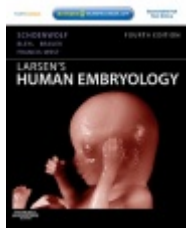
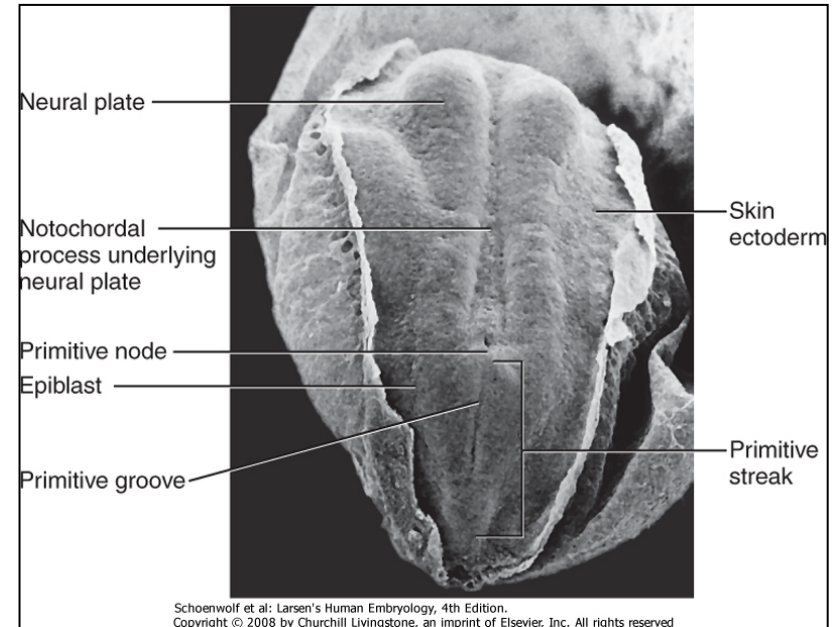
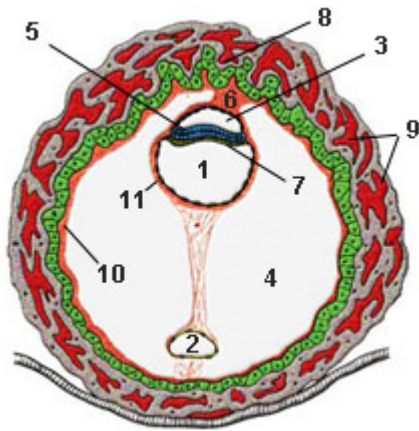
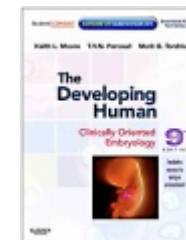


# Week 3: gastrulation

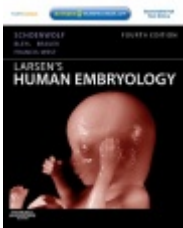
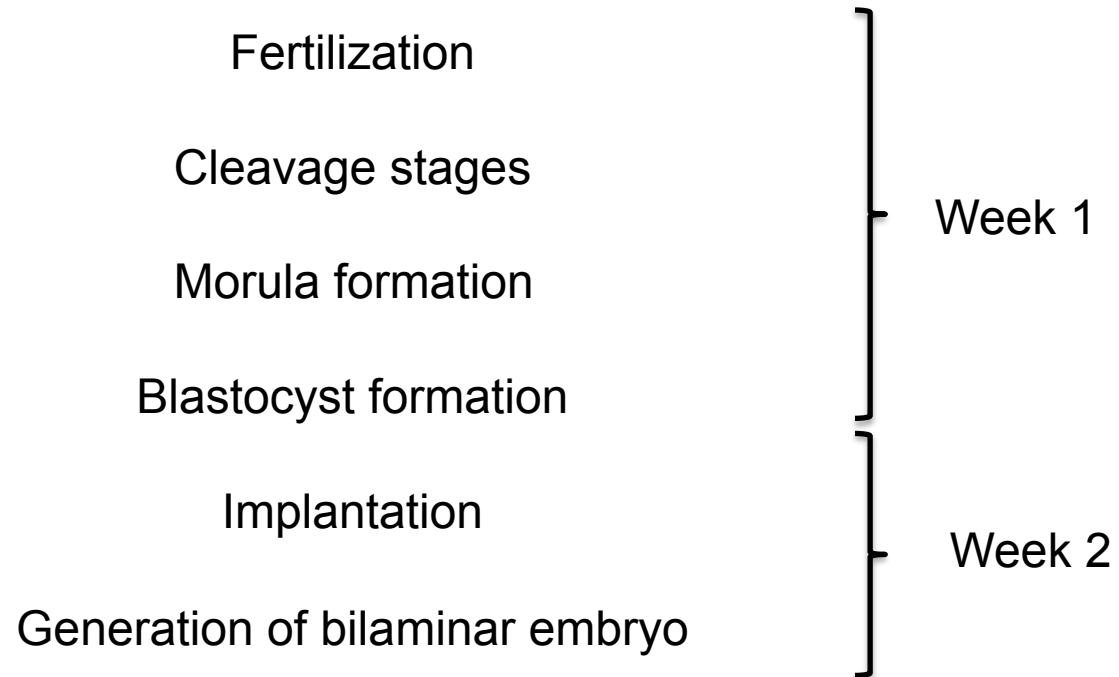


Resources:  
<http://php.med.unsw.edu.au/embryology/>  
Larsen's Human Embryology  
The Developing Human: Clinically Oriented Embryology

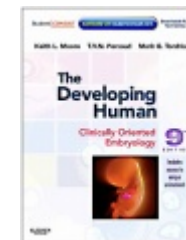


Dr Annemiek Beverdam – School of Medical Sciences, UNSW  
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# Week 1/2 Lecture overview



Resources:  
<http://php.med.unsw.edu.au/embryology/>  
Larsen's Human Embryology  
The Developing Human: Clinically Oriented Embryology



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# Week 3 Lecture overview

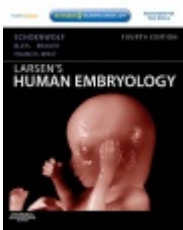
Placentation

Body axes

Gastrulation

Notochord formation

Embryo folding



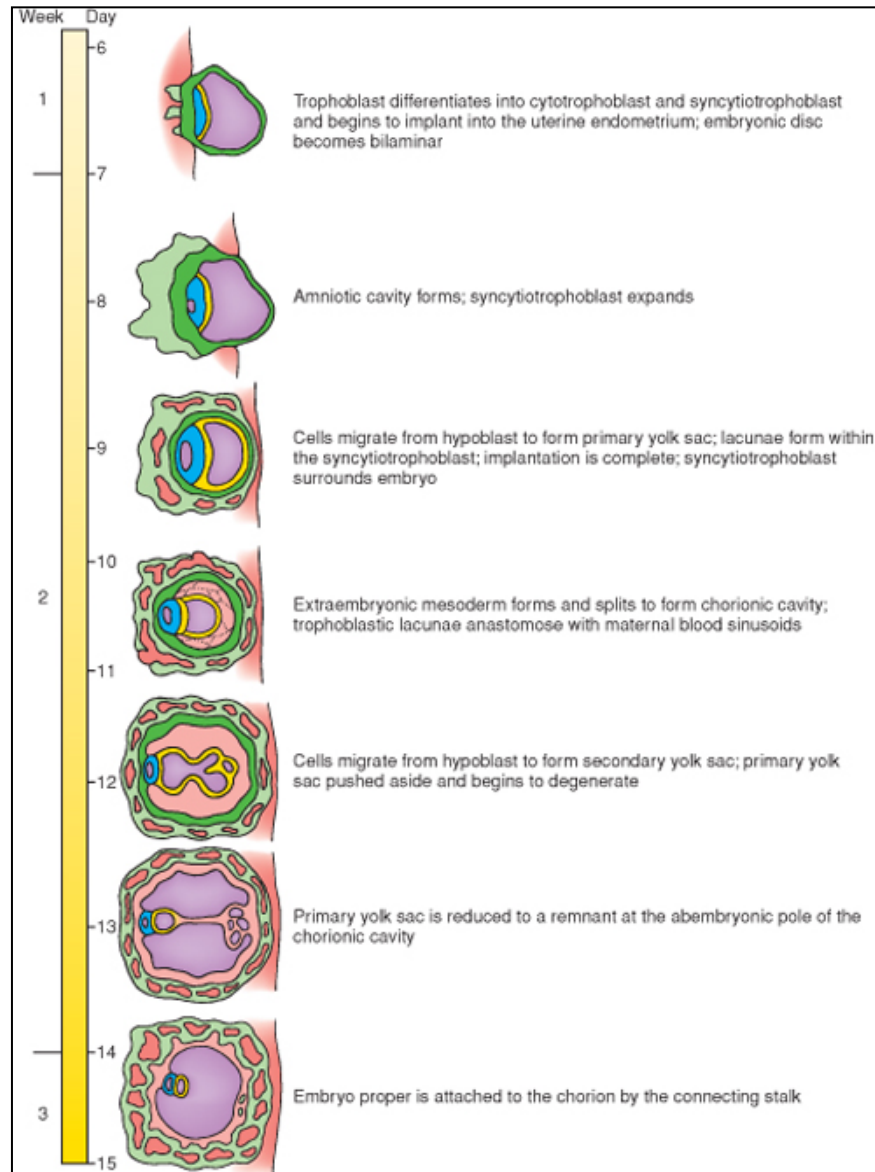
Resources:  
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Larsen's Human Embryology  
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# Implantation

