

# **VET-114**

## **Animal Anatomy and Physiology 2**

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### **Webinar – Chapter 17**

Female Reproduction System

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# A Warm Welcome from My Faculty TEAM and Me!!! 😊

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# The Pledge of Allegiance

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## *The Pledge of Allegiance*

*"I pledge allegiance to the flag  
of the United States of America,  
and to the republic for which it stands,  
one nation under God, indivisible,  
with liberty and justice for all."*

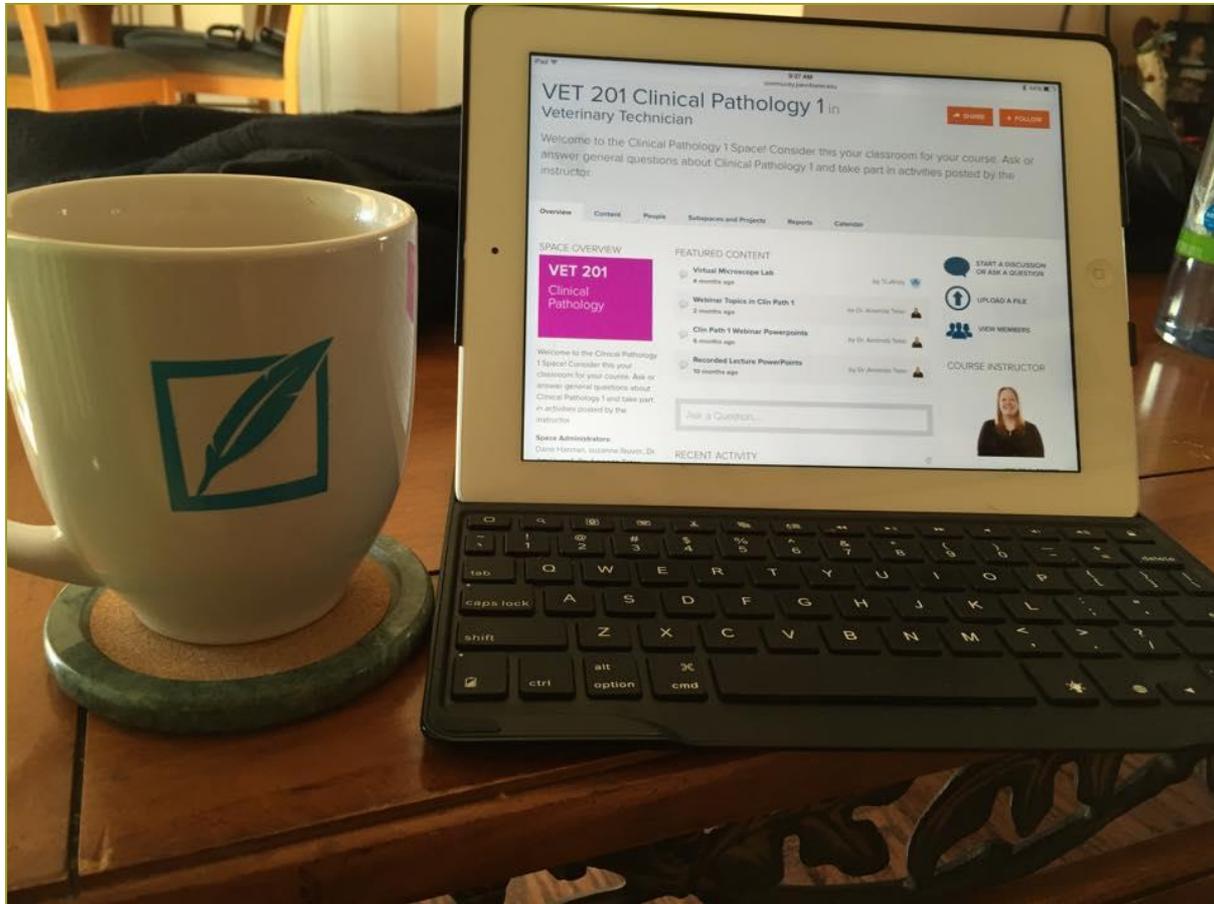


# Tribute to Our Military Students and Their Spouses!

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# Are You Using the Course Spaces?



# New “Medical Terminology Game”!

The screenshot shows the Penn Foster website for the Medical Terminology Challenge. The header includes the Penn Foster logo and the title "The Vet Tech Terminology Challenge". A left-hand navigation menu lists: Home, About, Anatomy + Physiology, Fill in the Blanks, Flash Cards, Pronunciation, Spelling, and Word Builder. The main content area features an "About The Vet Tech Terminology Challenge" section with a brief description and a "Learn more" link. Below this are six interactive buttons arranged in a 3x2 grid, each with an icon and a description of the activity.

Activity	Description
Anatomy + Physiology	Identify body parts within systems
Fill in the Blanks	Use correct terms in a sentence
Flash Cards	Self-test your knowledge of important terms
Pronunciation	Practice saying terms out loud
Spelling	Listen to a term, then spell it
Word Builder	Practice using prefixes, root words, and suffixes

# On the Floor at Dove!

<https://www.atdove.org/welcome>

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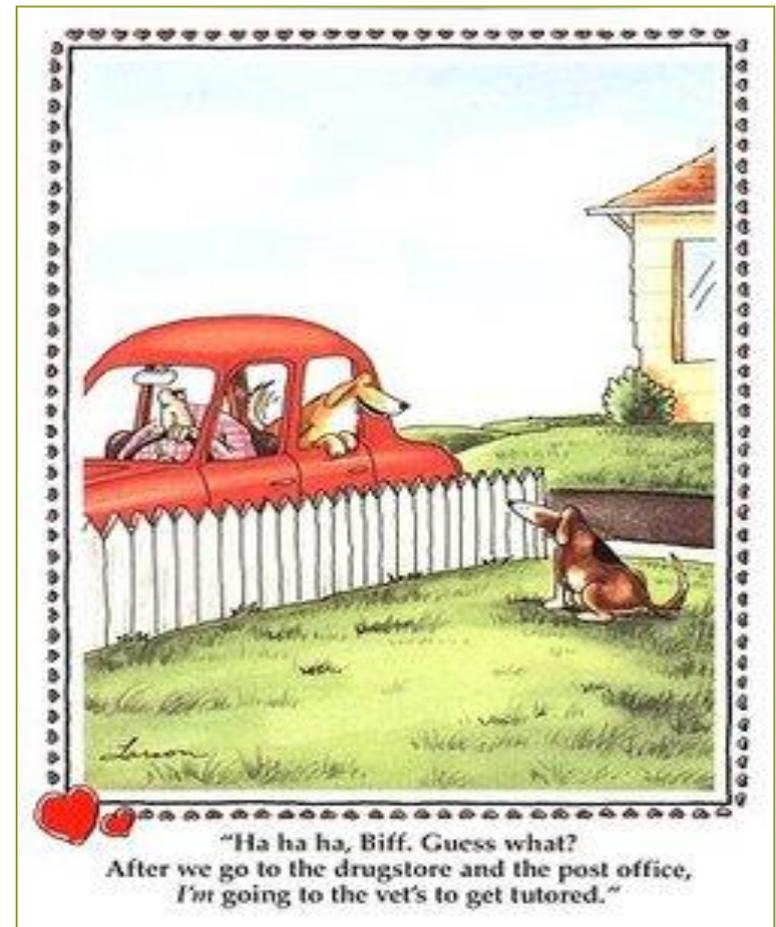
on the floor  
**@DOVE**  
atdove.org

### What is On the Floor @Dove?

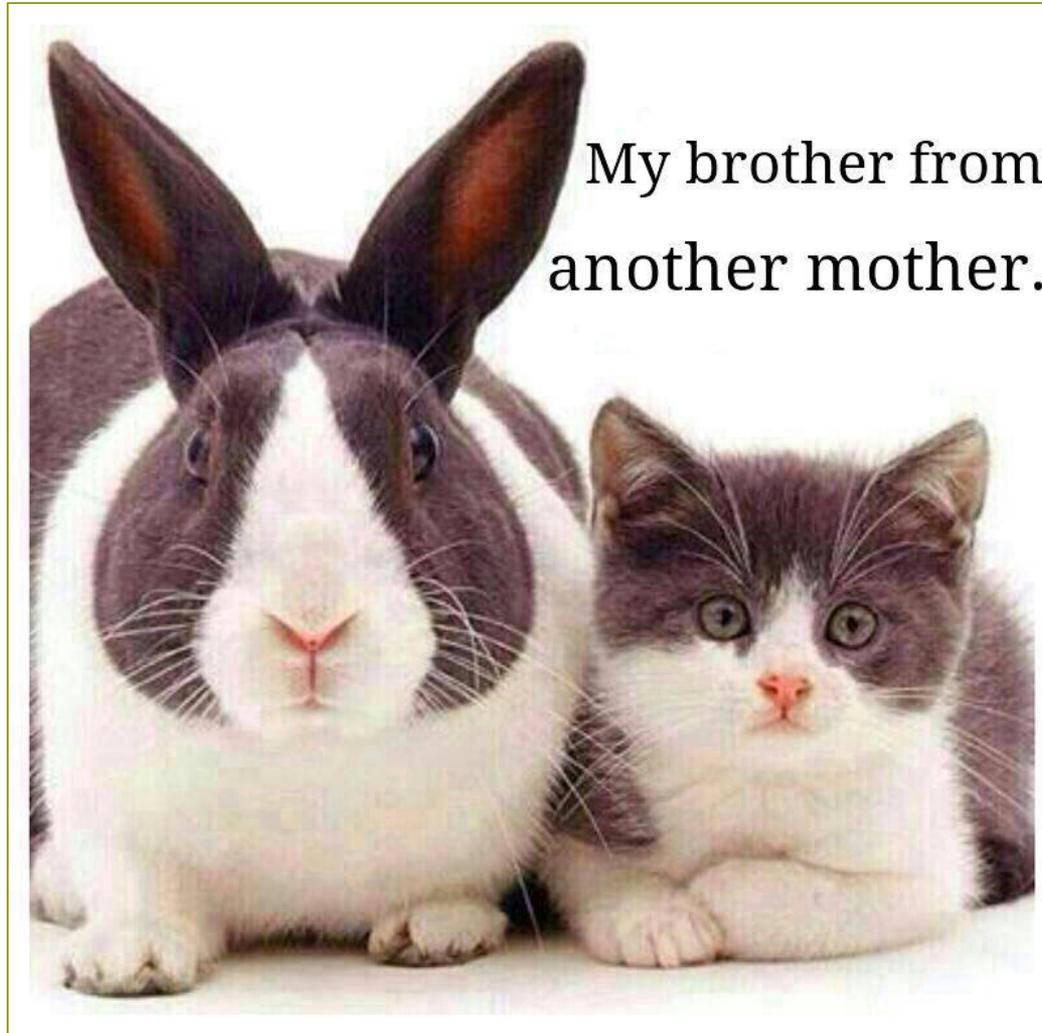
Watch this short video to learn more.

# The Reproductive System

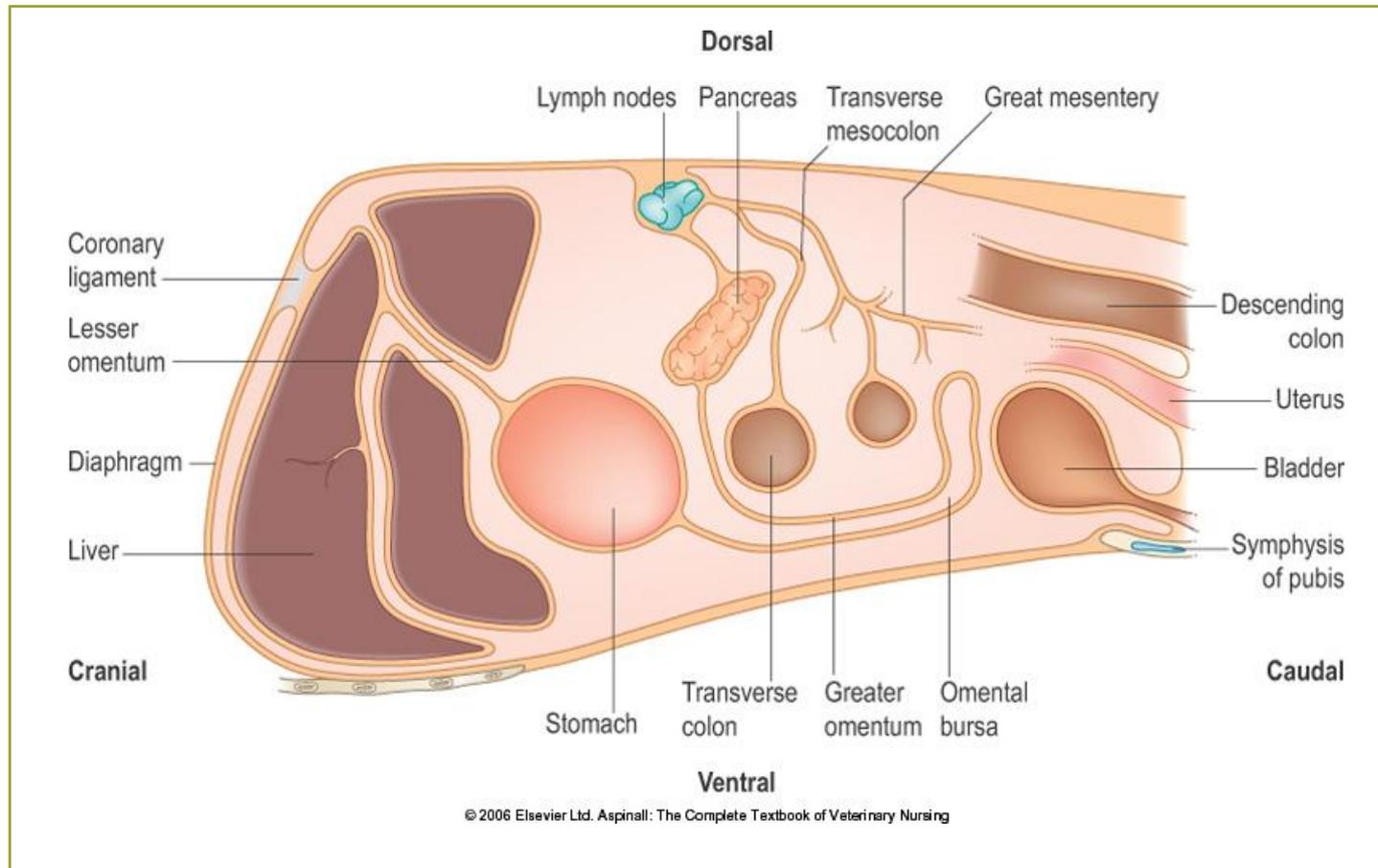
## Chapter 17 – Pages 387-404



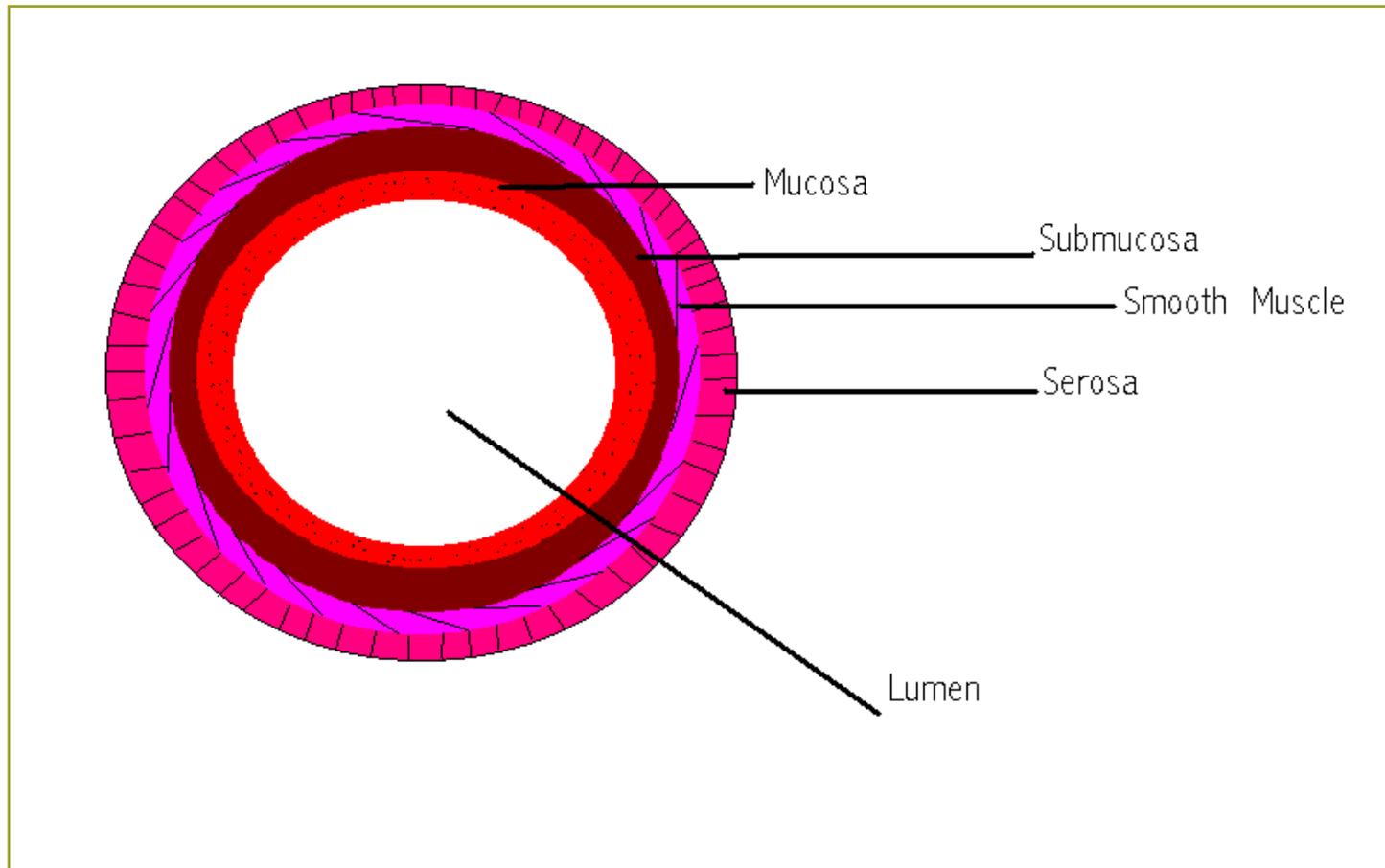
# Aren't Genetics and Reproduction FASCINATING??? 😊

