Placentation – Structure and Function

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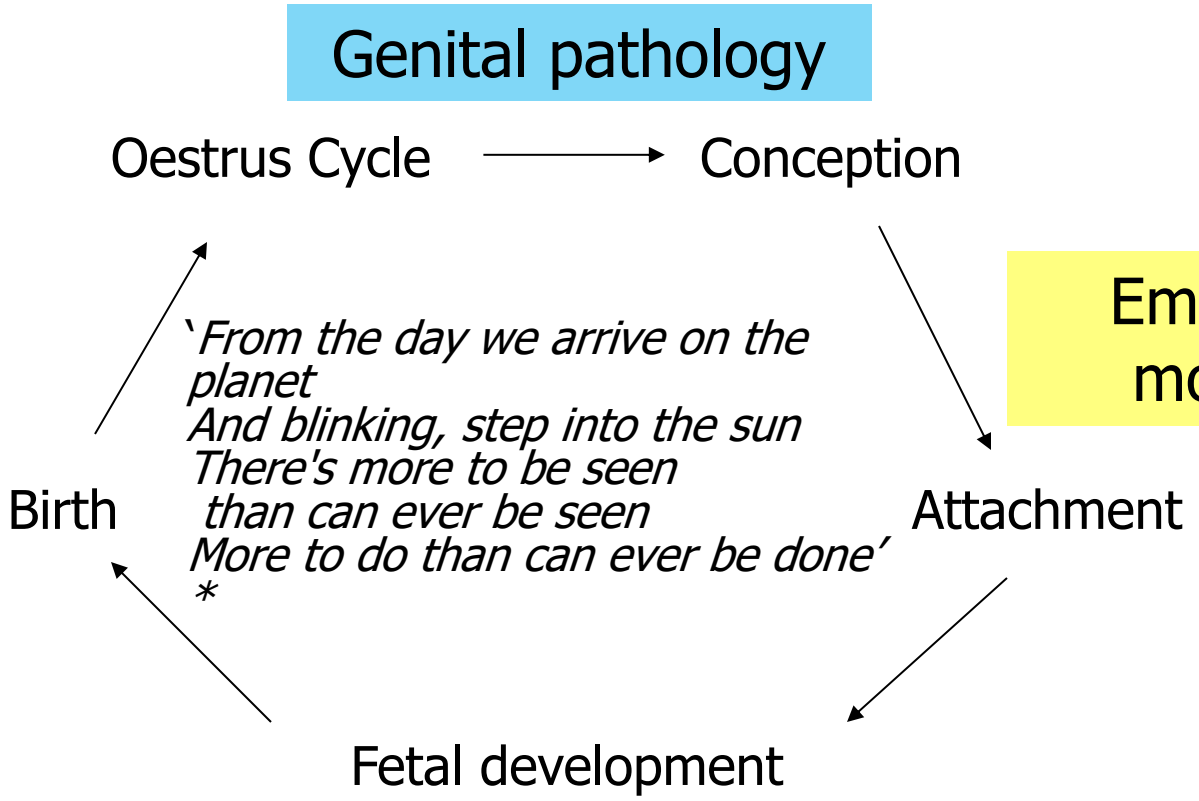
IMPROVE LIFE.

Circle of Reproductive Life*

Diseases of Sexual Development

Perinatal mortality

Stillbirth



* "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 class (lecture)

Placenta - human/primate speak

- ‘A flat cake’ = disc = exchange area
- ‘Membranes’ = transparent membranes = amnion

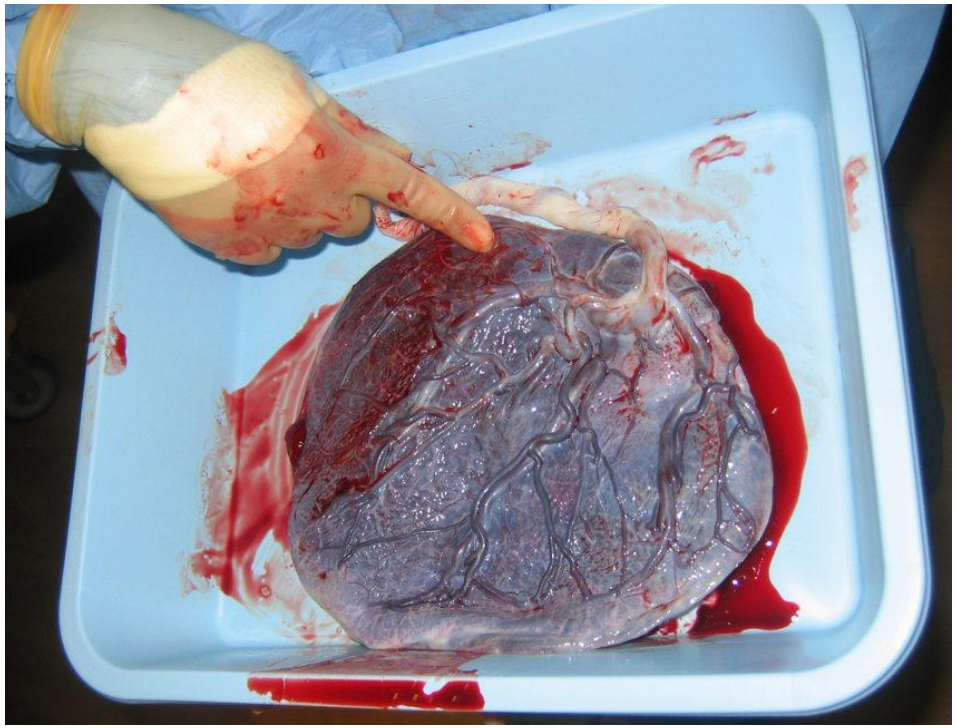


Photo complements of
common.wikimedia.org

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

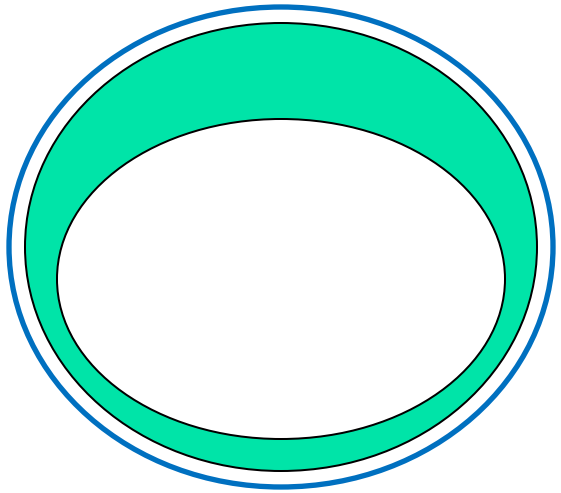
Lamniform Sharks – Nurse Shark

- 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!

