

#110 Seed dispersal

The flowers produce seeds which can be **dispersed** by the **wind** or other **animals**, providing a means of **colonising new areas**.



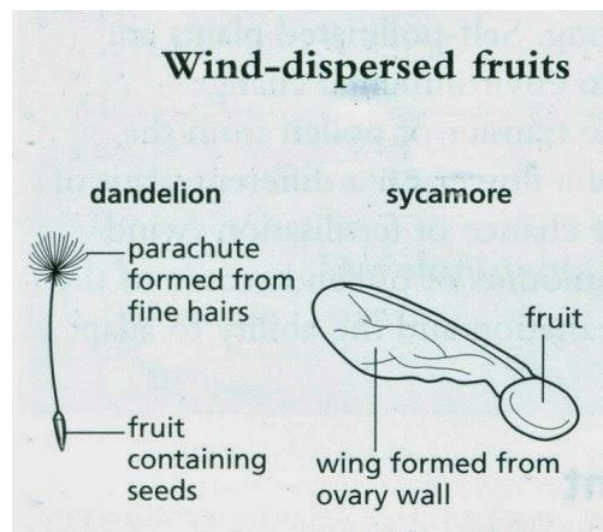
*Nutmeg is dispersed by birds.
Photo credit: russolab.unl.edu*

1. Wind-dispersed seeds

- Fruits contain seeds and usually have a **parachute** or a **wing** to help them be carried away from the parent plant by the wind.
- Examples: dandelion, sycamore

The **dandelion** fruit has a group of fine hairs called a pappus, which catches the wind and acts like a **parachute**. The fruit counterbalances the pappus.

The **sycamore** has a **wing** with a large surface area. When the fruit drops off the tree it spins, slowing down in descent. If caught by the wind the seed will be carried away from the parent plant, reducing competition for nutrients, water and light.



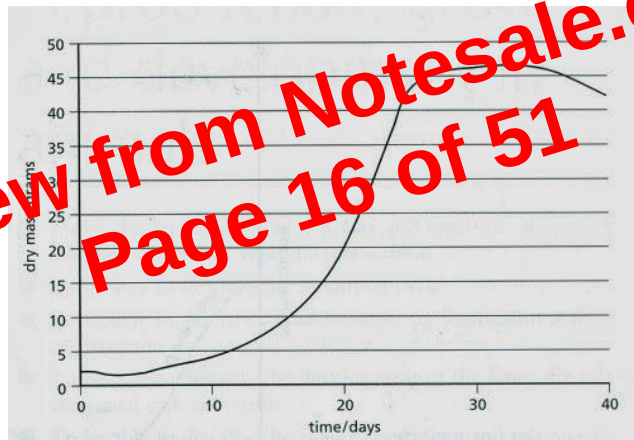
2. Growth

- due to an increase in cells, produced by mitosis.
- controlled by hormones (in animals) and growth substance like auxins (in plants).

Dry mass

- Often used as a measure of growth, because wet mass varies from day to day (e.g. plant will take up more water on a wet day than on a dry day, but the water does not all become part of the biomass – living material of the plant).
- Obtained by drying out the organism in an oven (killing it).
- Many individual have to be germinated at the same time and grown in the same conditions.
- Samples are dried at various times during the growth period.

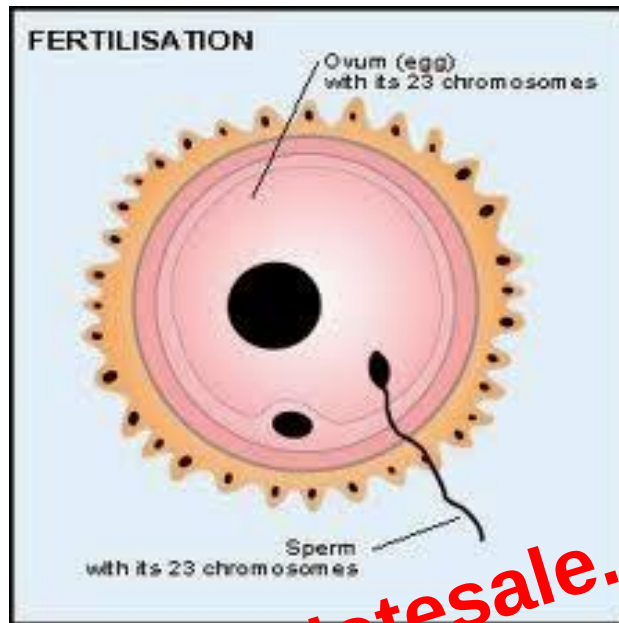
Example: Changes of dry mass during the growth of a plant from a seed.



