## variation

• Variation
Variation is the differences between individuals of the same species. Those variations that can be inherited are determined by genes. They are genetic variations. Variations may be brought about by genes, but can also be caused by the environment, or a combination of both genes and the environment.There are variations that are not heritable but determined by factors in the environment. The tan is an acquired characteristic. You cannot inherit a suntan. Black skin, on the other hand is an inherited characteristic.

## Discontinuous Variation

* Discontinuous variation In discontinuous variation, the variations take the form of distinct, alternative characteristics with no intermediates. Some people can roll their tongue into a tube. Others are unable to do it. They are known as non-tongue rollers. Again, there are no intermediates. Discontinuous variation cannot usually be altered by the environment. You cannot change your eye colour by altering your diet. A genetic dwarf cannot grow taller by eating more food. You cannot learn how to roll your tongue. Discontinuous variation is under the control of genes.

## Continuous Variation

* Continuous variation An example of continuous variation is height. There are no distinct categories of height; people are not either tall or short. There are all possible intermediates between very short and very tall. Continuous variation is influenced by a combination of both genetic and environmental factors.

## Causes of Variation

| Environmental variation : | Inherited Variation : |
|---|---|
| Variation in the characteristics caused by an organism's surroundings | variation in characteristics caused by and organism's parent |
| eg : scar by an accident | eg: natural eye and hair colour |

## DNA

DNA
Is the substance found in the nucleus of every cell in an organism.It carries information about how the organism develops and functions moreover DNA causes inherited variation. DNA is also known as the genetic material.

## Chromosomes

Chromosomes
Structure containing a molecule of DNA, which carries genetic information in genes
nucleus ----> chromosome ----> DNA -----> Gene
One extremely long DNA molecule is folded up together with some proteins to form a structure called a chromosome.

## Genes

Certain sections of a DNA molecule in a chromosome contain instructions for a characteristic. These sections are called genes.Genes control and determine the characteristics

## Sexual Reproduction

For sexual Reproduction to occur an organism need to produce gametes ( male gametes - sperm ) ( female gametes - egg). These are specialised cells that only contain half the normal number of cells and their nuclei only contain half the normal number of chromosomes.
human gametes -----> 23 chromosomes
total chromosomes -----> 46 chromosomes
Fertilisation
A male gamete and a female gamete need to fuse so that their nuclei become on which will cause 23 + 23 = 46 chromosomes. This process is known as fertilization and forms a fertilized egg cell.
Fertilization in humans
The tip of the sperm cell contains acrosome which is a jelly like substance that allows it to break through the jelly layer and cell membrane of the egg cell.Once the sperm cell has broken through the egg cell the nuclei of the sperm cell and the egg cell fuse.nThe sperm cell and the egg cell nucleus each have half the number of chromosome needed to make a new human . When they fuse the new cell contains a new combination of DNA , half of the mother and half of the father.
Embryo
Small ball of cells that develops from a fertilised gg cell. It becomes attached to the uterus lining and develops into the fetus

## Mitosis

| | |
|---|---|
| Mitosis is nuclear division giving rise to genetically identical cells. | meosis is reduction in which chromosome number is halved from diploid to haploid resulting in cells which are genetically different |
| it occurs in somatic cells | it occurs in germ cells |
| nucleus divides only one | nucleus divides twice |
| equational division | reduction division |
| two daughter cells are formed | four daughter cells are formed |
| daughter cell from somatic organs | daughter cells form gamete |
| number of chromosome is same in parent cell and daughter cells | number of chromosomes is daughter cell reduce to hald |
| no crossing over in chromosomes | crossing over occurs in chromosome |
| daughter cells are genetically identical | daughter cells ar egenitically different |

note :

A haploid nucleus is a nucleus containing a single set of unpaired chromosomes present , for example : egg and sperm cells

A diploid nucleus containing two sets of chromosomes preset , for example : body cells

## The Earth's structure and plate movement

Tectonic Plates
The Earth has four main layers - the inner core, the outer core, the mantle and the crust.
The inner core is 5,500°C - extremely hot. It is a very dense solid made from iron and nickel.
The outer core is 2,000 km thick and is a liquid.
The mantle is semi-molten and about 3,000 km thick.
The crust is the rocky outer layer. It is thin compared to the other sections, approximately 5 to 70 km thick.
The crust is made up of pieces called plates.
There are two types of crust: oceanic and continental crust.
The oceanic crust is found under the sea and is thinner and more dense than the continental crust.
Plate boundaries: where two or more plates meet.

## Plate Movement

It is believed that heat from the Earth's core caused convection currents in the mantle and that these currents slowly moved the crust around.
Earthquakes and volcanoes are primarily found at plate boundaries.
The plates are like giant rafts that slowly move around. At the boundaries between plates, molten magma is able to force its way to the surface and escape as lava.

## Constructive (divergent) plate boundary:

Two plates move away from each other.
• When two oceanic plates move away, magma rises to the surface (convention current) and solidifies when it comes in contact with cold ocean water.
• The magma turns to lava and forms new basaltic ocean crust.
• They can also form shield or basic volcanoes and have non-explosive eruptions.
• Small Earthquakes are triggered.
• If two continental plates move away from each other, a rift valley may form.
An example of a constructive plate boundary is the mid-Atlantic Ridge.

## Destructive (converging) plate boundary:

Two plates move towards each other.
• When an oceanic plate and continental plate move towards each other, the denser (oceanic) plate is forced down (subducted) under the lighter(continental) plate.
• This happens in the subduction zone and an ocean trench is formed.
• The friction between the plates triggers Earthquakes.
• The heat produced due to friction turns the descending plate into magma.
• The magma starts to rise and erupt (due to pressure) through a weakness in the crust as an explosive composite volcano.
An example of a destructive plate boundary is where the Nazca plate is forced under the South American Plate.
• Fold mountains are also formed.
• The magma that erupts at the surface forms a chain of volcanic islands
• If two continental plates move towards each other, the sediments between the two plates are compressed (collision zone) and pushed upwards to form fold mountains.
Eg Himalayas
• Earthquakes occur, but no volcanic activity as there's no subduction of oceanic plate.

## Conservative plate boundary:

• Two plates slide past each other.
• They move in different speeds.
• The plates get locked together and pressure builds up until it is released as an Earthquake.
The magnitude (strength) of an Earthquake is measured using a seismometer on the Richter scale.

## Fossilization

A fossil is the preserved remains or traces of a dead organism. The process by which a fossil
is formed is called fossilisation.
It's very rare for living things to become fossilised. Usually after most animals die their bodies
just rot away and nothing is left behind. However, under certain special conditions, a fossil can
form.
After an animal dies, the soft parts of its body decompose leaving the hard parts, like the
skeleton, behind. This becomes buried by small particles of rock called sediment.
As more layers of sediment build up on top, the sediment around the skeleton begins to
compact and turn to rock.
The bones then start to be dissolved by water seeping through the rock. Minerals in the water
replace the bone, leaving a rock replica of the original bone called a fossil.

## Magnetic Reversal

At the center of the ridge, hot magma pushes up through the crust and hardens into rock. Once the magma hardens, the alignment of magnetic domains in the rock is frozen in place forever. Magnetic domains are regions in the rocks where all the atoms are lined up and pointing toward Earth's north magnetic pole.
The newly hardened rock is gradually pushed away from the ridge in both directions as more magma erupts and newer rock forms. The alignment of magnetic domains in this new rock is in the opposite direction, showing that a magnetic reversal has occurred.