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

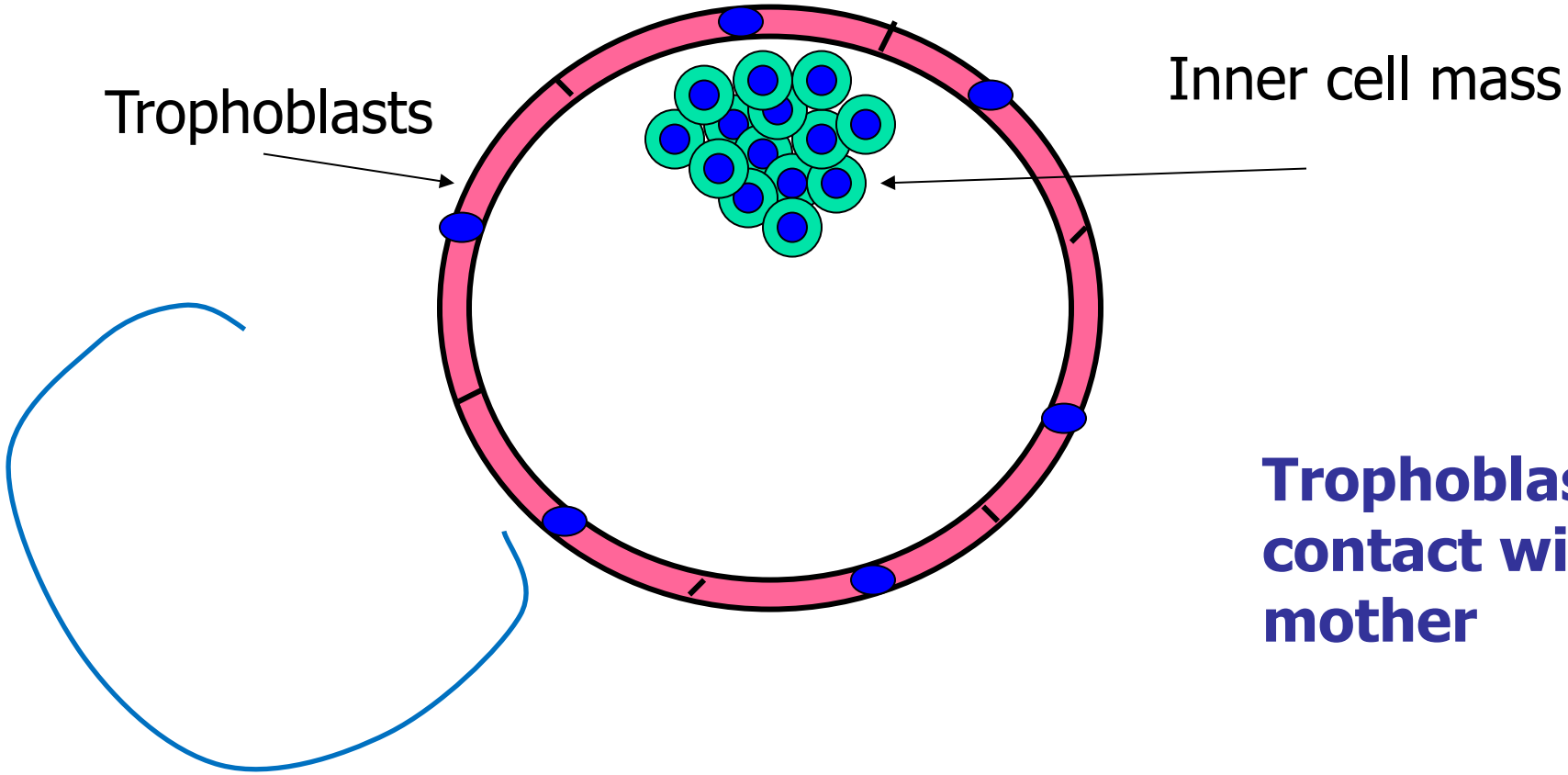
Morula = 16 cells +

Blastula = blastema
and blastocoel

Blastocyst

Formation of Chorion

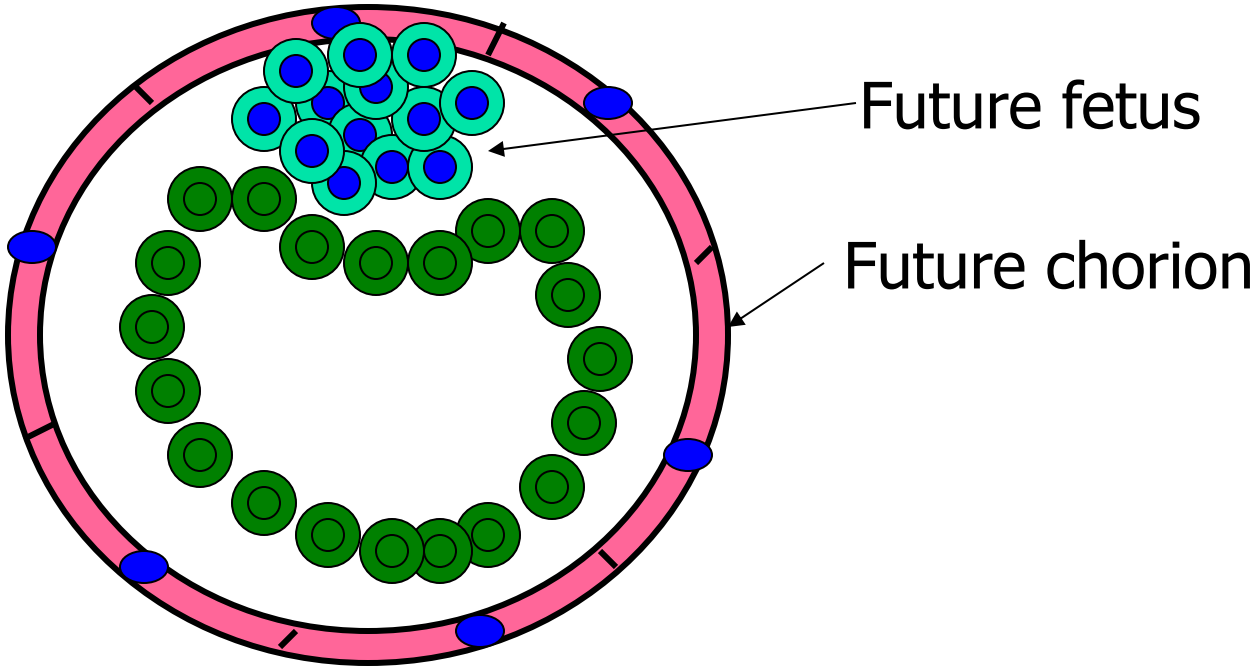
Chorion = Trophoblasts + mesoderm

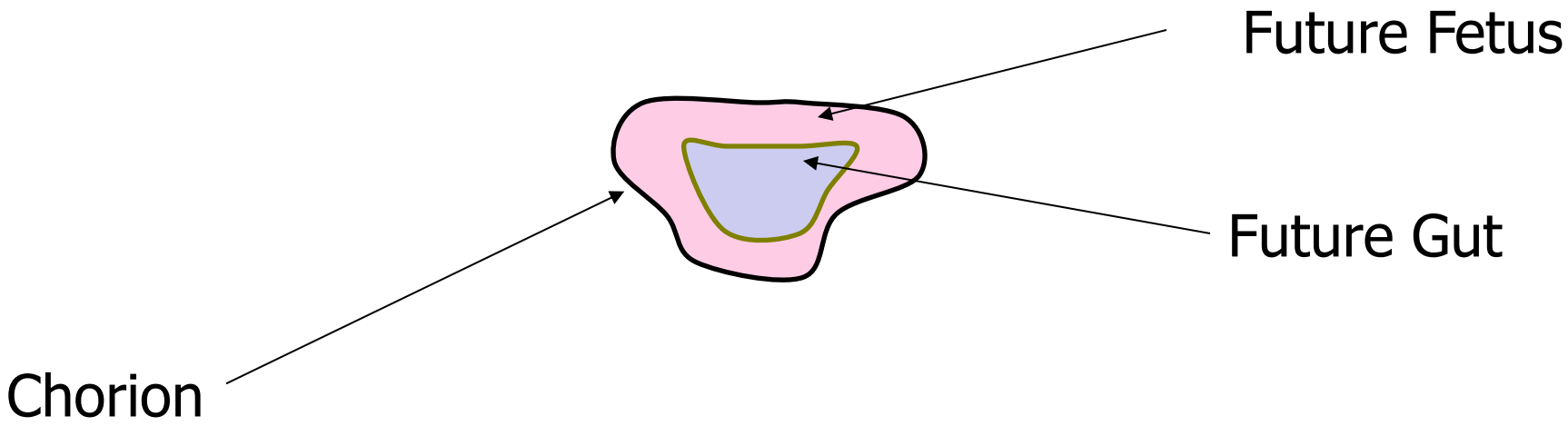


Trophoblasts are in contact with the mother

