H2 Reproduction in humans

Reproduction is a process by which organisms produce new individuals of their kind. Just like plants, animals also have reproductive organs which produce sex cells. The reproductive organs become active at a certain stage in life called *puberty*, when the body undergoes changes in appearance and behaviour. It is important that you understand reproduction so as to avoid AIDS and unwanted pregnancies. Do not be shy to learn about this topic, understand what it is all about!

Assessment objectives

By the end of the chapter students should be able to:

- ***identify the reproductive organs of humans;***
- ***identify sex cells in humans;***
- ***describe the process of fertilization in humans;***
- ***describe the course of pregnancy;***
- ***describe the role of the placenta;***
- ***describe the birth process.***

Reproductive organs

Female reproductive organs

The female reproductive system consists of ovary, oviduct, uterus, cervix, vagina and vulva. (see Figure 2.1).

Ovaries

The eggs (ova) and chemicals which control sexual development are produced by a pair of ovaries. One egg or ovum is released into the oviduct once every month.

Oviduct

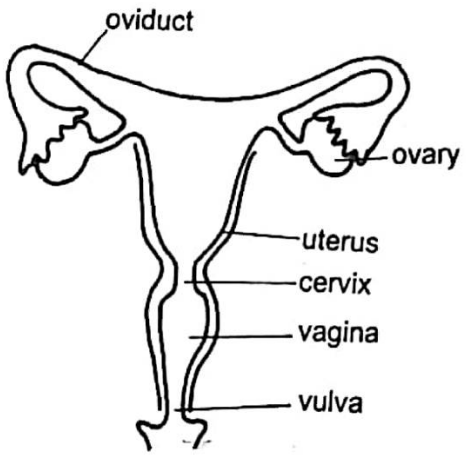
The egg is released into the oviduct or fallopian tube. The oviduct's inner walls have hair-like projections which move the liquid and suspended ovum towards the uterus. Fertilization takes place in the oviduct.

Uterus/womb

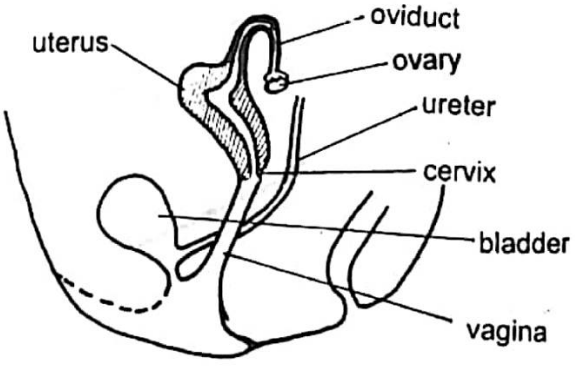
It is a thick-walled muscular sac in which the embryo develops until it is ready to be born.

Cervix

It is a narrow neck or exit into or out of the uterus. It is made up of muscles which close the uterus



a) front view



b) vertical section

ure 2.1 Front view and vertical

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during pregnancy but can open greatly during the birth of a baby.

Vagina/birth canal

Its upper end is the cervix and its lower end is the vulva. The vagina receives the erected penis during sexual intercourse. It also provides a passage for the birth of a baby.

Male reproductive organs

The male reproductive system consists of scrotum, testis, sperm duct, urethra and penis.
(See Figure 2.2.)

Testes

They are a paired structure which lie in a sac called scrotum. The main function of testes is to produce sperms. They also produce chemicals which control sexual development.

Scrotum

The scrotum keeps the testes at the right temperature for the production and storage of sperms.

Sperm ducts

It is a tube which carries sperms to the penis.

Urethra

It is a tube through which sperms pass out of the penis. The urethra also passes out urine but not at the same time with sperms!

Penis

It is an outside organ that is placed erect in the vagina before sperms are released so that the male and female sex cells are brought together for fertilization to take place.

Sex cells in humans

Female sex cells

The female produces eggs (ova). The eggs are produced in the ovaries. An egg is produced every month during menstruation. An egg is big and round. It has more cytoplasm than a sperm. The life span of a released egg is about 2 days.
Figure 2.3 shows an ovum or female sex cell.

