National 4 Biology

Baldragon Academy

Unit 2: Multicellular organisms summary notes

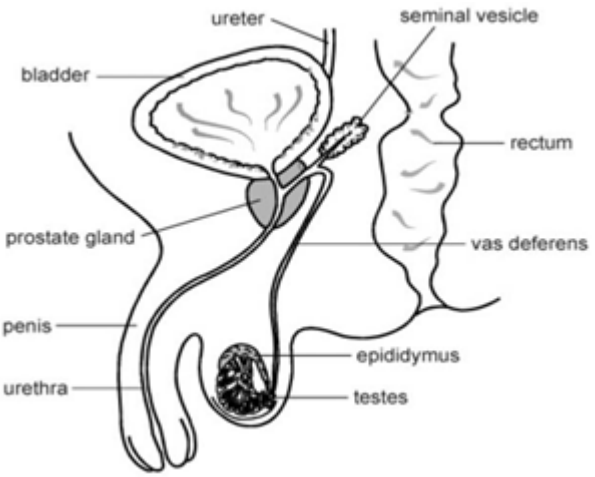
Key area 2.1 – Sexual and asexual reproduction and their importance for survival of species

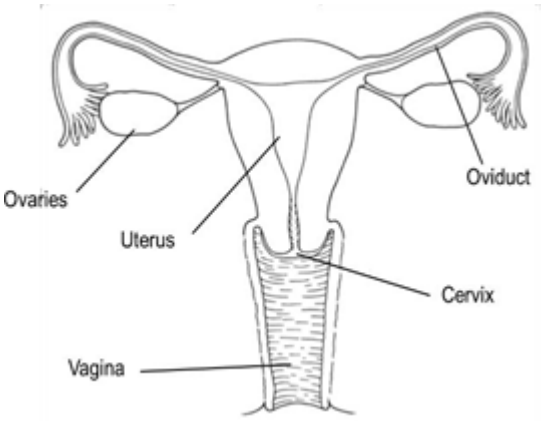
Sexual reproduction

Sexual reproduction involves 2 parents. Offspring produced are different from each other.
It is important for introducing variation between the offspring.
It also enables species to adapt to changing environmental conditions.

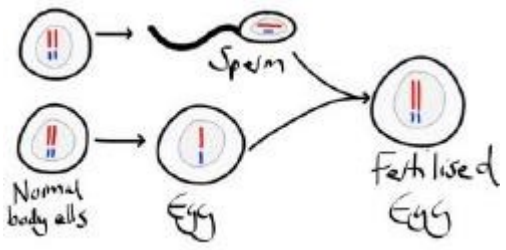
Fertilisation

Fertilisation is the process where the nucleus of the sperm fuses with the nucleus of the egg. The fertilised egg is called a zygote.

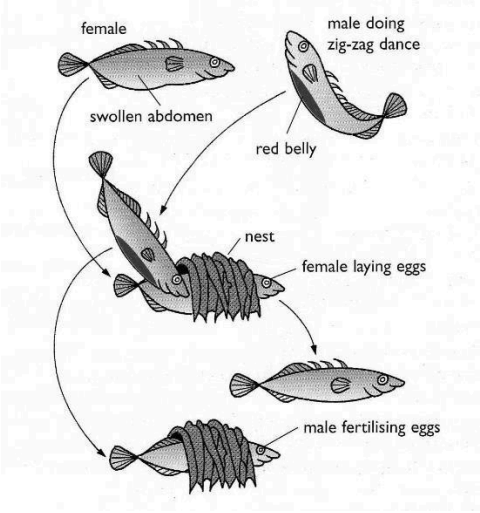




Sperm + egg → zygote



Fertilisation in fish



Internal	External
• Happens inside body • Baby protected in uterus • Small number of eggs fertilised	• Happens outside body • Large number of eggs fertilised

Asexual reproduction

Asexual reproduction involves just 1 parent.
All the offspring produced are identical to that parent.
There is no variation between offspring.
Asexual reproduction does not produce variation but it allows populations to grow quickly.

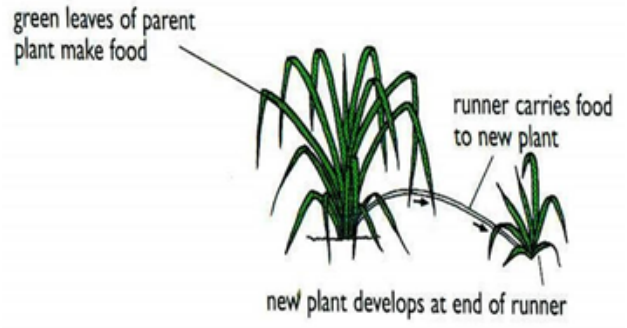
Key area 2.2 – Propagating and growing plants

Plant propagation

Plant propagation (produce new plants) can take place in a number of ways: sexually or asexually.
Sexual reproduction results in pollination by wind/insects, fertilisation and seed formation.
Asexual reproduction occurs through tubers, runners and bulbs.