## Week 2



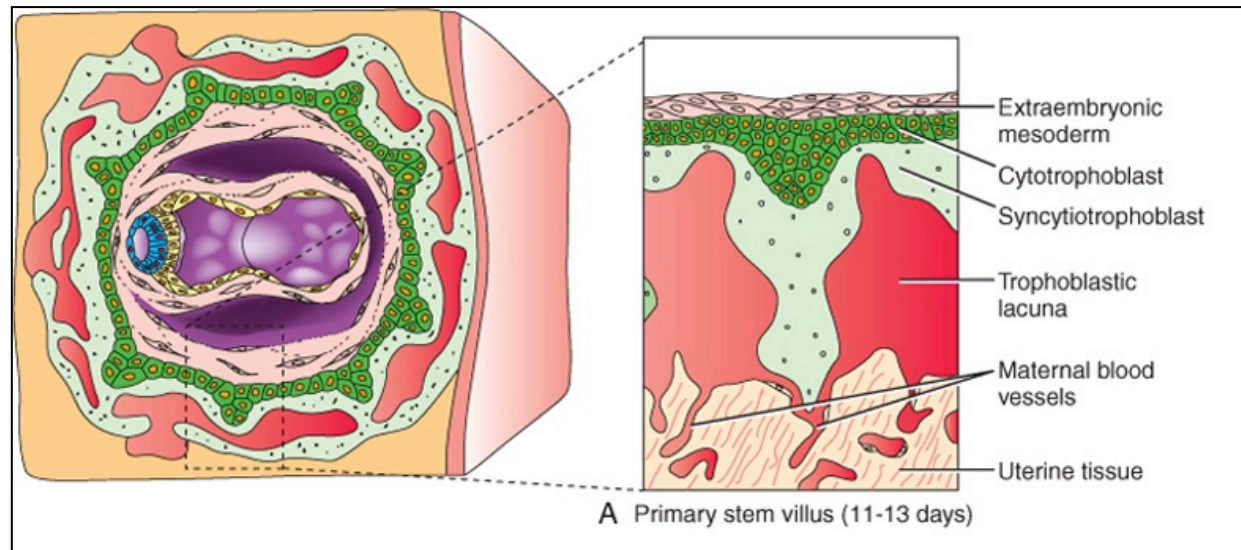
Extra-embryonic mesoderm  
of the second week  
is probably generated  
by hypoblast cells

# Placentation

1<sup>st</sup> week: Nutrients through diffusion  
Later: uteroplacental circulation

Day 11-13  
Trophoblastic lacunae  
Fusion with maternal circulation

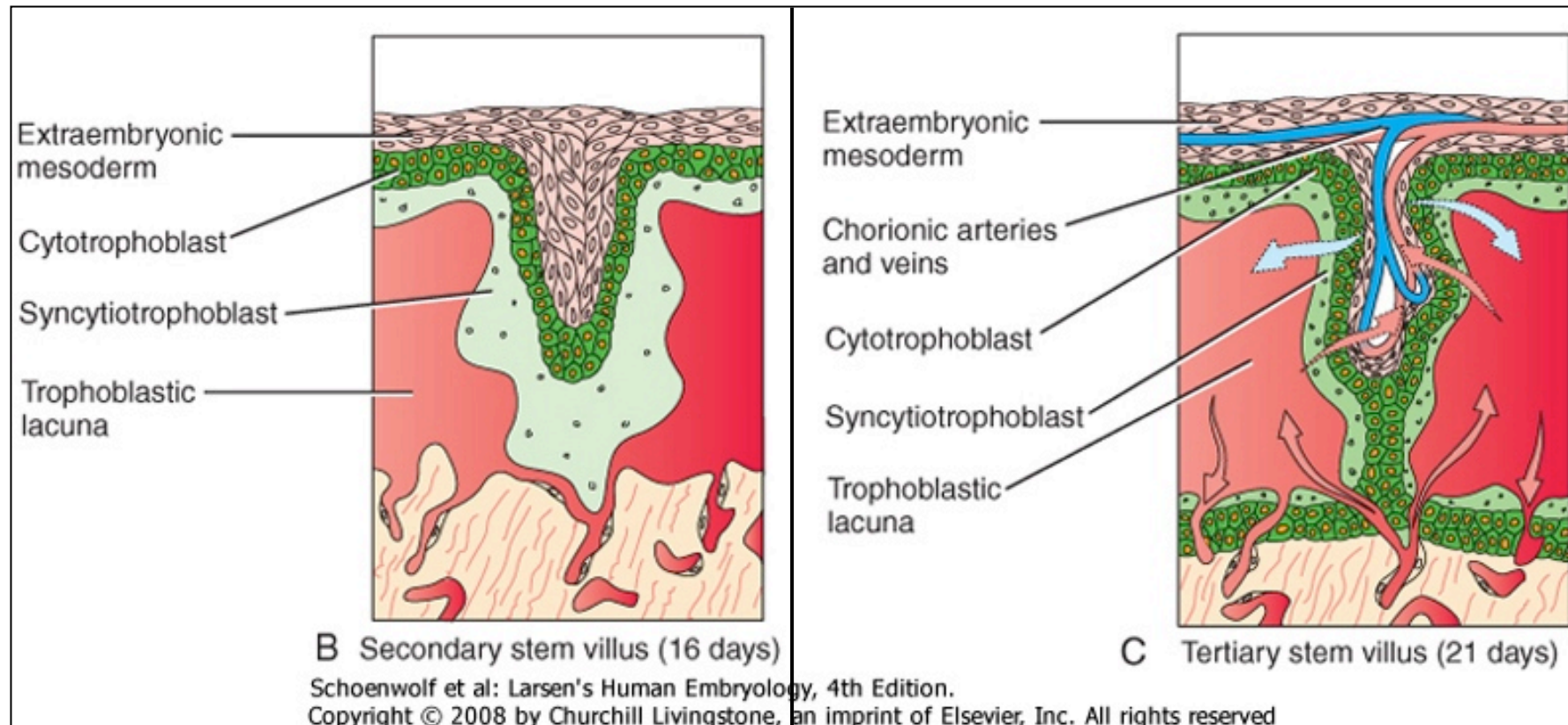
Primary chorionic stem villi formation: Cytotrophoblast projections into lacunae



