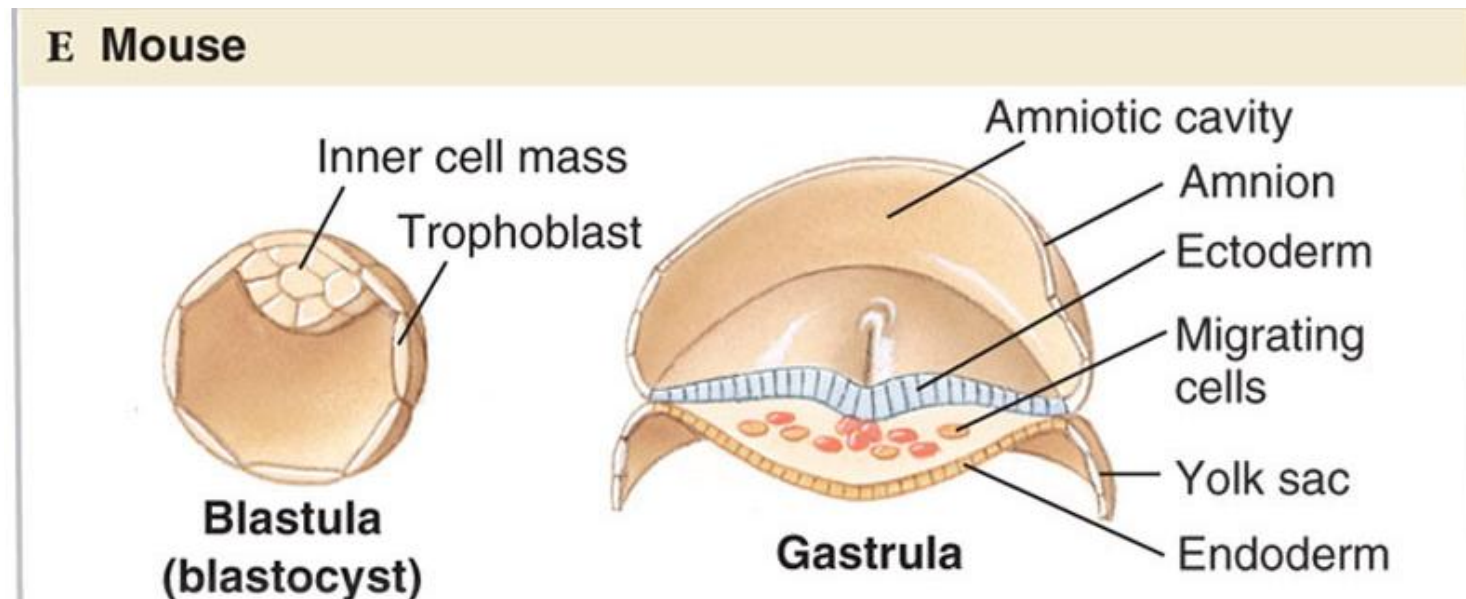
