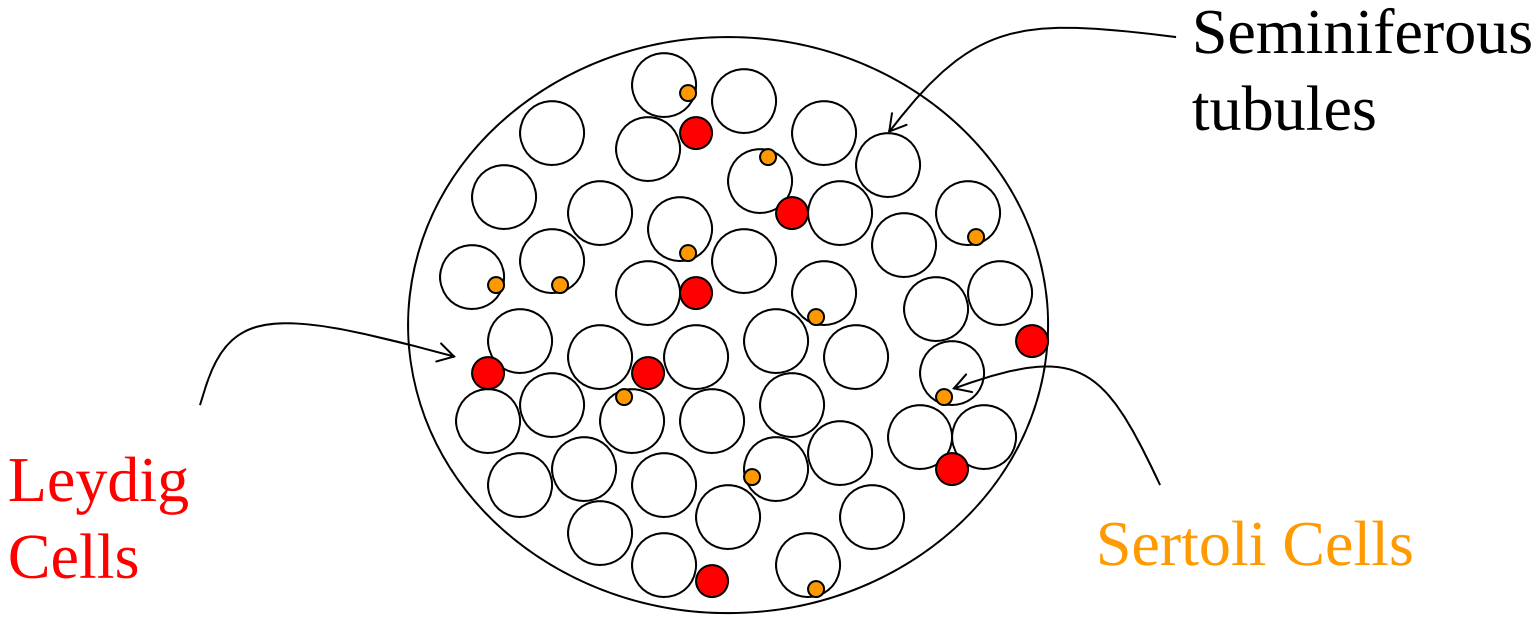
Reproductive Anatomy
Hormone Production

Male Anatomy

- Testes
  - Seminiferous tubules
    - Site of spermatogenesis
  - Sertoli cells—in tubules
    - FSH sensitive
    - Mechanical and nutritional support
  - Leydig cells—interstitial
    - LH sensitive, produce testosterone

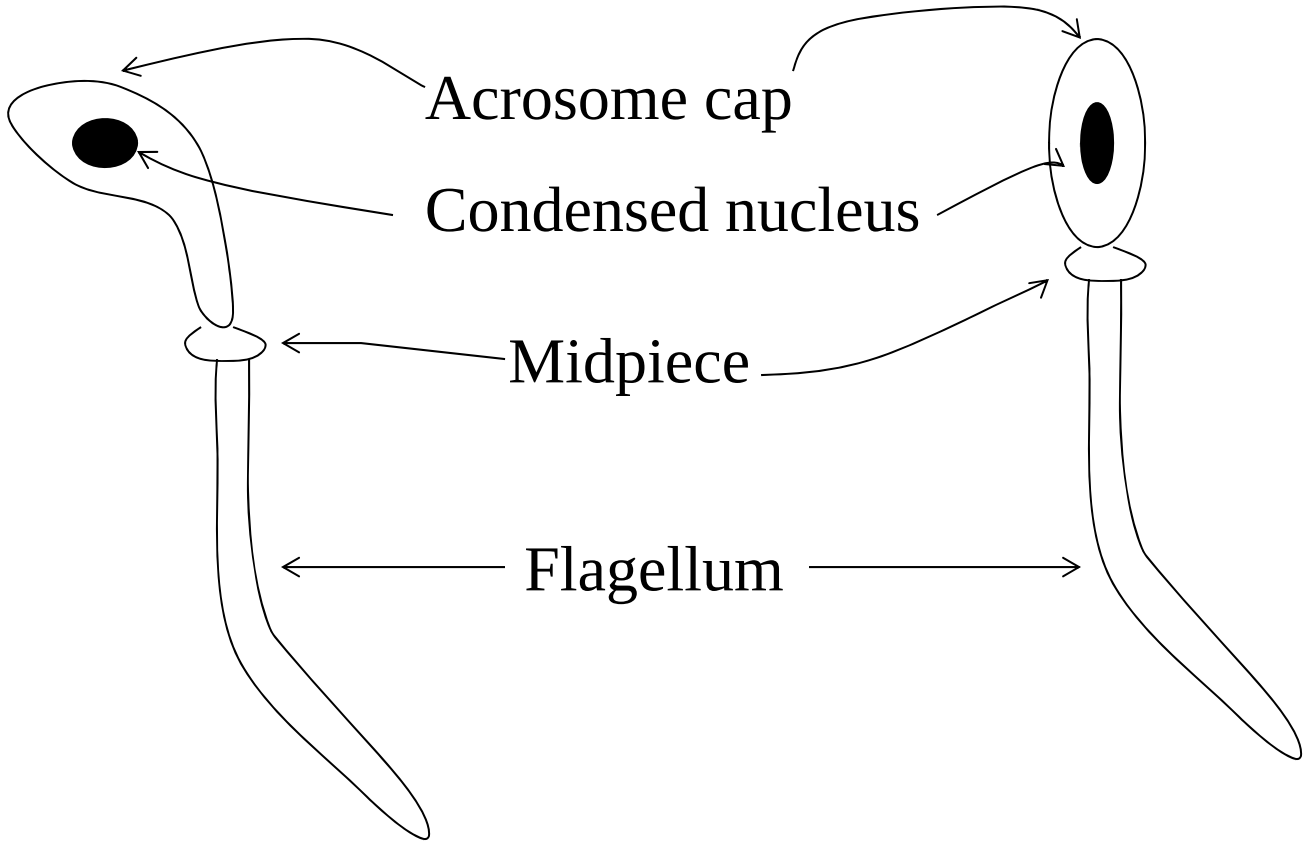
Cross Section of a Testicle



Spermatozoa

- Head
  - Acrosome cap: lytic factors
  - Condensed nucleus
- Mid-piece: Mitochondrial sheath—energy for motility.
- Flagellum: Motility for entry into the egg.

