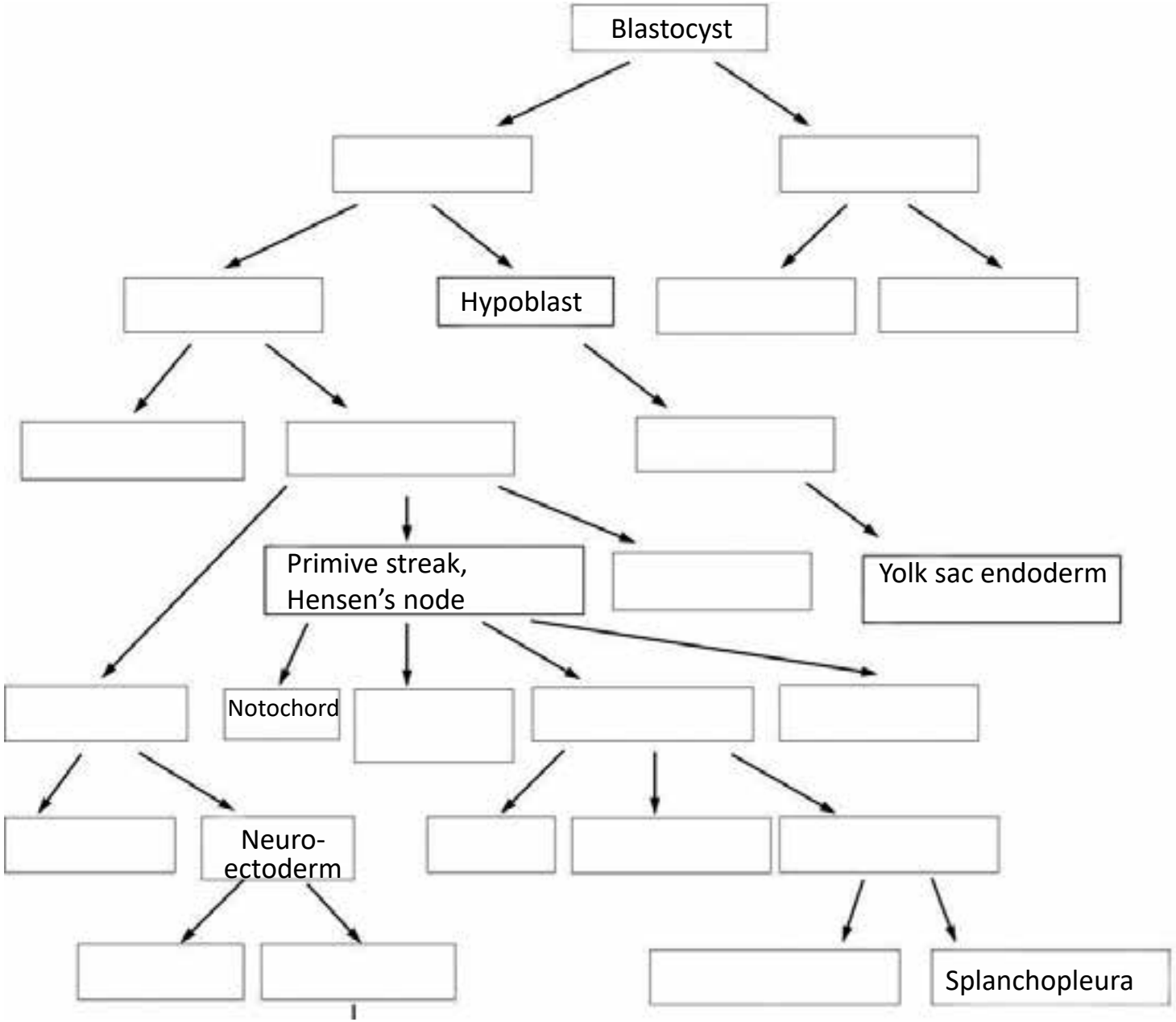


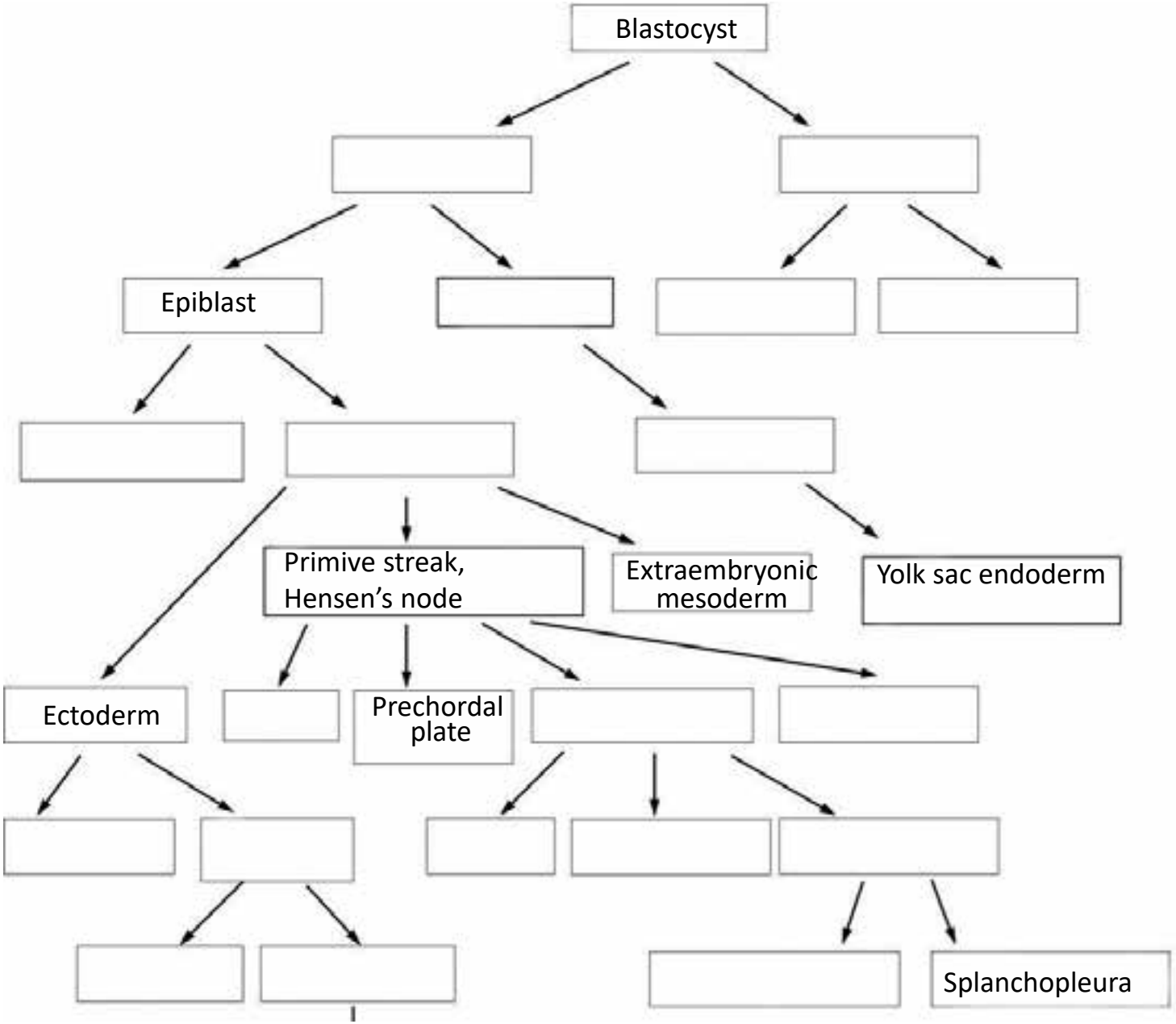







Trophoblast
Epiblast
Extraembryonic endoderm
Ectoderm
Somites
Neural tube
Somatopleura


Blastocyst
Hypoblast
Primive streak,
Hensen's node
Yolk sac endoderm
Notochord
Neuro-
ectoderm
Splanchopleura


Blastocyst
Epiblast
Primive streak,
Hensen's node
Extraembryonic
mesoderm
Yolk sac endoderm
Ectoderm
Prechordal
plate
Splanchopleura