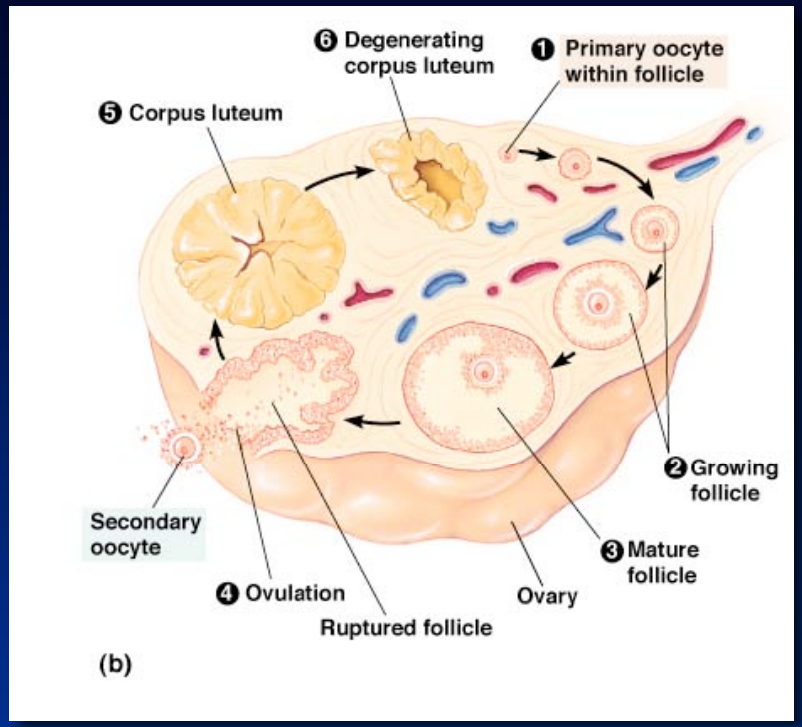
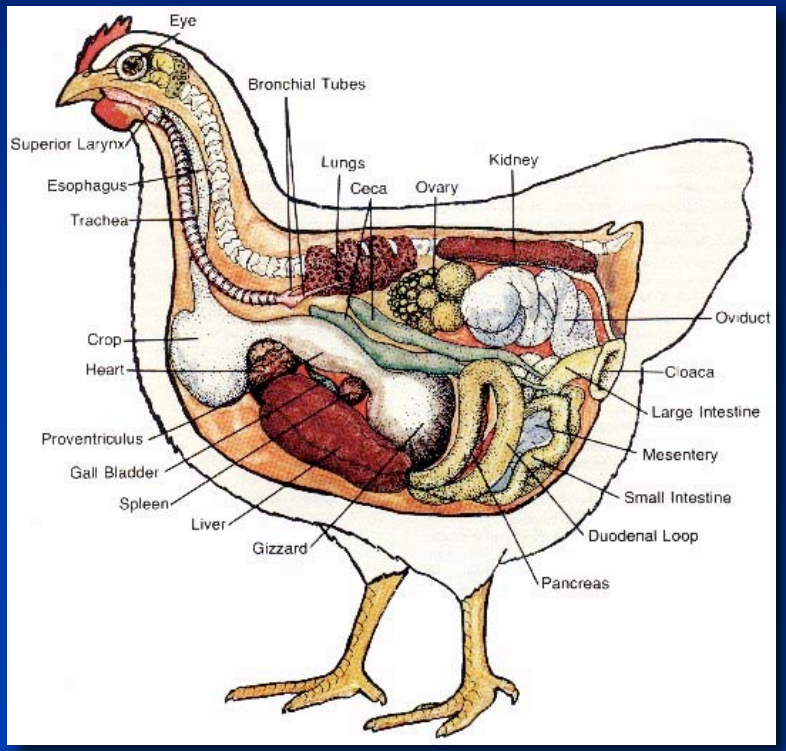
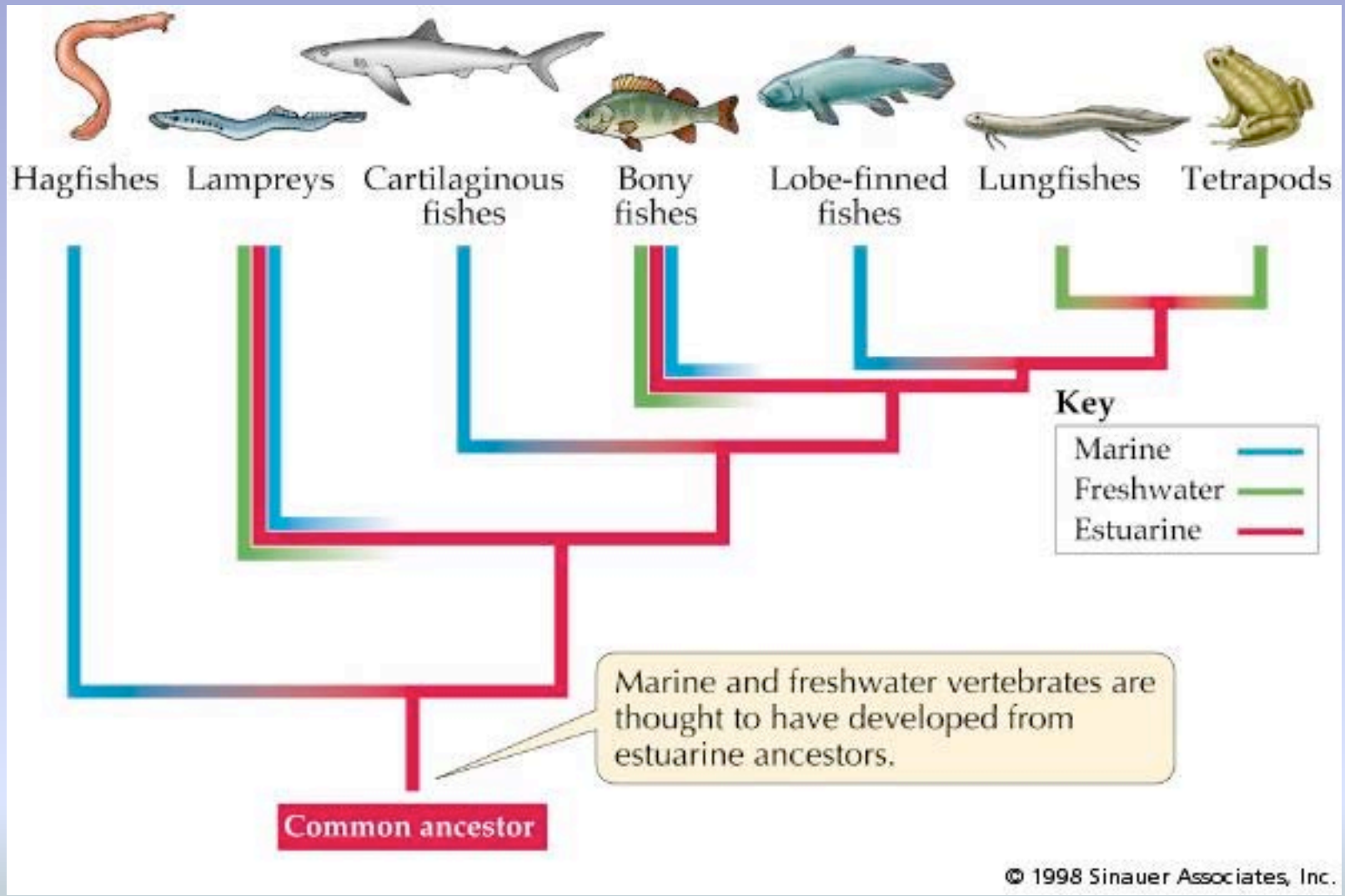
Female Reproductive Anatomy

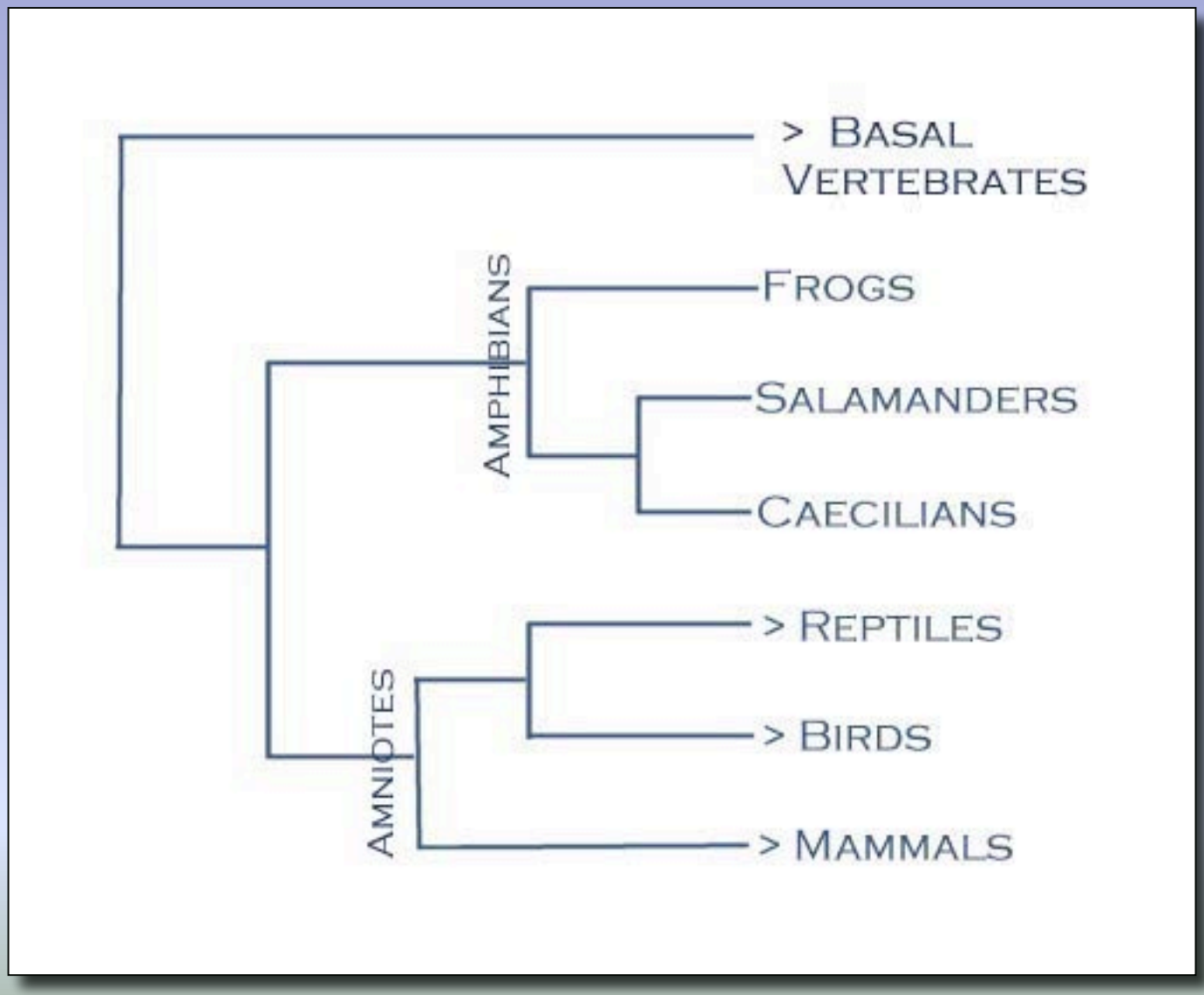




Vertebrate Tree



Tetrapod Tree



Ovary - Primary Organ

- Ovary - Gross anatomy
  - usually paired
  - may be solid or hollow
  - size can vary greatly depending on species and stage of reproductive activity