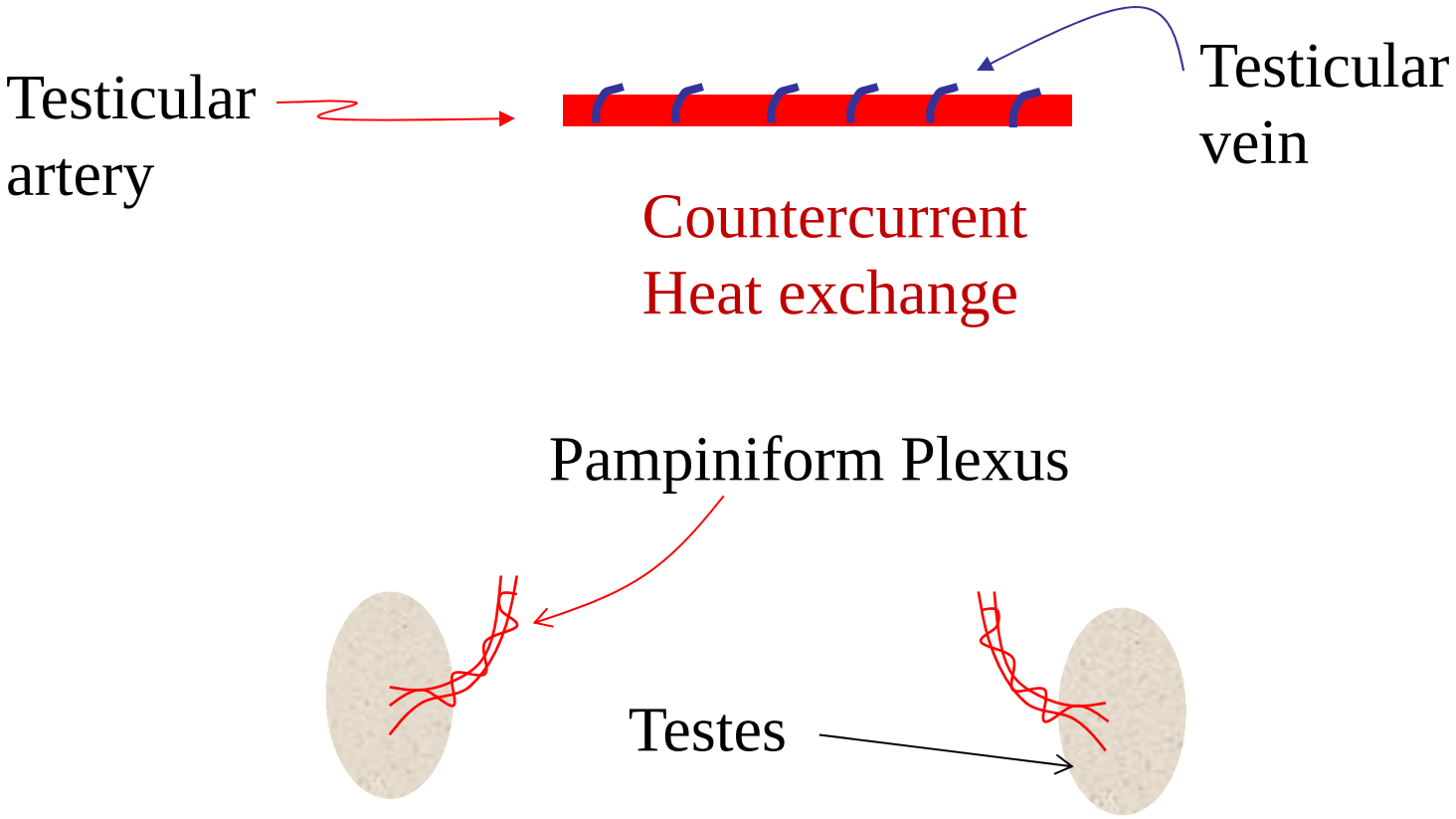
Spermatozoa



Hooked: mouse, rat, hamster

Ovoid: guinea pig, rabbit

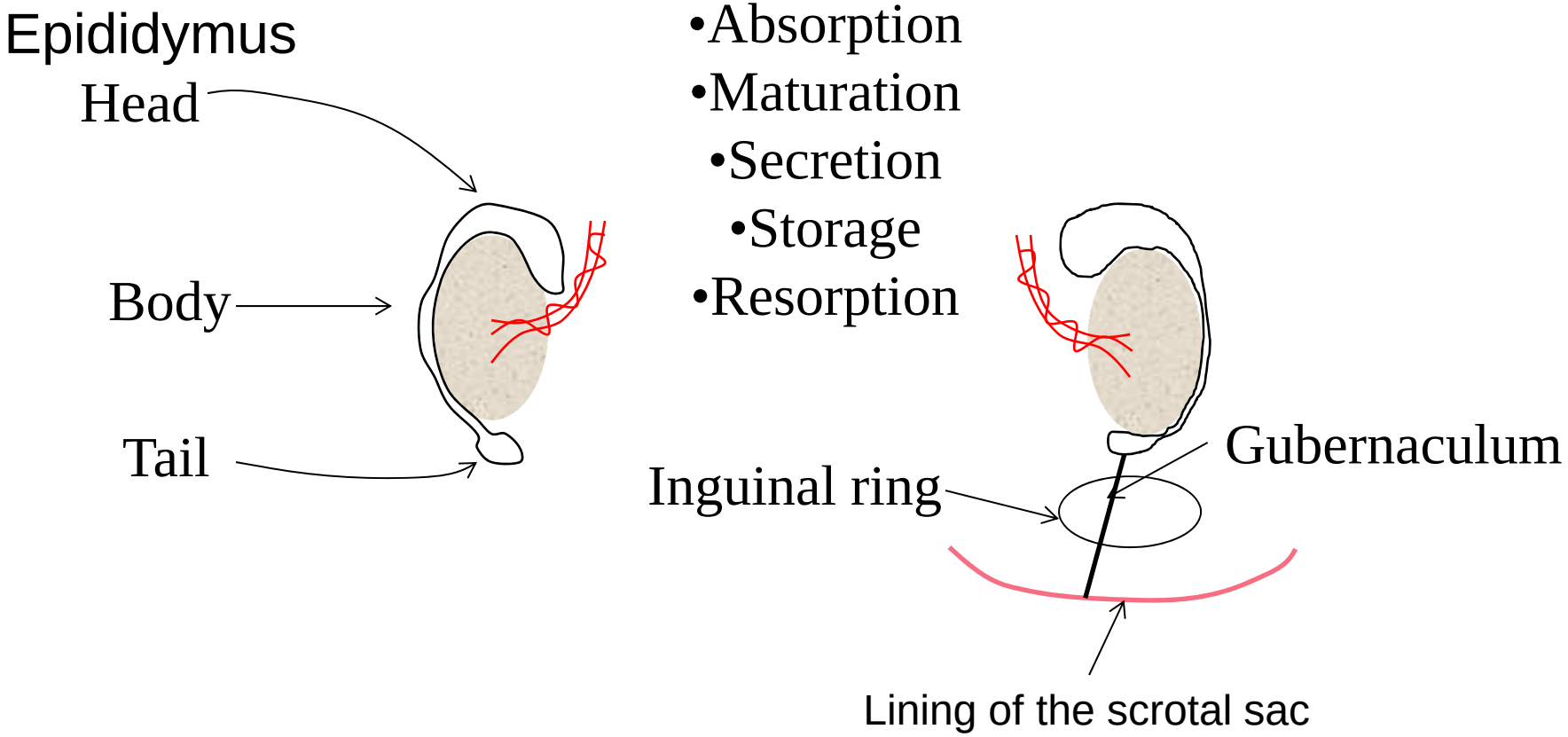
Testes


Testicular artery
Testicular vein
Countercurrent Heat exchange
Pampiniform Plexus
Testes

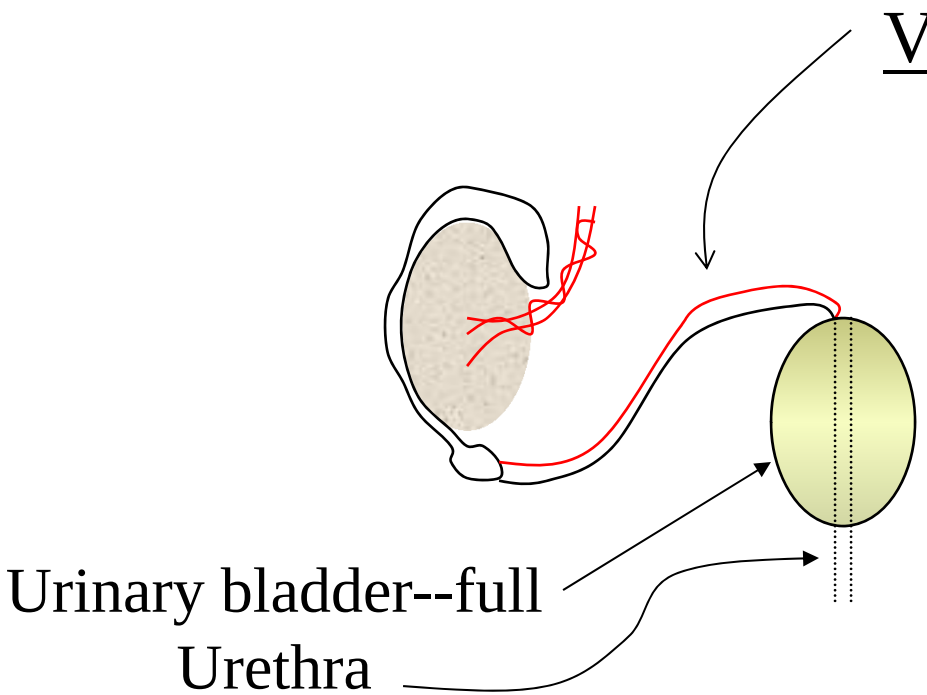
Epididymis and Gubernaculum

Functions of Epididymis

- Transport
- Absorption
- Maturation
- Secretion
- Storage
- Resorption



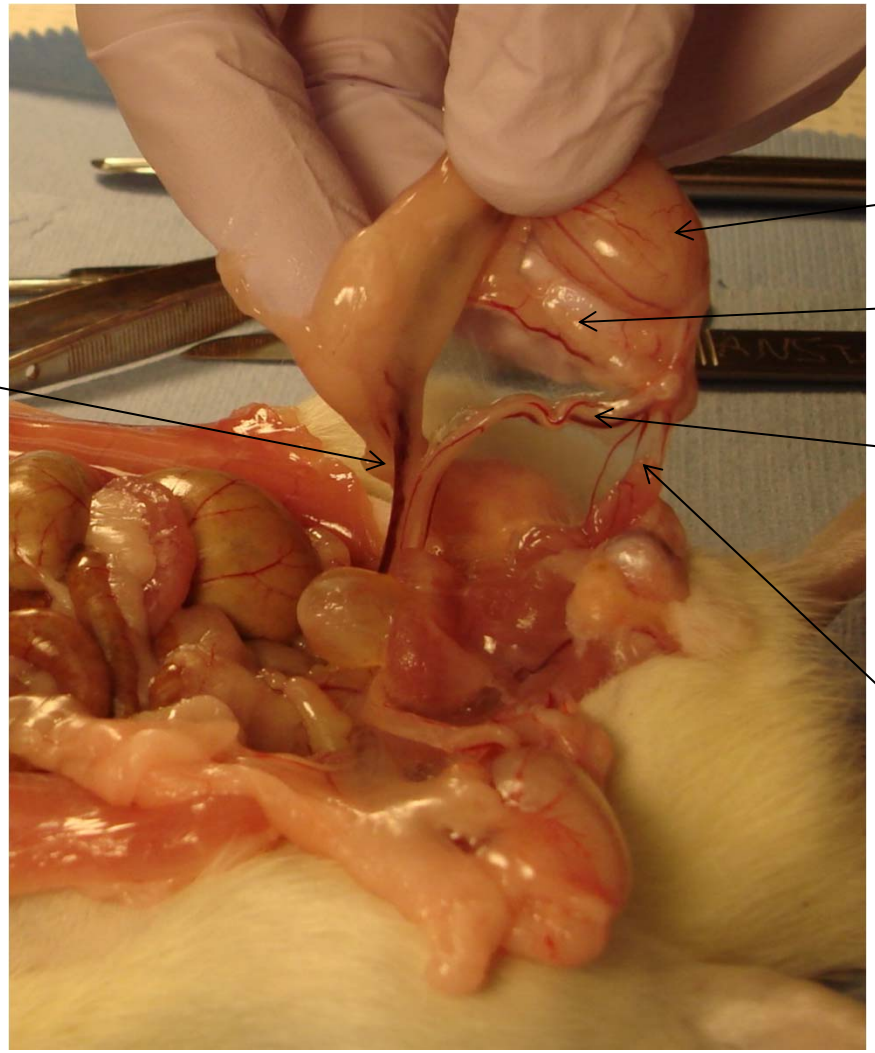
Vas deferens



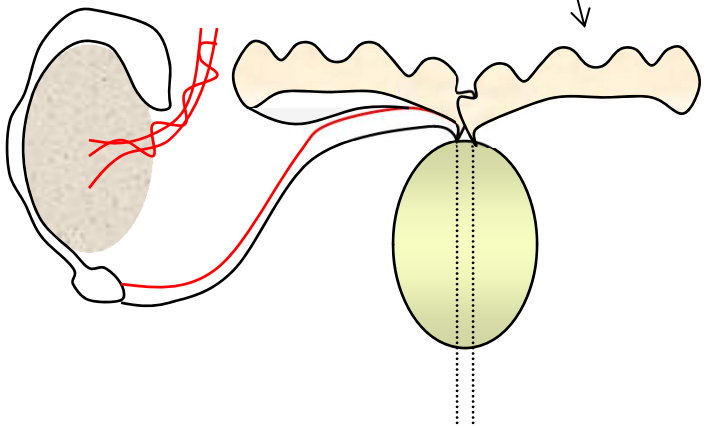
Vas deferens

A thick muscular-walled
Tube connecting the
Tail of the epididymus
To the urethra.
Artery and vein run
parallel