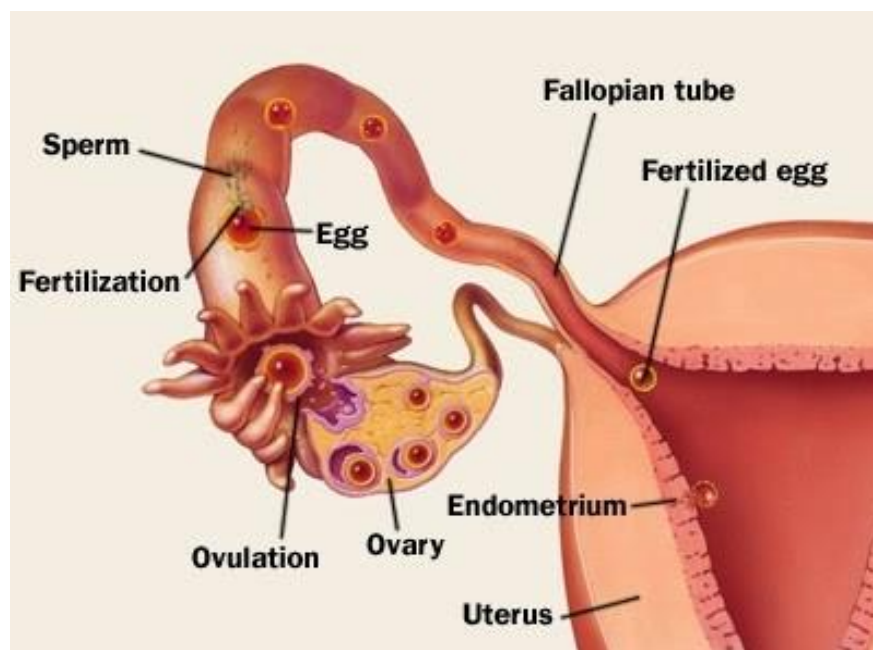
- ↓ slightly when the seed germinates, at day 2 (some of the stores in the cotyledon are being used in respiration).
- ↑ when the plumule starts to photosynthesise, and foliage leaves form to continue the process.
- ↓ at the end of the growth period (loss of seeds and fruits; leaves die).

#115 Formation of the fetus - fertilisation, implantation

After sexual intercourse, sperms swim through the cervix and the uterus into the oviducts, where they meet an egg. One **sperm** may **fertilise** the **egg** to produce a **zygote**.



After ovulation, the egg is caught in the funnel of the oviduct. Very slowly, the egg travels towards the uterus. If the egg is not fertilised by a sperm within 8-24 hours after ovulation, it will die. By this time, it has only traveled a short way along the oviduct. So a sperm must reach an egg while it is quite near the top of the oviduct if fertilization is to be successful.

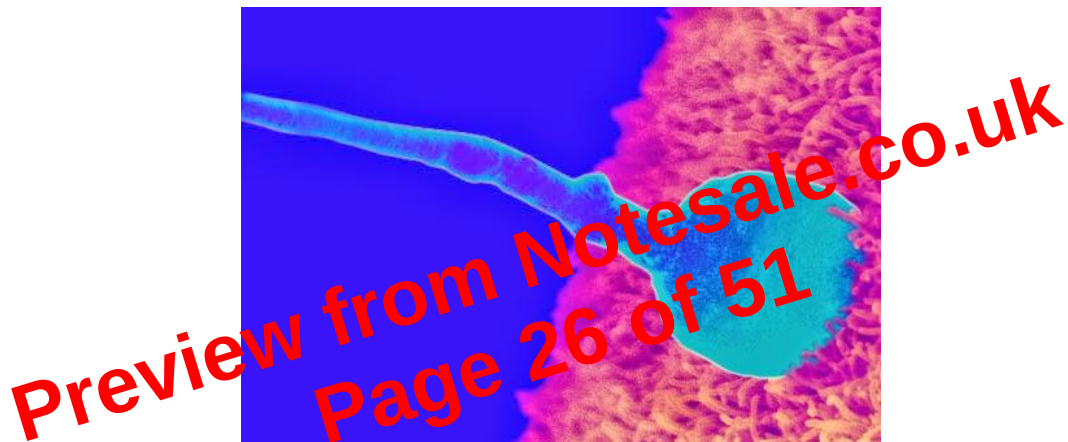


1. Sexual intercourse involves inserting the erect penis into the vagina.

- When stimulated, spongy tissue in the penis filled with blood and becomes erect.
- At the climax, semen is ejaculated from the penis into the neck of the vagina.
- Muscles in the wall of the sperm duct help to propel the semen forward
- The sperms with their tails swim from the vagina, through the cervix and uterus, into an oviduct.

