

Biology Unit: Living Things

Misconceptions

What some pupils think.....	Notes to aid misconception.....
The arrows on the food chain diagram.	The arrows represent the direction of energy transfer.
Snakes are invertebrates. **Huge misconception**	Pupils compare snakes to worms and therefore presume that snakes are invertebrates. Snakes are reptiles and have vertebrate. You could use the example of a King Cobra to aid this.
Plants and seeds are not alive.	Pupils think that because they do not see a plant moving that it is not living. They struggle to understand that plants move slowly and move to face the sun. You could use an example of the mimosa plant to show direct movement.
An animal's habitat is like its 'home'.	A habitat meets all the environmental conditions an organism needs to survive. For an animal, that means everything it needs to find and gather food, select a mate, and successfully reproduce. The habitat is more like a village than a home has it includes all resources not just the area where they sleep.
Fire is living.	Because fire moves and seems to have a life of its own, many pupils then think that this means it is a living organism.
The death of one of the parts of a food chain or web has no or limited consequences on the rest of the chain	They do not seem to understand that all animals rely on each other for food. Those animals exist in an ecosystem where many factors influence a food chain. Eliminating one organism often has a severe consequence. It could be that other organisms will increase or they could decrease.
There is always plenty of food for wild animals.	Wild animals especially predators often go without capturing prey. In some areas human growth means, there is less food for the animals that are already living in that habitat.
Animals are only land-living creatures	They do not see invertebrates, fish, and other creatures as being animals.
Animals and plants can adapt to their habitats; however, they change.	Students need to be told that adaptations especially, in mammals take a long time. They cannot quickly change their features to fit a changing environment.
All changes to habitats are negative.	Because pupils see many negative media about climate change, they then presume that if a habitat changes it is negative. This is not always the case. If an animal has an adaptation that suits the habitat change then that organism will thrive.
All plants start out as seeds.	Although this is mainly true, that is not always the case. Some plants such as strawberries can reproduce via asexual reproduction and the plant grows from the vine of the parent plant. Rather than a seed.
All plants have flowers.	Only angiosperms have flowers, Trees are plants they do not have flowers. Flowers are beneficial for plants that require pollinators to reproduce.
Plants that grow from bulbs do not have seeds.	Plants are complex organisms. They can have numerous different ways of developing and growing.
Only birds lay eggs.	Many other organism make eggs even two mammals the duck billed platypus, and the spine haired anteater. In addition, fish lay eggs.
All microorganisms are harmful.	Due to there being a big push about bacteria and disease, pupils often think that that means that all microorganisms are harmful. Remind pupils that they have many bacteria contained in the human gut, and if it were not for these microorganisms then our bodies would not be able to function.

Mushrooms are plants.	Mushrooms are actually the fruiting bodies of fungi. Fungi is its own kingdom, which is composed of hundreds of different species. They are not plants and they are not animals.
All cells are the same and have the same function.	There are ranges of different cells that have many different functions. For example, a plant can have palisade cells and root hair cells. Root hair cells help with water and mineral uptake. Palisade cell play a role in photosynthesis
Plants do not have cells	This is due to the pupils not thinking the plants are living organisms. As above, they have numerous cells, tissues, and organs.
Plant and animal cells both have a cell wall **MASSIVE MISCONCEPTION **	Pupils seem to think that an animal cell has a cell wall. To make this very clear get pupils to think about the shape of the cell. Draw animal cells as circles or irregular shapes. Plant cells are drawn as rectangles to show that the cell wall creates rigidity
Sperm cells are the same size as tadpoles and have eyes so they can see where they are going ** Huge misconception**	Due to how sperm is drawn pupils associate the shape with looking like a tadpole. They then presume that because of this then the sperm must be able to see where it is going. They struggle to understand that a sperm cell is microscopic which could be due to them thinking that you can see semen so that must be sperm. Try to have scale drawings up so pupils can see that they are extremely small.
Cells can be seen with the naked eye	Not seen by the naked eye and you certainly cannot see organelles with a naked eye. Using a light or electron microscope.
Cells are 2 dimensional	Cells are 3D. They also do not have a 100% fixed shape as that can change with the movement of substances in and out.
Biological drawing and drawing in art are the same	They are not. When you are biologically drawing then you do not use colour, cross-hatching. You simplify what you can see and draw with continuous lines.
Nucleus is the brain of the cell **Stays with pupils till KS4**	It is not a brain, it does not think. It contains genetic information and controls the activities of the cell.
Animal cells are more complex than plant cells	Animal and Plant cells actually contain many of the same features. At KS3, they learn more plant organelles than animals.
Cells only have a nucleus, cell membrane and cytoplasm.	Animal and plant cells contain many organelles.
Cells can be seen without being stained	Staining the organelles means that the organelles become visible. If you do not make the organelles visible then you will not be able to see them
Skin is not an organ	Skin is actually the largest organ of the human body. It is an organ because it is composed of many different
Plants are not multicellular **Secondary school problem**	This again stems from the fact that pupils do not believe that plants are living. They see them as sedentary inanimate objects. This is not the case. They are multicellular and very complex, containing different organs, tissues and systems.
Humans have one system	Humans have many different systems that allow us to get the nutrients and oxygen we require to exist.
All organisms are multicellular	They do not see unicellular organisms as being living things. Unicellular organisms are abundant in nature and vital for other organisms.
Diffusion happens in all states.	Diffusion happens in liquids and gases
Herbivores predate plants	Animals that eat plants do not predate them. Predation only refers to a predator seeking out and capturing prey.
All animals are carnivores	Animals can be herbivores, insectivores, frugivorous, and omnivores. What an animal eats depends on; the habitat they

	exist in, and what is available. If every animal were a carnivore then there would not be enough prey.
Plants don't produce their own food	They think that plants get all their nutrients from the soil. This is not the case. Photosynthesis Water + Carbon dioxide → oxygen + glucose. They then use the glucose and oxygen for respiration.
Bioaccumulation- Predators consume more of a toxin and that's why they are affected.	Bioaccumulation occurs because the predator is at the top of the food chain. This means that more of the toxin will build up in the organism as it continues to eat food that have higher levels of the toxin in.
***Respiration is breathing *** This is one of the biggest misconceptions pupils have when they start secondary school	Respiration is a chemical reaction that occurs in ALL living plant and animal cells. Aerobic respiration (in the presence of oxygen) in plant and animal cells Glucose + Oxygen → Carbon Dioxide + water vapour (+ energy) Anaerobic respiration (without oxygen) in animal cells Glucose → Lactic acid Anaerobic respiration (Without oxygen) in plant cells Glucose → Ethanol + Carbon dioxide Breathing is the exchange of respiratory gases (Oxygen and Carbon dioxide) between the body and the surroundings through the respiratory system.
Respiration only happens in animals.	Respiration happens in plants and animals. This process occurs in all cells 24/7.
Respiration only occurs when you are exercising	Respiration is a process that happens all the time. If this process stopped then so would you.
Mitochondria is a separate living organism inside the cell.	Mitochondria is an organelle inside the cell. It produces ATP, the universal energy molecule.
Only females have mitochondrial DNA	Males also have mitochondrial DNA.