Animal Science 434

Sexual Behavior
a. General Behavior



Reproductive Behavior

- Very strong drive and can take precedence over other activities
- Purpose
  - » Promote copulation
  - » Assure sperm and oocyte meet
  - » Primates – Social bonding (family groups)
- Goal is to achieve pregnancy and parturition
  - » or social bonding

Stages of Reproductive Behavior

- precopulatory
- copulatory
- post copulatory

Precopulatory Stage

- Search for sexual partner
  - » in female, generally limited to estrus
    - increased physical activity
    - In primates can occur at any time
  - » in male can occur at any time
  - » involves all of the senses
    - sight
    - smell
    - hearing
    - tactile

Search For Partner



Search For Partner



Search for Partner



Search for Partner



Search for Partner



Precopulatory Stage (cont.)

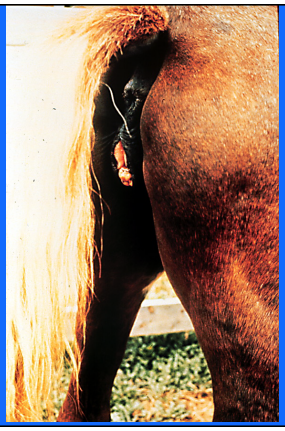
- Courtship
  - » species specific events
  - » sniffing of the vulva by male
  - » urination by the female
  - » flemen lip curl
  - » chin resting on female rump
  - » increased phonation
  - » male checks for female lordosis
  - » human
    - eye contact, touching, detection of pheremones



Lordosis



Winking of the Vulva





Biting To Check For Lordosis



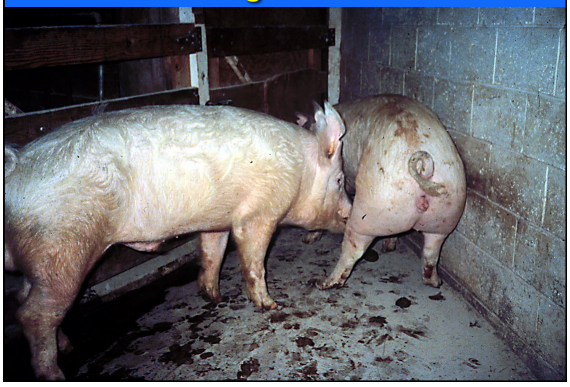
Unresponsive Mare



Sniffing the Vulva



Checking for Lordosis



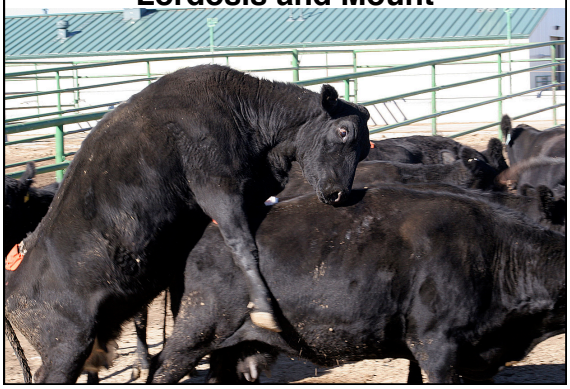
Sniffing Vulva



Chin Rest



Lordosis and Mount



Phonation of Elk



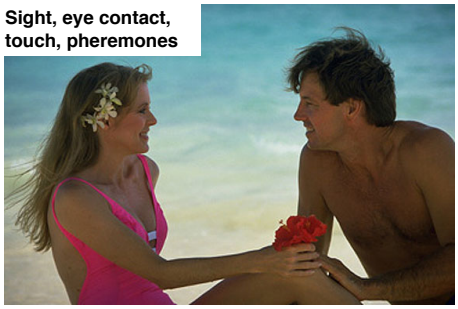
Listen to Elk Phonation

Go to

http://www.ansci.wisc.edu/jjp1/ansci_repro/lec/lec_15a_b_behavior/elk_phonation.html

Human Courtship

Sight, eye contact, touch, pheremones



Human Behavior

To view video clip go to

http://www.ansci.wisc.edu/jjp1/ansci_repro/lec/lec_15a_b_behavior/human_behavior.html

Precopulatory Stage (cont.)

- Search for sexual partner
- Courtship
- Sexual arousal
  - » Female
    - Lordosis
    - Presents hindquarters to male
    - Vaginal Secretions
  - » Male
    - Erection
    - Penile protrusion

Copulatory Behavior

- Mounting
- Intromission
- Ejaculation

Copulatory Behavior (cont.)

- Varies among species
  - » short copulators (1 - 3 seconds)
    - bull
    - ram
  - » sustained copulator (5 - 20 minutes)
    - boar
  - » intermediate (20 to 60 seconds)
    - stallion

Short Copulator



Short Copulator



Short Copulator



Copulatory Behavior (cont.)

