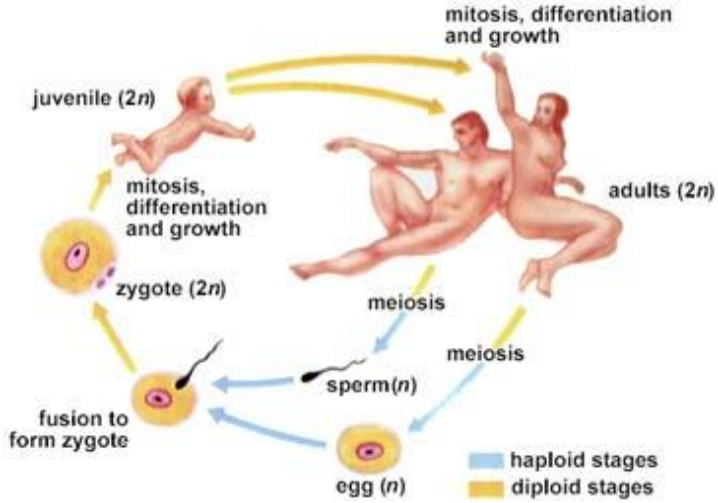
UNIT 9: REPRODUCTION. THE REPRODUCTIVE SYSTEM

I. Sexual reproduction

Reproduction is the process that continues life on Earth.

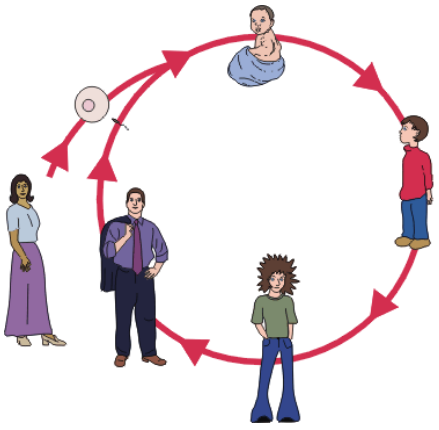


Human beings have a sexual reproduction. The females produce **eggs** and the males produce **sperm**. Egg and sperm are **gametes**. They are only produced in the reproductive organs (**ovaries** and **testes**). During sexual reproduction a sperm cell and an egg cell combine to produce a **zygote**.

Sexual reproduction involves the fusion of male and female gametes. The uniting of a sperm and an egg is known as fertilization.

The zygote receives a mixture of DNA from its mum and its dad. This is why sexual reproduction produces more variation than asexual reproduction.

II. Stages after birth



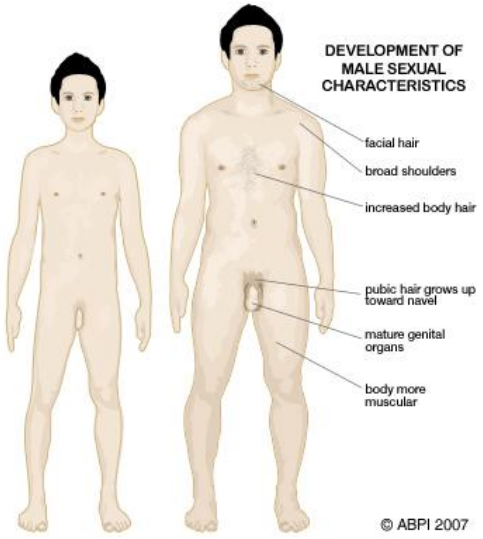
From birth to death, the human being lives several stages:

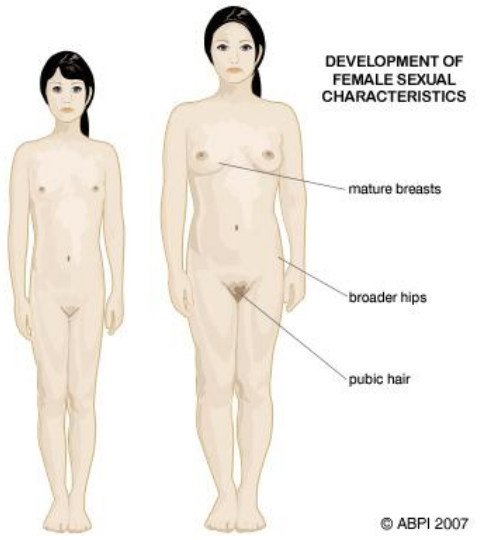
Infancy and childhood last from birth to puberty or sexual maturity. The baby is born with her primary sex internal and external characteristics. During this time, the baby´s body begins to function normally.

