• Reproductive System
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• Responsibility: Continue the species!
  • General structure:
    - Pair of gonads
    - Accessory organs, ducts, hormones, etc.
Male Reproductive System

- Testes (gonads) – produce sperm, secrete hormones
- Descend into scrotum for temperature regulation (sperm need 95°F)
• Sperm form in seminiferous tubules
• Travel to epididymis to mature
• Move through vas deferens, through ejaculatory duct, into urethra
• Sperm mixed with secretions from:
  - Seminal vesicles (fructose for energy)
  - Prostate (buffer)
  - Bulbourethral glands (mucous-rich fluid)
• Mixture called semen
• Typical ejaculation: 150-350 million sperm!
How do sperm form?

- **spermatogonium** (diploid)
- **primary spermatocyte**
- **early spermatids** (haploid)
- **secondary spermatocyte**
- **late spermatid**
- **mitosis meiosis I meiosis II**
- **immature sperm** (haploid)

- **wall of seminiferous tubule**
• Human seminiferous tubule (in testicle) filled with sperm
Mature Sperm

- **Head**: Nucleus with DNA, covered with enzyme-containing cap
- **Midpiece**: Mitochondria to supply energy
- **Tail**: Propels sperm forward
• Human sperm seen through a Transmission Electron Microscope (TEM)
Female Reproductive System

- Responsibility: Protect & nurture developing offspring from conception to birth
- Ovaries (gonads) produce eggs, release sex hormones
- From ovary, egg moves to oviduct (fertilization occurs here)
- Then, egg travels to uterus which is lined with endometrium
- Lower uterus called cervix
- Vagina connects cervix to outside
## Menstrual Cycle

<table>
<thead>
<tr>
<th>Phase</th>
<th>Events</th>
<th>Days of the Cycle*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menstrual phase</td>
<td>Menstruation; endometrium breaks down</td>
<td>1–5</td>
</tr>
<tr>
<td></td>
<td>Follicle matures in ovary; endometrium rebuilds</td>
<td>6–13</td>
</tr>
<tr>
<td>Proliferative phase</td>
<td>Endometrium begins to thicken, ovulation occurs</td>
<td>14</td>
</tr>
<tr>
<td>Progestational phase</td>
<td>Lining of endometrium develops to receive a possible embryo</td>
<td>15–28</td>
</tr>
</tbody>
</table>
• Newborn has ~2 million primary oocytes
• Oocyte + nourishing cells = follicle
• Immature eggs mature 1 at a time
• Only 3-400 will mature
• Continues until menopause
Birds do it, bees do it...

- = Coitus, copulation
- Erection – penis stiffens and lengthens due to dilated blood vessels and pooling blood
- Ejaculation – forceful expulsion of semen
• Muscle contractions in uterus move sperm into oviduct
• If ovulation has recently occurred or occurs soon, egg may be fertilized

Sperm entering an oviduct (SEM x500)
Fertilization

• Sperm enters egg

• Zygote is formed after a series of steps

haploid egg and sperm nuclei
Early Human Development

- Egg + sperm = zygote (1st cell)
- Zygote develops via cleavage into morula
Growth of the Baby

• Morula becomes embryo
• Amnion surrounds it
• Placenta starts to form
• Called fetus at 9 weeks
• Gastrulation organizes cells into germ layers: ectoderm, mesoderm, & endoderm
• Cells go through differentiation (get their jobs)
• Organs & tissues form by morphogenesis
• Cells grow and migrate
• Organs grow in size
• Apoptosis helps to sculpt some body parts