Vas deferens



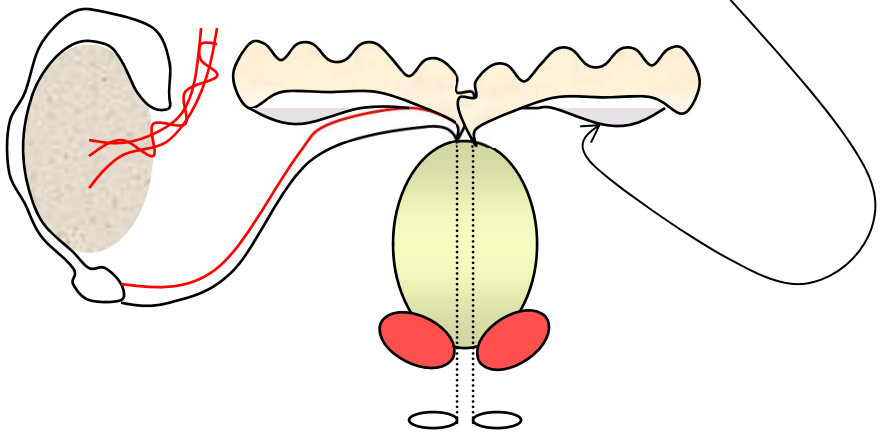
Seminal vesicles



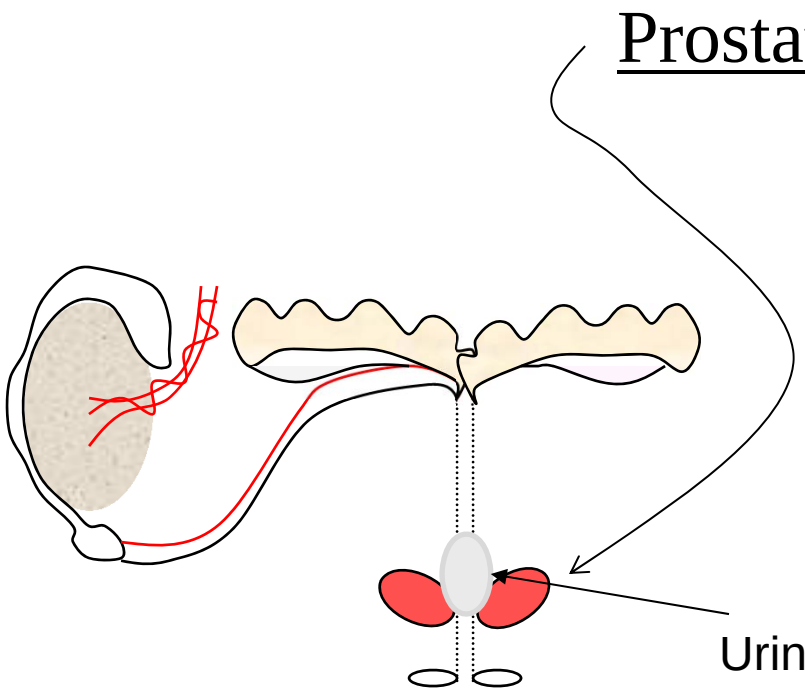
Seminal vesicles

- Fructose
- Lactic acid
- Buffer
- Prostaglandins
- Proteins

Coagulating glands



Prostate glands

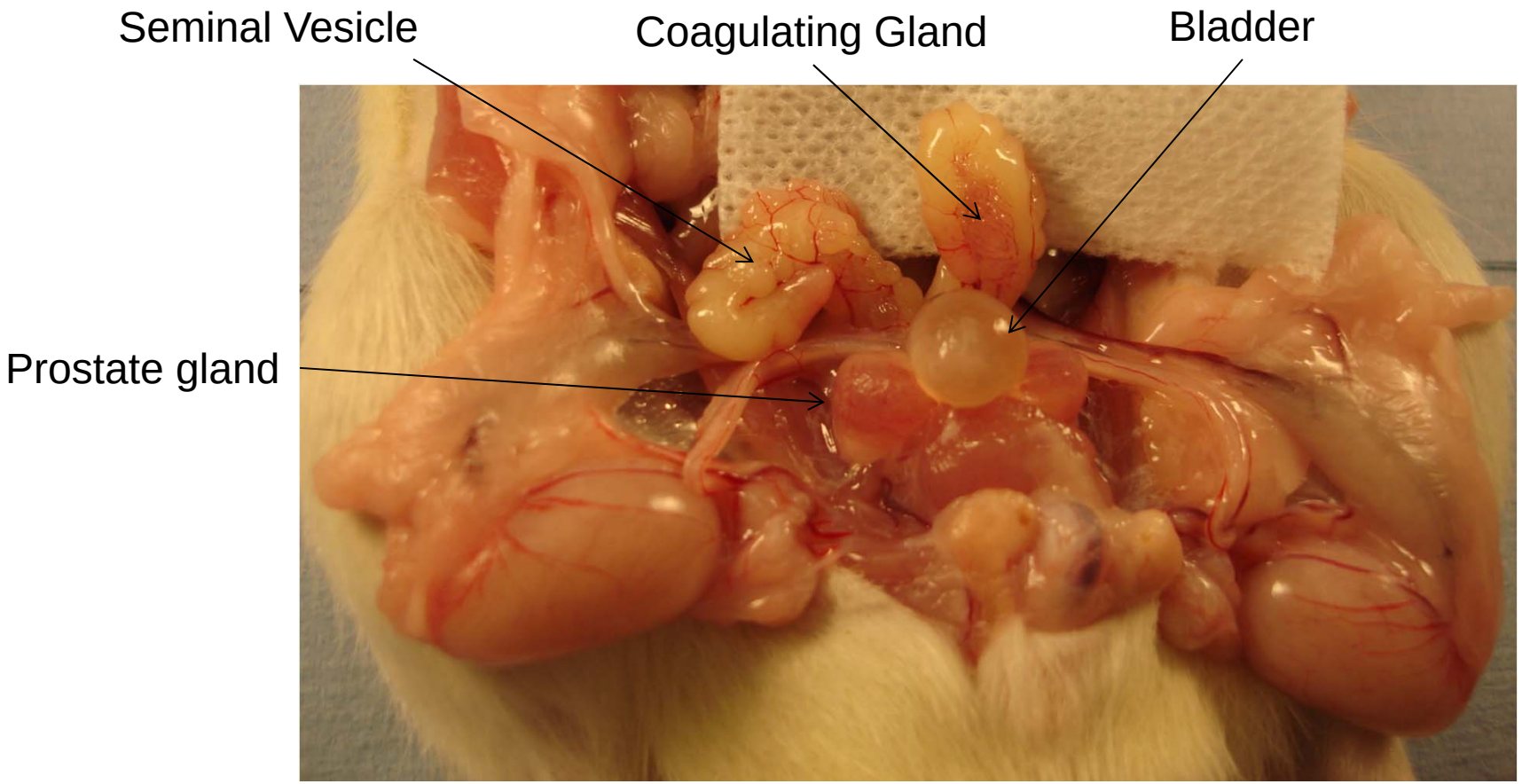


Prostate glands

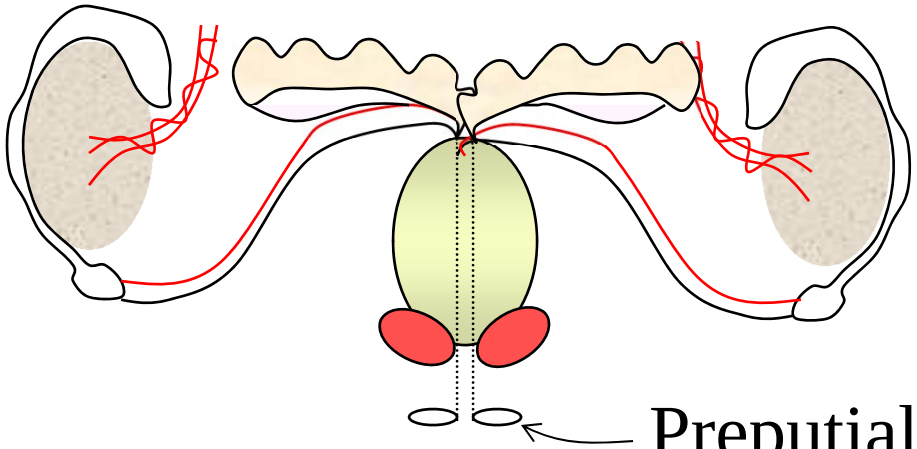
- Energy source
  - Citric acid
  - Fructose
- Enzymes

