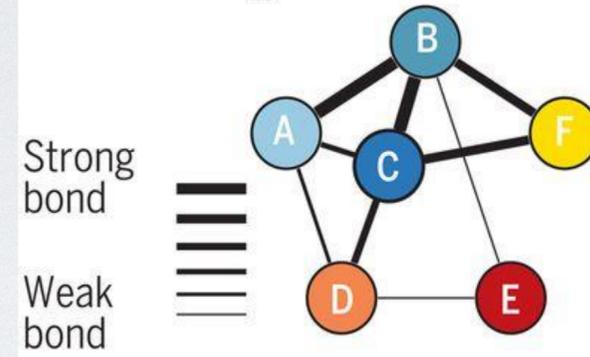


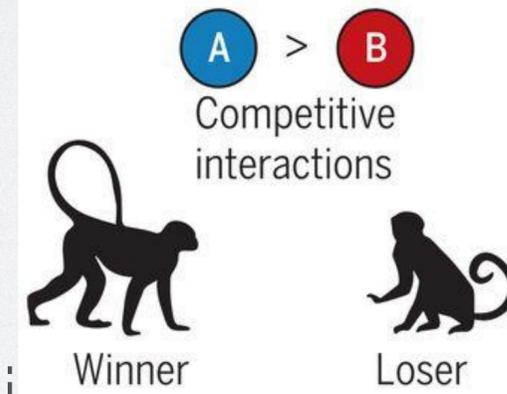
WHY DO WE NEED MALES?

- Social Integration and Health
- Social Status and Competitive Interactions
- Impact of Early-Life Adversity
- Cross-Species Comparison of Social Adversity

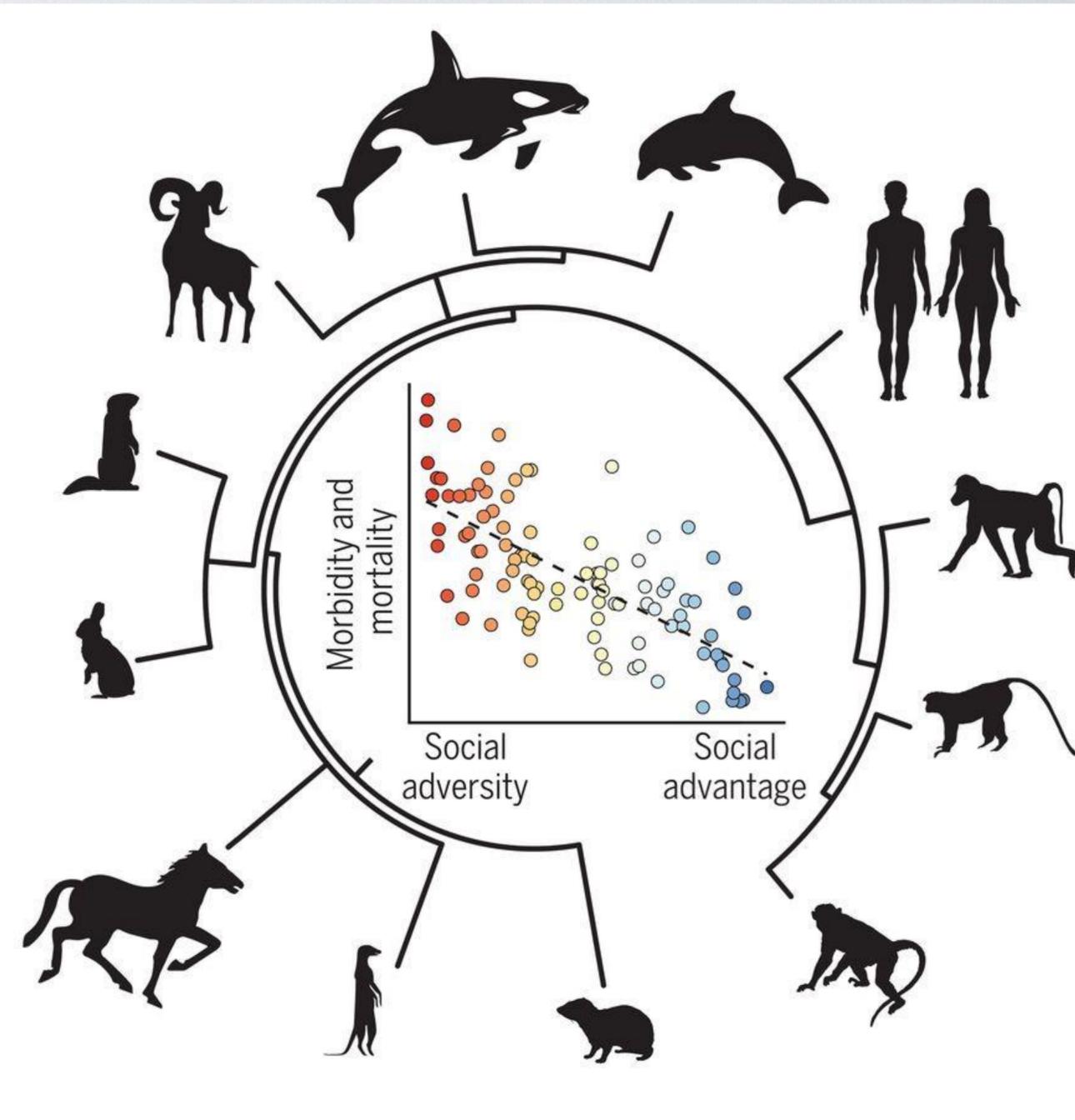
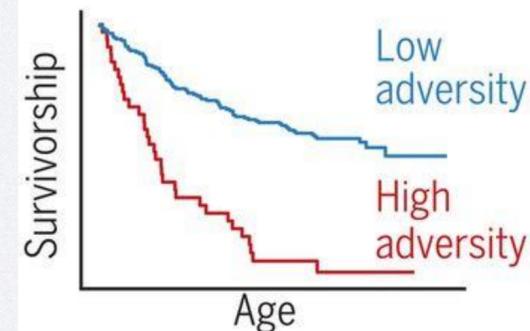
Social integration



Social status



Early life adversity



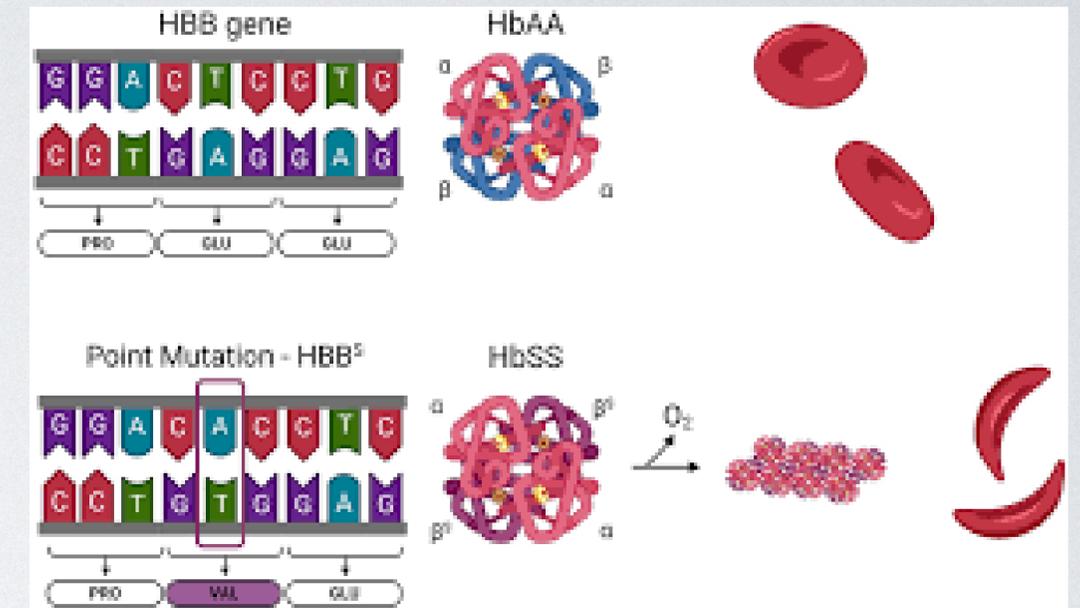
WHY DO WE NEED MALES?

- It is the most important organ for the continuity of the species.
- It ensures the sustainability of the production chain.
- A single male can fertilize many females.
- One undesired trait can influence the entire herd.
- Mutation rate is 6 times higher than female

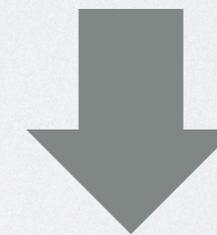


Why Are Mutations Six Times Higher in Males?

- **Spermatogenesis:** Continuous sperm production involves many cell divisions, increasing mutation chances.
- **Oogenesis:** Fewer cell divisions in females mean fewer mutation opportunities.
- **Cell Division Difference:** By age 30, males undergo ~400 divisions, females only ~24.
- **Aging Impact:** Older males pass on more mutations due to cumulative replication errors.
- **Biological Advantage:** Stronger DNA repair in females; males contribute to genetic diversity.
- **Evolutionary Benefit:** Male mutations boost adaptability and variability in populations.