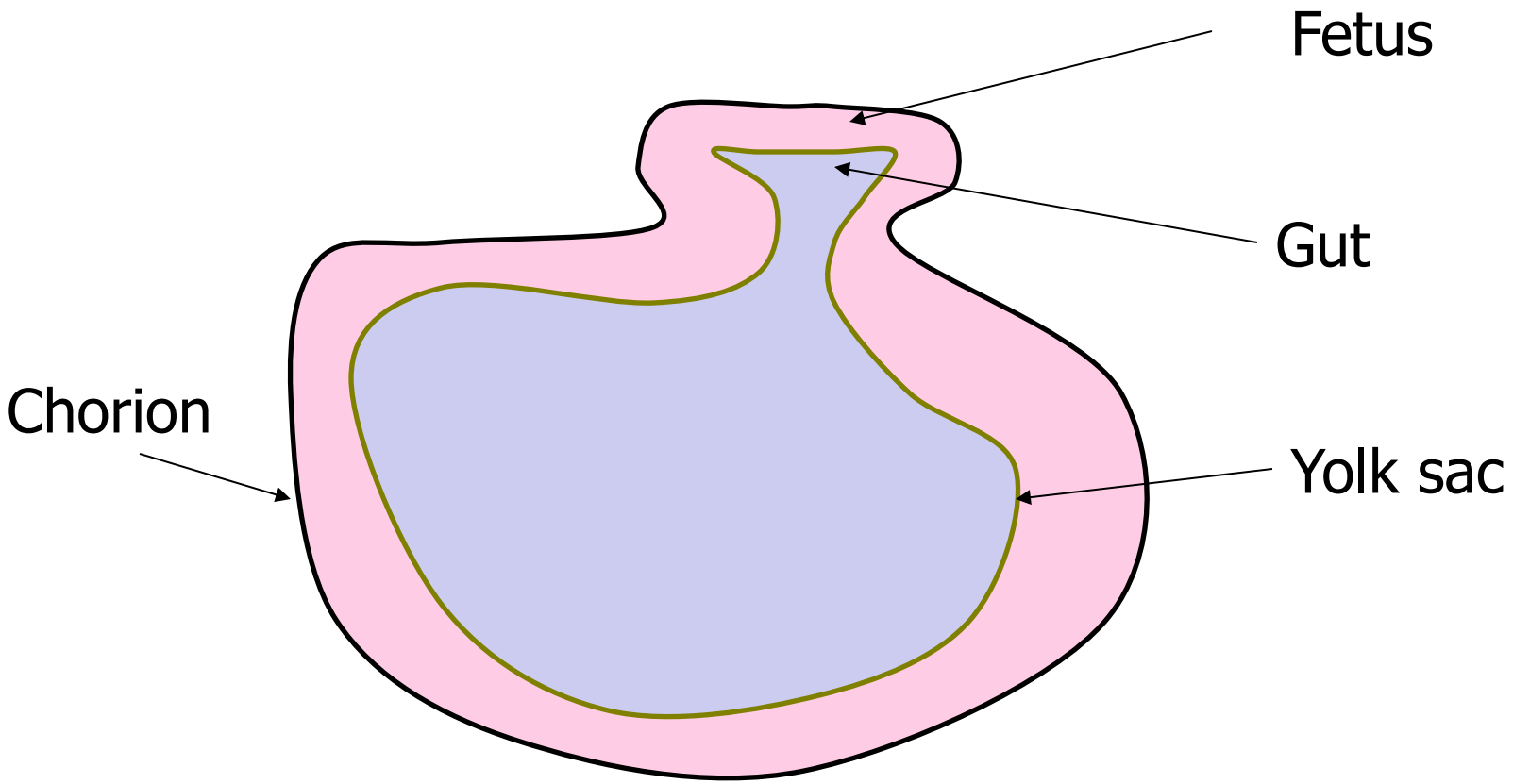
Formation of endoderm

- Endoderm = gut + yolk sac

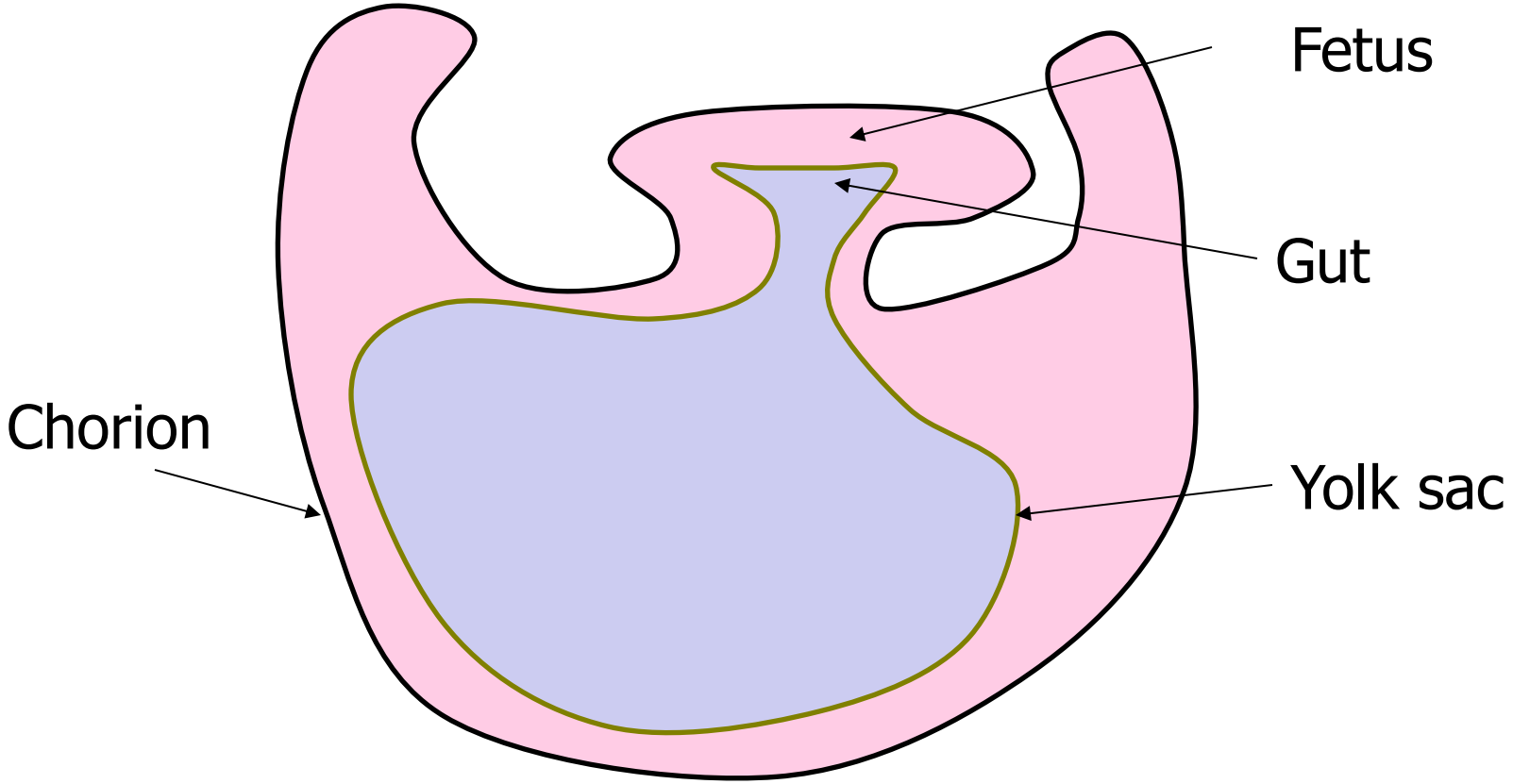



Future Fetus
Future Gut
Chorion

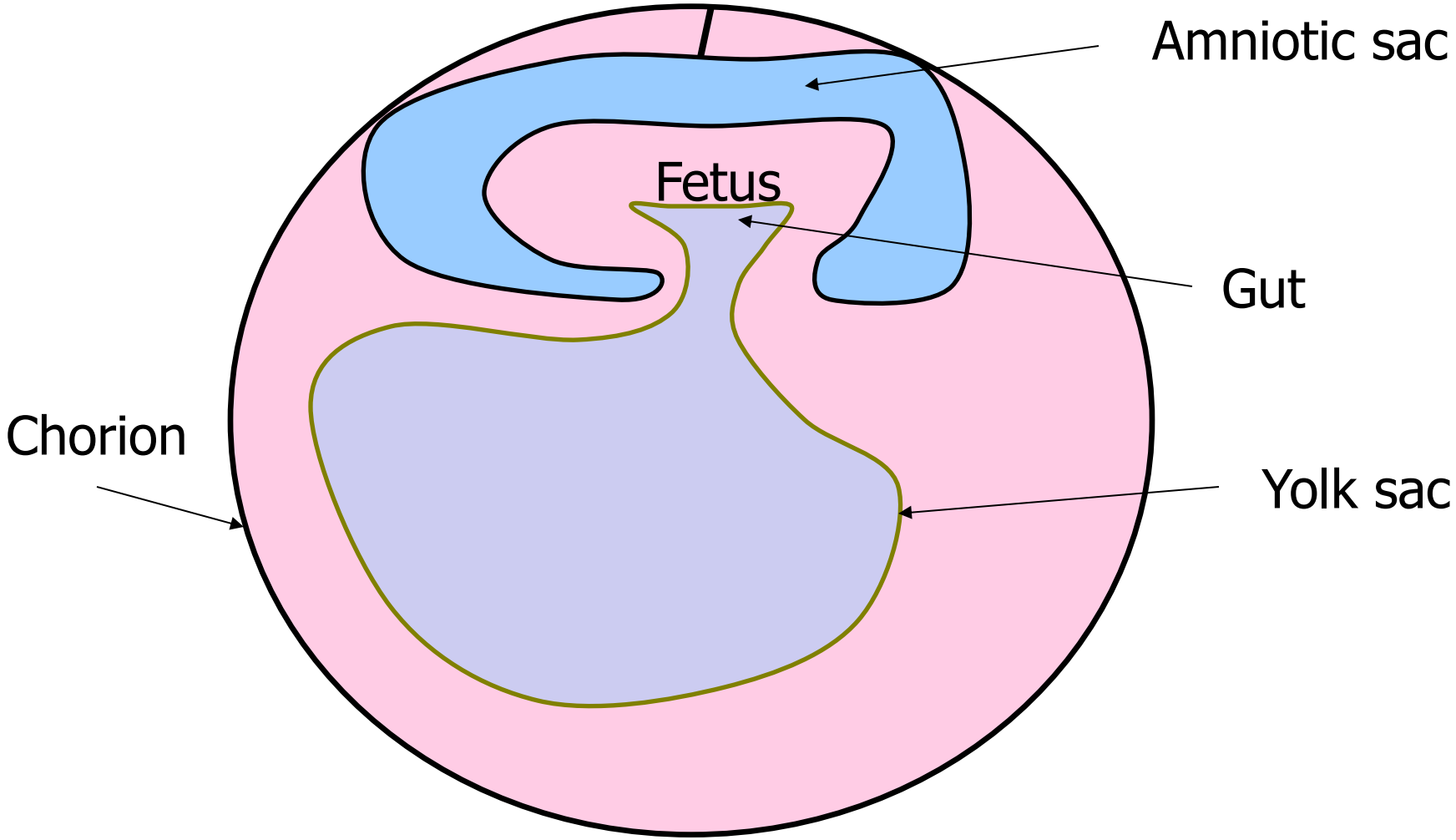
Formation of Yolk sac



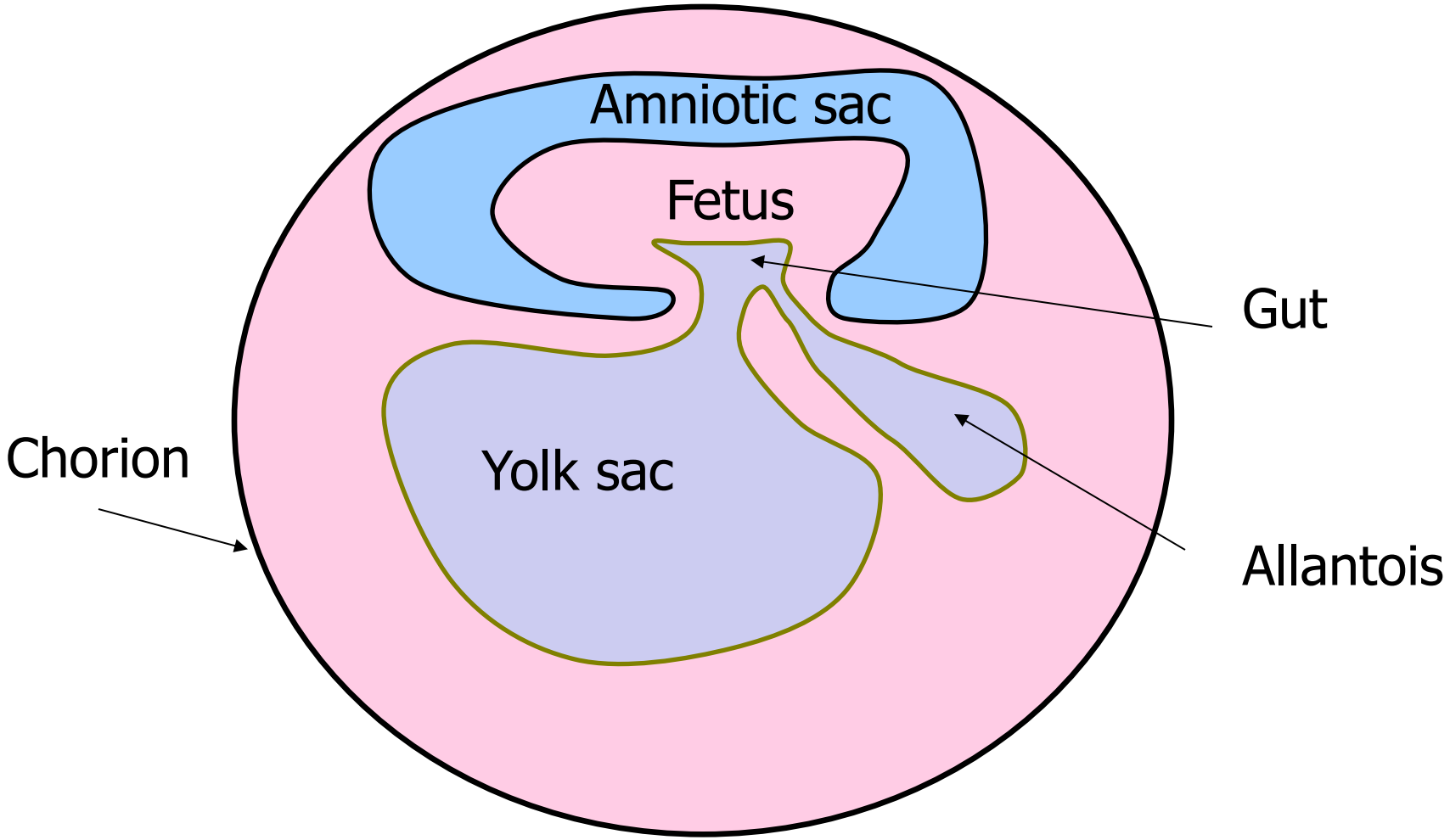
Formation of Amnion



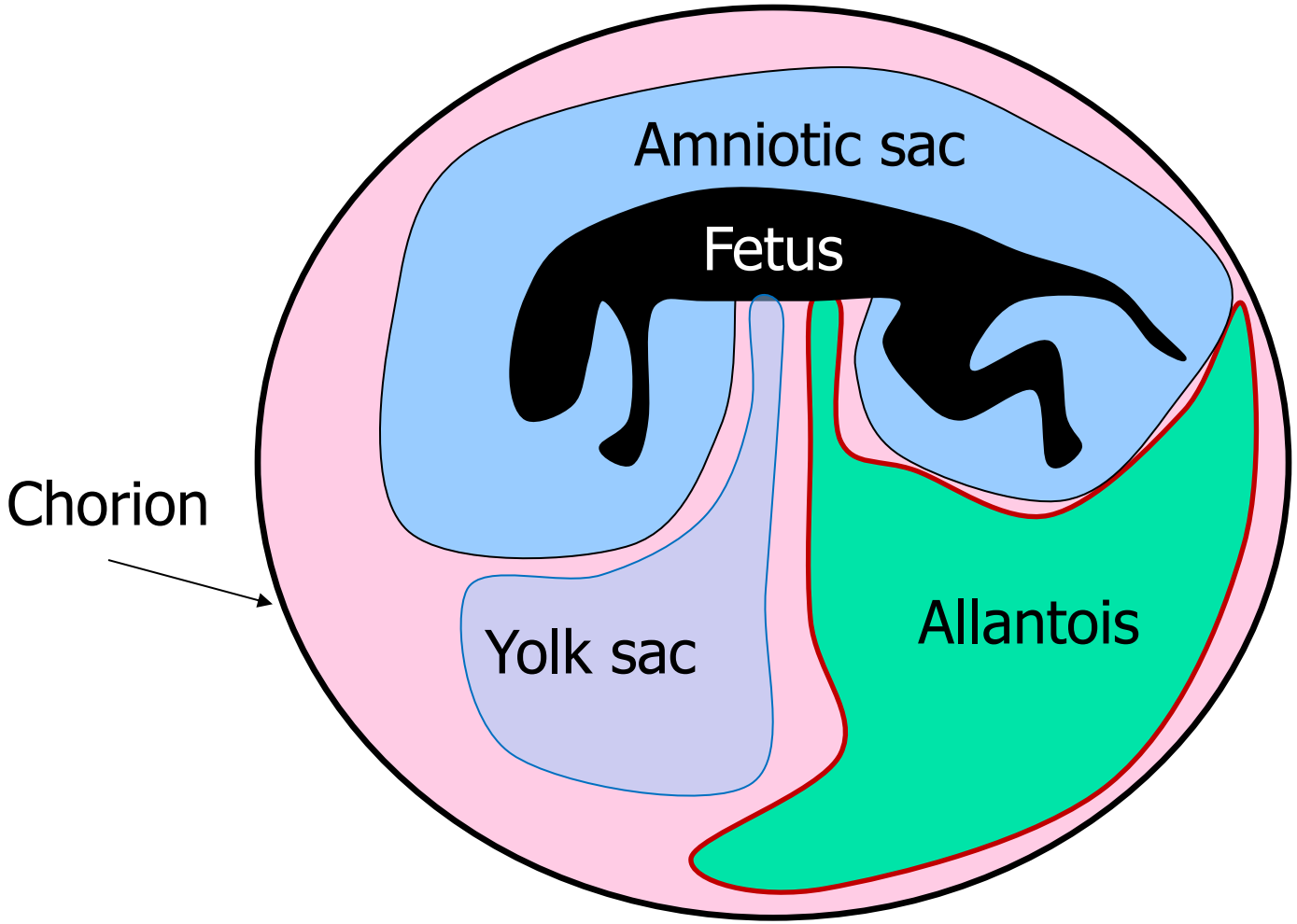
Formation of amnion



Formation of allantois



