

Unit 2 – Topic 1

Sexual and Asexual Reproduction – Pupil Notes

1. Reproduction

- **Reproduction** is the production of **new members of a species**.
- For a species to survive it must produce sufficient young to replace those lost through old age, disease and other causes of death.
- **Reproduction** can be either **sexual** or **asexual**
- In **asexual reproduction** there is **only one parent**.

2. Asexual reproduction

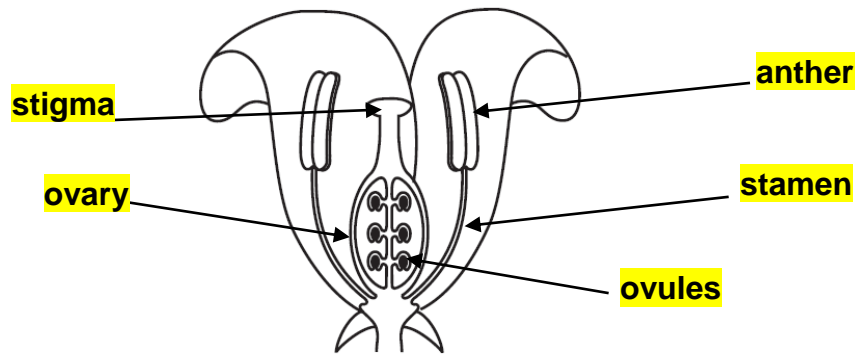
- **Asexual reproduction** involves on **one parent**.
- Ordinary cell division (mitosis) produces new cells identical to the original parent.
- This is how all living organisms **grow**. Their cells **divide** and multiply by replicating themselves.
- Some **unicellular organisms** reproduce this way by **asexual reproduction** e.g. bacteria and yeast.
- This produces cells which are **genetically identical** to the parent cell
- These **genetically identical organisms** are known as **clones**.
- Asexually reproducing organisms do not need to find a mate, so the energy that would have been used for sexual activity can be used for other things.
- Asexual reproduction does **not produce variation** as all **organisms are genetically identical**
- This means **all organisms** would be affected by changes in environmental conditions.

3. Sexual Reproduction

- **Sexual** reproduction involves **two parents**
- This involves the production **sex cell** which are called **gametes**, these are produced by special sex organs

4. Sexual Reproduction in Flowering Plants

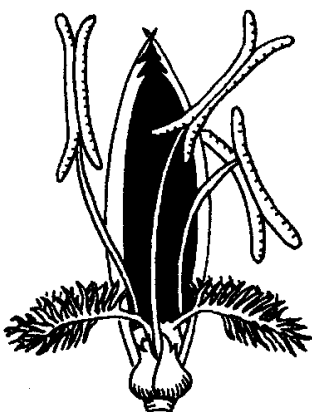
- The **anther produces pollen** which contains the **male gamete**.
- The **ovary produces ovules** which contain the **female gamete**.



Name of Structure	Function of Part
Stamen	Male part of flower made up of the filament and the anther
Anther	Produces pollen grains, which contain the male gamete.
Stigma	Female part of the flower. Traps pollen grains on its sticky surface.
Ovary	Produces ovules
Ovules	Contain the female gametes

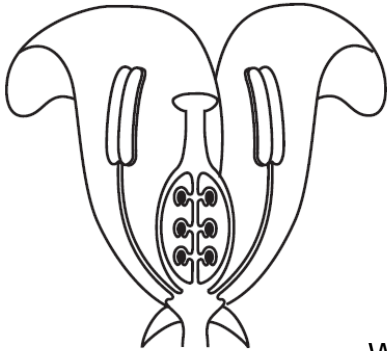
5. Pollination and Fertilisation

- **Pollination** is the transfer of pollen from the anther to the stigma. This can be performed by either wind or insects.
- In wind pollinated flowers



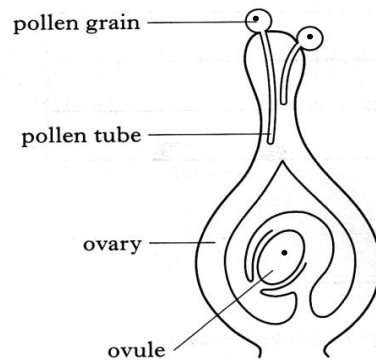
- Flowers are small without bright petals, scent or nectar
- Anthers hang outside flower so that pollen is blown away by wind
- Feathery stigmas hang outside flower so that they can catch pollen blown in the wind
- Pollen grains are light and smooth so that they are blown easily away.