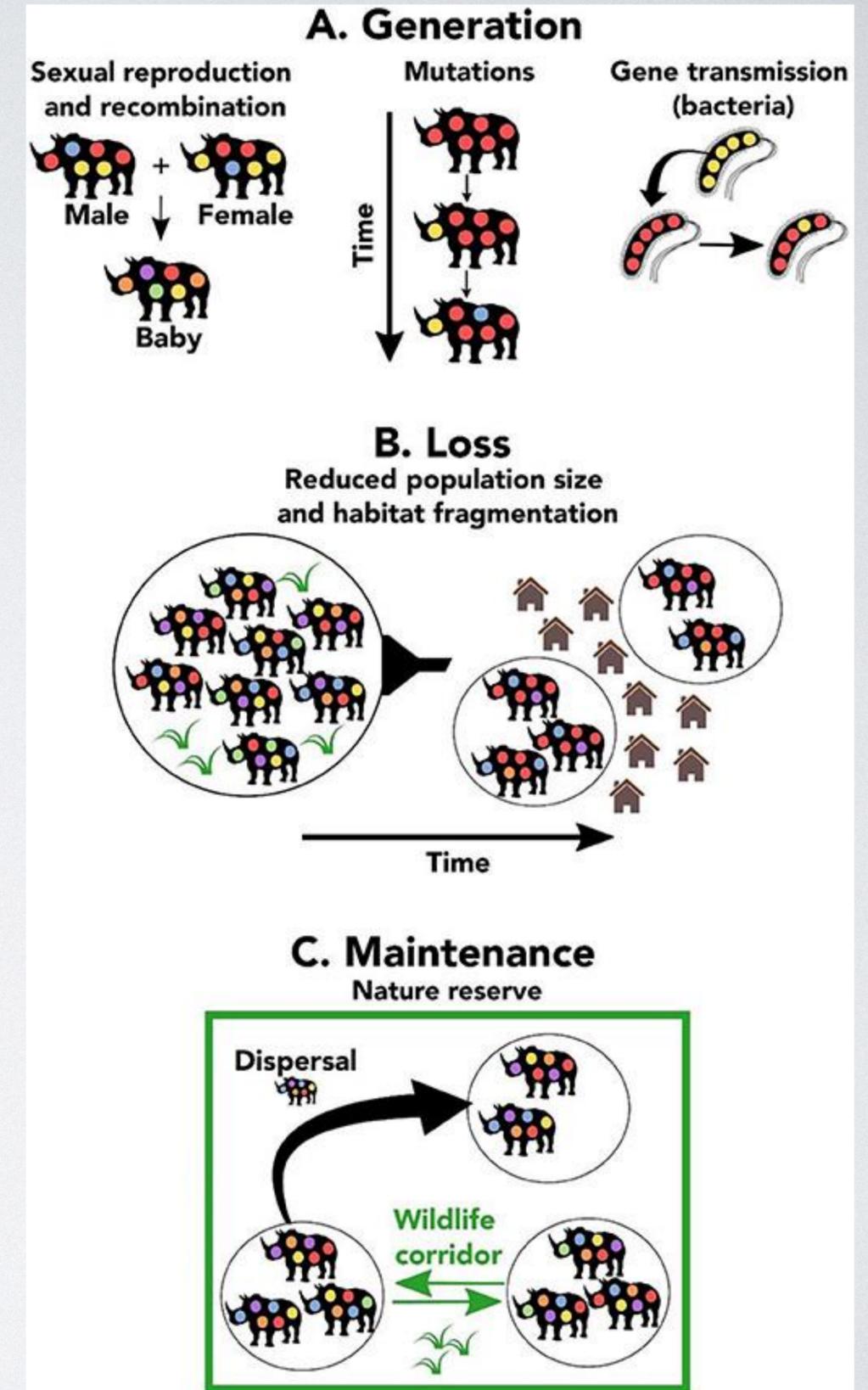
Sickle cell anemia is caused by a single nucleotide mutation in the HBB gene.



Malaria Resistance

Genetic Diversity Dynamics:

- **Generation (A):** New alleles arise through mutations and recombination during sexual reproduction. Bacteria can share alleles via gene transmission.
- **Loss (B):** Habitat fragmentation and reduced population sizes lead to genetic diversity loss due to isolation and limited gene flow.
- **Maintenance (C):** Establishing nature reserves and wildlife corridors enables gene flow between populations, preserving genetic diversity.



CLINICAL ANDROLOGY

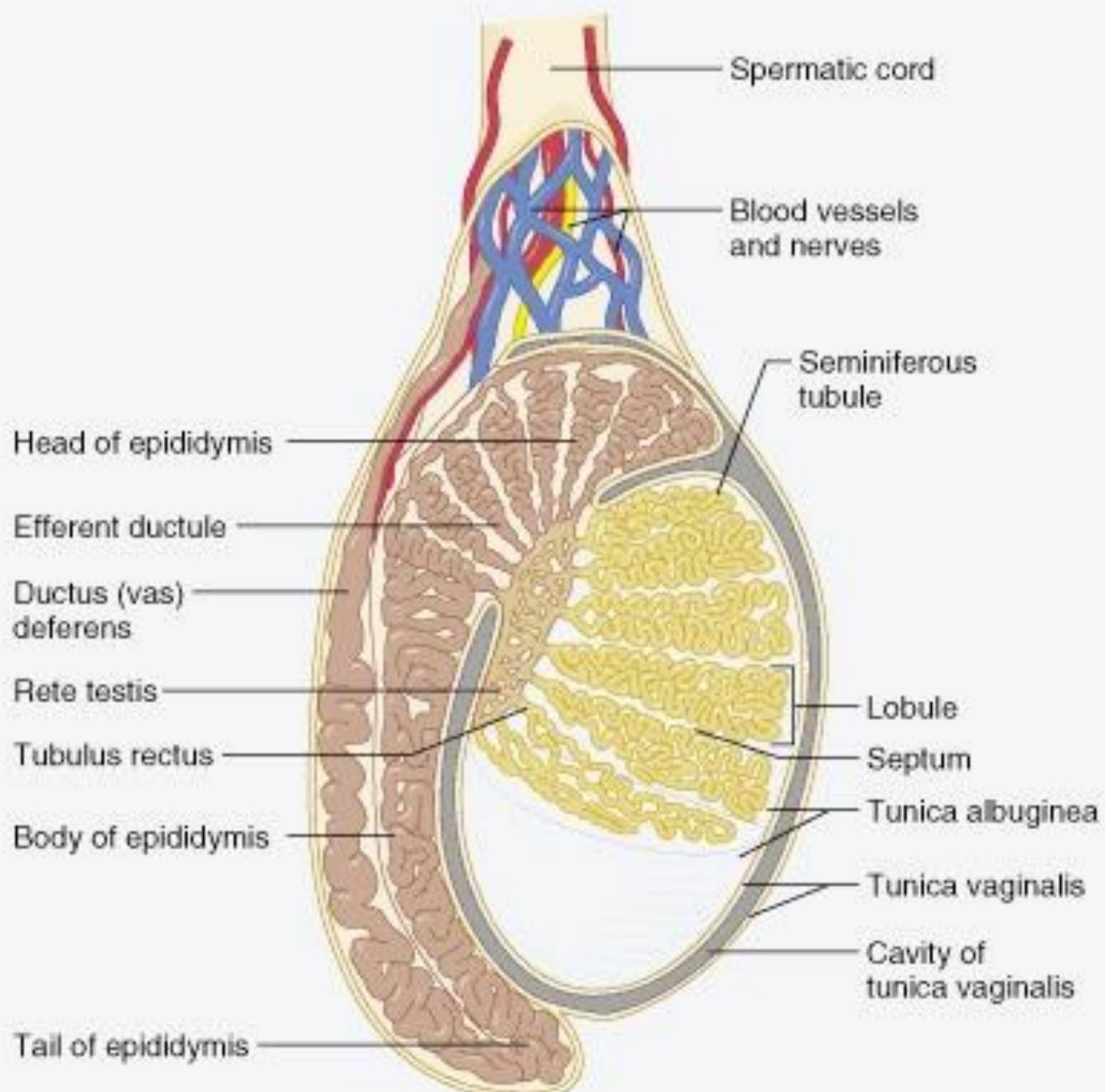
- Male animal reproductive health is often overlooked (except Stallion and Bull)
- Diagnosis time, treatment protocol and prognosis ?
- Treatment or replacement?



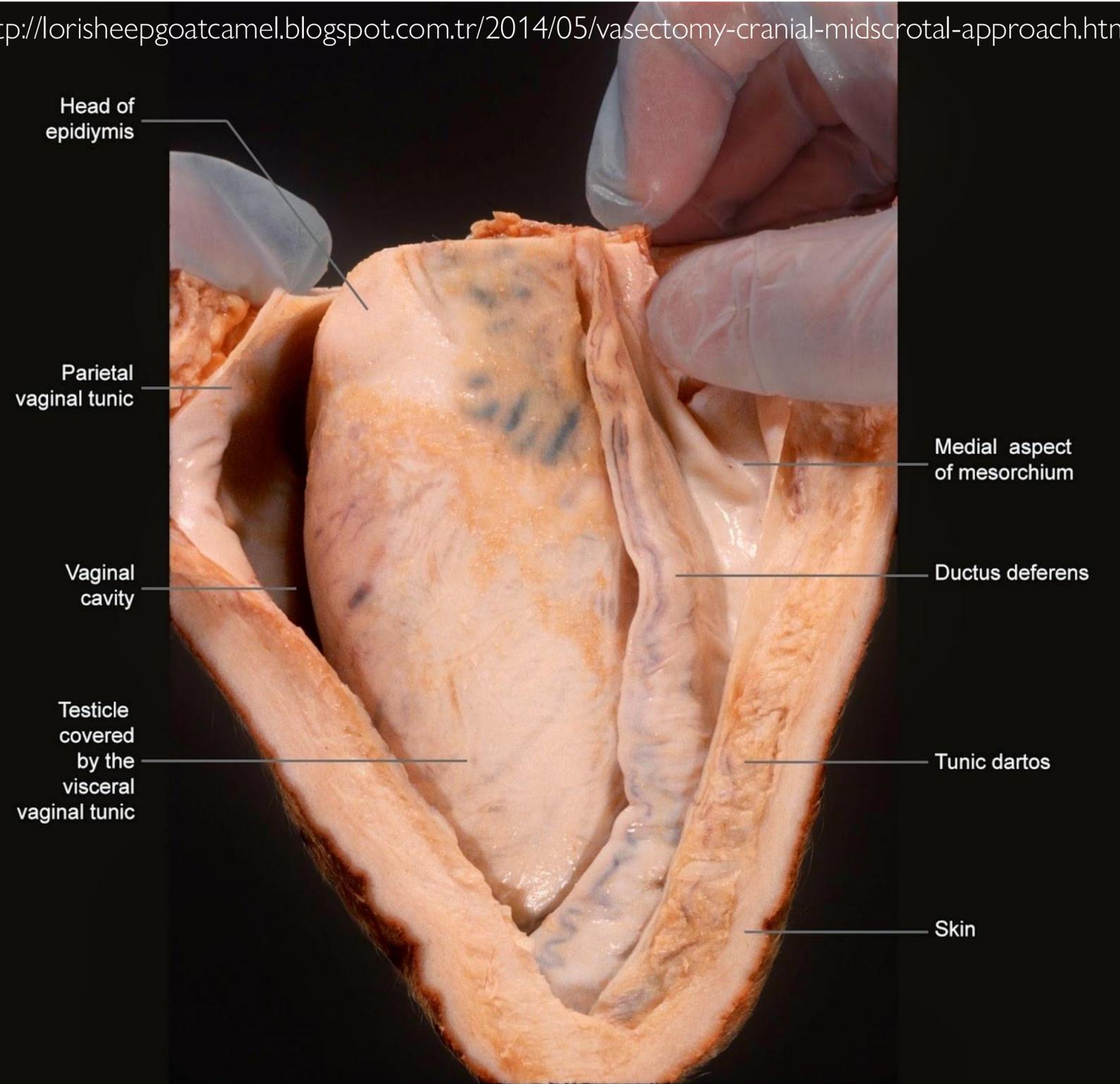
Fusachi Pegasus
70.000.000 Dolar

MALE REPRODUCTIVE ANATOMY

<http://lorisheepgoatcamel.blogspot.com.tr/2014/05/vasectomy-cranial-midscrotal-approach.html>