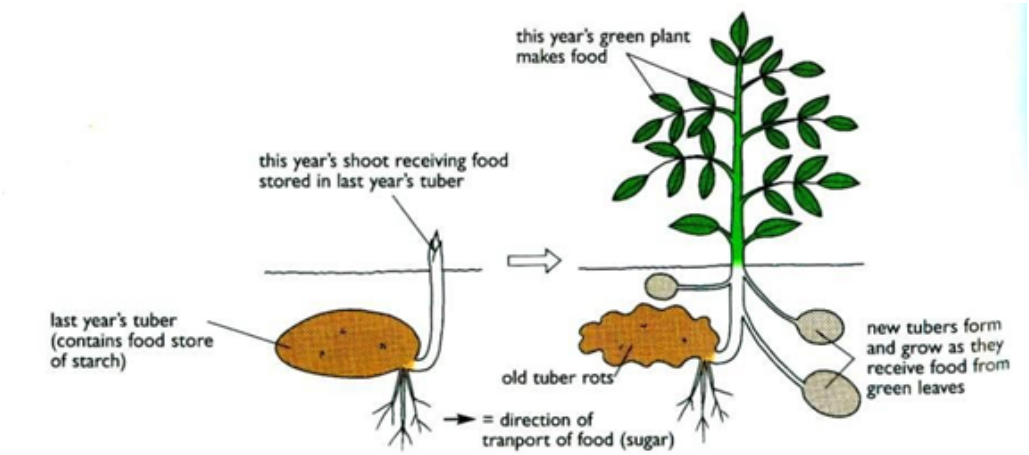
Runners

Runners are stems with buds on them that produce roots and leaves to form a new plant. Examples include strawberry and spider plant.



Tubers

Tubers are parts of plants that become swollen with stored food and grows into new plants. Examples include potato and sweet potato.

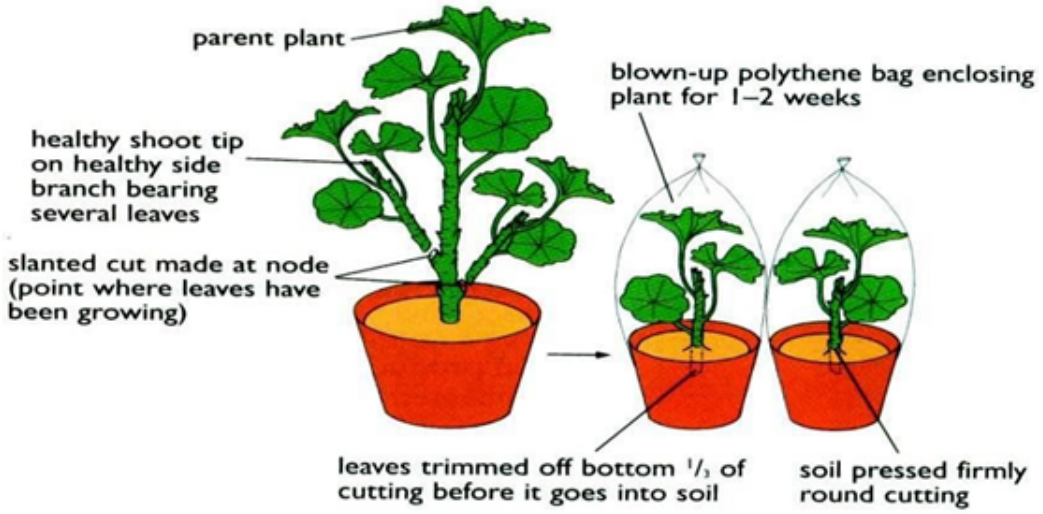


Bulbs

Bulbs contain swollen leaves and food which grow into new plants. Examples include onion, daffodil and tulip.

Cuttings

A cutting is an artificial method which involves part of the parent plant being cut off and planted in the soil. It will grow into a plant.



Advantages of Asexual Reproduction	Disadvantages of Asexual Reproduction
Offspring are identical to parents = desirable characteristics	Identical offspring are vulnerable to spread of disease
Gets food from parents so grows quickly	Offspring close together = competition

Key area 2.3 – Commercial use of plants

Commercial use

Plants are grown to provide food, fuel, raw materials and medicines.
They are also used for aesthetic reasons (making something look pretty).
Pharming is a type of genetic engineering that genetically modifies plants to produce medicinal products.

