

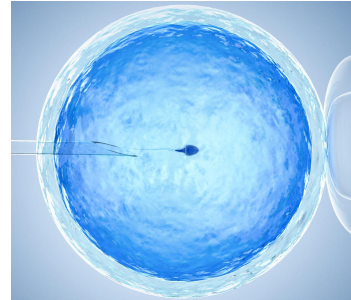
Exploring Science / Historical Steps

In Vitro or In Vivo? Were you an “in vivo” or “in vitro” baby? These Latin phrases are often used in science. *In vivo* means “in a living thing.” *In vitro* means “in glass.”

The birth of **Louise Brown** in 1978 made history. She was the world’s first “test tube baby.” No, Louise was not born from a test tube. But the sperm from her father and the egg from her mother were *joined* in a dish (“in vitro”). In other words, fertilization did not occur inside of her mother (“in vivo”). News reporters thought that it would sound dramatic to use the phrase “test tube baby.”

Since this type of fertilization happens in a dish, scientists call it **in vitro fertilization** (or simply **IVF**). For Louise, a few days after fertilization, the embryo was placed in her mother to grow (for 9 months).

In most cases, a human egg is fertilized inside of the egg tube of the mother. But in one out of seven couples, fertilization or embryo growth won’t happen on its own. Before 1978, these couples were not able to produce a child. Currently, IVF is used in the delivery of over 500,000 babies per year!



A tiny syringe (at left) injects one sperm into an egg.

➤ Do you think that a human embryo will ever develop entirely outside of a woman’s body?

How Mammals Reproduce

Humans are members of the class of vertebrates called **mammals**. The class includes familiar animals such as dogs, cats, monkeys, and whales. All mammals have **mammary** (MAM-uh-ree) **glands** which produce milk for feeding their young. Mammals also have hair or fur on their bodies, and all are warm-blooded.

Most mammals give birth to one or more live young. However, there are two mammals that lay eggs - the platypus and the spiny anteater.

Let’s look at the reproduction of a typical mammal - us! (Observe page 208’s illustrations).

The male’s main reproductive organs are the two **testes** (TEST-tees). These organs produce the sperm cells. The testes hang outside of the body in a sac called the **scrotum** (SKROH-tum).

A **sperm tube** from each **testis** (TEST-tis) joins to form a single tube. This single tube, the **urethra** (you-REE-thruh), is in the center of the **penis**. For mating to occur, the penis must temporarily become firm; this is called an

erection. Sperm pass through the urethra as they leave the body. [Note: When males go to the bathroom, the same tube (the urethra) carries urine out of the body.]

In the female, the organs that produce eggs are the **ovaries** (OH-vuh-rees). About every 28 days, one of the two ovaries releases a single egg. The egg moves into an **egg tube** (also called the **Fallopian** (fuh-LOW-pea-un) **tube**). While the egg is inside of this tube, it can be fertilized.

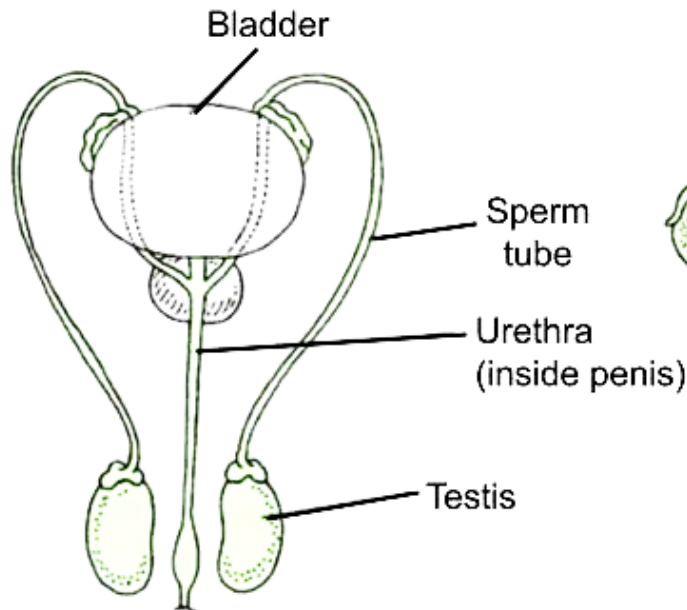
In the female, young are grown in an organ called the **uterus** (YOO-tuh-rus); it is also called the **womb**. In a young woman it is quite similar in shape to an upside-down pear, and is about $\frac{3}{4}$ the pear’s size. Obviously, this organ can stretch a great deal in order to hold, and grow, a baby.

The flexible tube from the base of the uterus to the outside of the body is called the **vagina** (va-JIYE-nuh); it is also called the **birth canal**.

