



Placentation – Structure and Function

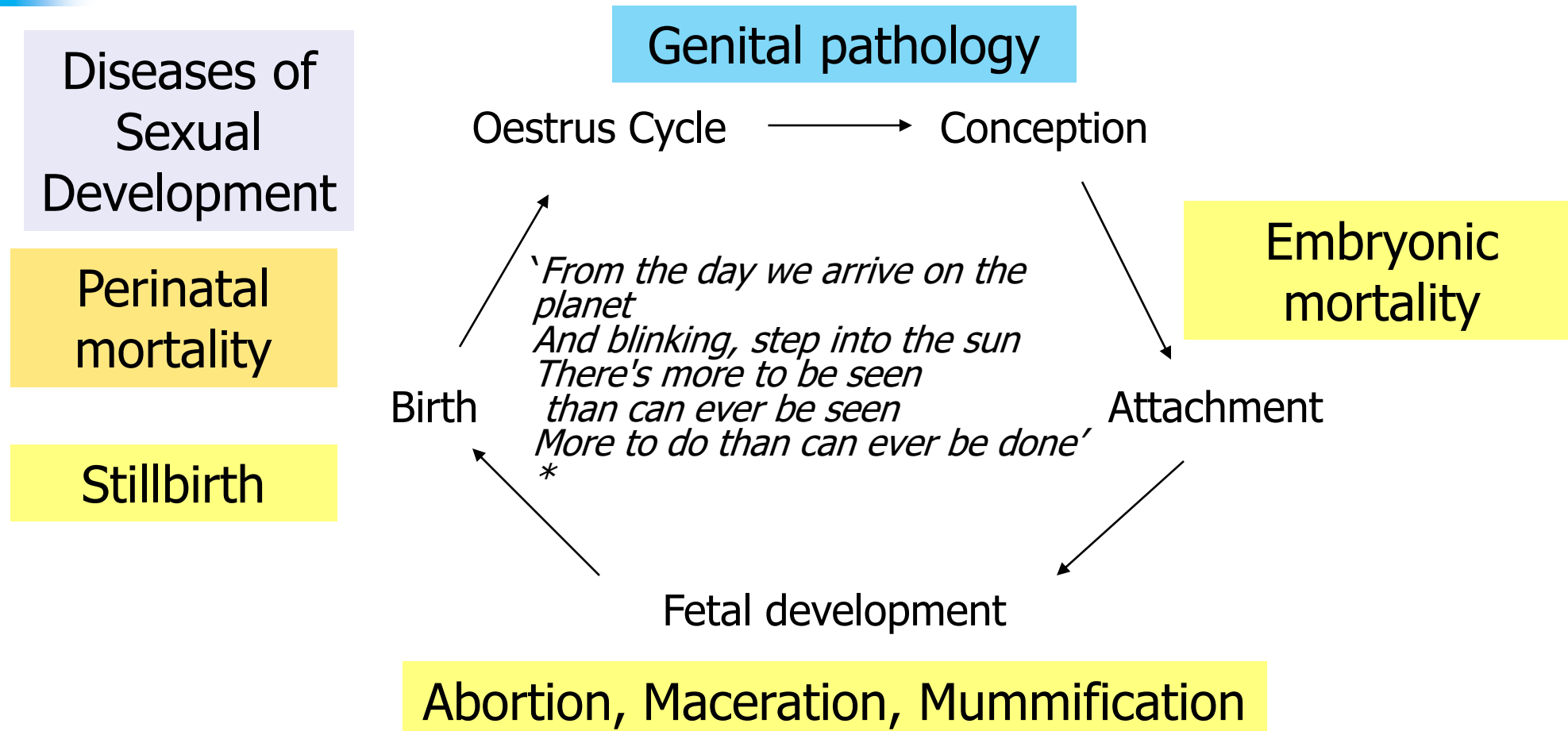
Rob Foster

VetReproPath.com

UNIVERSITY
of GUELPH

IMPROVE LIFE.

Circle of Reproductive Life*



* "Circle of Life" Music by Elton John, lyrics by Tim Rice, Performed by Elton John



Housekeeping

- Continuing Education
 - Zachary: Pathologic Basis of Veterinary Disease
 - [Reproductive Pathology Website](#)
- Presentations
 - Available on CourseLink and vetrepropath.com
 - Conventions of File Naming standardised
 - Accessible - Accessibility of Ontarians with Disabilities Act (AODA)
 - Accessibility checking limits font size (22 point) and amount of material on slides (5-6 lines)
- Notes (aka long notes) are on CourseLink.
 - Read before the lecture

Placenta - human/primate speak

- 'A flat cake' = disc = exchange area
- 'Membranes' = transparent membranes

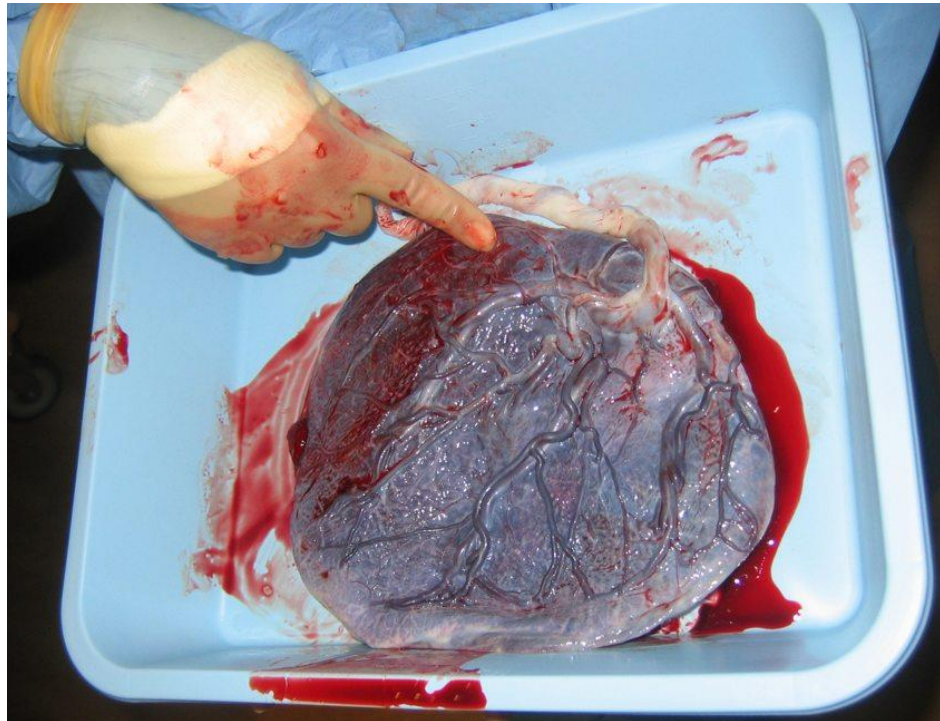


Photo complements of
[common.wikimedia.org](https://commons.wikimedia.org)

Reproduction

Reproduction occurs at the interface between aquatic and terrestrial environments.



What does a fetus need?

- Protective environment
- Shock absorbing
- Oxygen, Nutrition
- Transfer maternal immunity
- Waste removal