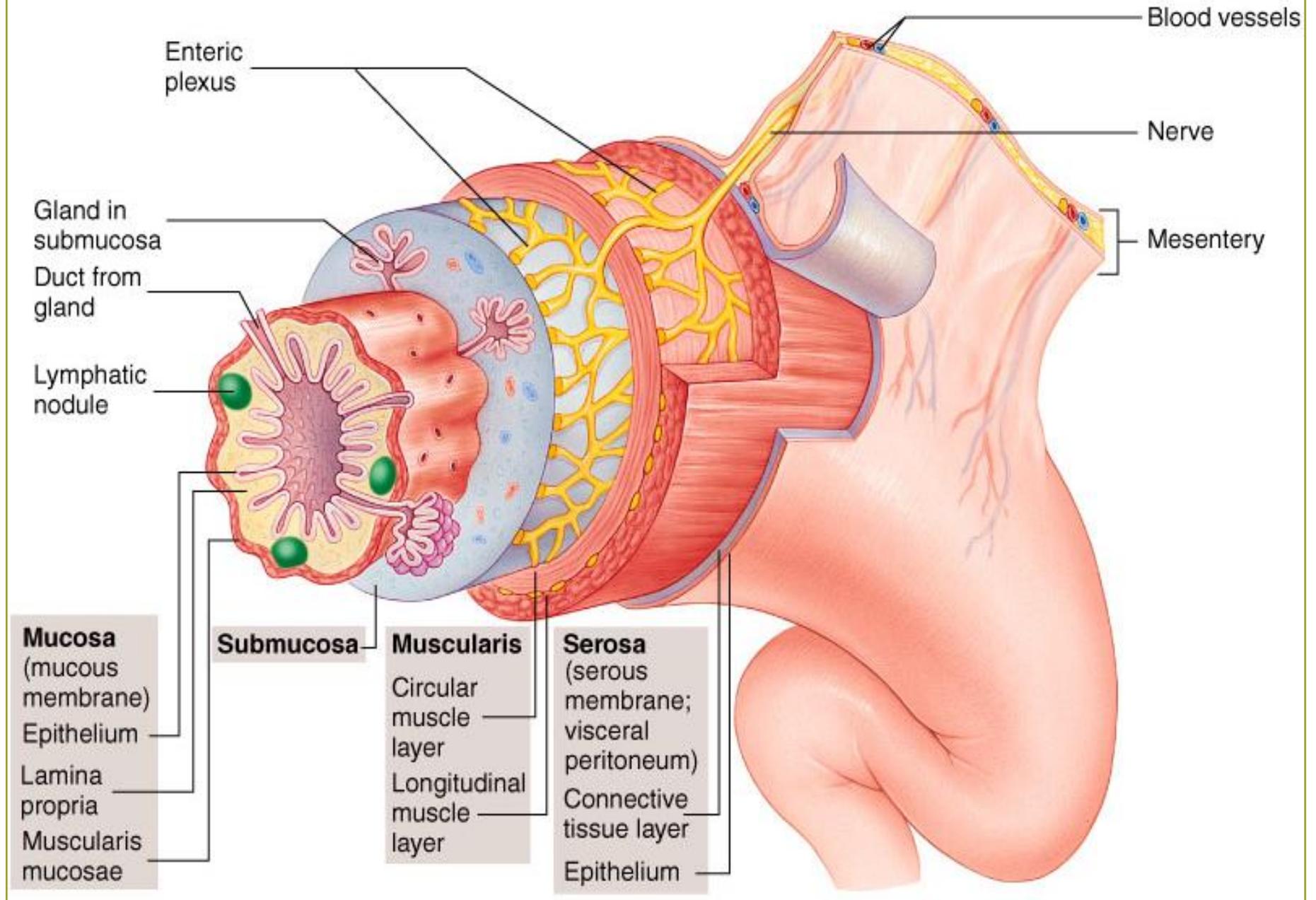


# Female – 3 Tracts



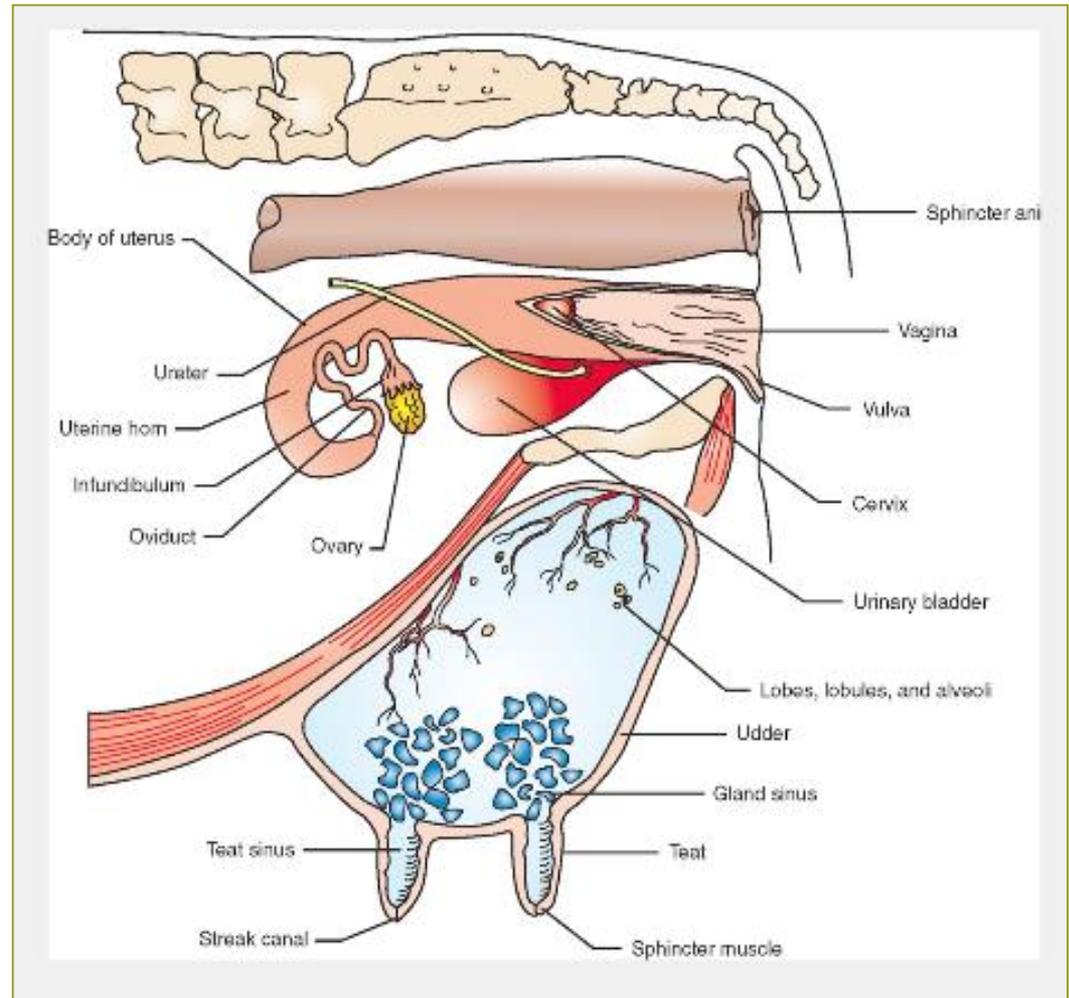
# 4 Layers of the Tracts





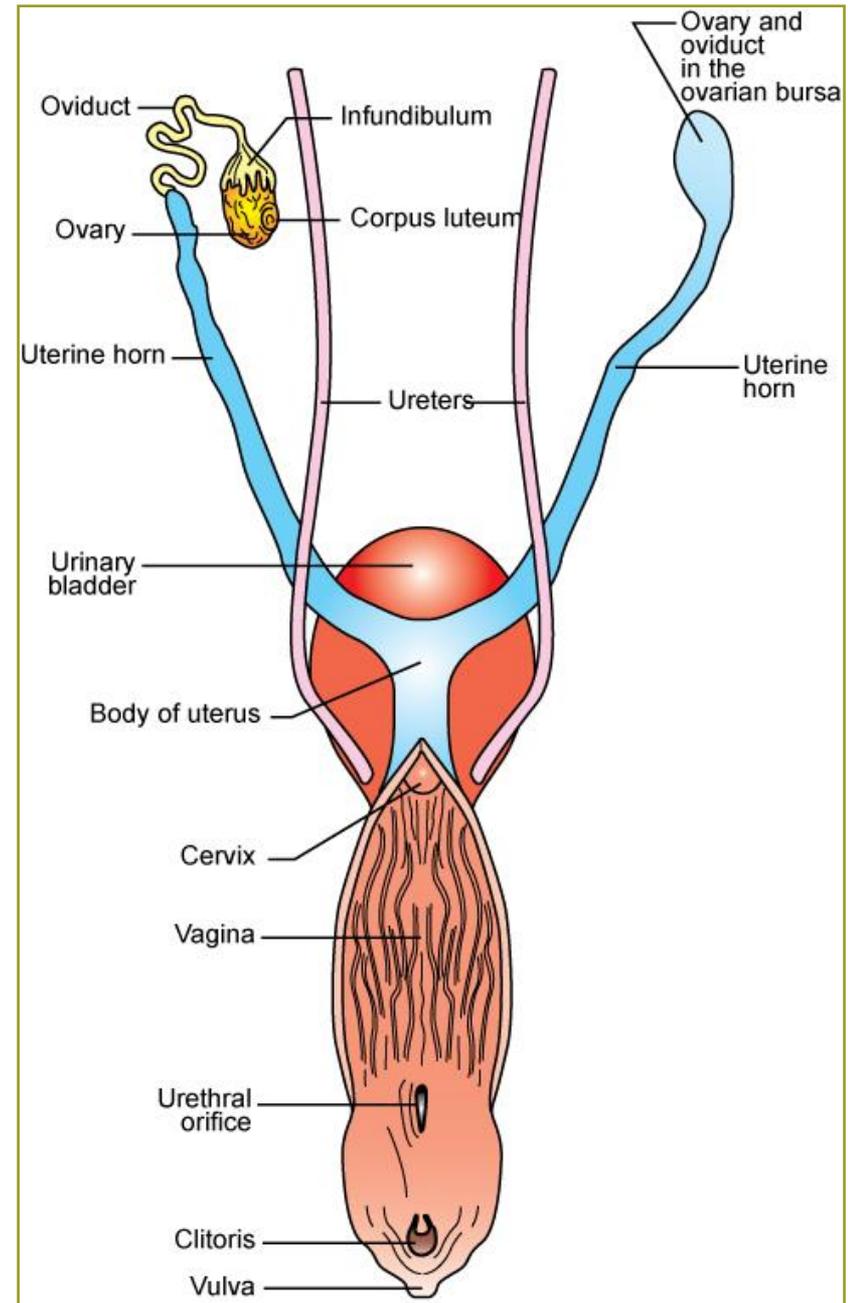
# Female Reproductive System Functions

- Produces female sex hormones
- Develops ova
- Fertilization
- Pregnancy
- Parturition
- Nursing of newborn