http://www.easynotecards.com/notecard_set/20437



Organ

Testis & Semineferous tubule

Collection ducts

Epididymis

Seminal Vesicle

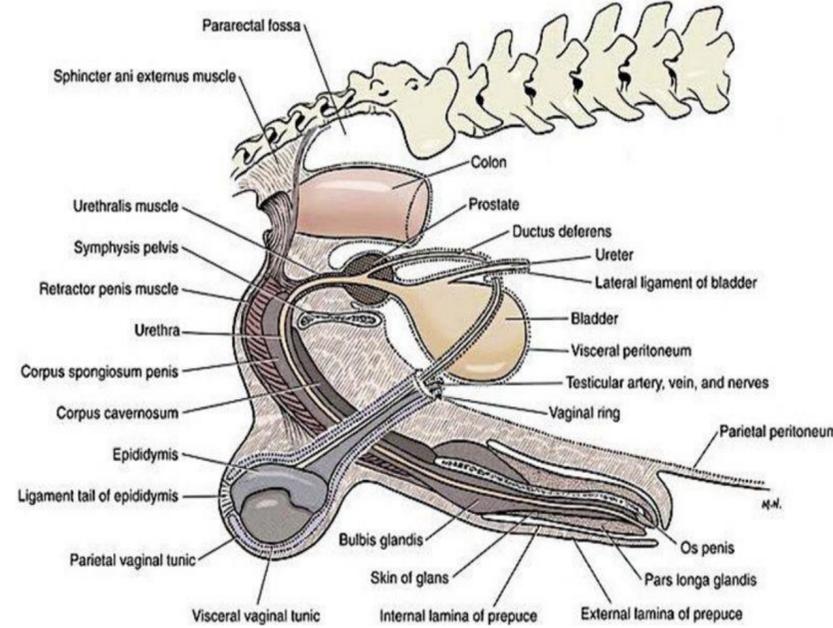
Prostate

Cowper or Bulbouretral gland

Urethra

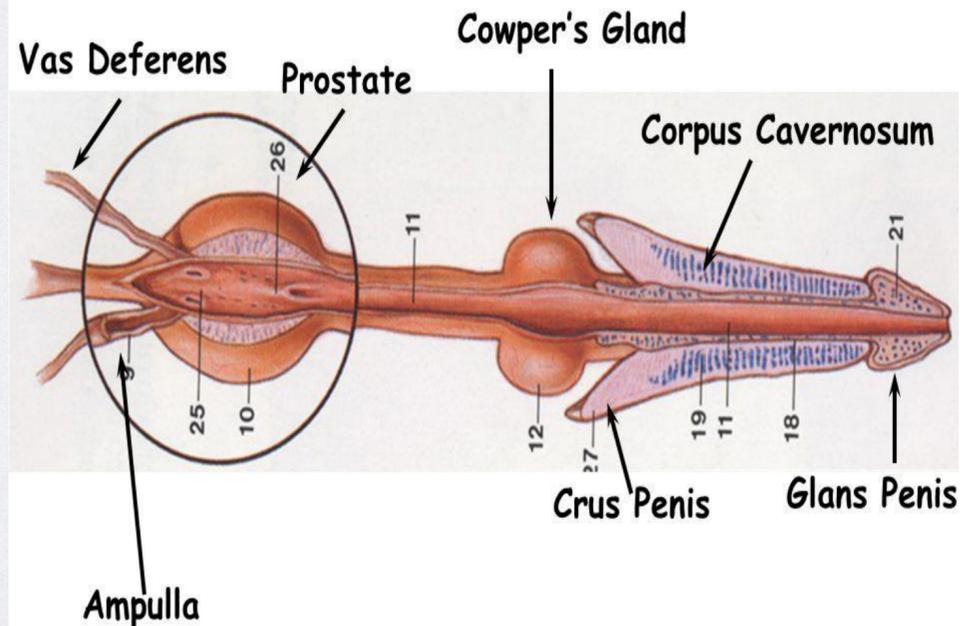
Penis

Anatomy of the Dog



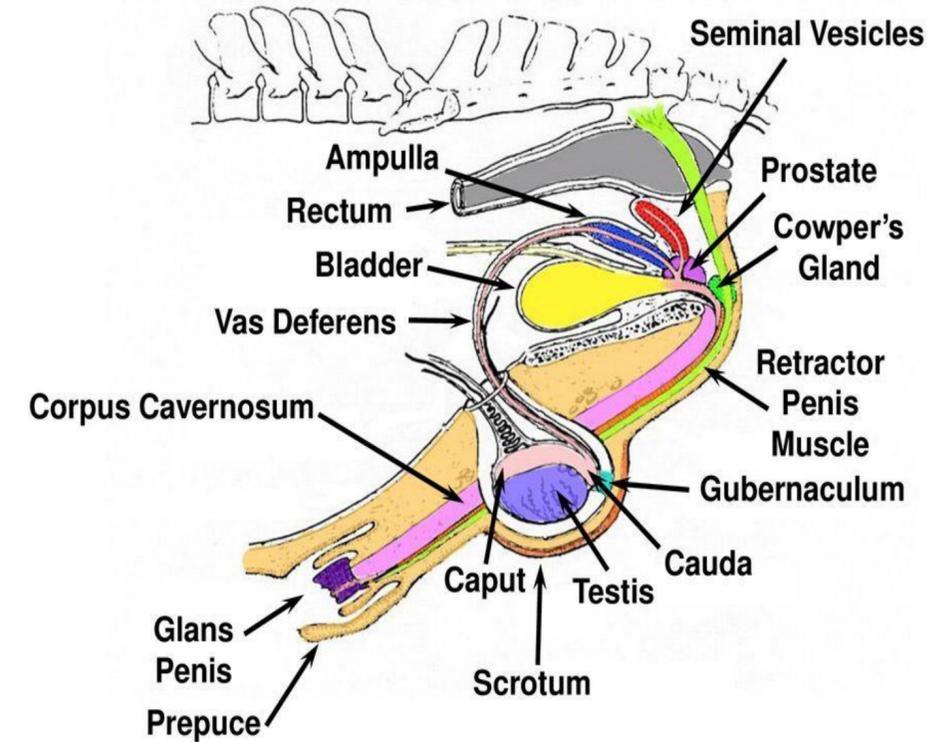
No ampulla, seminal vesicles, disseminate prostate or Cowper's gland

Cat (Tom) Reproductive Tract

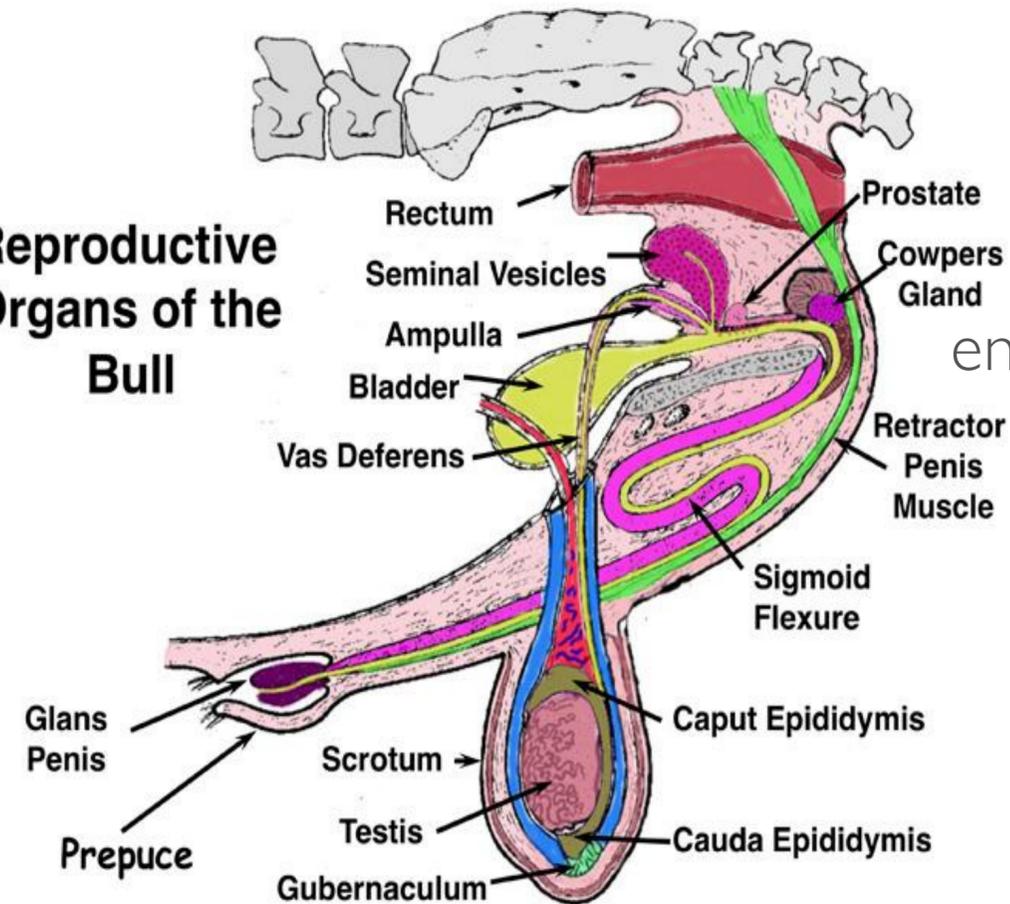


No Seminal Vesicles or Disseminate Prostate

Reproductive Organs of the Stallion



Reproductive Organs of the Bull



Function

Sperm Production

Transport & Storage

Transport, Maturation Storage, Ejaculation

Secrete thick liquid to transport sperm

Secrete thin liquid to neutralise vaginal environment and nourish sperm

Lubrication & vaginal Plug

Passage for urine and urethra

Copulation

Species	Seminal Vesicles	Prostate Gland	Bulbourethral Glands	Ampulla
Bull	++	++ (compact and disseminate)	+	+
Stallion	+++	+++ (two lobes)	+	+
Small Ruminant (Sheep/Goat)	++	+ (disseminate only)	+	+
Pig	+++	+ (small and disseminate)	+++	-
Camel	-	++ (compact)	+	+
Dog	-	++ (compact only)	-	-
Cat	-	+ (compact)	+	-
Rabbit	++	+ (compact)	+	+