Gastric brooding frog:
American Museum of
Natural History

(Grey) Nurse and Great White Sharks



Complements of Australian Museum Online
australianmuseum.net.au



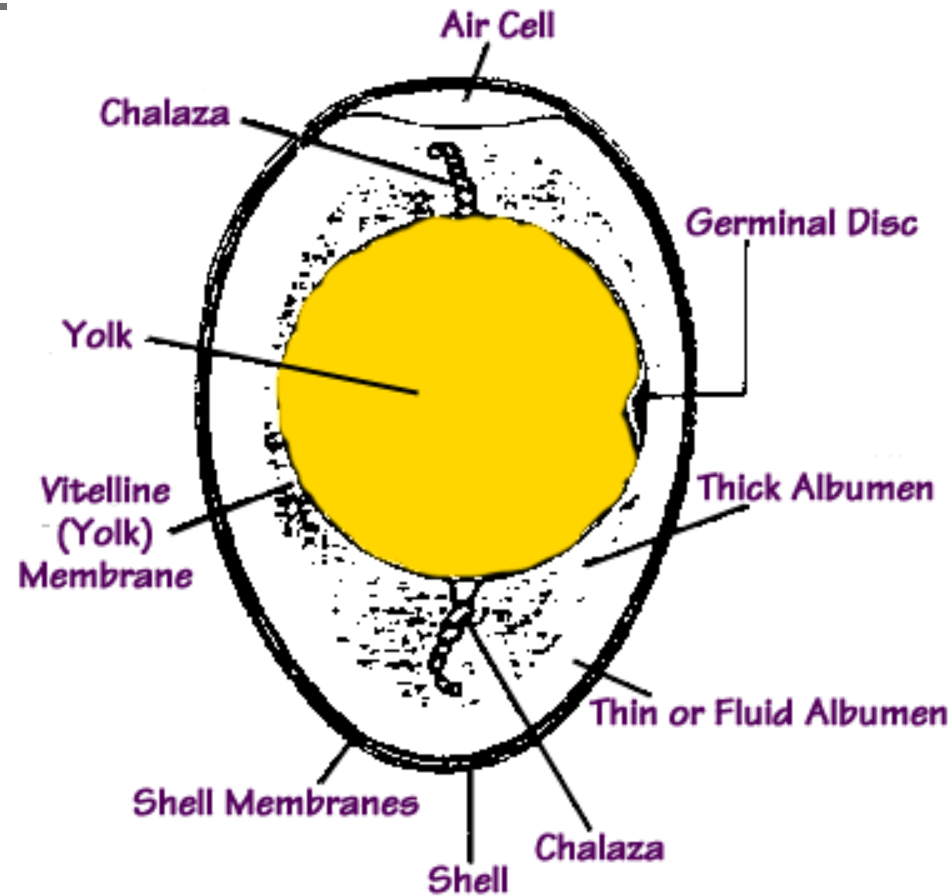
Lamniform Sharks – Nurse Shark

- Young develop in the uterus in an egg case
- When 55mm long, break out
- Nutrition of young
 - Uterine fluid (histotrophic nutrition)
 - Oophagy – eat unfertilized eggs
 - Cannibalism – eat other fetuses
- 2 are born!

Chicken and the egg



Chicken and egg – Which came first?



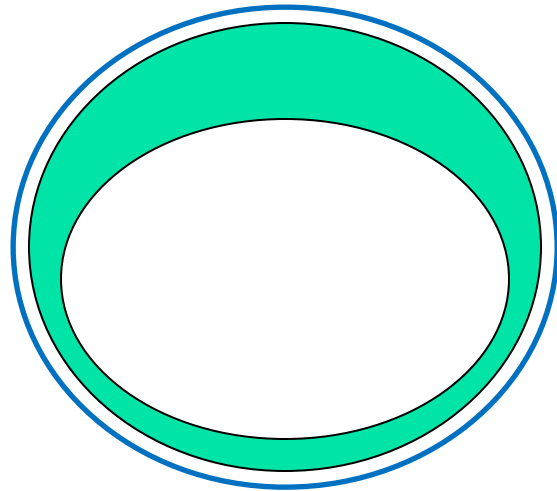
Complements of www.urbanext.uiuc.edu



Amniotes

- Amniotes (membrane around the fetus) – tetrapod vertebrates including amphibians, reptiles, mammals
- Mammals
 - Prototheria – Monotremes
 - Theria
 - Metatheria – Marsupials
 - Eutheria – placental mammals