# Placentation

Day 16  
Secondary stem villus  
Cytotrophoblast projections

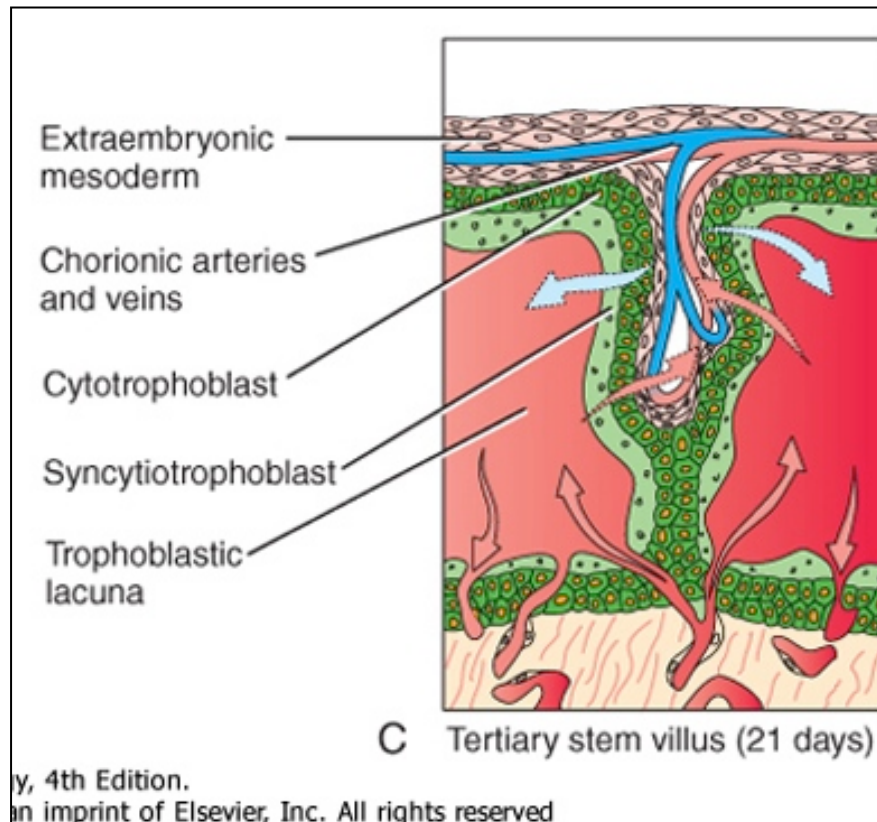
Day 21  
Tertiary stem villus  
Blood vessel development



# Placentation

Placental barrier

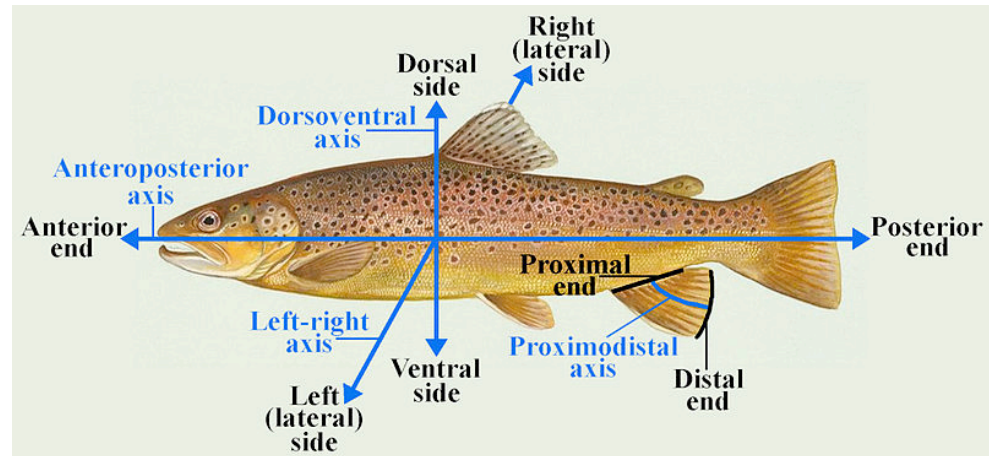
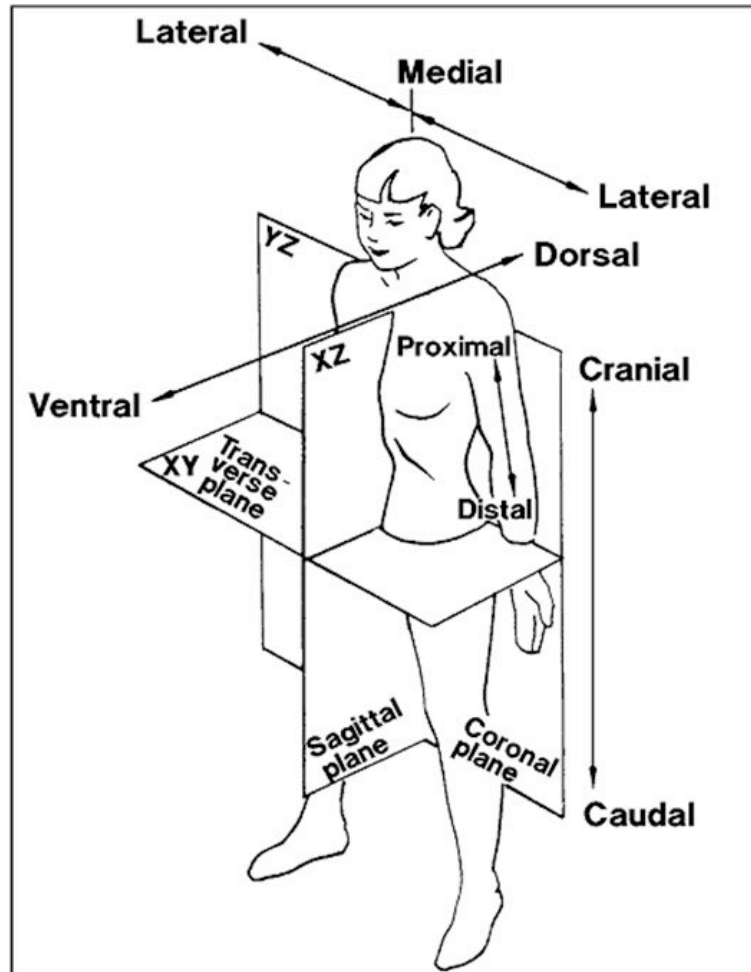
No mixing of embryonic and maternal blood



4 separating tissue layers:  
Endothelium  
Connective tissue (EEM)  
Cytotrophoblast  
Syncytiotrophoblast