Puberty is the development stage when a person becomes physically but not mentally able to reproduce. For girls puberty

occurs between ages 9 and 13. For boys puberty occurs between ages 12 and 16. During puberty, hormones cause changes in the body. Secondary sex characteristics also develop:

In men	In women
• Extra hair on the face and body • Muscles develop • Deepening of voice • Sperm production	• Extra hair on underarms and pubic area • Hips widen • Development of breasts • Egg release and menstrual cycle starts.





Adolescence usually is when the final growth occurs. The person is ready for reproduction.

Adulthood is the final stage of development from adolescence to the old age. This is when the growth of muscular and skeletal systems stops.

ACTIVITIES

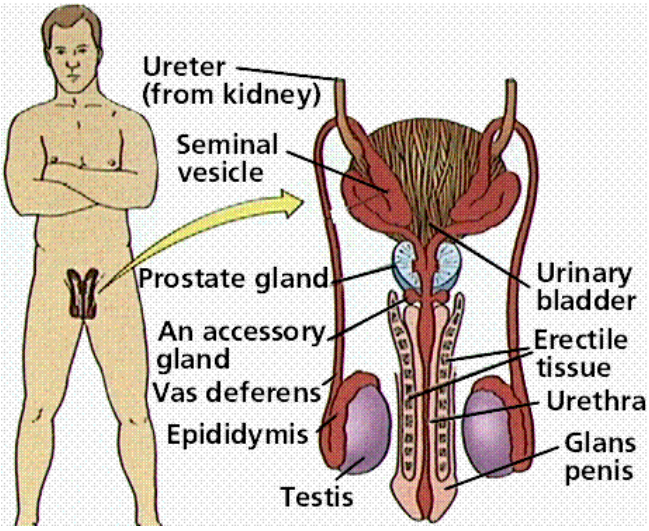
1. Name the stages of development that you are in. What physical changes have occurred or will occur during this stage of human development?
2. Describe two secondary sexual characteristics in males and females.
3. Circle the correct word(s) in each sentence below to complete them.
   a) Sexual reproduction involves one/two individual(s).
   b) The cells that are involved in sexual reproduction are called clones/gametes.

c) Sexual reproduction produces individuals with different/identical genes to the parents.
d) In sexual reproduction the sperm cell contains the same number of / half number of chromosomes as the zygote.

III. The male reproductive system

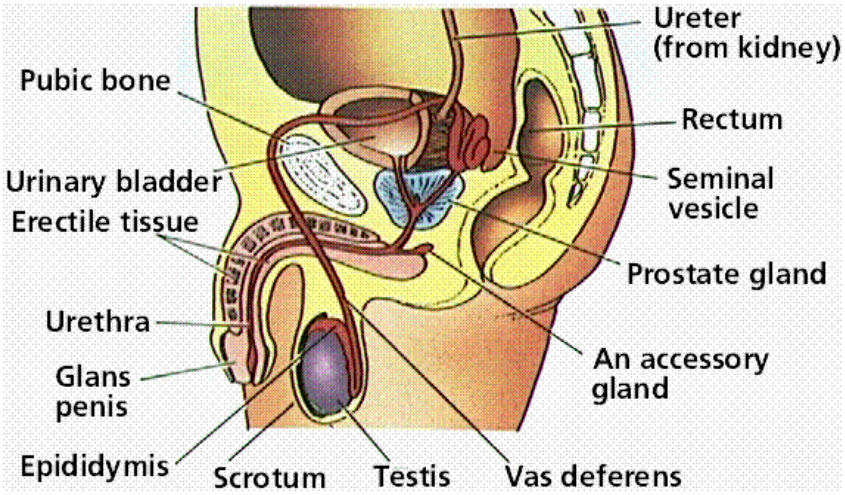
The male reproductive system is made up of external and internal organs.

The external organs are the **penis** and the **scrotum**. The scrotum contains two organs called **testes** (singular: testis). As males mature sexually, the testes begin to produce **testosterone**, the male hormone and sperm, which are male reproductive cells.



Testes are located outside the body cavity. A temperature lower than 37°C is required for the development of sperm.

Each **sperm** cell has a head and tail. The head contains hereditary information, and the tail moves the sperm. Sperm are produced in greater number at lower temperature. Testes produce 100-200 million sperm each day.