Basic embryology



Zygote = fertilised ovum

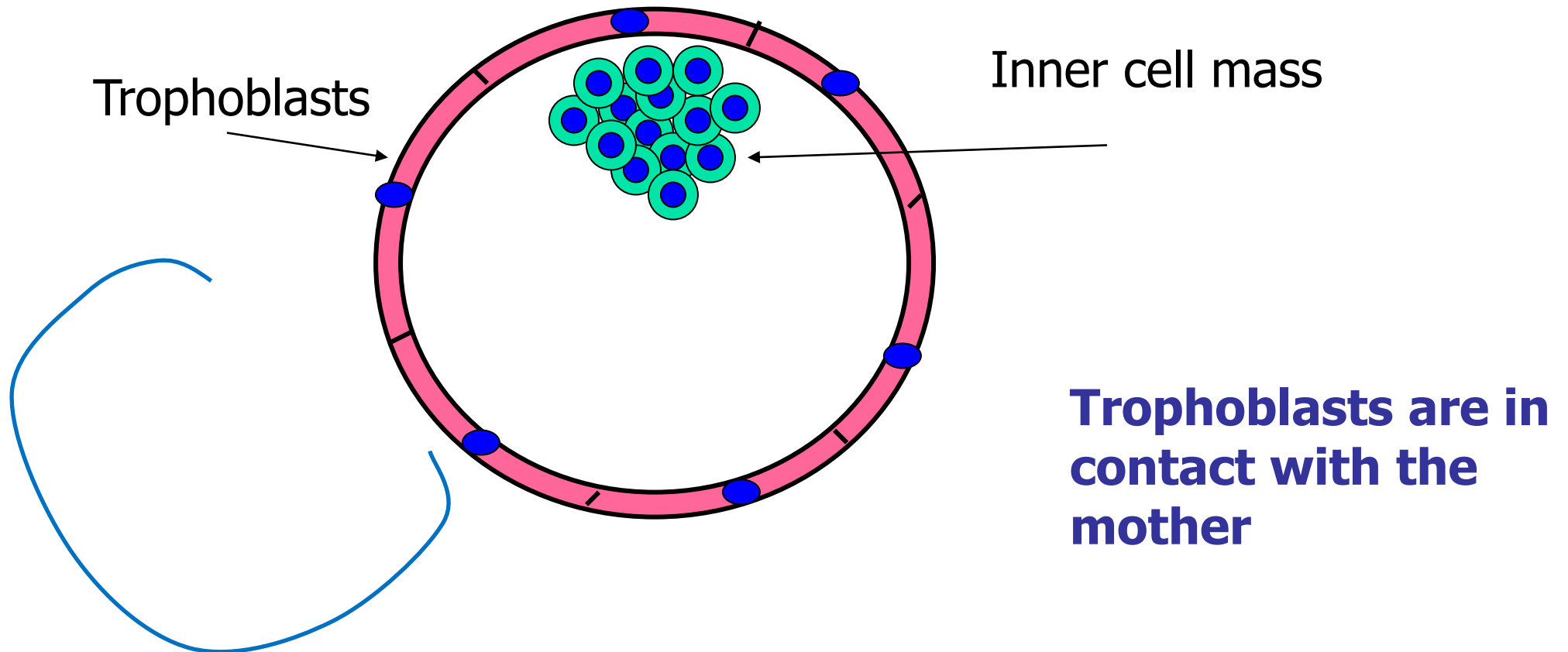
Morula = 16 cells +

Blastula = blastema and blastocoel

Blastocyst

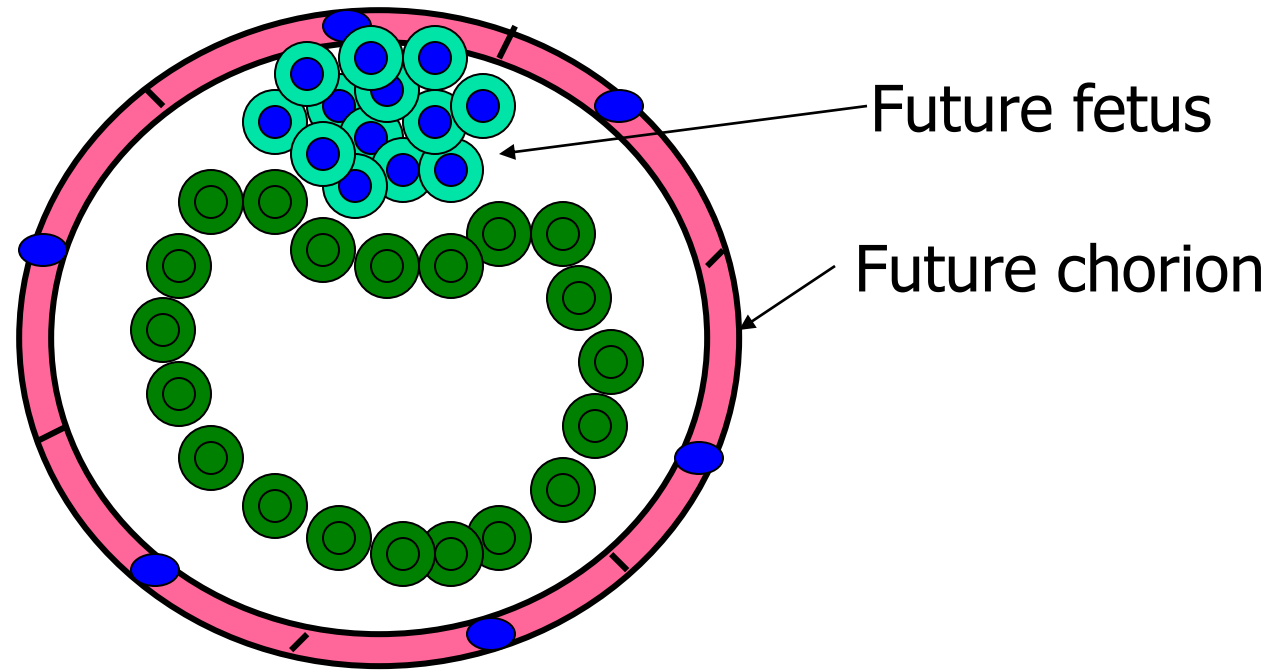
Formation of Chorion

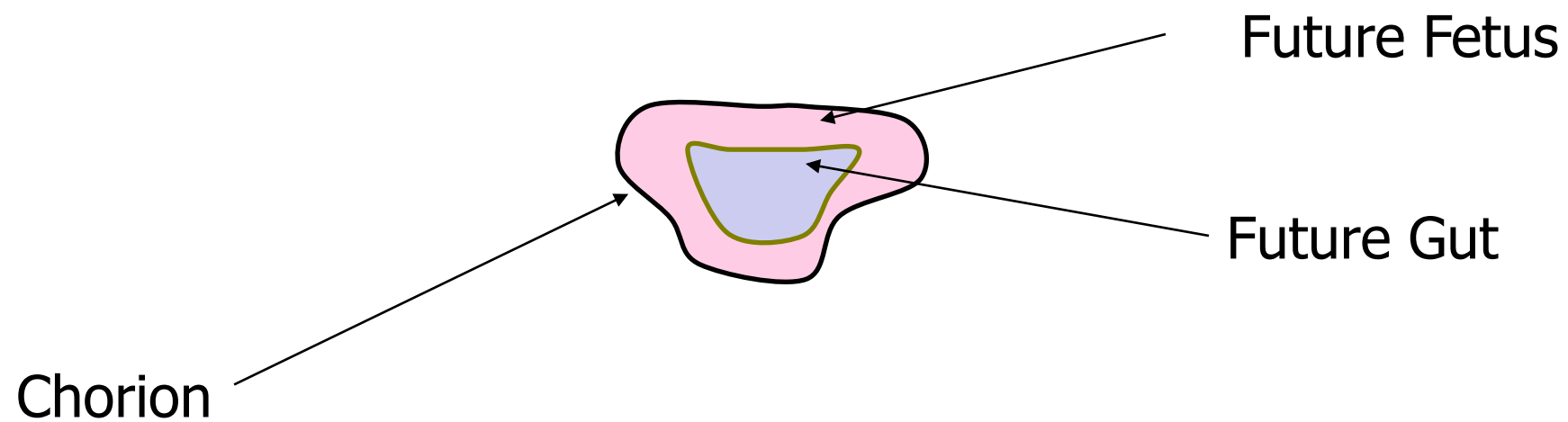
Chorion = Trophoblasts + mesoderm



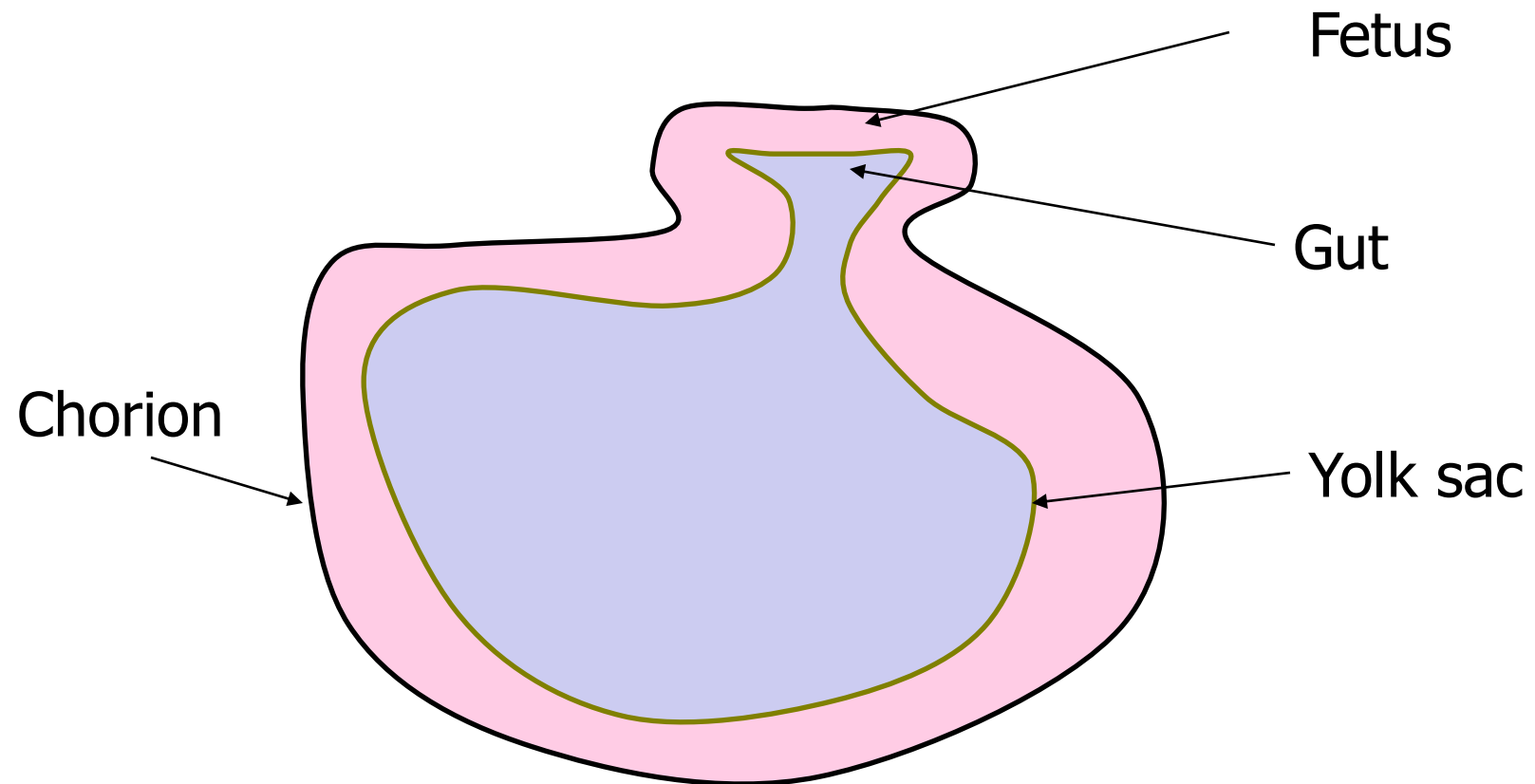