- Varies among species
  - » short copulators (1 - 3 seconds)
    - bull
    - ram
  - » sustained copulator (5 - 20 minutes)
    - boar
  - » intermediate (20 to 60 seconds)
    - stallion

Sustained Copulator



Sustained Copulator



Copulatory Behavior (cont.)

- Varies among species
  - » short copulators (1 - 3 seconds)
    - bull
    - ram
  - » sustained copulator (5 - 20 minutes)
    - boar
  - » intermediate (20 to 60 seconds)
    - stallion

Intermediate Copulator



Postcopulatory Behavior

- Male
  - » Dismounting
  - » Refractory period - all males have this
    - time when copulation will not occur
    - Dependent on:
      - – Species dependent
      - – sexual rest prior to copulation
      - – age of male
      - – degree of female novelty
      - – number of previous ejaculates
    - for semen collection try to minimize
  - » Memory
    - a bad experience will carry over
- Female - will often mate again immediately

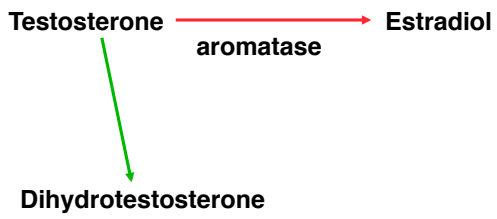
Endocrine Effects on Sexual Behavior

- Prenatal steroid exposure
  - » Feminization – No steroid exposure
  - » Masculinization (defeminization) – estradiol or testosterone
- Postnatal Behavior
  - » castrated female
    - no steroids - no estrus behavior
    - plus estradiol - estrus behavior
    - plus progesterone and then estradiol - maximum estrus behavior
    - plus testosterone - male-like behavior

Sexual Behavior (cont.)

- Postnatal Behavior
  - » castrated male
    - no steroids - decreased sexual behavior
    - plus testosterone - sex behavior restored
    - plus dihydrotestosterone - decreased sex behavior
    - plus estradiol - sex behavior restored

Aromatization



Sexual Behavior (cont.)

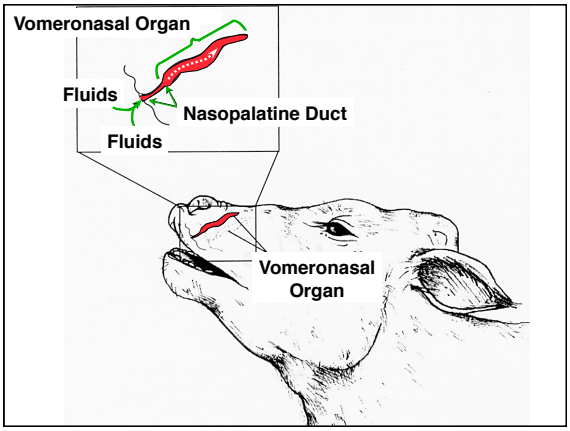
- both male and female sexual behavior is dependent on estradiol receptors in brain

Control of Reproductive Behavior

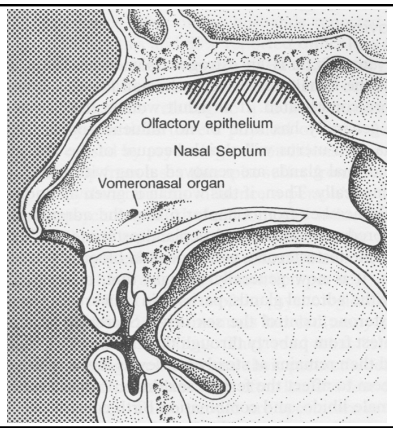
- Sensory systems
  - » Olfactory, visual, auditory, tactile
- Hypothalamus
  - » Estradiol receptors, increase response to sensory neurons
- Midbrain
  - » Signals from hypothalamus
  - » Speeds up nerve impulses
- Medulla
  - » Coordinates lordosis and mounting
- Spinal Chord
  - » Sends signals to specific muscles

Sensory Inputs for Reproductive Behavior

- specific importance varies with species
- olfaction
  - » pheromone
    - volatile substance which elicit specific behavior in the recipient
    - males produce
      - – boars
      - – humans
    - females produce during estrus
      - – dogs and rats can sense cow pheromones
    - flehmen response







Sensory Inputs for Reproductive Behavior (cont.)