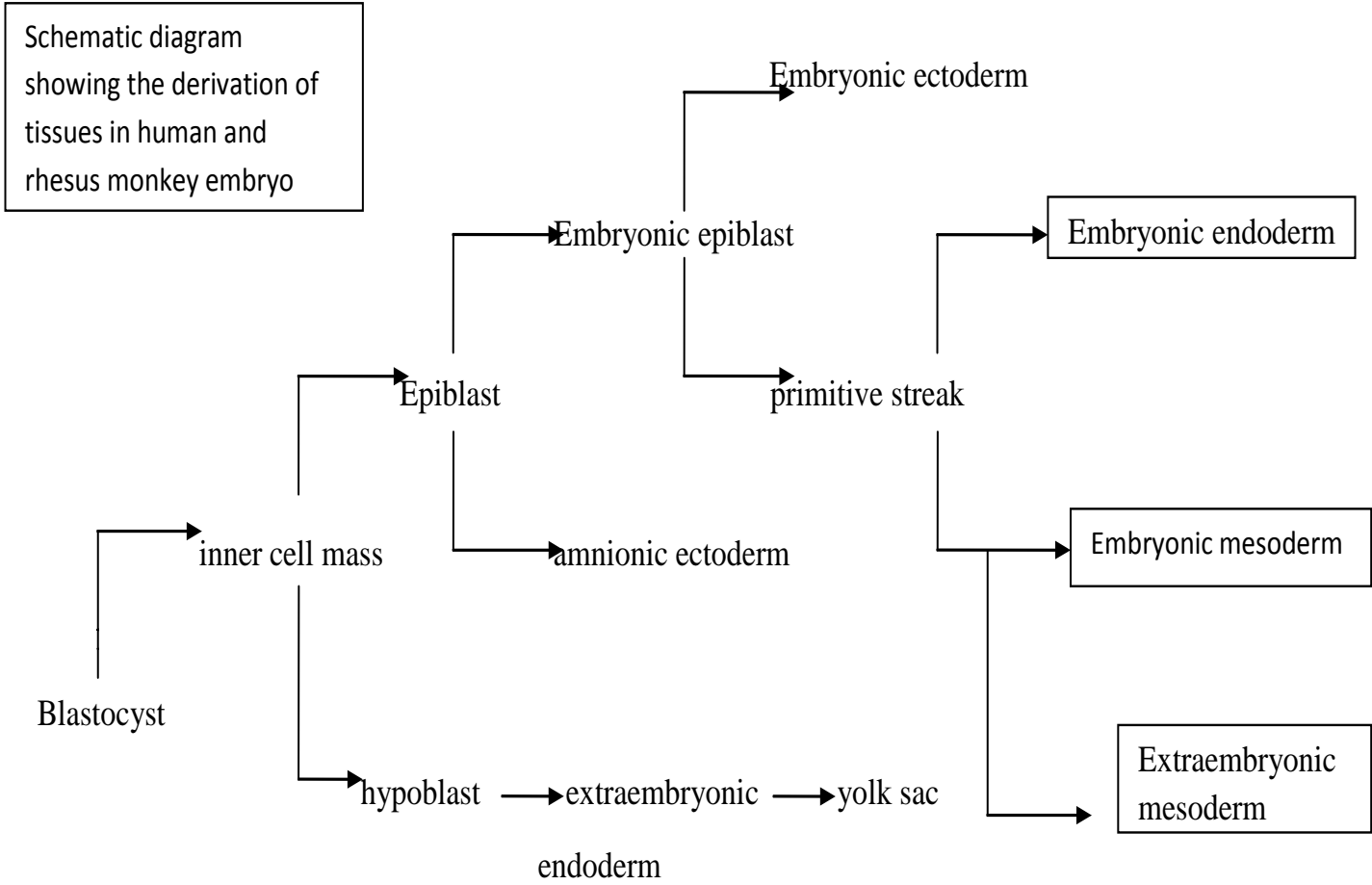


