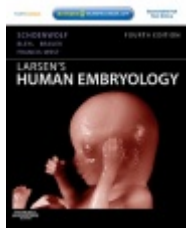
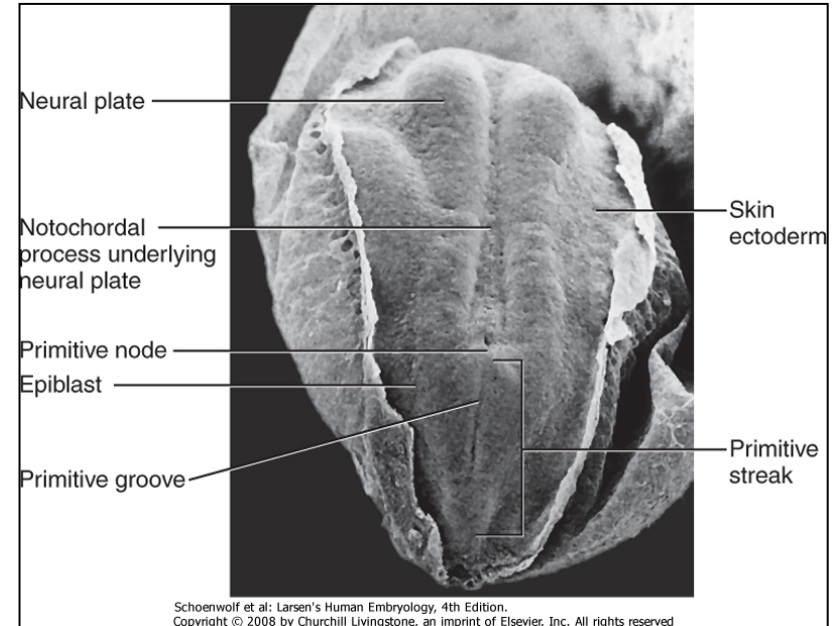
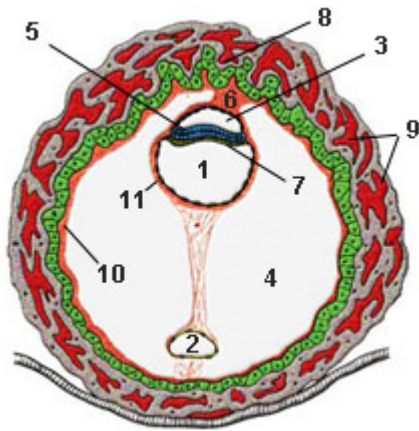
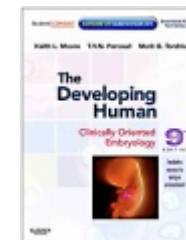


Week 3: gastrulation



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
Wallace Wurth Building Room 234 – A.Beverdam@unsw.edu.au

Week 1/2 Lecture overview

Fertilization

Cleavage stages

Morula , Compaction,

Blastocyst formation, hatching, implantation

Uterus

Generation of bilaminar embryo

Twinning

Dr Annemiek Beverdam – School of Medical Sciences, UNSW
Wallace Wurth Building Room 234 – A.Beverdam@unsw.edu.au

Week 3 Lecture overview

Placentation

Body axes

Gastrulation

Axis formation

Embryo folding

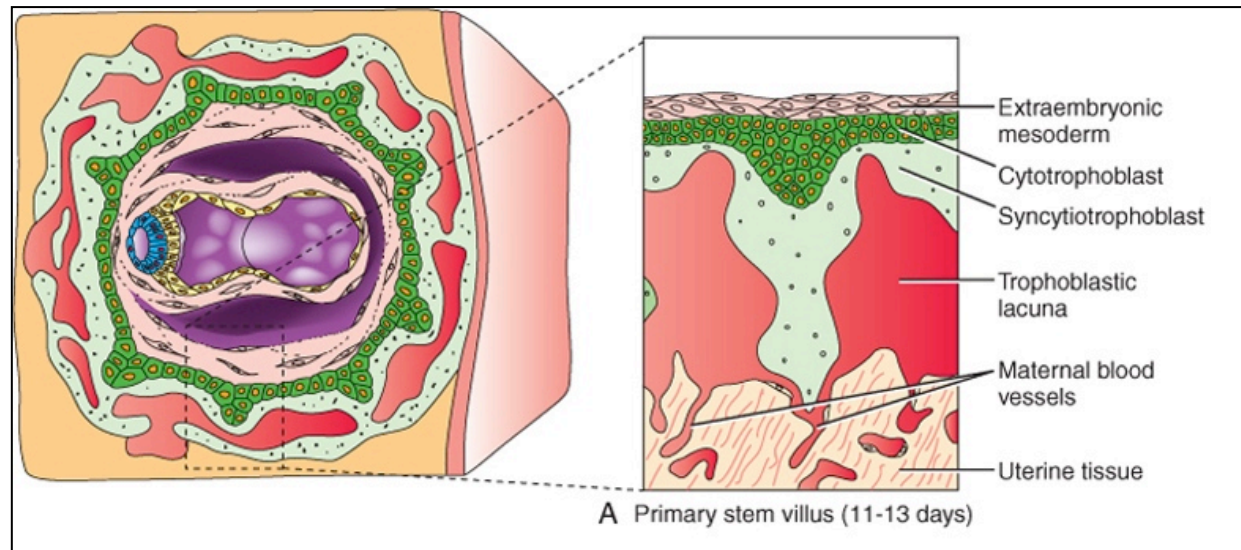
Dr Annemiek Beverdam – School of Medical Sciences, UNSW
Wallace Wurth Building Room 234 – A.Beverdam@uq.edu.au