Formation of endoderm

- Endoderm = gut + yolk sac

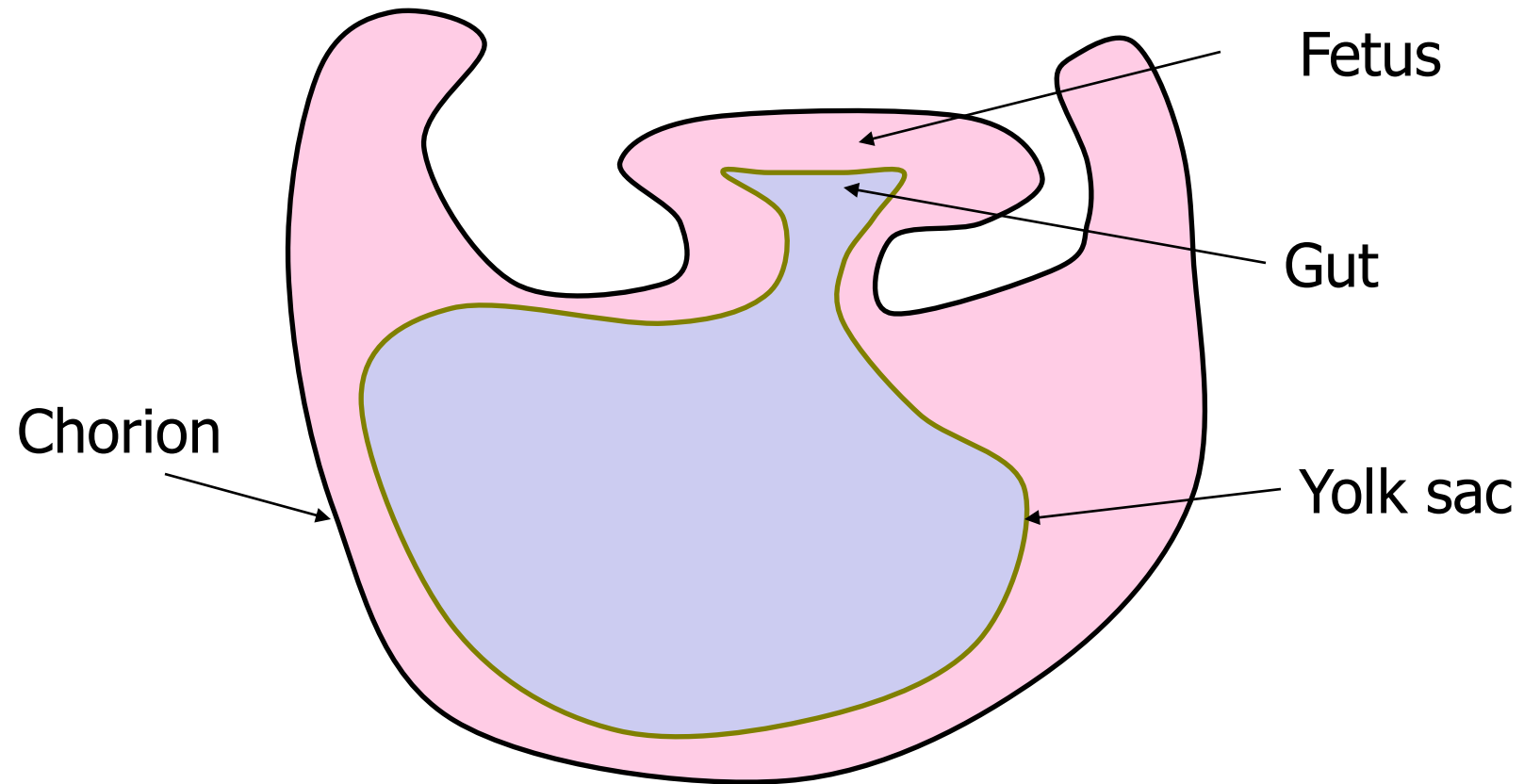




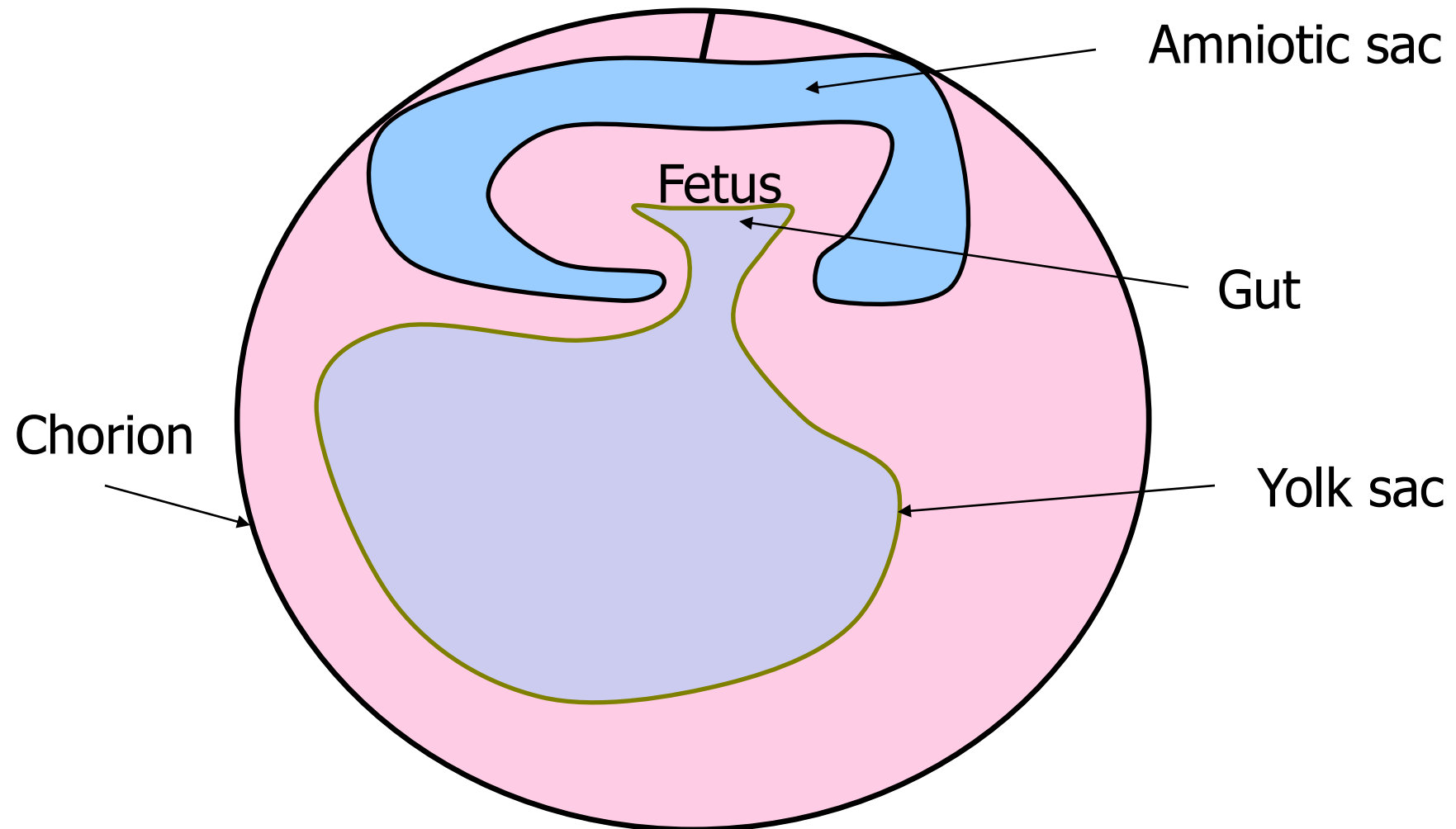
Formation of Yolk sac



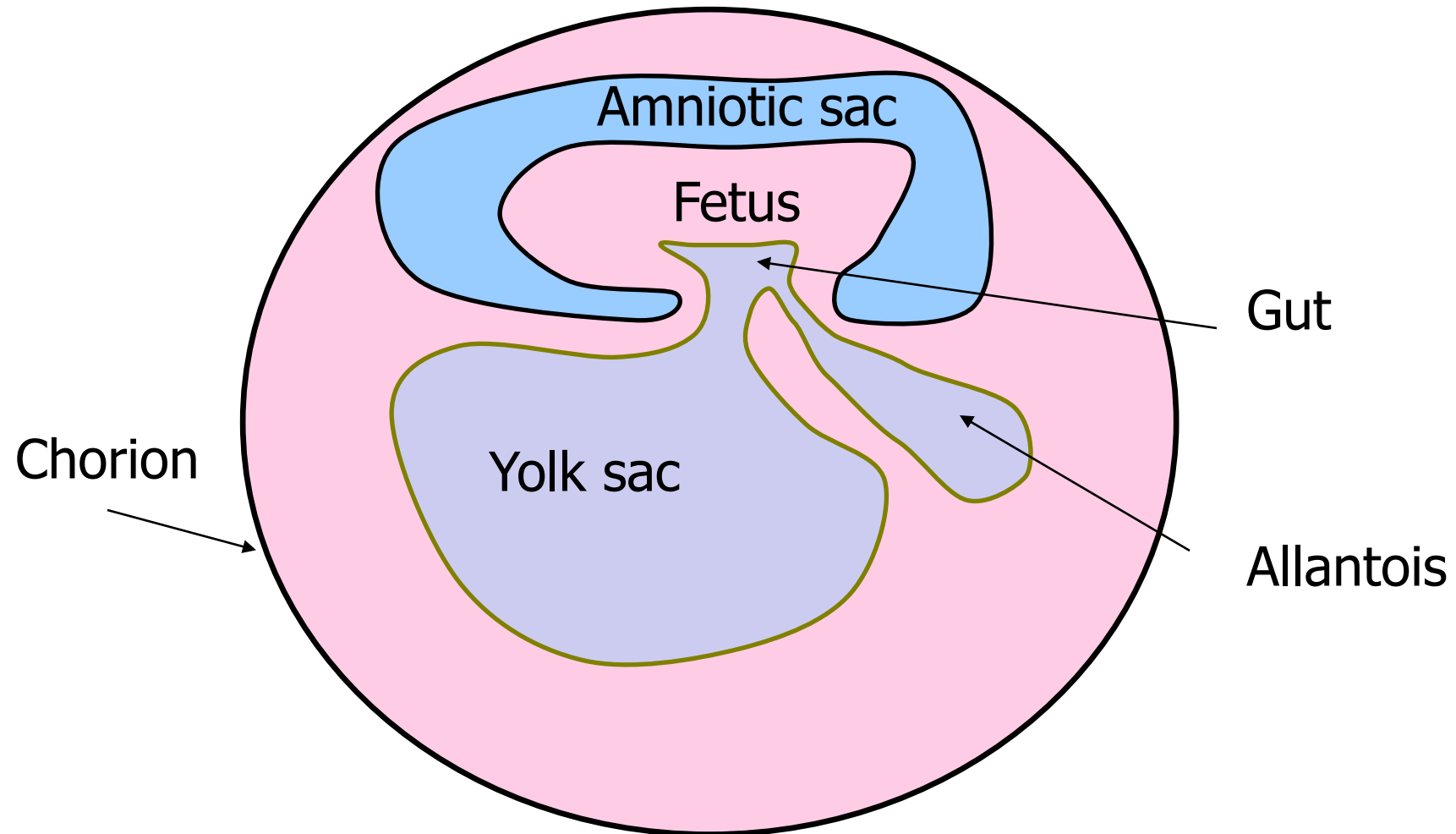
Formation of Amnion



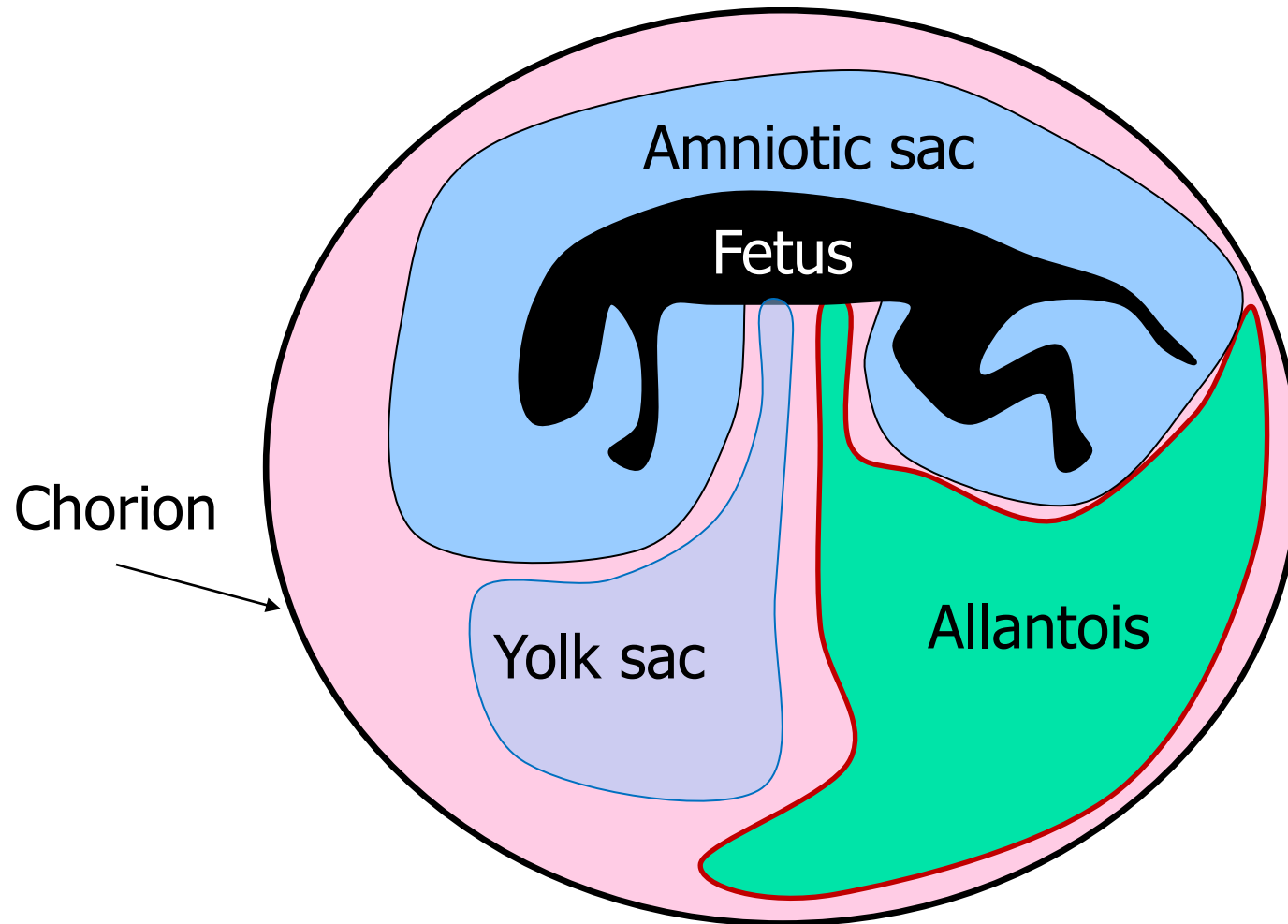
Formation of amnion



Formation of allantois

