

UNIT 2 TOPIC 5

Pupil Notes

Growth and Development of Different Organisms

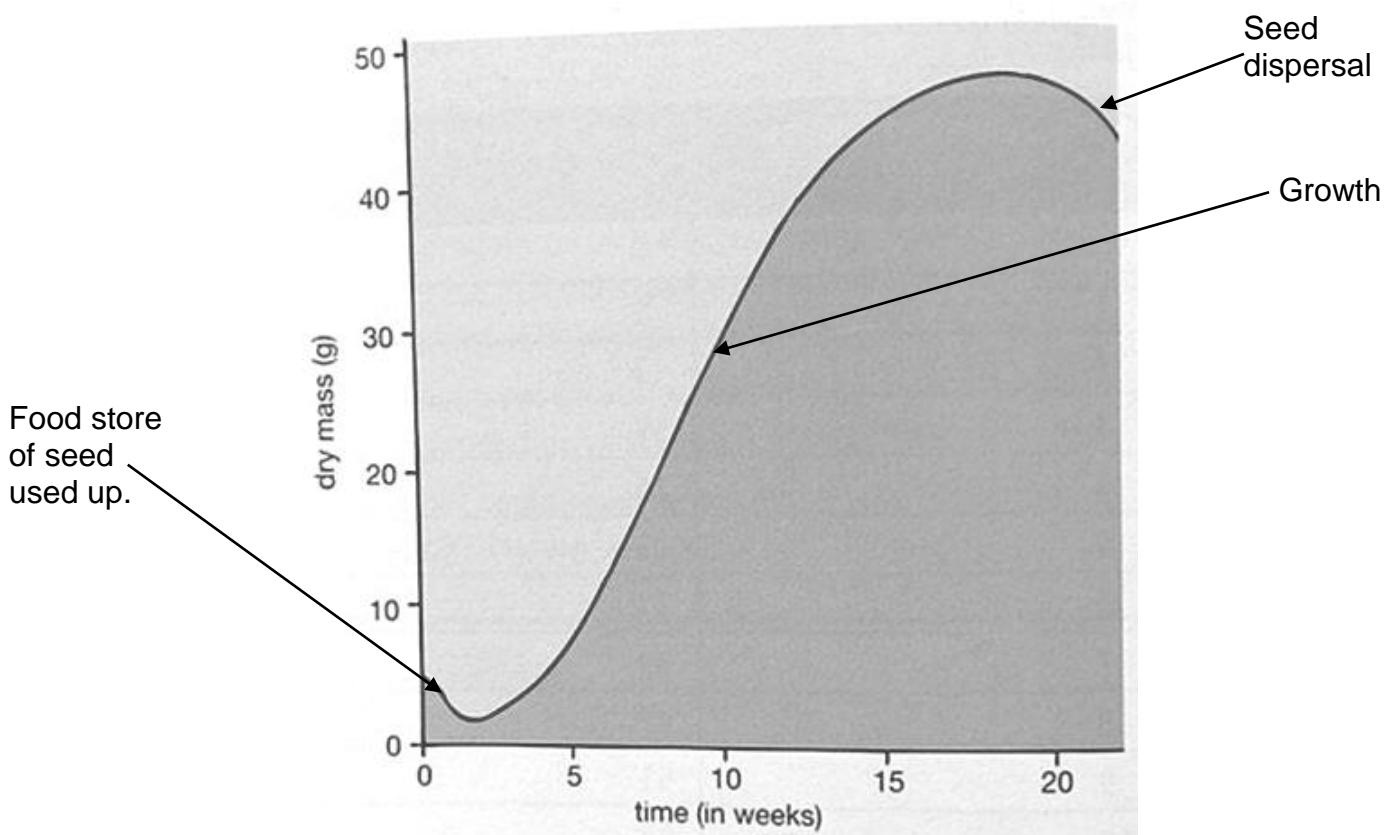
Growth

Growth is an **irreversible increase in dry mass** of an organism.