Food

Plants are grown as food, either for consumption by humans or food for livestock (cows, pigs etc).
These include, but are not limited to:
Strawberries
Bananas
Carrots
Peas
Potatoes
Tomatoes
Lettuce

Fuel

Biofuels are produced from plants as full or partial replacements for petrol and diesel.

Crops including sugar cane, sugar beet and maize can be used for petrol.

Crops such as rapeseed and sunflower produce oils that can make biodiesel.

Microscopic algae can be grown to produce fuels.

Medicines

People have always used plants for traditional treatments of illness and injury. Many plants have medicinal value:

Opium poppy provides pain relief.

Foxglove treats heart disease.

Willow provides pain relief.

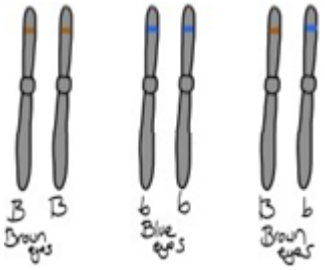
Key area 2.4 – Genetic Information

Genetic information

Your chromosomes contain all your genetic material. Chromosomes are made of genes.
Genes control characteristics (our features).
As we inherit half of our DNA from our father and the other half from our mother this ensures variation.

Words to learn

Phenotype – physical appearance
Genotype – set of genes. Shown by letters e.g. HH, Hh or hh.
Dominant – always shows up in the appearance (phenotype). Use a capital letter.
Recessive – both parents need to pass on the recessive gene for the offspring to have that appearance. Use a small letter.



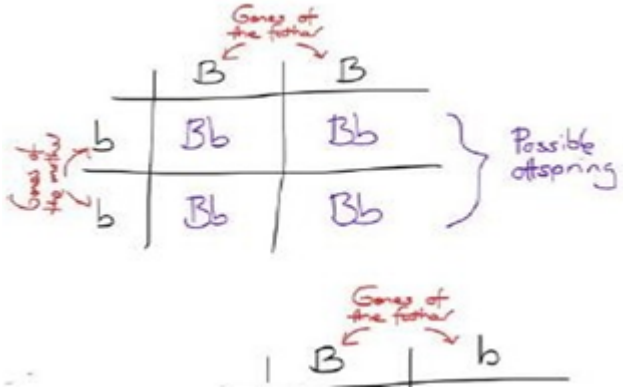
Genetics crosses

If we know what type of genes two parents have, we can predict what characteristics their children will have.

In this example we have a blue eyed mother and a brown eyed father. The mother must have two copies of the blue eyed gene (bb) because she has the recessive characteristic - blue eyes. The father could have Bb or BB. Let's assume in this case the father is BB.

We know that one chromosome will be inherited from the mother and one from the father but it is not possible to predict which one. We need to look at all the possibilities. We can do this by doing genetic crosses.

On one side of the cross we put the type of genes held by the mother. On the other side of the cross we put the type of genes held by the father. By completing the cross we can see the different gene combinations that can arise.



What if the father had a copy of both the brown and blue eyed gene (Bb)? What would our cross look like then?
Let's repeat the exercise but with the new genes for the father. In this case the possible gene combinations in the children are Bb, Bb (Brown eyes) and bb, bb (Blue eyes). This means the couple will have a 50:50 chance of having brown or blue eyed children.

Key area 2.5 – Growth and development of different organisms

Growth and development

The growth and development of different organisms can be influenced by different factors.
Water, oxygen and warmth are important for the growth and development of plants.
Humans need a balanced diet, water, minerals, vitamins and suitable conditions.

Main food groups

The three main food groups are:

- Carbohydrates e.g. bread, potatoes, pasta, lentils, carrots.
- Fat e.g. dairy products, meat, oily fish, vegetable oils.
- Protein e.g. meat, fish, eggs, beans, nuts.

These provide us with energy to fight disease, repair, grow, keep warm and move.

Requirements for growth

We need a **balanced diet** to ensure we have all the requirements for healthy growth and development.

This includes:

Water

Vitamins

Minerals

3 main food groups

Vitamin or mineral	Foods found in	Function in human body
Vitamin A	Milk, eggs, liver, carrots.	Prevent eye problems.
Vitamin B12	Fish, red meat, poultry, milk, cheese and eggs.	Helps make red blood cells.
Vitamin C	Citrus fruits, peppers, tomatoes, broccoli and spinach.	Healthy bones teeth and gums.
Vitamin D	Your skin makes it when you are in the sun! It is also found in egg yolks, oily fish	To absorb calcium (see below)
Calcium	Milk and other dairy products.	Strong healthy bones
Iron	Red meat, fish, lentils, beans, green leafy vegetables. Some cereals are also fortified with iron.	Helps red blood cells carry oxygen around the body.