Gross Anatomy - Mammal

Human

Cow

- Paired, solid
- Size changes little with reproductive activity
  - 'Blisters on the surface'

Gross Anatomy - Reptile

- Paired, solid ovary
- Enlarged dramatically with reproductive activity

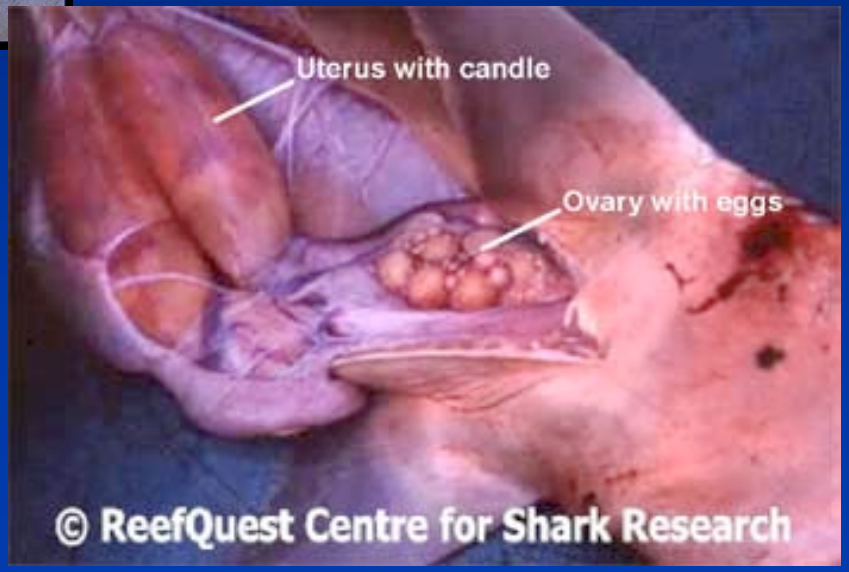
Alligator

Gross Anatomy - Fish

Perch

- Teleosts
  - Paired - can be fused completely or in part

- Elasmobranchs
  - Paired but fused midline

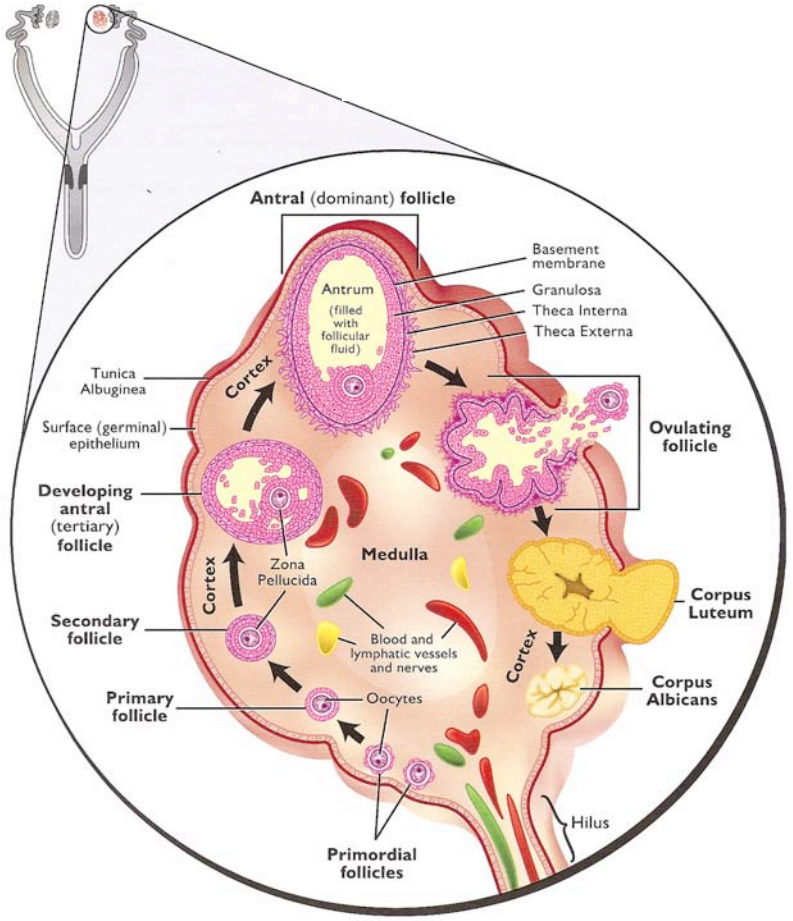


Shark

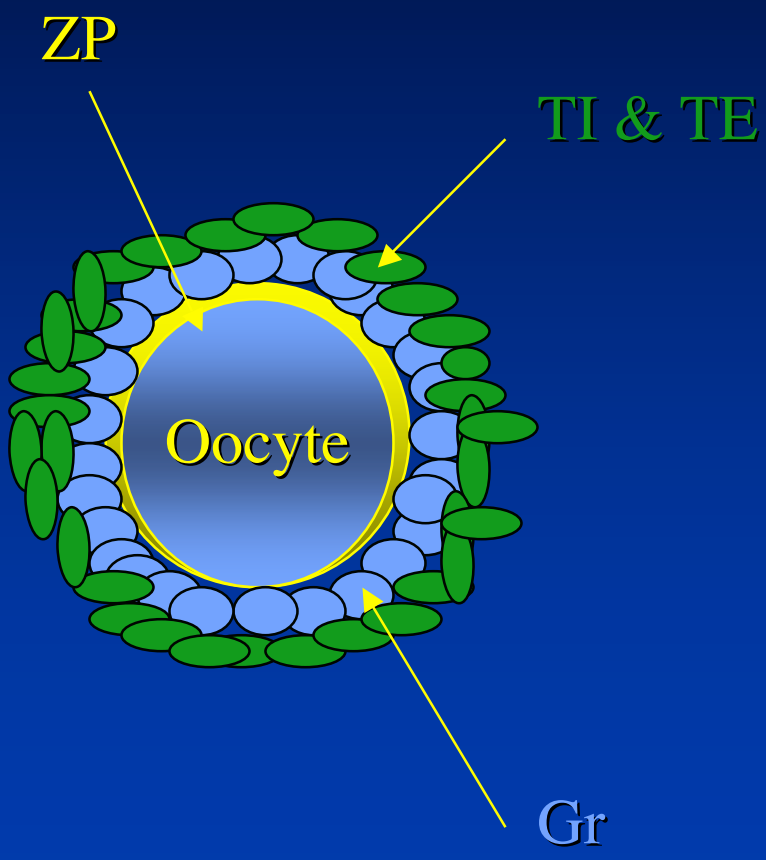
Ovarian Histology

- Serosa
  - outer covering of tough connective tissue
- germinal epithelium
  - single layer of cells once thought to produce the germ cells - thus its name
- ovarian stroma or cortex
  - contains follicles and scar tissue, some blood vessels
- ovarian hylus or medulla
  - contains blood vessels, nerves, lymph

Eutherian Mammals



Ovarian Follicle

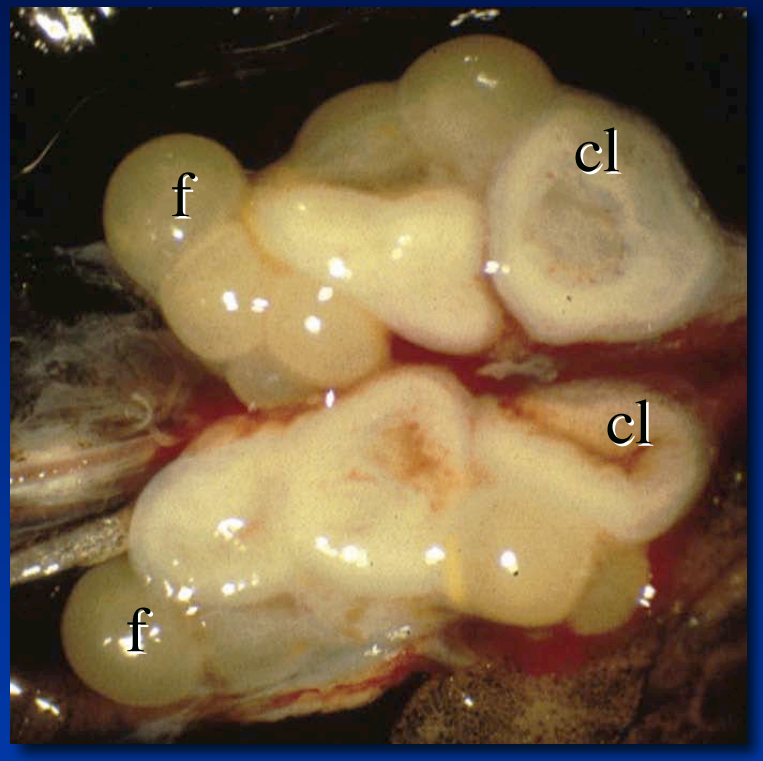


- **follicle** - composite structure that will produce mature oocyte
  - primordial follicle - germ cell (oocyte) with a single layer of mesodermal cells around it
  - as development of follicle progresses, oocyte will obtain a 'halo' of cells and membranes that are distinct:
    - 1. zona pellucide (ZP)
    - 2. granulosa (Gr)
    - 3. theca interna and externa (TI & TE)