Gastrulation - Mammals

- In mammals the blastula is called a **blastocyst**.
 - **Inner cell mass** will become the embryo while **trophoblast** becomes part of the placenta.
- Notice that the gastrula is similar to that of the chick.

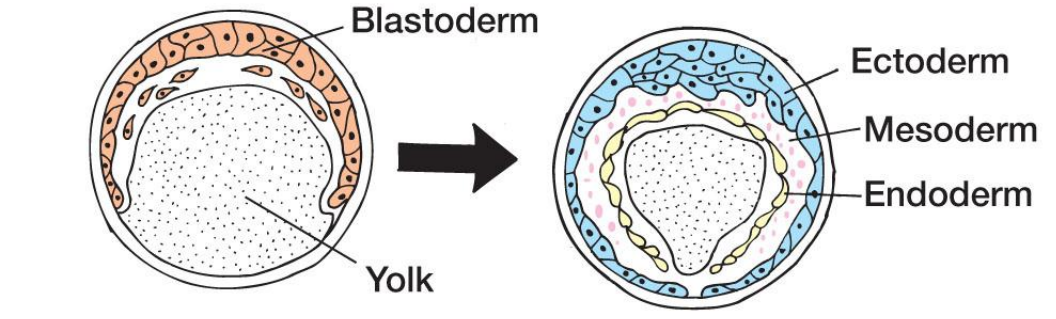


EMBRYONIC TISSUES

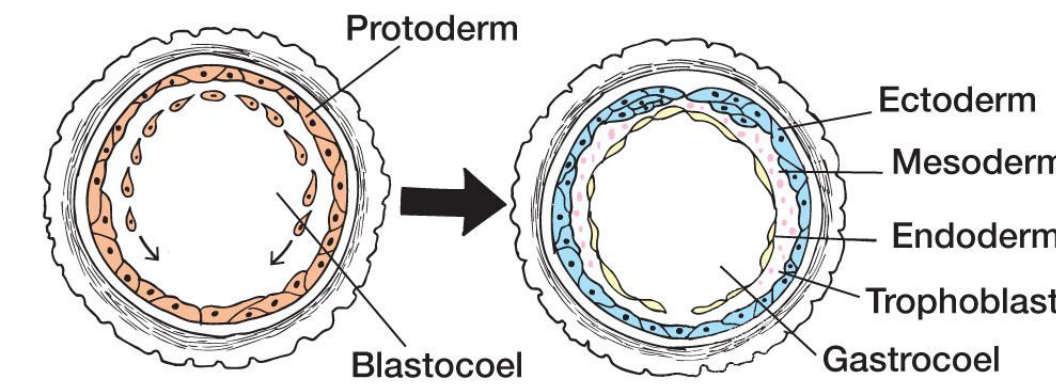


Gastrulation in Mammals

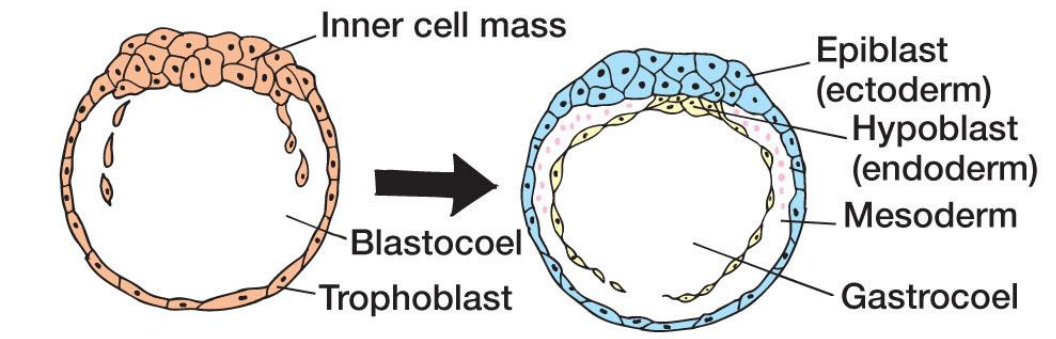
- Cavities form above and below ICM, which expand (as amnion and yolk sac, respectively), leaving a flat 2-layered plate of cells.
- Primitive streak forms as in birds and reptiles to produce primary germ layers.