Placentation

1st week: Nutrients through diffusion
Later: uteroplacental circulation

Day 11-13
Trophoblastic lacunae
Fusion with maternal circulation

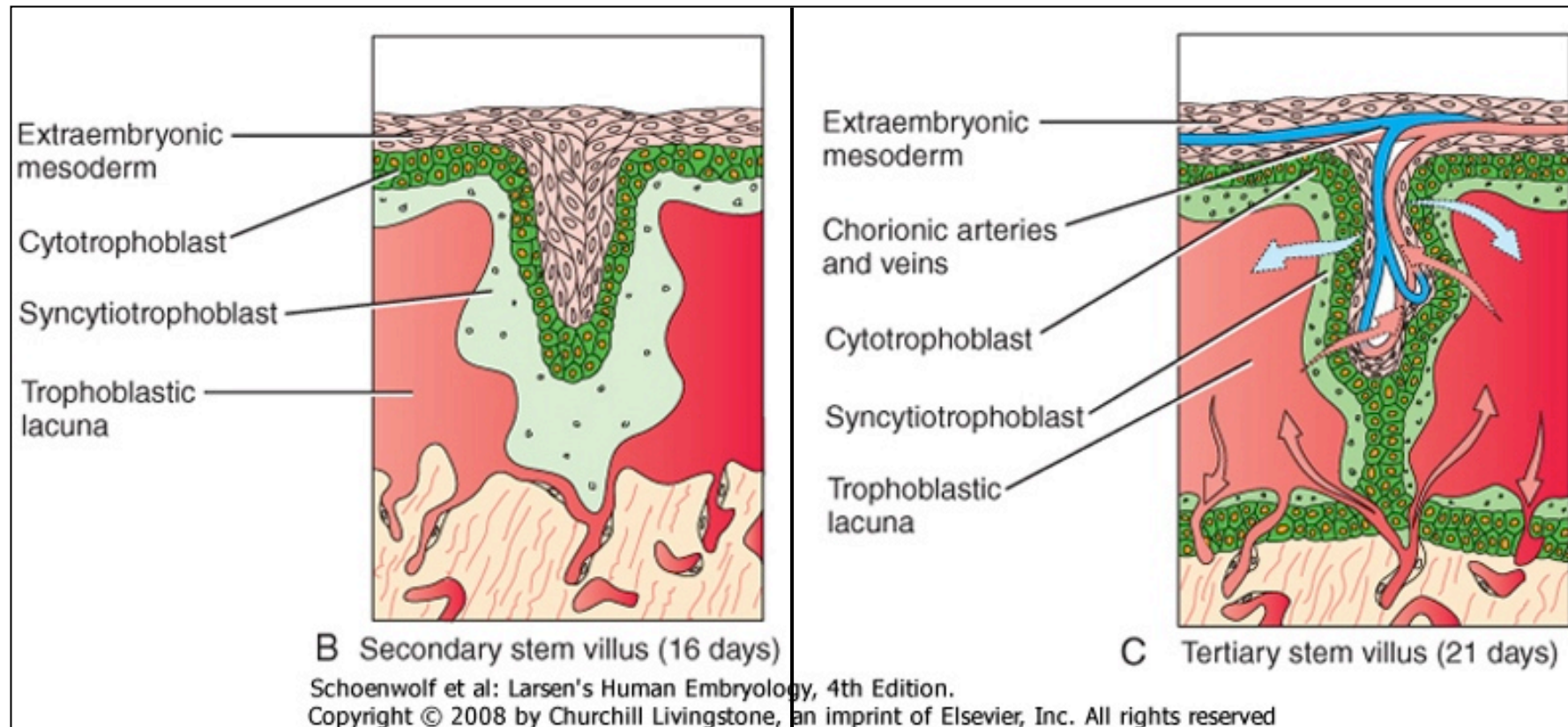
Primary chorionic stem villi formation: Cytotrophoblast projections into lacunae



Placentation

Day 16
Secondary stem villus
Cytotrophoblast projections

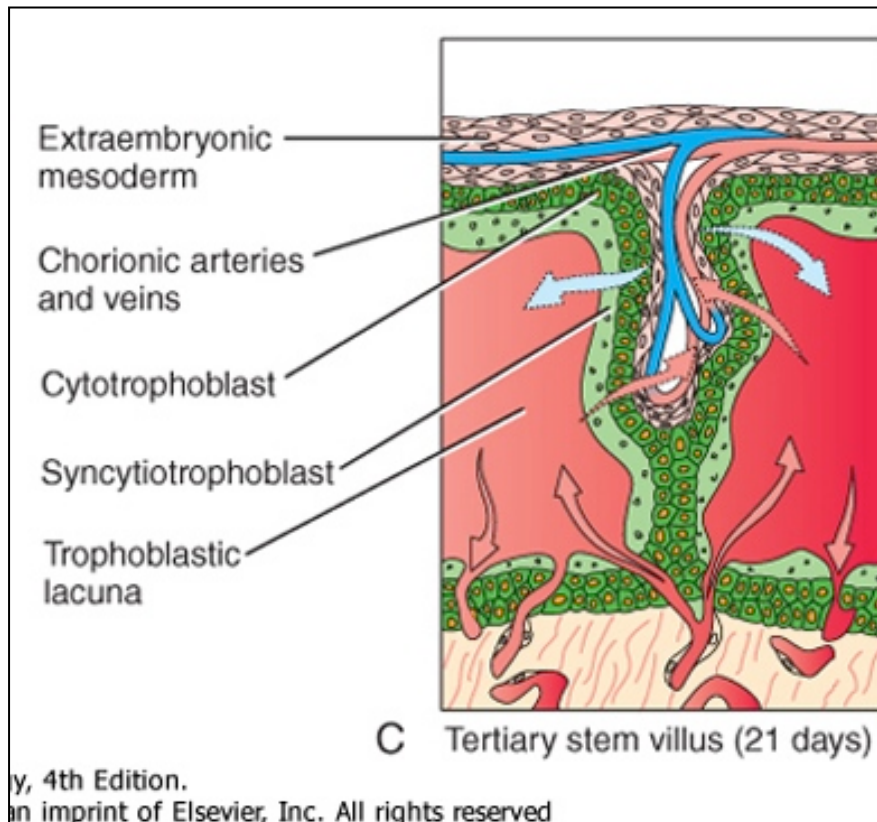
Day 21
Tertiary stem villus
Blood vessel development