Human Ovary

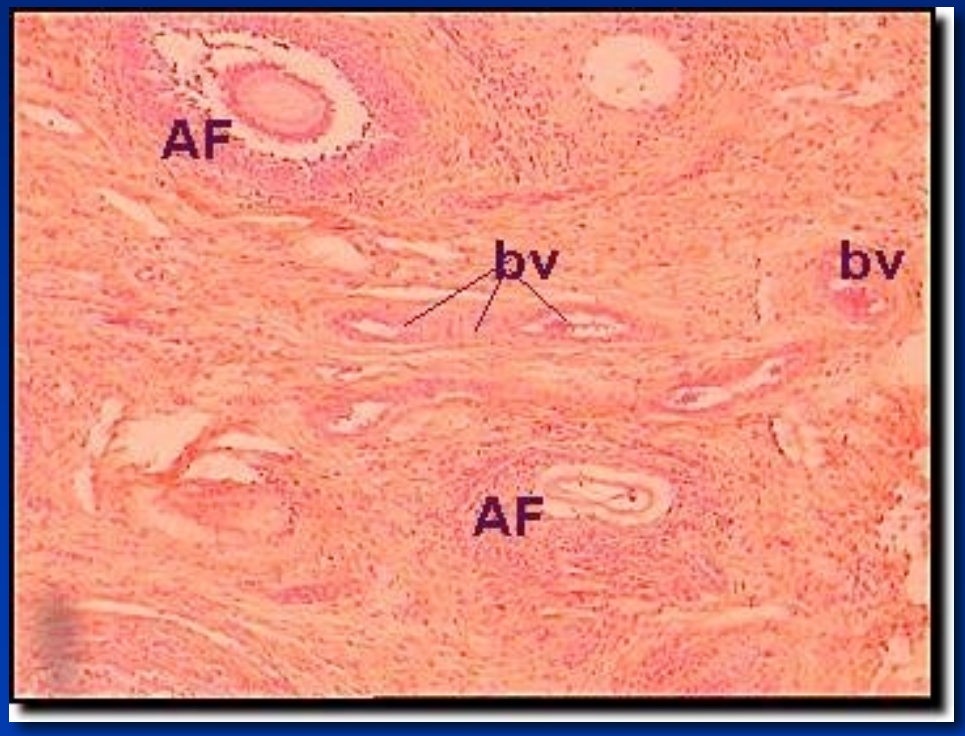
Corpora Lutea (CL)

- remnant of ovulated follicle
  - following ovulation theca and granulosa cells remain in ovary
  - these cells luteinize and produce progesterone
  - will remain 'active' for a species specific period of time and then undergo luteolysis - luteal death



Atresia

- Atretic follicles - follicles undergoing death = atresia

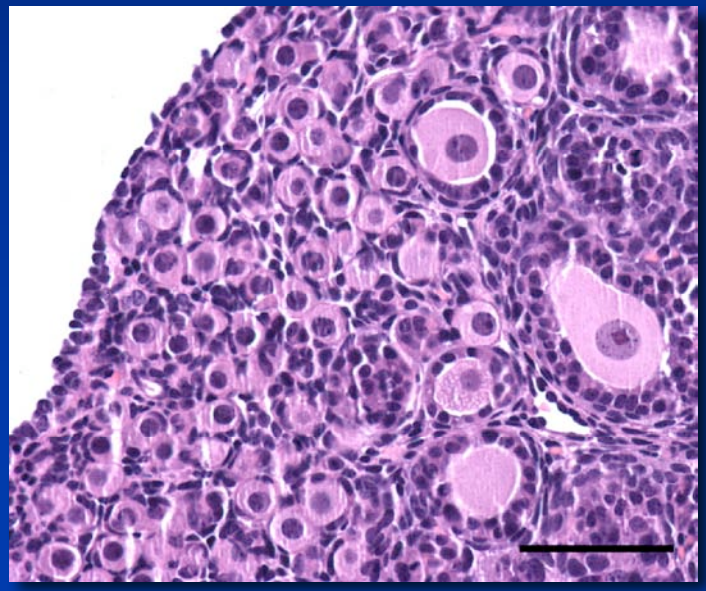


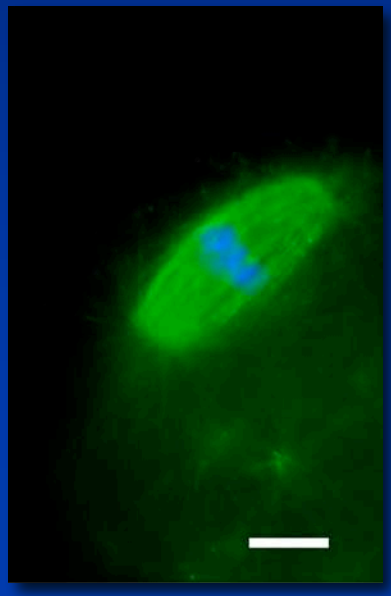
Human Ovary

- at 5 months in utero - ovary has >3,500,000 germ cells
  - they then begin to die - atresia
- at birth each ovary has 400,000 germ cells
  - all she will have for rest of life
- at puberty = 83,000/ovary
- at 35 yrs = 30,000 follicles

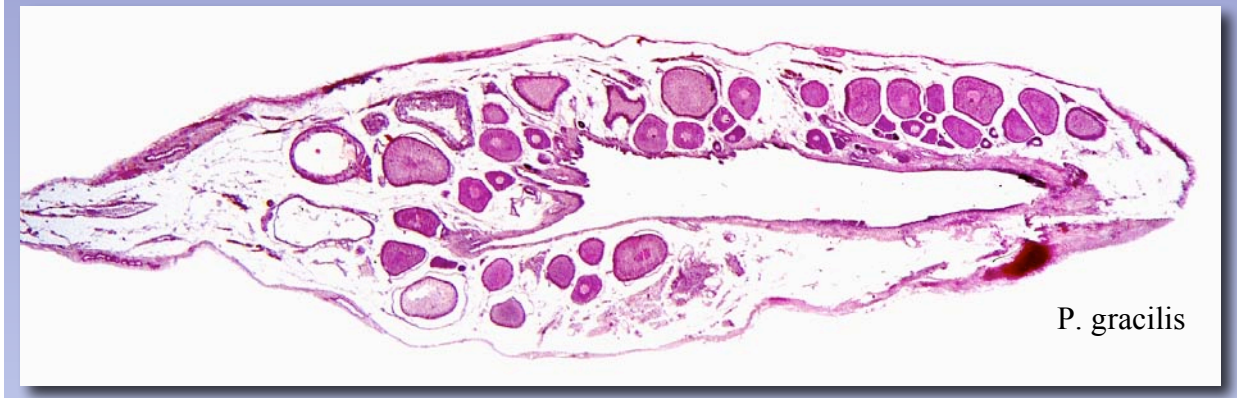
Oogonial Nests

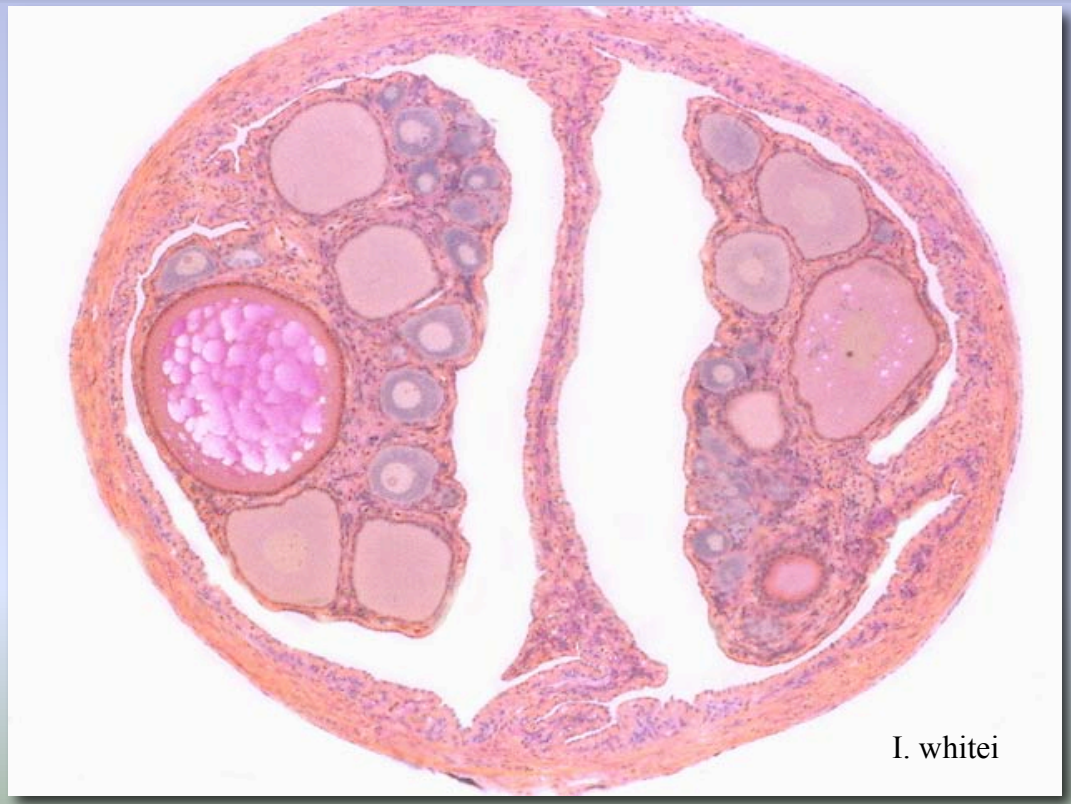
- Oogonial Nests
  - some species (adults) retain clumps of oogonia that undergo mitosis to generate new follicles.
  - Not found in mammals or birds