# Trace an Egg Cell (Canine)

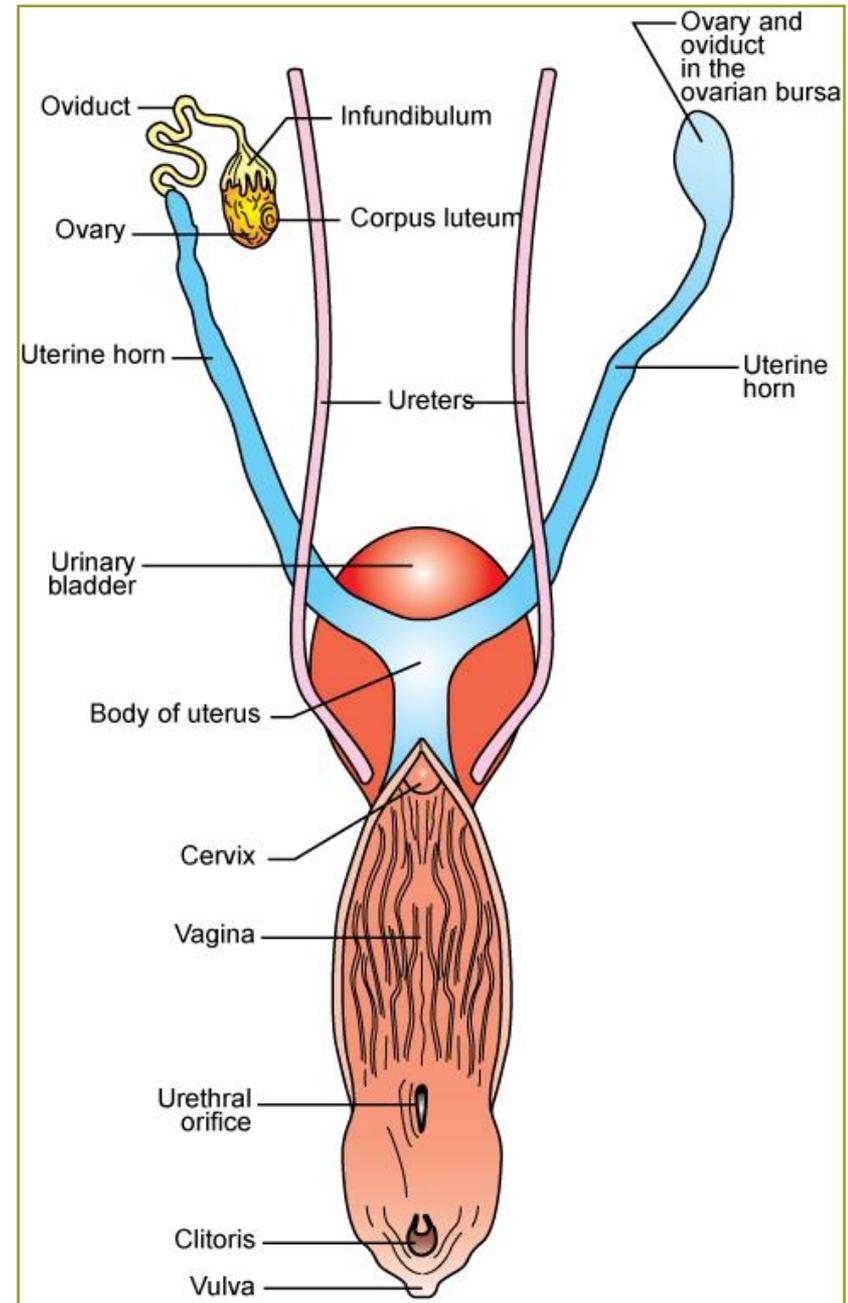
Figure 17-13, Page 399

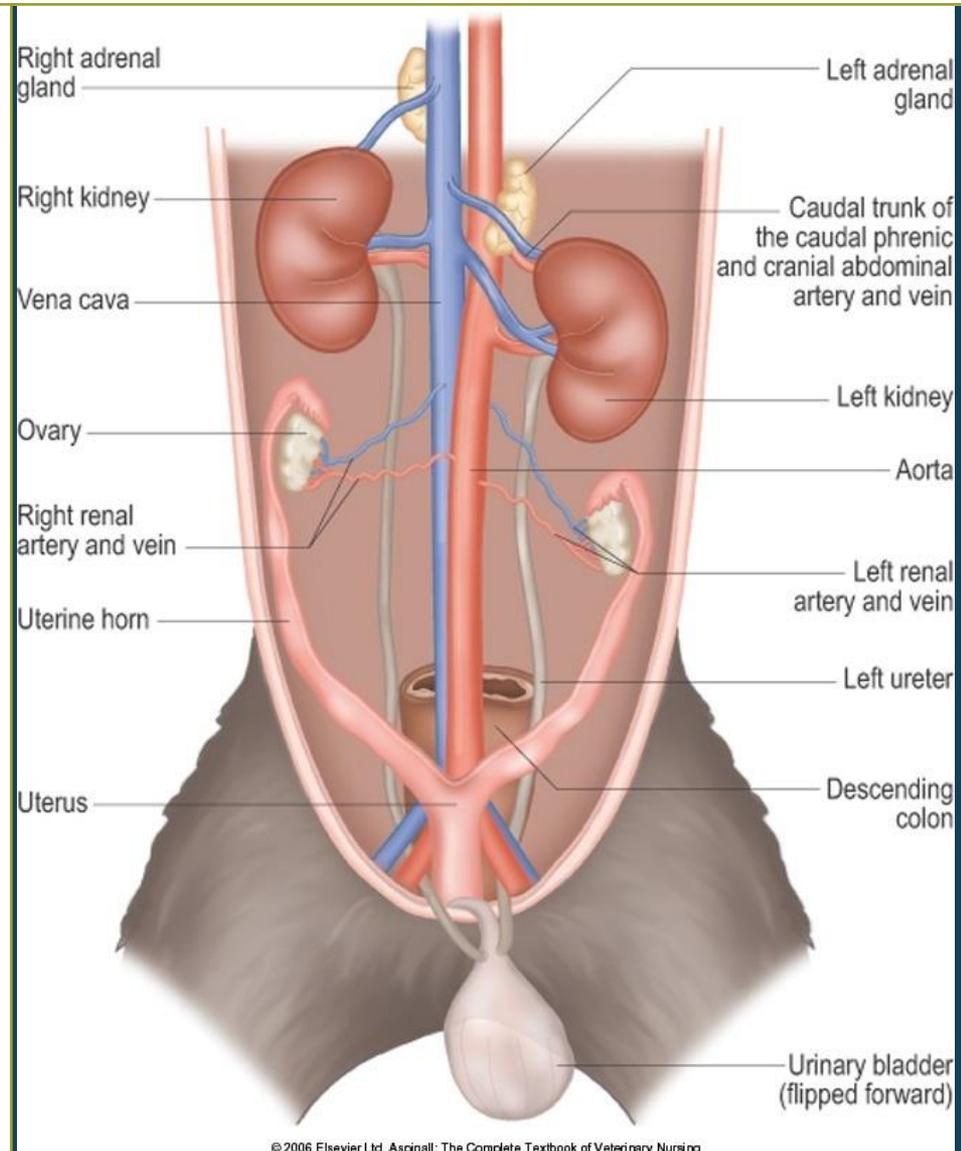
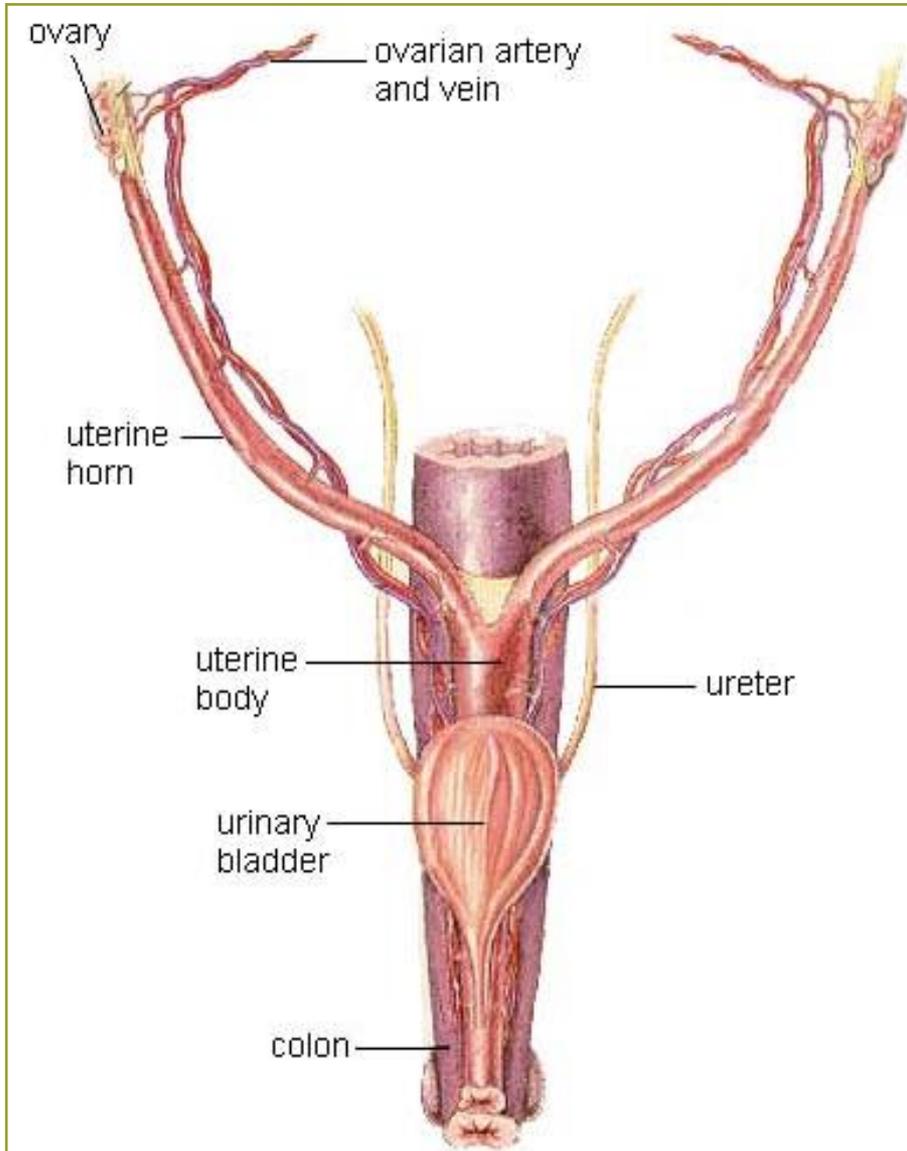


# Female Reproductive System

Figures 17-12 to 17-16,  
Pages 399-400

- Ligaments
- Ovaries
- Oviducts
- Uterus
- Cervix
- Vagina
- Vulva





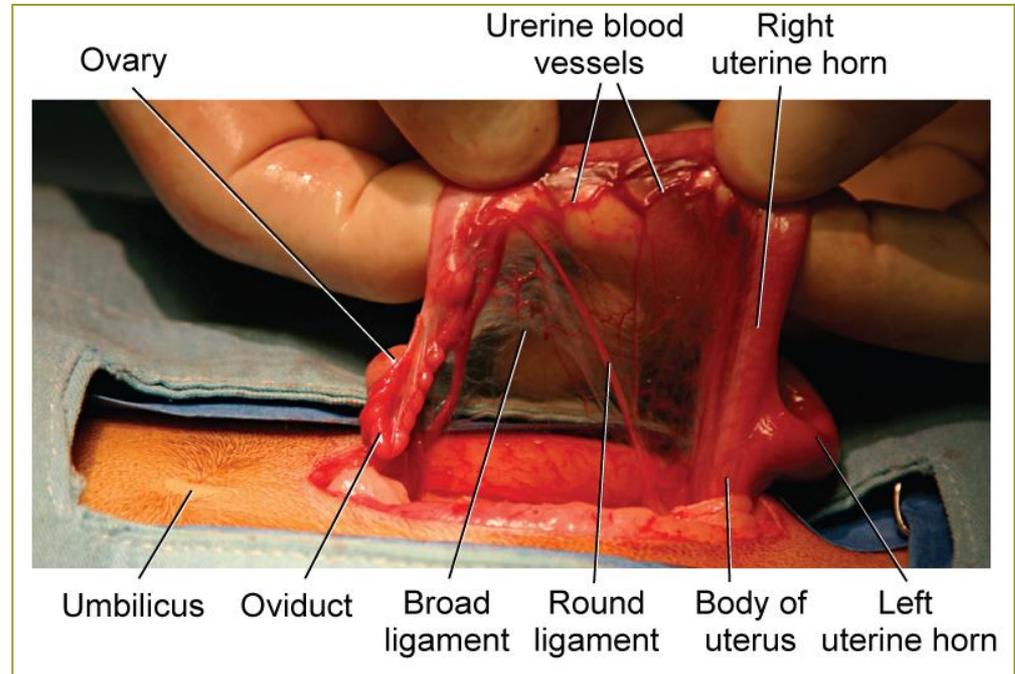
# Broad and Round Ligaments

Figure 17-15, Page 400

- Broad ligament:

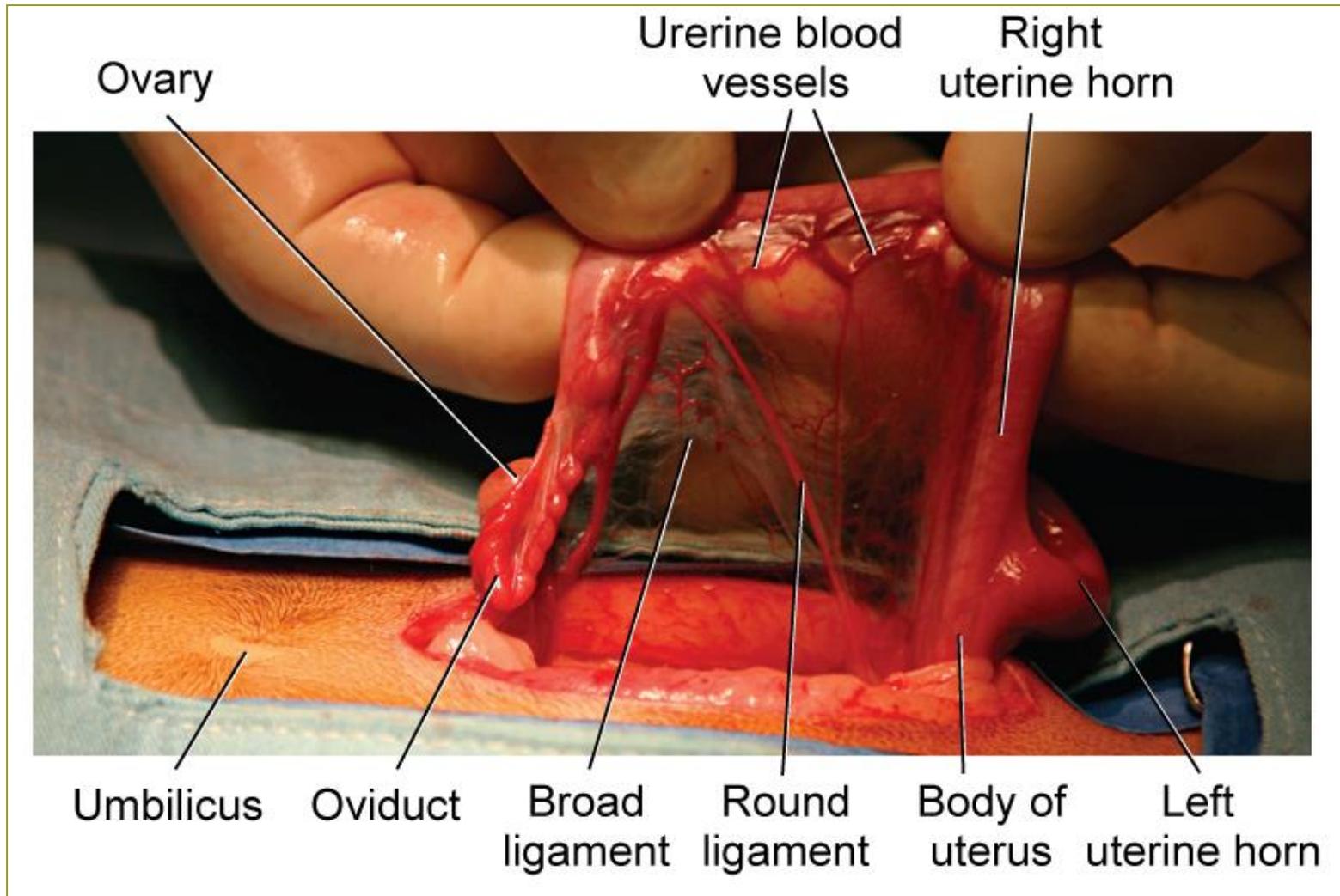
- Suspend ovaries, oviducts, and uterus
- Contain blood vessels and nerves