Urinary bladder--empty

Seminal Fluid Organs



Preputial gland



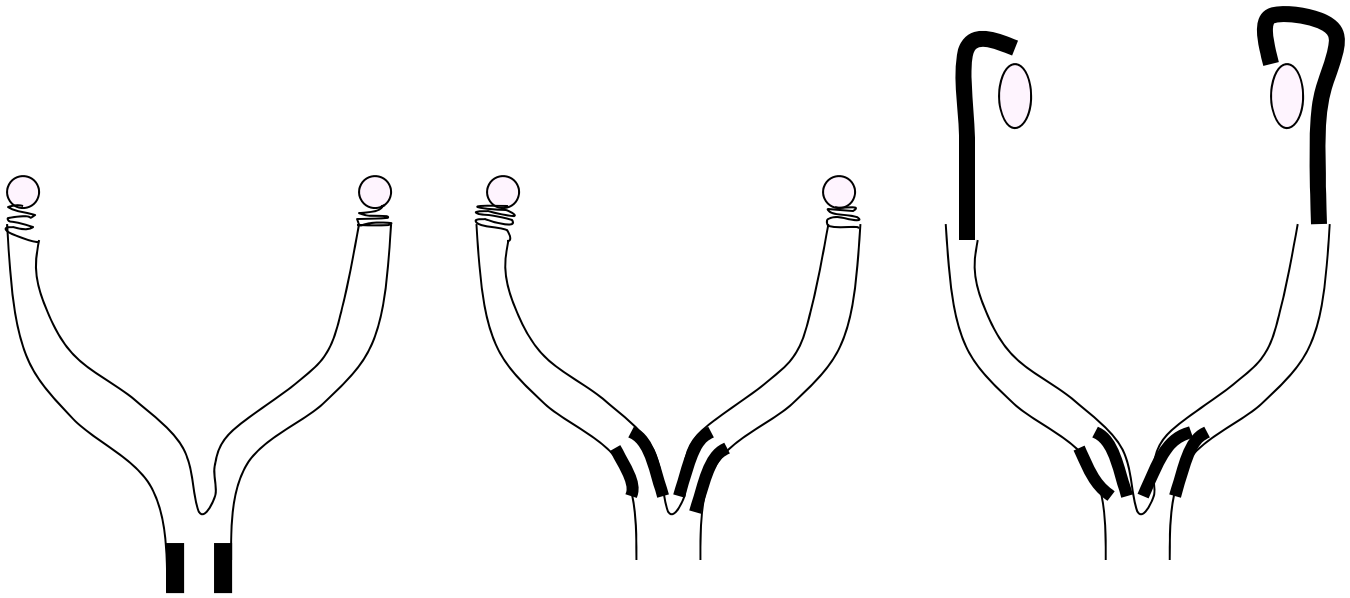
Preputial glands

- Pheromones

Female Anatomy

- Vagina: Receives spermatozoa and site of copulatory plug
  - Rats, mice, hamsters—prepubertal membrane
  - Guinea pig—membrane ruptures and reforms
  - Rabbit—no vaginal membrane
- Cervix: muscular barrier & mucoid barrier
  - Cervical plug
  - Reflex arc receptors

Uterine Horns



Bicornuate
Mouse, gerbil

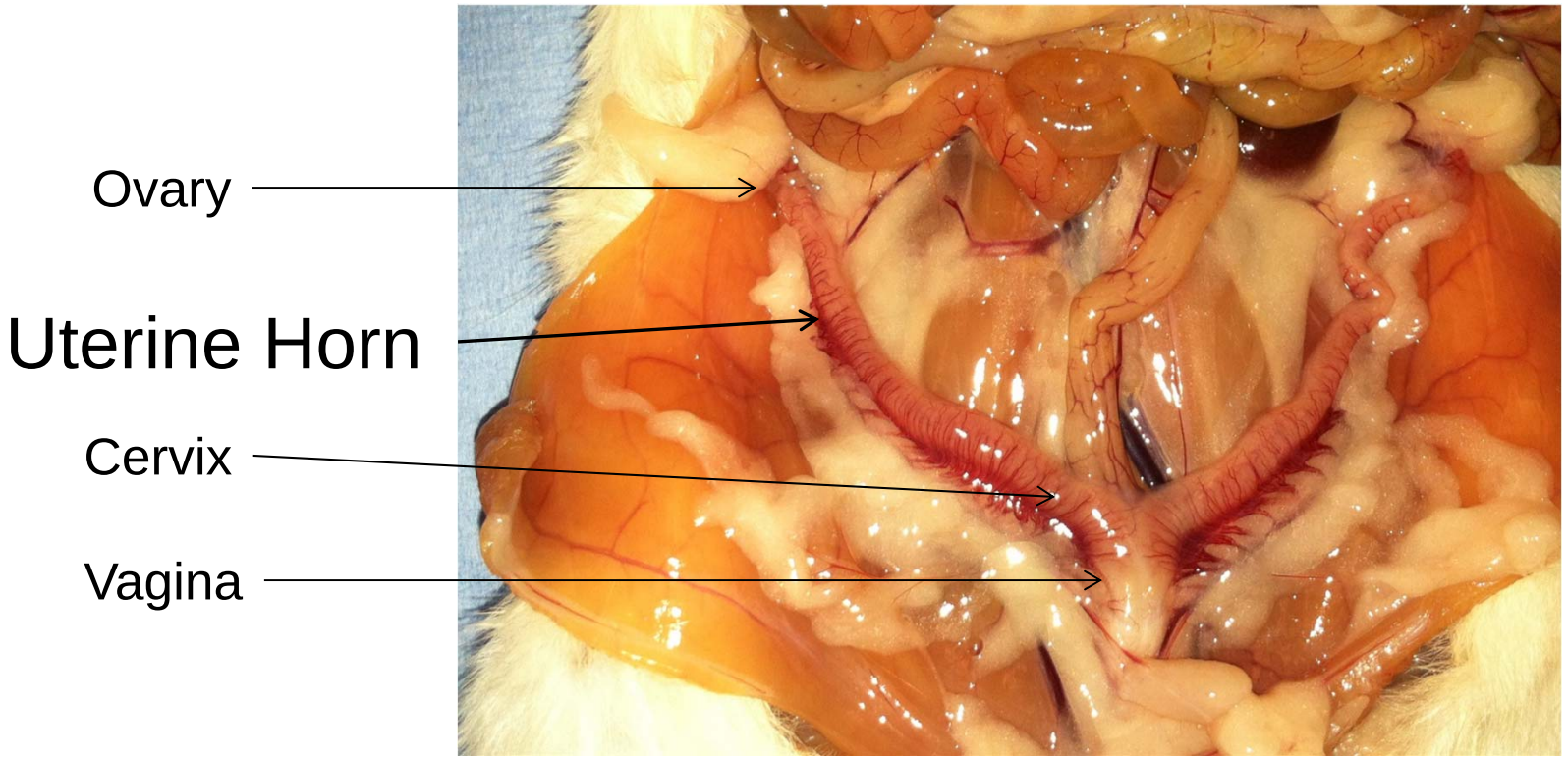
Duplex
Rat, hamster,
Guinea pig

Duplex
Rabbit

Function
Nourishment: Secretions & implantation
Endocrine: Placenta produces placental lactogen
Parturition: Muscular contraction

Endometrium:
inner cell layer
Myometrium:
muscle cell layer

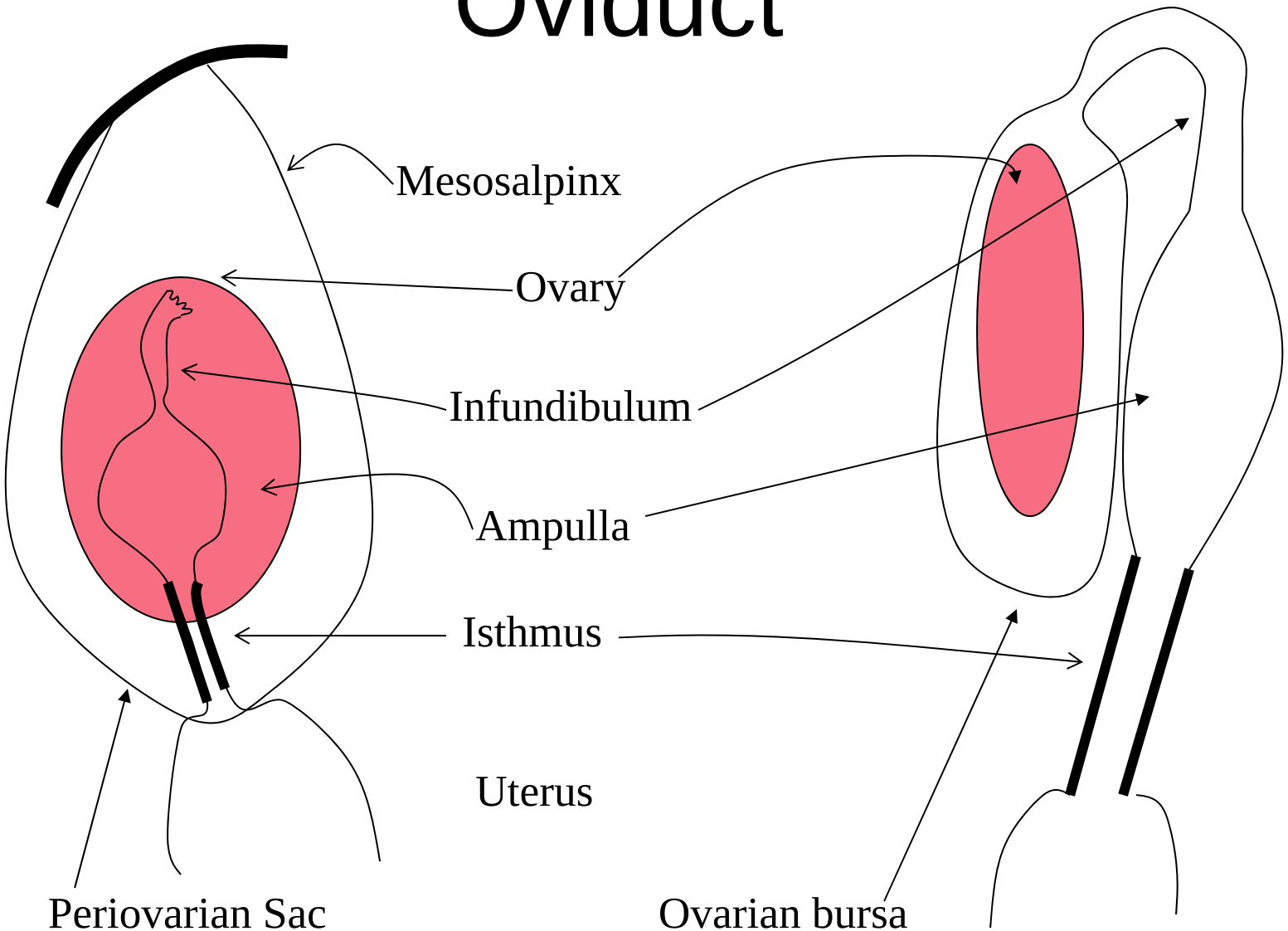
Uterine Horns



Oviduct

- Functions
  - Receives ova
  - Site of sperm capacitation
  - Site of fertilization
  - Site of early embryo development

