

# Control and Movement

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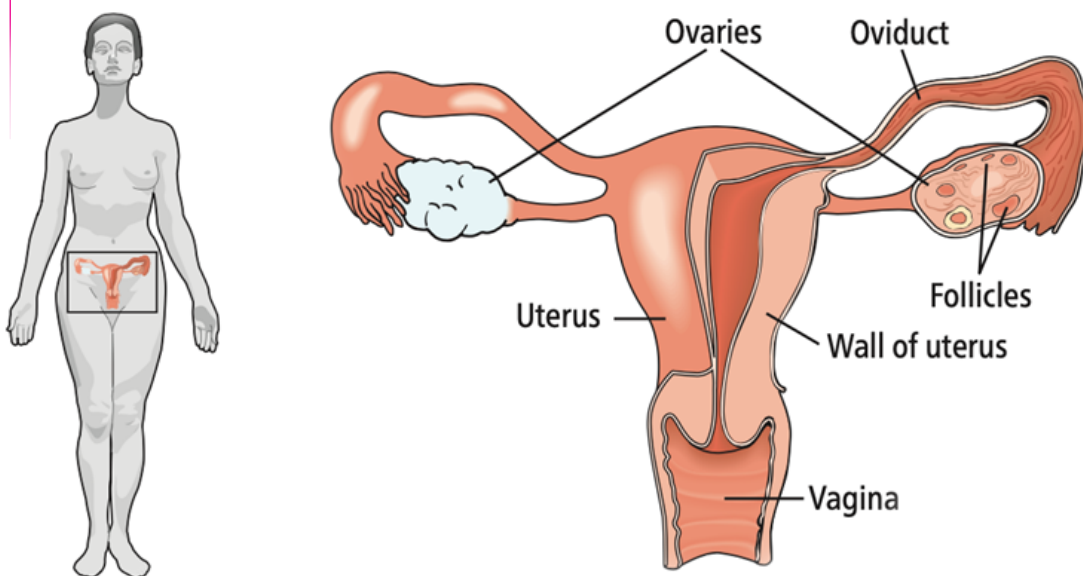
Photo Credit: Anne-Marie Keppel

## 13.2 Reproduction

Where do babies come from? Without reproduction, humans—or any other species—would quickly go extinct.

Human reproduction begins with the production of **gametes**, or sex cells—eggs in women and sperm in men. Eggs and sperm are produced through meiosis. They are haploid cells with only half the usual number of chromosomes. At **fertilization**, egg and sperm join to form a diploid cell that develops into a new human being. Let's start by looking at the female and male reproductive systems.

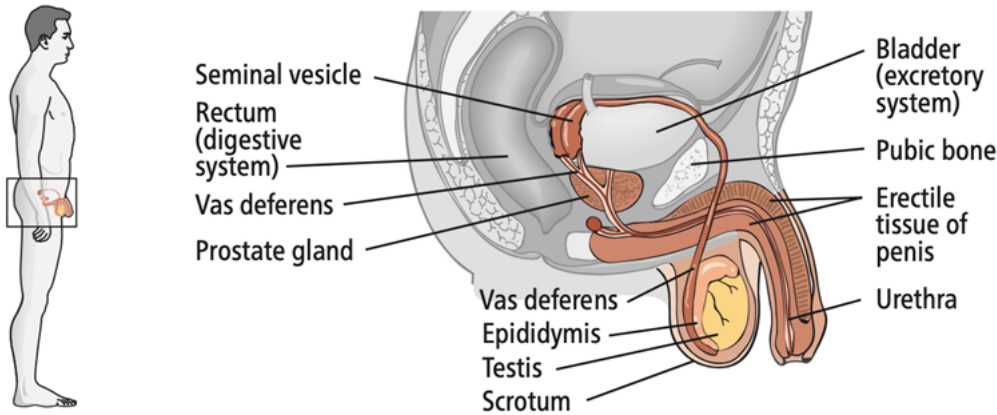
In females, eggs are made in the **ovaries** (Figure 13.5). Each ovary is made up of about 400,000 follicles, which are developing eggs surrounded by support cells. (This is the number at puberty, but it decreases over time.) During each menstrual cycle, a single follicle matures and releases an egg in a process called **ovulation**. The egg is a large cell, with lots of nutrients stored in its cytoplasm. Eggs are relatively large because they are the result of unequal meiosis: During cell division, the future egg receives almost all the cytoplasm, while the other cells (which quickly degenerate) receive very little cytoplasm. After ovulation, the egg enters the oviduct, where cilia sweep it toward the uterus. Fertilization typically takes place while the egg is still in the oviduct. The fertilized egg then continues to the **uterus**, where it implants and continues development.