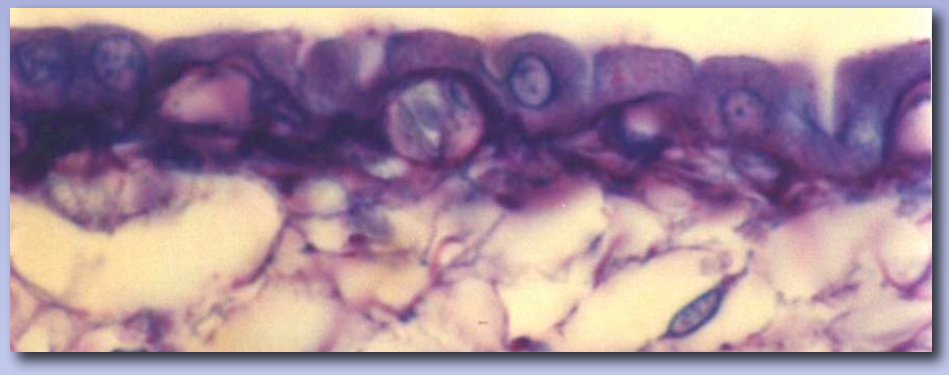
Fish Ovary - Histology


P. gracilis


I. whitei

- Hollow, fused
- Ovulation toward the central cavity

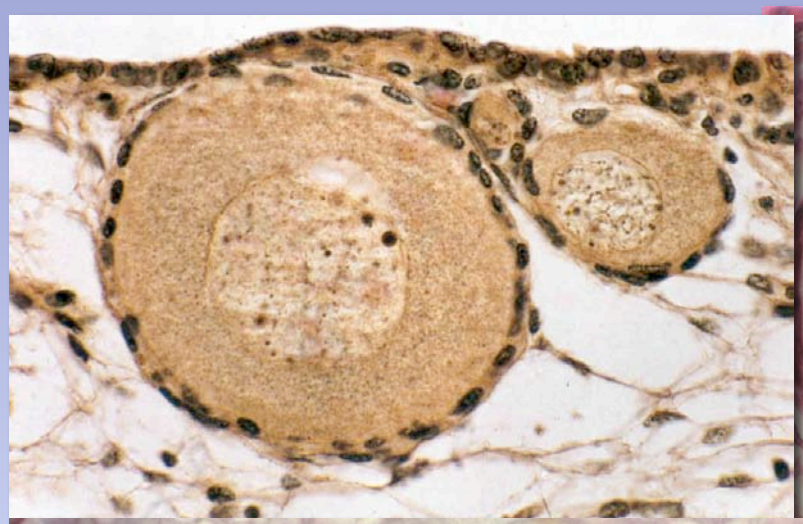
Fish Ovary - Germinal Epithelium

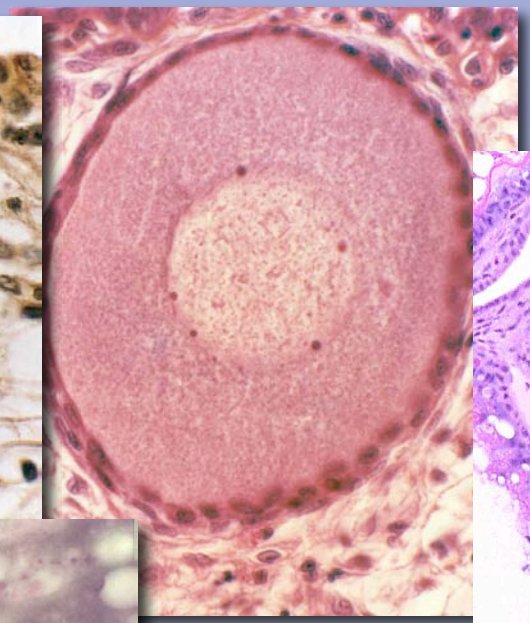


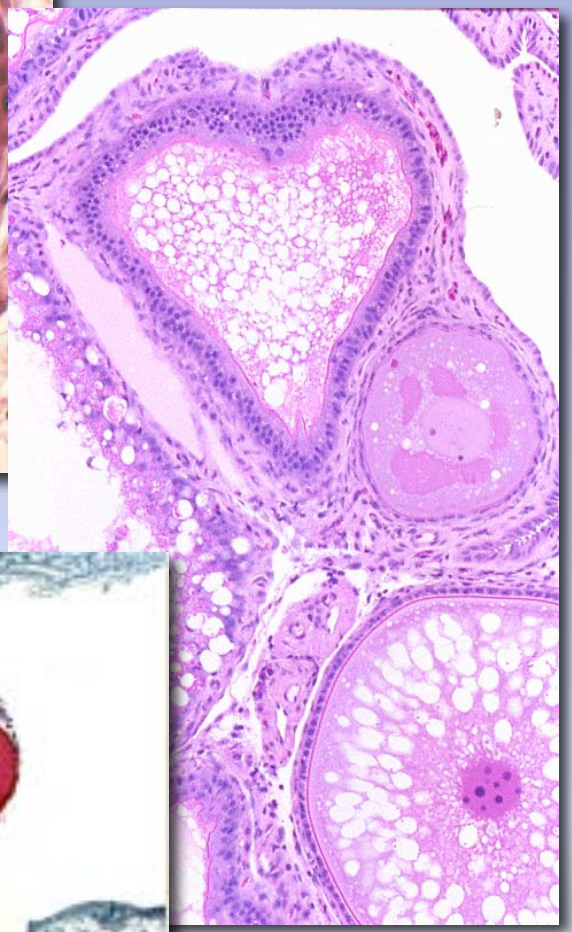
- Germ cells (oogonia) lie below surface of ovarian epithelium