- Round ligament of the uterus



# Broad and Round Ligaments

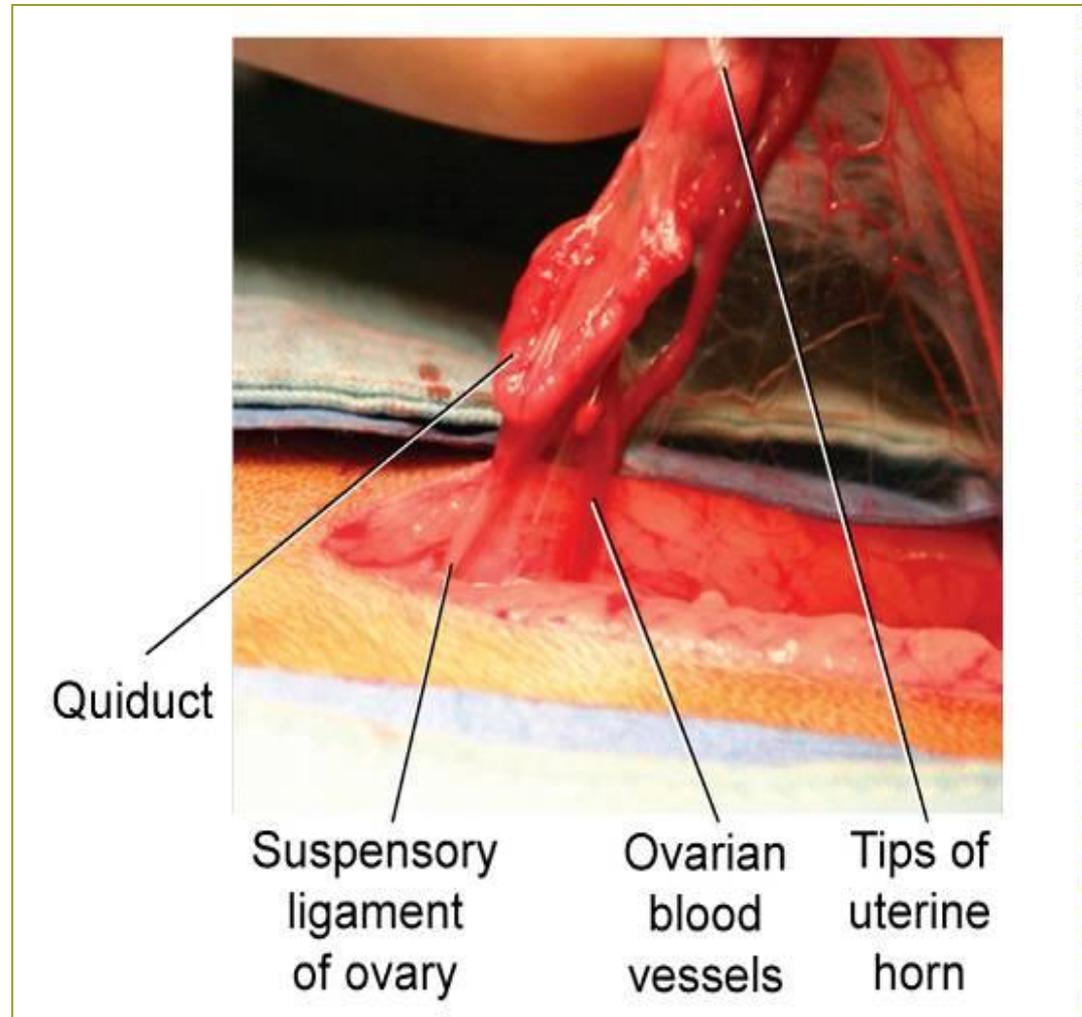
Figure 17-15, Page 400



# Suspensory Ligament of Ovary

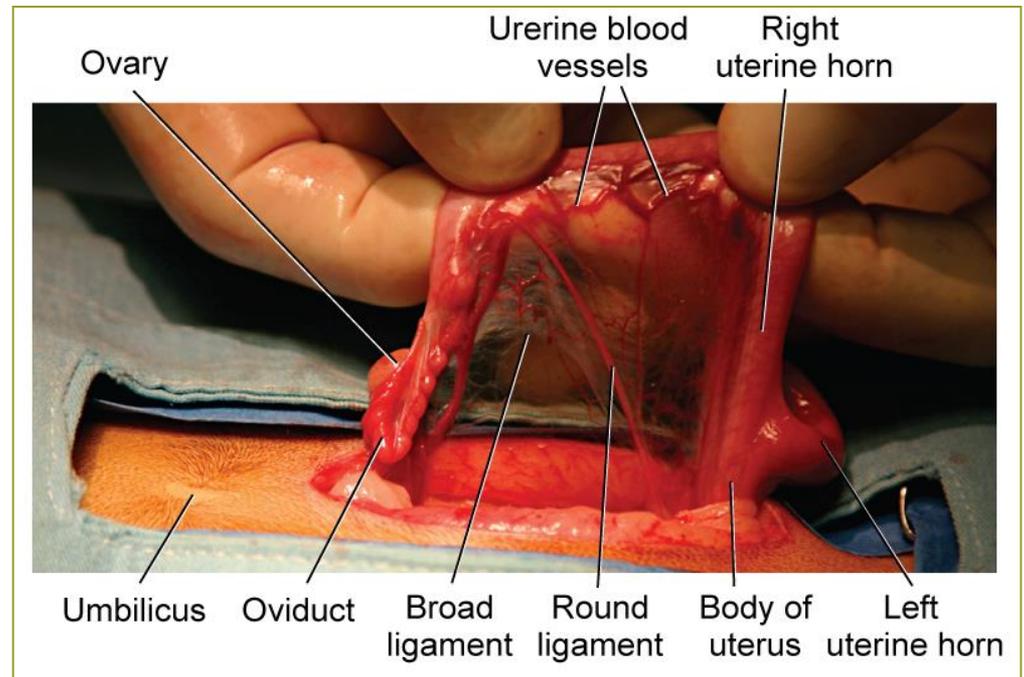
Figure 17-16, Page 400

- Ovarian end of broad ligament attached to body wall in area of last rib
- Must be broken during OHE



# Ovaries

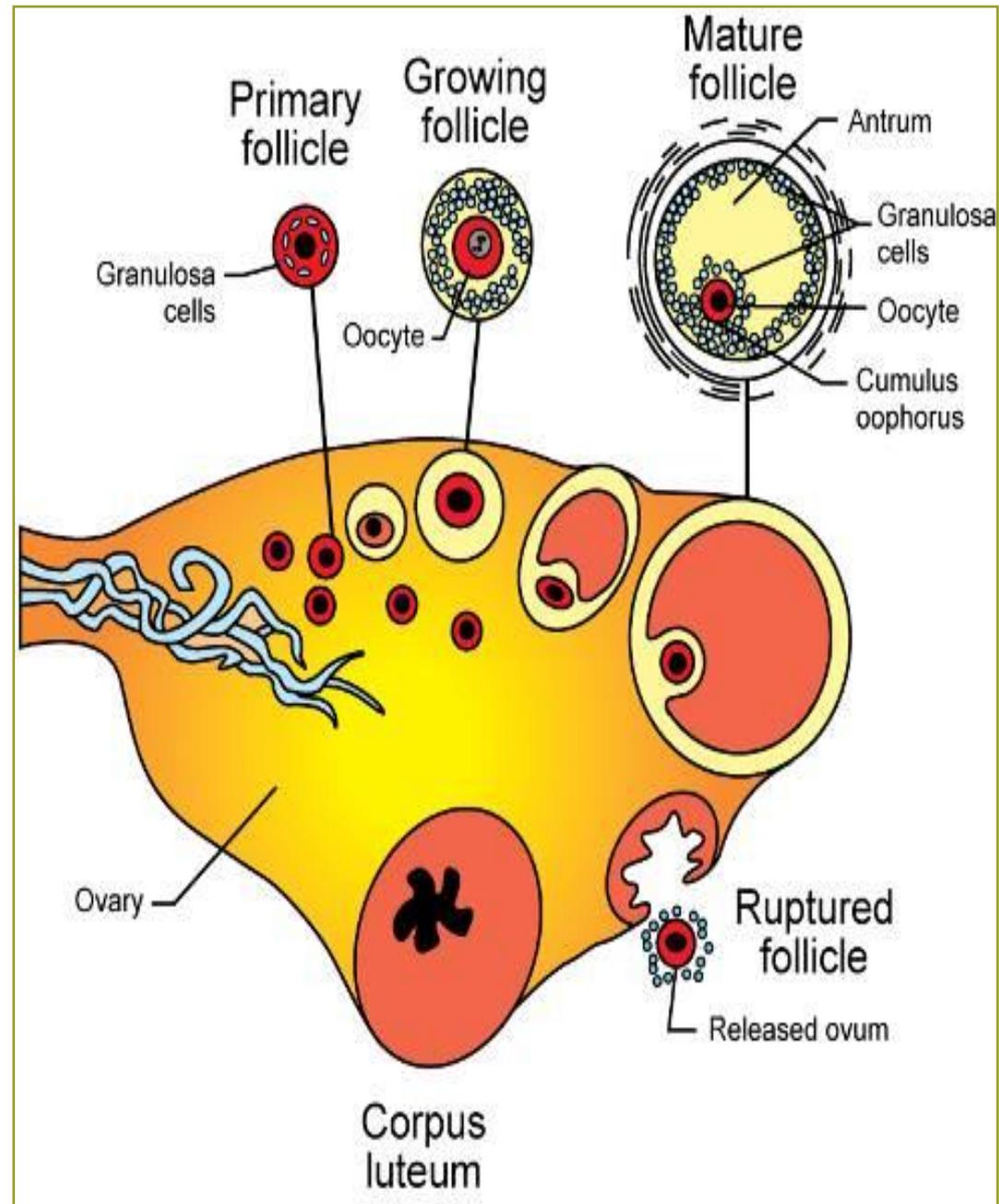
- In dorsal abdomen just posterior to kidneys
- Species variation in appearance
- Site of [oogenesis](#)
- Production of [estrogens](#) and [progestins](#)

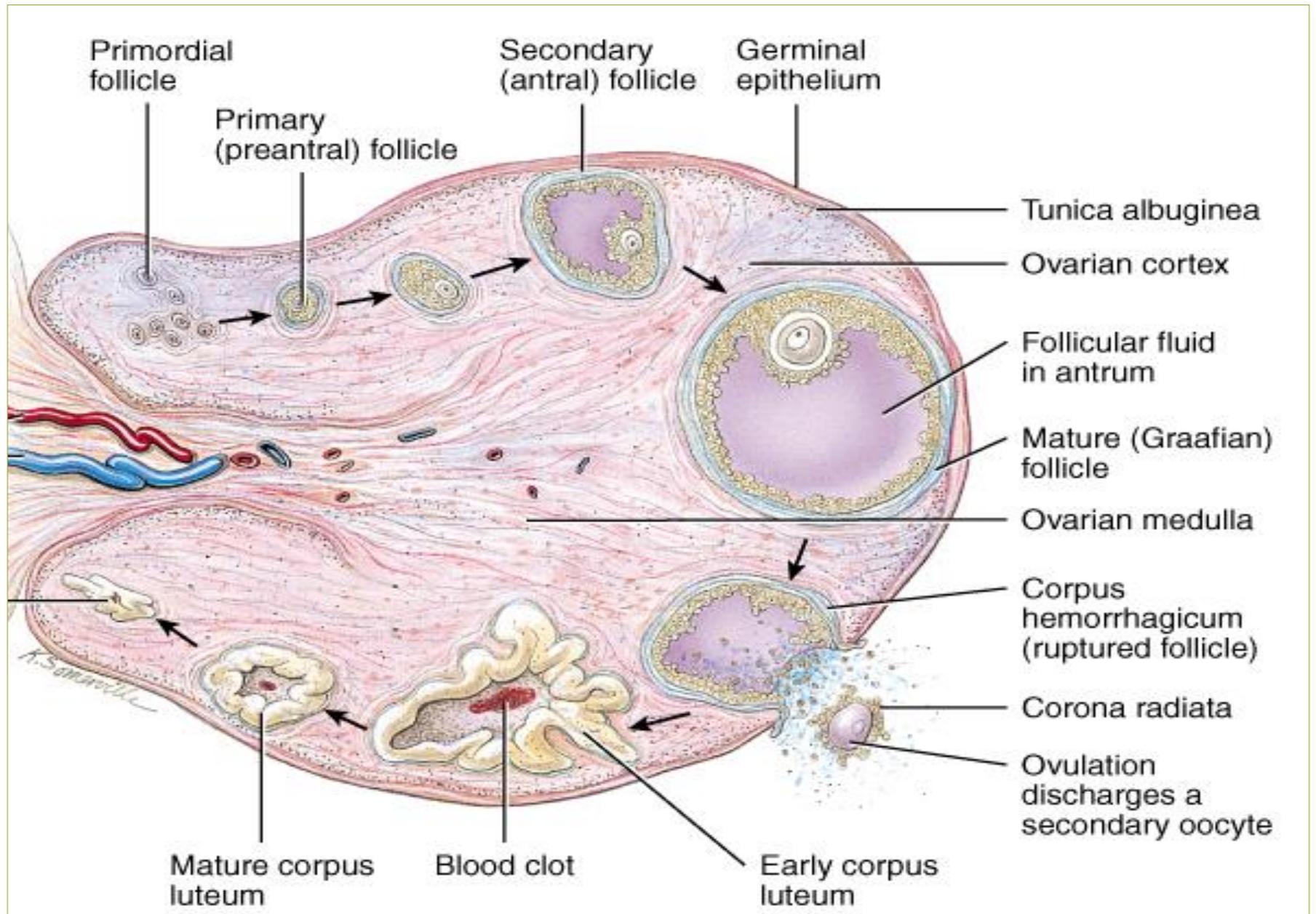


# Ovaries

## Figure 17-17, Page 401

- 2 functions
  - Ova (eggs)
  - Female hormones
    - Estrogen
    - Progesterone
  - Follicles & corpus luteum
- Ovarian artery
- Palpated rectally in cows, mares
  - Determines when to breed





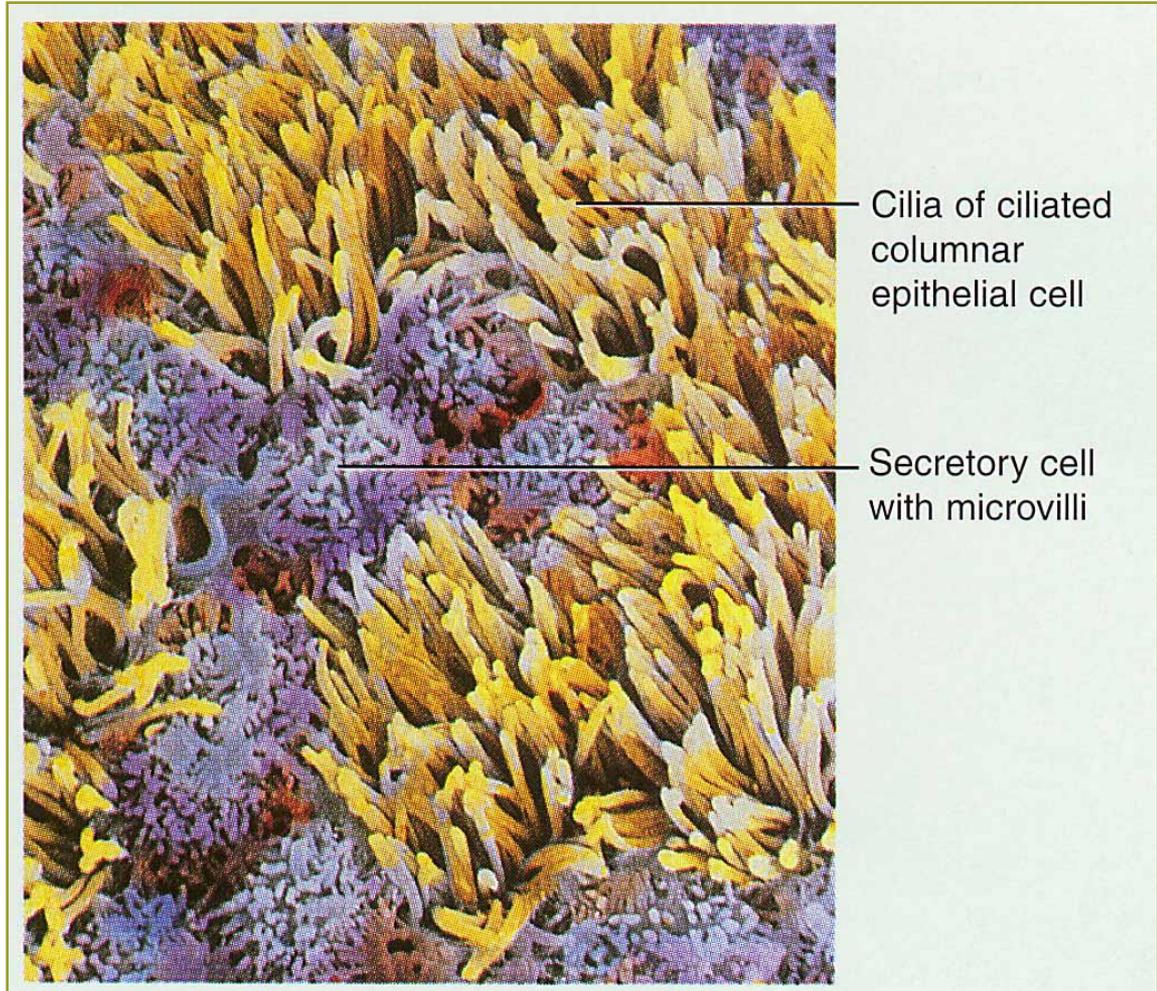
# Oviducts

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- Also known as fallopian tubes and uterine tubes
- Extend from the tips of the uterine horns
- Infundibulum: enlarged opening at the ovarian end of each oviduct
- Fimbriae: muscular projections form margin of infundibulum; help properly position infundibulum