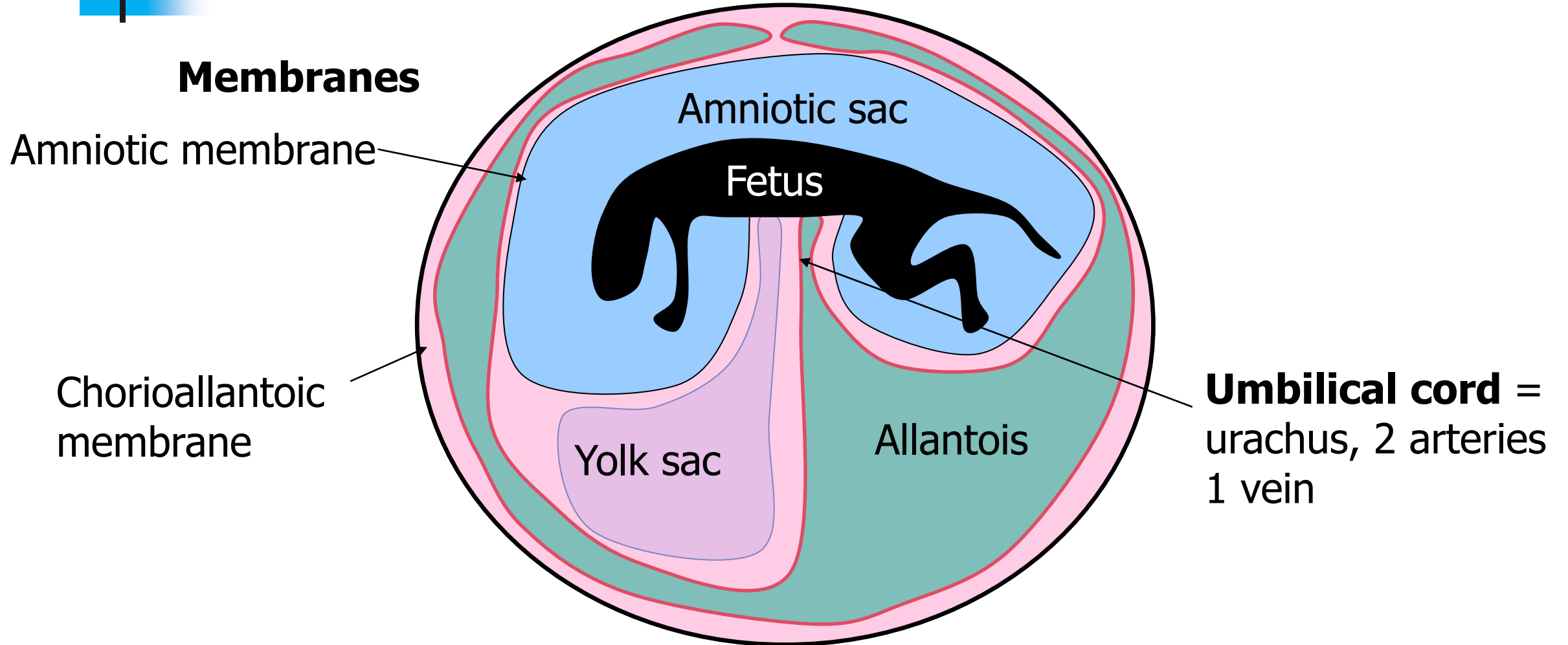


Formation of allantois



Formation of allantois

Membranes







Vascular system of placenta

- Blood supply is high volume – low pressure
- Yolk sac prominent placentas
 - Marsupials
 - Rodents and lagamorphs
 - Carnivores
 - Allantoic vasculature takes over later