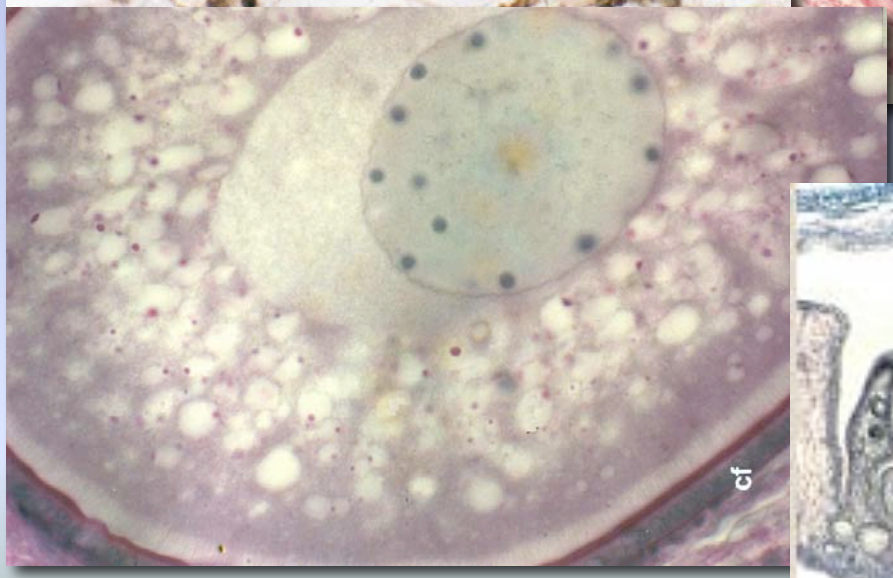
I. whitei

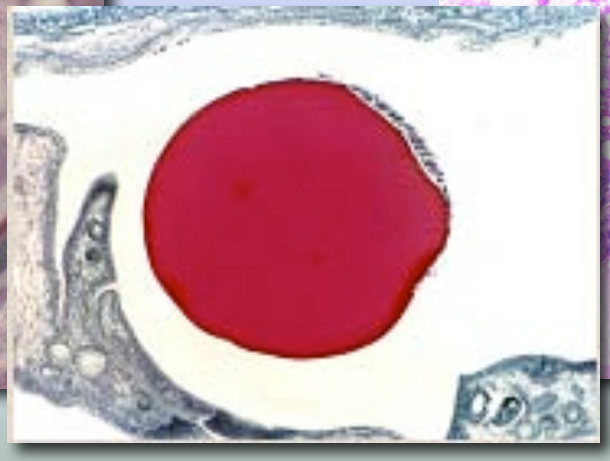
Follicles at various stages



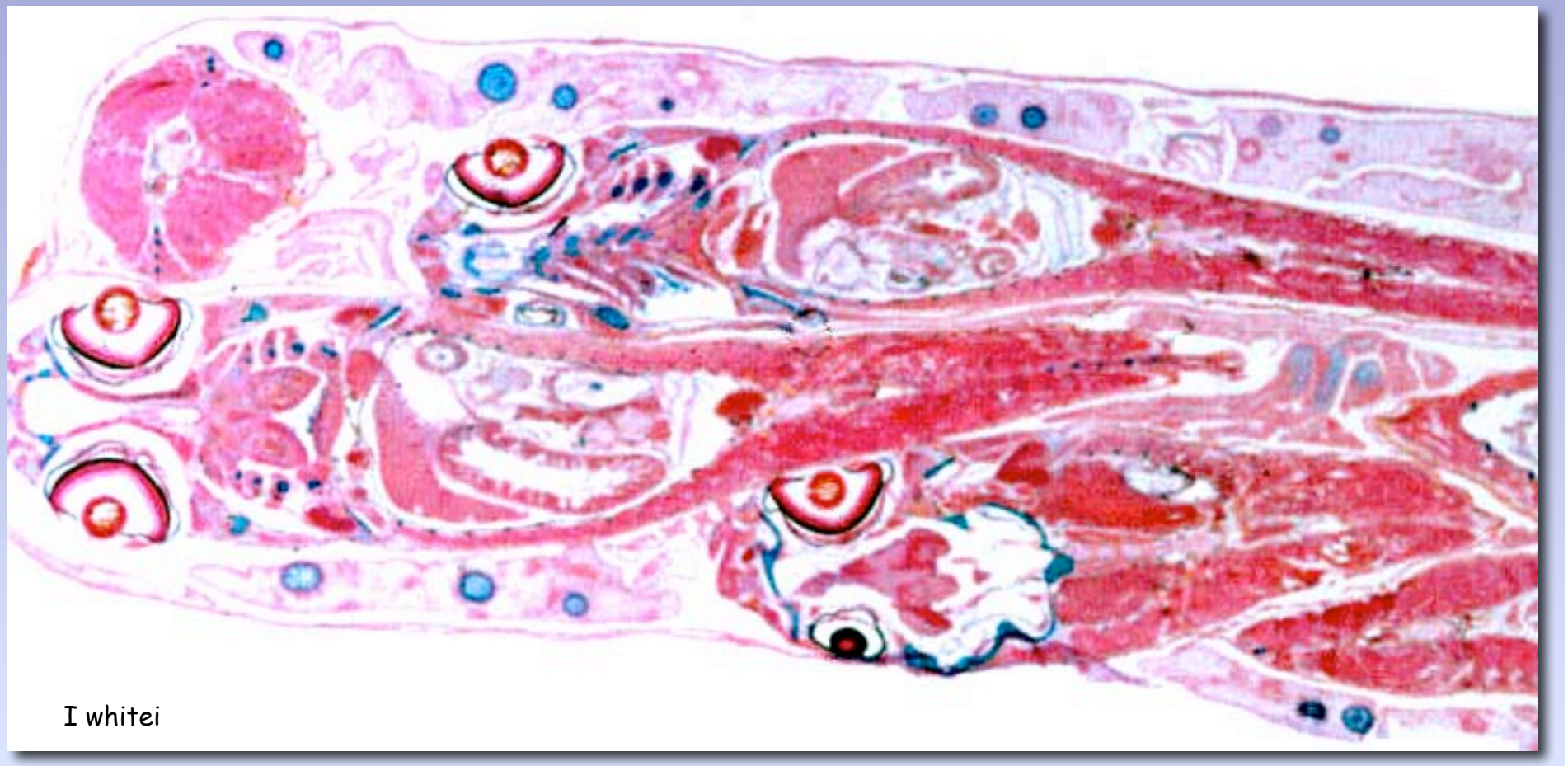








What is this?



Ovary of viviparous fish with developing embryos in it!

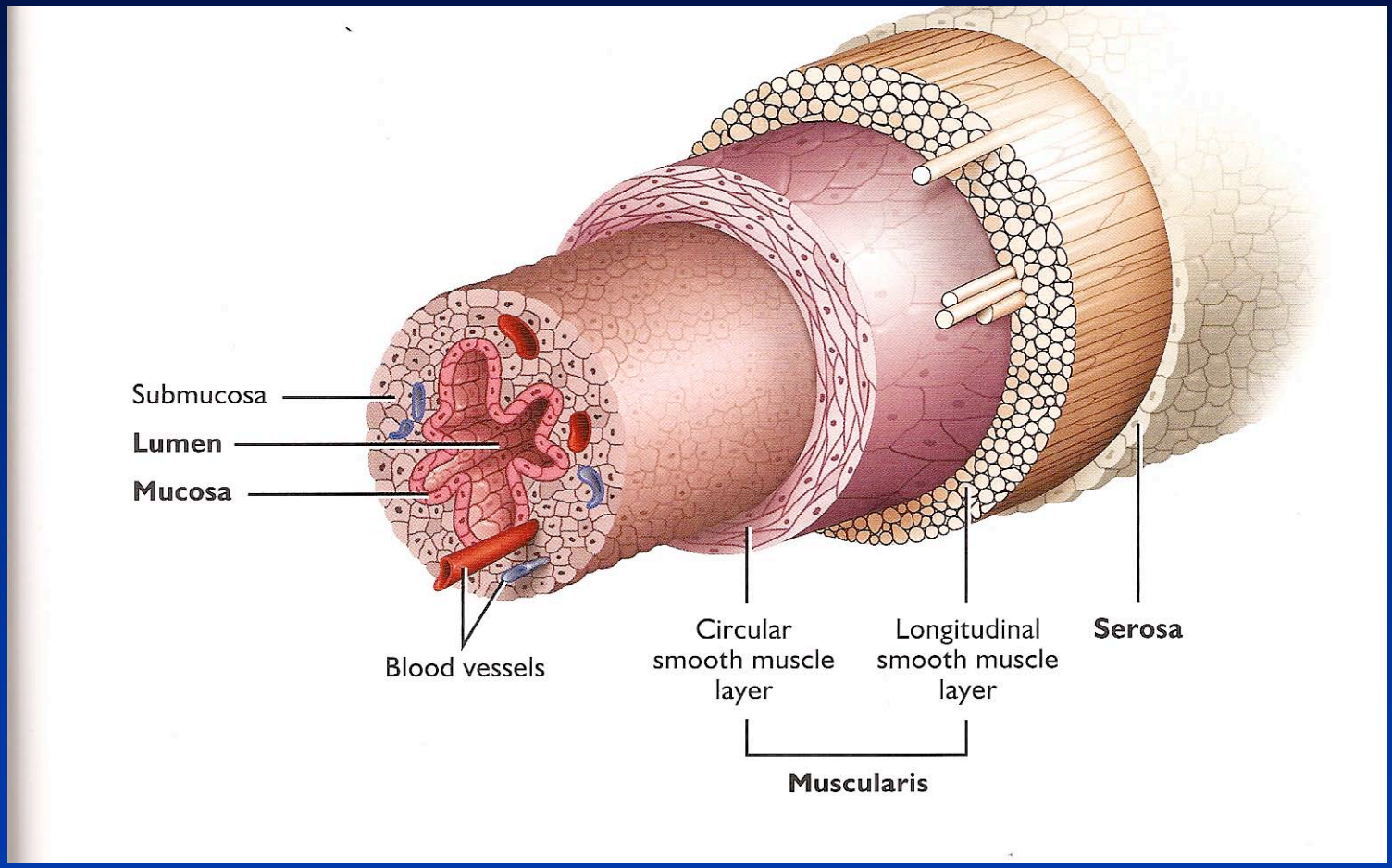
Summary - Ovary

- Chondrichthyes- - paired, fused, solid
- Osteichthyes
  - Teleosts - paired, fused or not, hollow
  - Holostean - paired, separate, solid
- Amphibians - paired, separate, solid
- Reptiles - paired, separate, solid (some ribbon)
- Birds - paired, separate, solid
- Mammals - paired, separate, solid

Duct system

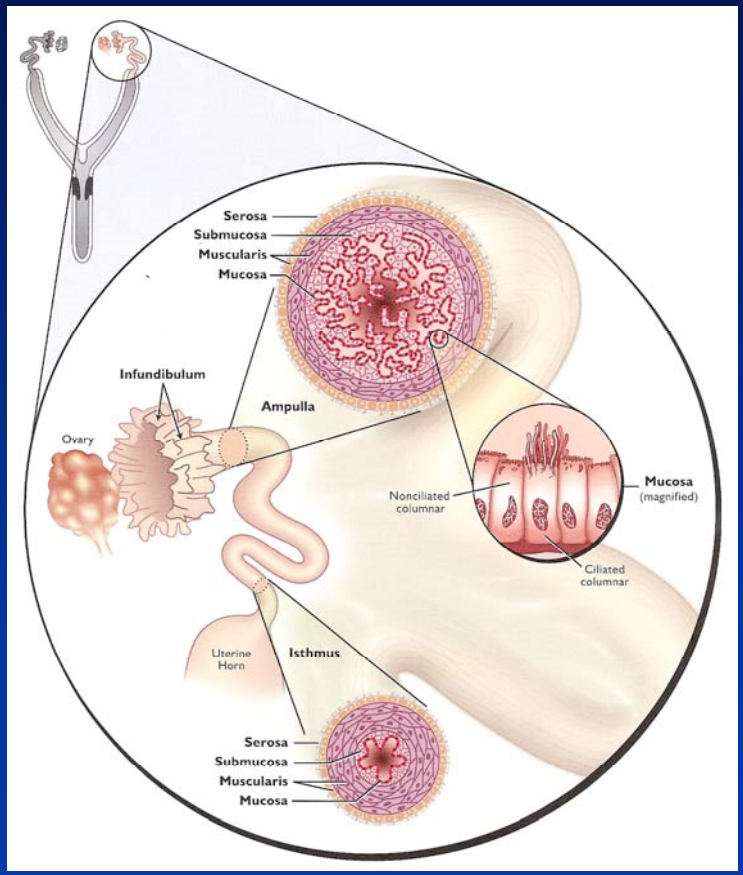
- all derived from the embryonic Müllerian duct
- whole duct is termed **oviduct** in comparative biology
  - in mammals - oviduct usually refers to Fallopian tube

