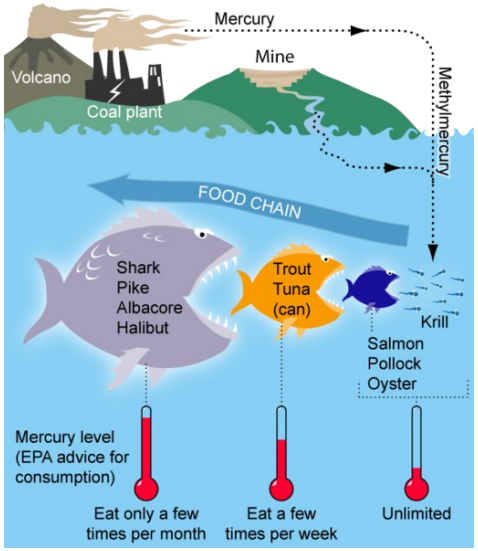
SCIENCE

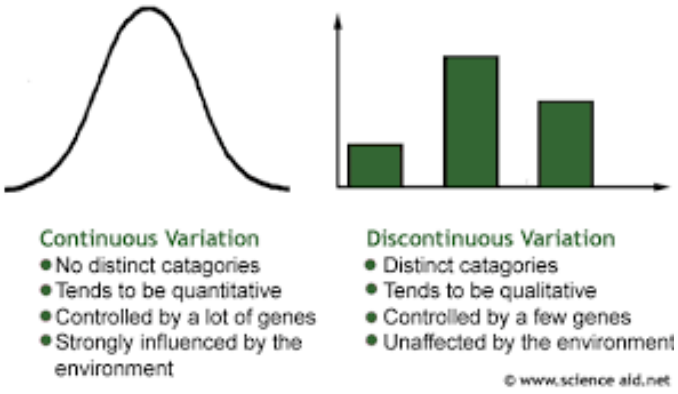
Year 9: Environment

1) Bioaccumulation



- A contaminant gets into the environment (such as mercury or DDT).
- These contaminants don't break down naturally.
- The primary consumer eats a small amount and is unaffected.
- The secondary consumer eats a few primary consumers an the contaminant builds up in their systems.
- This means the tertiary consumer or apex predators will consume a large amount of the contaminant and this can cause them harm.

2) Variation



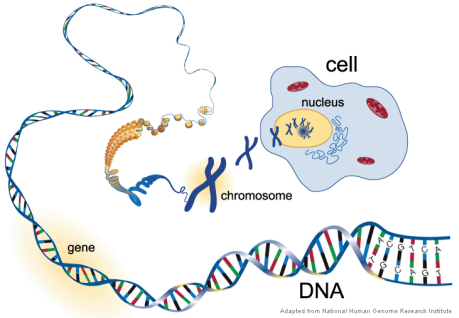
Examples of continuous variation are height, hair colour etc.

Examples of discontinuous variation are blood type, eye colour and inherited diseases eg. Cystic fibrosis.

Keyword	Meaning	Keyword	Meaning
Bioaccumulation	A process of build up of chemicals in an organism that takes place if the rate of intake exceeds the rate of excretion	**Allele**	Different versions of the same gene.
Variation	A change or slight difference in something within a certain limit.	**Dominant allele**	When there are two different alleles in a gene, the dominant allele is expressed.
Genotype	The full set of genes within the organism	**Recessive allele**	The trait will only be expressed if 2 recessive alleles are present.
Phenotype	The observable characteristics of an organism.	**Natural selection**	The process whereby organisms better adapted to their environment tend to survive and produce more offspring
Gene	A section of DNA that codes for a particular protein.	**Selective breeding**	Involves choosing parents with particular characteristics to breed together and produce offspring with more desirable
DNA	A molecule that carries the genetic information. It makes up a chromosome.	**Biodiversity**	the variety of plant and animal life in the world or in a particular habitat

3) Genetics

- Everyone inherits half of their chromosomes from their mother and half from their father through the sperm and egg combining (fertilisation)
- All the inherited genes make up the genotype of the organism.
- A gene codes for a characteristic eg. Hair colour. You could get one allele from your mother and one from your father. Eg. Brown hair from one, red from the other.
- The dominance of the alleles you inherit will determine your phenotype (what colour hair you have)



- It is possible for you to be a carrier of a recessive characteristic. You won't appear to have it on the outside, but your offspring could inherit it from you.