Horse

Endometrial
surface with
embryo



Photo courtesy Dr Tony Hayes

Horse

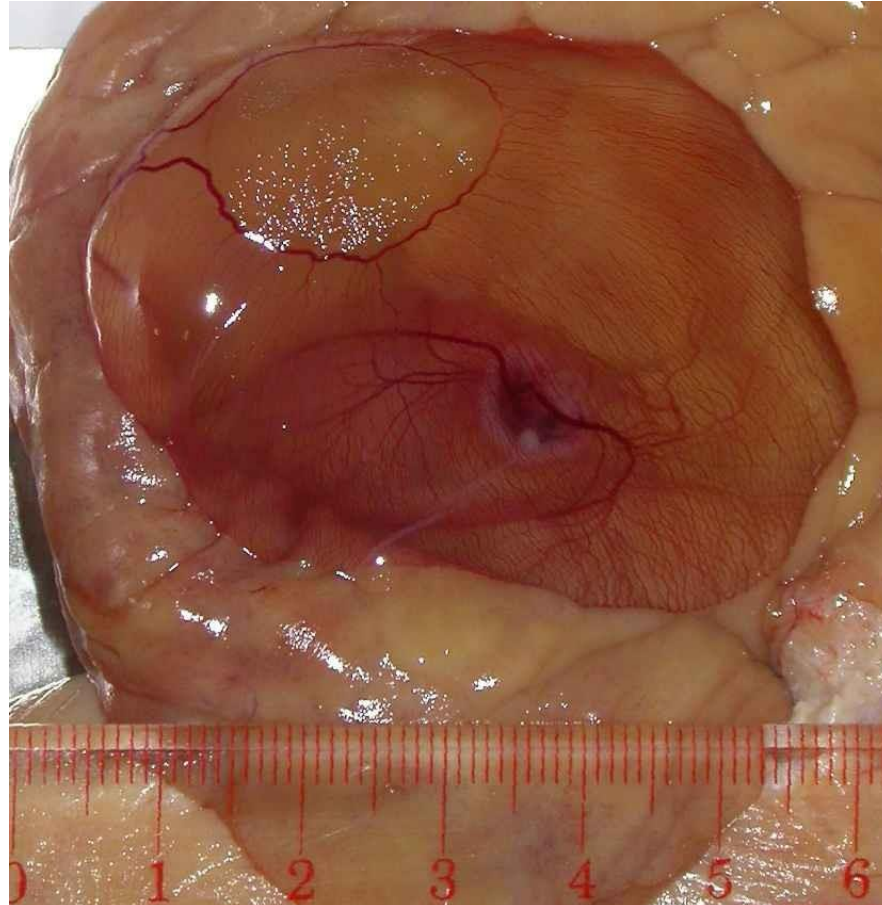


Photo courtesy Dr Tony Hayes

Horse

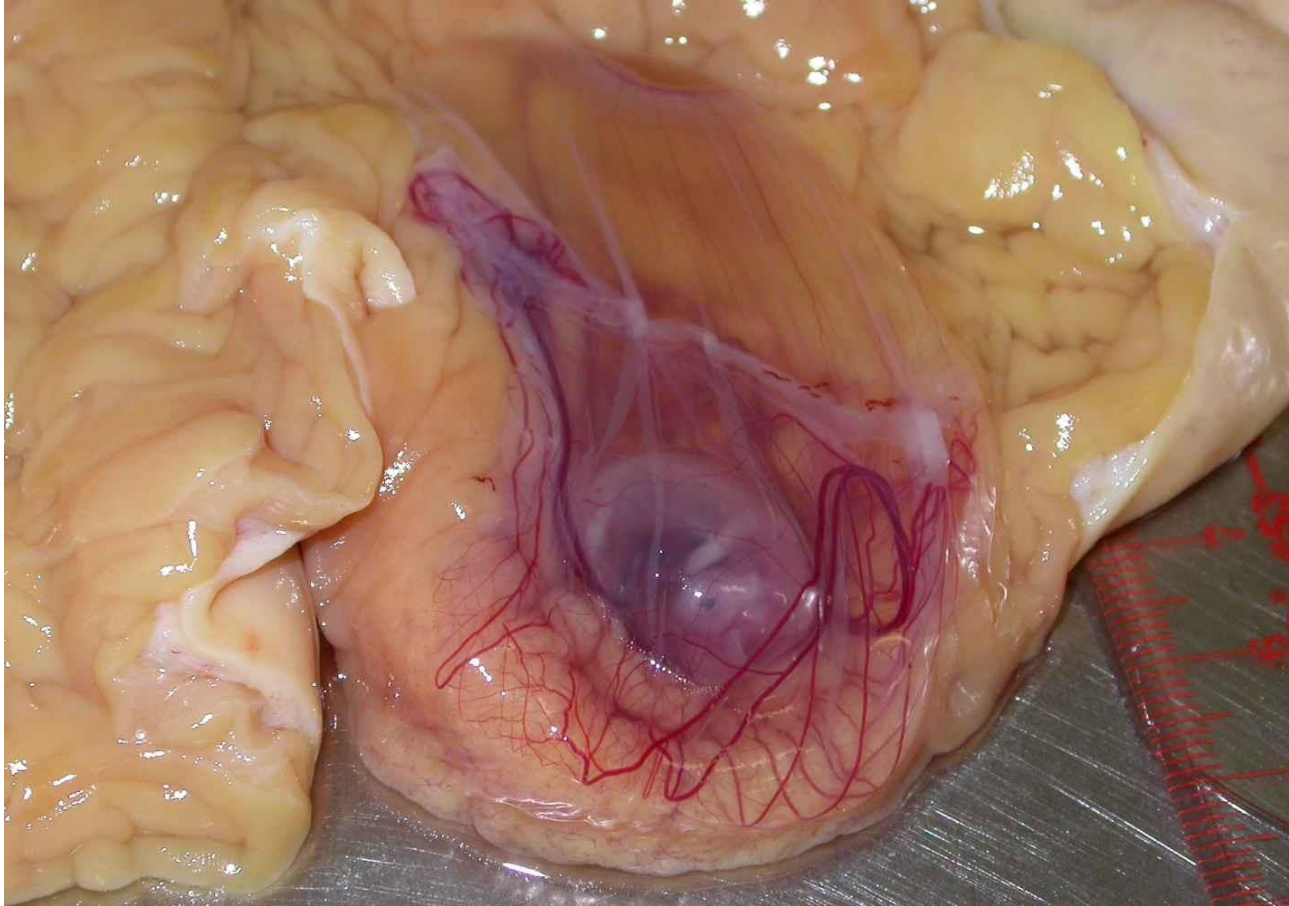


Photo courtesy Dr Tony Hayes



Placental structures

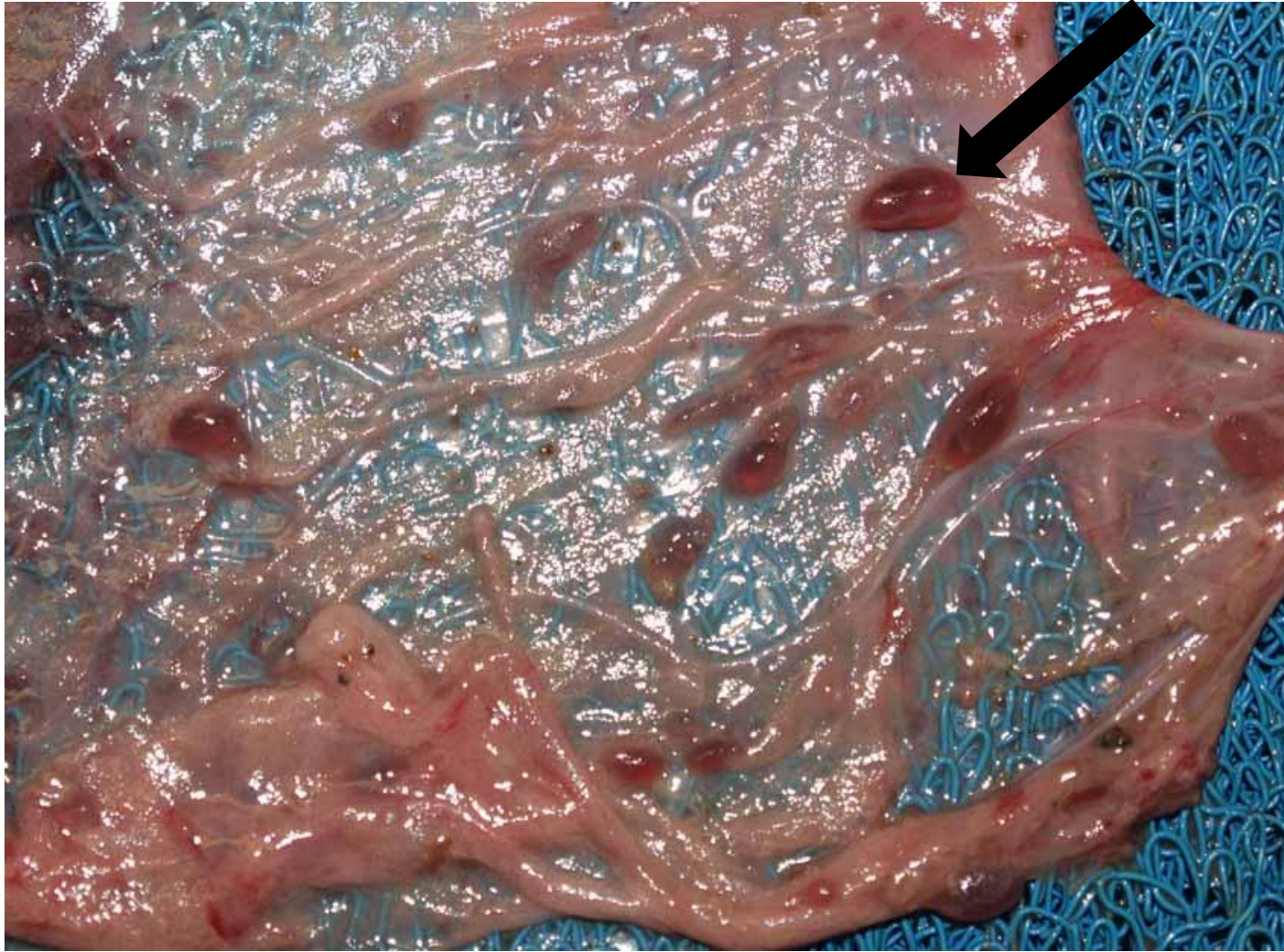
- Chorion and arrangement
 - Pig – villus – uterine milk - histotroph
 - Equine – microcotyledonary – uterine milk - histotroph
 - Ruminant – cotyledonary - haemotroph
 - Carnivore – zonary - haemotroph