Female Tubular Structures



Mammalian Fallopian tube

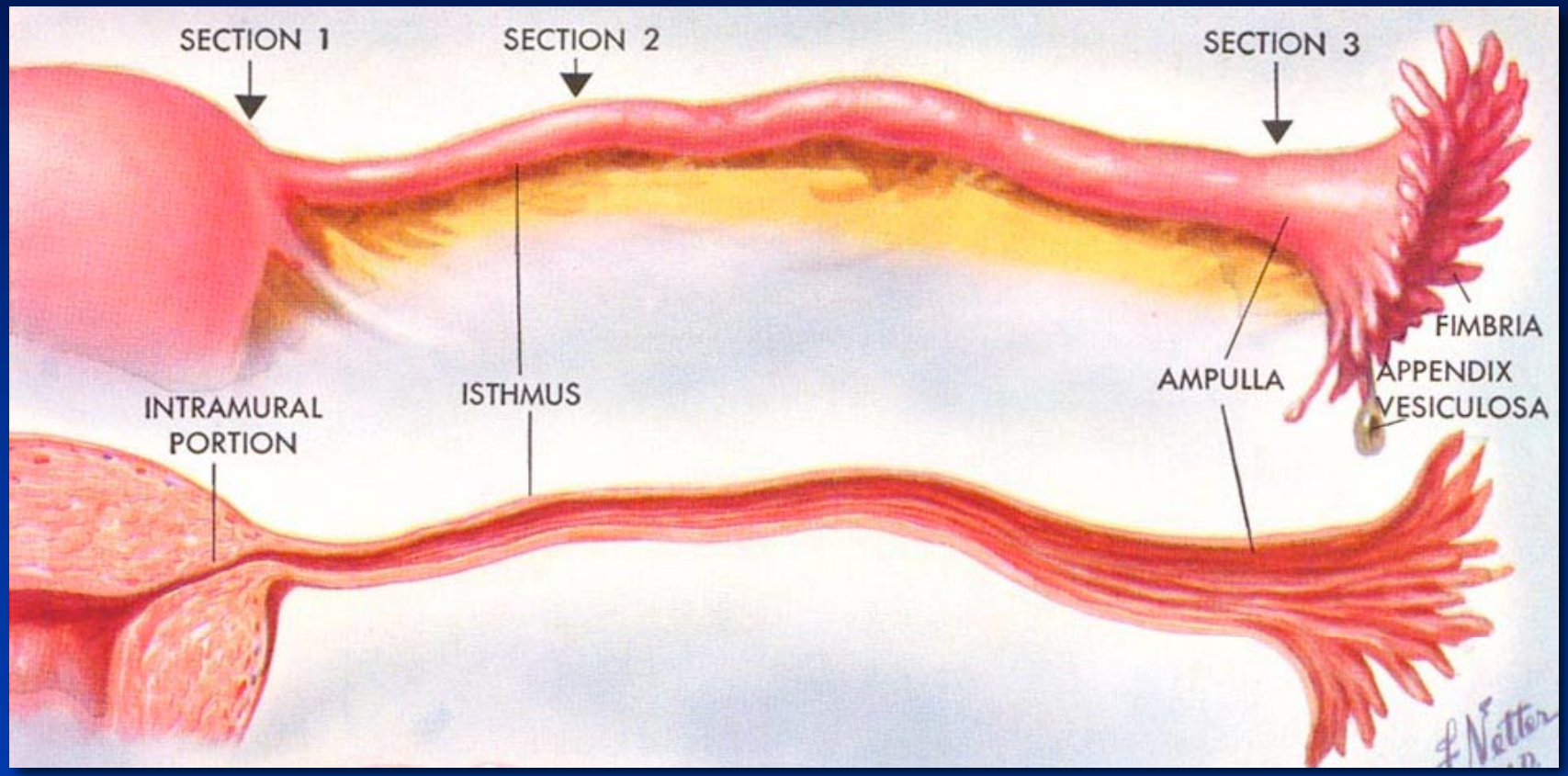
- after Fallopius
- three regions
  - infundibulum, ampulla, isthmus (& intramural region)
- **infundibulum** - top thin walled region that receives the egg
  - opening is **ostium**
  - finger-like projections are **fimbria**
- **ampulla** - ciliated for sperm and ova transport
  - region where egg is fertilized in many species
  - egg 'white' or albumen is secreted
- **isthmus** - junction with uterus
  - usually aglandular
  - **Intramural region** - region thru wall of uterus (mammals)



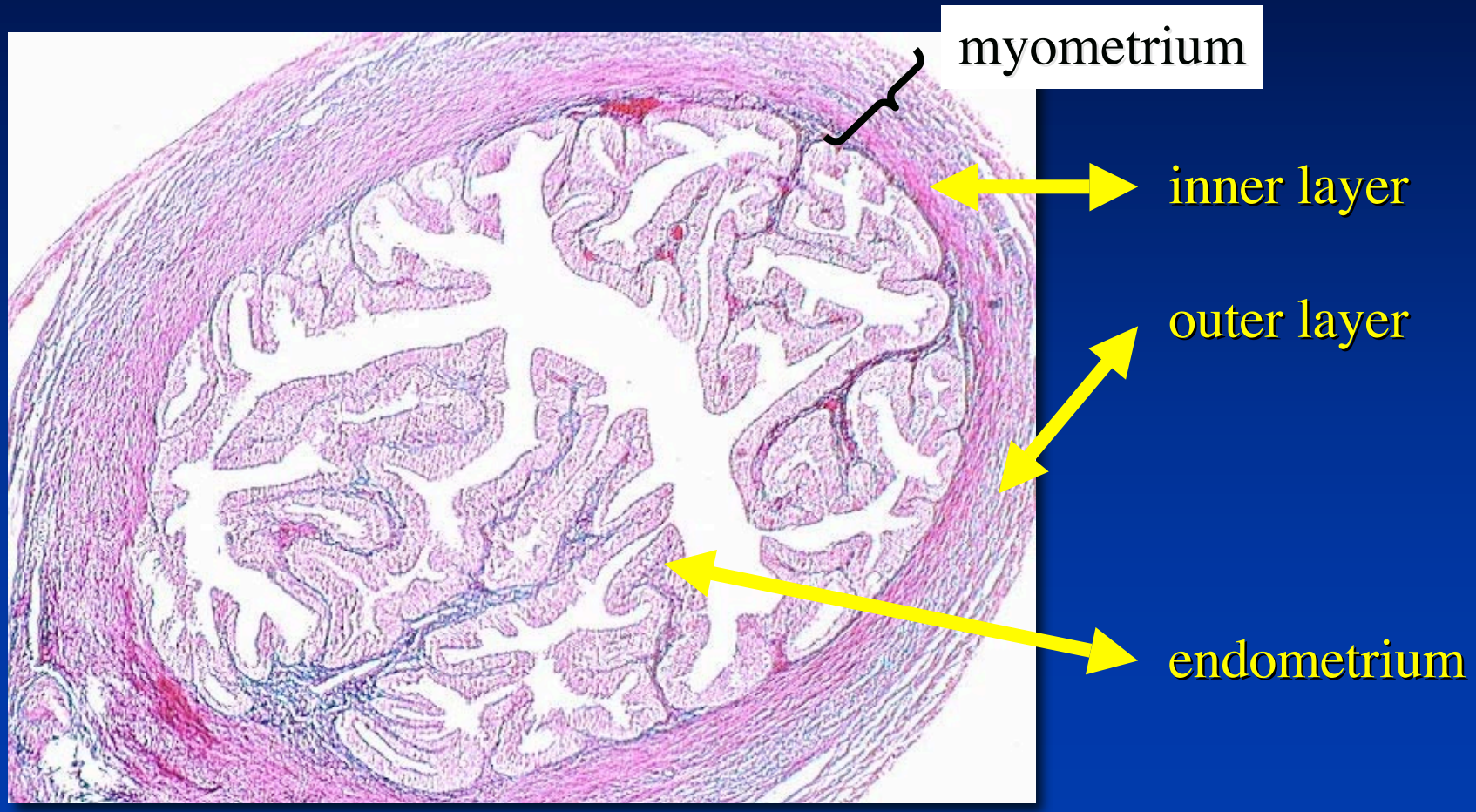
Fallopian Tube

- thin walled muscular tube
- three layers
  - Serosa - outer connective tissue covering
  - Myometrium - thin layers of smooth muscle
    - Inner layer - circular
    - Outer layer - longitudinal
  - Endometrium - layer(s) of epithelial cells
    - Can be 'thrown into folds'

Mammalian Fallopian tube anatomy



Mammalian Tube - Isthmus



Reptilian Tube - Isthmus

Lamina propria (glandular)