Formation of allantois

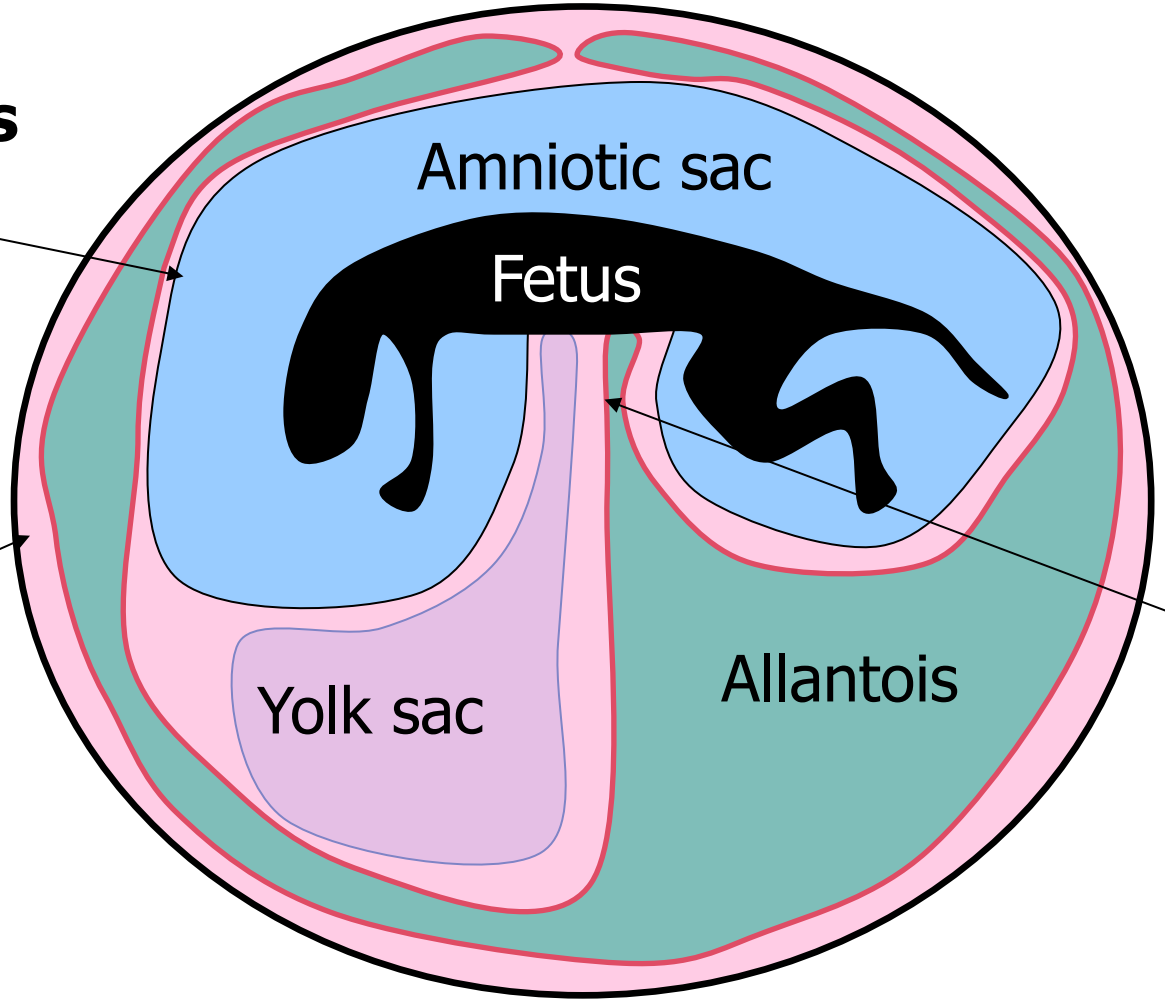


Formation of allantois

Membranes

Amniotic membrane

Chorioallantoic membrane



Umbilical cord = urachus, 2 arteries 1 vein

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

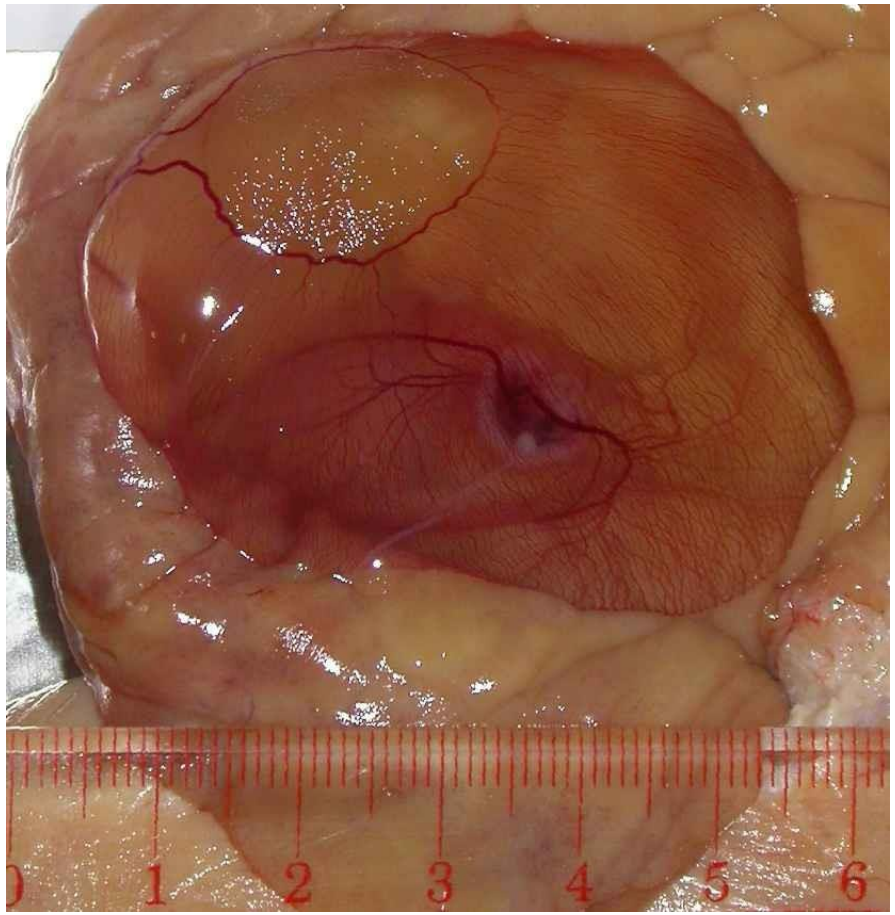


Photo courtesy Dr Tony Hayes

Horse

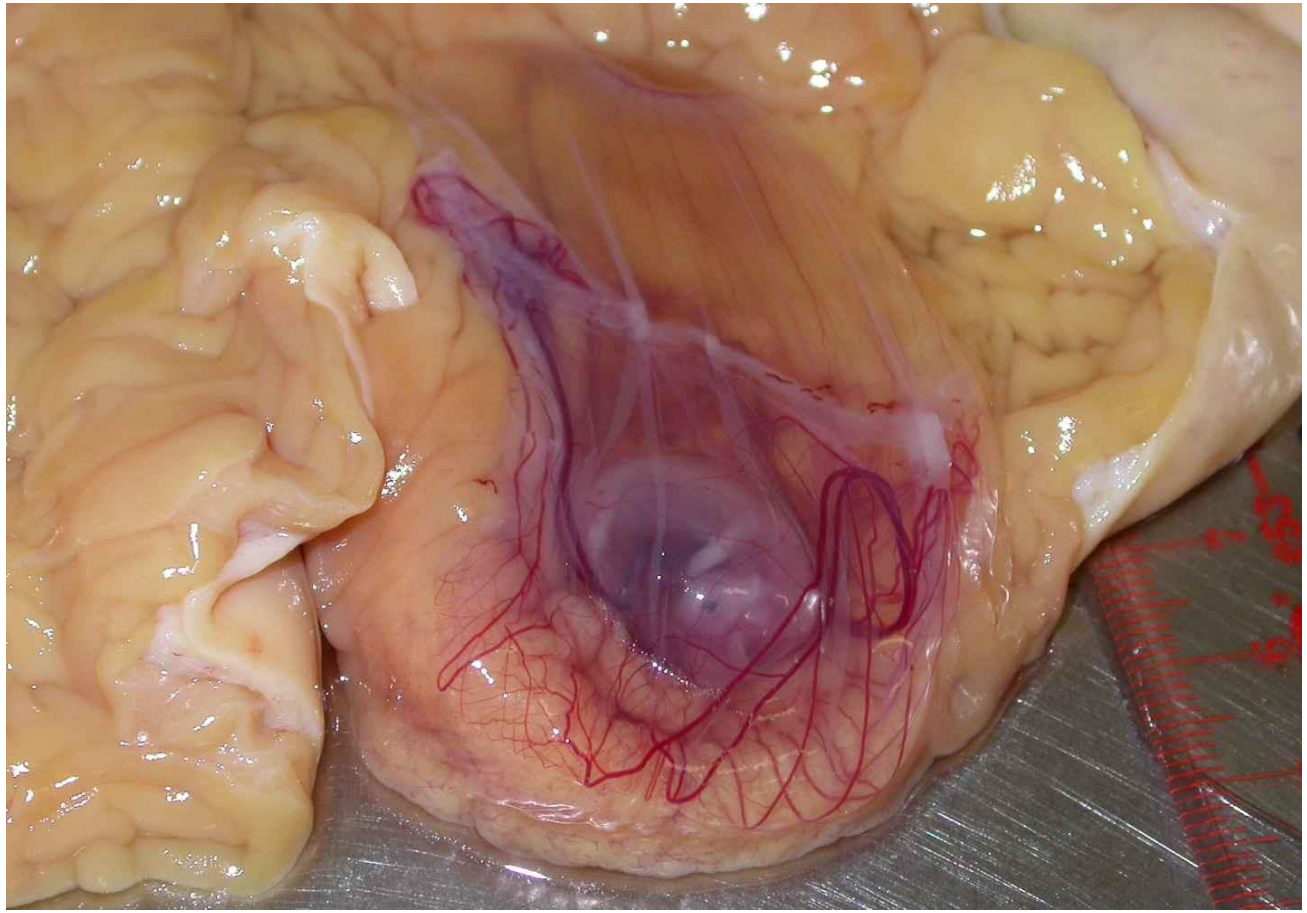