Requirements for plant/seed growth

Seeds need **warmth, oxygen and water** to grow.

W O W!

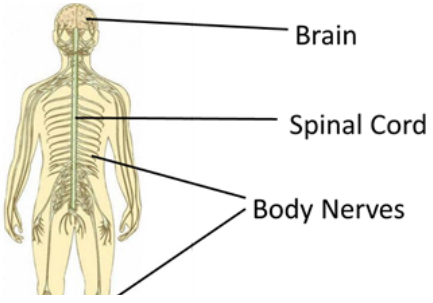
Plants also require minerals for healthy growth. Three minerals are required: Nitrogen (N) Phosphorus (P) Potassium (K)

Key area 2.6 – Biological actions in response to internal and external changes to maintain stable body conditions

Nervous system

The nervous system allows the different cells and organs of a multicellular organism to communicate with each other.
It is made up of three parts:
The brain
The spinal cord
The nerves

The CNS is made up of the brain and spinal cord.



Homeostasis

Homeostasis is the body keeping its internal conditions at suitable and stable levels.

Body temperature

The ideal body temperature for humans is 37˚C. It can be measured using a thermometer. If it rises above 40˚C it causes heatstroke. If it falls below 35˚C it causes hypothermia. Both can result in a coma and ultimately, death.

When body temperature increases, it results in:

- Increased sweating
- Decreased shivering
- Hairs lie flat
- Blood vessels get wider (vasodilation)

When body temperature increases, it results in:

- Decreased sweating
- Increased shivering
- Hairs stand up
- Blood vessels get narrower (vasoconstriction)

Blood glucose regulation

Cells need glucose for energy. Our bodies make sure that there is always enough glucose in the blood to give to cells to use for energy. The concentration of glucose in the blood has to be kept within narrow limits as too much or too little can cause severe medical issues.

Hormones are chemicals which send messages to different parts of the body. Insulin and glucagon are two hormones which control the level of glucose in your blood. They are made by the pancreas.

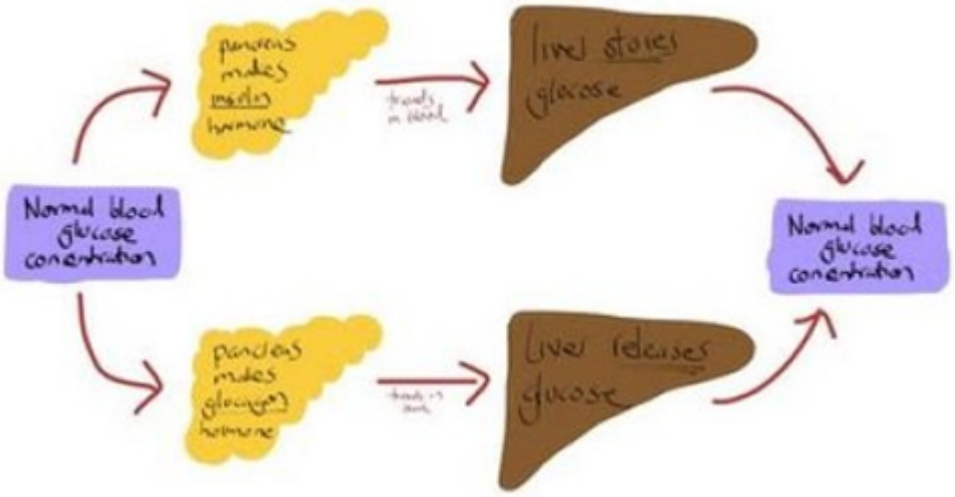
If there is too much glucose in your blood:

- Insulin is made by the pancreas.
- It tells the liver to store glucose until it is required.
- The **liver** is where excess glucose is stored.

If there is too little glucose in your blood:

- Glucagon is made from the pancreas.
- It tells the liver to release some glucose that it has stored back into the blood.

Diabetes is a medical condition in which the body cannot control blood glucose levels. There are 2 types:
Type 1 diabetes (pancreas can't produce insulin).
Type 2 diabetes (pancreas doesn't produce enough insulin).


pancreas makes insulin hormone
travels in blood
liver stores glucose
Normal blood glucose concentration
Normal blood glucose concentration
pancreas makes glucagon hormone
liver releases glucose