Many organs help in the production, transportation and storage of sperm. After sperm are produced, they travel from the testes through **sperm ducts** to the outside of the body.

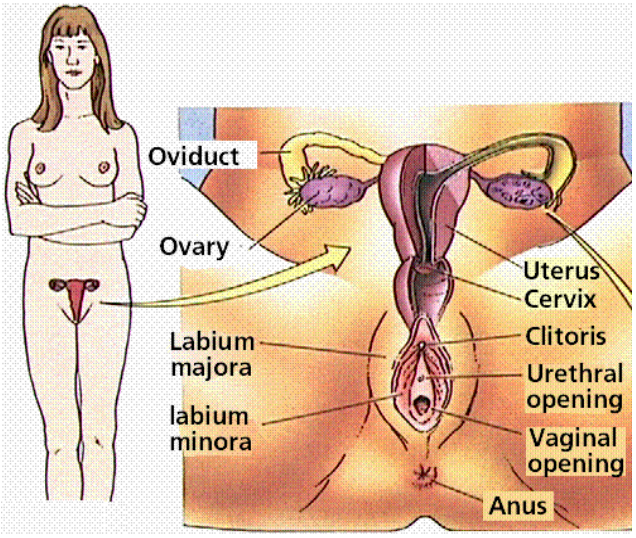
Sperm require a fluid to survive. The **seminal vesicles** and the **prostate gland** produce a fluid which provides energy, nutrients and protection for the sperm. This fluid is called semen.

Semen is the fluid that contains sperm and other fluids from male reproductive glands.

Semen leaves the body through the **urethra**, which is the same tube that carries urine from the body. However, semen and urine never mix.

IV. The female reproductive system

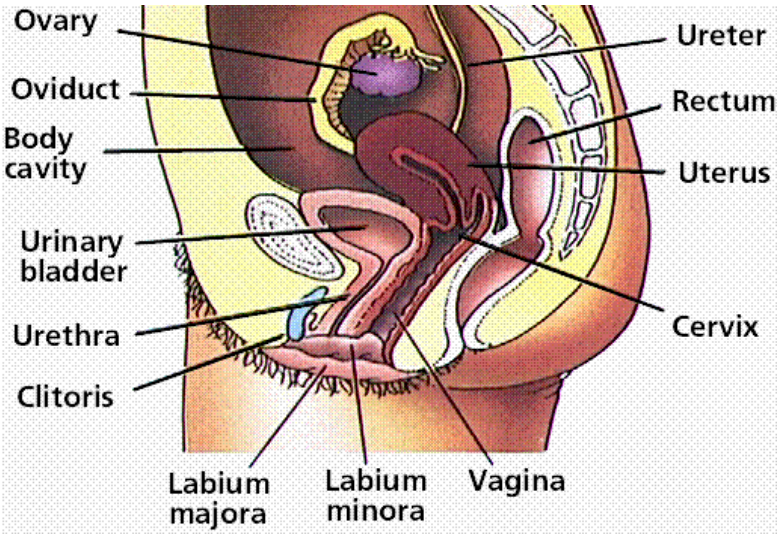
The female reproductive system is also made up of external and internal organs. The external genital organs include the mons pubis, labia majora (singular: labium), labia minora, Bartholin's glands and clitoris. The area containing these organs is called the **vulva**. The labia minora surround the openings to the vagina and urethra.



The internal genital organs form a pathway (the genital tract). This pathway consists of the following:

The **ovaries** are the female sex organs. They are located in the lower part of the body cavity. The ovaries produce **eggs**, which are female reproductive cells and **progesterone** and **estrogens** which are the female hormones.

When a female is born, she already has all of the cells in her ovaries that will develop into eggs. At puberty eggs start to develop in her ovaries because of specific sex hormones.



About once a month, an egg is released from an ovary in a hormone-controlled process called ovulation.