2. Fertilisation happens in the oviduct

- ovum/egg pass down in oviduct
- a single **sperm penetrates the membrane of ovum** by secreting a protease enzyme; only the head of the sperm goes in, the tail is left outside.



Credit: Web MD

- the sperm nucleus and the egg nucleus **fuse** to form a **diploid zygote** = **fertilization**
- sperm can remain active in the oviduct for at least 2 days and the ovum may take a day to pass from the ovary to the uterus, so there is a fertile period of 3 to 4 days around ovulation when fertilization can happen.

3. The zygote implants in the uterus wall

- the zygote moves slowly down the oviduct. As it goes, it **divides** by mitosis.



Prevents mixing

This is really important because the fetus and mother may have different blood groups - any mixing could result in **blood clotting**, which could be fatal to both mother and fetus.

3. An amnion protects the fetus

The fetus is surrounded by a strong membrane, called amnion. Inside the amnion is a liquid called amniotic fluid.



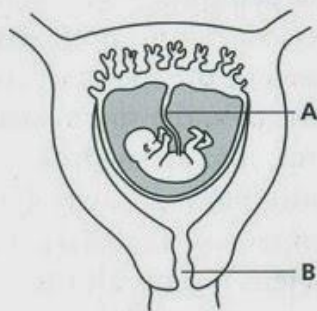
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The fetus in the amniotic sac. Credit: preventdisease.com

Amniotic sac: **membrane** from embryo cells: encloses fetus, prevents entry of bacteria

Amniotic fluid: supports, protects fetus from **mechanical damage**; **absorbs urine** released by fetus.

Try this



1 Figure 20.5 shows a fetus developing in the uterus.

- a) i) Copy the figure, and label parts A and B. [2 marks]
- ii) Outline **three** functions of the placenta. [3 marks]
- iii) The blood of the fetus and that of the mother flow close to each other in the placenta, but do not mix. State **two** advantages to the fetus of having a separate blood system from that of the mother. [2 marks]

Figure 20.5

Answer

a) i) **A**, umbilical cord ; **B**, vagina

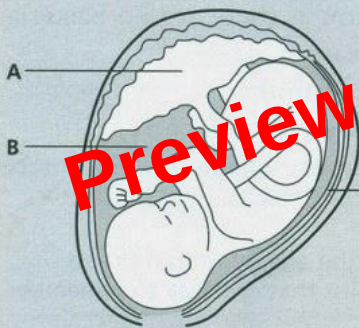
ii) **Tree** functions from:

- transfers O₂ from mother to fetus
- transfers nutrients (of named nutrients) from mother to fetus
- transfers CO₂ from fetus to mother
- transfers wastes (or named wastes) from fetus to mother
- allows the transfer of antibodies from mother to fetus
- prevents mixing of the blood of mother and fetus.

iii) Helps prevent bacteria passing from mother to fetus, the blood group of mother and fetus may be different.

Sample question and answer

Sample question Figure 20.6 shows a fetus developing in the uterus. Copy and complete the table below by identifying the parts labelled **A**, **B** and **C** and stating a function of each one.



Part	Name	Function
A		
B		
C		

[6 marks]

Student's answer

Part	Name	Function
A	placenta ✓	provides the fetus with blood containing oxygen from the mother X
B	amniotic fluid ✓	protects the fetus X
C	uterus X	contains the fetus during pregnancy X

Examiner's comments The description of the function of the placenta is very badly worded: the placenta prevents the blood of the mother and fetus from mixing. Answers containing biologically incorrect information are penalised.

Details about the amniotic fluid are too vague to gain the mark for the function. The correct answer was 'to protect the fetus from physical damage'.

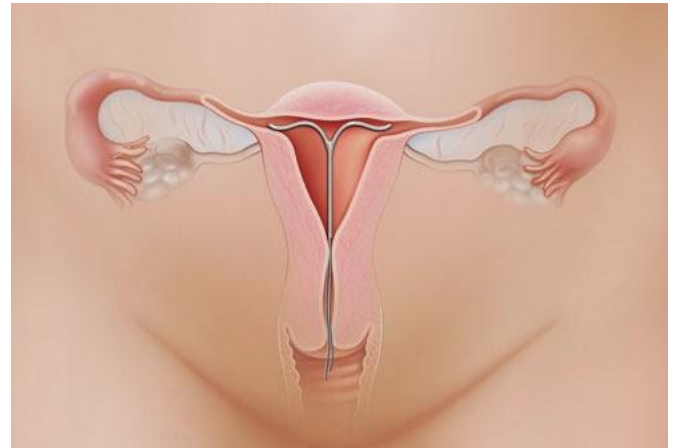
Part C is the amniotic sac, which contains the amniotic fluid.