Placentation

Placental barrier

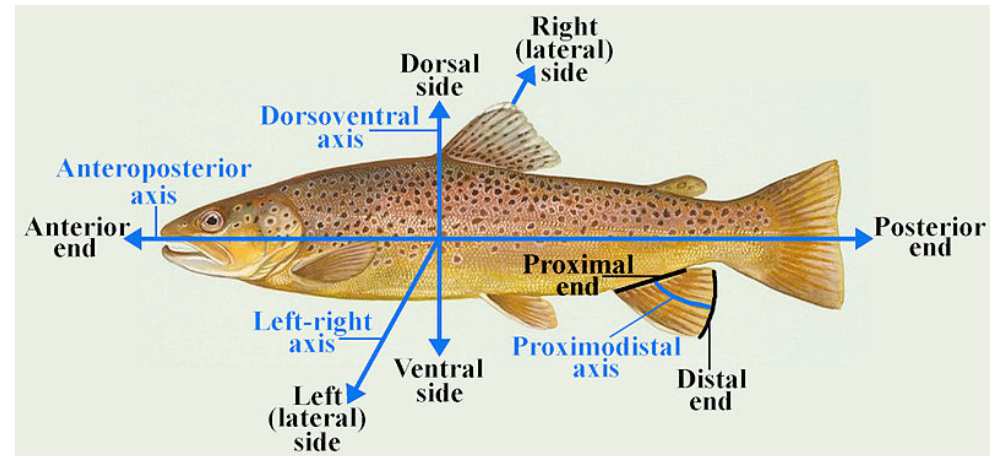
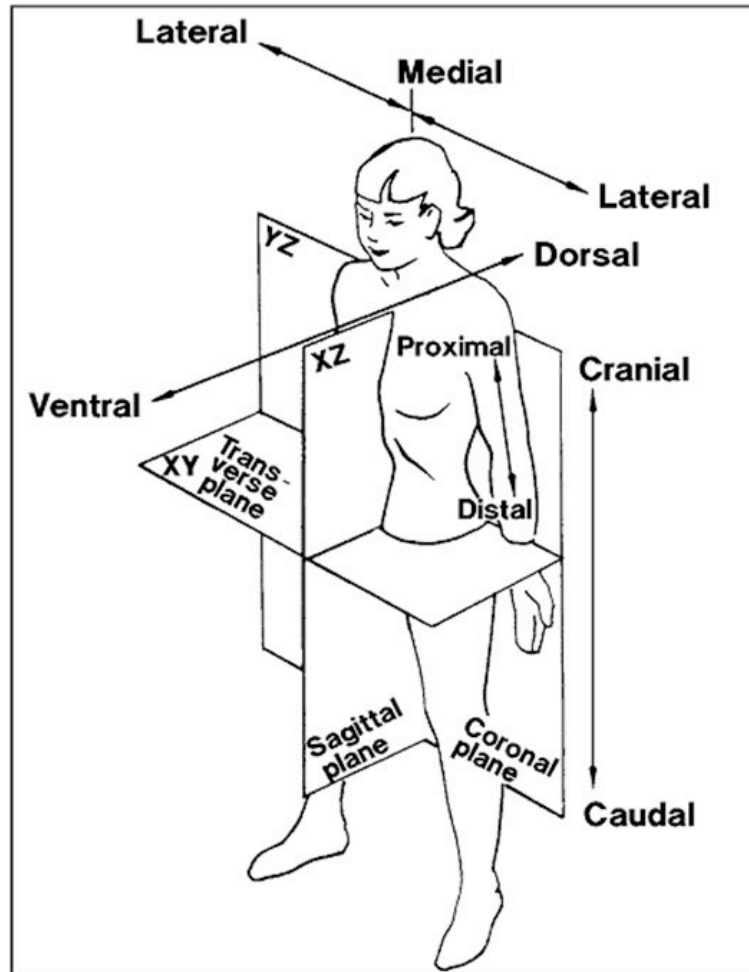
No mixing of embryonic and maternal blood