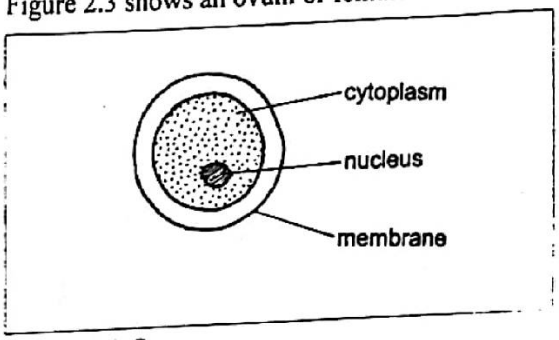


Figure 2.3 Ovum

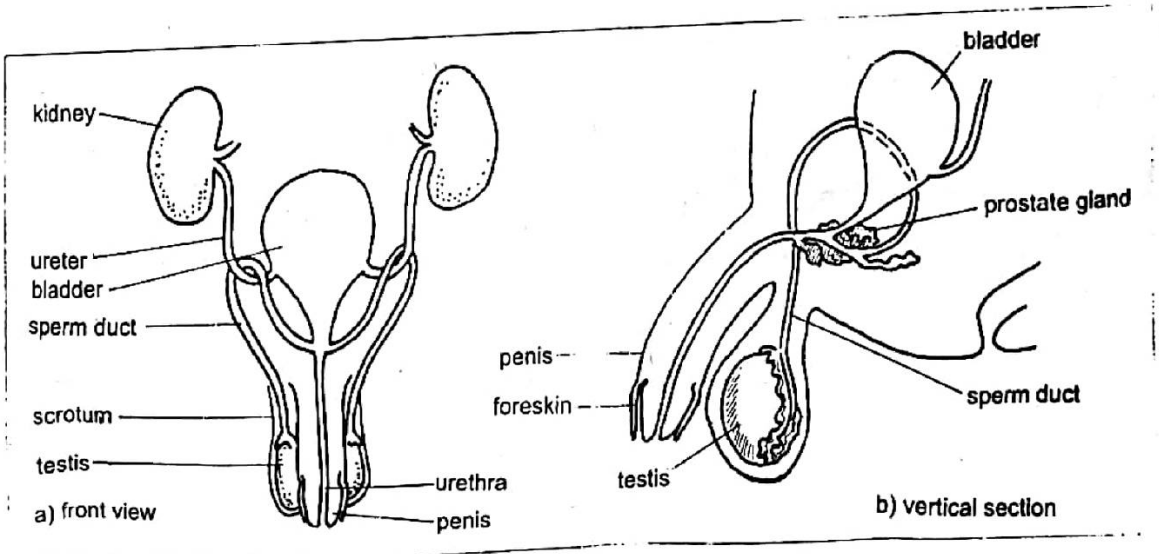


Figure 2.2 Male reproductive system

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The structure and function of sex cells

Human males produce sperm cells (spermatozoa) and females produce egg cells (ova).

A sperm cell has a head, a middle section and a tail. The head contains a nucleus with the **heritable** characteristics (DNA) of the father. There are many mitochondria in the middle section of a sperm cell. These provide energy so the sperm can swim towards the ovum. Sper cells are very small compared to the ova of a female.

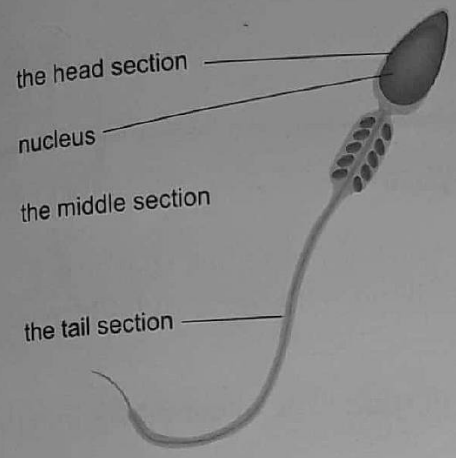


Figure 8.3 The structure of a sperm



Figure 8.4 A micrograph of a sperm

An ovum has a nucleus and cytoplasm, and is surrounded by a cell membrane. The nucleus contains the heritable characteristics (DNA) of the mother. The cytoplasm stores food for the embryo to develop and grow.