(a) Monotreme

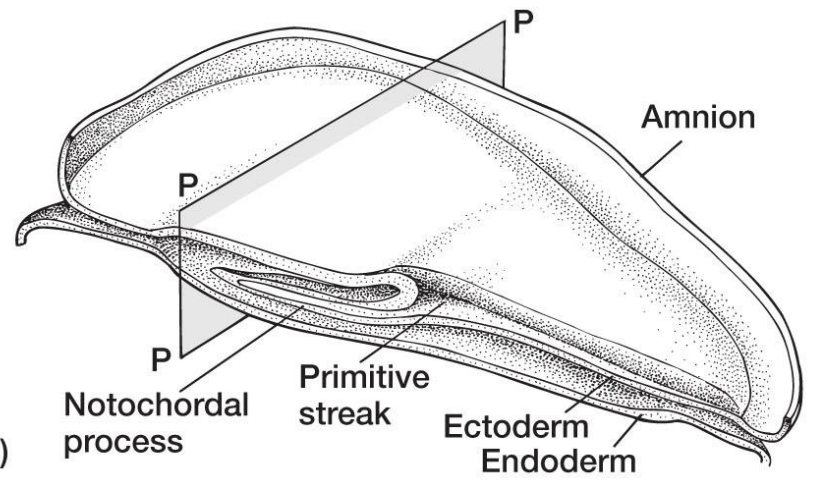


(b) Marsupial

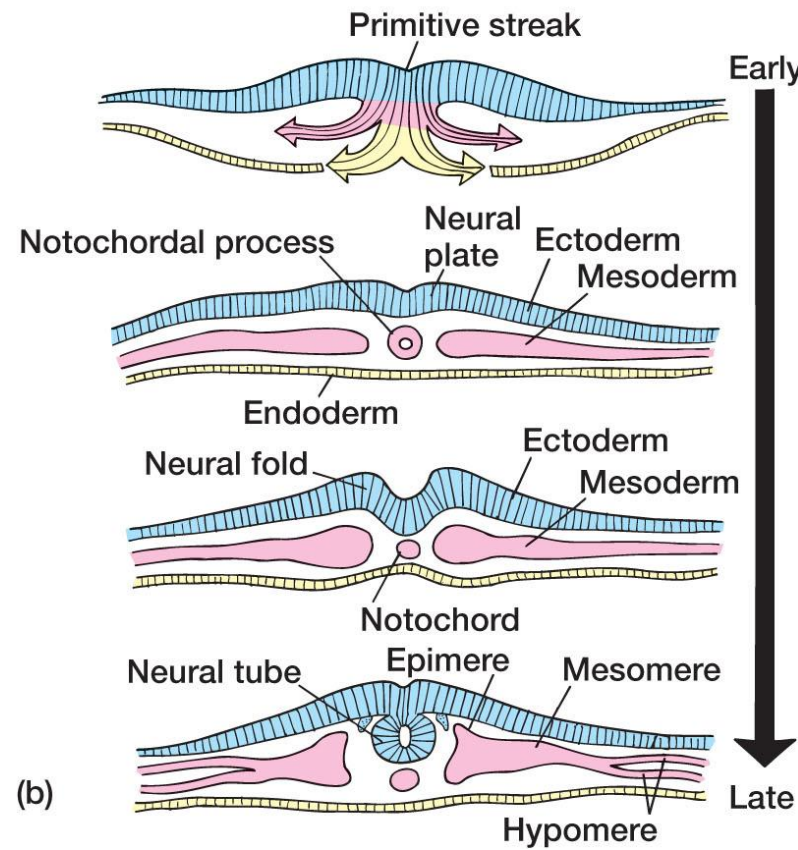


(c) Eutherian

Figs 5.15 & 5.16 – Gastrulation in Mammals



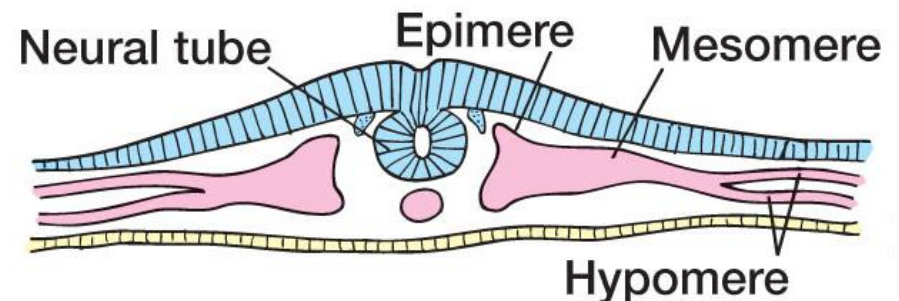
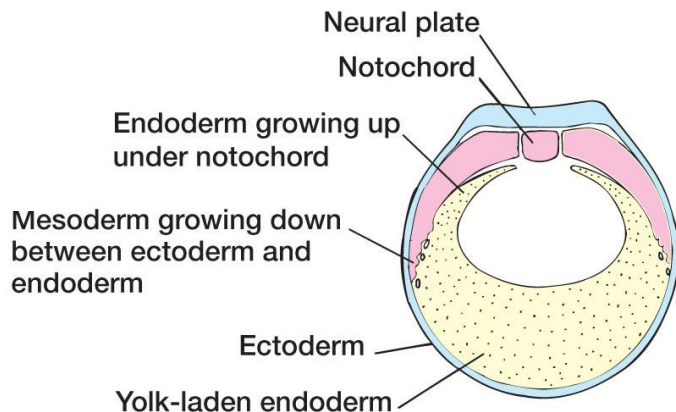
(a)



(b)

Major Tissue Regions after Gastrulation

- Skin ectoderm
- Neural ectoderm
- Notochordal mesoderm
- Lateral mesoderm
- Endoderm



NEURAL TUBE FORMATION – Amphioxus

1. Folding up of tissue at junction of future skin ectoderm and neural ectoderm areas; the two tissues separate as this fold forms.
2. Skin ectoderm grows over the top of neural ectoderm.
3. Beneath “skin,” lateral margins of neural ectoderm grow upward and together to form tube.
4. Tube first closes at midpoint, progresses anteriorly and posteriorly. Anterior end opens to surface as *neuropore*, posterior end forms common opening with blastopore (becomes anus) forming *neurenteric canal*.