# Oviducts

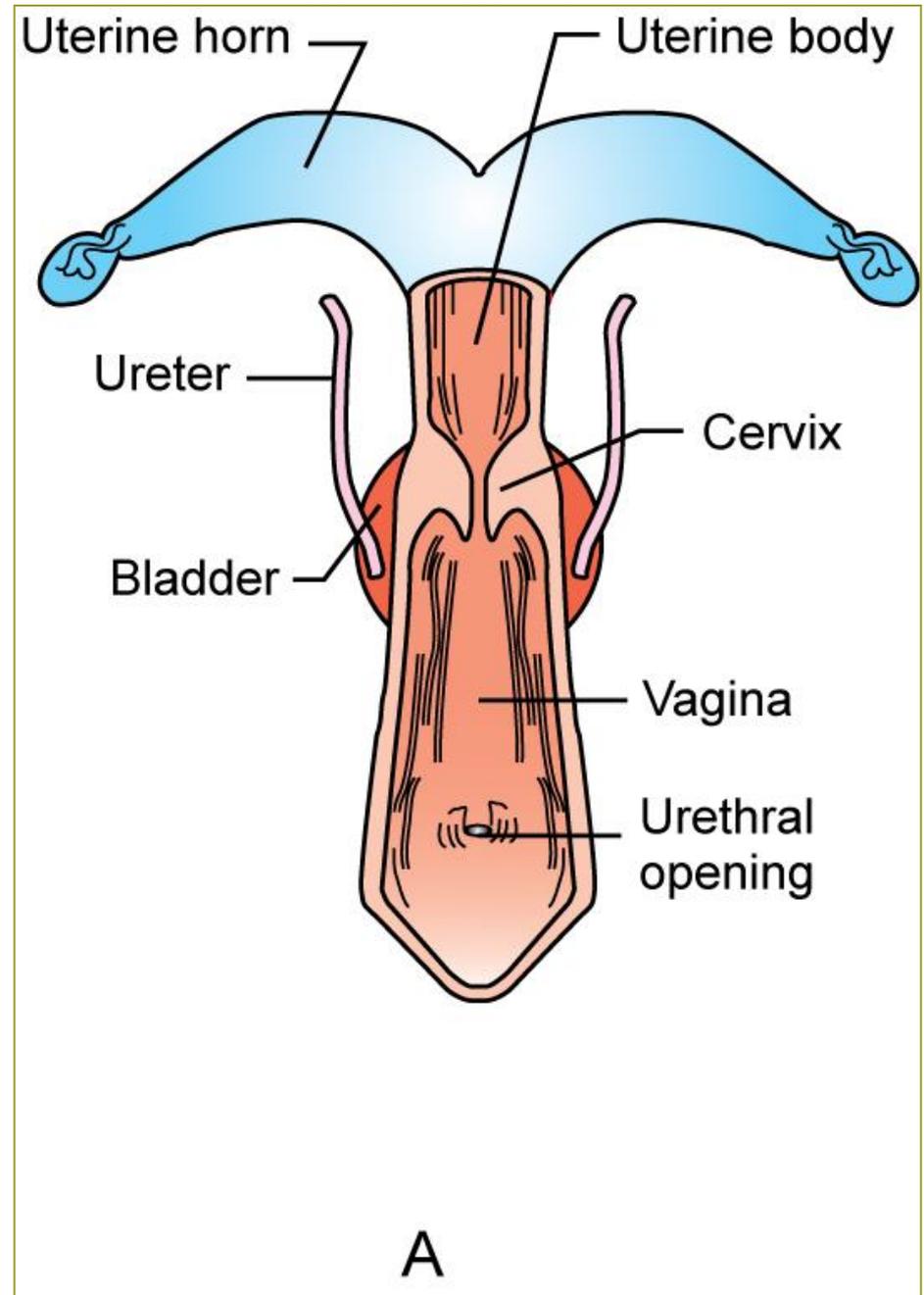
- Site of fertilization
- Linings covered with many cilia
- Move ova down toward uterus



# Uterus

## Figure 17-14A, Page 400

- Hollow muscular organ
- Usually Y shaped
  - Uterine body forms the base of the Y
  - Uterine horns form the arms



# Uterus (Womb)

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- Where zygote implants and grows
- “Litter species” have more horn than body
  - Dogs, cats, pigs
- 3 layers
  - Endometrium – site of zygote implantation
  - Myometrium – thickest layer
  - Perimetrium

# How Many Newborn, You Ask? 😊

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- Uniparous species
  - One mature ovum produced per cycle
  - Horse, cow, and human
- Multiparous species
  - Multiple ova produced per cycle
  - Cat, dog, and sow

# 3 Layers of Uterine Wall

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- Endometrium: lining composed of simple columnar epithelium and simple tubular glands
  - Secrete mucus and other substances
- Myometrium: thick layers of smooth muscle
- Perimetrium: outermost layer covered by the visceral layer of peritoneum

# Cervix

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- Muscular valve that seals off uterus
- Naturally open on only 2 occasions
  - Estrus (true heat)
    - Sperm in
  - Parturition (birthing)
    - Newborns out
- Smooth muscle sphincter between uterus & vagina

# Vagina & Vulva

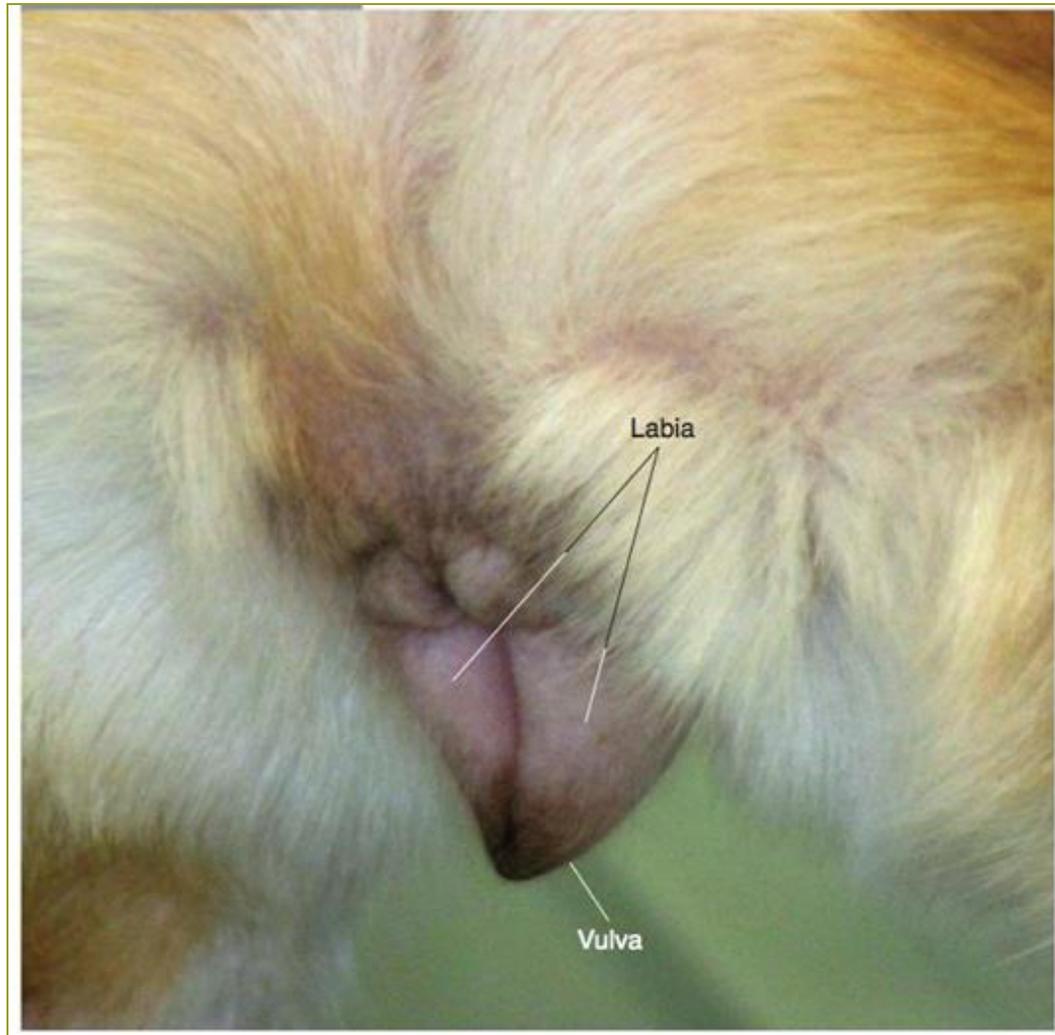
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- Vagina
  - Tube that receives the penis at breeding
  - Urethral orifice on ventral floor
- Vulva (& Vestibule)
  - Only part of female reproductive system visible outside the body (**external genitalia**)
  - Clitoris
  - Labia

# Swollen Vulva of Bitch in Heat

**Bassett Lab Manual – Page 429**

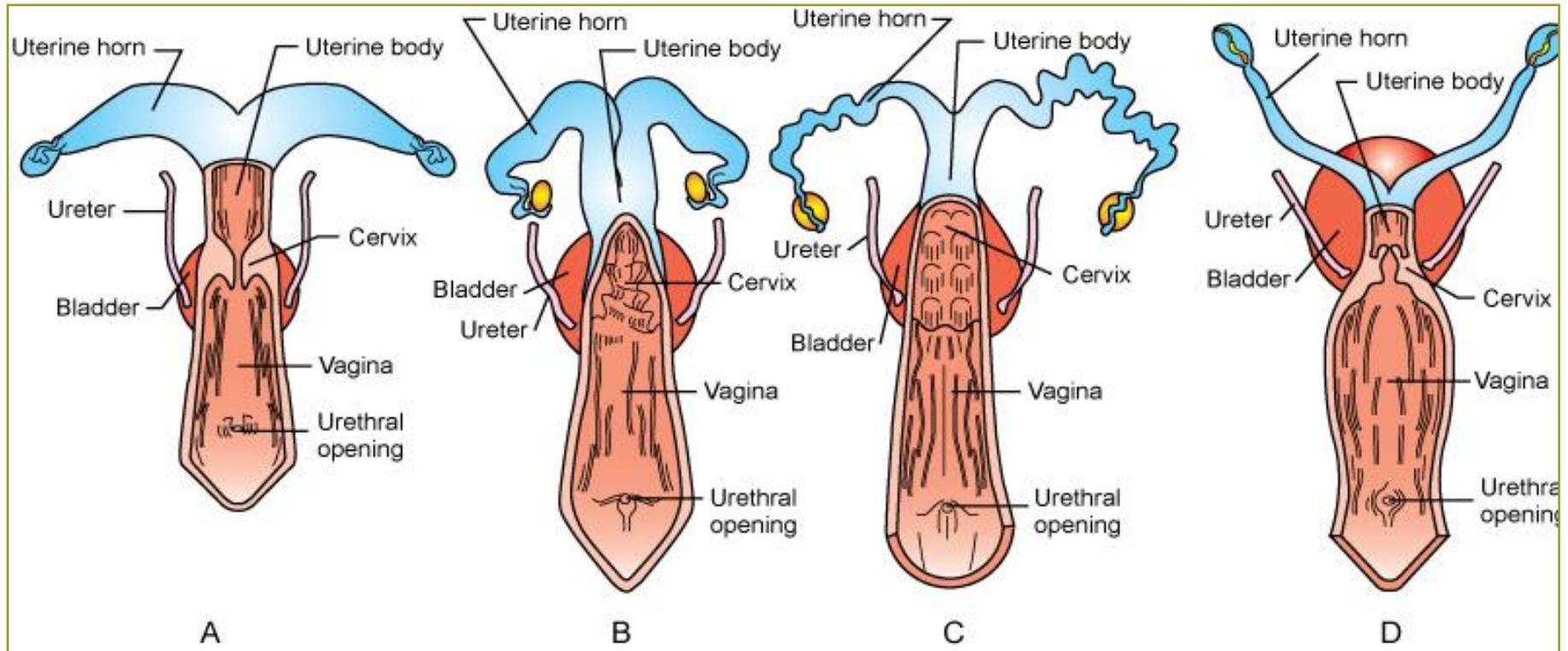
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# Comparative Female Reproductive Anatomy

Figure 17-14, Page 400

- Mare (A), Cow (B), Sow (C), Bitch (D)



# Breeding, Parturition



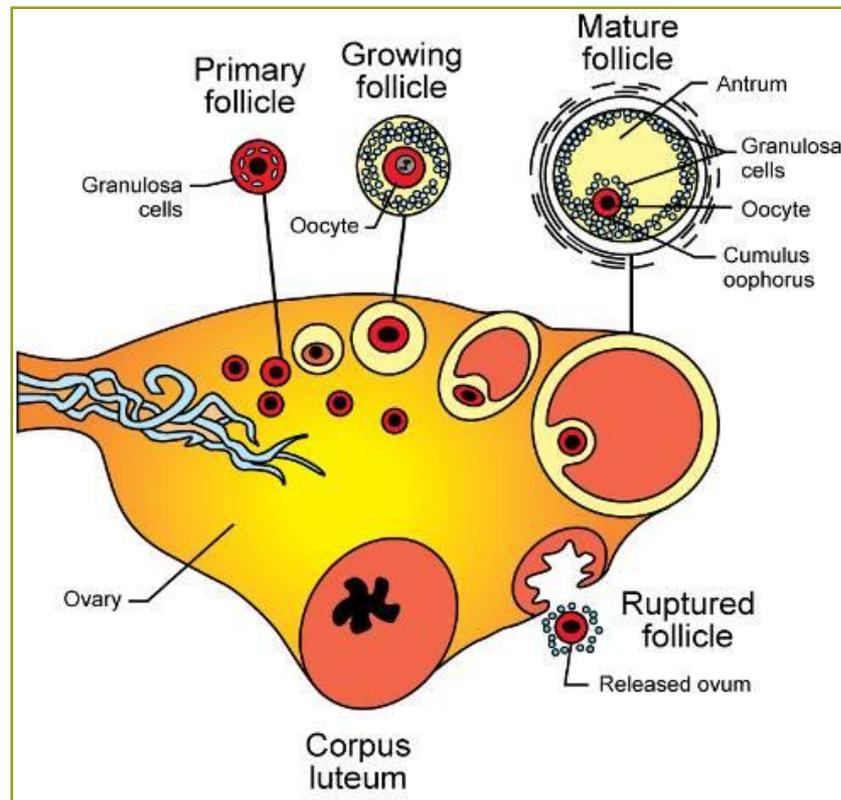
# Names for Female Animals

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<b>Species</b>	<b>Name</b>
Dog	Bitch
Cat	Queen
Horse	Mare
Cattle (after 1 <sup>st</sup> calf)	Cow
Cattle (before 1 <sup>st</sup> calf)	Heifer
Pig	Sow
Sheep	Ewe

# Topic 14

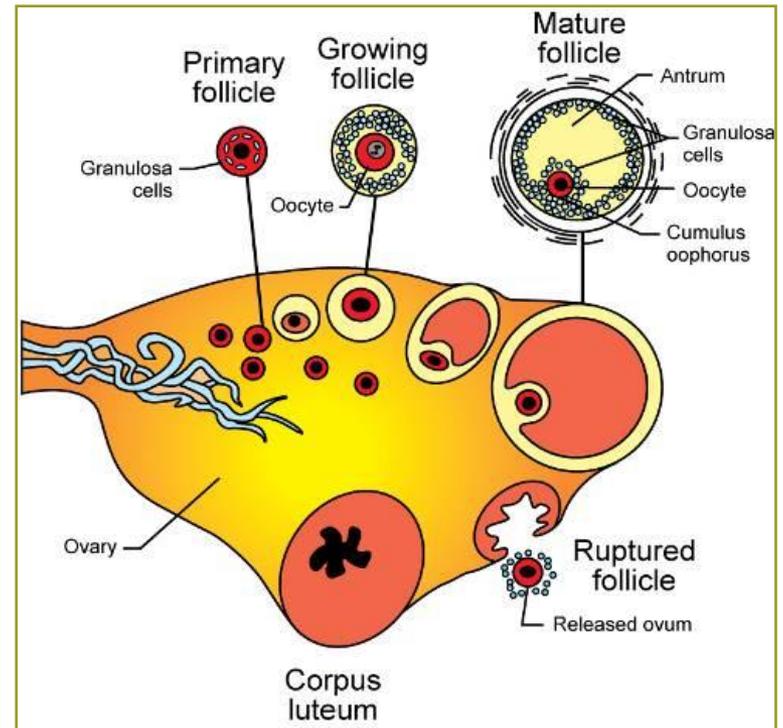
Describe the events that occur during the ovarian cycle of female animals