Word help

heritable: characteristics capable of beir passed from parents to offspring

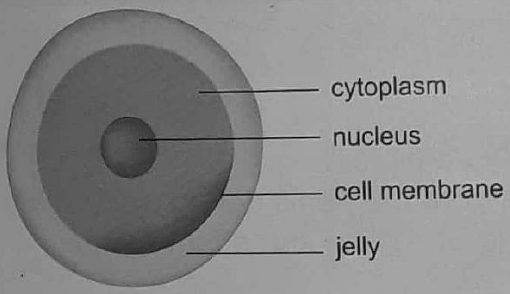


Figure 8.5 The structure of an ovum

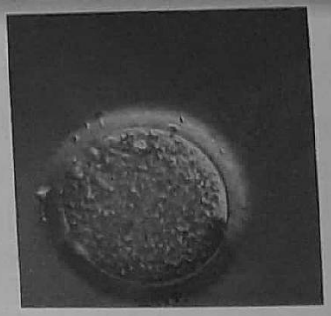


Figure 8.6 A micrograph of an ovum

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Male sex cells

Figure 2.4 shows a sperm. Sperms are the male sex cells. They are produced in the testes.

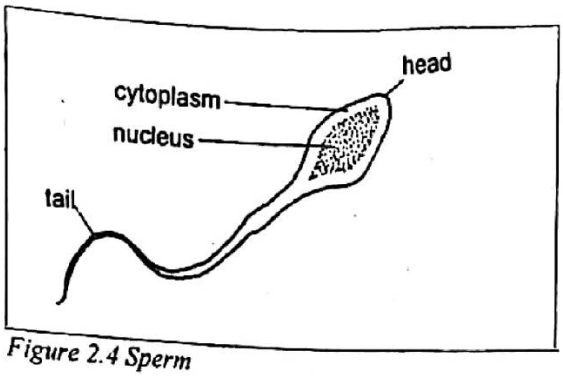


Figure 2.4 Sperm

The sperm has a head and a tail. The tail helps the sperm to swim and move. It is smaller than the ovum and contains less cytoplasm. The life span of a released sperm is about 3 days.

Fertilization in humans

During mating the male produces sperms which enter the female through the vagina and then swim up through the cervix into the uterus. The sperms move into the fallopian tube/oviduct. In the oviduct the sperms meet the egg which has been produced by the ovary. Males release many sperms during mating but only one sperm will fertilize the egg. Once the head of a sperm enters an ovum, the ovum produces a protective coat around itself to prevent further entry of sperms. The other sperms die. The male sex nucleus and the female sex nucleus join or fuse and this process is called *fertilization*. The fertilized egg (now called a zygote) moves along the oviduct and divides several times.

Implantation and gestation

The zygote continues to divide and develops into a ball of dividing cells called an *embryo*. The embryo attaches or implants itself to the wall of the uterus. *Implantation* is the attachment of the developing embryo to the lining of the uterus.

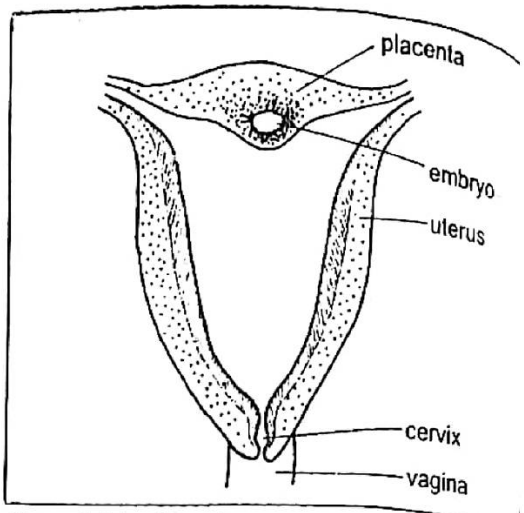


Figure 2.5 Implantation

A placenta is formed by the thickening of the lining of the uterus in preparation for the development of the foetus. See Figure 2.5

The placenta connects the embryo to the wall of the uterus and provides for the exchange of materials between the blood of the embryo and the blood of the mother. (See Figure 2.6). The two blood systems are separate but close together.