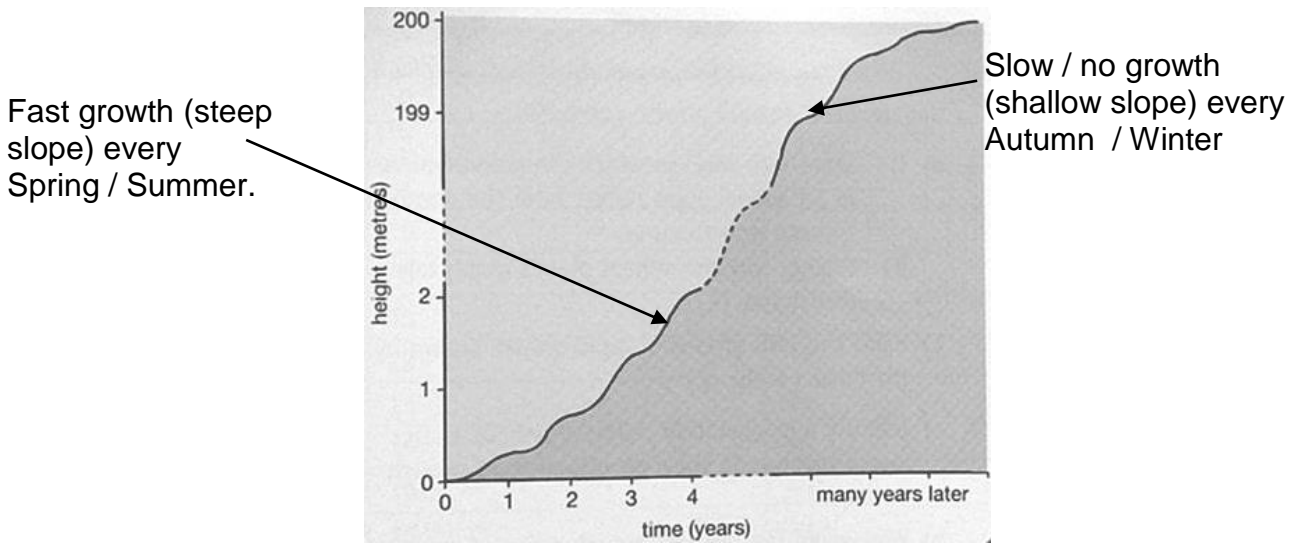
Different organisms grow in different ways. A **growth curve** can be used to track the growth of an organism.

A number of growth curves are shown below.

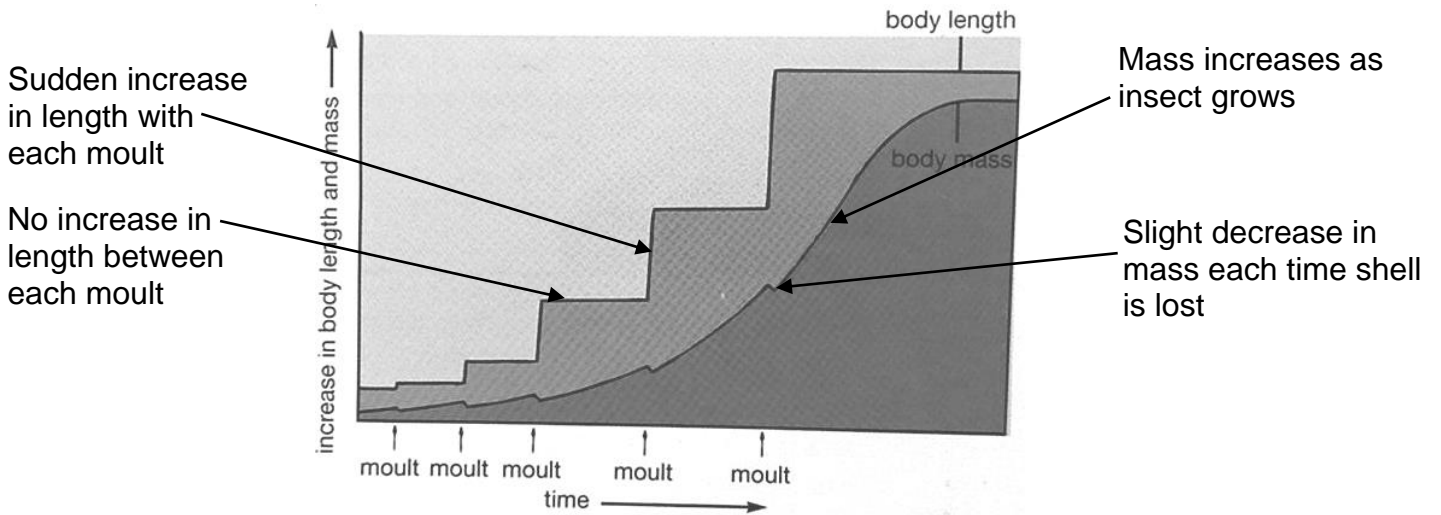
Annual Plant (only lives one year):