# Body axes

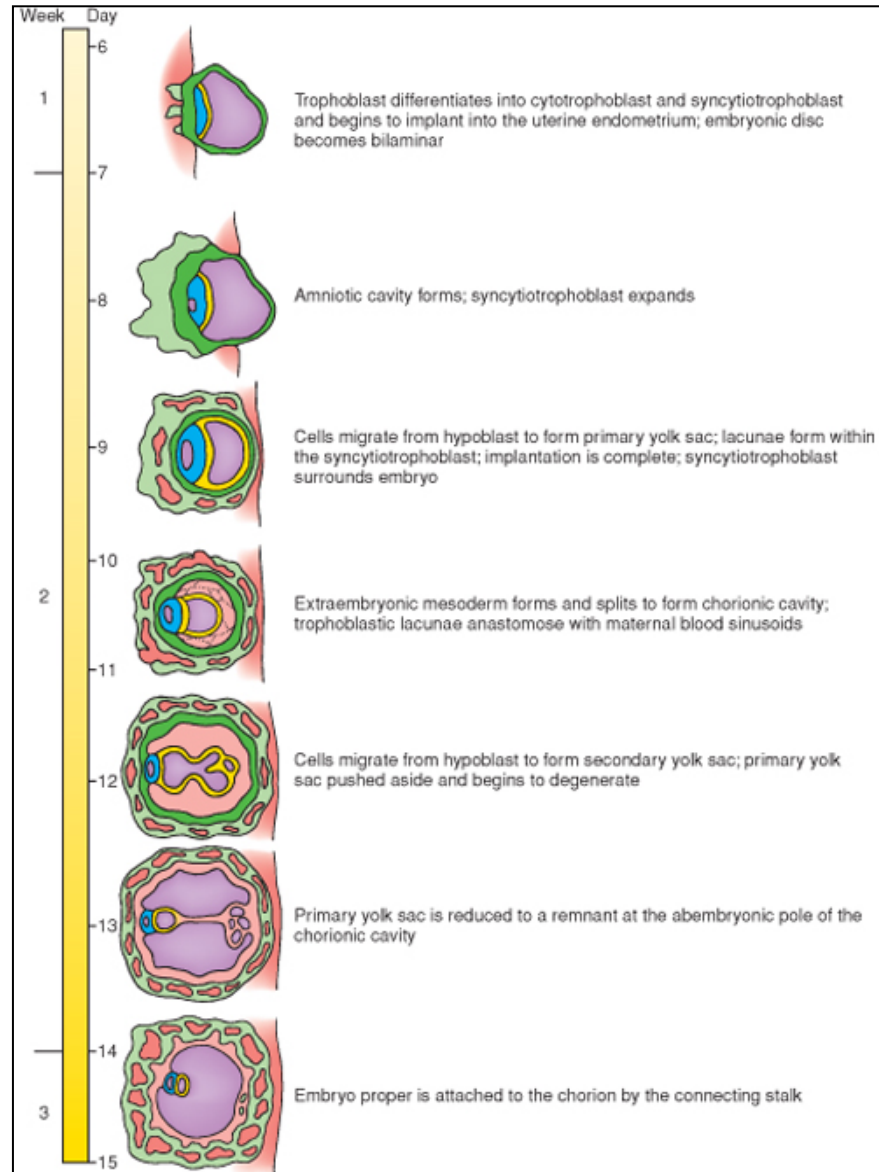
## Anatomical orientation





# Implantation

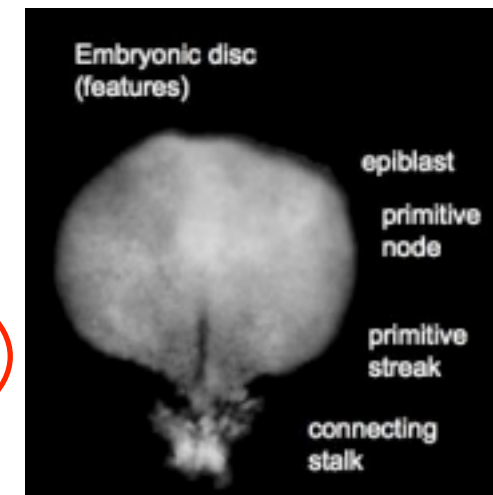
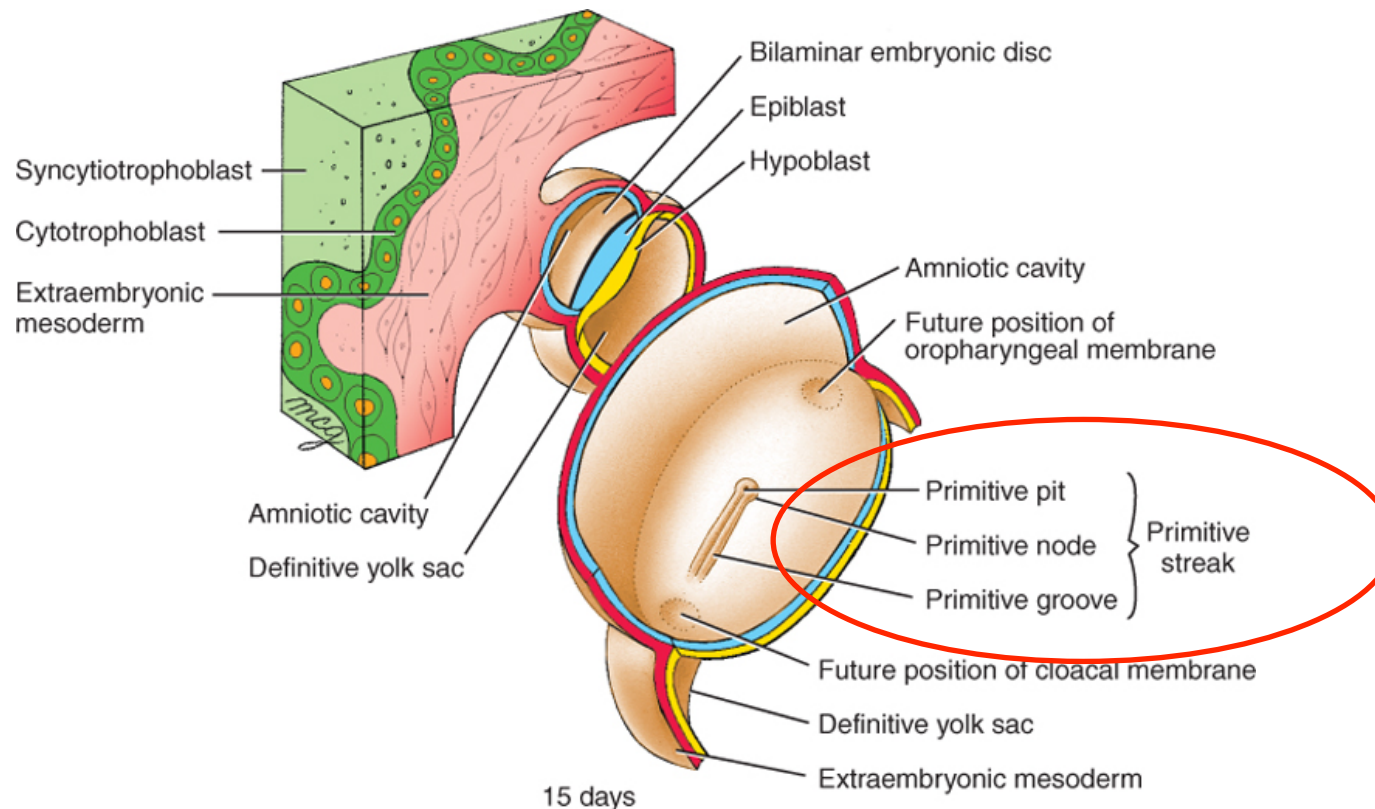
## Week 2



# Gastrulation

Day 15

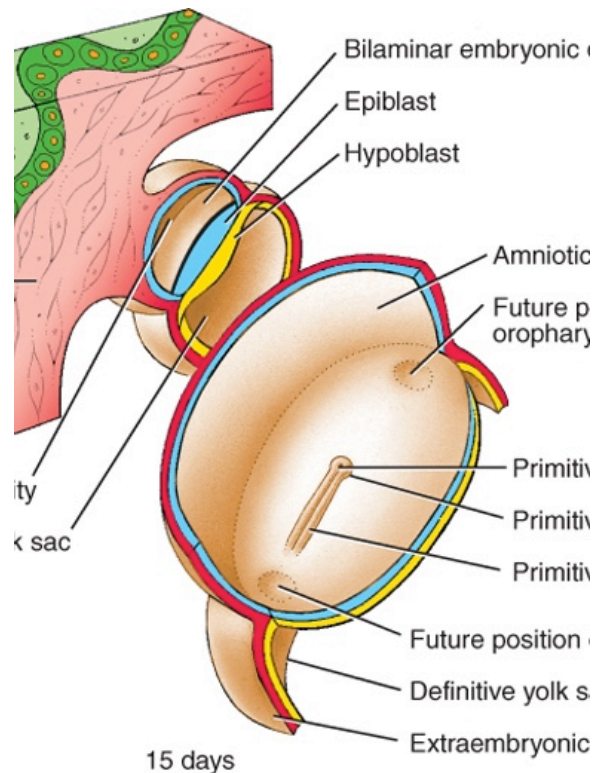
Formation of the 3 germ layers  
Formation of body axes



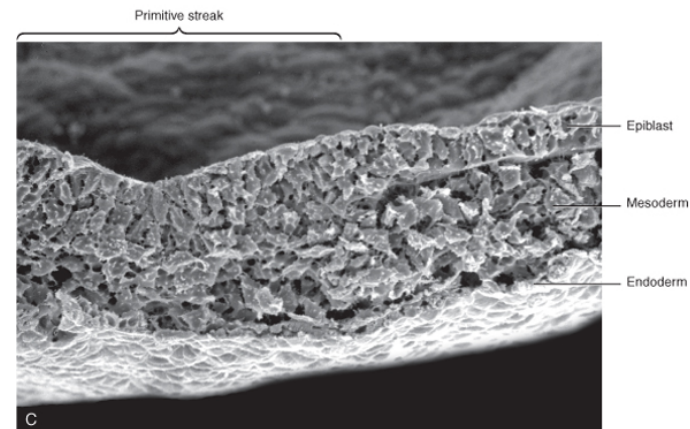
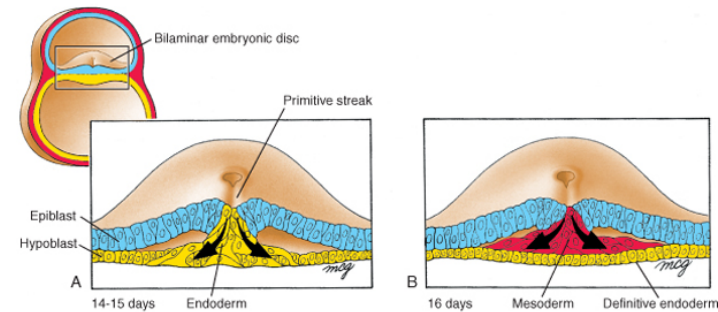
# Gastrulation