- In insect pollinated flowers

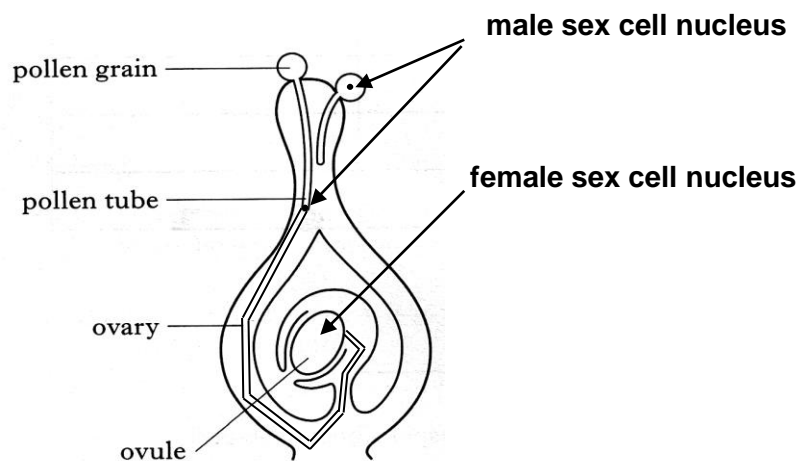


- Flowers large with bright petals, scent and nectar to attract insects
- Anthers and sticky stigma inside flower so that insect brushes against them
- Pollen grains are rough or sticky to catch onto insect.

- When a **pollen grain** lands on the stigma during pollination a sugary substance on the surface causes it to **grow a pollen tube**.



- The pollen tube **grows down into the ovary**. The **male sex cell nucleus** then leaves the pollen grain and **travels down the pollen tube into the ovary** to reach the female sex cell nucleus.

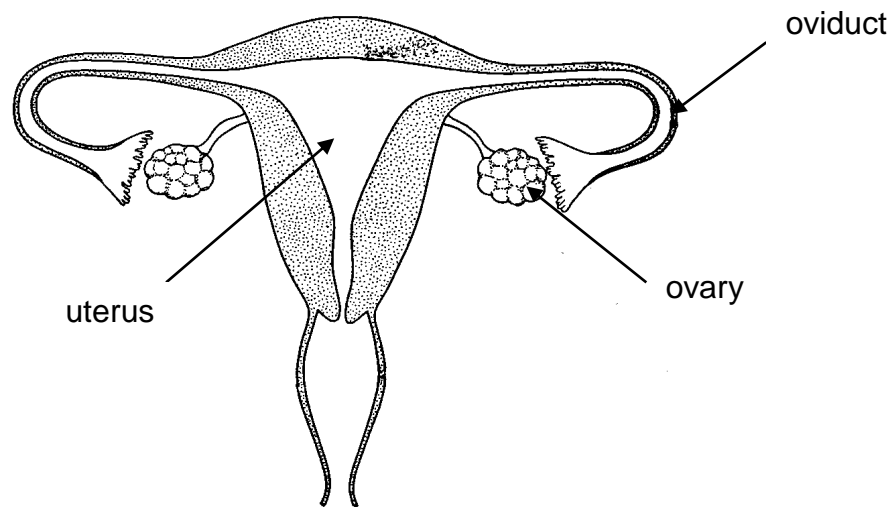


- **The fusion of the nuclei from the male and female sex cell is called fertilisation.** The fertilised egg is zygote which is referred to as a seed.