Epithelium

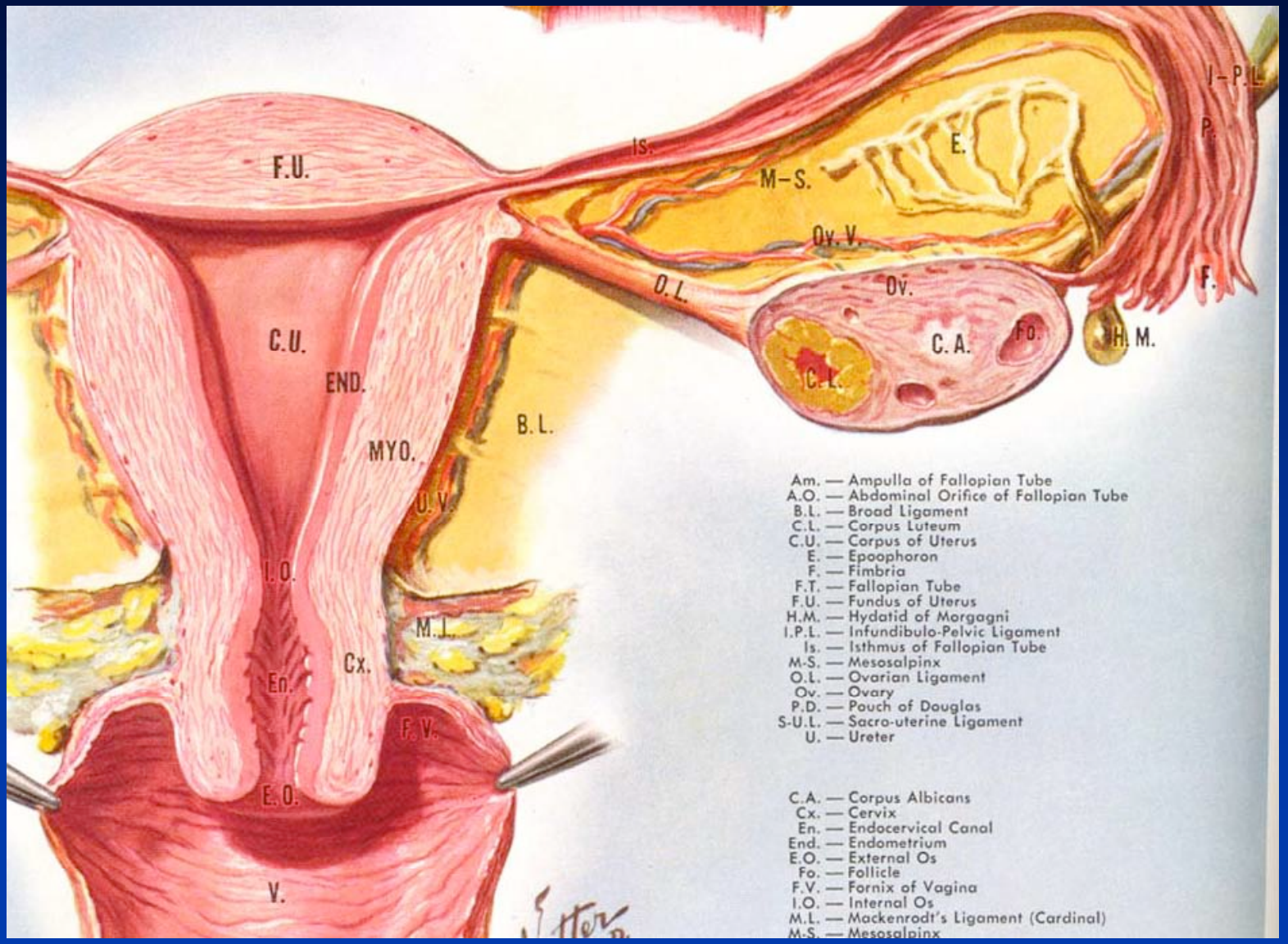
Myometrium

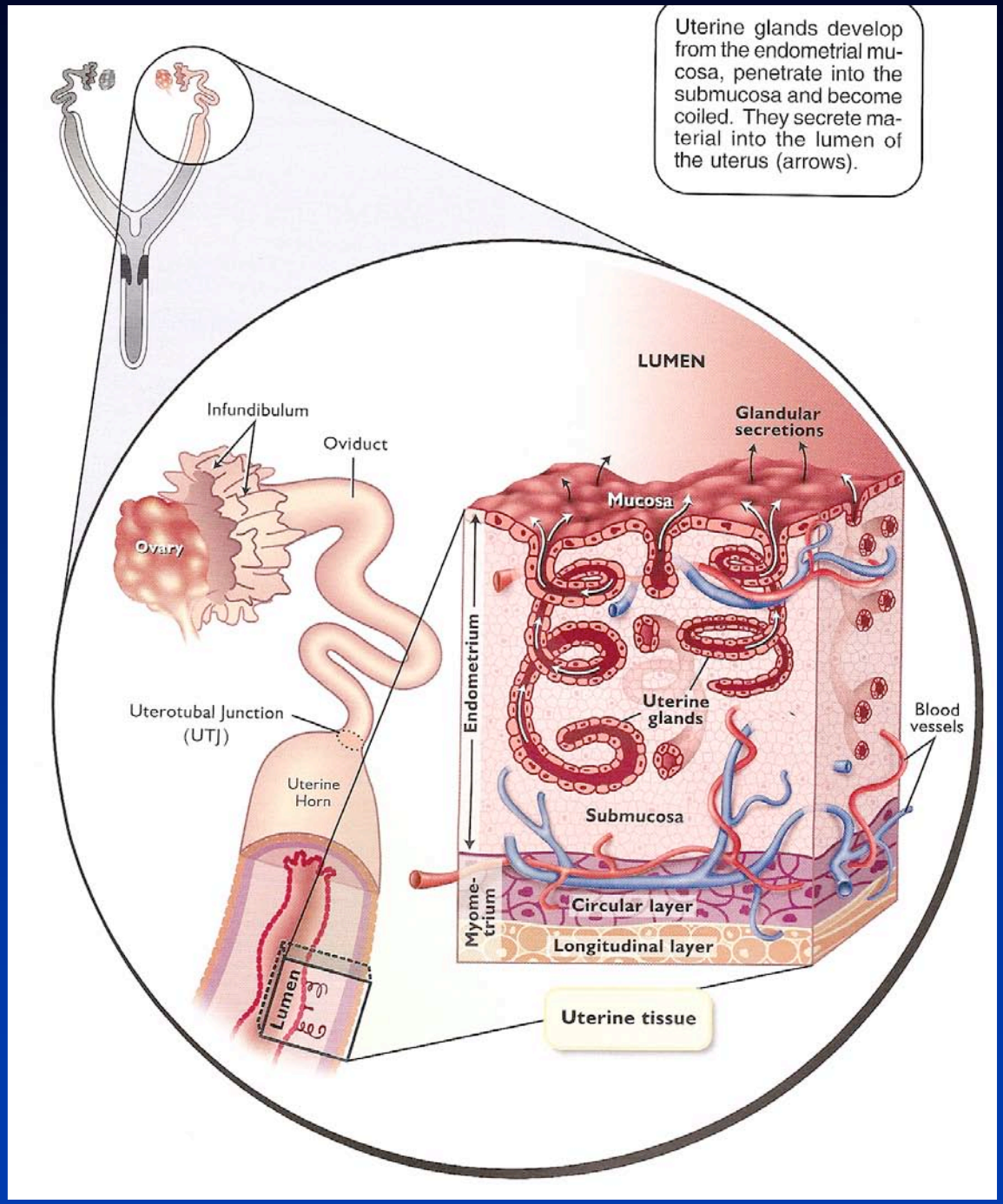
endometrium

Uterus

- thick walled muscular tube
- three layers
  - serosa, myometrium, endometrium
- region for egg / embryo development in viviparous species
- egg shell protein and calcium secreted in oviparous species
- structure and shape variable depending on species and stage of reproductive activity

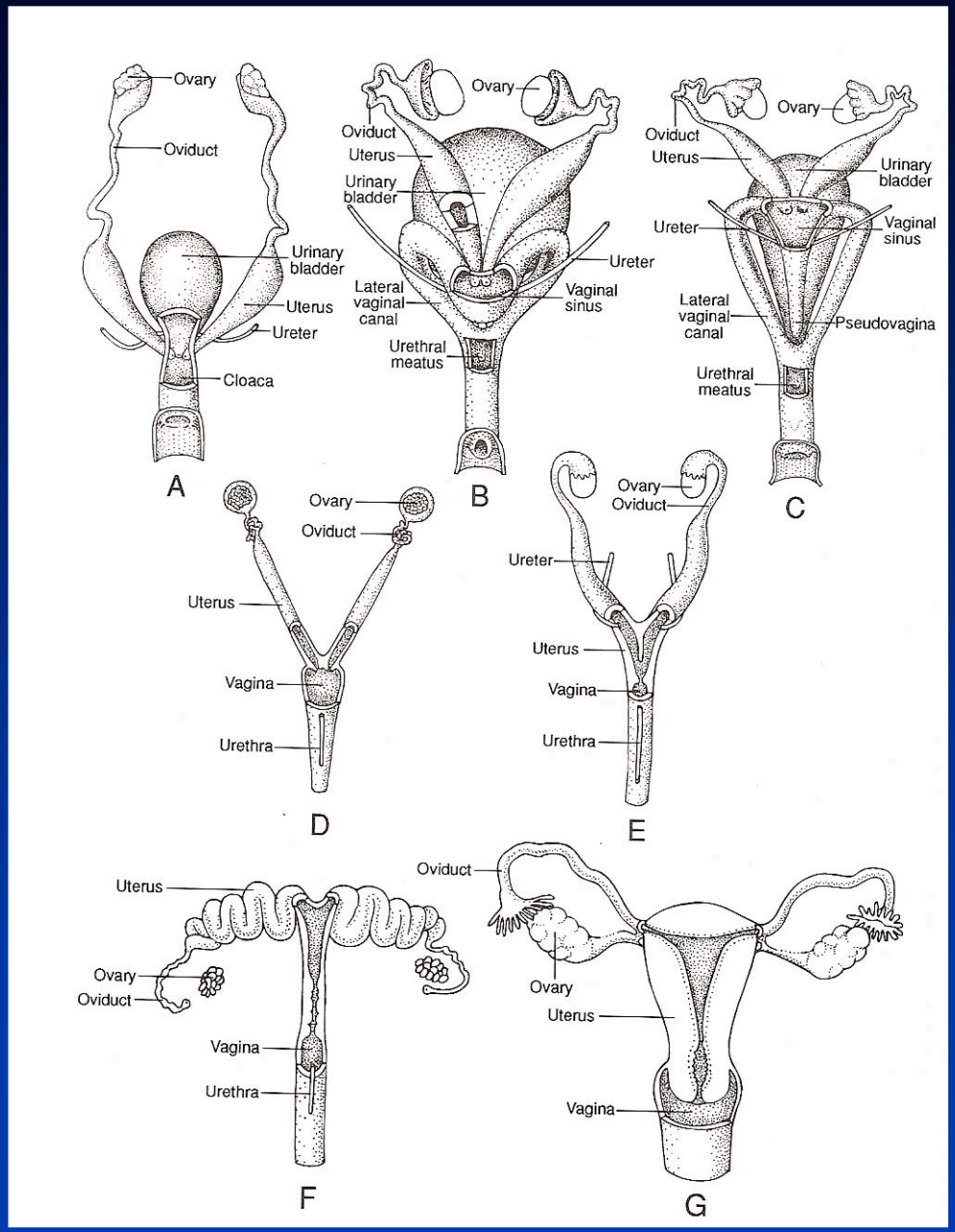
Human Uterine Anatomy



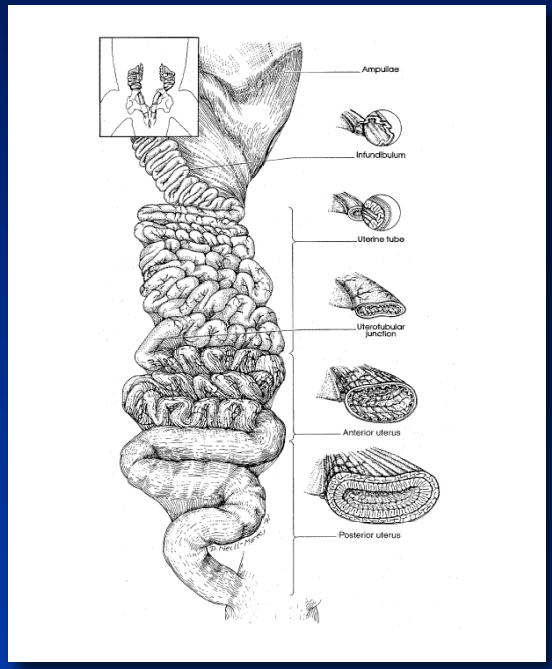

Uterine glands develop from the endometrial mucosa, penetrate into the submucosa and become coiled. They secrete material into the lumen of the uterus (arrows).
LUMEN
Infundibulum
Oviduct
Ovary
Glandular secretions
Mucosa
Endometrium
Uterine glands
Blood vessels
Uterotubal Junction (UTJ)
Uterine Horn
Submucosa
Myometrium
Circular layer
Longitudinal layer
Lumen
Uterine tissue