The **oviducts** (**Fallopian tubes**) are two

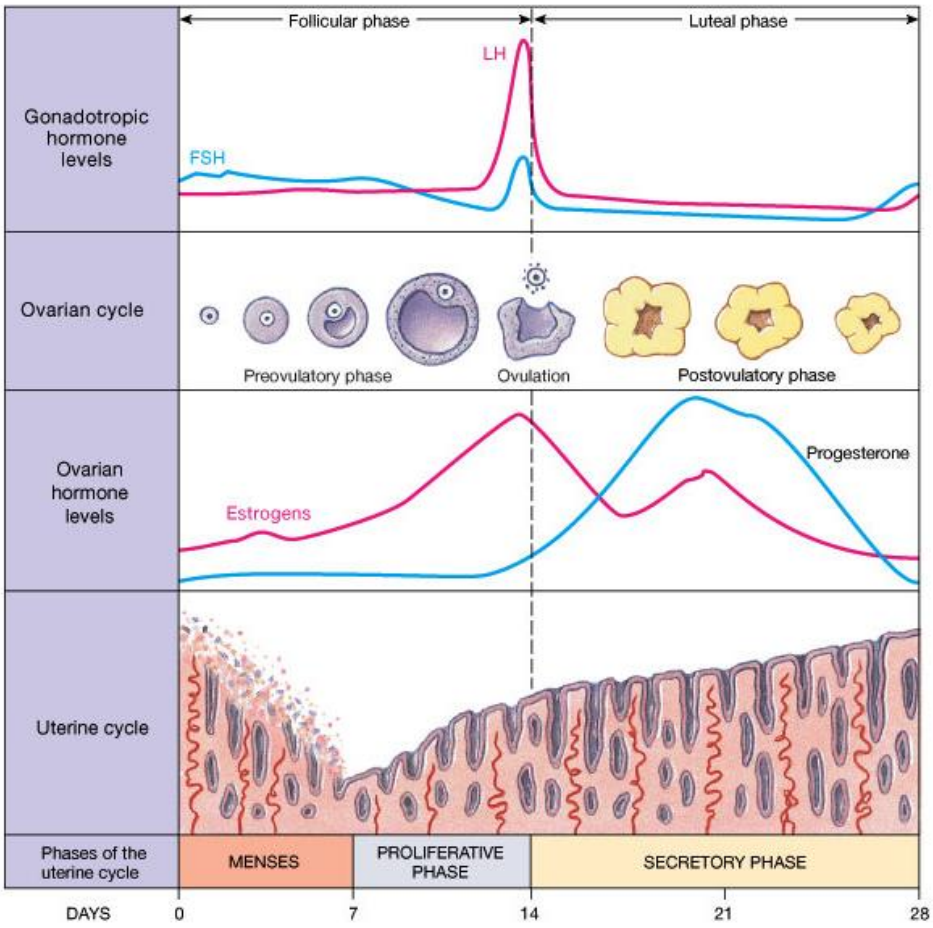
tubes that connect to the uterus. After the eggs are released from the ovaries, they travel through the oviducts. If a sperm fertilizes the egg, it usually happens in an oviduct.

The **uterus** or **womb** is a hollow, muscular organ with thick walls and it is where a baby develops before birth.

Vagina is a muscular tube that connects the end of the uterus to the outside of the body.

V. The menstrual cycle

The menstrual cycle is the monthly cycle of changes in the female reproductive system. Before and after and egg is released from an ovary, the uterus changes. The menstrual cycle lasts 28 days but it can vary in some women. Changes include the maturing of an egg, the production of female sex hormones, the preparation of the uterus to receive a fertilized egg and menstrual flow. This is caused by the ovarian cycle and the uterine cycle working together.



The menstrual cycle has four stages:

1. Day 1 is when the bleeding starts. The uterus lining breaks down for about four days. This is called **menstruation** or **period**.
2. **Proliferative phase** (**follicular** in the ovary): the lining of the uterus builds up again, from day 4 to day 14. The new layer is full of blood vessels, ready to receive a fertilised egg.
3. **Ovulation**: an egg is developed and then released from the ovary at day 14.
4. **Secretory phase** (**luteal** in the ovary): the wall is maintained for about 14 days, until day 28. If the egg is no fertilised, the lining of the uterus breaks down again as the hormones levels decrease and the whole cycle starts again. Menstruation begins and the cycle repeats itself. But if the egg is fertilised and enters the uterus, this is ready to support the developing of an embryo.

The menstrual cycle is controlled by hormones:

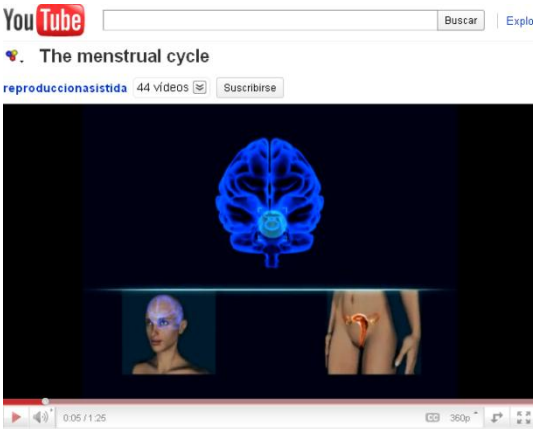
- **Estrogens** cause the lining of the uterus to thicken and grow.
- **Progesterone** maintains the lining of the uterus. When the level of progesterone falls, the lining breaks down.