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

Body axes

Anatomical orientation

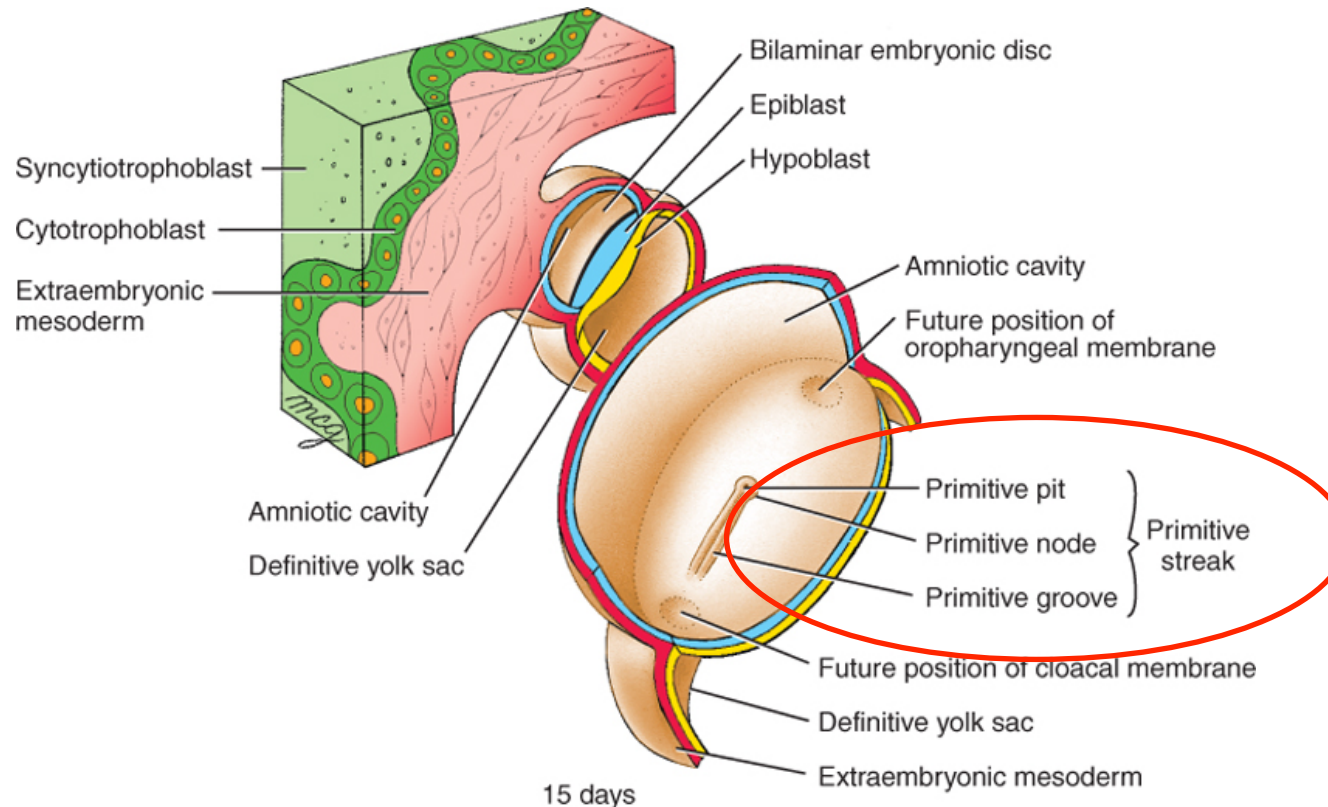


Gastrulation

Day 15

Formation of third germ layer

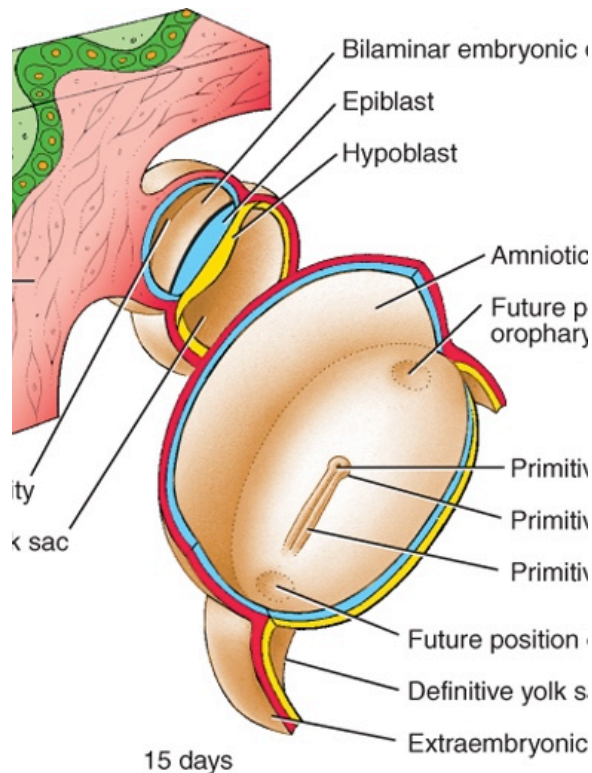
Formation of body axes



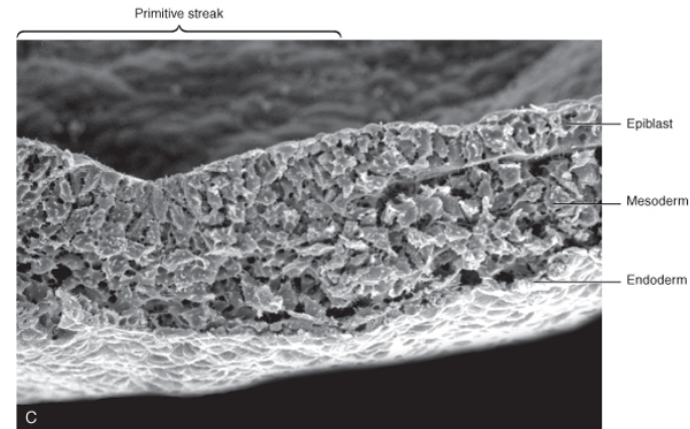
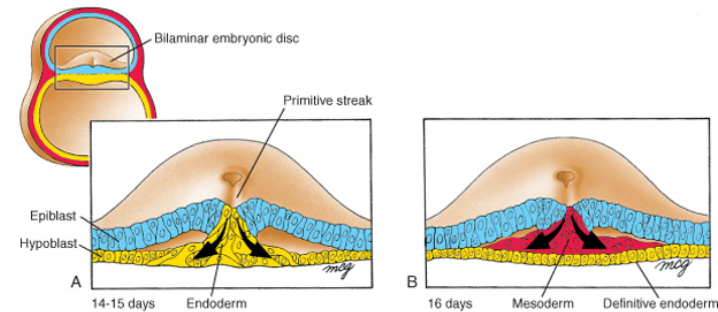
Gastrulation

Day 16

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



15 days
Larsen's Human Embryology, 4th Edition.
Copyright © 2008 by Churchill Livingstone, an imprint of Elsevier, Inc. All rights reserved.



Schoenwolf et al: Larsen's Human Embryology, 4th Edition.
Copyright © 2008 by Churchill Livingstone, an imprint of Elsevier, Inc. All rights reserved.