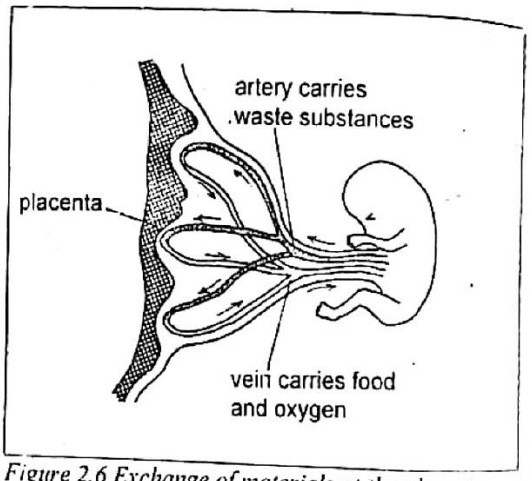


Figure 2.6 Exchange of materials at the placenta

The umbilical cord connects the embryo to the placenta. Food and oxygen dissolved in blood are carried from the mother to the embryo through the umbilical cord. Waste products dissolved in blood are carried from the embryo to the mother through the umbilical cord. The embryo grows bigger and forms organs. It grows inside a bag of protective liquid.

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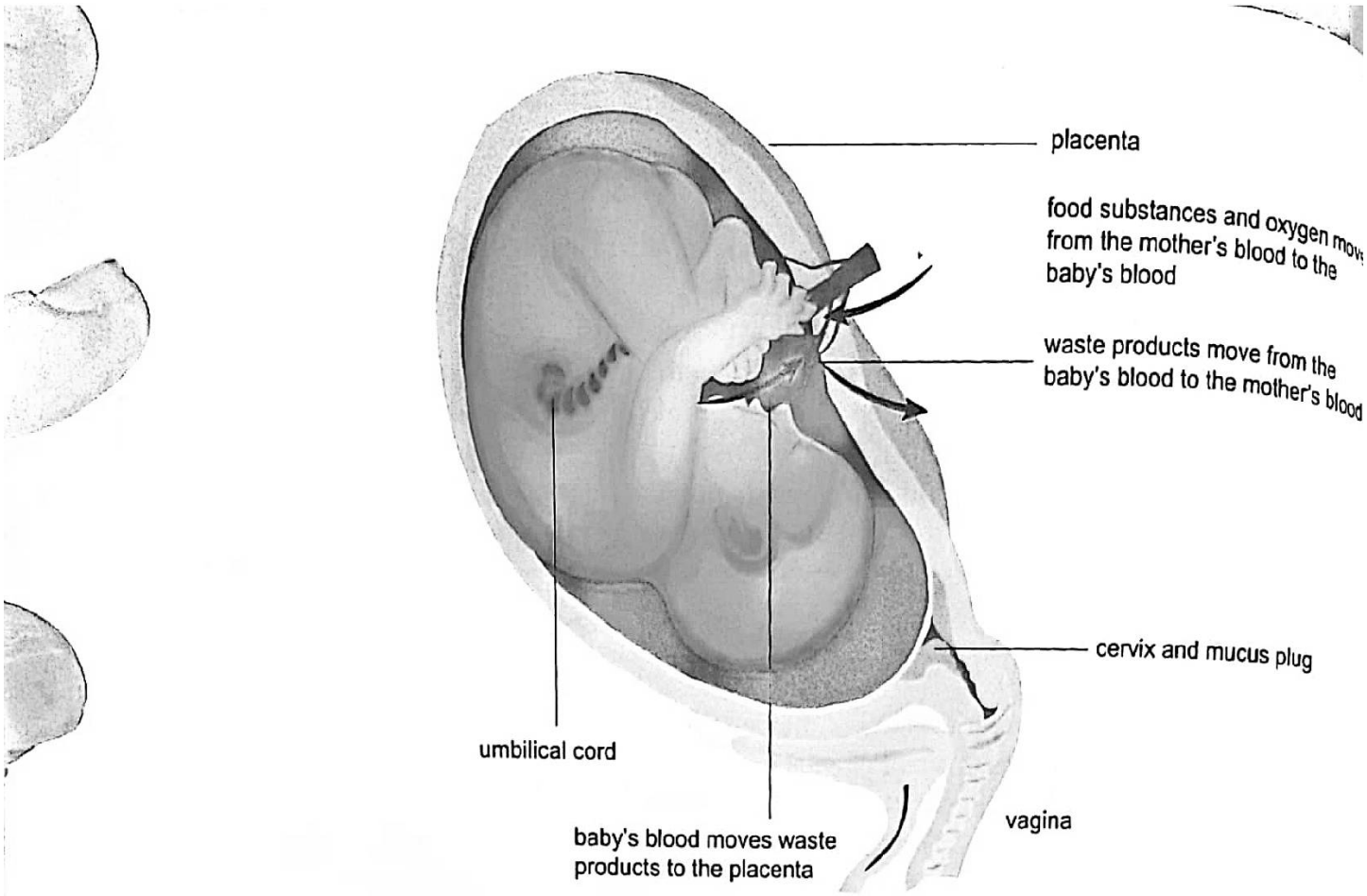


Figure 8.10 Foetus developing in the uterus

As the embryo grows into a baby, the placenta also grows. After week eight the embryo is called a foetus. Figure 8.10 shows the foetus and placenta.