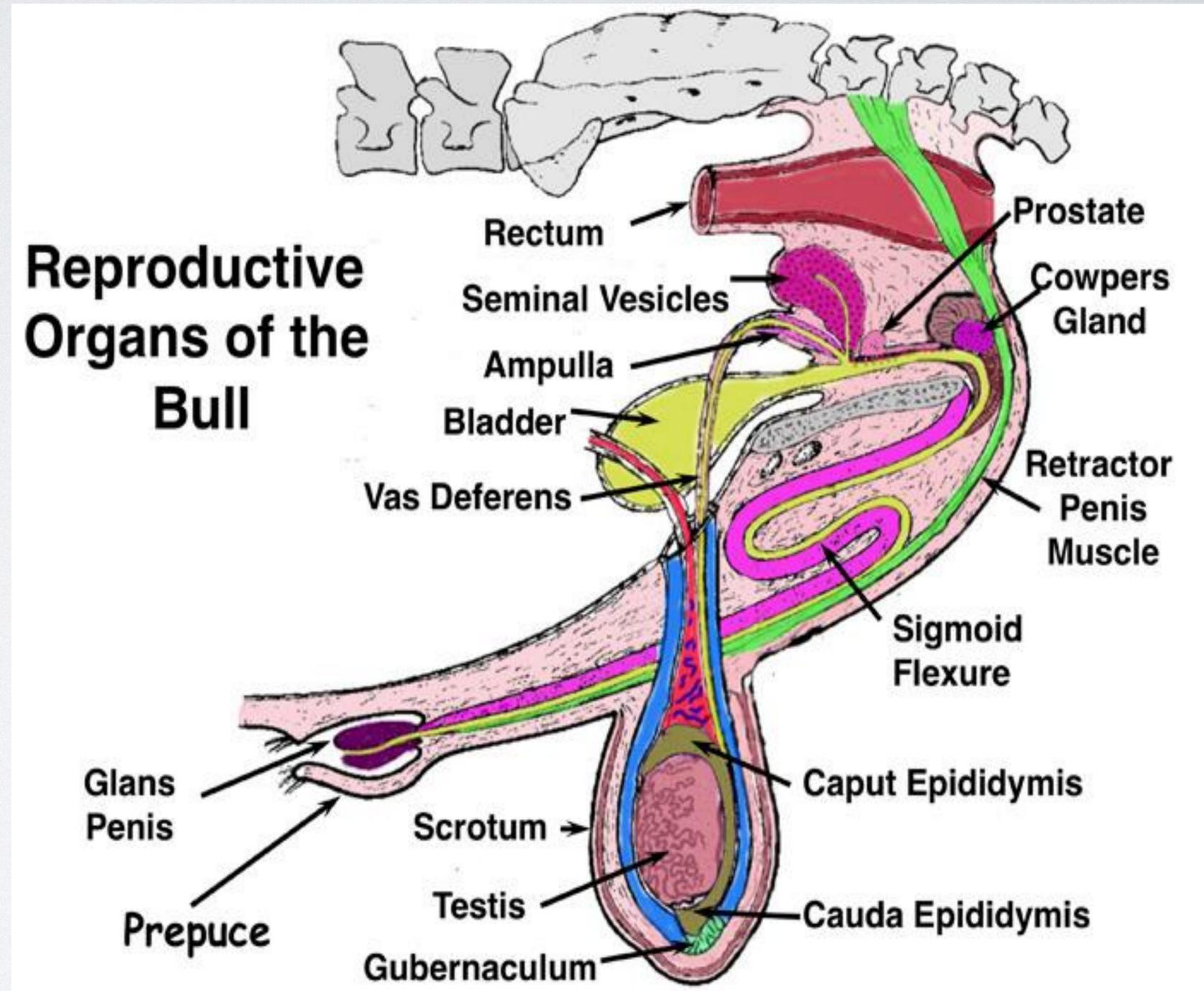
Reproductive Organs of a Bull

External:

- Penis: Fibroelastic with a sigmoid flexure.
- Prepuce: Protects the penis.

Internal:

- Testes: Produce sperm and testosterone.
- Epididymis: Sperm maturation and storage.
- Vas Deferens: Transports sperm.
- Accessory Glands: Seminal vesicles, prostate gland (compact and disseminate), bulbourethral glands, and ampulla.



Reproductive Organs of a Stallion

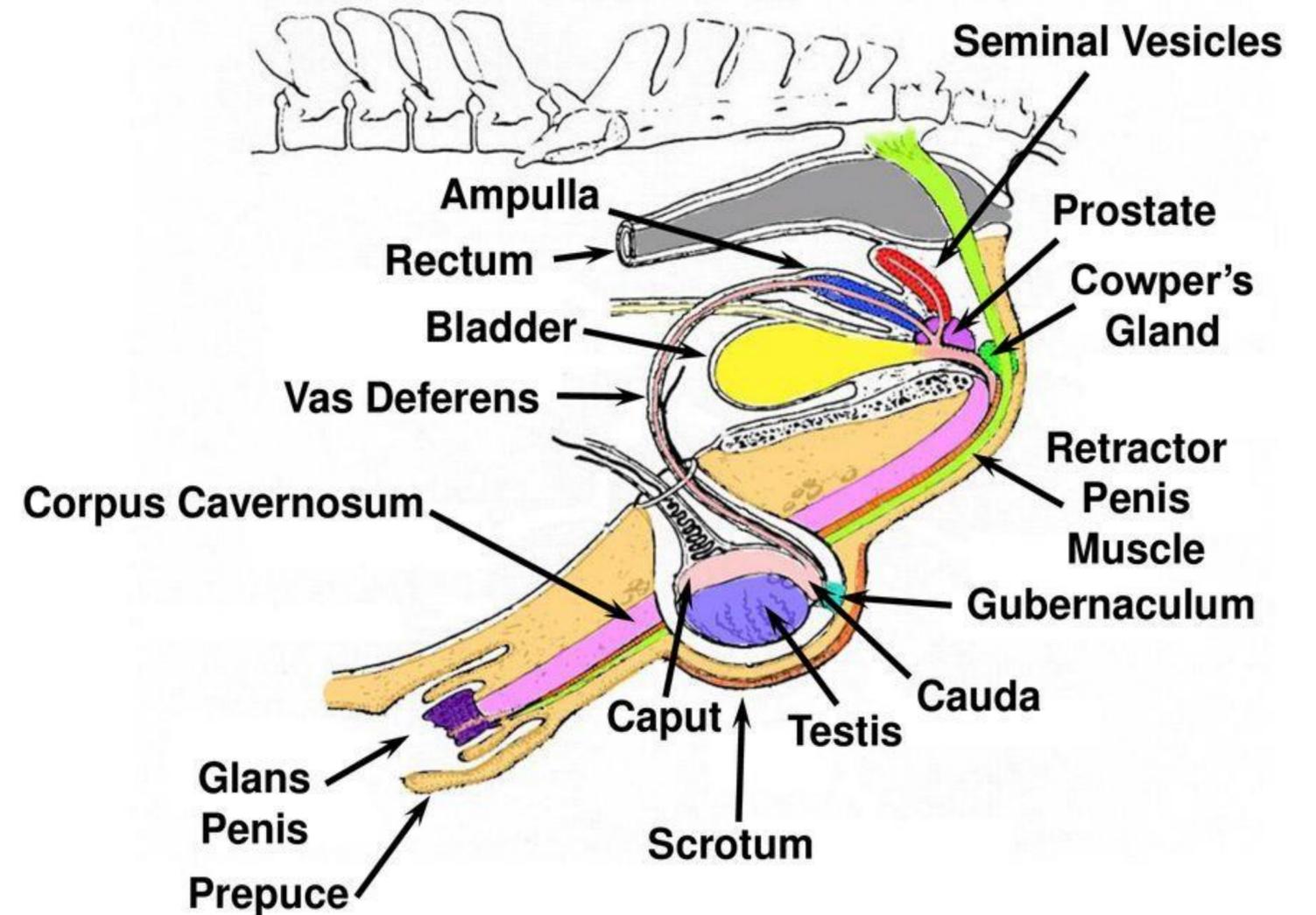
External:

- **Penis:** Musculocavernous type, allowing significant length and diameter increase during erection.
- **Prepuce:** Protects the penis.

Internal:

- **Testes:** Produce sperm and testosterone.
- **Epididymis:** Sperm maturation and storage.
- **Vas Deferens:** Transports sperm.
- **Accessory Glands:** Seminal vesicles, prostate gland (two lobes, no disseminate part), bulbourethral glands, and ampulla.