Gastrulation

Day 16

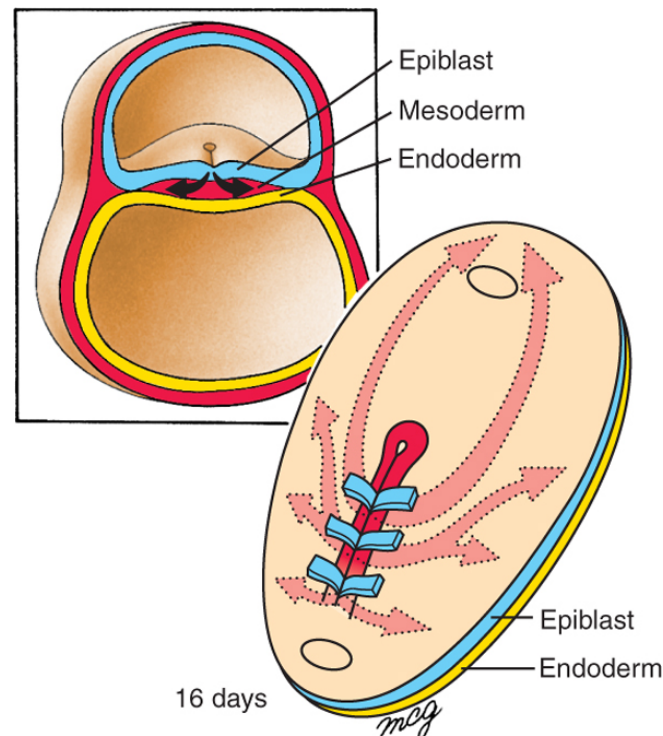
Ingression of epiblast cells: EMT transition

Generation of definitive endoderm

Generation of intra-embryonic mesoderm

Oropharyngeal and cloacal membrane

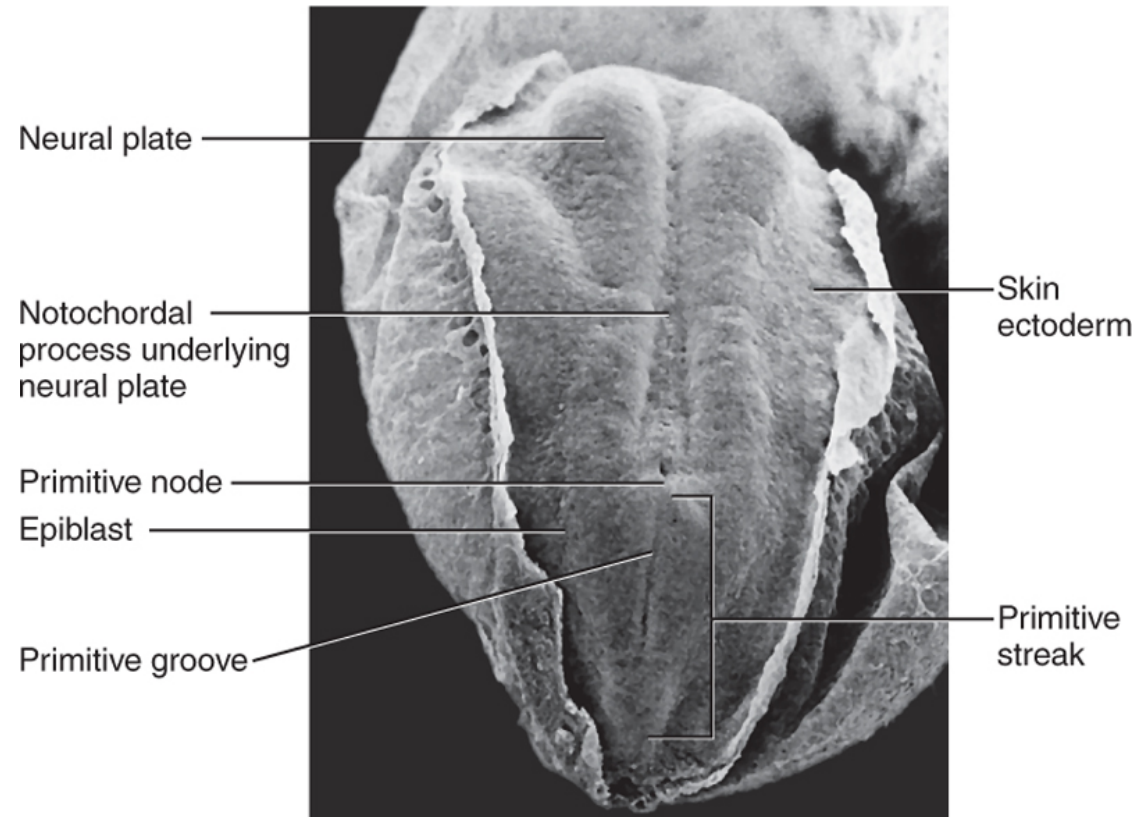
Embryonic ectoderm



Schoenwolf et al: Larsen's Human Embryology, 4th Edition.
Copyright © 2008 by Churchill Livingstone, an imprint of Elsevier, Inc. All rights reserved