Day 16

- Ingression of epiblast cells: EMT transition
- Generation of definitive endoderm
- Generation of intra-embryonic mesoderm
- Oropharyngeal and cloacal membrane
- Embryonic ectoderm



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# Gastrulation

Day 16

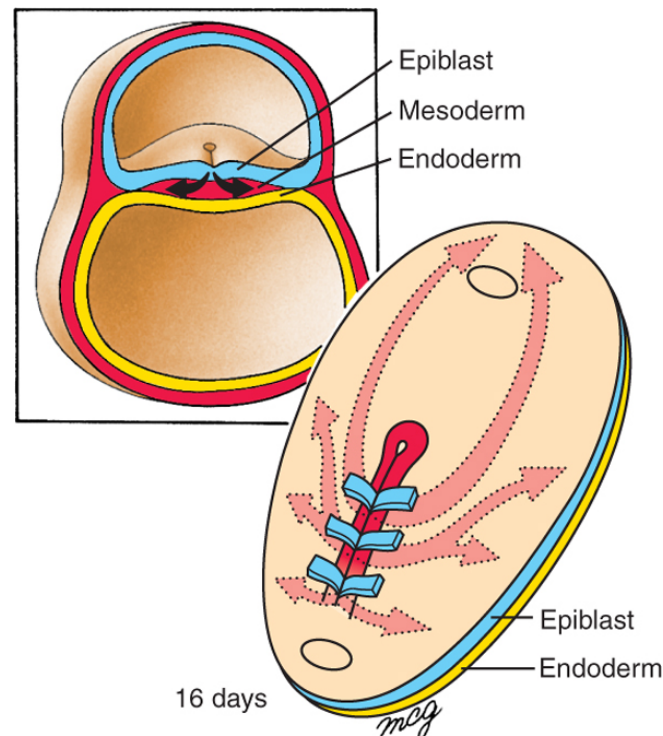
Ingression of epiblast cells: EMT transition

Generation of definitive endoderm

Generation of intra-embryonic mesoderm

Oropharyngeal and cloacal membrane

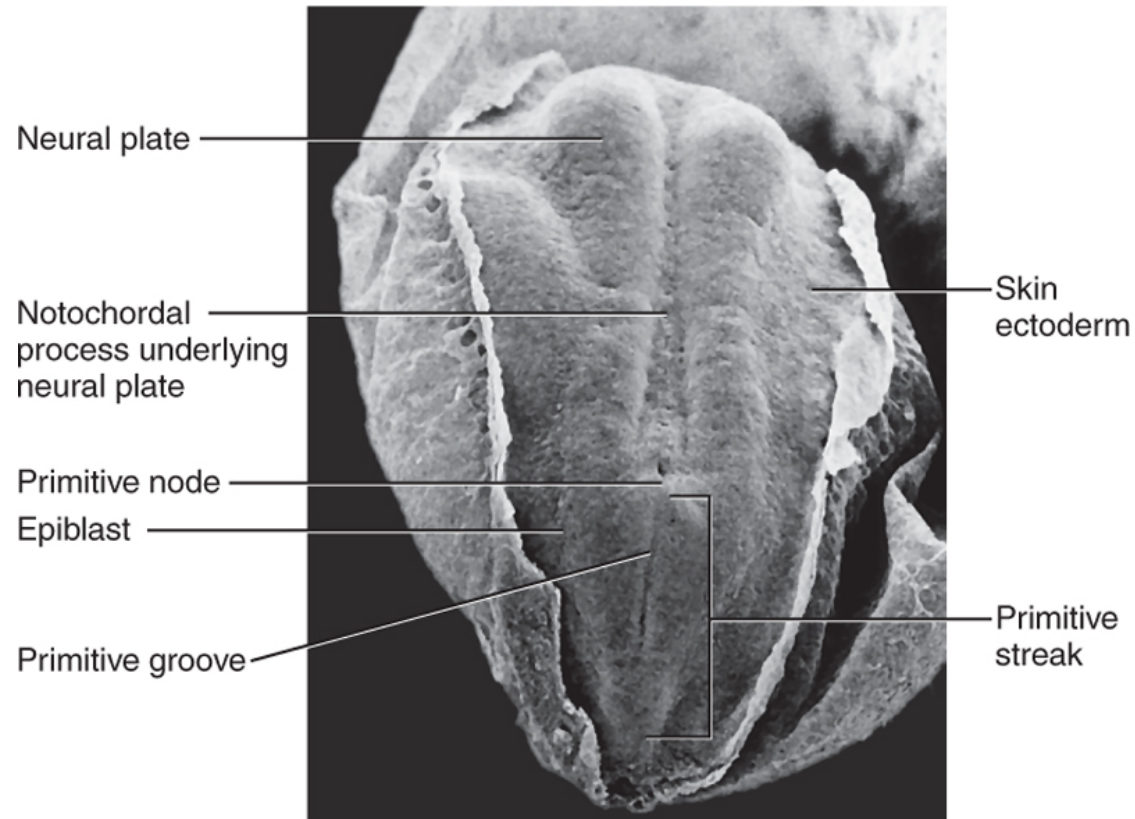
Embryonic ectoderm



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# Gastrulation

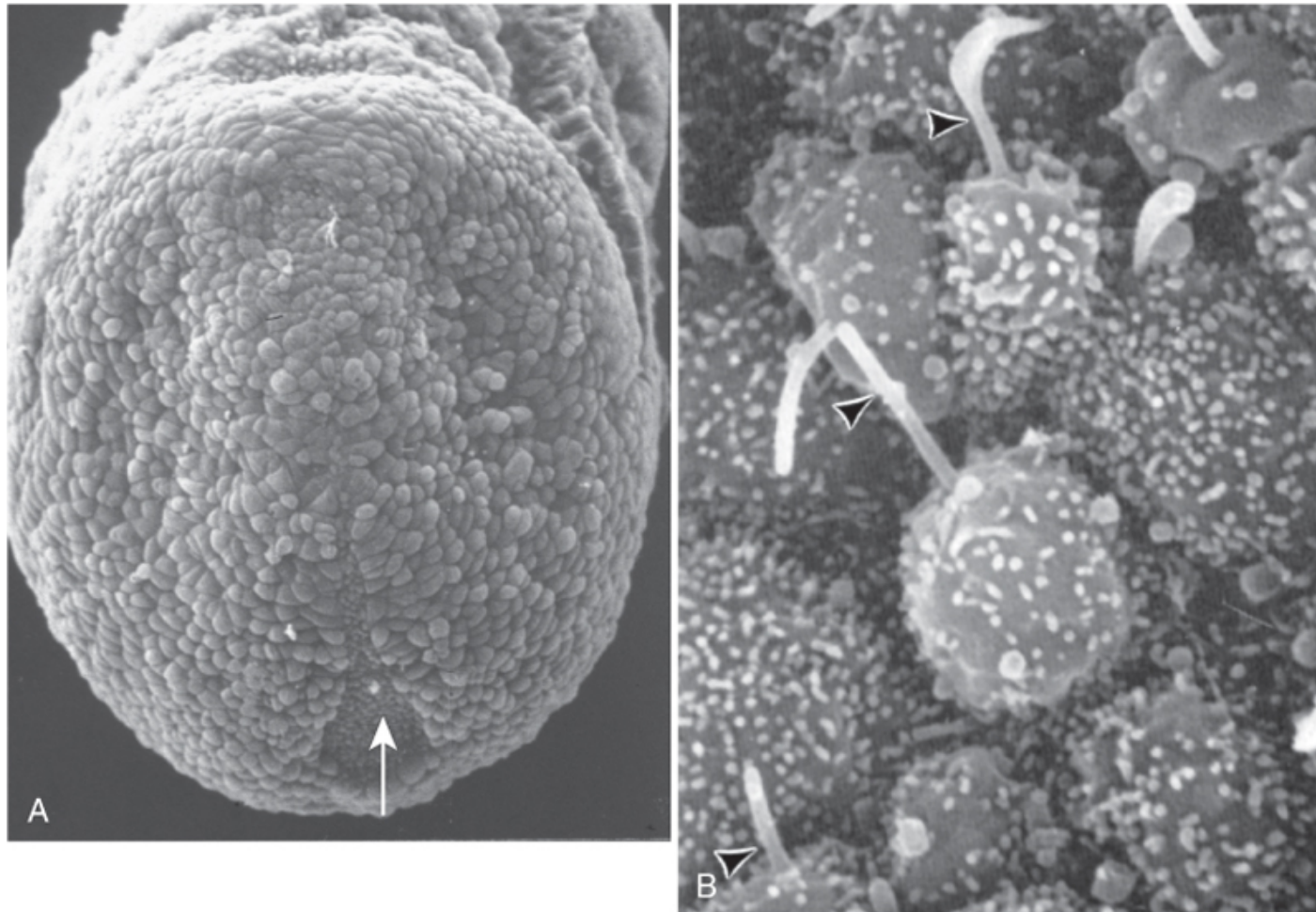
Ingression of epiblast cells: EMT transition