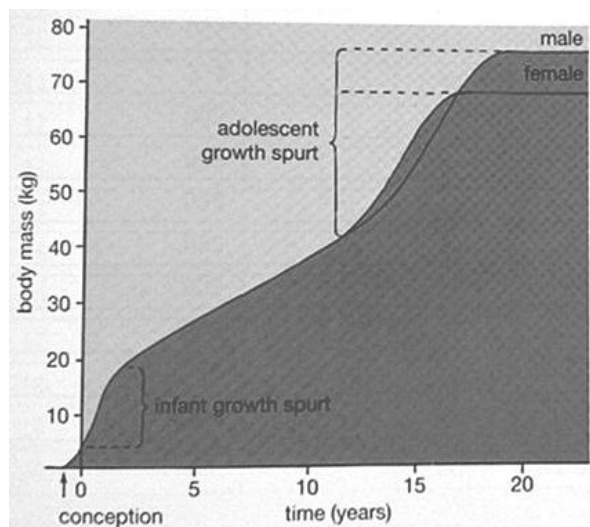
Perennial Plant (e.g. tree – lives for many years)



Insect (grows inside exoskeleton and moults)



Human

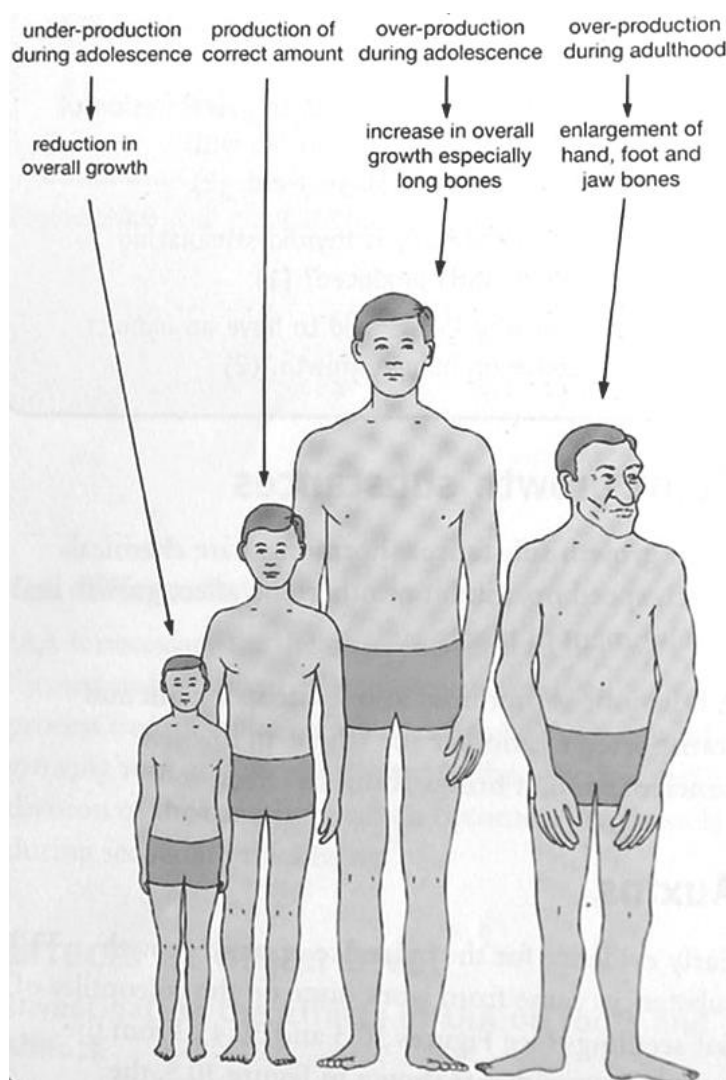


Hormones

Hormones control a number of things inside an organism including growth.

Hormones are special chemicals that are produced in one area of an organism and are transported elsewhere.

Growth hormone (also known as somatotrophin) is one such hormone in the human body. Its **over-** or **under-production** can lead to abnormal growth as shown below:



Food and Development

Food is required by the body to ensure healthy growth and development. If the correct chemicals are not taken into the body, certain aspects of growth and development cannot occur in the normal way.

Different food types have different uses in the body. A **balanced diet** (made up of carbohydrates, proteins, fats, vitamins and minerals) is essential for healthy development.

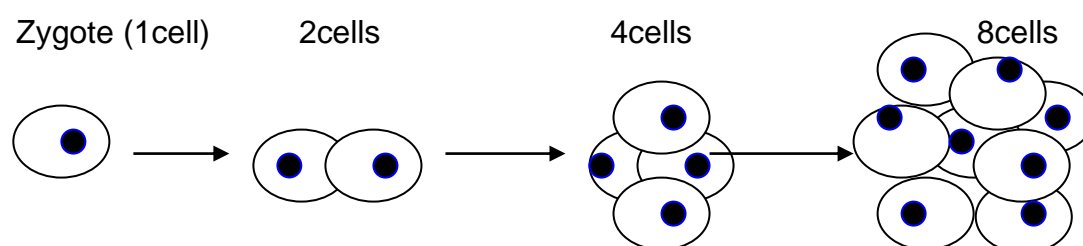
A **diet lacking in a particular vitamin or mineral** can cause problems in development, especially as a person is still growing.