Gastrulation

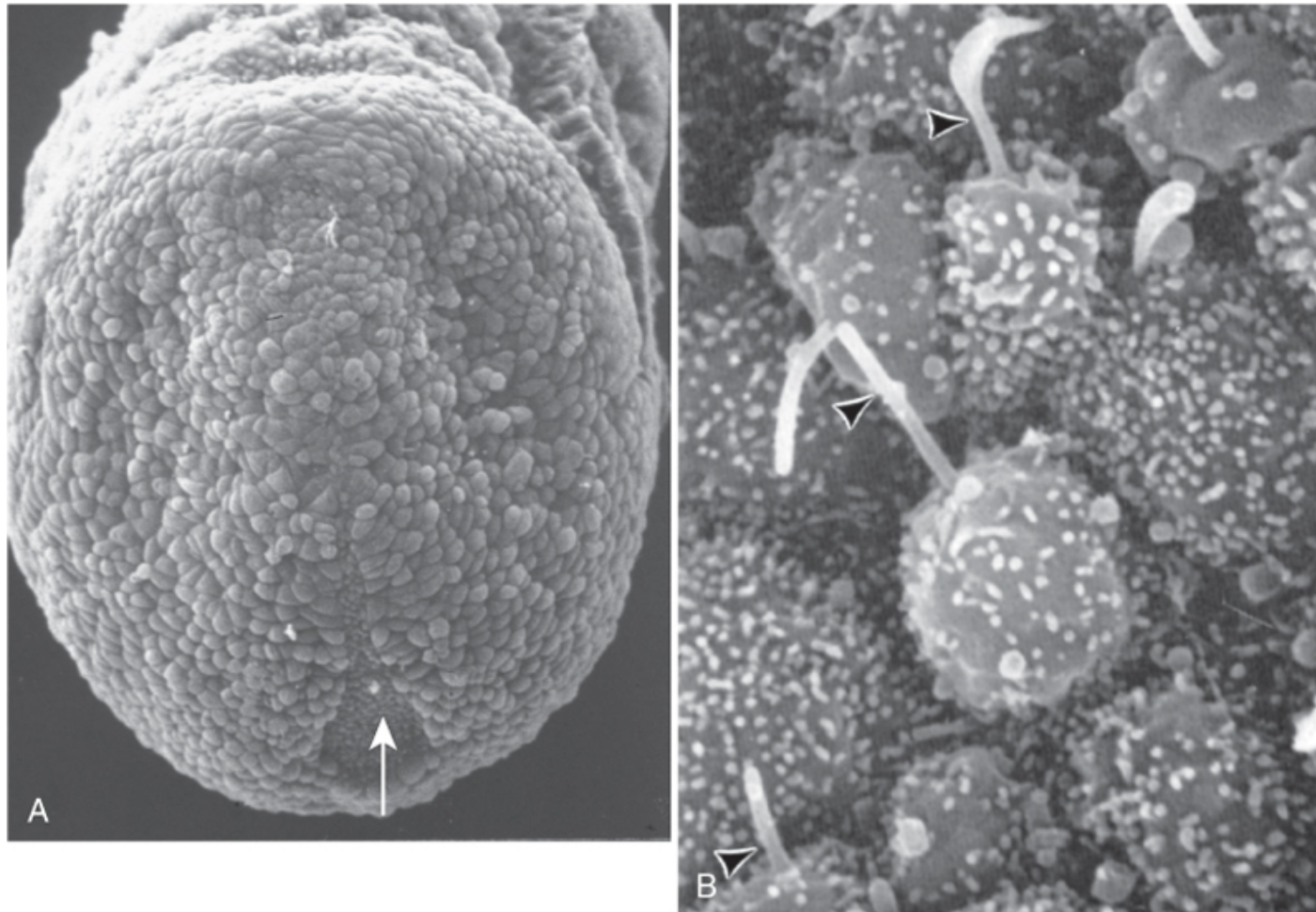
Ingression of epiblast cells: EMT transition



Schoenwolf et al: Larsen's Human Embryology, 4th Edition.
Copyright © 2008 by Churchill Livingstone, an imprint of Elsevier, Inc. All rights reserved

Gastrulation

DV axis generation: Nodal cilia, Lefty/Nodal signalling



Schoenwolf et al: Larsen's Human Embryology, 4th Edition.
Copyright © 2008 by Churchill Livingstone, an imprint of Elsevier, Inc. All rights reserved

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)

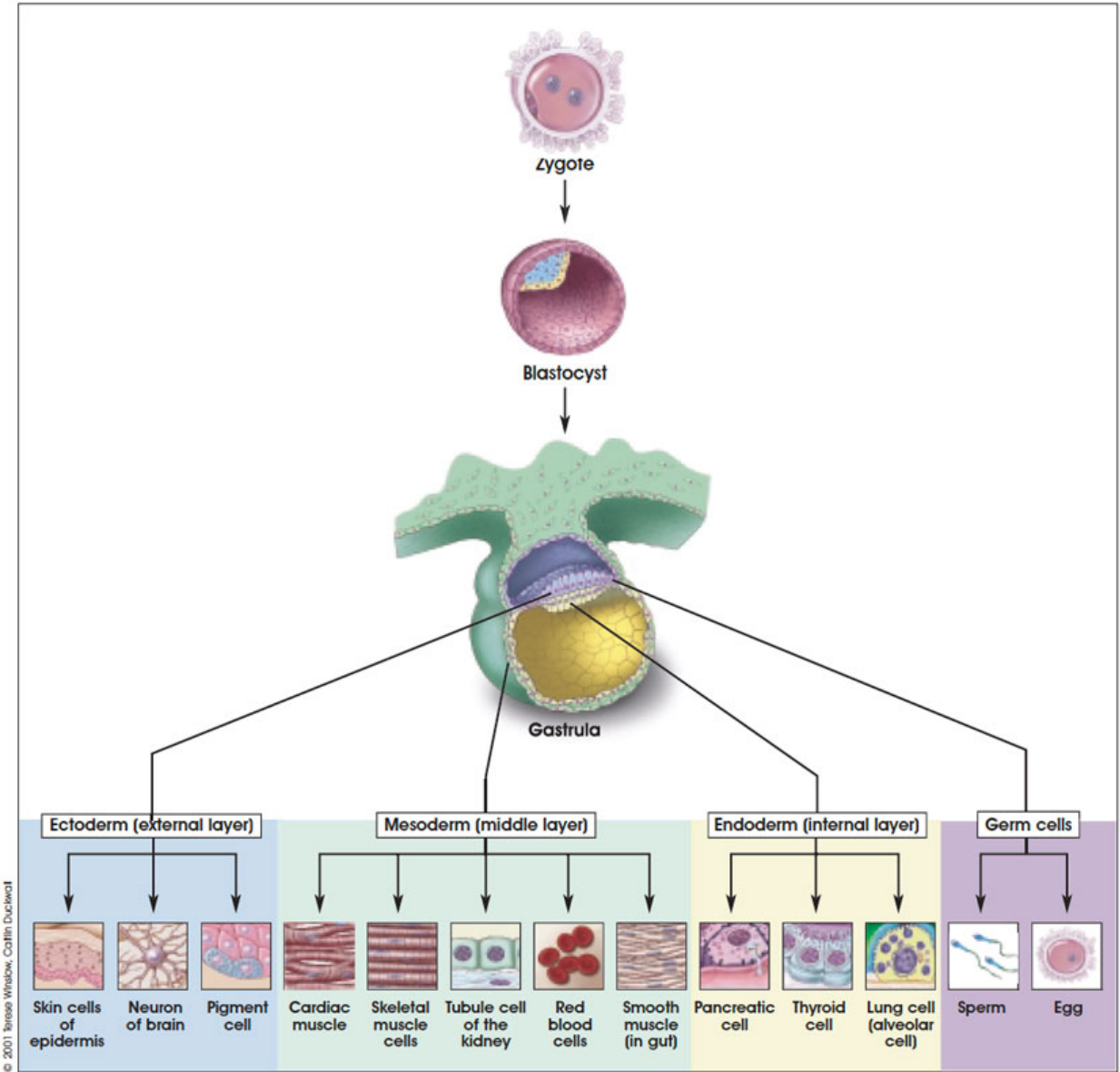
Mesoderm

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

Endoderm

epithelial linings of gastrointestinal and respiratory tracts

Embryonic development:

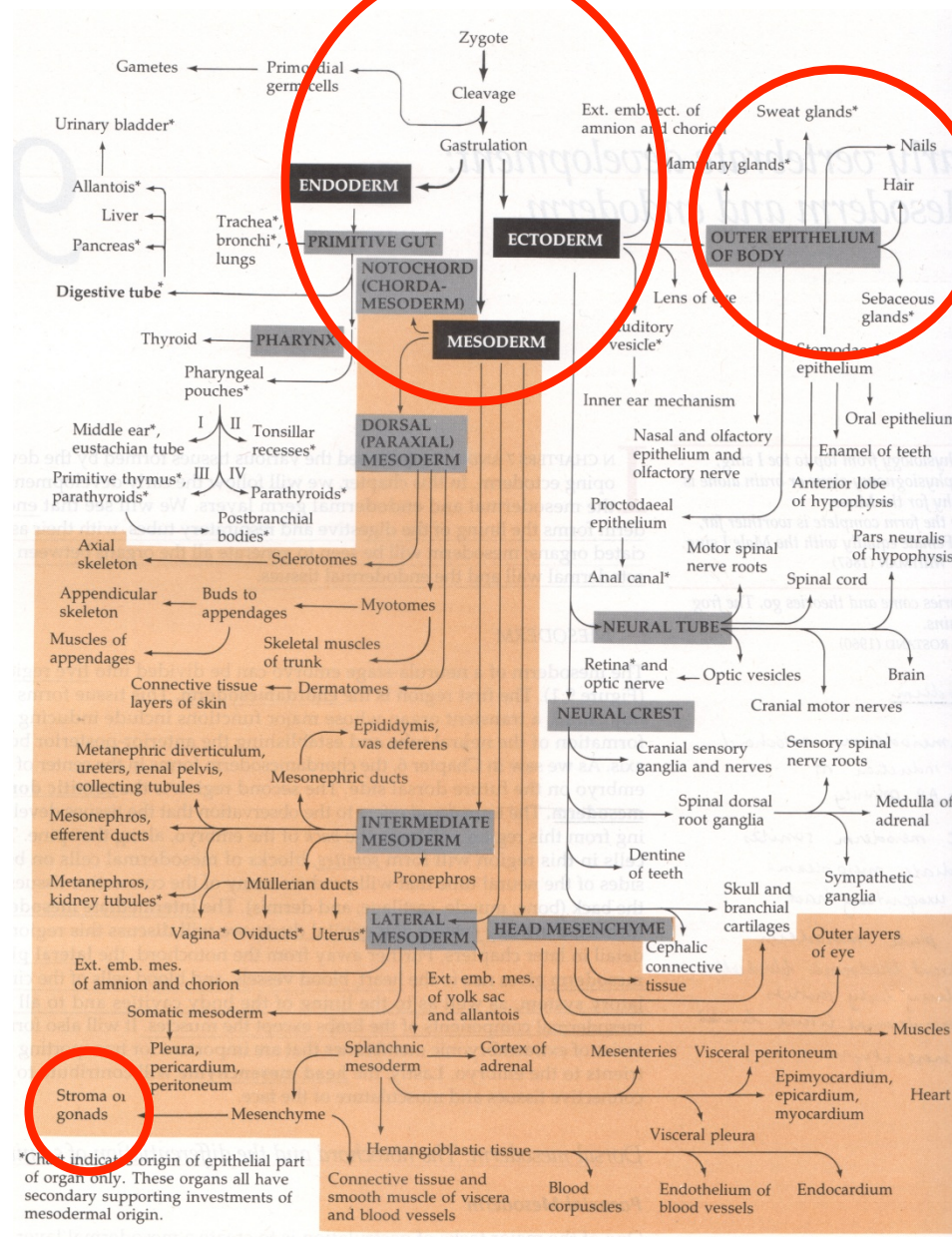


3 weeks

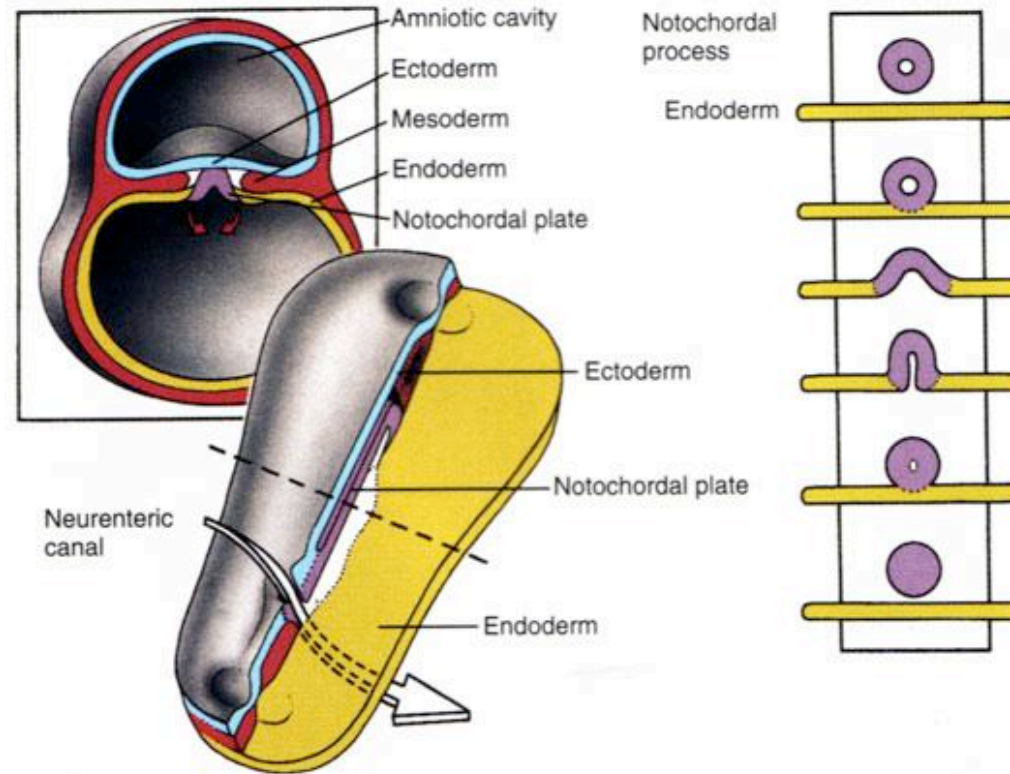
37 weeks

© 2001 Terese Winslow, Corliss Duckwatt

Embryonic development:



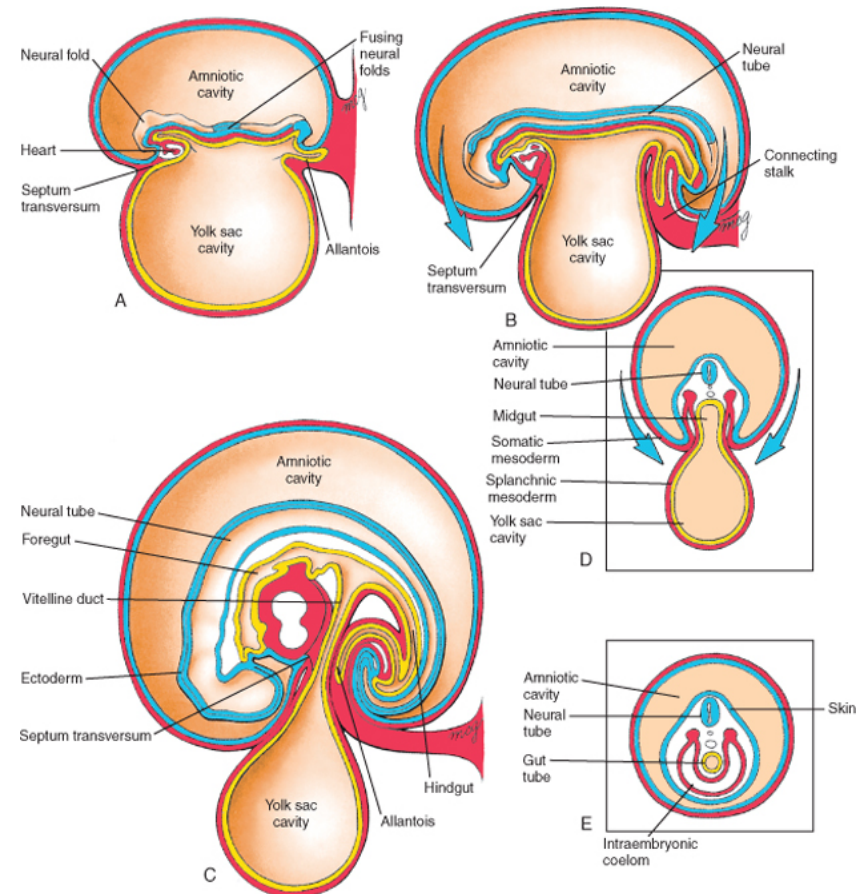
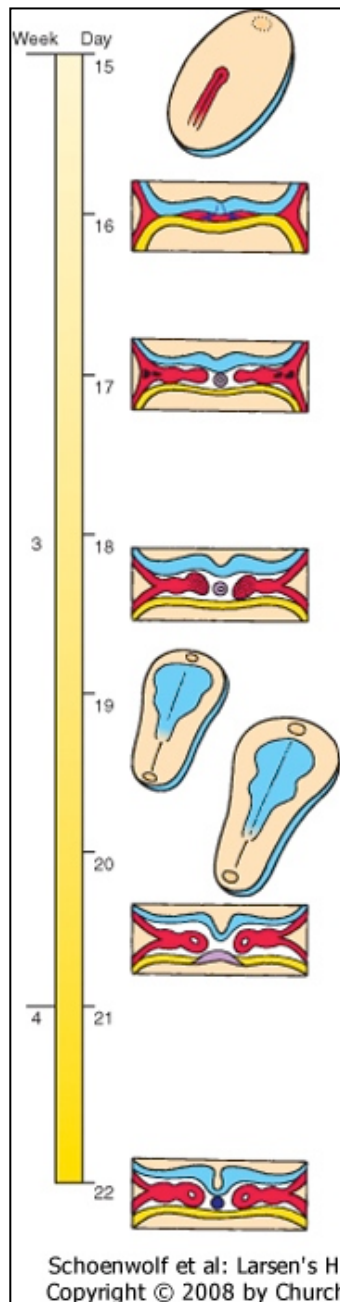
Notochord



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

Embryo folding

Generation of primitive gut
Neural plate and neural tube



Schoenwolf et al: Larsen's Human Embryology, 4th Edition.
Copyright © 2008 by Churchill Livingstone, an imprint of Elsevier, Inc. All rights reserved

http://php.med.unsw.edu.au/embryology/images/2/27/Week3_folding.mp4

Week 3 Lecture overview

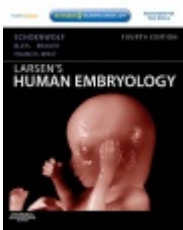
Placentation

Body axes

Gastrulation

Axis formation

Embryo folding



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
Wallace Wurth Building Room 234 – A.Beverdam@unsw.edu.au