Reproductive Organs of the Stallion



Seminal Vesicles in Male Animals

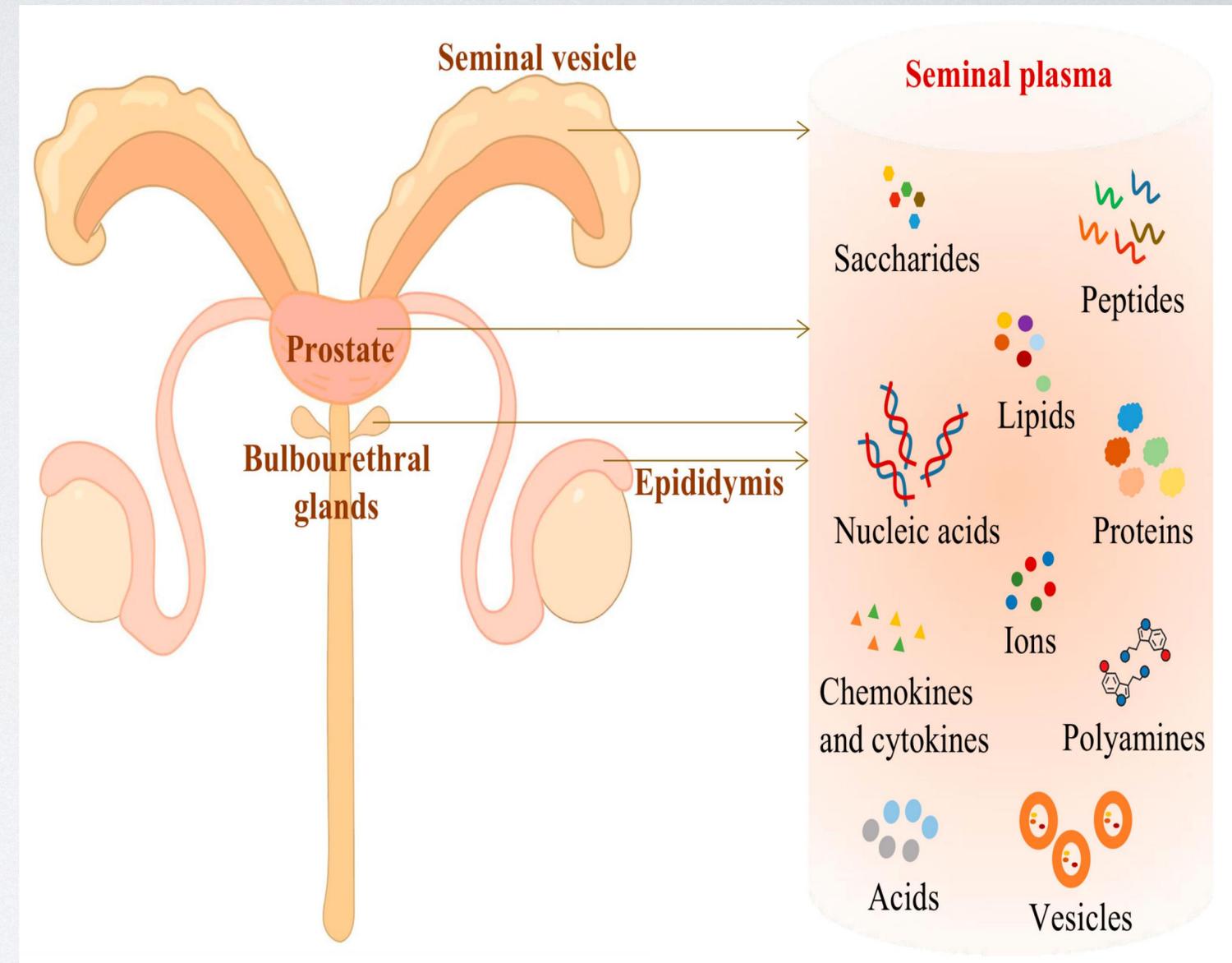
Seminal vesicles are paired accessory sex glands located near the junction of the vas deferens and the urethra in many male mammals. They vary in size, shape, and development across species.

Primary Function:

1.Seminal Fluid Production: Seminal vesicles produce a significant portion (up to 60-70%) of the ejaculate volume in species that have them.

2.Nutrient Supply: The fluid is rich in:

- 1.Fructose:** Provides an energy source for sperm.
- 2.Prostaglandins:** Help with sperm motility and facilitate sperm movement within the female reproductive tract.
- 3.Proteins and Enzymes:** Stabilize sperm and support fertilization.

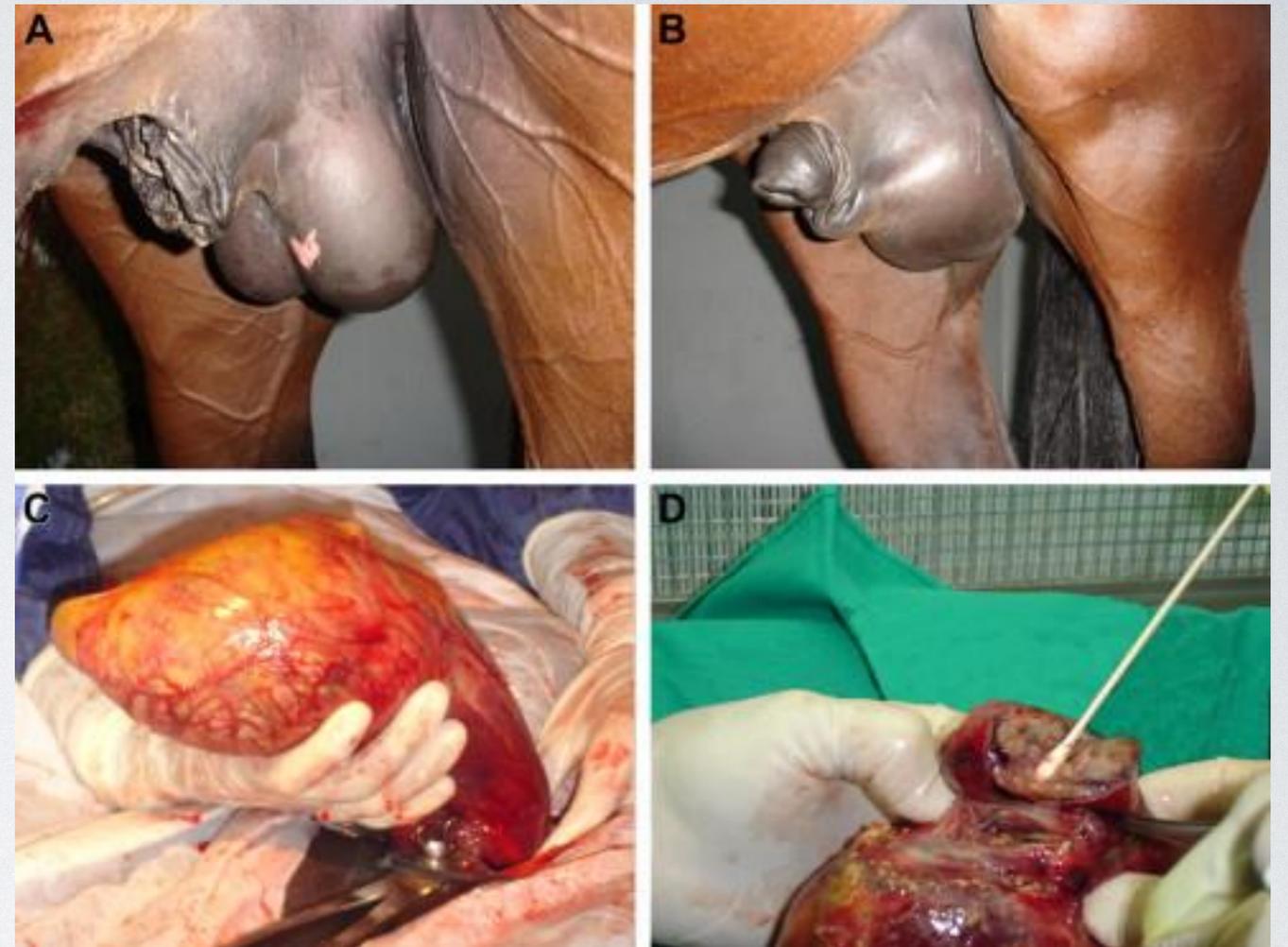


Key Roles:

- **Nourishing Sperm:** The fructose and nutrients maintain sperm viability and energy.
- **Protective Medium:** The slightly alkaline fluid helps neutralize the acidic environment of the female reproductive tract.
- **Semen Coagulation:** In some species, proteins from the seminal vesicles contribute to semen coagulation, which can help sperm remain in the female reproductive tract longer.
- **Aiding Fertilization:** Prostaglandins in the fluid may enhance sperm motility and influence the female reproductive tract to support fertilization.

Important Facts:

- **Species Variation:**
 - Present in most domestic species, including **bulls, stallions, small ruminants, pigs, and rabbits.**
 - **Absent** in **dogs, cats, and camels.**
- **High Fructose Content:** A diagnostic marker in fertility assessments (e.g., bull semen evaluation).
- **Secretion Volume:** Largest contribution to semen volume in species like **pigs.**



Clinical Relevance:

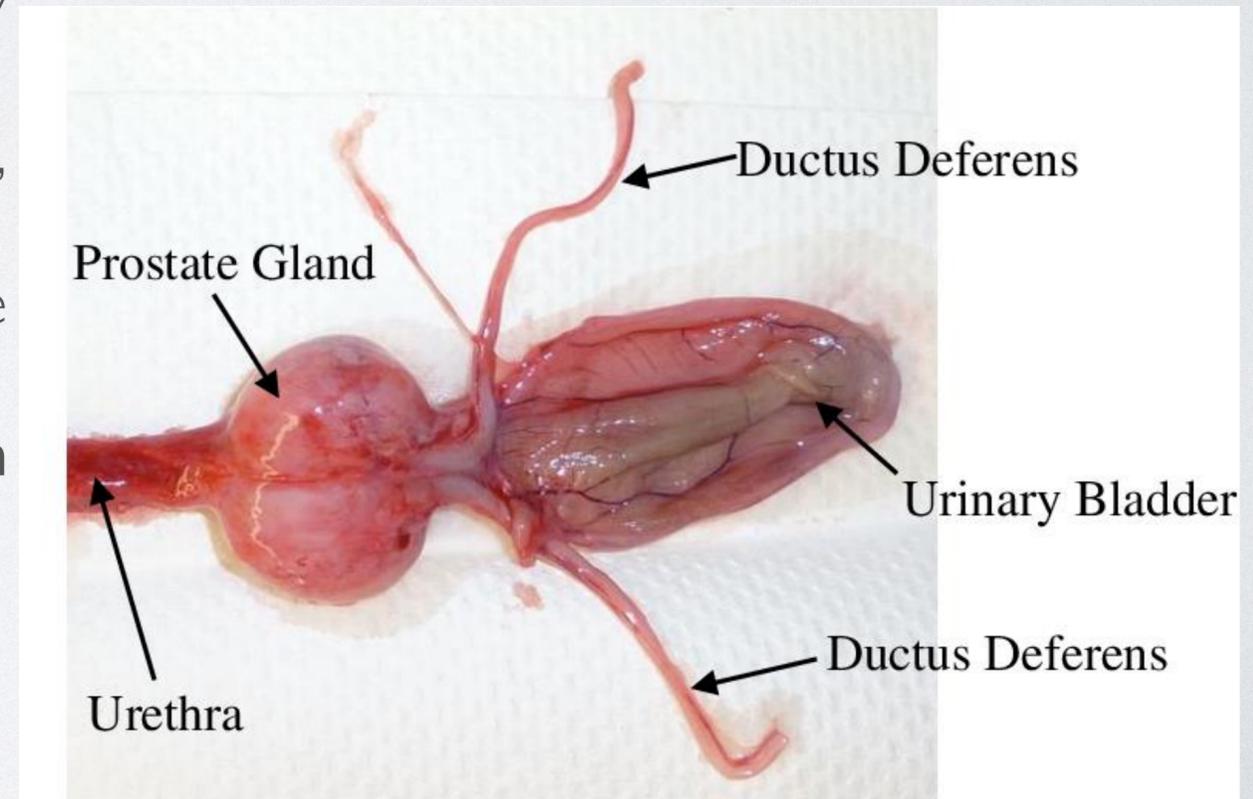
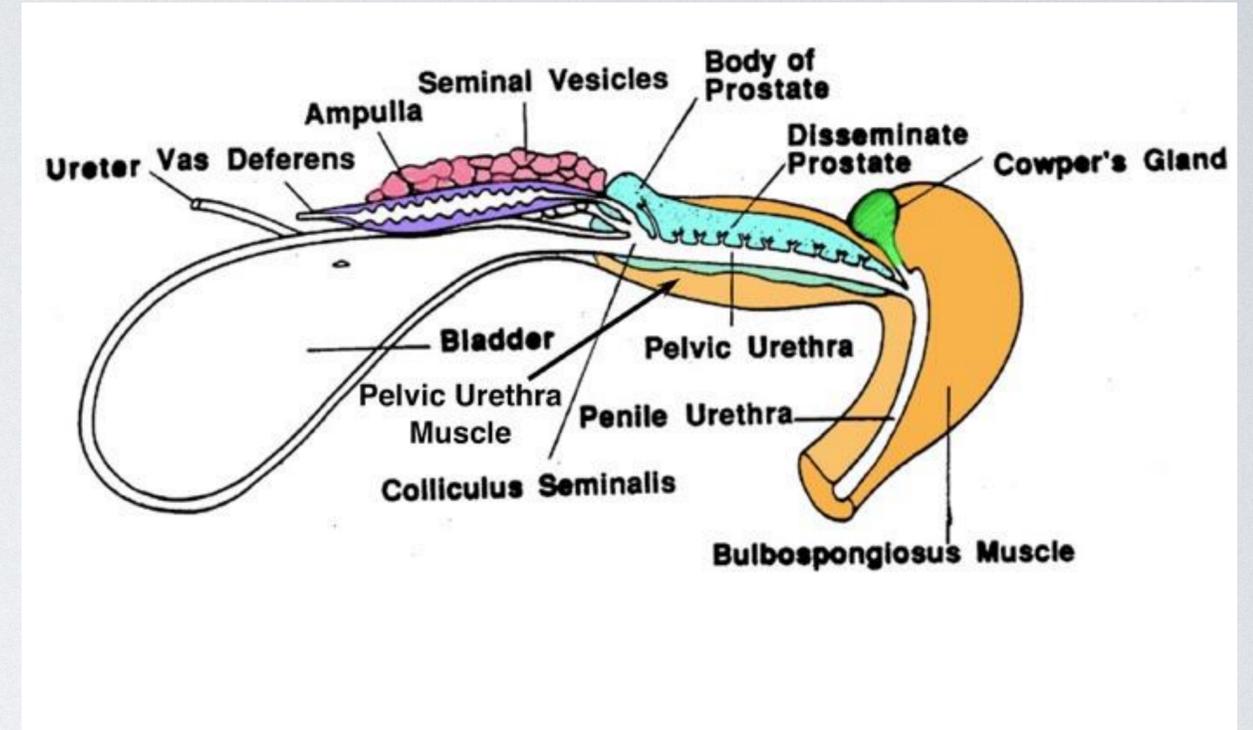
- **Infertility Indicator:** Abnormal seminal vesicle function can lead to reduced semen volume and lower sperm viability.
- **Infection Risk:** Seminal vesiculitis, particularly in stallion & bulls, can impact fertility.

The prostate gland is an accessory sex gland found in male mammals. It is located at the junction of the urethra and the vas deferens and varies in structure and significance across species. The prostate gland can exist in two forms:

- **Compact (Body):** A distinct glandular structure.
- **Disseminate:** Glandular tissue spread within the wall of the pelvic urethra.

Primary Function:

1. **Seminal Fluid Contribution:** The prostate gland secretes a milky, slightly alkaline fluid that forms part of the semen.
2. **Enzyme Production:** Produces enzymes like **prostate-specific antigen (PSA)**, which liquefy semen post-ejaculation.
3. **pH Regulation:** The alkaline secretion helps **neutralize the acidity** of the female reproductive tract, enhancing sperm survival.
4. **Sperm Activation:** Provides nutrients and enzymes that enhance **sperm motility** and longevity.



anatomy of the canine prostate.

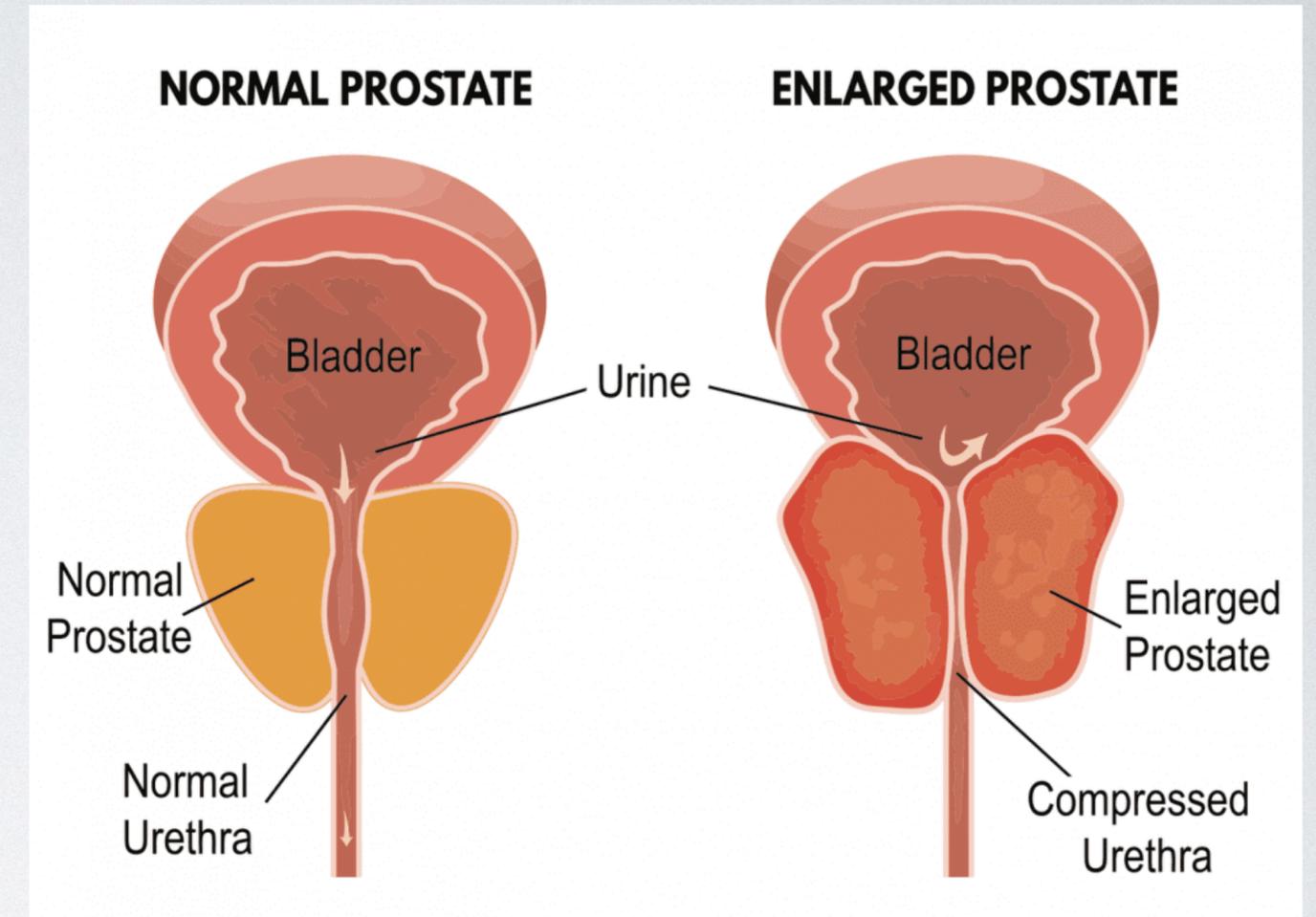
Prostate Gland in Male Animals

Key Roles:

- **Sperm Viability:** The prostatic fluid supports sperm health and motility.
- **Ejaculate Liquefaction:** Enzymes reduce semen viscosity, aiding sperm release.
- **Antimicrobial Activity:** The secretion may help reduce the risk of infections in the reproductive tract.

Important Facts:

- **Species Variation:**
 - Present in all domestic animals, but the development and form differ:
 - **Bulls:** Both compact and disseminate parts.
 - **Stallions, dogs, cat, camel, rabbit:** Compact only.
 - **Small Ruminants:** Disseminate only.
 - **Pigs:** Small, mostly disseminate.