Some of these problems are shown in the table below:

Diet Lacking...	Leads to...
Calcium	Weaker teeth and bones
Vitamin D	Rickets
Iron	Anaemia
Vitamin C	Scurvy
Protein	Problems making/replacing new cells
Fats	Poor vitamin absorption

Foetal Development

Following fertilisation, the fertilised egg (**zygote**) begins to divide by the process of **cell division**.



The fertilised egg divides to form 2 cells, which then divide to form 4 cells and so on.

The cells become **smaller** as cell division takes place.

Stages of Human Development

- Fertilisation takes place in the **oviduct**.
- When the fertilised egg reaches the **uterus** it becomes embedded in the uterus wall, which has a spongy lining rich in blood.
- The growing embryo gets its food through the **umbilical cord**, which is attached to the **placenta**.
- The embryo is **protected** by the **amniotic fluid** present in the uterus.
- The fluid is inside a water sac (**amnion**).
- When the baby is born the placenta is also expelled from the mother's body.

The Placenta

The placenta is a large disc which has many finger-like villi sticking into the uterus wall where there is a rich supply of maternal blood.

In the placenta OXYGEN and FOOD pass from the mother's bloodstream to the baby's bloodstream. CARBON DIOXIDE and WASTE pass from the baby's bloodstream to the mother's bloodstream.

However, many undesirable chemicals (that can have a **negative** effect on growth and development) can pass from the mother into the developing baby.

If the mother smokes, drinks alcohol or takes drugs during pregnancy they will pass via the placenta into the baby's bloodstream. For example:

NICOTINE: from cigarette smoke has a negative effect on the growth of the baby in the womb. Babies born of mothers who smoke are more likely to be small.

ALCOHOL: If a mother drinks alcohol during pregnancy, this can lead to **foetal alcohol syndrome**, which affects the baby's growth and mental development.

CANNABIS: It is possible that taking cannabis during pregnancy could cause problems for the developing baby, including: **low birth weight** and **learning problems in later life**, as cannabis may have subtle effects on a baby's developing brain.

HEROIN: Has serious risks for a developing baby and can even be fatal. Babies who are exposed to heroin in the uterus have a high risk of **premature birth**, being **born too small**, having **breathing problems** at birth and **needing a longer stay in hospital**. If a pregnant woman takes heroin during pregnancy, her baby could also have **withdrawal symptoms**. The risk of **cot death** for babies exposed to heroin in the uterus is also much higher than average. As they grow older, children who were exposed to heroin in the womb may also have problems with **growth, intelligence** and **behaviour**.

Development in Plants

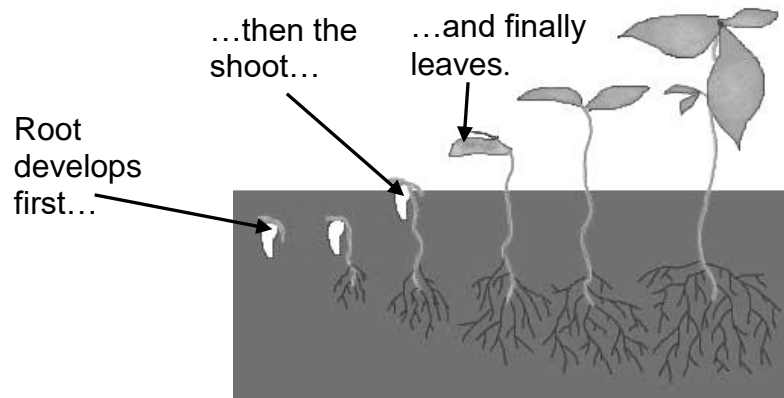
Plants also need certain chemicals and conditions in order to grow and develop properly.

Requirements for Germination

Once a seed has been dispersed, it may begin to develop into a plant, provided the conditions are correct. **GERMINATION** is the start of growth in the seed.

The embryo plant inside the seed needs energy to start growing during germination. This energy is provided by the food store in the seed.

The stages of germination are shown below:



But germination does not just happen immediately after being dispersed. The seed requires a few important factors before germination can take place.

In order to germinate, a seed needs 3 things:

- WATER (allows the seed to swell up and the embryo to start growing)
- OXYGEN (so that energy can be released for germination)
- WARMTH (germination improves as temperature rises - up to a maximum)