They both are produced in the ovaries.

- **Gonadotropic hormones** (**FSH** and **LH**) promote ovulation and stimulate secretion of sex hormones locally in the ovaries

Take a look in these couple of videos to learn more and understand better the menstrual cycle.

Female reproductive system



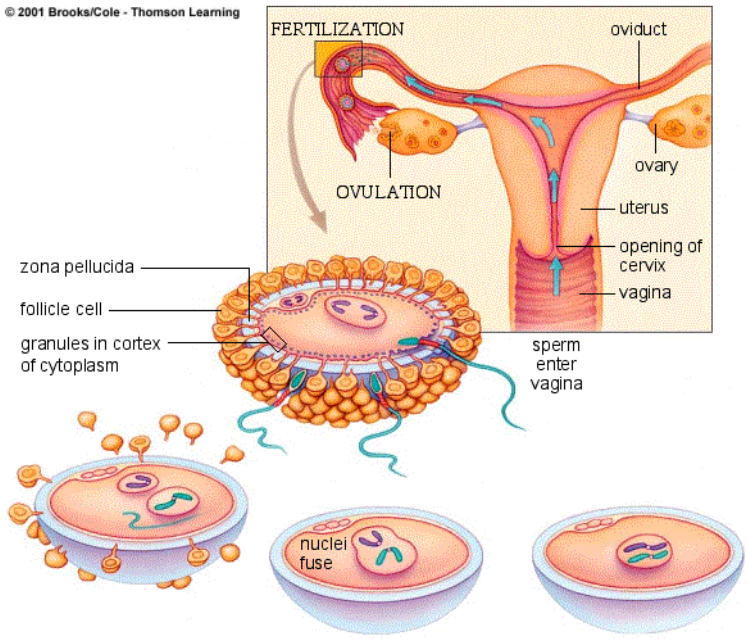
Menstrual cycle

ACTIVITIES

4. Identify the major functions of the male and the female reproductive systems in humans.
5. Explain the movement of sperm from the testes to the oviduct.
6. Sequence the stages of the menstrual cycle in a human female.
7. Adolescent females often require additional amounts of iron in their diet. Why?

VI. Fertilization

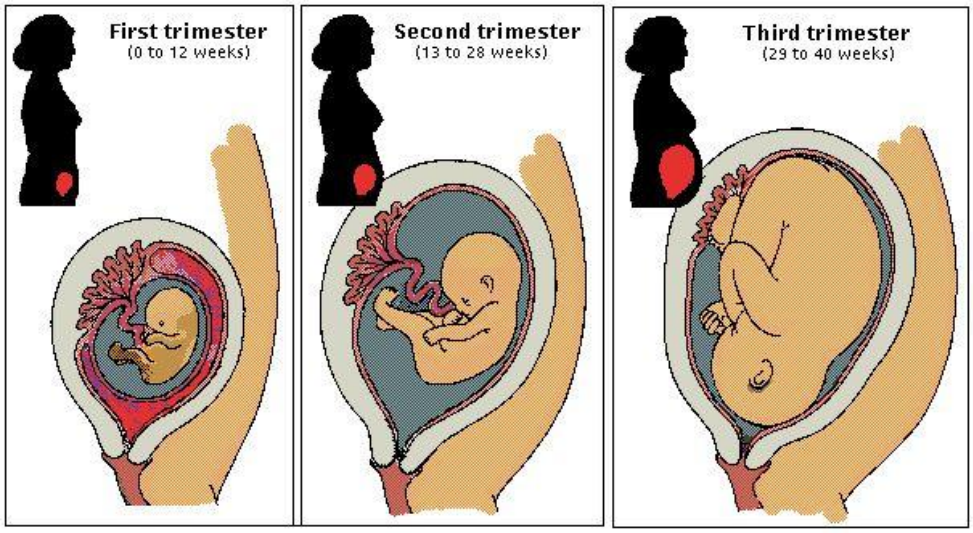
Although 200 million to 300 million sperm can be deposited in the vagina, only several thousand reach an egg in the oviduct, and only one fertilises the egg. The egg´s membrane is broken, and the sperm head can enter the egg. The nucleus of the successful sperm joins with the nucleus of the egg. This joining of nuclei creates a fertilized cell called the **zygote**.