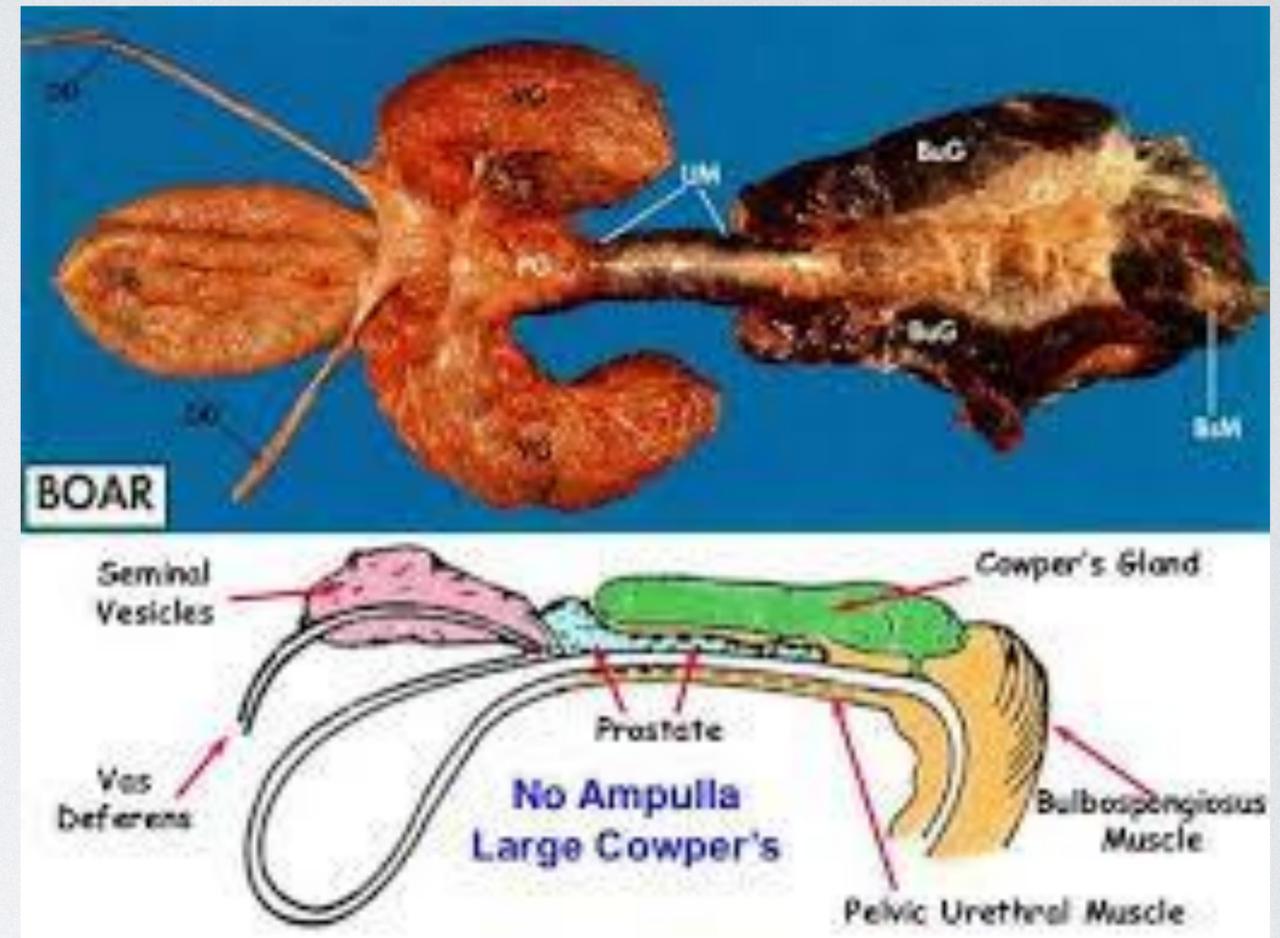
- **Clinical Significance in Dogs:** The prostate is the **only accessory sex gland** in dogs, making it vital for fertility. It is also prone to conditions like **benign prostatic hyperplasia (BPH)**, infections, and neoplasia.

Bulbourethral Glands in Male Animals

The **bulbourethral glands**, also known as **Cowper's glands**, are small, paired exocrine glands located on either side of the urethra, near the base of the penis in male mammals. These glands are part of the accessory sex glands and vary in size and importance across species.

Primary Function:

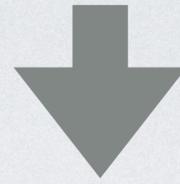
- 1.Pre-Ejaculate Secretion:** The bulbourethral glands produce a clear, viscous fluid commonly referred to as **pre-ejaculate**.
- 2.Lubrication:** This fluid **lubricates the urethra**, reducing friction during the passage of sperm.
- 3.pH Regulation:** The secretion is **alkaline**, helping to **neutralize the acidity** of the male urethra, creating a safer environment for sperm.
- 4.Semen Coagulation:** In some species, the fluid contributes to the **gel-like consistency** of semen.



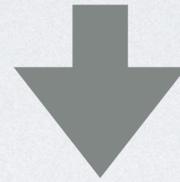
Key Roles:

- Sperm Protection:** The alkaline nature of the fluid protects sperm from residual urine acidity.
- Facilitating Sperm Transport:** The mucus-rich fluid helps sperm travel smoothly through the urethra.
- Contribution to Seminal Volume:** Particularly significant in **pigs**, where it contributes heavily to the **volume and consistency** of ejaculate.

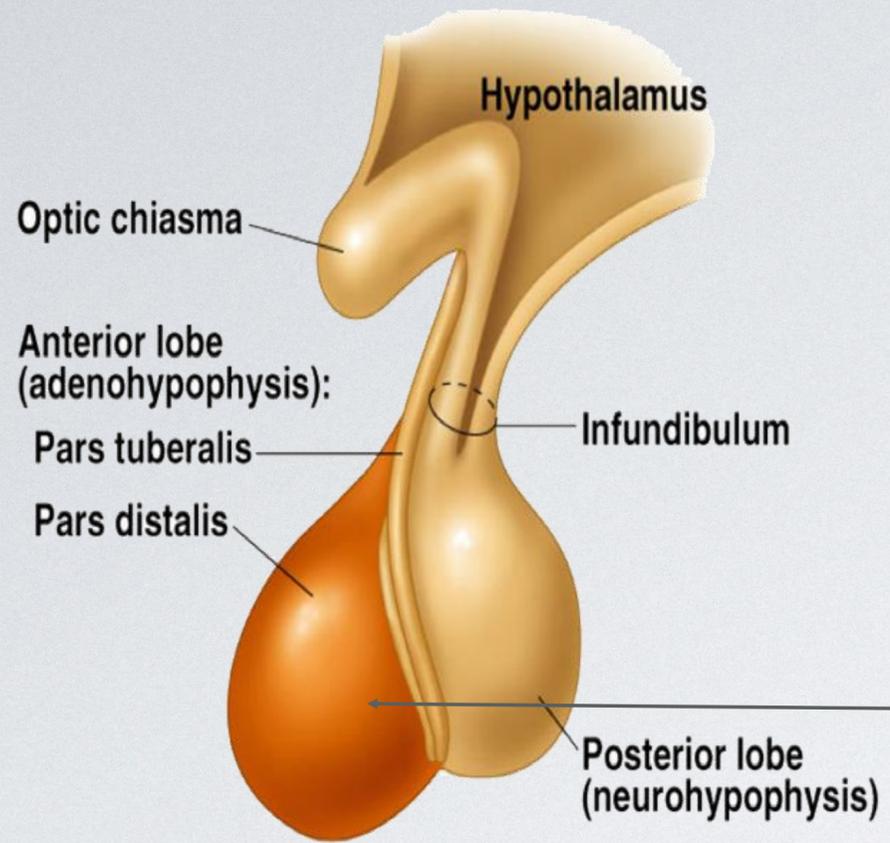
Hypothalamus



GnRH (Gonadotropin releasing hormone)