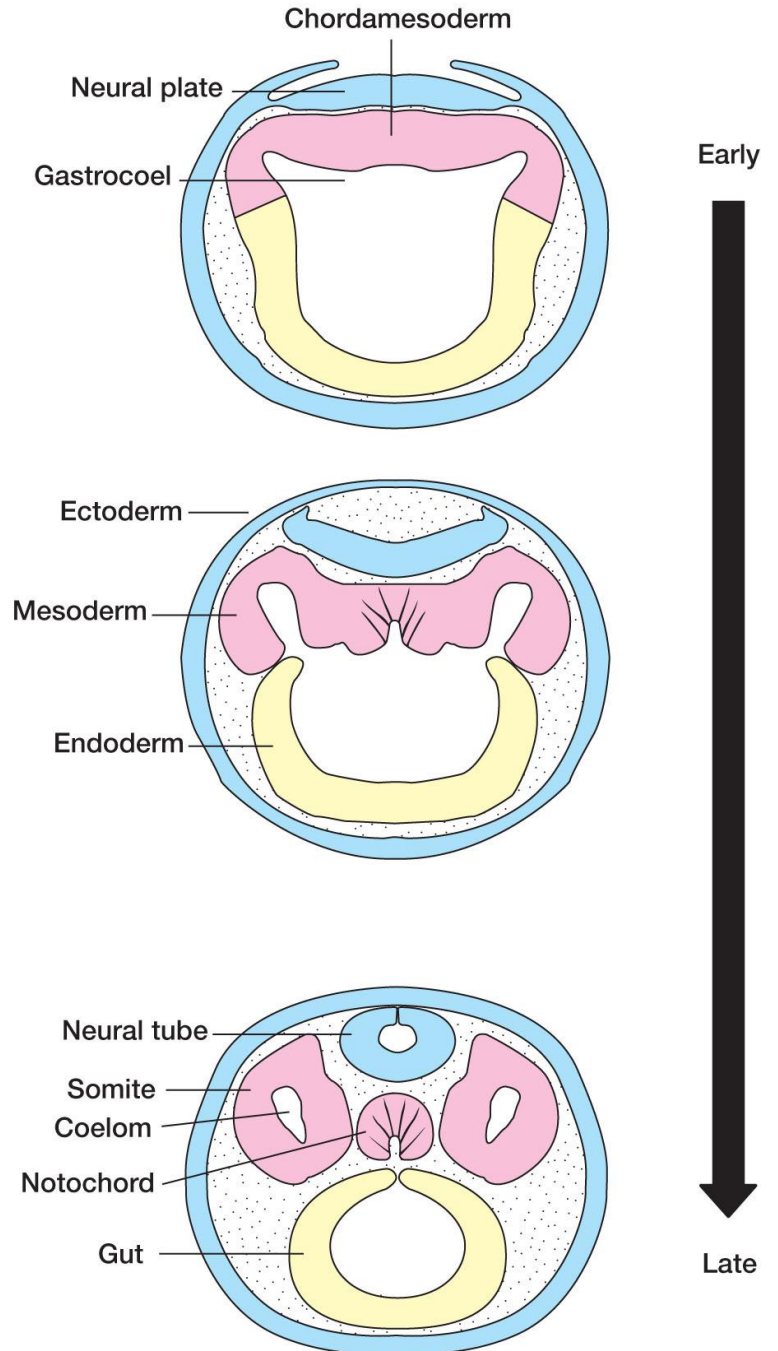
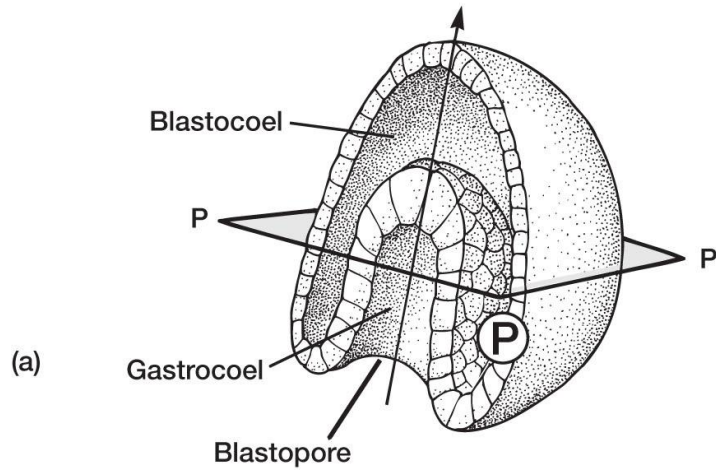


Fig 5.7 – Gastrulation and Neurulation in Amphioxus

NEURAL TUBE FORMATION – Vertebrates

1. Formation of neural folds along margins of skin-neural ectoderm
2. Mid-dorsal meeting of folds, simultaneous with joining of skin ectoderm
3. During folding, high crests of tissue are formed on either side = *neural crest cells*