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# Gastrulation

DV axis generation: Nodal cilia, Lefty/Nodal signalling



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[http://php.med.unsw.edu.au/embryology/images/a/a9/Nodal\\_cilia\\_001.mp4](http://php.med.unsw.edu.au/embryology/images/a/a9/Nodal_cilia_001.mp4)

# Gastrulation

**Epiblast** forms 3 germ layers:

- Ectoderm: epithelium (previous epiblast)
- Mesoderm: mesenchymal layer (embryonic connective tissue)
  - Endoderm: epithelium

**Hypoblast:**

- replaced by definitive endoderm

# End product gastrulation:

## Trilaminar embryo

### Ectoderm (*Neural crest*)

brain, spinal cord, eyes, *peripheral nervous system*  
epidermis of skin and associated structures,  
*melanocytes, cranial connective tissues (dermis)*

### Mesoderm

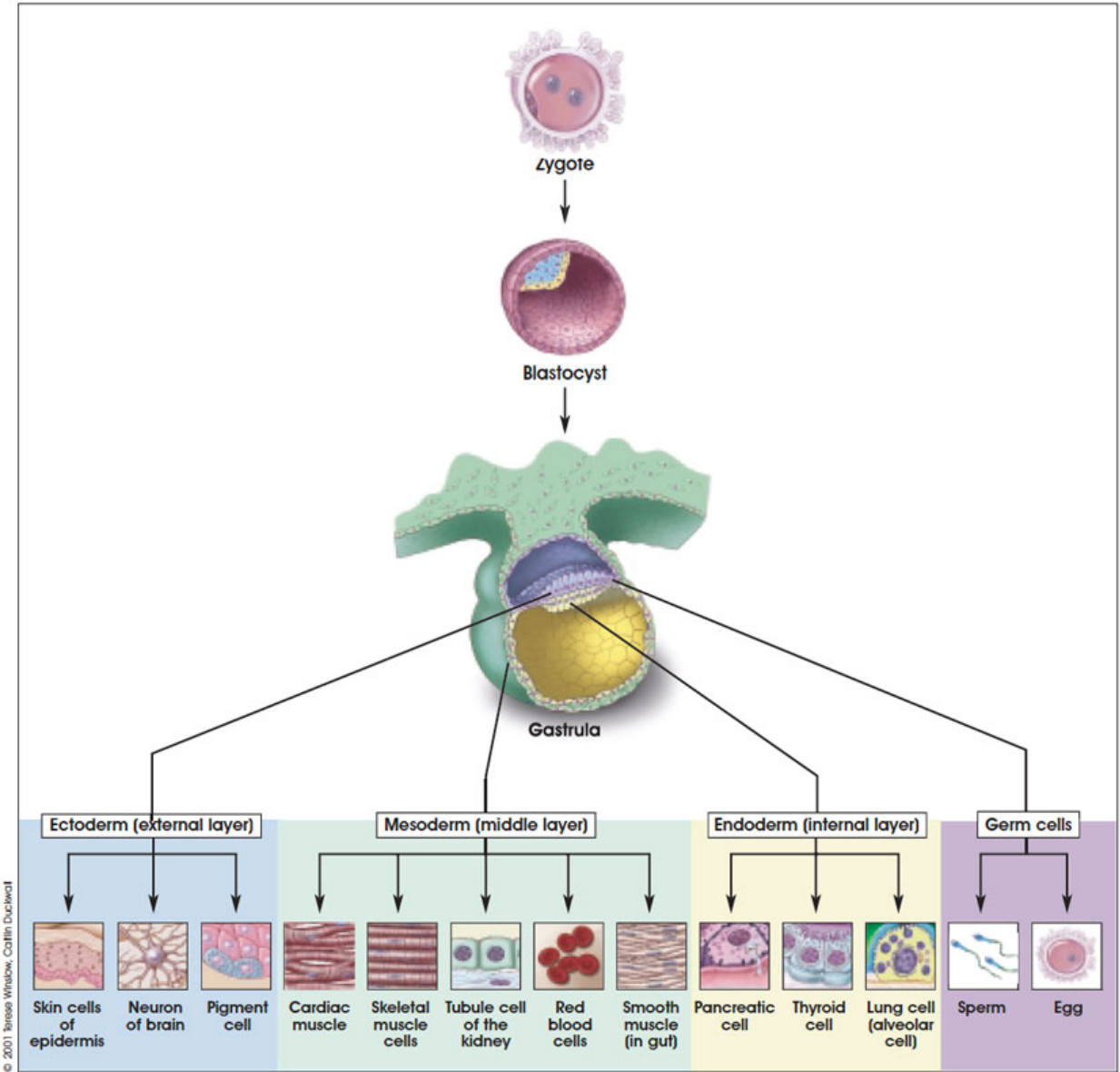
musculo-skeletal system, limbs  
connective tissue of skin and organs  
urogenital system, heart, blood cells

### Endoderm

epithelial linings of gastrointestinal, liver, pancreas,  
thyroid and respiratory tracts