Anterior Pituitary



Luteinising Hormone

LH

FSH

Follicle Stimulating Hormone

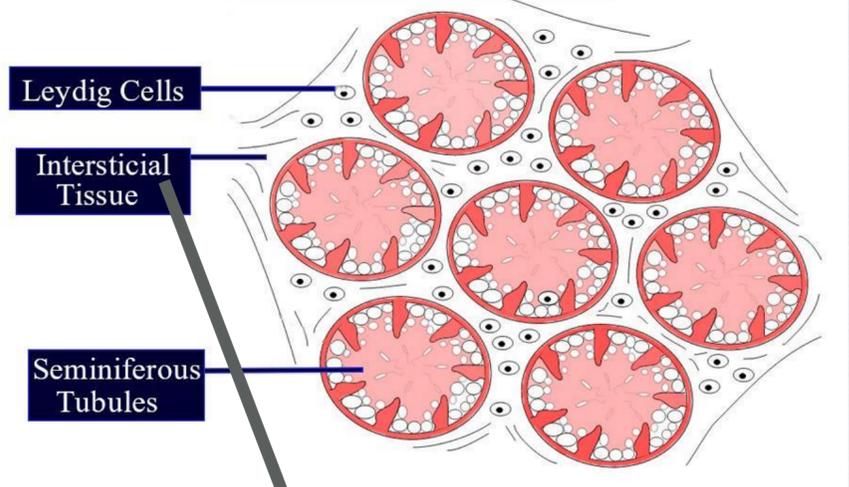
TESTIS



LH

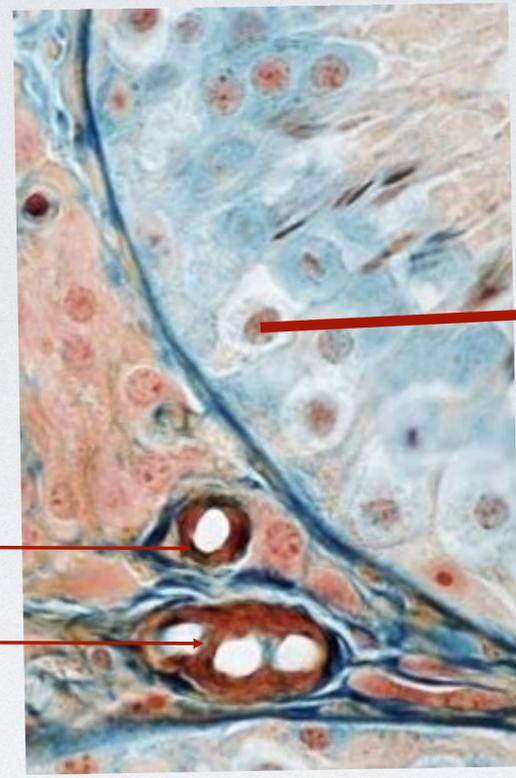


Leydig Cells



Leydig Cells
Interstitial Tissue
Seminiferous Tubules

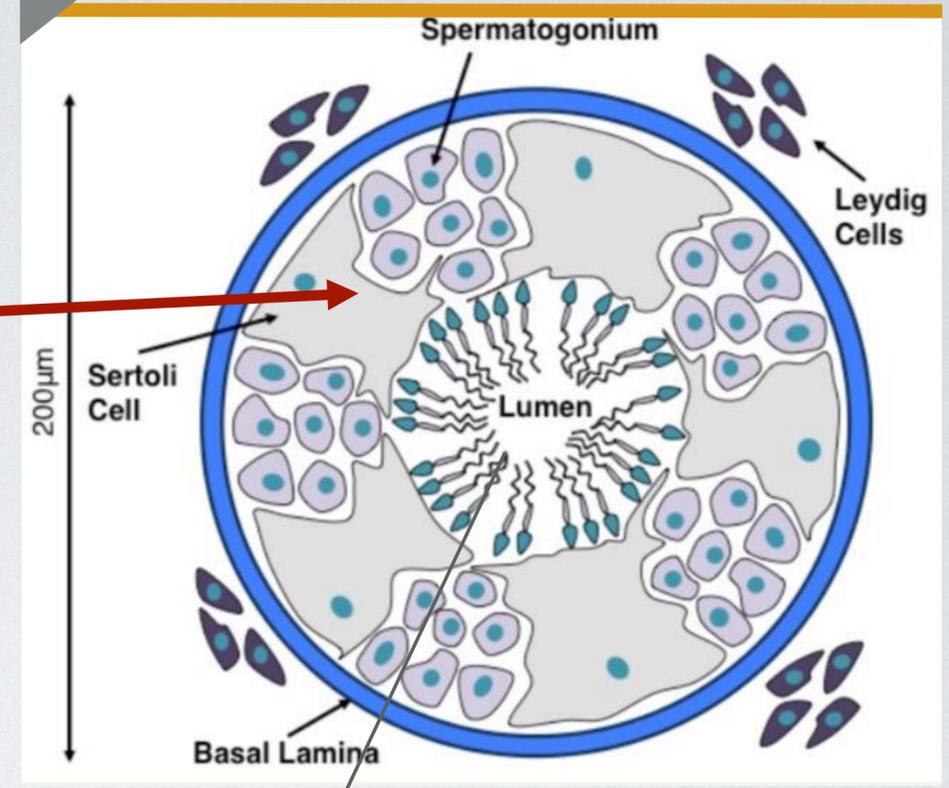
Leydig cells



FSH



Seminiferous Tubule



1. Testosterone



Spermatogenesis
Maintain Secondary sex characteristics

Enhance spermatogenic cells bind to TEST

Regulation of Spermatogenesis

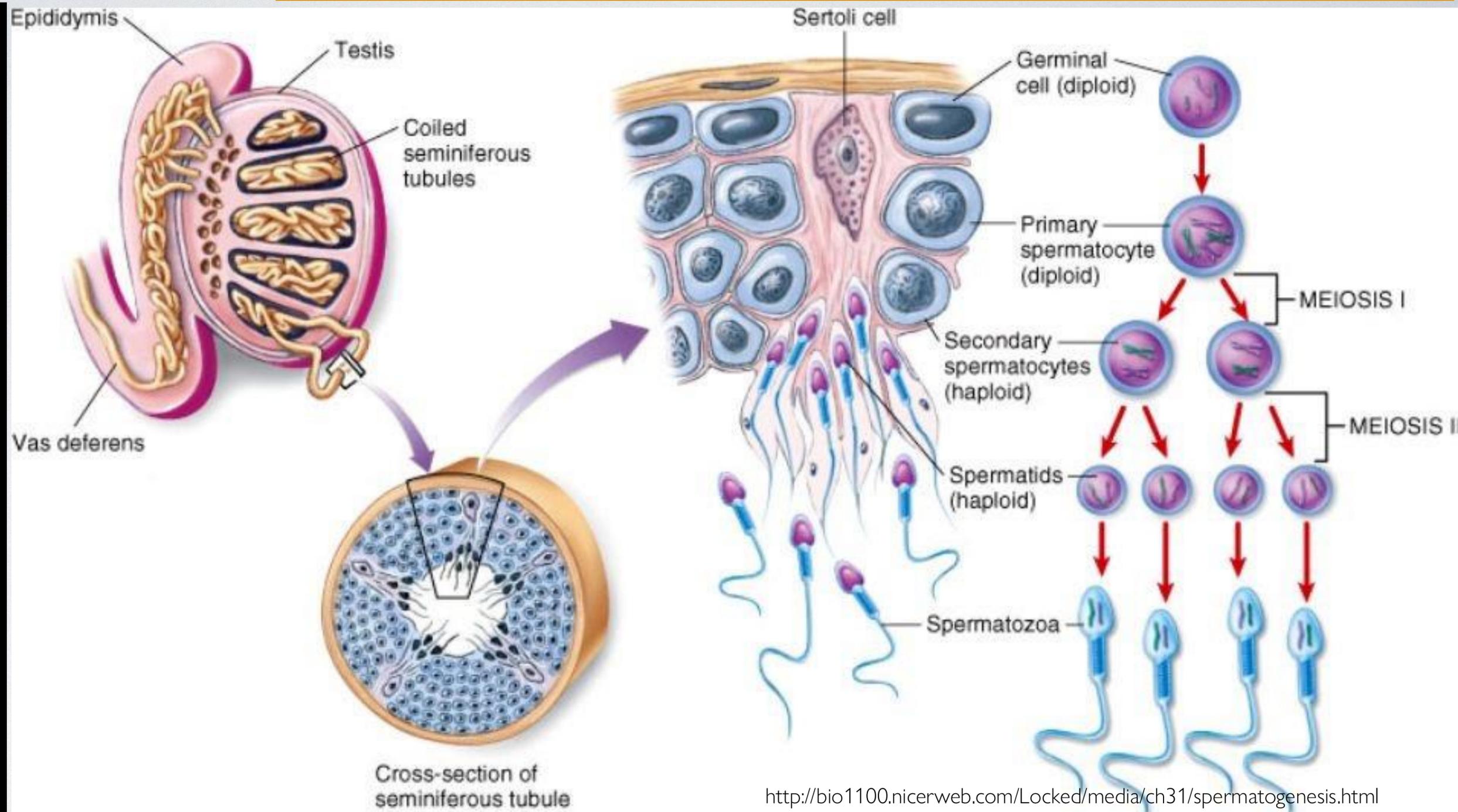
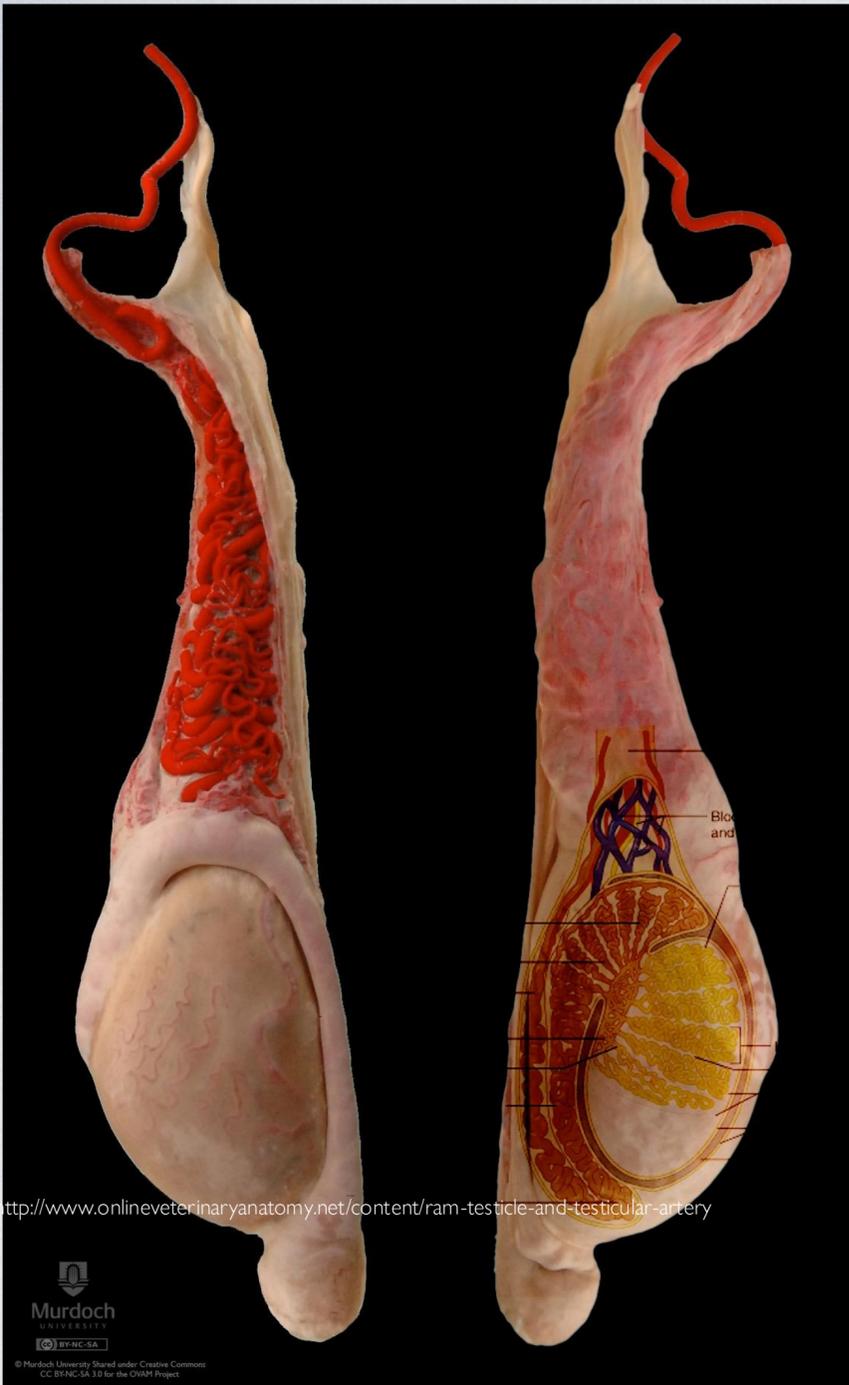
2. Androgene binding protein (ABP)

3. Inhibin (dont produce)/Activin (produce)
Anti müllerian hormon (Amh)

Testosterone Aromatase

Estrogen & 5a-dihydrotestosterone (DHT).

SPERM PRODUCTION (SPERMATOGENESIS)



Spermatogenesis. A germinal cell in the **seminiferous tubules** of the **testis** matures into a diploid **primary spermatocyte**, which undergoes **meiosis I** to form 2 haploid **secondary spermatocytes**; **meiosis II** then produces 4 haploid **spermatids**. Spermatids develop into **spermatozoa** (**sperm**).

Hormon	Source	Effect	Target Organ	Function
FSH	Anterior Pituitary (Hypophysis)	HPG axis / Spermatogenesis	Sertoli cells	Spermatogonia to mature spermatids
LH	Anterior Pituitary (Hypophysis)	HPG axis / Testosterone Production	Leyding cells	Testosterone production, maintaining spermatogenesis, to turn the cholesterol to testosterone
Testosterone	Testis (Leyding/interstitial cells)	Spermatogenesis, secondary sex traits,	Testis, Accesory gland, hair follicules, muscle and bone tissue	Development of ext/internal reproductive organs, testicular descend, Spermatogenesis, libido, protein synthesis, Eritropoesis (Hemotokrit level)
Prolactin	Posterior Pituitary (Hypophysis)	Indirectly controls male reproduction	Hypothalamus, Testis, accessory glands,	LH receptors in leyding cells, Steriodogenesis, spermatogenezis, Motility
Inhibin, Activin, ABP, AMH	Testis (Sertoli cell)	Spermatogenesis, Sexual differentiation	Testis, pituitary	Sperm production switch on/off button