Mammalian Uteri

- A = Monotreme (Echidna)
- B = Marsupial (Opossum)
- C = Marsupial (Kangaroo)
- D = Eutherian (Rat)
- E = Eutherian (Cat)
- F = Eutherian (Pig)
- G = Eutherian (Woman)



Comparative Duct Systems

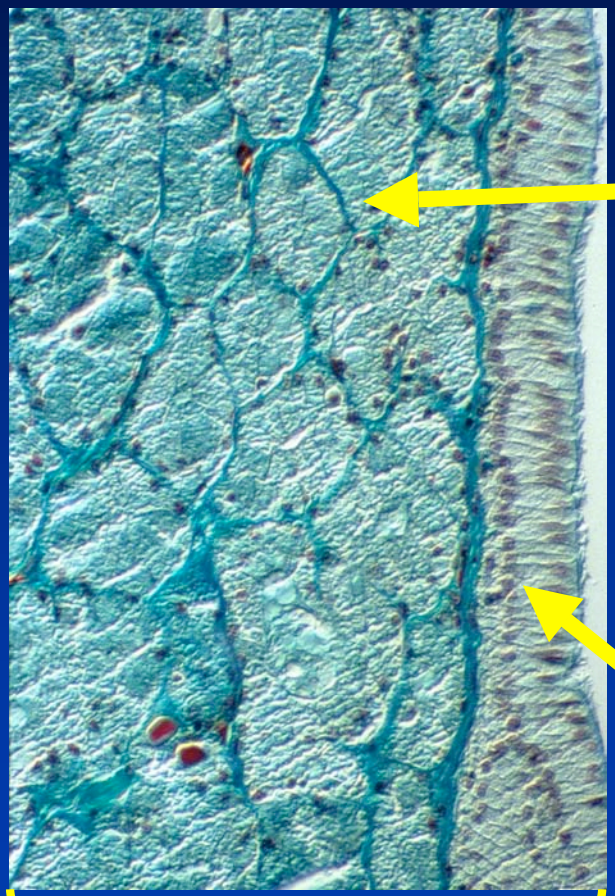


- Derived from Mullerian duct
- May have one or two 'horns'
  - Most birds have one
- Functions
  - Sperm transport
  - Egg shell/jelly production
  - Growth factor synthesis

Alligator Uterus - Isthmus

Fiber Region

Calcium Region

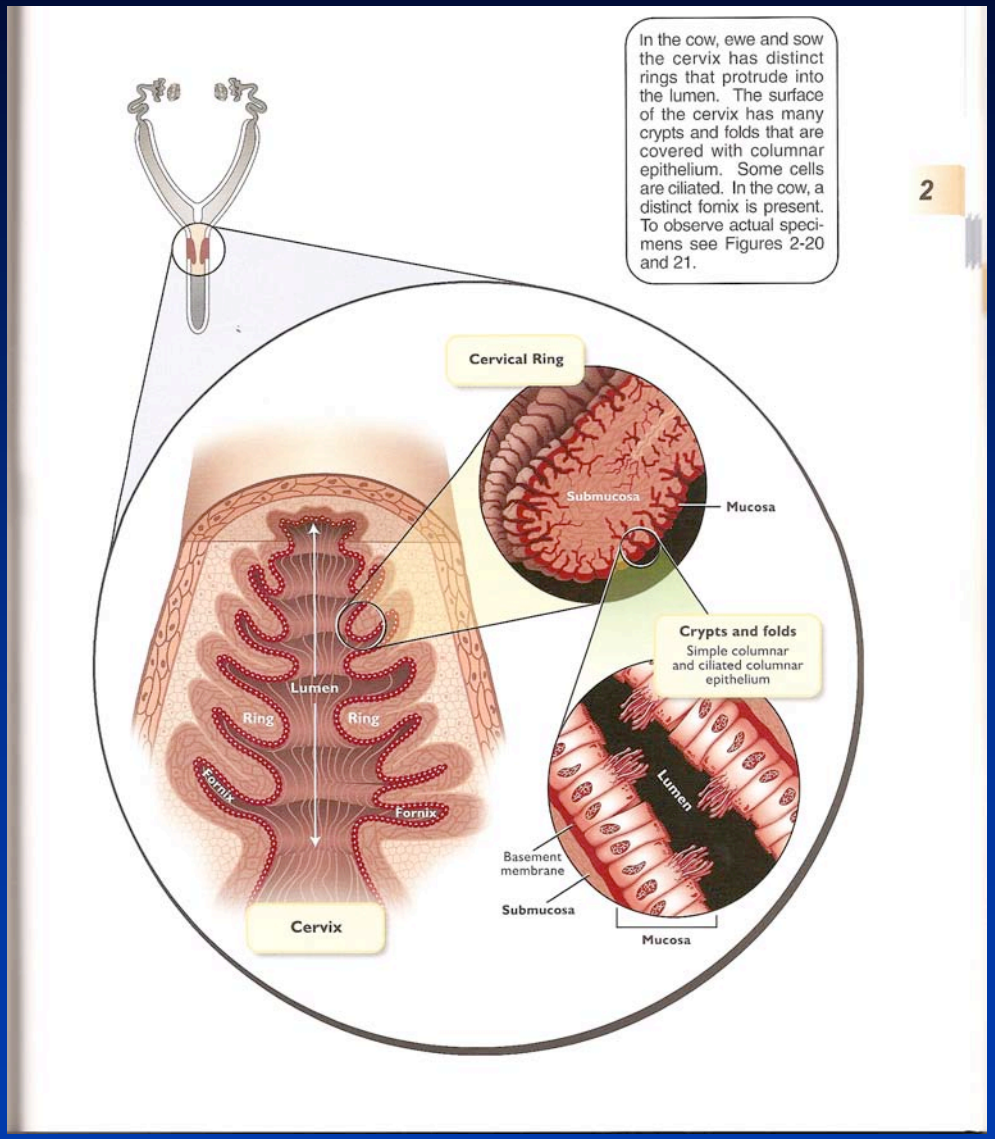


Lamina propria
(glandular)

Epithelium

endometrium

endometrium

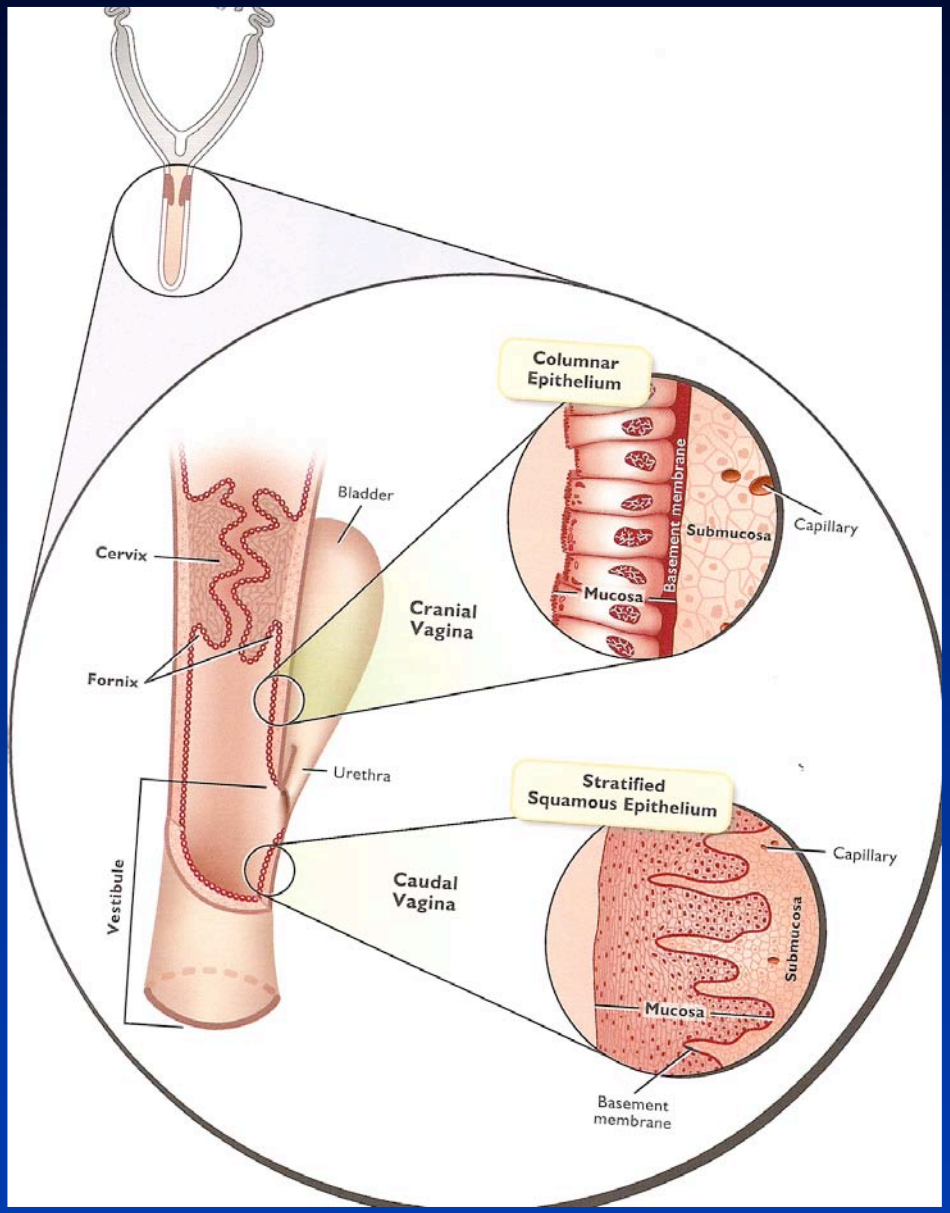


Cervix

- Highly muscular walls
- Barrier to sperm
- Functions to retain egg in uterus

Vagina/Cloaca

- communicates with outside and connects uterus via cervix
- receives sperm in internal fertilizers
- in some - connects to **cloaca** - common vestibule for urinary, digestive and reproductive systems



Vagina

- Thick muscular walls
- Sperm transport and selection
- Embryologically from two origins
  - Mullerian duct
  - External genitalia

Cloaca

- Common region into which the vagina and intestine open
- Latin for 'sewer'
- Common in birds, reptiles