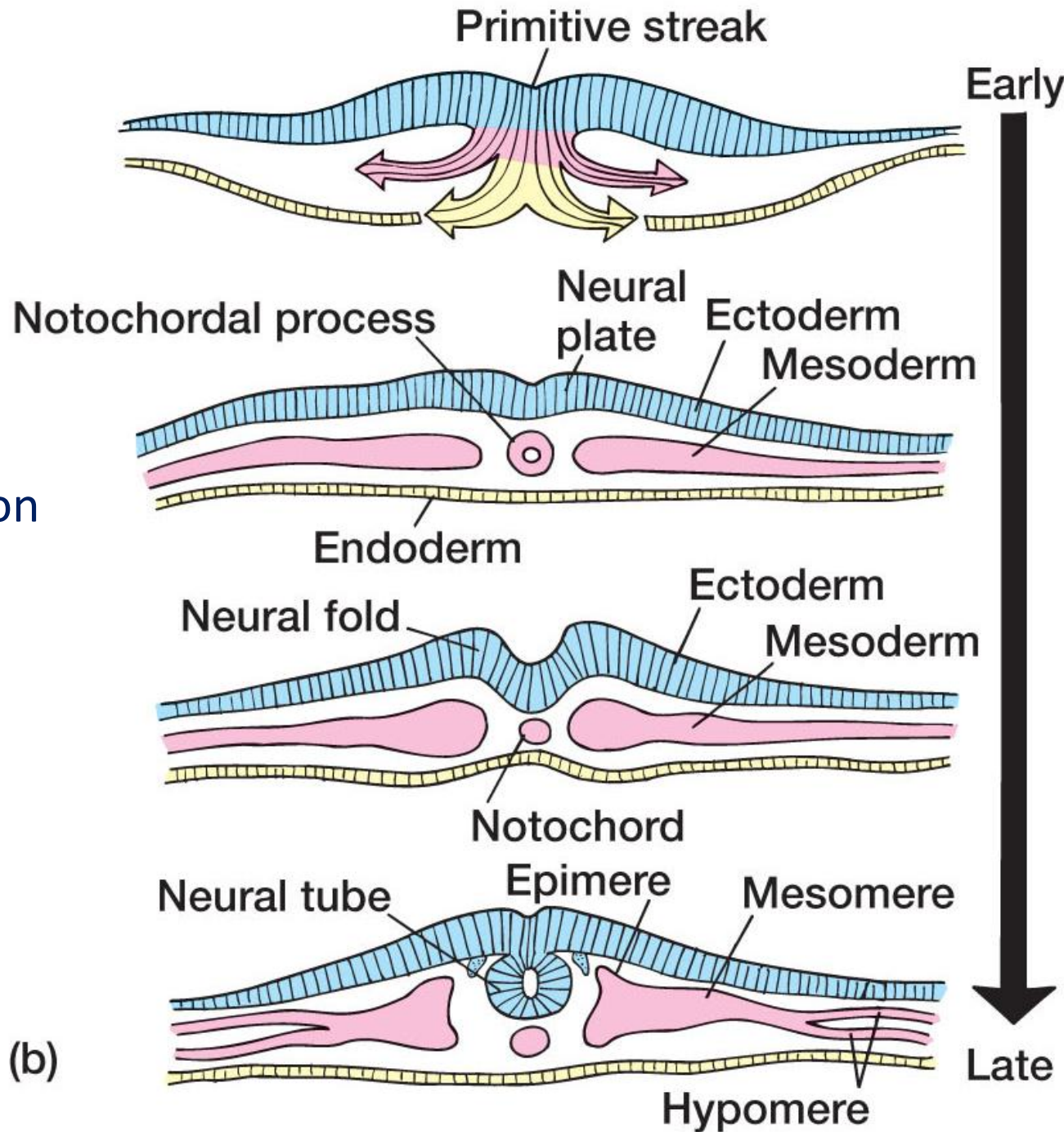


Fig 5.16 – Gastrulation and Neurulation in Mammals

MESODERM DEVELOPMENT

- Majority of body structures are mesodermal in origin.
- *Notochordal Mesoderm* rapidly rounds up and separates from lateral mesoderm, forming a discrete cylinder = *notochord*.
 - Notochord is much reduced or obliterated in most adult vertebrates, but forms the center around which vertebral formation occurs.
- *Lateral Mesoderm* – Amphioxus
 - Mesoderm forms paired series of segmentally arranged blocks = *somites*.
 - From their initiation, somites have a cavity inside = *coelomic cavity*.