- Allantoic cavity and membrane
- Amniotic cavity and membrane
- Umbilical cord and components



Umbilical cord

- 2 arteries – from iliac arteries
- 1 vein – to ductus venosis
- Urachus – from bladder to allantois

Porcine placenta



Chorionic cysts

Porcine placenta

Villi



Equine placenta

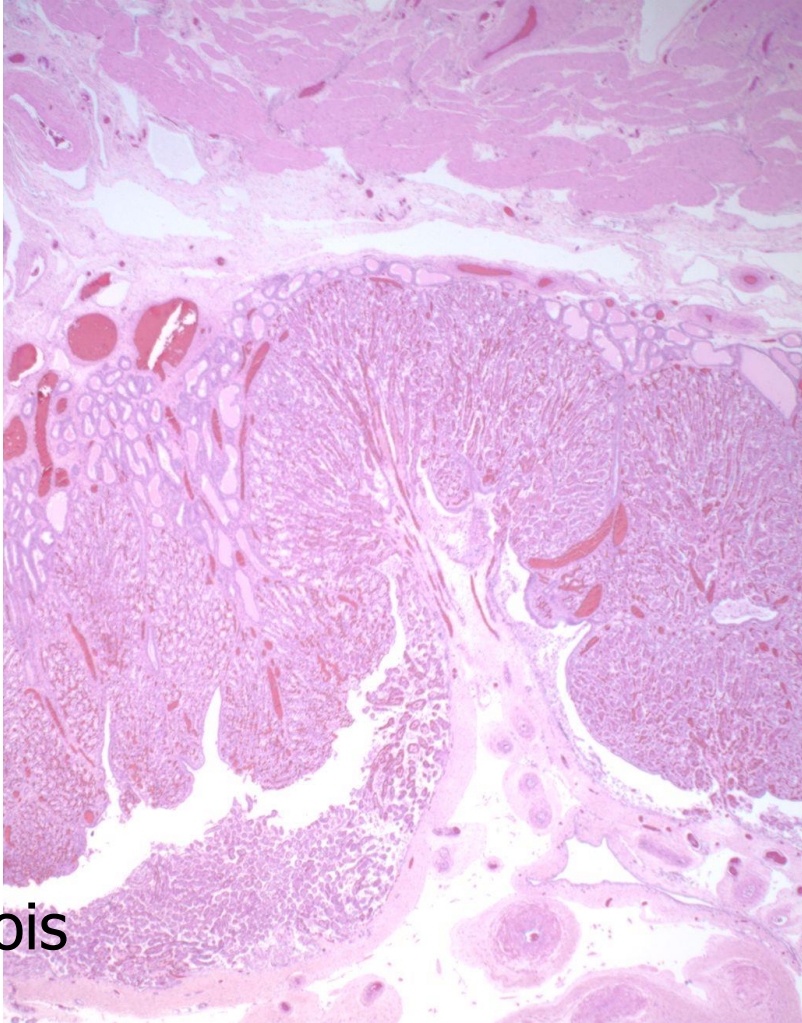


Equine placenta

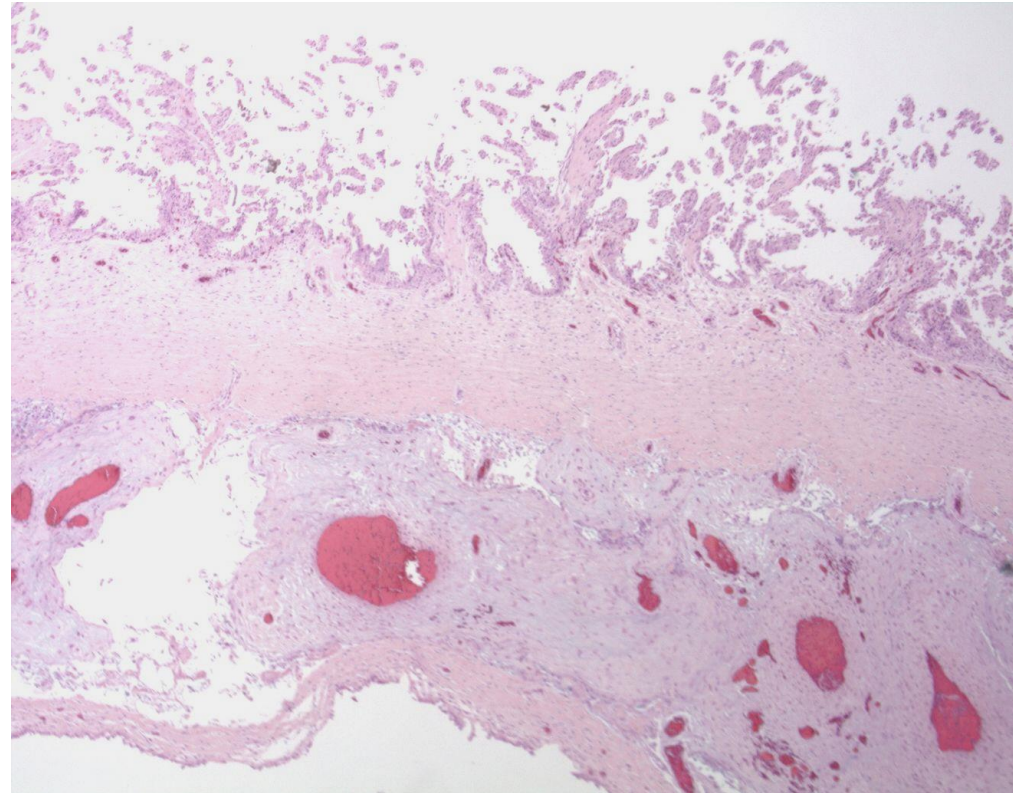
Uterus

Endometrial
glands

Chorioallantois



Microcotyledons



Chorioallantois

Ruminants – placentomes

- Caruncle (maternal)