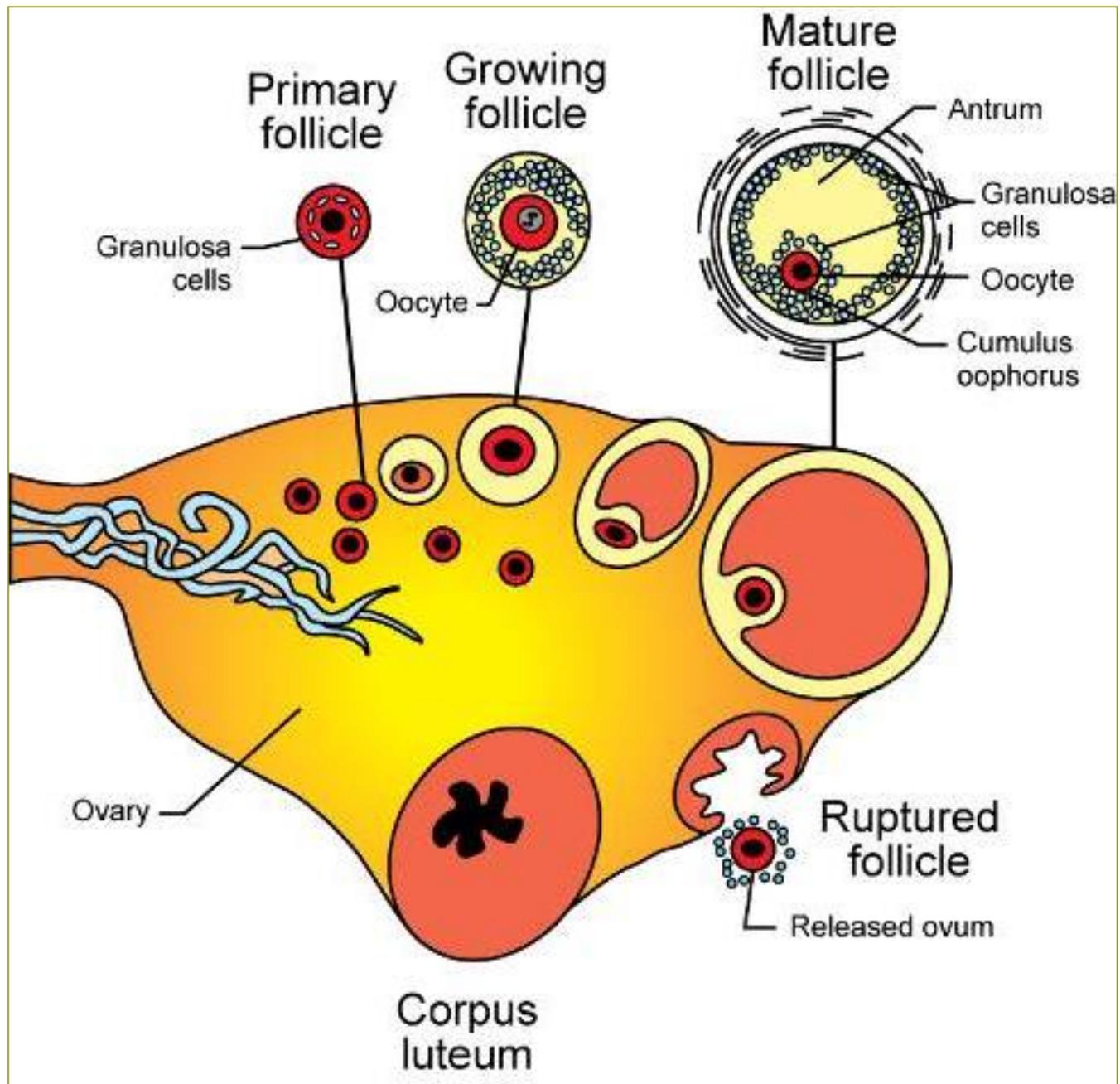


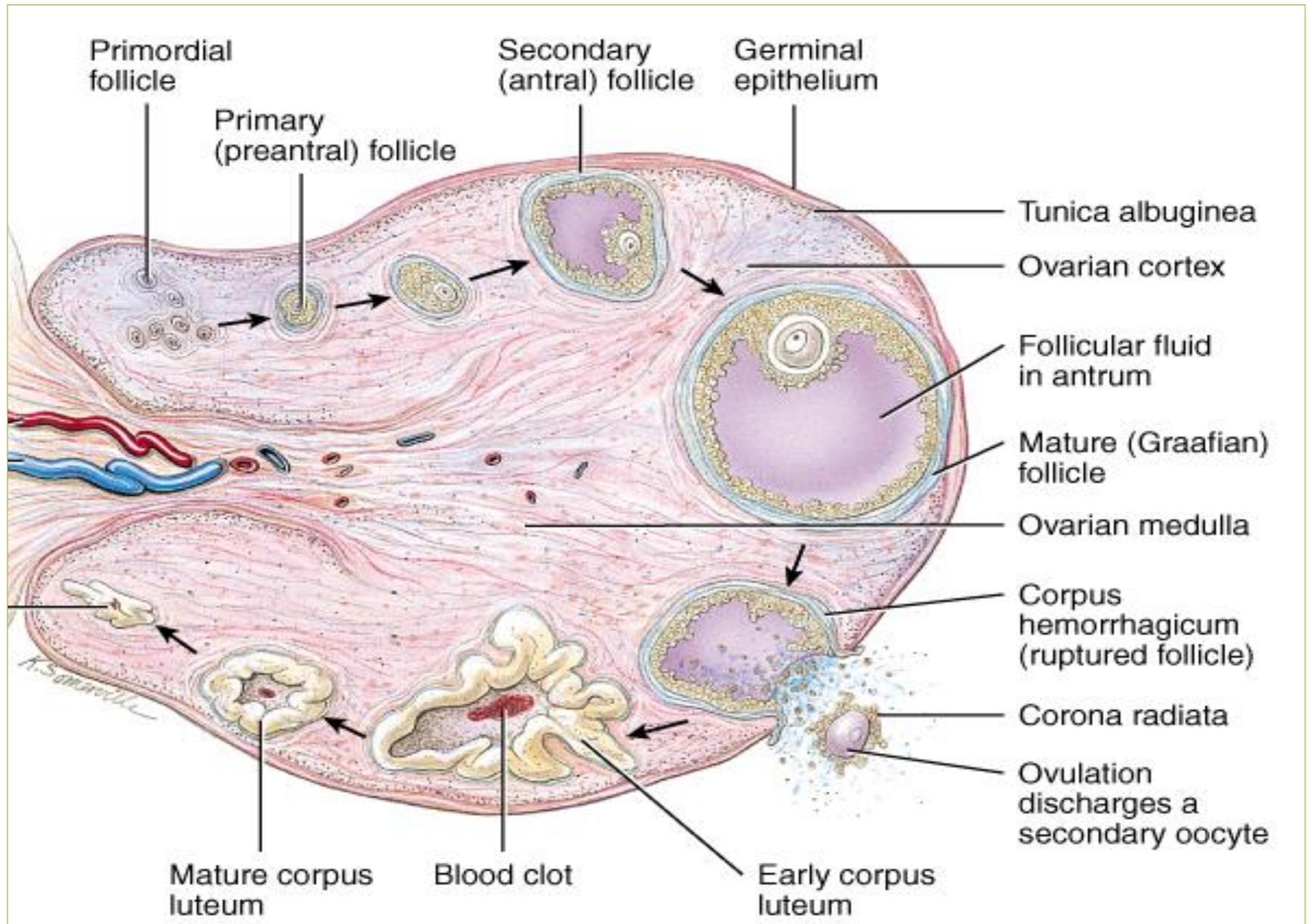
# Ovarian Physiology

## Figure 17-17, Page 401

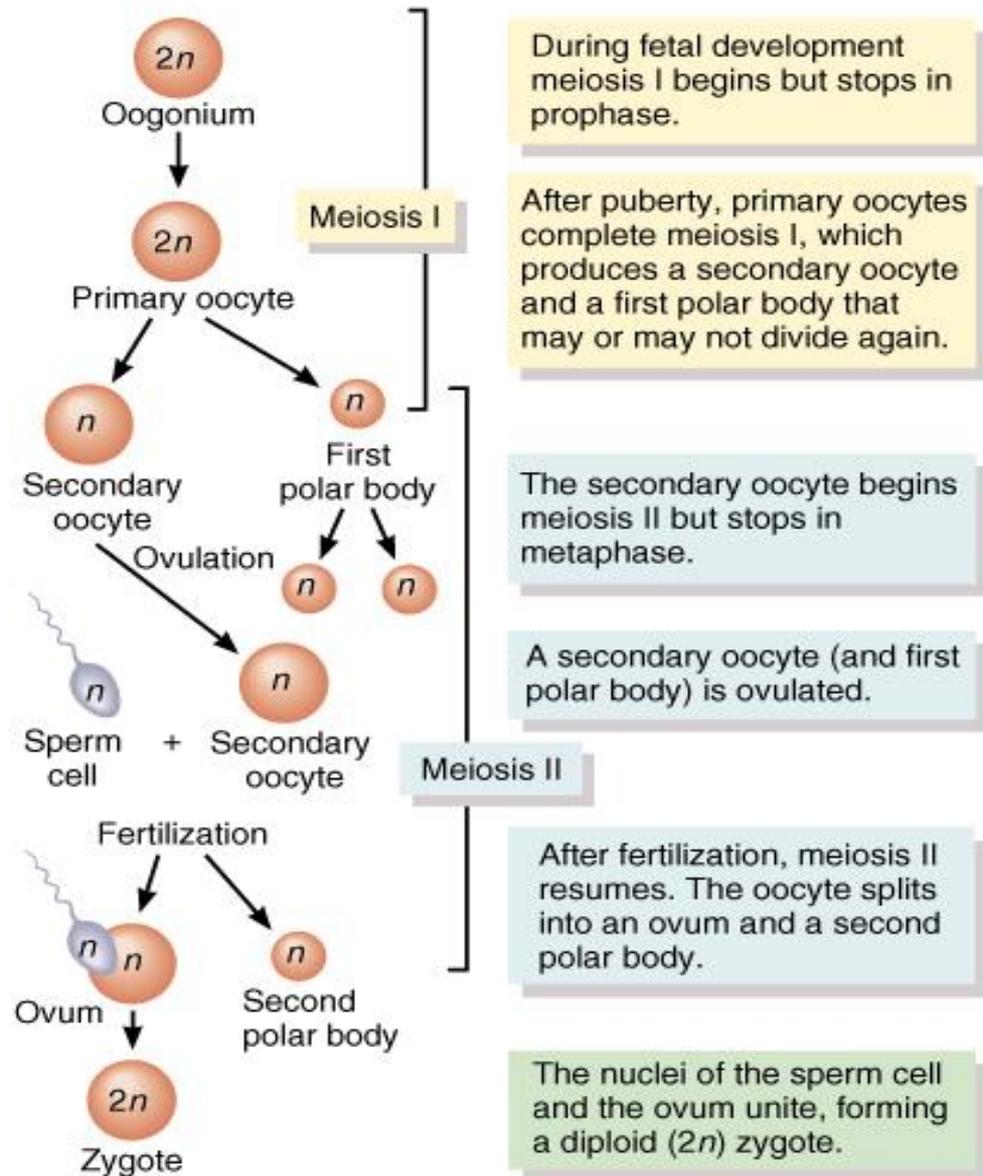
- Follicle
  - 1 egg (ovum)
  - Estrogen production
    - Prepares animal for breeding & pregnancy
- Graafian follicle (mature)
- Ovulation – follicle rupture
  - Egg “caught” by oviduct
  - Ruptured follicle become corpus luteum
- Corpus luteum produces progesterone
  - Maintains pregnancy







# Oogenesis In Ovaries



# Corpus Luteum

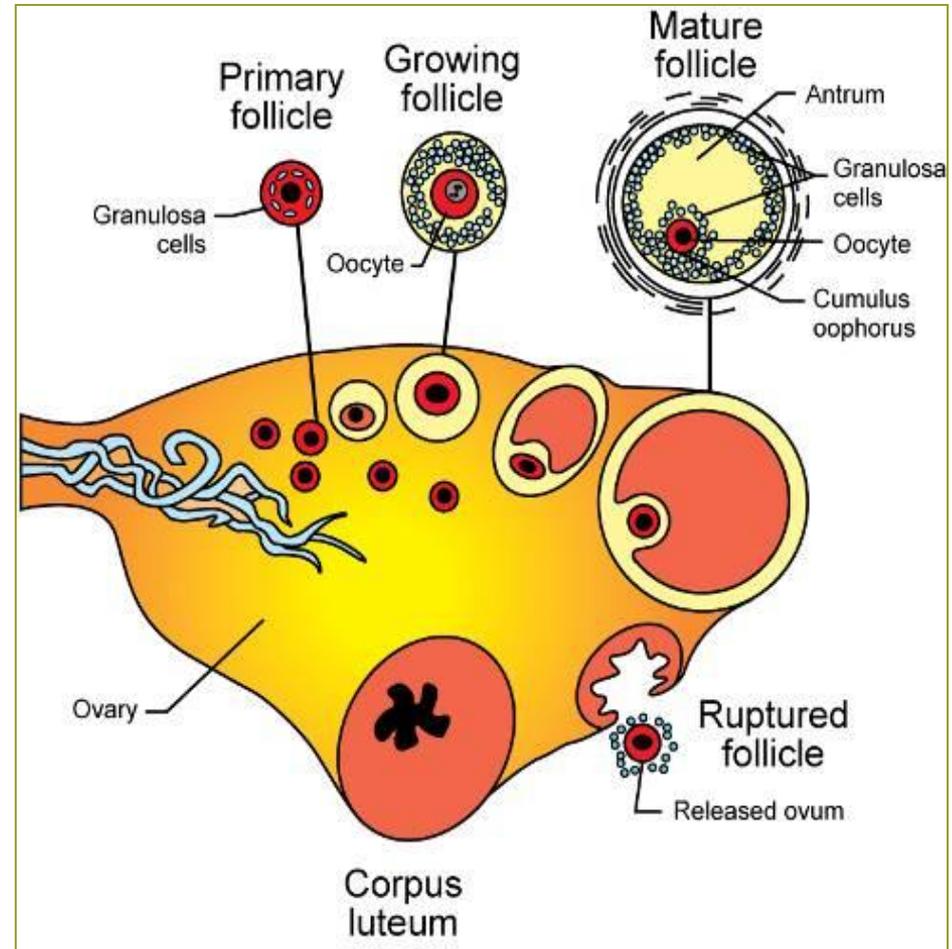
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- If pregnancy occurs, remains for entire pregnancy
- If pregnancy does not occur, degenerates after a short period
- False pregnancy (pseudocyesis)
  - Common in dogs



# Ovarian Cycle

- Development of ovum, ovulation, formation of corpus luteum, and degeneration of unripened follicles and corpus luteum
- Influenced by follicle stimulating hormone (FSH) and luteinizing hormone (LH)



# Ovulation

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- Rupture of mature follicle and release of secondary oocyte into oviduct
  - Becomes ovum if fertilization occurs
- Surface of mature follicle weakens, ruptures
- Fluid released from antrum along with oocyte (still surrounded by corona radiata)
- Empty follicle fills with blood (corpus hemorrhagicum)

# Ovulation

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- Occurs spontaneously in most species as a result of rising levels of LH
- Induced ovulators: ovulation occurs after breeding
  - Cat
  - Rabbit
  - Ferret

# Corpus Luteum

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- Formed by divisions of granulosa cells that line the blood-filled follicle
- Influenced by continued stimulation of LH
- Produces progestins (primarily progesterone)
  - Necessary for maintenance of pregnancy
- Endocrine signal to ovary causes corpus luteum to be maintained if ovum implants in uterus

# Topic 15

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List the stages of the estrous cycle and describe the events that occur during each stage

## A Dog's Menstrual (Heat) Cycle



### Introduction

*While dogs may seem to have a menstrual cycle that is very similar to a woman's menstrual cycle, dogs do not experience an actual menstrual cycle. Primates are the only mammals that have a true menstrual cycle. Instead, dogs have what is called an estrus cycle.*

# Female Reproductive Physiology

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- **Puberty** – age at which reproductive organs become functional
- Males
  - Quite often mature later than female
  - Always ready for breeding
- Females
  - Usually mature first
  - Are only fertile and receptive for a brief time



# Estrous Cycle

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- Time from the beginning of one heat period to the beginning of the next
- Controlled by 2 anterior pituitary hormones
  - Follicle stimulating hormone (FSH)
    - Oogenesis
  - Luteinizing hormone (LH)
    - Ovulation, corpus luteum production