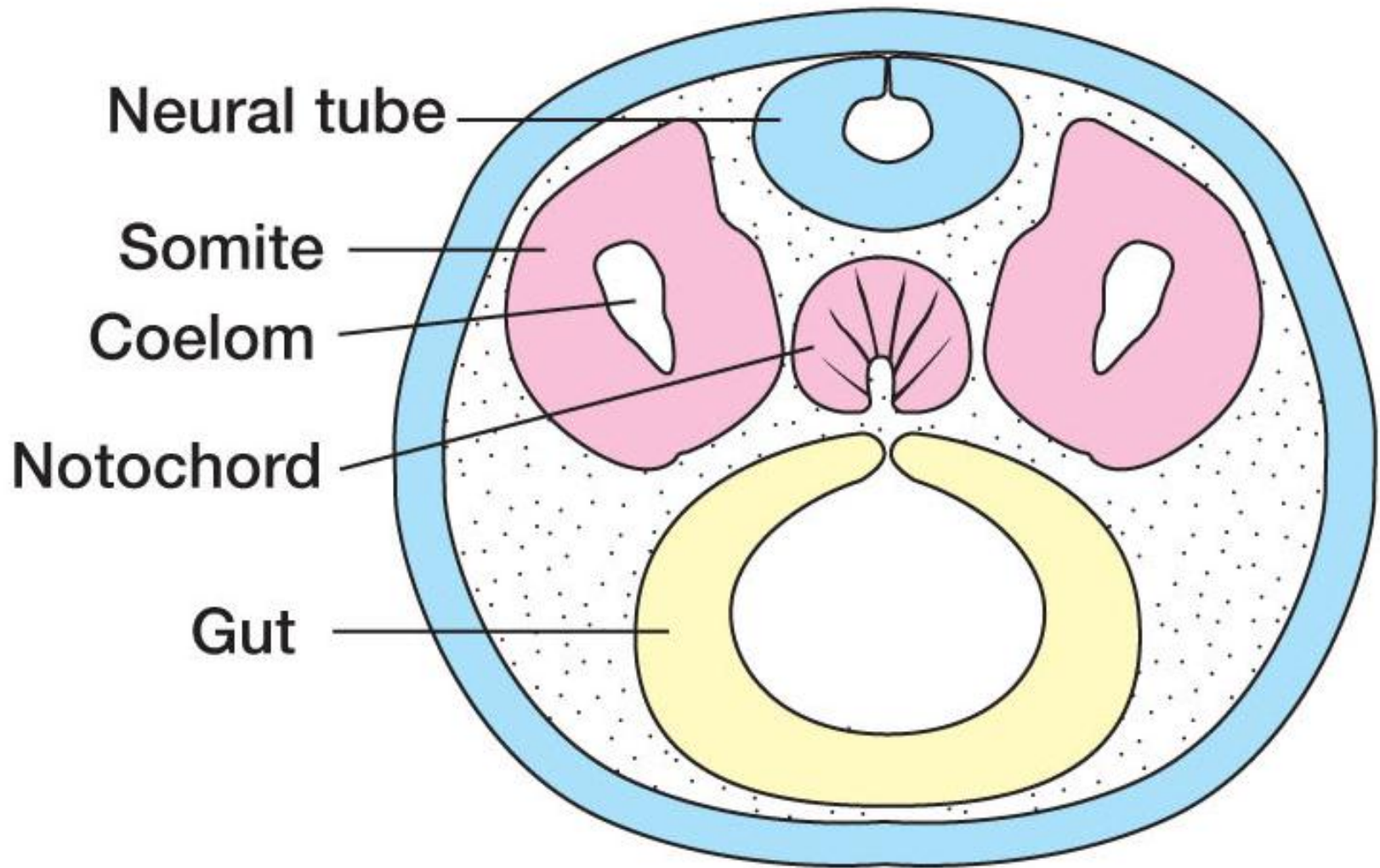


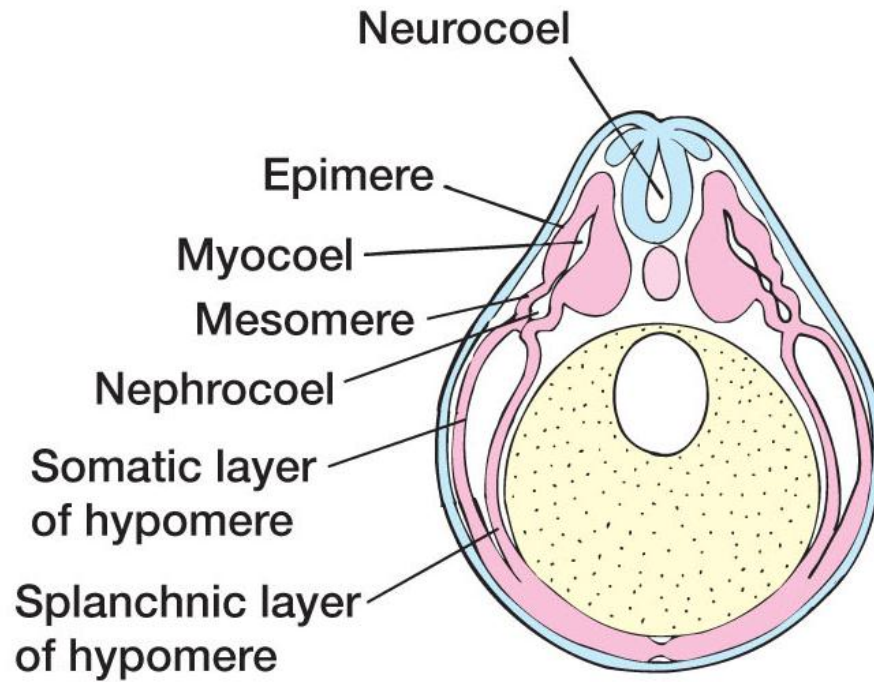
Fig 5.7 (b) – Notochordal and lateral mesoderm in Amphioxus