Photo courtesy Dr Tony Hayes

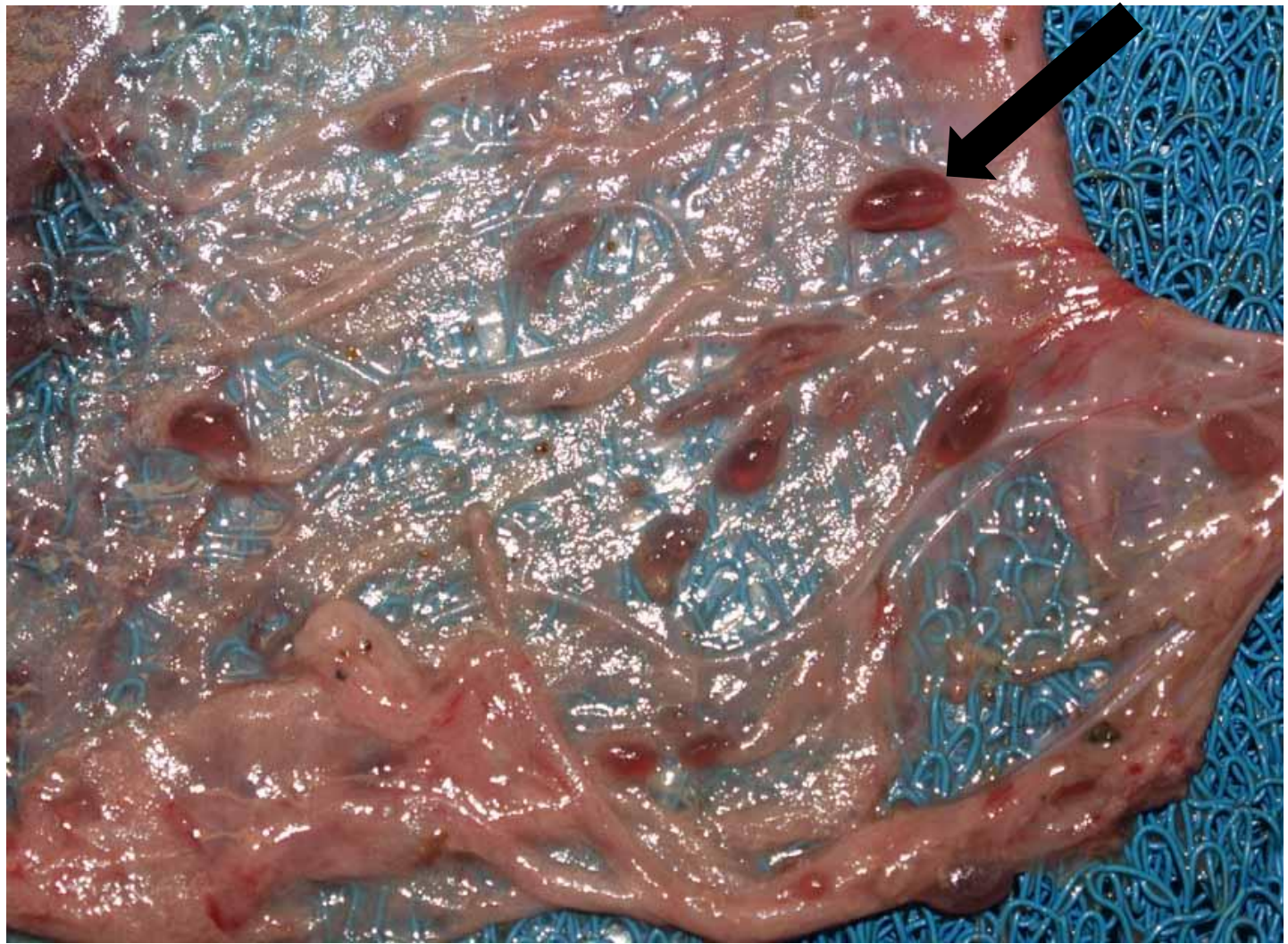
Placental structures

- Chorion and arrangement
  - Pig – villus – uterine ‘milk’ from endometrial glands - histotroph
  - Equine – microcotyledonary – 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 – through liver to vena cava
- Urachus – from bladder to allantois

