Classification and Biodiversity

Living organisms show a range of sizes, features and complexity. Two of the major groups we learn about can be grouped as follows:

Plants	Animals
Flowering - like daisy, rose, dandelion.	Vertebrates - have a backbone like birds, snakes, humans.
Non-flowering - like mosses and ferns.	Invertebrates - do not have a backbone like insects, spiders.

Classifying and naming organisms - Traditionally based on morphological features but more recently DNA analysis has been used to more accurately group organisms to show how related they are.

DOMAIN	The largest groups. There are 3 domains. Eukarya (which contains 4 of the 5 kingdoms) Bacteria and archaea.
KINGDOM	There are 5 kingdoms: animals, plants, fungi, single celled organisms and bacteria.
PHYLUM	Groups get smaller and organisms
CLASS	more similar as they have more
FAMILY	**morphological features** (body structures) in common.
GENUS	The first part of an organism's scientific name. Starts with a capital letter, e.g. Panthera.
SPECIES	The second part of an organism's scientific name, e.g. tigris.

Panthera tigris

Scientific names are used as they are **universal**. Language barriers or the use of common names for organisms could be confusing. The use of these names from the binomial system by all scientists **avoids any confusion**.

Adaptations

Living things become adapted to their habitat.

These adaptations may be **morphological**.

Fennec foxes who live in hot climates have large ears to radiate heat away from their bodies.

Arctic foxes have small furry ears to reduce heat loss.

Adaptations may also be behavioural; the Fennec fox is mostly nocturnal (awake at night) and burrows under the sand to avoid the heat of the day in the desert.

Competition

All organisms compete for survival.

Animals compete for:

- food, territory and mates.

Plants compete for:

- light, water and minerals.

Interspecific competition - competition between different species.

Intraspecific competition – competition between members of the same species.

Other than competition, the size of a population is changed by: **predation, pollution or disease**.

Biodiversity

Biodiversity is a measure of:

- the variety of different species in a particular area
- the numbers of each of those species in a particular area.

It is important as it provides:

- food and potential foods
- industrial materials
- new medicines
- and enhances human well-being.

Biodiversity and endangered species can be conserved and protected by:

- Convention on International Trade in Endangered Species
- Sites of Special Scientific Interest
- captive breeding programmes
- national parks
- seed/sperm banks
- local biodiversity action plans.

Measuring biodiversity

Plants

To measure the biodiversity of plants in an area or to investigate the different distribution of plants we can use a **quadrat**.

It is important to take a **random sample** of an area to avoid collecting **biased data**.

A **larger sample** will give a valid estimate of the number of plants in the area.

Quadrat

1. Lay out two tape measures at right angles.
2. Use a pair of dice or a random number generator to generate co-ordinates.
3. Place the quadrat at those coordinates
4. Count the different species and the number of each in each quadrat.
5. Take a mean number of each species of plants from all the quadrats collected.
6. Multiply up to estimate how many in the whole area.

Quadrat, usually a 1 m square grid.

Measuring the distribution of plants can be carried out using quadrats set in a row 1m apart. This will give you an idea of how plant life changes along a particular route, e.g. along a seashore. This is called a **transect**.

Measuring biodiversity

Animals

Measuring the biodiversity of animals can not be achieved using quadrats as animals may move quickly out of the area.

Instead scientists use the **capture/recapture technique**.

Method

1. Carefully collect organisms found in 1 area without trampling habitat or leaving litter.
2. Mark the organisms and return them to the same area they were collected from.
3. Leave time for organisms to reintegrate into their community.
4. Return and again collect as many organisms as found, collect as those already marked and unmarked samples.
5. Use an equation to calculate the estimated population size.

When using capture/recapture data, assumptions made include:

- no death
- immigration or emigration
- marking technique does not affect chances of survival.

Biological Control

Biological control - The use of one organism to control the population size of another species by eating it. This is often the use of a predator species to control the number of a prey species that have become pests. A lot of research is needed to make sure that any alien species introduced into a habitat does not become invasive and affect the native species populations. A lot of research is needed to prevent any species introduced having a negative effect on non-targeted species.

Predator	An animal that hunts and eats another for food.
Prey	An animal that is eaten by a predator.
Pest	An organism that eats a crop plant.
Native species	An organism that lives in the country.
Alien species	An organism introduced into a country in which it does not normally live.
Invasive species	An alien organism that has had a negative effect on the native species.