6. Sexual Reproduction in Animals

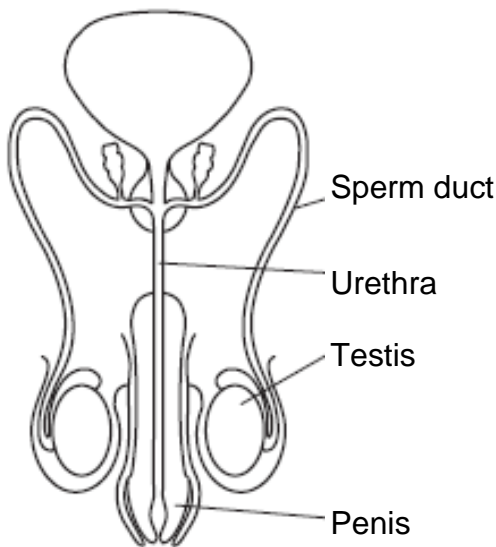
- In mammals the **male gamete** is **sperm** and the female **gamete** is the egg.
- The **sperm cell** consists of a head, which contains a **nucleus** and a **tail** to allow it to **swim**. A large number of sperm cells are produced.
- The **egg cell** is **larger** than the sperm and has a **food store**, it is unable to move on its own. It also contains a **nucleus**.
- The human reproductive organs are shown below

Female Reproductive Organs



Name of Structure	Function of Part
Ovary	Produces egg cells
Oviduct	Site of fertilisation in mammals
Womb	Where the embryo develops
Vagina	Where sperm cells are deposited

Male Reproductive Organs



Name of Structure	Function of Part
Testis	Produces sperm cells
Sperm duct	Transfers sperm from testis to penis
Urethra	Tube which carries sperm cells (and urine) out of body
Penis	Passes sperm cells into vagina

- To produce a new offspring by **sexual reproduction**, the nuclei of the female sex cell has to fuse with the nuclei of the male sex cell in a process called **fertilisation**.
- **Sexual reproduction** leads to **variation** in a species, this may lead to some individuals that are **better adapted** to a new set of environmental conditions.
- Fertilisation either occurs by **internal fertilisation** or **external fertilisation**

7. Internal Fertilisation

- Internal fertilisation occurs in land living animals as there is no water to carry the sperm to the egg.
- Internal fertilisation occurs in mammals in the oviduct of the female.
- Internal fertilisation occurs in the following stages
 - The egg cell is released from the ovary
 - The egg cell is moved along the oviduct by hair-like cilia
 - The nuclei of the sperm cell fuses with the nuclei of the egg cell during **fertilisation** forming a **zygote**
 - As soon as the egg has been fertilised a **fertilisation membrane** forms around the egg to prevent further entry of sperm.
 - The zygote then **divides** to produce a **ball of cells**. Further cell division occurs to form an **embryo** which will eventually develop into a new individual.

8. External Fertilisation

- External fertilisation is found in many aquatic animals e.g. fish and amphibians.
- In external fertilisation, sperm are deposited in water close to the eggs.
- Gametes are usually released at the same time during a courtship behaviour to increase the chance of successful fertilisation.
- Large numbers of egg cells are released during external fertilisation as there is a reduced chance of fertilisation.

9. Survival rates

- For a species to survive, it must be able to reproduce successfully.
- Animals which reproduce by **internal fertilisation** will have a better chance of successful fertilisation than those animals which reproduce by **external fertilisation** and will normally produce much **fewer eggs**.
- Also, those animals where there is a high degree of **parental care** (e.g. mammals) will have better chances of survival and these will also produce much **fewer eggs** than those with little or no parental care (e.g. fish).

The table below compares the survival chances for different animals

<i>Animal</i>	<i>Number of eggs produced</i>	<i>Type of fertilisation</i>	<i>Number of eggs fertilised</i>	<i>Parental care</i>	<i>Number of young surviving</i>	<i>Percentage of young surviving</i>
Pheasant	15	internal	12	yes	5	33.3
Rabbit	8	internal	8	yes	4	50
Human	1	internal	1	yes	1	100
Trout	3000	external	2000	no	150	5
Frog	1000	external	750	no	100	10