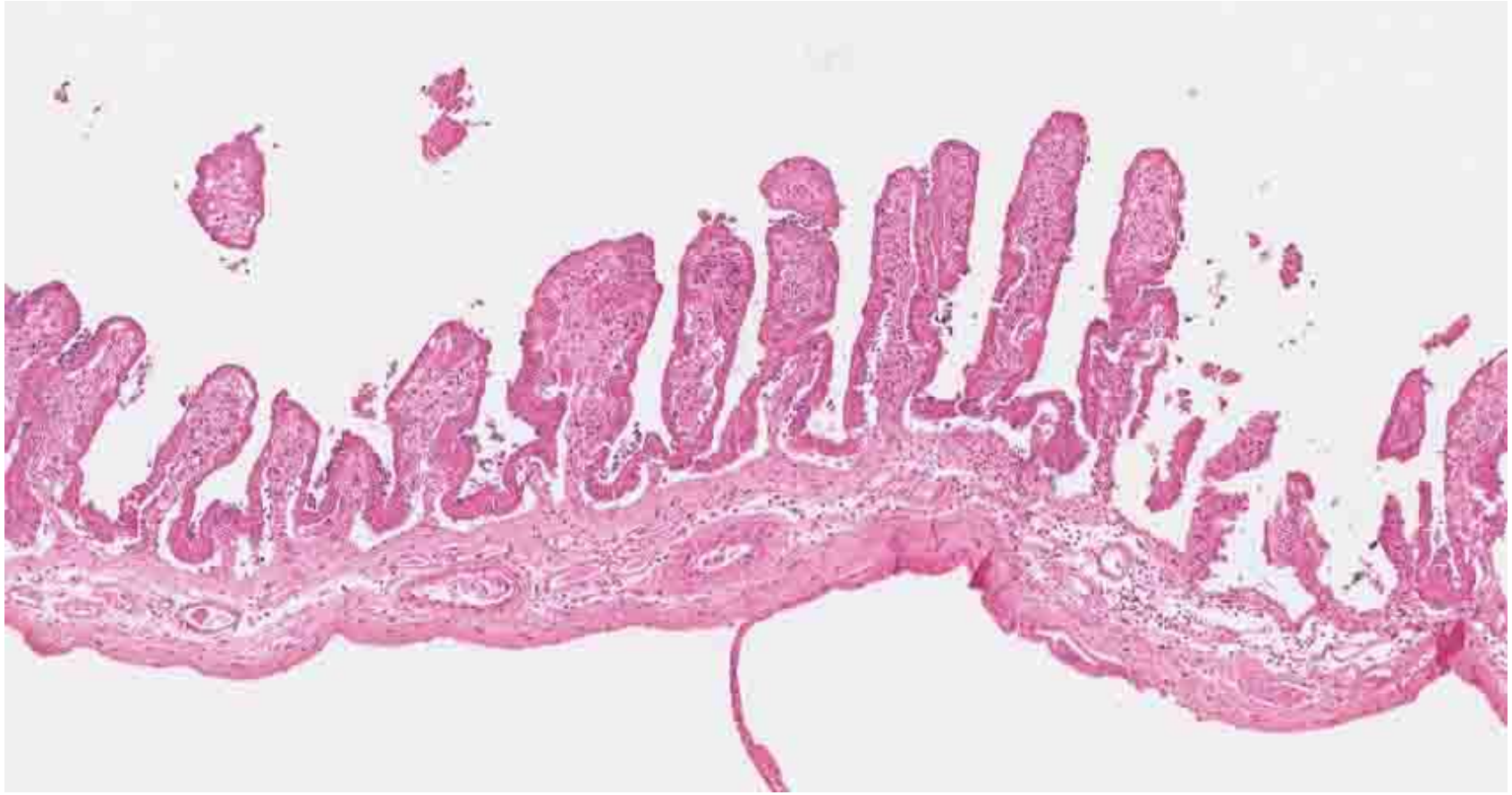
Porcine placenta



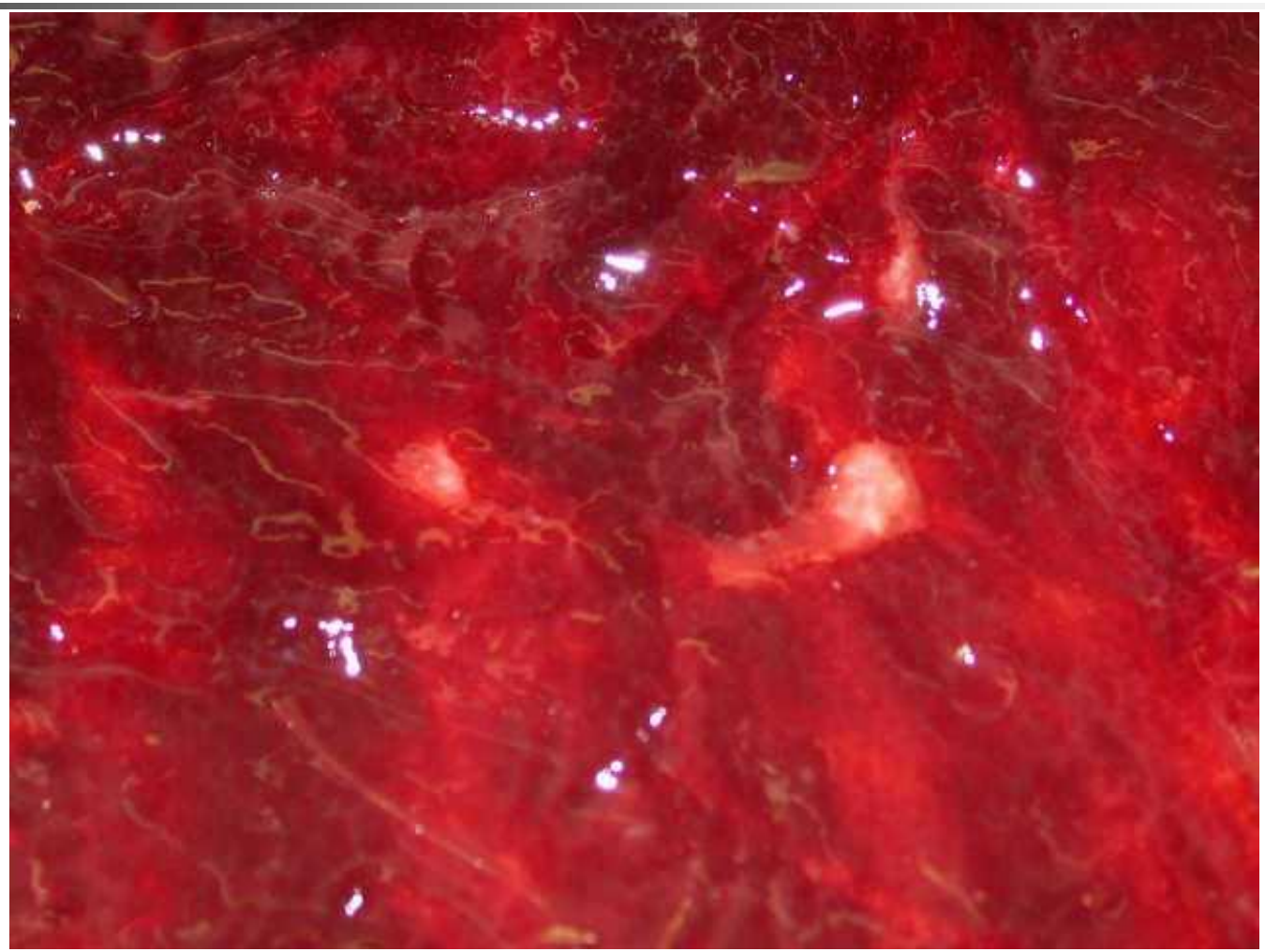
Chorionic cysts

Porcine placenta

Villi



Equine placenta

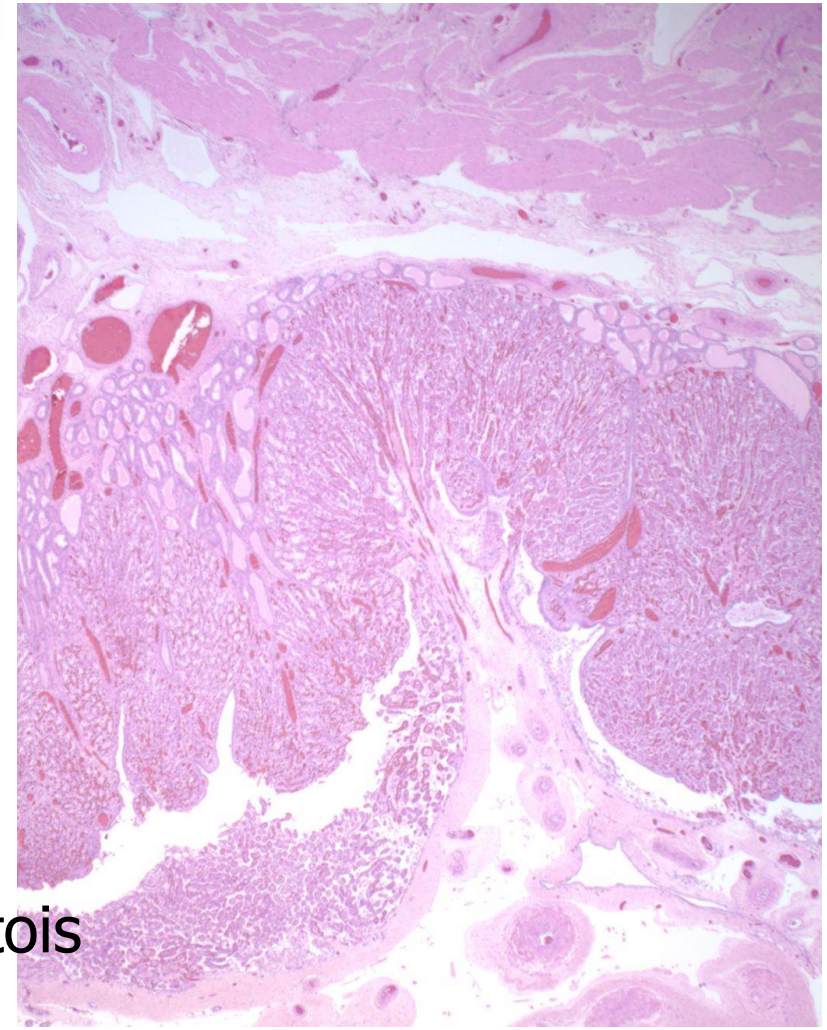


Equine placenta