IUD

IUD stands for intrauterine device, a T-shaped piece of plastic that is placed inside the uterus by a doctor.

The copper IUD, ParaGard, works for as long as 12 years. The hormonal IUD, Mirena, must be replaced after 5 years. Both types make it more difficult for sperm to fertilize the egg.

Fewer than eight in 1,000 women get pregnant.

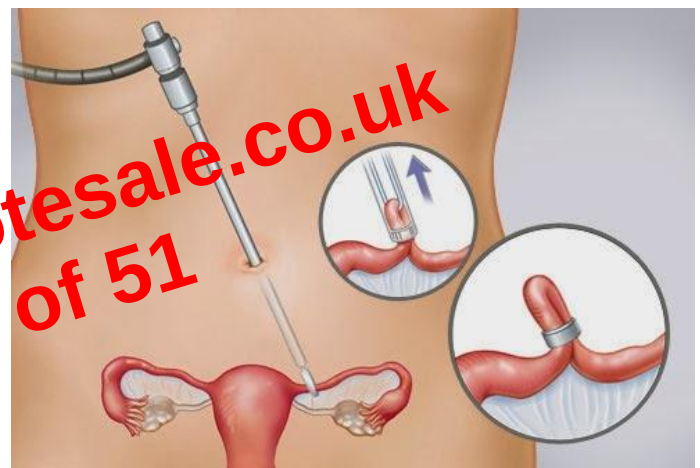


Surgical methods

Tubal Ligation

A surgeon closes off the fallopian tubes, preventing eggs from making their journey out of the ovaries.

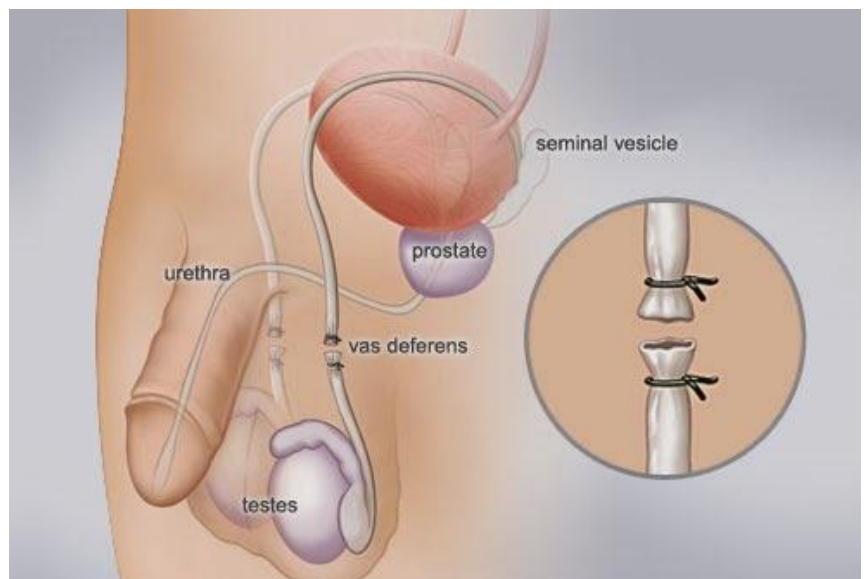
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Vasectomy

Besides condoms, a vasectomy is the only birth control option available to men. It involves surgically closing the vas deferens – the tubes that carry sperm from the testes, through the reproductive system.

This prevents the release of sperm but doesn't interfere with ejaculation.



- An egg is released from an ovary about once a month. If it is not fertilised, the thick lining of the uterus breaks down, in **menstruation**.
- The menstrual cycle is controlled by the **hormones** oestrogen, progesterone, FSH and LH.
- **Birth control** helps a couple to avoid having unwanted children. There are natural, surgical, mechanical and chemical methods.
- Hormones can be used to increase fertility.
- **Gonorrhoea** and **HIV/AIDS** are infectious diseases that can be transmitted by sexual contact.

In plants

- The **flowers** are the reproductive organs. Male gametes are made inside pollen grains, produced by anthers. Female gametes are made inside ovules produced by ovaries.
- The movement of pollen from an anther to a stigma is called **pollination**, and may be brought about by insects or the wind.
- After landing on a suitable stigma, a pollen grain **germinates** and the gametes travel down the style to the ovules. Here, **fertilisation** takes place and a **zygote** is produced. The zygote develops into an **embryo**, and the ovule develops into a **seed**. The ovary develops into the **fruit**, containing the seeds which contain the embryos.
- Fruits are adapted to **disperse seeds**, using animals or the wind.
- Seeds require certain conditions before they will germinate.