Oviduct



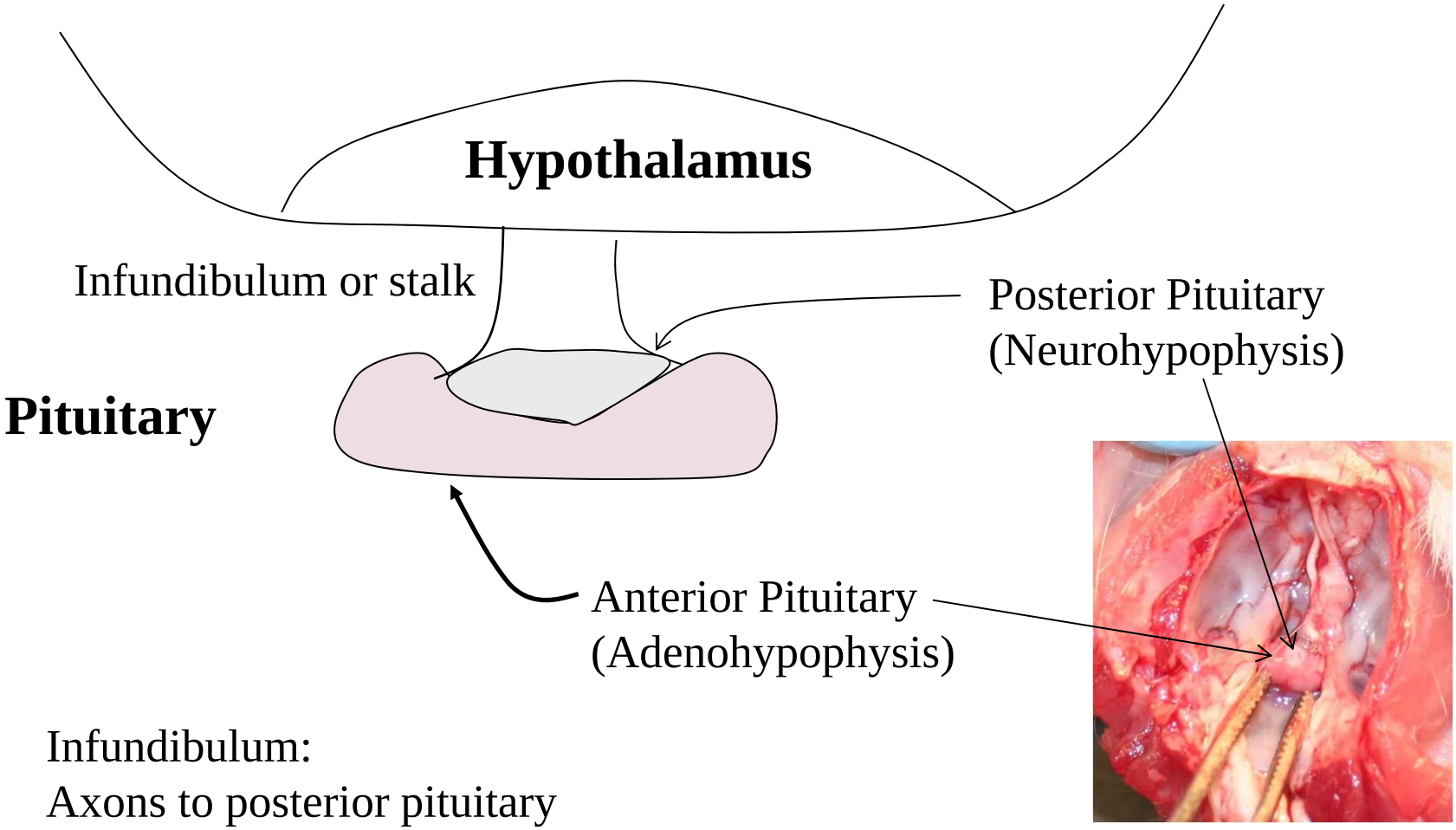
Periovarian Sac
Mouse, rat, hamster

Ovarian bursa
Guinea pig, rabbit

Ovary

- Site of follicular development
- Site of hormone production
  - Estrogen
  - Progesterone

The Brain



Infundibulum:
Axons to posterior pituitary
Hypothalamo-hypophyseal portal system to anterior pituitary

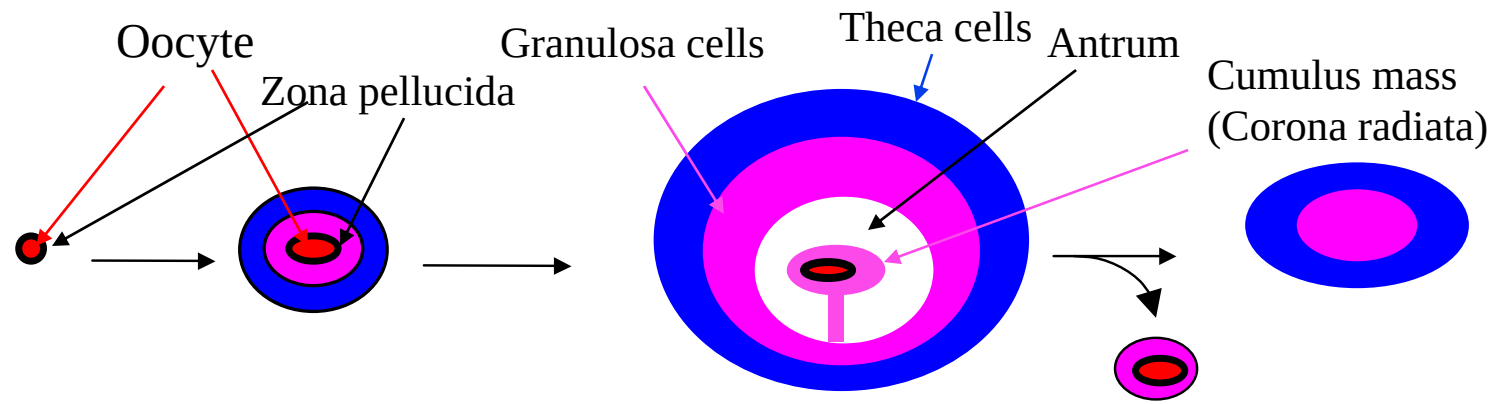
GnRH

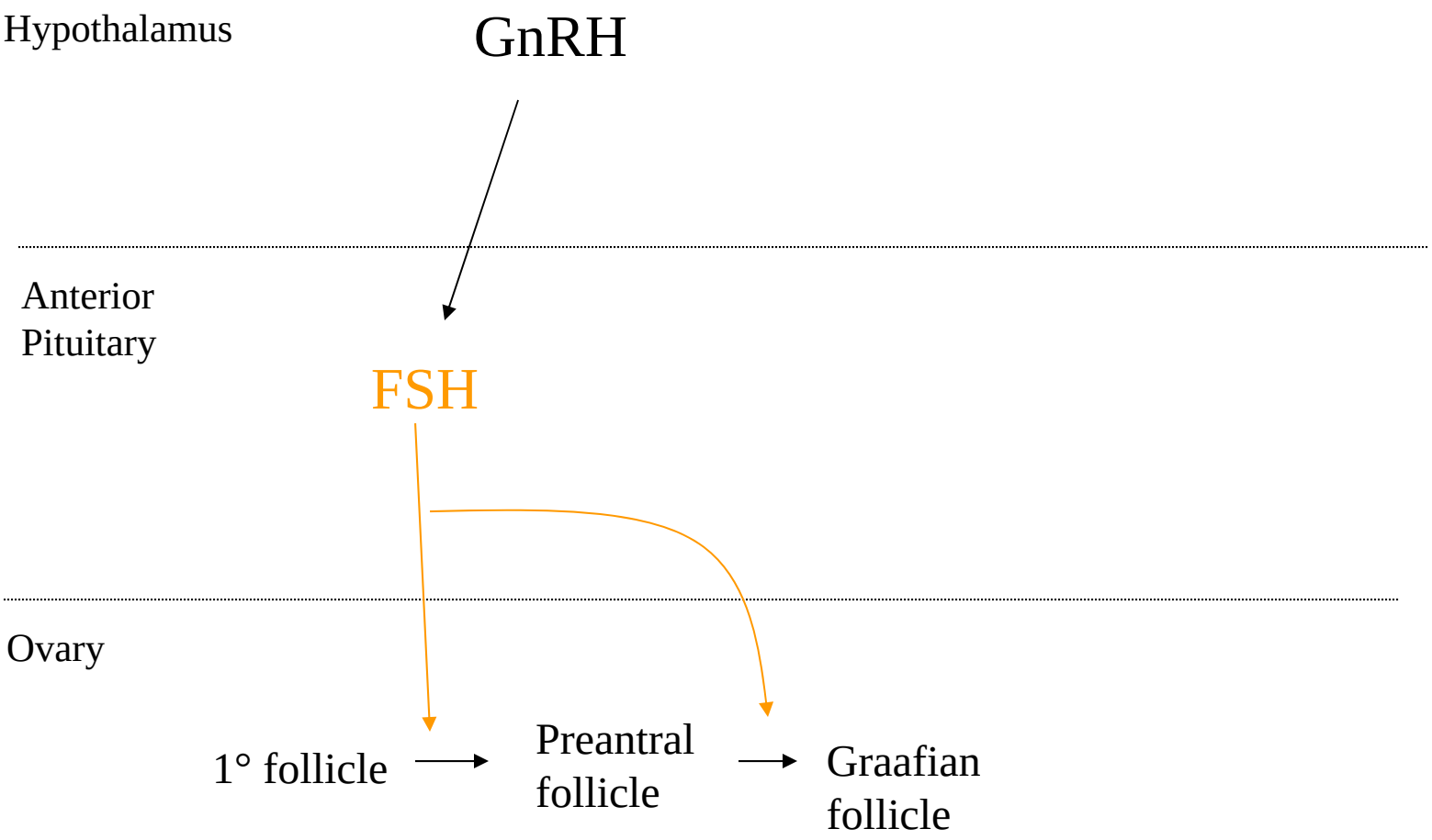
- Gonadotrophin Releasing Hormone
- From—Hypothalamus (preoptic area)
- Effects
  - Stimulates FSH
  - Stimulates LH
- Control
  - Feedback from estradiol and progesterone
  - Suppressed by melatonin (photoperiod)