VII. Pregnancy

After fertilization, the zygote moves along the oviduct to the uterus. During this time, the zygote is dividing and forming a ball of cells.

After a few days the ball of cells reaches the lining of the uterus, where it attaches itself. Now we call it as **embryo** and it receives nutrients in the uterus until the **placenta** develops. An **umbilical cord** connects the embryo to the placenta. Blood vessels in the umbilical cord carry nutrients and oxygen from the mother´s blood through the placenta to the embryo. Wastes from the embryo are carried in other blood vessels in the umbilical cord through the placenta to the mother´s blood.



This period of development from fertilized egg to birth is known as pregnancy.

Pregnancy in humans lasts about 40 weeks. During the third week a thin membrane called amniotic sac begins to form around the embryo. The amniotic sac is filled with a liquid, which acts as a cushion for the embryo. After the first two months of pregnancy, the developed embryo is called a **fetus**.

ACTIVITIES

8. Describe what happens when an egg is fertilised in a female.

9. Describe the major events that occur from fertilized egg to fetus.

10. Fill in the blanks with the correct word.
_____ is a mixture of sperm and fluid.
The time of development until the birth of a baby is known as _____.
During the first two months of pregnancy the unborn child is know as _____.
The _____ is a hollow, muscular female organ.
The _____ _____ is the membrane that protects the unborn child.
The _____ is the organ that produces eggs.

11. Choose the word or phrase that best answers the question.
A) Where is the egg usually fertilized?
a.- oviduct b.- vagina c.- uterus d.- ovary

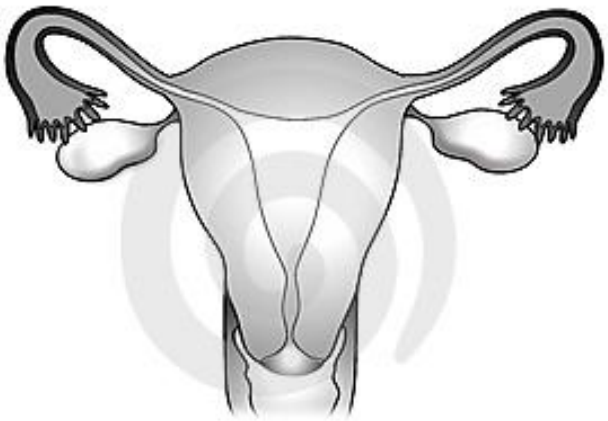
B) What gland produces testosterone?
a.- thyroid b.- testes c.- pancreas d.- ovary

C) What is the monthly process that releases an egg?
a.- fertilization b.- ovulation c.- menstruation d.- puberty

D) What is the union of an egg and sperm?
a.- fertilization b.- ovulation c.- menstruation d.- puberty

E) During which period does growth stop?
a.- childhood b.- adulthood c.- adolescence d.- infancy

12. Identify the structure in the above diagram in which each process occurs: ovulation, fertilization and pregnancy.



WEBGRAPHY AND INTERNET SOURCES:

- http://usmlelinks.com/wp-content/uploads/2010/07/menstrual_cycle.png
- http://w-pregnancy.com/pregnancy-countdown/
- http://www.abpischools.org.uk/page/modules/hormones/horm3.cfm?coSiteNavigation_allTopic=1
- http://www.brown.edu/Courses/BI0032/gentherp/introsex1.htm
- http://www.clipart.dk.co.uk/372/subject/Biology/Egg_cell
- http://www.healthandyogaguru.com/2008/09/26/sexual-cells-re-production-in-human/
- http://www.merckmanuals.com/home/sec22/ch241/ch241b.html
- http://www.oum.ox.ac.uk/thezone/animals/life/produce.htm
- http://www.stockphotos.ro/female-reproductive-system-illustration-image4187130.html
- http://www.youtube.com/watch?v=8qrWlf0bXpU
- http://www.youtube.com/watch?v=MLJTLAKFM3k&feature=related
- http://www2.estrellamountain.edu/faculty/farabee/biobk/biobookreprod.html#Human%20Reproduction%20and%20Developm