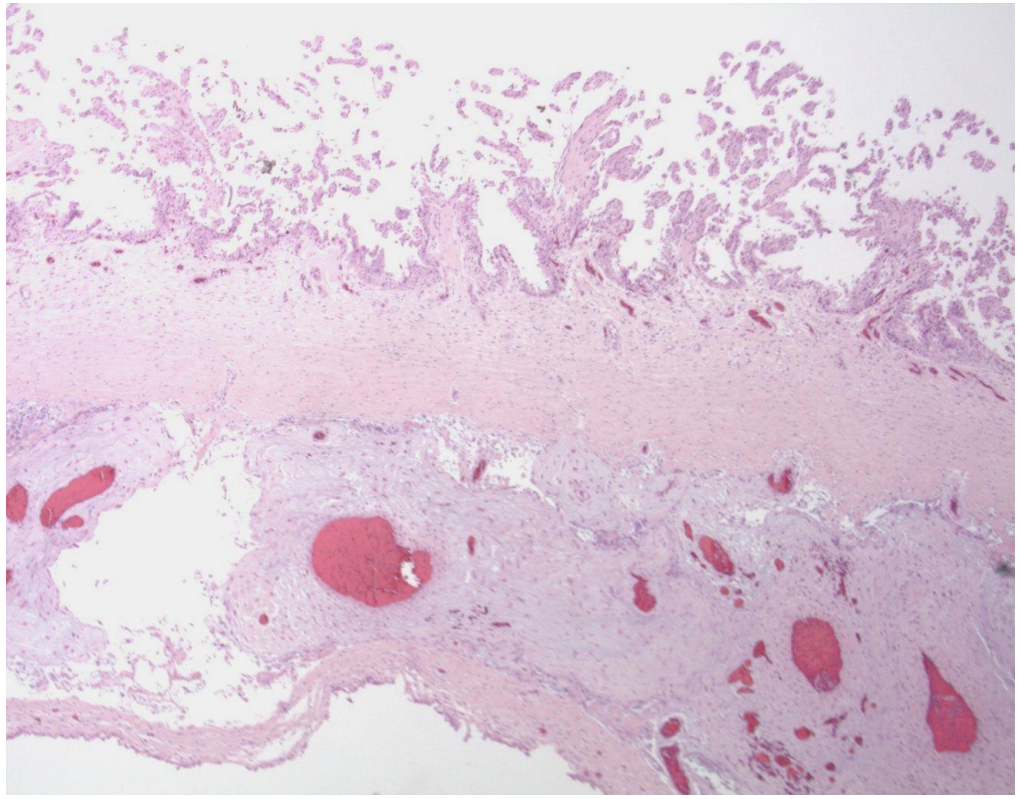
Uterus

Endometrial glands

Chorioallantois



Microcotyledons



Chorioallantois

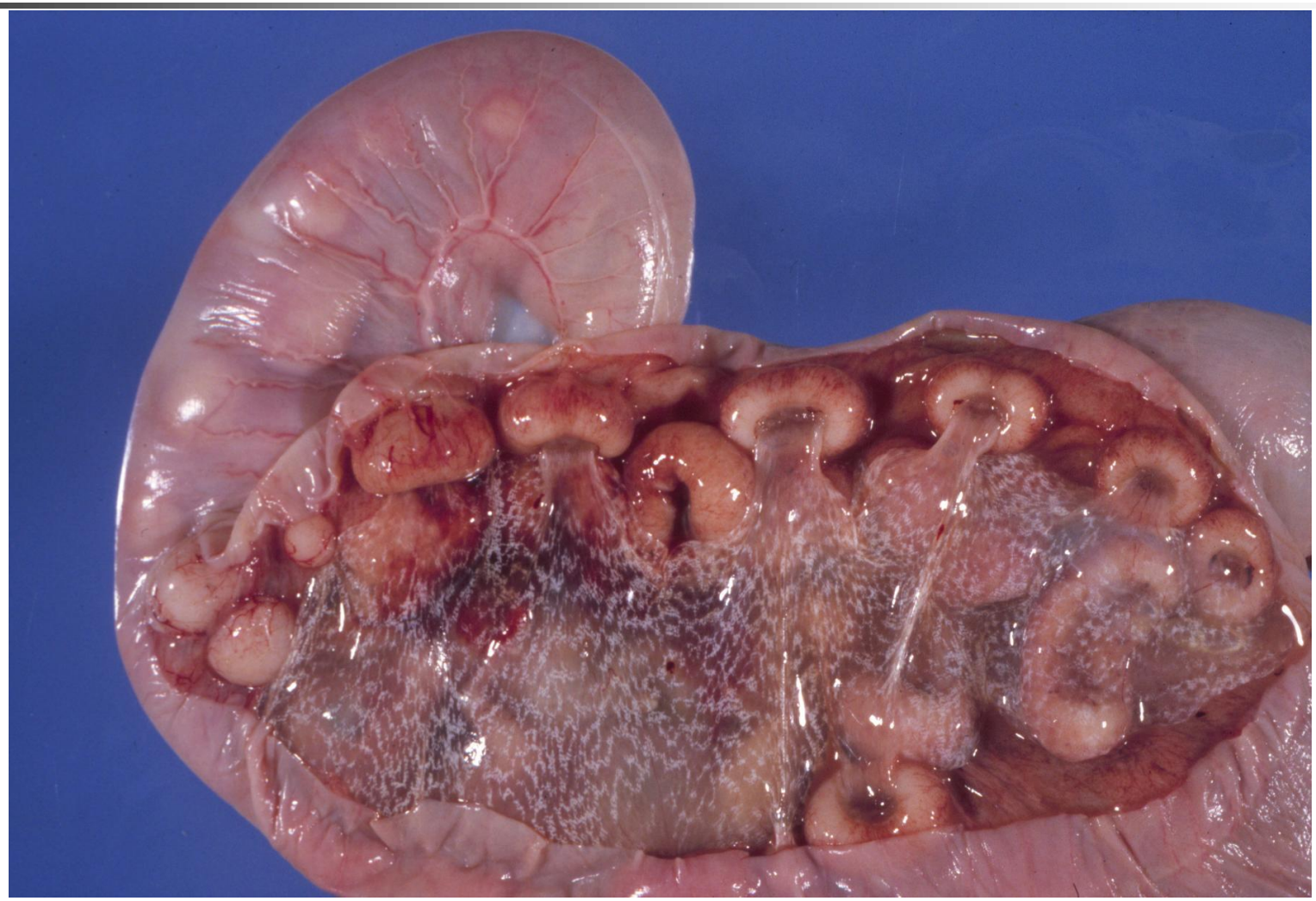
Ruminants – placentomes

- Caruncle (maternal)

- Cotyledons (fetal)