- Cotyledons (fetal)



Ruminant



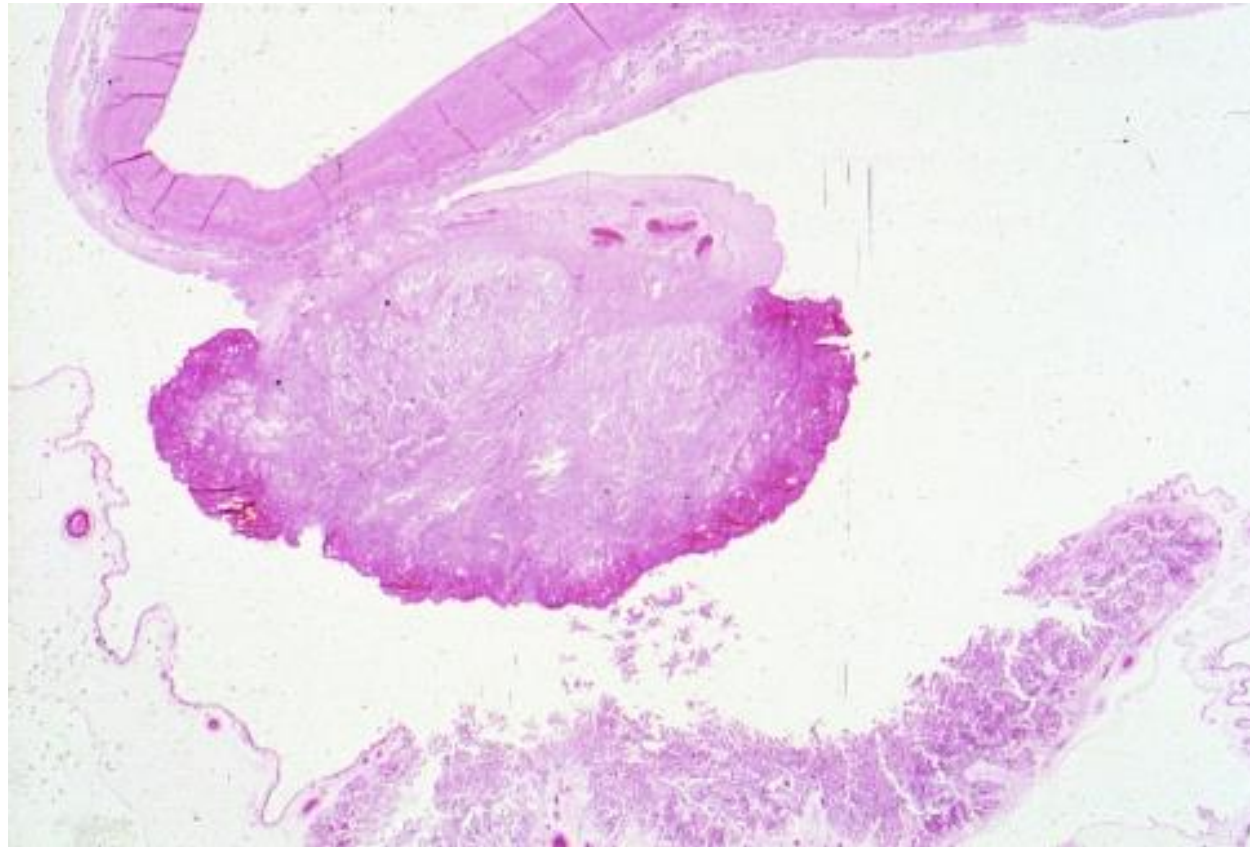
Placentome

Uterus

Caruncle

Cotyledon

Chorioallantois



Ruminants

Cotyledonary



Go Placenta!



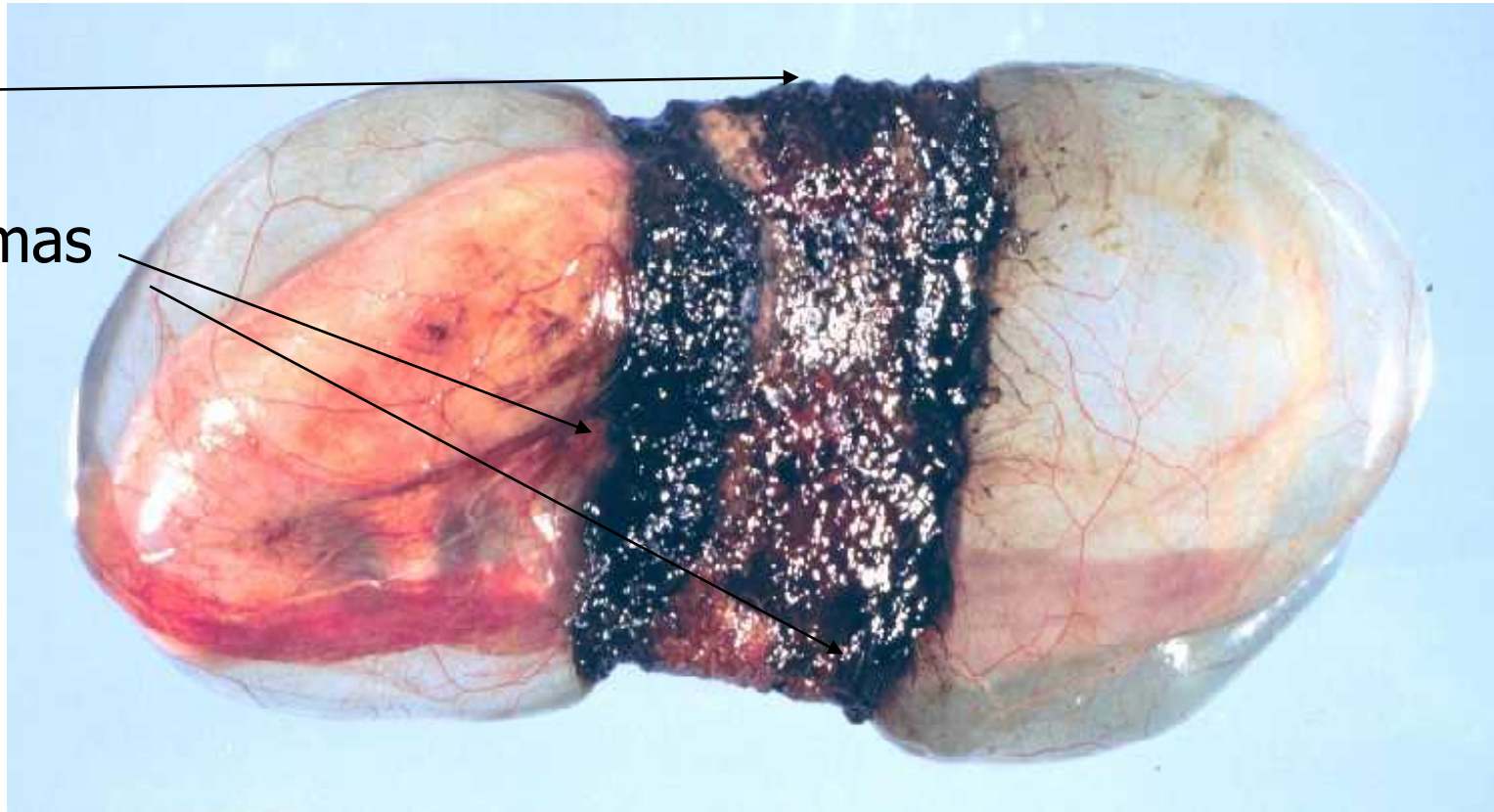
Photo compliments of Dr Jeff Caswell

Carnivore

Zonary (girdle)

Labyrinth

Marginal hematomas
on each side of
labyrinth





Common embryonic remnants

- Meckels diverticulum – small intestine – yolk sac
- Yolk sac remnant in horse
- Persistent urachus
- Round ligaments of bladder (umbilical arteries)
- Falciform ligament (umbilical vein)



Placental structures

- Chorion and arrangement
 - Pig
 - Equine
 - Ruminant
 - Carnivore
- Allantoic cavity and membrane
- Amniotic cavity and membrane
- Umbilical cord and components