# Embryonic development:

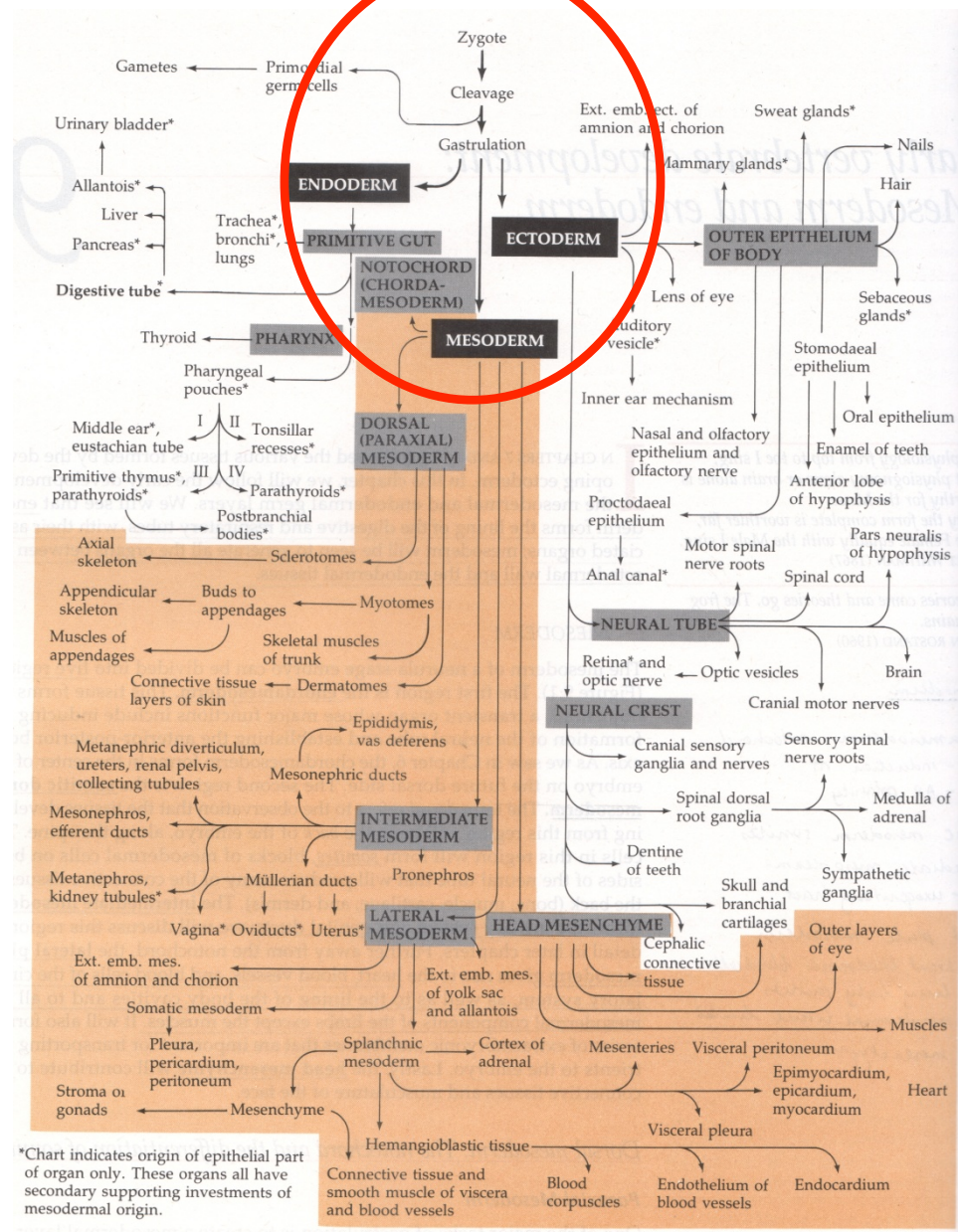


3 weeks

37 weeks

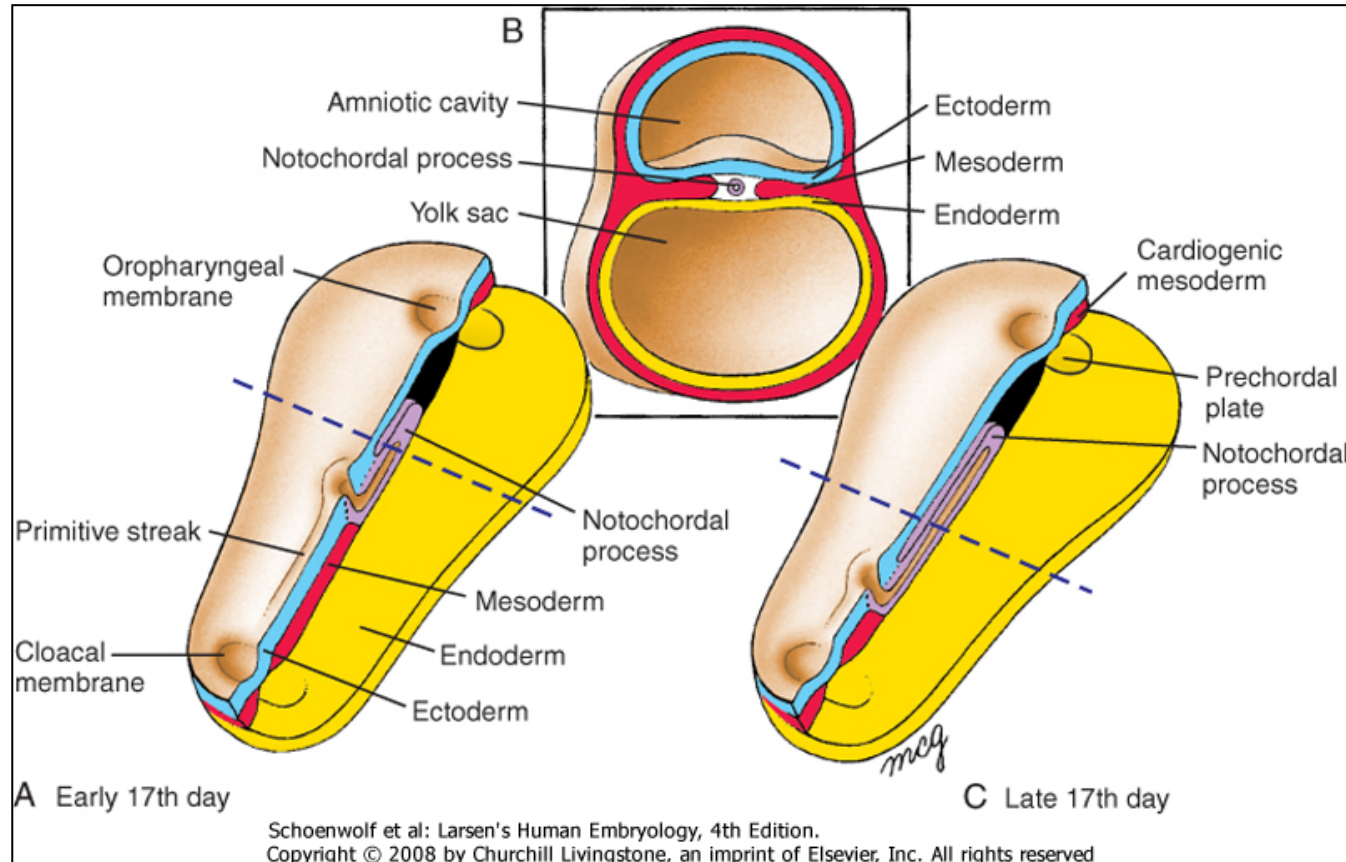
© 2001 Terese Winslow, Corliss Duckwatt

# Embryonic development:



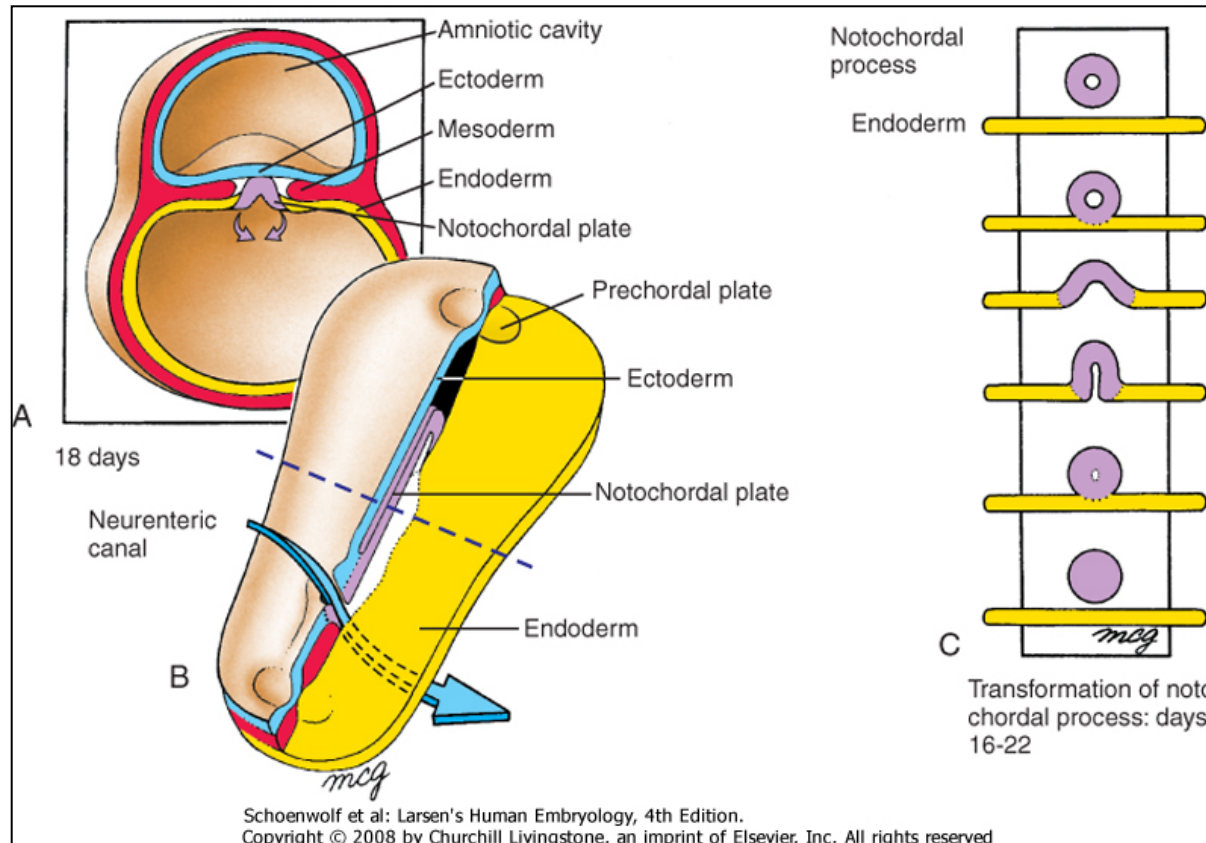
\*Chart indicates origin of epithelial part of organ only. These organs all have secondary supporting investments of mesodermal origin.