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# Estrous Cycle Stages

Proestrus

Estrus

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Metestrus

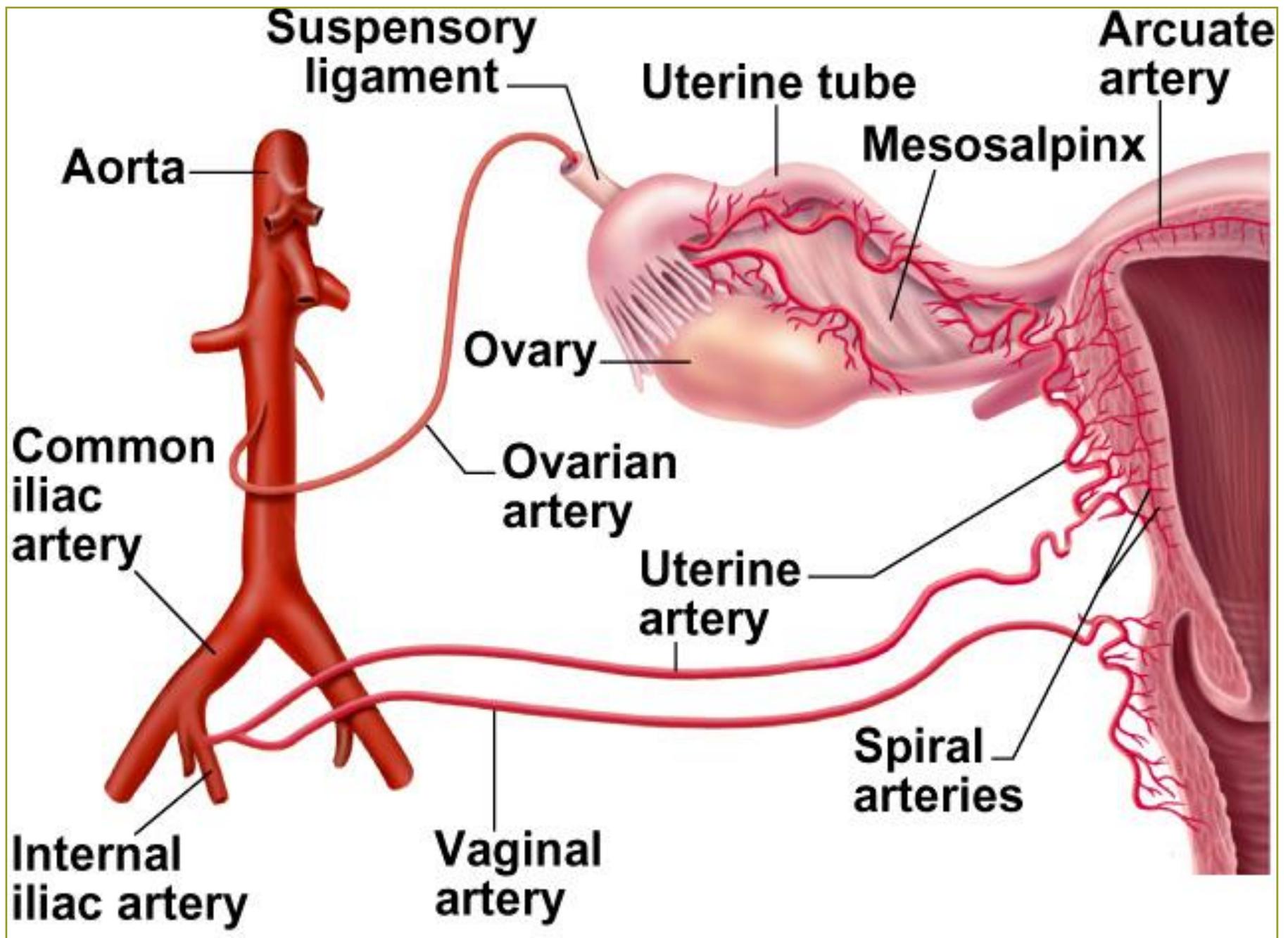
Diestrus

Anestrus (in some species)

# Proestrus

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- The “building up” phase (7 days)
- Blood spotting starts (Day 1)
- Follicles begin developing
- Estrogen output increases
- Blood supply to ovaries increases



# Estrus

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- “True heat” (7 days)
- Estrogen level production peaks
- Female sexually receptive
- Bloody discharge lighter (straw colored?)
- Ovulation! (one or multiple ova)
  - Ovulation occurs near end of estrus in some species
- Induced ovulator species (e.g., cat, rabbit) remain in a prolonged state of estrus if not bred

# Metestrus

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- 7 days
- Time when corpus luteum develops
- Lining of uterus thickens for implantation
- Progesterone produced by corpus luteum temporarily inhibits follicular development in the ovary
- Cornified epithelial lining that developed in the vagina during proestrus and estrus is lost

# Diestrus

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- Corpus luteum at maximum size and exerting maximum effect
- If fertilized ovum implants, corpus luteum is retained well into the pregnancy
- If no pregnancy occurs, corpus luteum degenerates at the end of diestrus
  - Animal then either goes back into proestrus or ovary shuts down and animal goes into anestrus
- Seen in seasonally polyestrus animals (cat, horse, cattle, swine)

# Anestrus

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- Period of temporary ovarian inactivity
- Seen in seasonally polyestrous, diestrous, and monoestrous animals
- Ovary temporarily shuts down
- Ovarian inactivity (5+ months in dogs)
- Period between breeding cycles

# Types of Estrous Cycles

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- Polyestrous: animals that cycle continuously throughout the year if they are not pregnant (cattle and swine)
- Seasonally polyestrous: animals with seasonal variations in estrous cycles (horse, sheep, cat)
- Diestrous: animals with two cycles per year, usually spring and fall (dog)
- Monoestrous: animals with one cycle per year (fox and mink)

# Why Are There Sooooo Many Cats?

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- **Seasonally polyestrus** (10 months)
- Anestrus (2 months)
- **Induced ovulators**
  - Need 2 stimuli
- **Post-partum estrus**
  - Can have 3 litters per year!
- Female cats left alone for 30 minutes outside..... pregnant!
- Rabbits the same

# The Numbers!

Table 18-1, Page 409

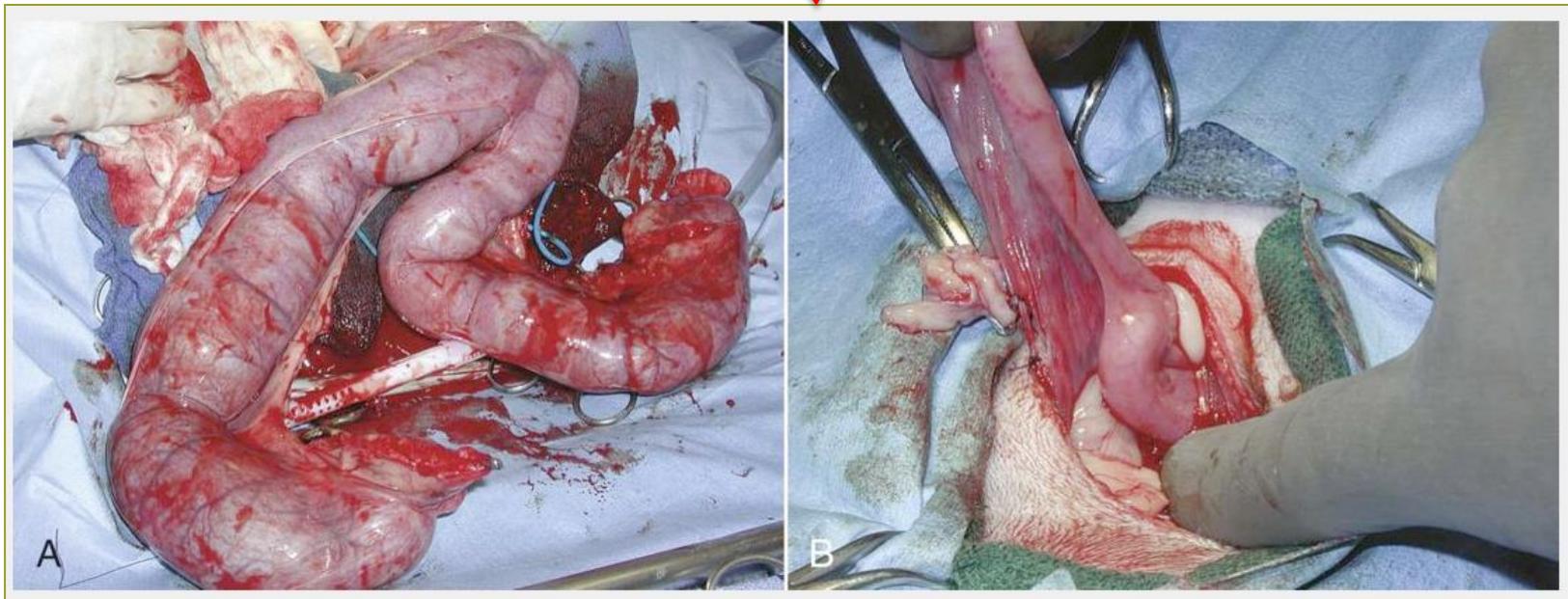
<b>Female</b>	<b>Length of Cycle</b>	<b>Length of Estrus</b>	<b>Gestation</b>
Bitch	21 days	7 days	2 months
Queen	18-21 days	Induced Ovulator	2 months
Mare	~21 days	5 days	11 months
Cow	21 days	18 hours!	9 months

# Topic 16

## McCurnin 8<sup>th</sup> edition – Page 1236

List and describe clinical applications and diseases of the reproductive system

FIGURE 32-29 Pyometra. The uterus must be carefully handled in cases of pyometra because it is often large, friable, and heavy. Compare (A) the pyometra uterus with (B) the normal uterus.



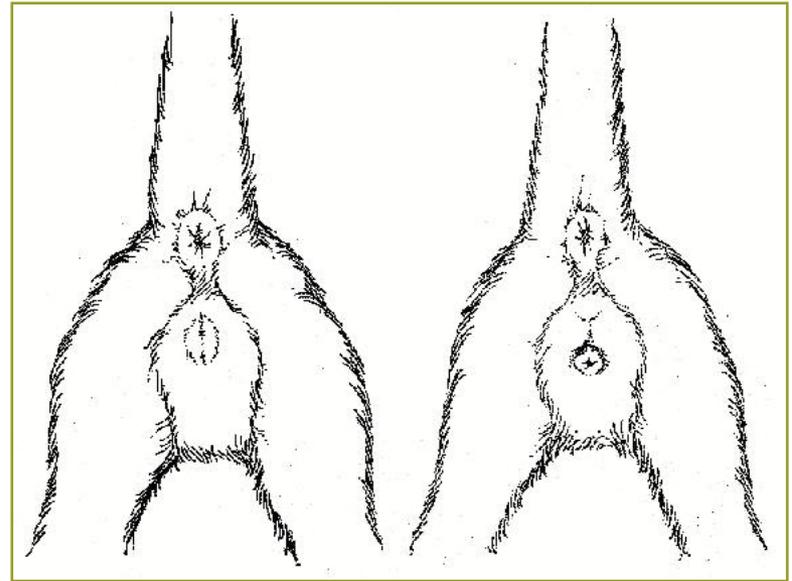
# Male Clinical Applications

- Cryptorchidism (Page 395)
  - Cat vs. dog
  - Increased tumor risk?
- Sertoli cell tumor (Page 395)
- Vasectomy (Page 397)
- Canine Prostate Problems (Page 397)



# What About Sexing Cats?

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# Orchidectomy

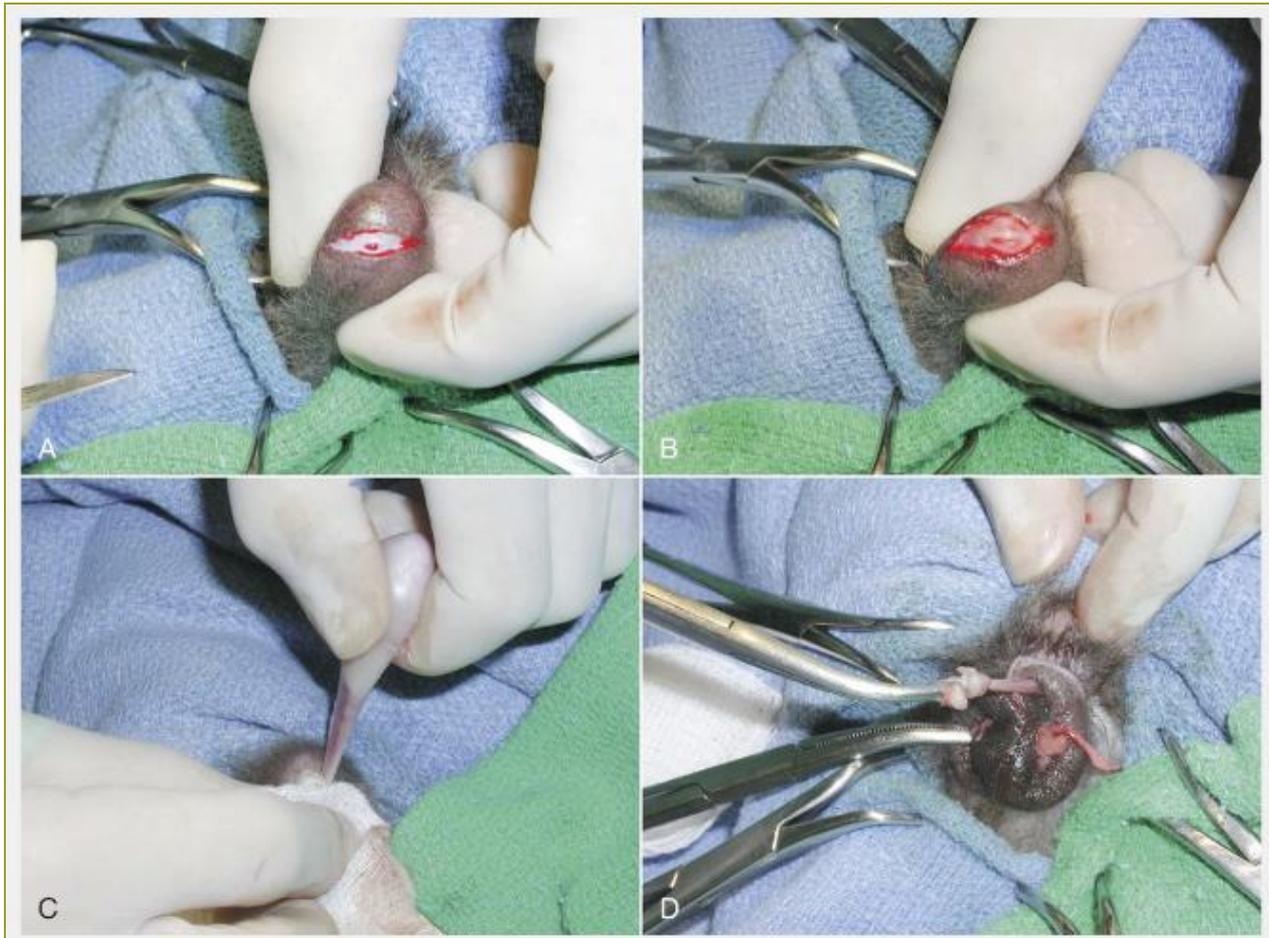
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- Castration, “neutering”, OE
- Definition – surgical removal of testicles
- Medical vs. behavioral reasons
- What age?
- **Client education!**



# McCurnin 8<sup>th</sup> edition – Page 1242

FIGURE 32-34 Feline castration. **A**, A skin incision is made directly over the scrotum as pictured. **B**, Manual pressure is applied to the testicle to exteriorize it through the incision. **C**, Traction is then applied to the testicle to pull it out of the scrotal sac for ligation. **D**, In this image, the spermatic cord has been knotted on itself and then will be released to go back into the scrotal sac. The scrotal sac will be left unsutured.