- Auditory
  - » cows bellow
  - » sows grunt
  - » good for long-range signaling
- Visual
  - » posturing
  - » males observing other males or females mounting
  - » valuable for close encounters

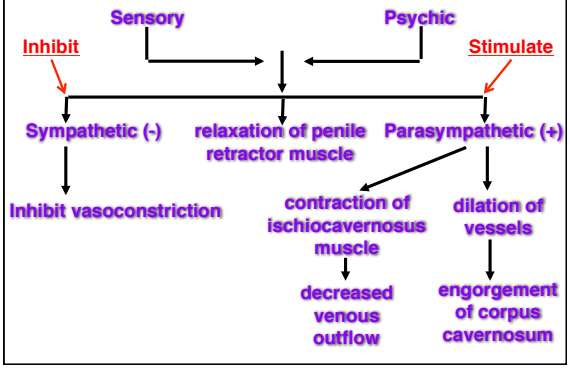
Sensory Inputs for Reproductive Behavior (cont.)

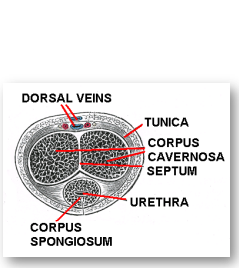
- Tactile
  - » biting on neck or whithers of mare
  - » chin resting on cow
  - » boar nudging of sow flank
  - » final stimulus before copulation
  - » leads to erection

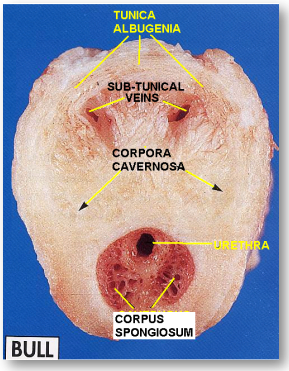
Erection, Emission and Ejaculation

- **Erection**
  - » **Vasodilatation, inhibit vasoconstriction, relax retractor penis muscle**
- Emission
  - » Contraction of cauda epididymis and vas deferens
    - Oxytocin from posterior pituitary
    - Sympathetic neurons
  - » Release of accessory gland fluid
    - Sympathetic neurons
- Ejaculation
  - » Contraction of smooth and striated muscles

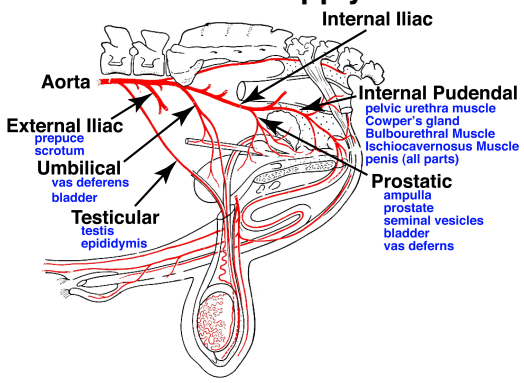
Erection





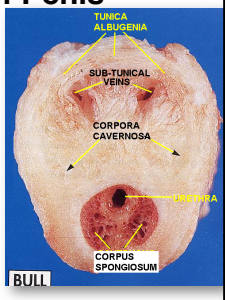


Arterial Supply



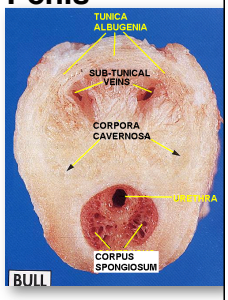
Flaccid State of Penis

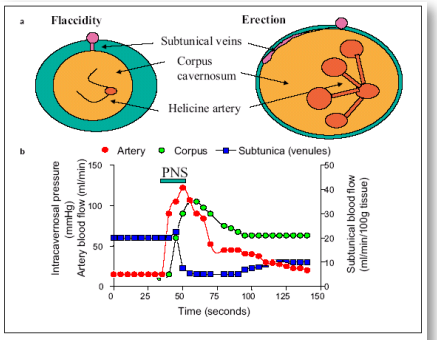
- **Corpus Cavernosum (CC)**
  - **Internal Pudendal Artery**
  - **Helical arterioles to corporal sinuspoids**
- **Subtunical veins**
  - **Drain CC**
- **Relaxed state**
  - **Sympathetic nerves active**
  - **Norepinehrine (NE) released**
  - **Arterioles contract**
  - **Smooth muscle of Corpus Spongiosum (CS) contract**



Erect State of Penis

- **Sympathetic nerves inhibited**
- **Parasympathetic nerves stimulate**
  - » **Nitric Oxide (NO)**
  - » **Helical arterioles dilate and corporal sinusoids swell**
  - » **Smooth muscle of Corpus Spongiosum (CS) relax**
  - » **Sub-tunical Veins compressed**