FSH

- Follicle Stimulating Hormone
- From—Anterior pituitary
- Control—GnRH via hypothalamo-hypophyseal portal system in the infundibulum.
- Effects
  - Stimulates follicular development and maturation
  - Prevents atresia
  - Stimulates estradiol synthesis

Follicular Development (Ovary)



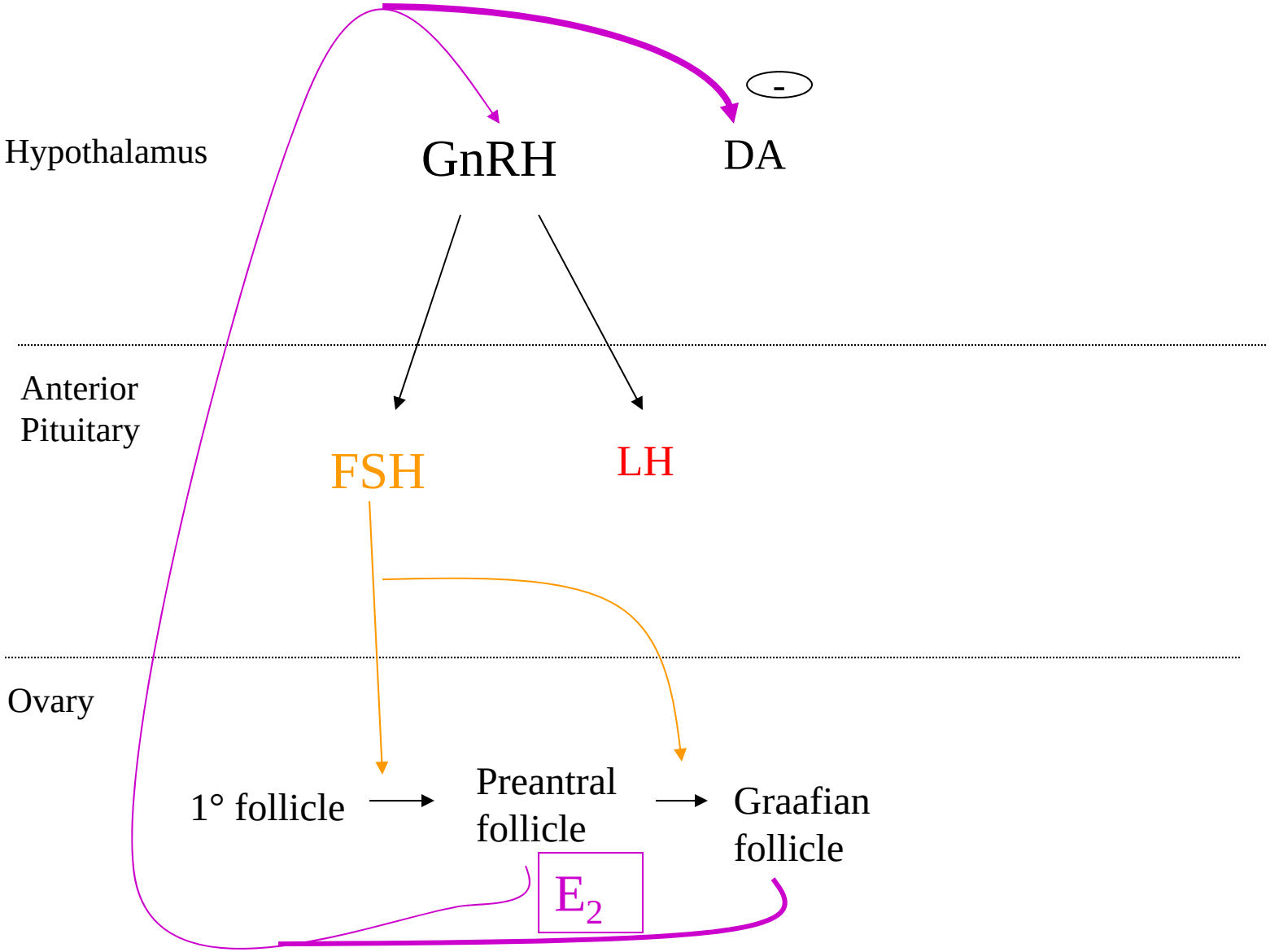

Hypothalamus
GnRH
Anterior
Pituitary
FSH
Ovary
1° follicle
Preantral
follicle
Graafian
follicle

E_2

- Estradiol
- From granulosa cells (ovary)
- Effects
  - Feedback effect on GnRH
  - Time behavioral estrus
  - Inhibit dopamine
  - Growth and development of 2° sex tissues

E_2—Feedback & Interactions

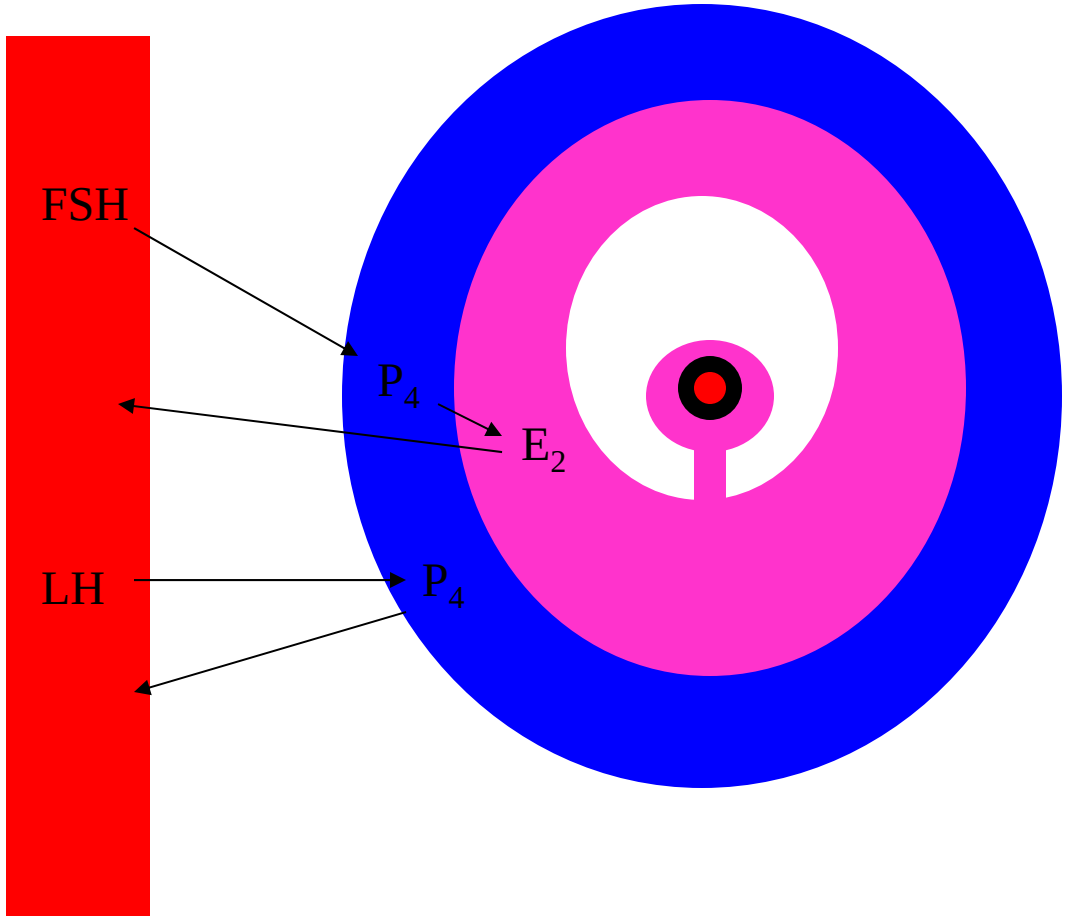
- Rising E_2 → Stimulates GnRH → Production, Release, Receptors
- High E_2 → Spikes GnRH; Inhibits dopamine
- High E_2 + P_4 → Behavioral estrus
- Low E_2 + high P_4 → Inhibits GnRH