# Why Neuter?



# Neutering by Species

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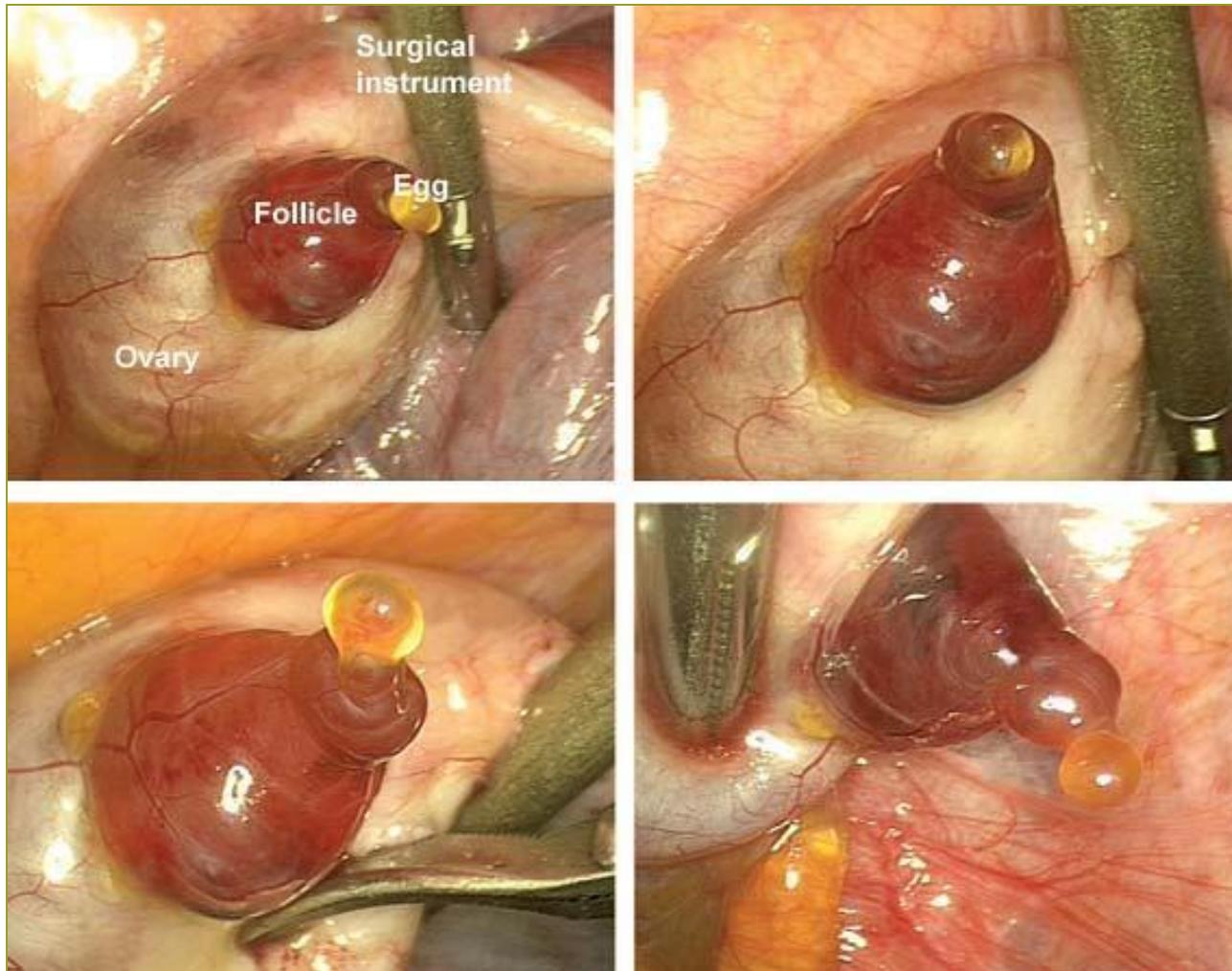
<b>Species</b>	<b>Intact</b>	<b>Castrated</b>
Dog	Dog	Neutered Dog
Cat	Tom	Neutered Tom
Horse	Stallion	Gelding
Cattle	Bull	Steer
Pig	Boar	Barrow
Sheep	Ram	Wether

# Female Reproductive Pathology

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- Pyometra
- Dystocia
- Mastitis
- Pseudocyesis (false pregnancy)
- Cystic ovaries
  - Cats
  - Cows

# Feline Cystic Ovaries



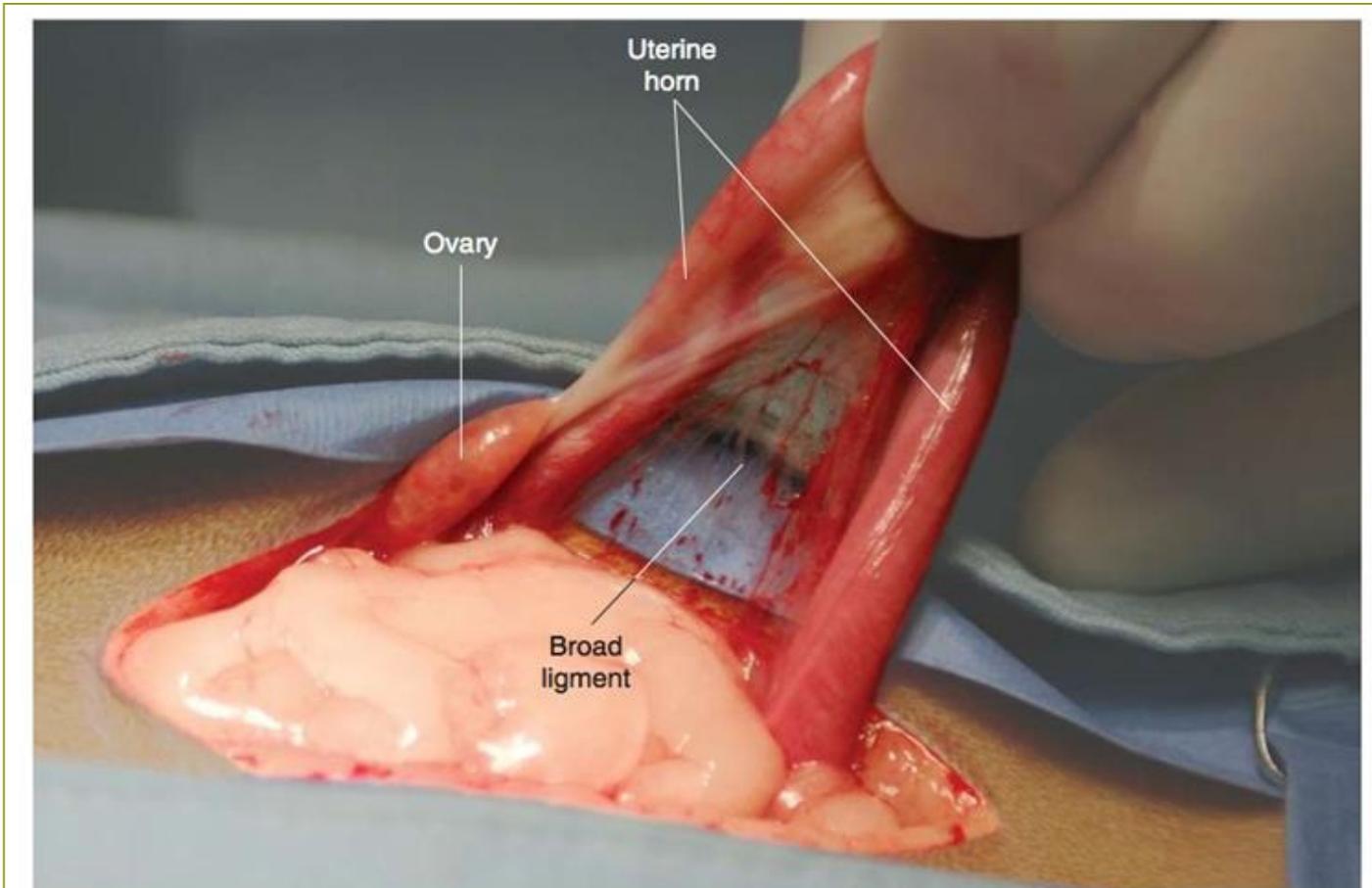
# Birth Control

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- When in bitches are in heat, the leash in the BEST form of birth control! 😊
- Surgical birth control
  - Ovariohysterectomy (OHE)
  - Orchiectomy (OE)
  - Stress **MEDICAL** (not behavioral) benefits
- Birth control pills? (**Secret of Life!**)

# Ovariohysterectomy

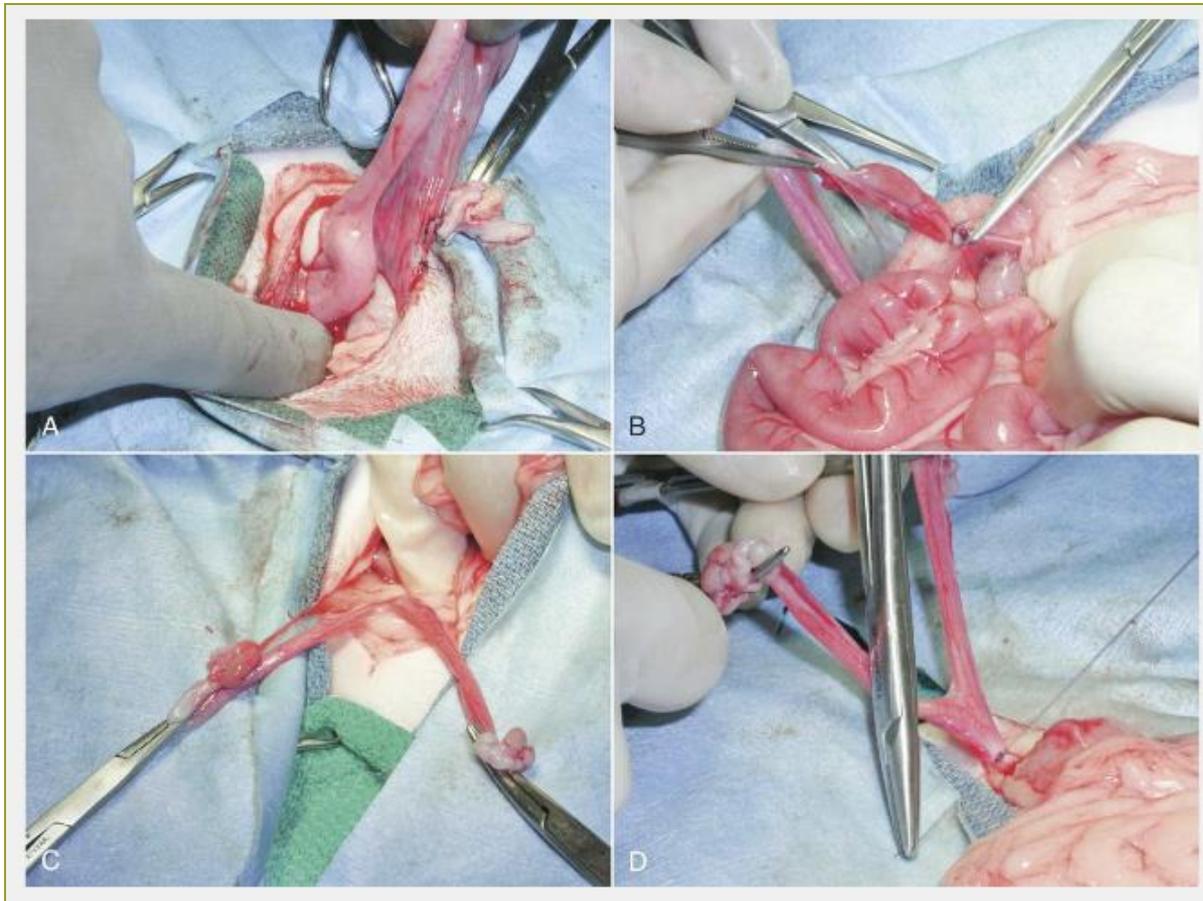
Clinical Application – Page 401  
Bassett Lab Manual – Page 425



**Figure 15-14** "Quiet" Ovary During the Anestrus Period. Feline.

# McCurnin 8<sup>th</sup> edition – Page 1234

FIGURE 32-27 Ovariohysterectomy. **A**, The uterine body is exposed and the suspensory ligament broken down so the ovarian pedicles can be ligated. Both uterine horns are shown in this figure as digital manipulation is used to bring the uterus out of the abdomen. **B**, Once the ovarian pedicle is freed, two circumferential sutures are secured on the portion that will remain in the animal. The ovarian pedicle would be severed proximal to the ovary but distal to the placed ligatures. **C**, The uterine body is fully exposed with gentle traction once the ovarian pedicles are ligated and severed and after the broad ligament is broken down. **D**, The uterine vessels are ligated with tranfixation sutures that individually ligate the vessels on either side of the uterine body and/or as shown with circumferential ligatures that encircle the entire uterine body and the uterine vessels.



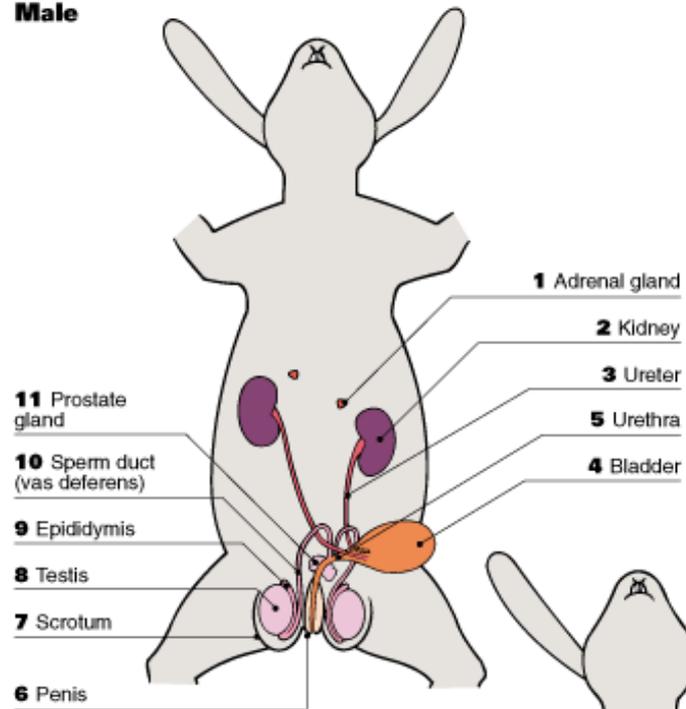
# So You Want To Breed Your Dog?

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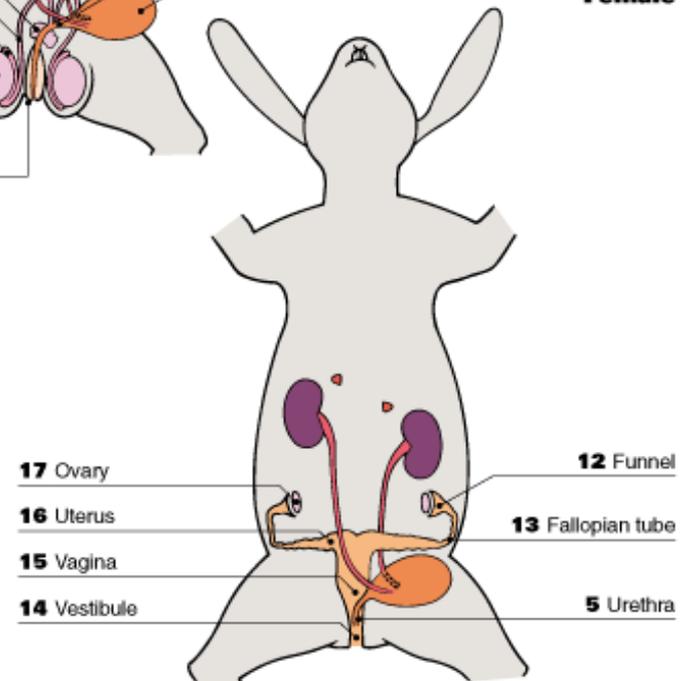
- Breed twice when ovulation is occurring
- Eggs only in oviduct 72 hours
- Sperm only live for 72 hours
- Best time to breed? Day 10 – Day 12
- Vaginal cytology
  - Best way to detect ovulation

# Fun Page!

## Male



## Female



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**Test Yourself**  
**KNOW THESE IN EVERY CHAPTER!**

Pages 388, 390, 395, 399, 402, 403, 404

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# Clinical Applications

Pages 389, 395, 395, 397, 397, 401

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