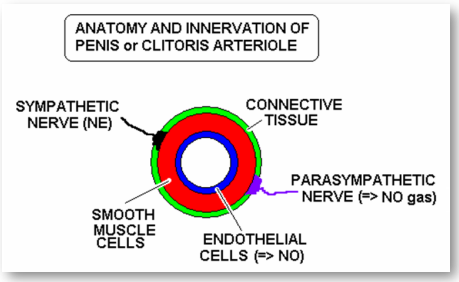


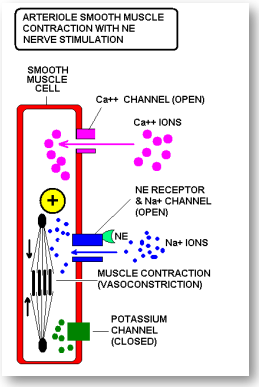


PNS = PARASYMPATHETIC NERVOUS SYSTEM

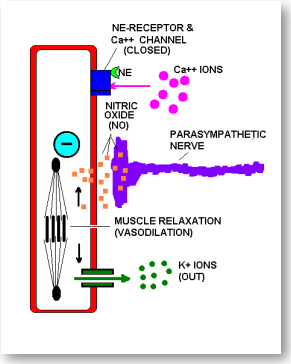
EVENTS IN ERECTION

1. SEXUAL AROUSAL: AFFERENTS FROM HIGHER CNS & GENITALIA TO LUMBAR SPINAL "ERECTION CENTER" IN LUMBAR SPINAL CORD (IN BOTH MALES AND FEMALES).
2. PARASYMPATHETIC MOTOR NERVES TO *PUDENDAL ARTERIOLES* OF PENIS [or CLITORIS] GENERATE *NITRIC OXIDE (NO)* IN ARTERIOLE SMOOTH MUSCLE ➔
3. RELAXATION OF ARTERIOLES ➔ MAJOR VASODILATION ➔
4. INCREASED BLOOD FLOW FILLS TISSUES (*CORPUS CAVERNOSUM & SPONGIOSUM*)➔
5. SWELLING BLOCKS *SUB-TUNICA VEINS'* OUTFLOW ➔
6. RAPID RISE IN Corpus Cavernosum TISSUE PRESSURE ➔
7. ERECTION





NE RELEASED FROM *S* NERVE
➔ NE BINDS TO Na+ CHANNEL
➔ Na+ IONS ENTER
➔ CELL DEPOLARIZES
➔ ACTION POTENTIAL
➔ Ca++ CHANNELS OPEN
➔ MUSCLE CONTRACTS
➔ ARTERIOLE CONSTRICTS
➔ *LOW BLOOD FLOW*

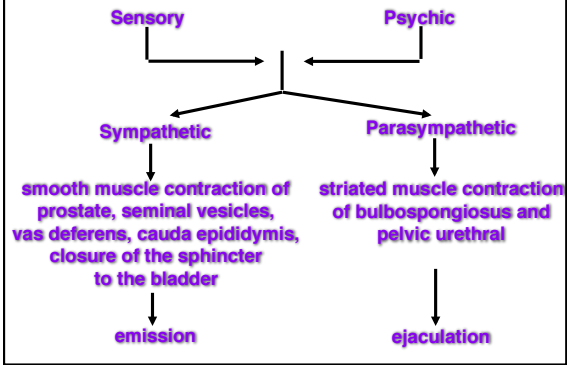


NO GAS DIFFUSES INTO CELL
➔ *GUANYLATE CYCLASE* ENZYME ACTIVATED
➔ *CYCLIC GMP (cGMP)*
➔ K+ CHANNEL OPENS
➔ K+ IONS LEAVE
➔ INSIDE MORE NEGATIVE
➔ Ca++ CHANNELS CLOSE
➔ MUSCLE RELAXATION
➔ ARTERIOLE DILATES
➔ *HIGH BLOOD FLOW*

Sildenafil - Viagra

- cGMP is broken down by phosphodiesterase 5 (PDE_5)
- Sildenafil is and inhibitor of PDE_5
  - » cGMP remains elevated and thereby the erection
  - » Side effect – erection over 4 hours
    - Go to Emergency Room – you could not ever have another erection!

Emission and Ejaculation

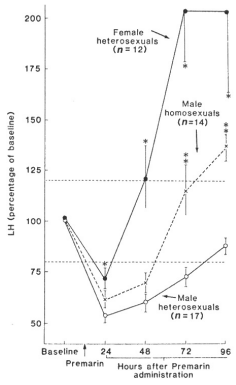


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  - » Release of accessory gland fluid
    - Sympathetic neurons
- Ejaculation
  - » Contraction of smooth and striated muscles

Homosexual Behavior

- common in farm animals
- useful to detect when females in heat
  - » selection by man may have enhanced this
- can collect bulls off of other bulls as mounts







Maternal Behavior

- **Prepartum**
  - » **High estrogen, low progesterone (leading to parturition)**
  - » **Prolactin (crosses blood brain barrier)**
- **Postpartum**
  - » **Prolactin (mostly lactation, promotes paternal and alloparental care)**
  - » **Oxytocin (does not cross blood brain barrier)**
    - **Intracerebral production- social bonding**
  - » **Opiods (decreases promote social bonding)**
  - » **Serotonin (low levels associated with increased maternal behavior, opposite infant rejection)**