**FIGURE 13.5**  
The female reproductive system.



In males, sperm are made in the **testes**, which are located in the scrotum (Figure 13.6). The scrotum hangs away from the body to keep the testes at a temperature lower than body temperature. This is essential for sperm production. From the testes, sperm enter the *epididymis*, where they complete development and become mobile. Each mature sperm cell has a head that contains DNA, mitochondria, and enzymes for penetrating the egg. Sperm also have a tail for swimming.



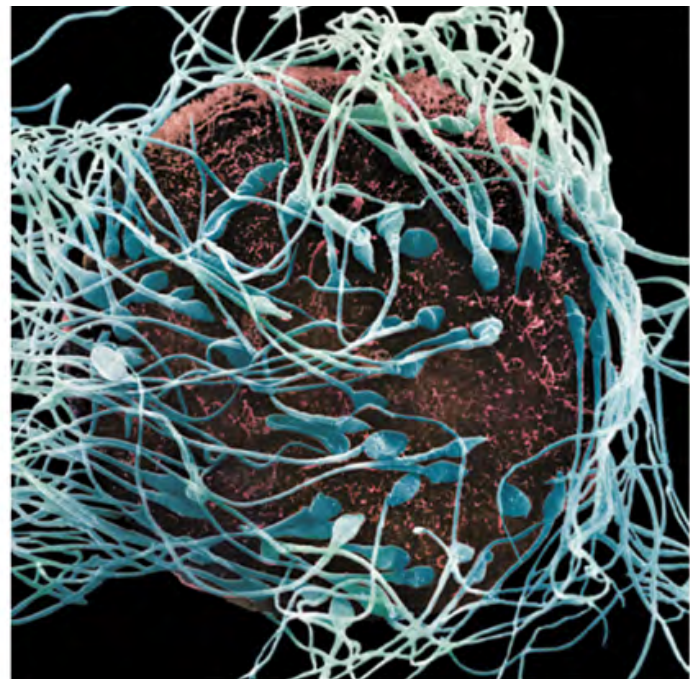
**FIGURE 13.6**  
The male reproductive system.

During sexual intercourse, sperm travel along the *vas deferens* to the *urethra*, a tube inside the penis. Sperm are ejaculated from the urethra in *semen*. In addition to sperm, semen contains fluids from the *seminal vesicles* and *prostate gland* that nourish sperm and protect them from the acidic environment of the vagina. There are about half a billion sperm in each ejaculate, each vying for the chance of encountering the egg.

**FIGURE 13.7**

Sperm surround a human egg.

After sexual intercourse, sperm swim up the oviduct towards the egg (Figure 13.7). The egg is covered by a jellylike layer called the *zona pellucida*. Enzymes released from the heads of many sperm eat away at this cover. A single sperm finally reaches the egg's cell membrane, and the cell membranes of egg and sperm fuse. At this point, the *zona pellucida* quickly undergoes a change in thickness that make it impenetrable to additional sperm, assuring that the fertilized egg doesn't end up with too many chromosomes.



**READING CHECK**

**If you place an unfertilized egg with its zona pellucida removed into a petri dish containing many sperm, what is the likely result?**

**CHECK YOUR ANSWER**

Multiple sperm will probably fertilize the egg. Normally, the *zona pellucida* undergoes changes at fertilization to prevent additional sperm from entering the egg.



You can read more about the female and male reproductive systems here:

<https://www.livescience.com/26741-reproductive-system.html>