The placenta develops many blood vessels and membranes to create a large surface area for the exchange of substances between mother and baby.
Nutrients like glucose, amino acids, fatty acids and glycerol, vitamins and minerals can enter from the mother to the foetus. Antibodies and oxygen also enter the foetus through the placenta. The placenta also removes waste products like carbon dioxide from the foetus.

Something interesting

About 20 percent of a pregnant woman's blood supply goes through the placenta every minute. When a baby is born, the placenta will be about 20 cm in diameter and weigh about 1.3 g.

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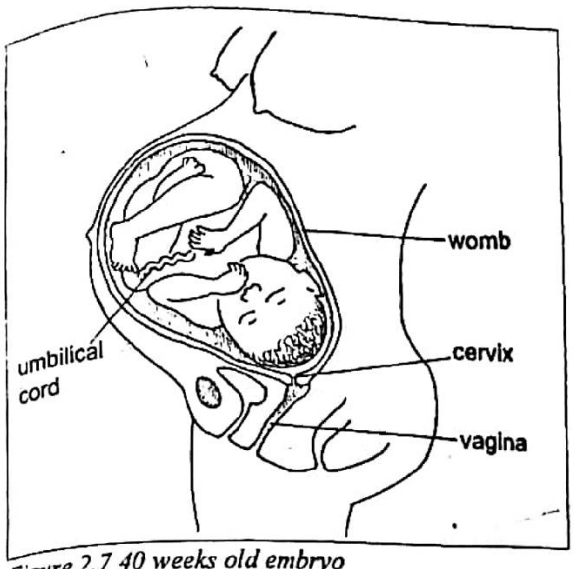


Figure 2.7 40 weeks old embryo

At 40 weeks the baby is now fully developed and is ready to be born. Most of the space in the uterus is filled by the baby. The baby can only kick very strongly but can no longer move around. When the baby is ready to be born it moves until its head faces down. Under normal circumstances a human embryo needs nine months to be well developed. The length of time the embryo spends in the uterus that is from fertilization to birth is called *gestation period.*

The birth process/child birth/labour

At the beginning the vagina is closed and so is the cervix. When labour starts the muscles of the womb start contracting pushing the baby down. The process is accompanied by pain. The contractions force the baby to push against the opening of the womb which is the cervix.

The bag containing the protective fluid bursts and this is called breaking of the waters. The baby is now pushed out through the vagina. The baby easily passes through the narrow opening because its bones are soft. The baby's head moves out first through the vagina. The rest of the body just slips through.

When the baby finally comes out the umbilical cord is cut and tied. When a baby is born it cries. If it does not cry the midwife beats the baby's bottom lightly. This is done to open up the lungs so that the baby starts breathing. Immediately the baby may start suckling.

A few moments after the baby is born the placenta is pushed out of the uterus and these remains are called the *afterbirth.*

Remember . . .

1. Reproduction is a process whereby young ones are produced.
2. Male and female sex cells are referred to as gametes.
3. Sperms are male sex cells and eggs/ova are the female sex cells.
4. Sperms are produced in the testes and eggs in the ovaries.
5. a) The oviduct can be called the fallopian tube/egg tube.
   b) The egg is the ova (plural)/ovum (singular).
   c) The uterus is the womb.
6. Fertilization in mammals is internal.
7. Fertilization is the joining/fusion of a sperm and an ovum to produce a zygote.
8. Implantation takes place in the uterus and this happens after fertilization which takes place in the oviduct.
9. Exchange of nutrients and wastes between foetus and mother occurs through the placenta.
10. When the baby in the uterus has fully developed and is ready to be born the walls of the uterus contract forcing the baby out. This process is called labour. The cervix then opens and the baby comes out through the vagina.
11. Different animals have different gestation periods.

Study questions

Paper 1: Multiple choice questions

1. In mammals eggs are produced in
   A ovaries
   B testes
   C uterus
   D scrotum
2. The period from fertilization to birth is called
   A reproduction
   B gestation
   C fertilization
   D implantation

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