Human Reproductive Systems

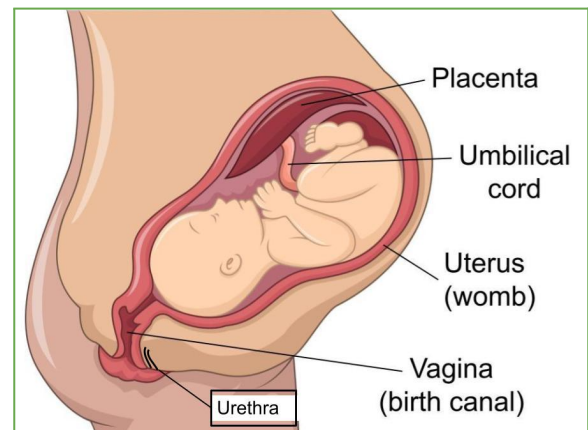
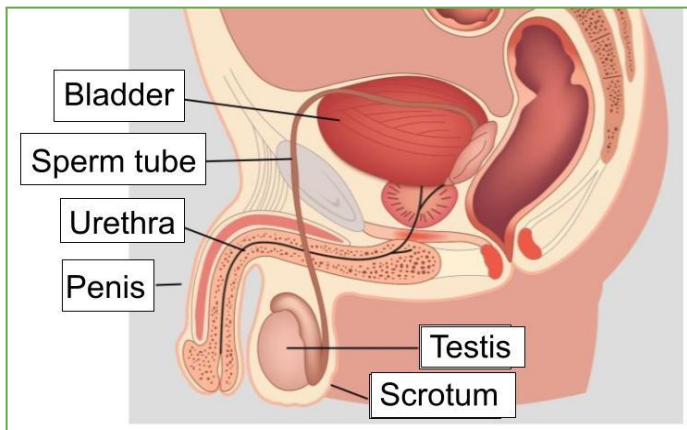
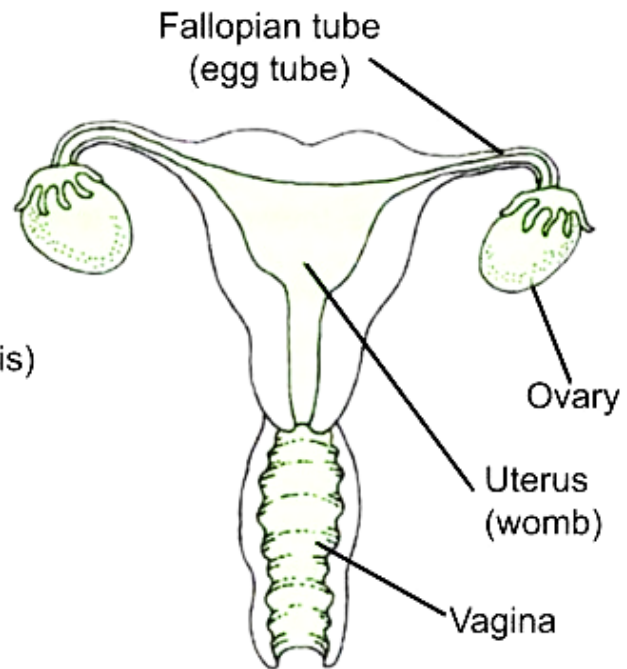
- MALE -

(top: front view / bottom: side view, facing left)



- FEMALE -

(top: front view / bottom: side view, facing right)



[Note: Observe the illustration of the FEMALE above. The vagina is an entirely separate tube from the urethra. In females, the urethra carries only urine. Its opening lies just in front of the opening for the vagina. The urethra drains the urinary bladder. If the bladder were shown in the above diagram, it would be under the uterus, below the baby's head. Do you see why pregnant women frequently need to urinate?]

Once a female's body is old enough to have children, the lining of her uterus goes through a cycle each month. The lining thickens with delicate blood vessels for about 3 weeks. Next,

for about 5 days, these tiny blood vessels and about 3 tablespoons of blood slowly pass out through the vagina. This "shedding" phase is called **menstruation** (men-STRUAY-shun), or having a **period**. If fertilization occurs, the lining is not shed; that is, there is no menstruation.

During mating, called **intercourse** (when the penis and vagina "join"), sperm cells enter the female's body. The sperm swim through the uterus and into the egg tubes. Millions of sperm may go into the tubes, but only one sperm cell can fertilize one egg.

The fertilized egg, or zygote, moves down the egg tube as it starts to develop. While still a tiny embryo, it floats into the uterus. The embryo attaches itself to the wall of the uterus.

As the human embryo continues to develop, a flat structure called the **placenta** (pluh-SENT-uh) forms on the wall of the uterus. Blood vessels in the placenta bring food and oxygen from the mother to the embryo. These blood vessels also carry wastes away from the embryo. The embryo is joined to the placenta by the ropelike **umbilical cord**.

After about two months, a human embryo is called a **fetus** (FEE-tus). The fetus develops and grows until it is a baby, ready to be born.

When the time of birth comes, the muscles in the walls of the uterus contract, as **labor** begins. The contractions of labor push the baby through the expanding birth canal, and out into the world.

During the period of time between fertilization and birth, the mother is **pregnant** (PREG-nunt). The time of pregnancy for humans is about 9 months.

For some other mammals, pregnancy may be shorter or longer. For a rat, pregnancy lasts only 3 weeks. For an elephant, it takes 22 months. Mammals provide more care for their young than any other animals.



Chimpanzee mother nursing her baby

[Note: Chimpanzees are our closest relatives. Over 98% of our DNA is identical to theirs.]

REVIEW

U-8 L-5

I. In each blank, write the choice that fits best. Choose from the words below.

umbilical cord
birth canal

placenta
uterus

egg tube
fetus

urethra
mammary glands

sperm tube

Milk for a mammal's young are produced in the _____.
Sperm cells pass from the sperm tubes into the _____, the tube inside of the penis. An egg can be fertilized while it is in an _____.
The _____ connects the embryo to the placenta. After about two months, the embryo is called a _____. During labor, the _____ contracts and pushes the baby through the _____ (also called the vagina).

II. Circle the word (between the brackets) that makes each statement correct.

A. Mammals are [warm-blooded / cold-blooded].

B. The fertilized egg is the [ovary / zygote].

C. Sperm cells are produced in the [testes / placenta].

D. A human egg is produced about once every [9 months / 28 days].

III. If a pregnant mother drinks alcohol, the developing baby can be seriously harmed. In a few sentences, explain how the alcohol gets into the fetus. Use these terms in your answer: uterus; placenta; umbilical cord.