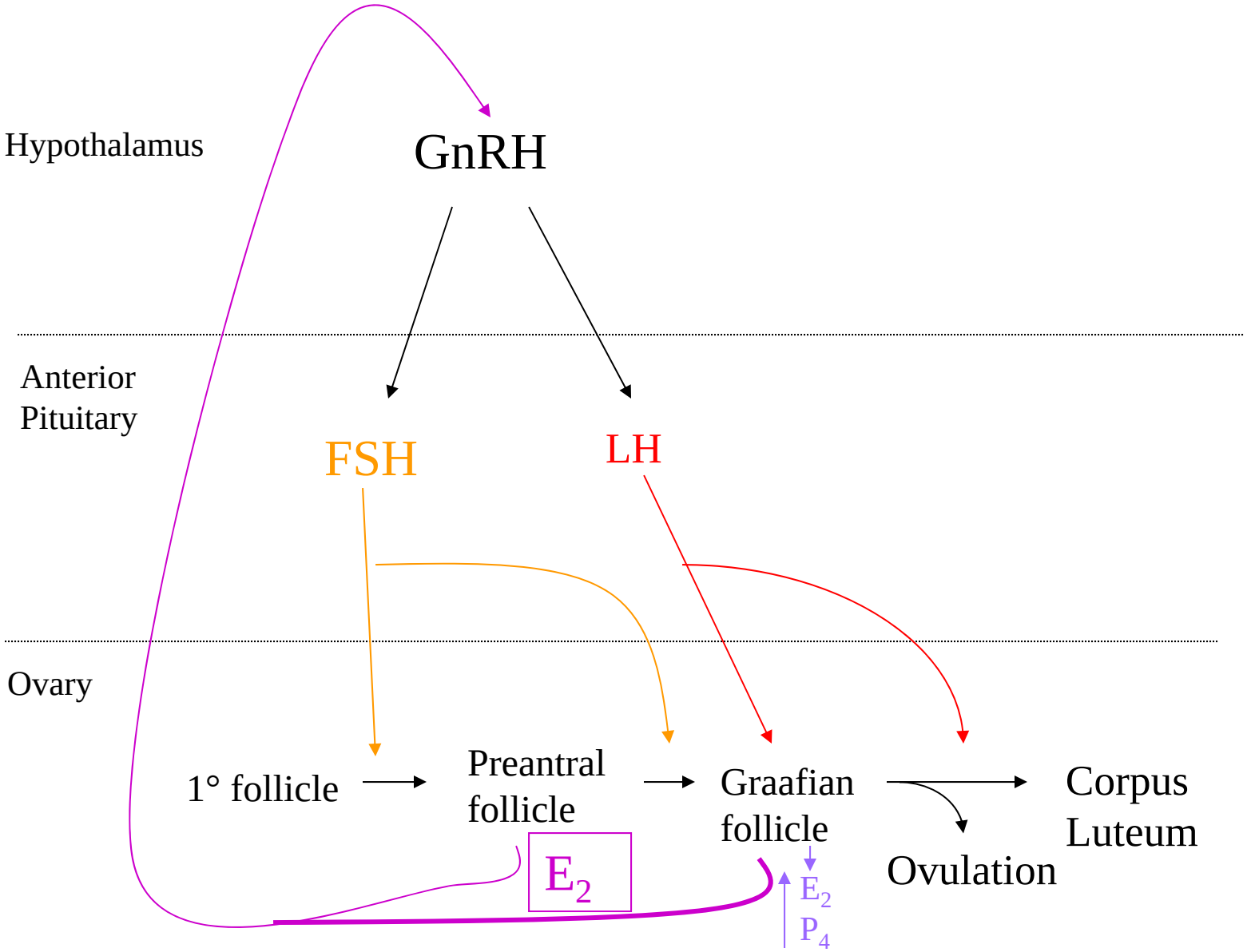

Hypothalamus
GnRH
DA
-
Anterior
Pituitary
FSH
LH
Ovary
1° follicle
Preantral
follicle
Graafian
follicle
E_2

LH

- Luteinizing Hormone
- From—Anterior Pituitary
- Control—GnRH via hypothalamo-hypophyseal portal system
- Effects
  - Final maturation of Graafian follicle (w/FSH)
  - Luteinization of Graafian follicle—P_4 release
  - Triggers ovulation
  - Formation of corpus luteum

Luteinization of the Follicle

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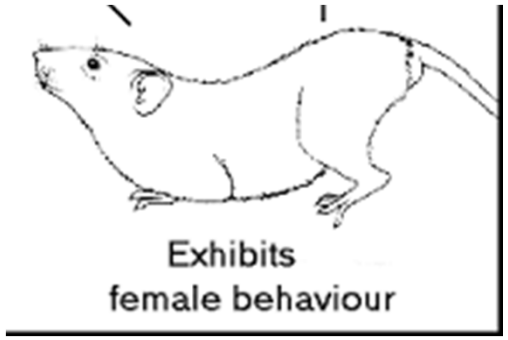
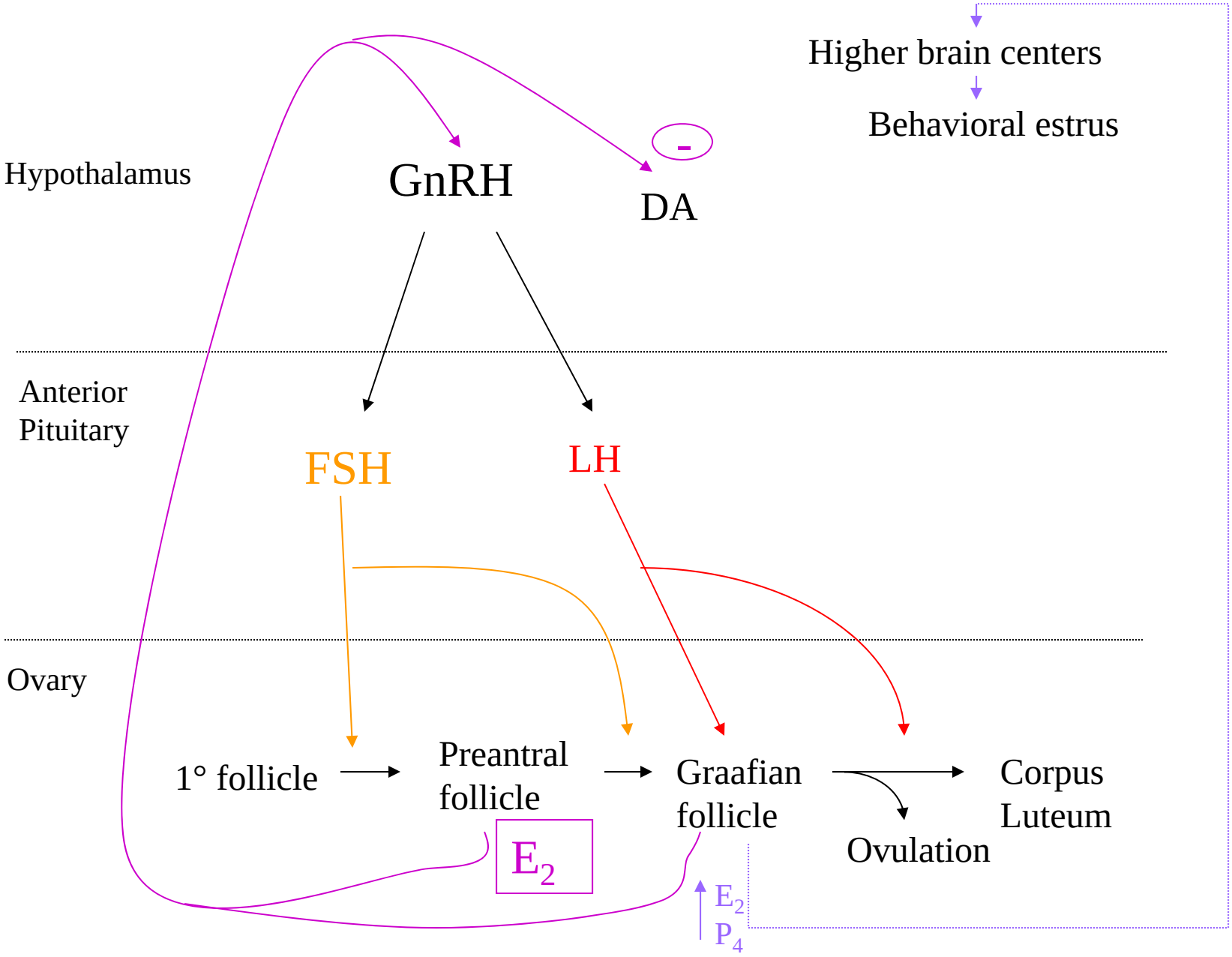
GnRH
Anterior
Pituitary
FSH
LH
Ovary
1° follicle
Preantral
follicle
Graafian
follicle
Corpus
Luteum
Ovulation
E2
E2
P4

P_4

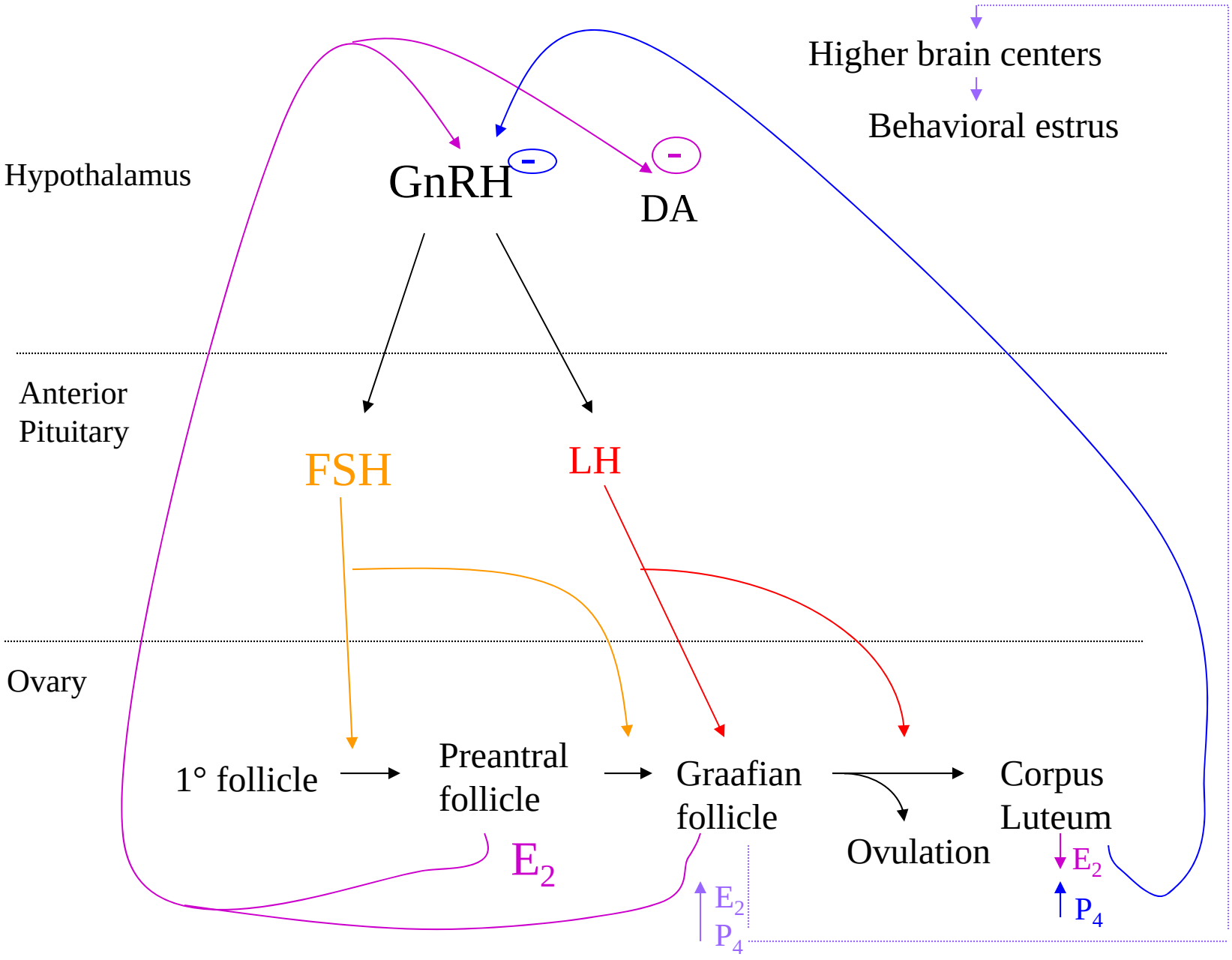
- Progesterone
- From—Theca cells (ovary)
- Effects—Graafian follicle (w/high E_2)
  - Behavioral estrus
    - Lordosis