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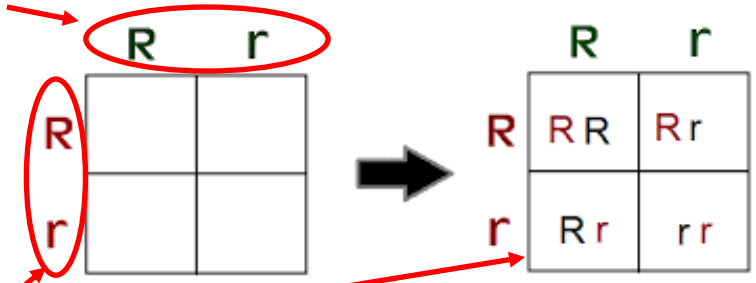
4) Punnet Squares

Punnet squares help to work out how likely a person will inherit a particular characteristic from their parents.

These are the alleles from the egg. The capital letter shows the dominant allele.



These are from the sperm.

These are all the possible combinations of alleles the offspring could inherit.

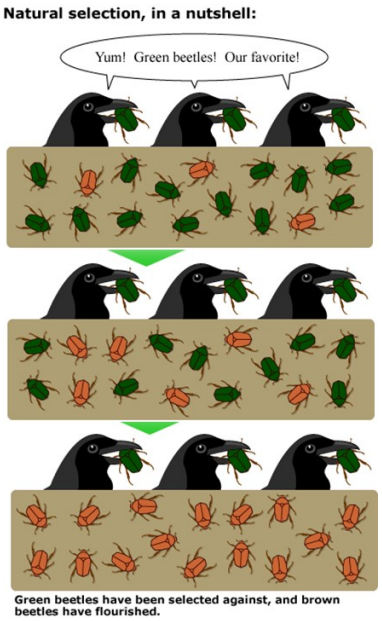
Here there's a 75% chance of inheriting the dominant trait and a 25% chance of inheriting the recessive.

5) Natural Selection

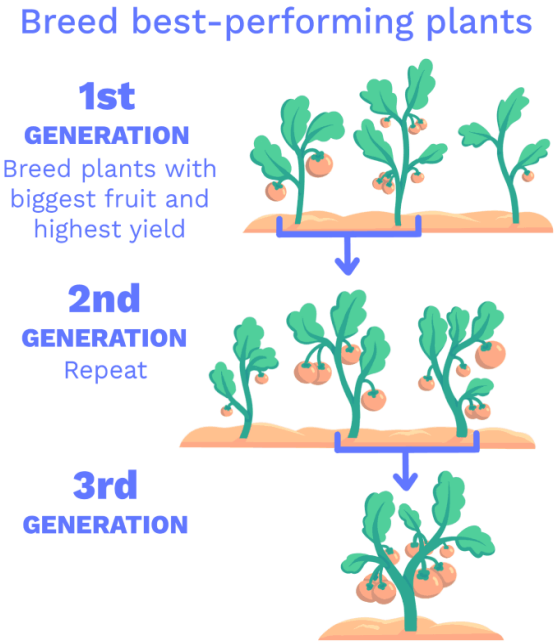
The theory of evolution states that evolution happens by natural selection. The key points are that:

- individuals in a species show a wide range of variation
- this variation is because of differences in their **genes**
- individuals with characteristics most suited to the environment are more likely to survive and reproduce
- the genes that allow these individuals to be successful are passed to their offspring

Eventually, after many generations, this leads to changes in the population.



6) Selective breeding



Uses the same ideas as natural selection, but it's entirely driven by humans, not the environment.

The basic principles are:

- Individuals in a species show a wide range of variation.
- Humans choose the characteristic that is beneficial to them eg. Cows that produce more milk, sheep that produce more wool, dogs that don't shed fur, flowers with particular colours etc.
- The breed together individuals with the desired characteristics for many generations.
- This leads to offspring with the desired characteristics.

7) Biodiversity

Biodiversity has 3 components:

Species diversity

The number of different species

The abundance of each species in an area.

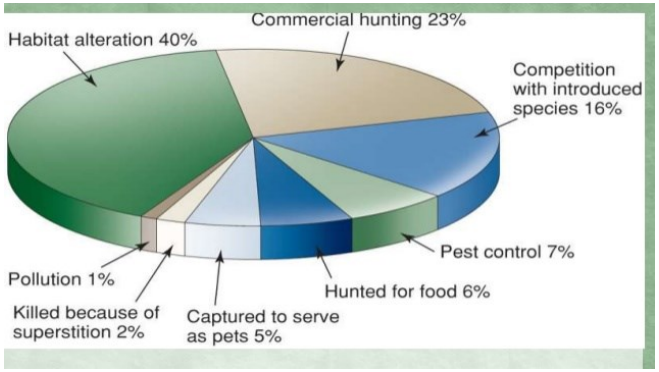
Genetic diversity

The variation of alleles within a species (or a population of a species)

Ecosystem diversity

The more different habitats there are the greater the species diversity.

The Bottleneck Effect, The Founder Effect and Selective Breeding are three ways that genetic variation can be reduced in a population.

Reducing genetic variation means reducing the number of different alleles.

This increases the risk of extinction as well as the examples below.