www.fungiforays.co.uk

Ruminant



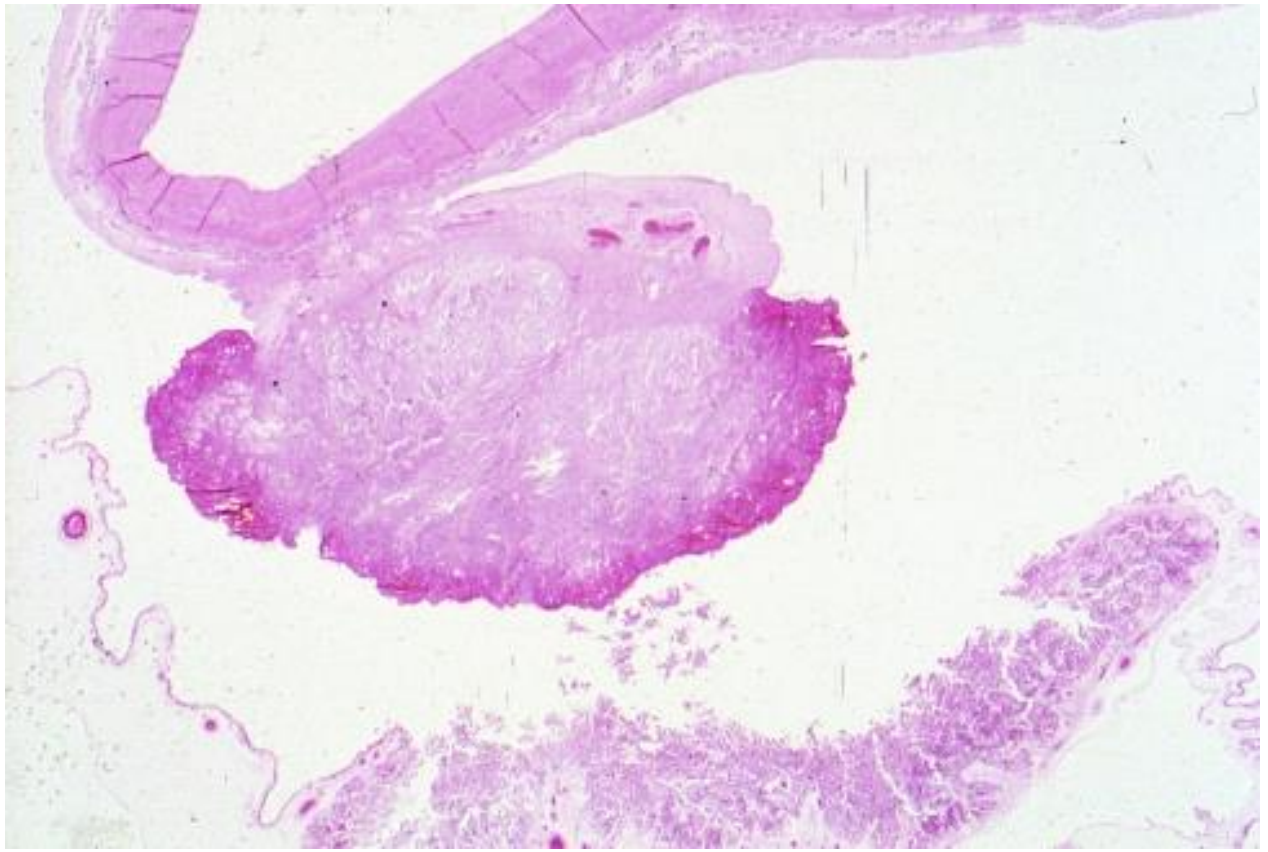
Placentome

Uterus

Caruncle

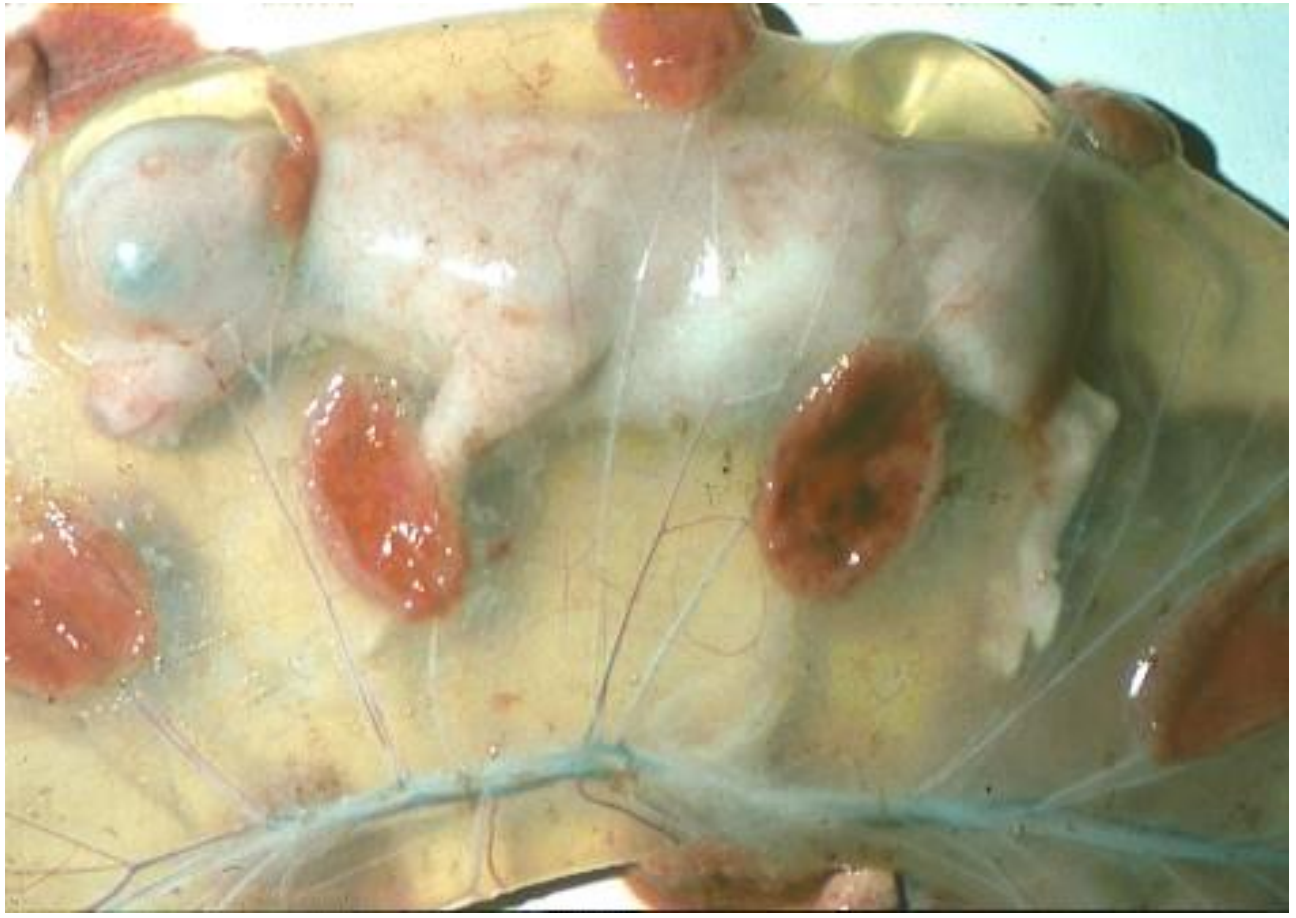
Cotyledon

Chorioallantois



Ruminants

Cotyledonary



Go Placenta!

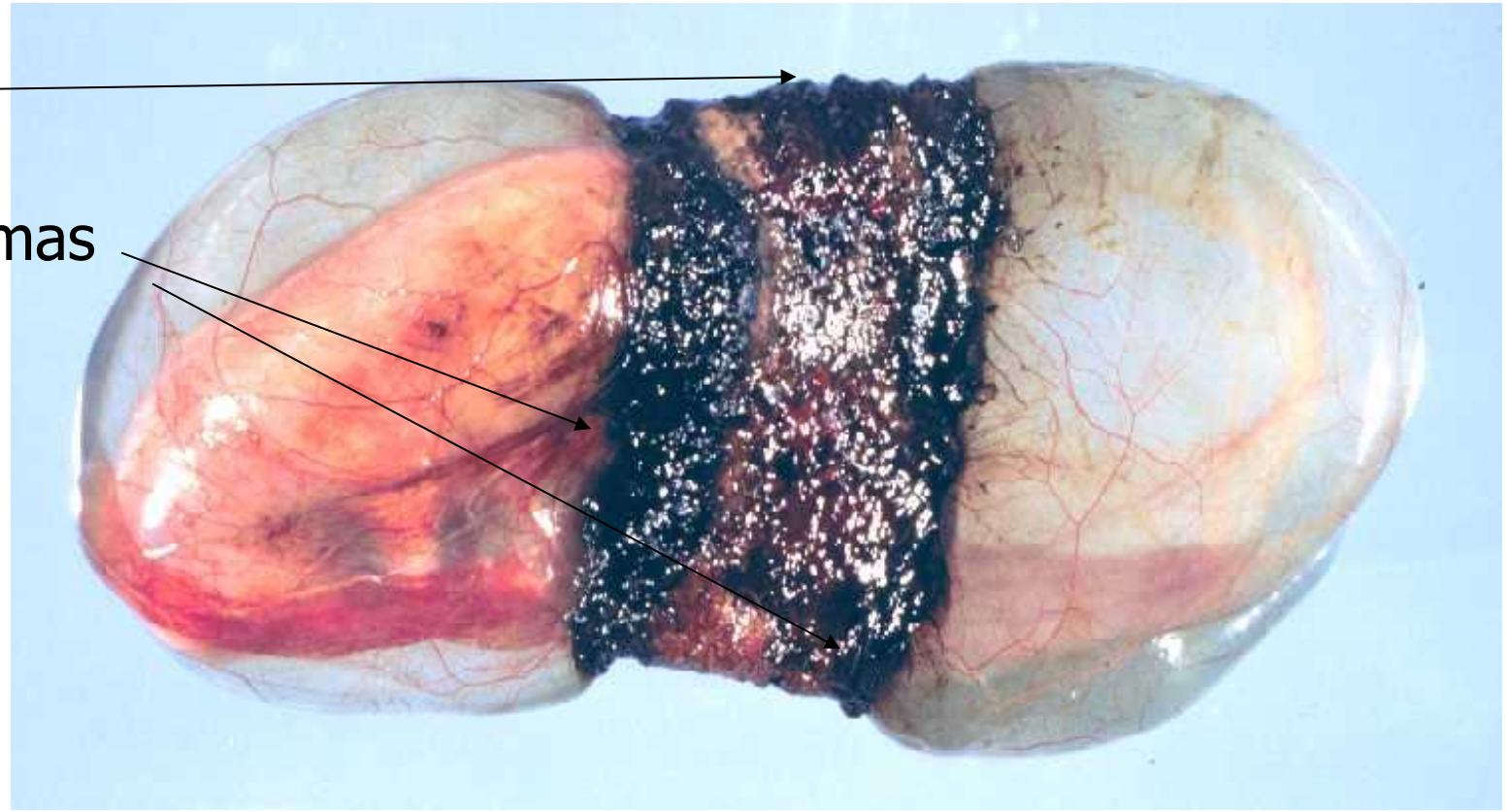
Photo compliments of Dr Jeff Caswell

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

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