Higher brain centers
Behavioral estrus
Hypothalamus
GnRH
-
DA
Anterior
Pituitary
FSH
LH
Ovary
1° follicle
Preantral
follicle
Graafian
follicle
Corpus
Luteum
Ovulation
E2
E2
P4

P_4

- Effects from corpus luteum (w/low E_2)
  - Pregnancy maintenance
    - Promote glandular and secretory activity
      - Oviduct and endometrium
      - Cervical and copulatory plugs
      - Mammary glands
    - Suppresses GnRH
    - Prevent myometrial contractions
      - Except in the GP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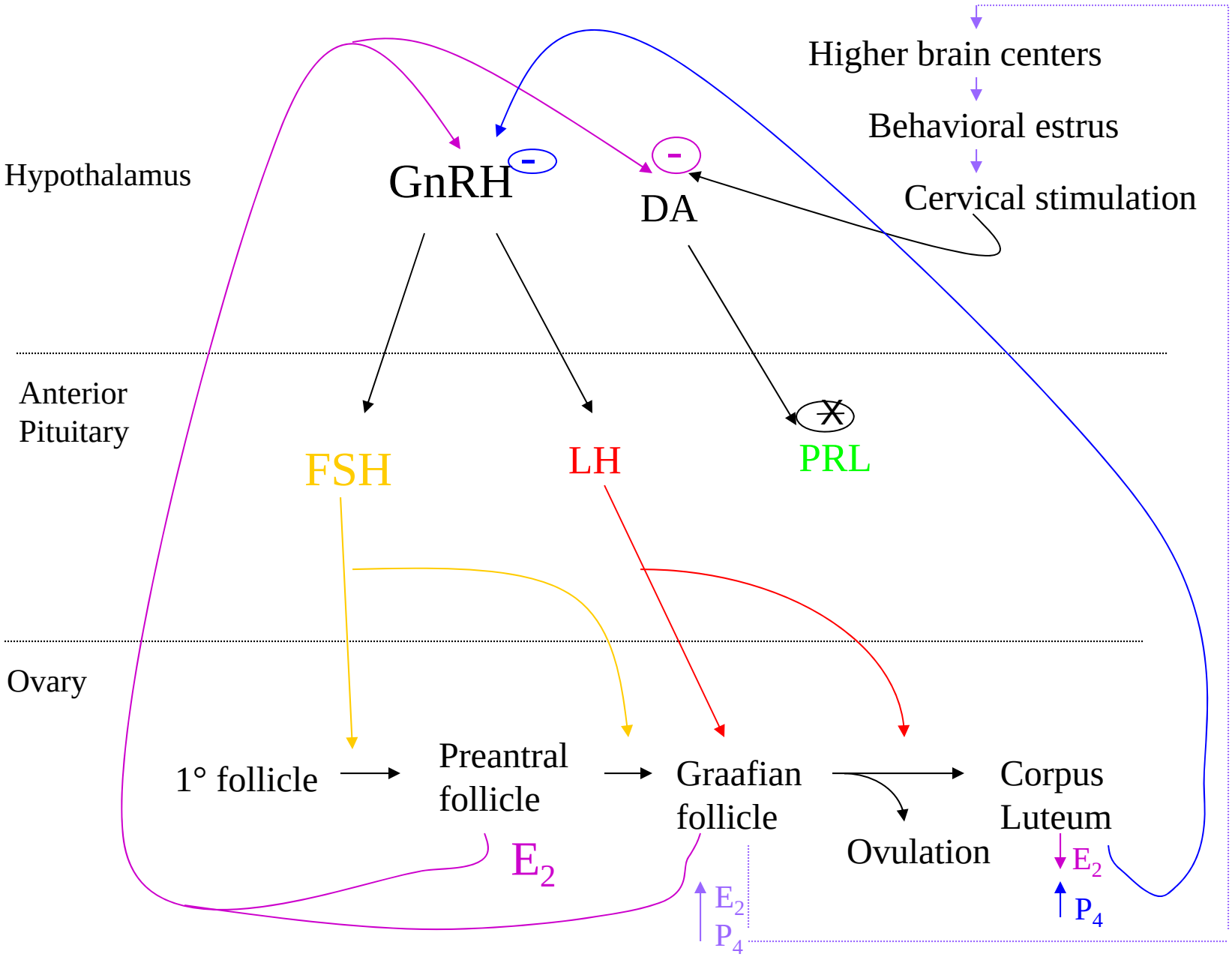
follicle
Graafian
follicle
Ovulation
Corpus
Luteum
E2
E2
P4
E2
P4

DA

- Dopamine
- From—Hypothalamus (supraoptic nuclei)
  - A neurotransmitter, not a hormone
- Effect—Suppresses PRL
- Control—Suppressed by
  - High levels of E_2
  - Cervical stimulation—neural reflex arc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Behavioral estrus
Cervical stimulation
Hypothalamus
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Anterior
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PRL
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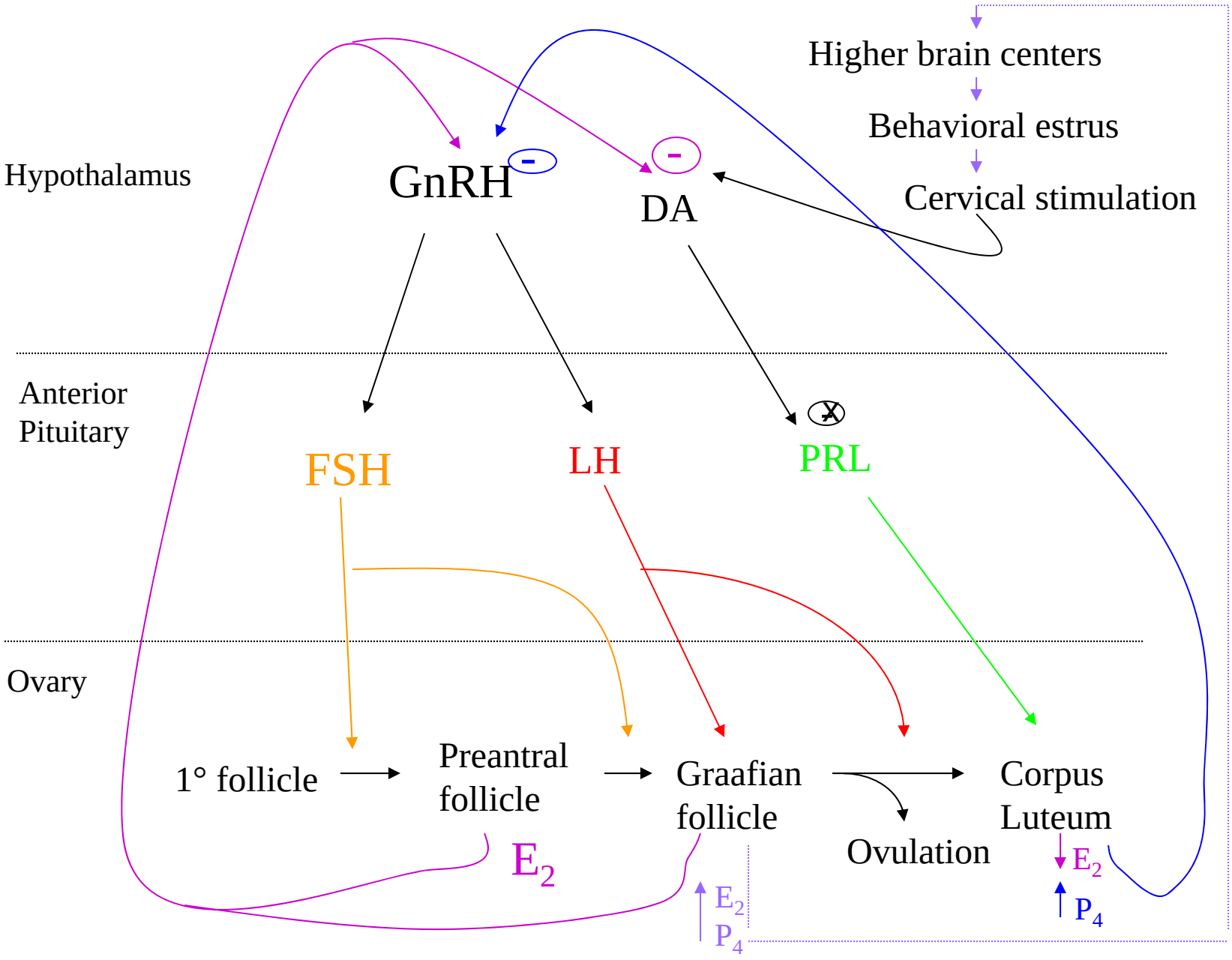
follicle
Ovulation
Corpus
Luteum
E2
E2
P4
E2
P4

PRL

- Prolactin
- From—Anterior Pituitary
- Control--Suppressed by Dopamine except
  - During ovulation by E_2
  - During pregnancy by neural reflex arc beginning with cervical stimulation

PRL

- Effects
  - Luteotrophic (except in the GP)
  - Mammotrophic
  - Lactogenic
  - Maternal behavior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E2
E2
P4
E2
P4