MESODERM DEVELOPMENT

- Lateral Mesoderm – Vertebrates
- Initially there is no segmentation of mesoderm; instead forms as a continuous sheet without a central cavity.
- Mesodermal differentiation occurs from dorsal midline outward into 3 divisions, each extending the entire length of the body trunk.
- Differentiation always occurs head-to-tail.
- The 3 divisions are:
 1. Next to neural tube and notochord = *Epimere* (somites). Thicken and subdivide on either side to form longitudinal rows of blocks. This is the first indication of segmentation in vertebrate embryos. Proliferation and differentiation occurs within somite forming:
 - *Sclerotome* = portion surrounding notochord and neural tube
 - *Dermatome* = outermost portion near skin ectoderm
 - *Myotome* = middle portion between and ventral to sclerotome and dermatome

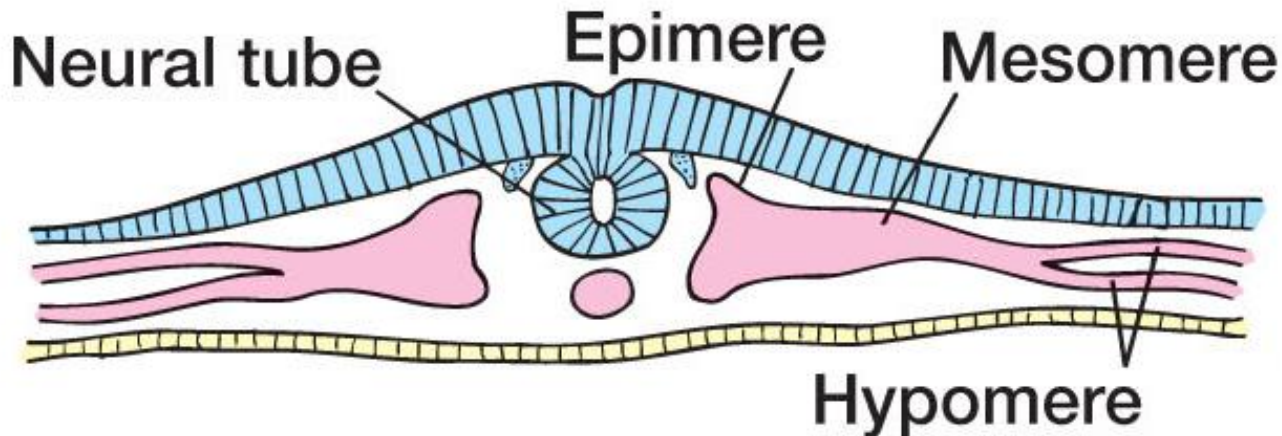
MESODERM DEVELOPMENT

2. Lateral and ventral to somites is a relatively small region of mesoderm, known as intermediate mesoderm or *Mesomere*. This may show segmentation similar to somites.
3. Beyond mesomere region, extending ventrolaterally is a sheet of mesoderm known as *lateral plate mesoderm or Hypomere*.
 - Apart from cyclostomes, there is no segmentation in this region. Coelomic cavity forms within lateral plate mesoderm, dividing it into:
 - *Somatopleure* = external mesoderm + ectoderm
 - *Splanchnopleure* = internal mesoderm + endoderm



Figs 5.11 & 5.16
Mesoderm divisions
in Amphibians and
Mammals

(b)



Organogenesis/Differentiation

- Once the mesoderm divisions are set up, then ontogenetic development proceeds to embryonic differentiation to adult body.
- What causes this differentiation?
- **Induction** = process by which developmental fate of cells is determined

References

- <https://smackslide.com>