# Notochord



- Axial mesoderm
- Transient
- Crucial signalling centre
- Mechanical role in embryonic folding

# Notochord

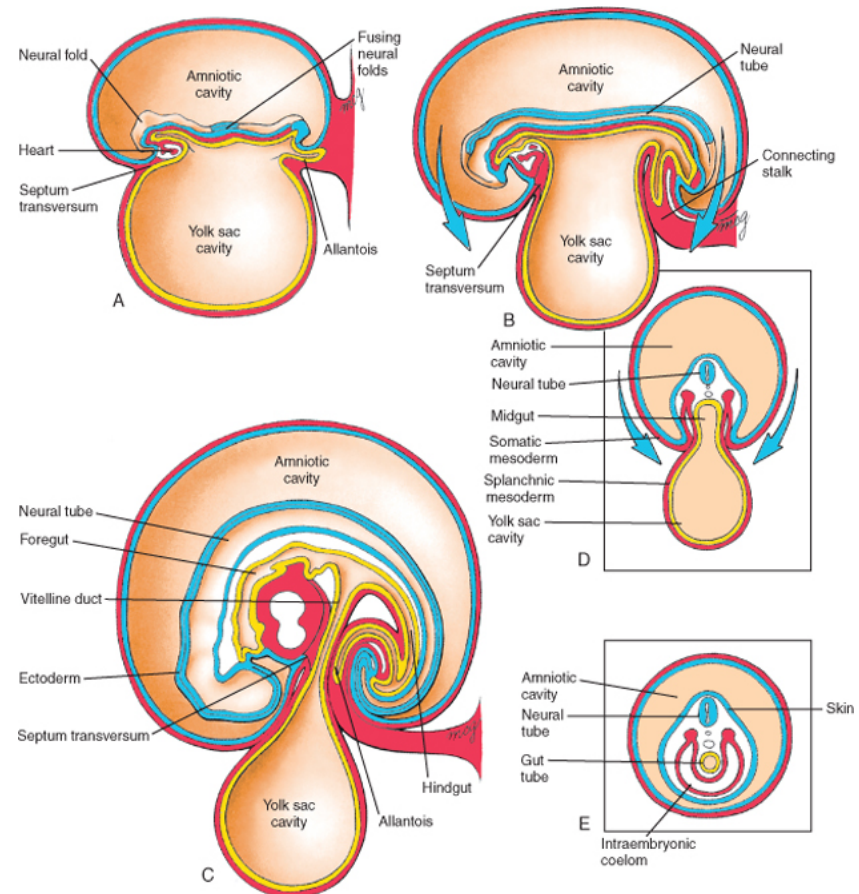
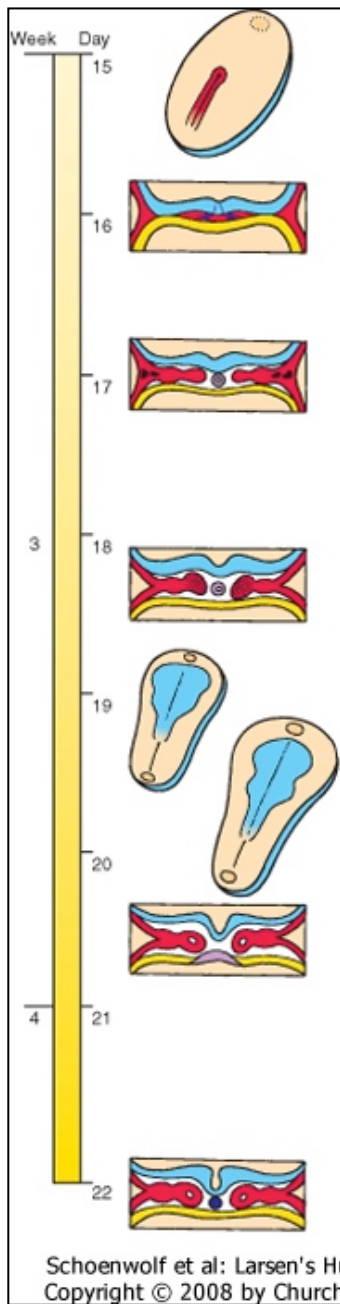


Notochordal  
plate

- Axial mesoderm
- Transient
- Crucial signalling centre
- Mechanical role in embryonic folding

# Embryo folding

Generation of primitive gut  
Neural plate and neural tube



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[http://php.med.unsw.edu.au/embryology/images/2/27/Week3\\_folding.mp4](http://php.med.unsw.edu.au/embryology/images/2/27/Week3_folding.mp4)

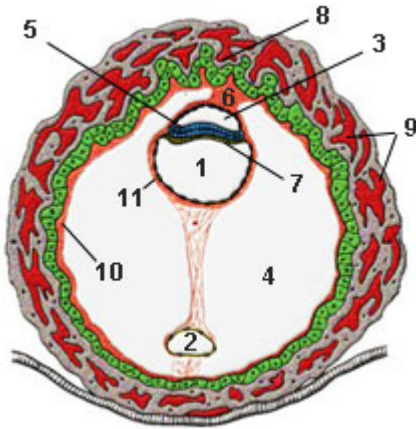
≈ 3 week old embryo



≈ 4 week old embryo



# Week 3 Lecture overview



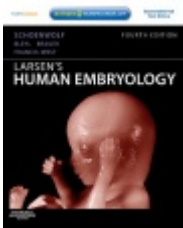
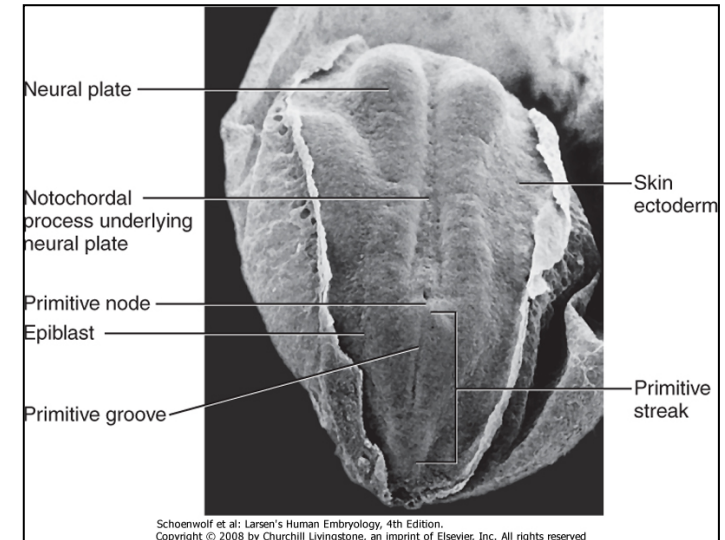
Placentation

Body axes

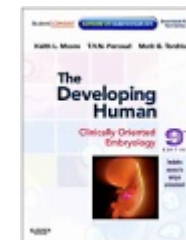
Gastrulation

Notochord formation

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