

**Adaptation:** It is any attribute of the organism (morphological, physiological, behavioural) that enables the organism to survive and reproduce in its habitat. Many adaptations have evolved over a long evolutionary time and are genetically fixed.

It can be any morphological, physiological, or behavioural trait of an organism that allows it to survive and reproduce in a habitat or ecosystem. Adaptation is a biological mechanism by which an organism gradually gets more acclimated to its surroundings.

The natural environment is a constantly changing elements of our planet. This changing environment ensures that the species that are capable of adapting survive and have an advantage over organisms that do not adapt. The competition caused by adaptations is critical to the evolution process. The changes in the structure of organisms aid in their survival in an environment.

### **Structural adaptations**

These are distinctive adaptive traits of an organism's body, such as color, skin, and shape. These modifications enable organisms to survive in their natural habitat or ecosystem. Animals have structural modifications that give them a competitive advantage and they exhibit a variety of structural adaptations, such as powerful claws to catch prey or dig tunnels (e.g., Mole), whale blubber for buoyancy and heat insulation, woodpecker beaks to peck into trees to find insects for food, and so on.

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### **Physiological adaptations**

These are adaptive mechanisms found in organisms that allow them to undertake specific metabolic activities to live in their natural habitat. Animals' physiological adaptations enable them to compete, help to protect themselves from enemies, and kill their prey (e.g., venom production in snakes) and help mammals to maintain a constant body temperature.

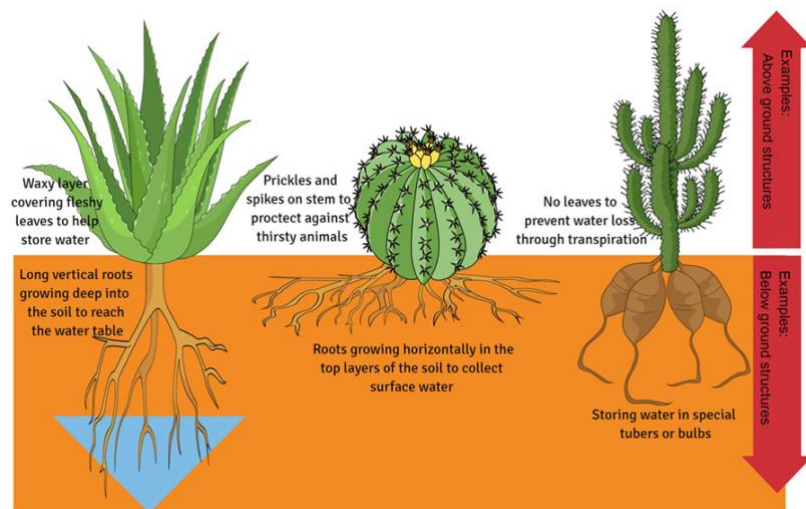
### **Behavioral adaptations**

These are the behaviors that an organism exhibits to survive in its natural habitat. Animal and avian migration, hibernation, and aestivation are regarded as behavioral adaptations. Animal behavioral adaptations are behaviors that give them an advantage, such as luring opposite sexes, protecting themselves, breeding, and so on. Mating rituals, such as a male peacock bird displaying his tail feathers to lure a female partner, are an example.

Plant life, like animals, is dependent on a variety of basic survival needs. Light, air, water, nutrients, soil, and a proper climate are all required for growth. However, not every habitat provides the necessary needs. As a result, to live in such conditions, plants have evolved specific physiological, behavioral, and morphological adaptations.

## Desert plants

- Desert plants have spines to avoid excessive evaporation of water.
- Succulent stems and leaves to retain moisture.
- Long, deeper roots that can take water from the Earth.
- Plants grow short to conserve energy.
- Seeds remain dormant until they get the water needed to thrive.



## Aquatic plants

- Aquatic plants have adapted stems and roots for nutrient and air uptake.
- The top portion of the root partially arises from the water to allow photosynthesis.

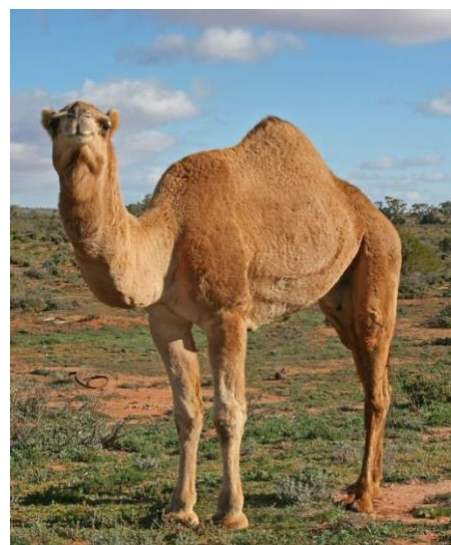
## Polar plants

- Polar plants have a small stature, hairy appendages, and a dark color.
- Because deep layers of permanently frozen ice inhibit roots from penetrating through the permafrost, only plants with shallow roots can flourish in the tundra.
- Trees retain dead leaves for insulation.

## Desert animals

### Adaptations:

- **Water conservation by reduced sweating:** Camels can survive temperatures as high as 44°C without sweating. Cold-blooded animals have no sweat glands and depend on their surroundings to control their body temperature.
- Water is obtained by animals from desert plants such as cacti. Some insects also extract fluids from plants, such as nectar and sap.
- **Water conservation by insoluble excreta:** Birds and reptiles in the desert hold water because their metabolic wastes are released in the form of uric acid, an insoluble white substance.
- **Nocturnal lifestyle:** In some animals, nocturnal life reduces water loss and improves osmoregulation, especially in dry biomes.
- **Massive ears:** Jackrabbits, for example, have extraordinarily huge ears with a network of blood arteries. When these animals snooze in the shade, their massive ears disperse the heat from their body.



## Grassland animals

Grasslands are regions where grasses are the primary vegetation.

### Adaptations:

- **Anatomical adaptation:** Grassland animals, such as bison, have specially adapted teeth and digestive tracts that aid in breaking down the stiff grass.
- **Camouflage:** Predators that attack their prey have colors that perfectly align with their surroundings. This allows them to blend in with their surroundings and sneak up on their prey.

## Animals of the Polar regions

Extreme weather and hostile environments characterize the polar regions.

### Adaptations:

**Dense fur:** This is a key adaptive trait because it protects organisms from intense cold. Polar bears, for example, have fur that extends all over their bodies, even the soles of their feet. Fur helps to prevent slipping on the ice. The white fur of the animal aids in camouflaging it against the background of snow. This aids in predation or avoiding becoming prey.

**Blubber:** A thick layer of fat covers the entire body, excluding the fins and flippers of some sea mammals, such as whales and seals. This layer protects against extreme cold and improves buoyancy. They can also use this fat as food if there is no food available or when they are inactive.

Mammals from colder climates generally have shorter ears and limbs to minimise heat loss. (This is called **the Allen's Rule.**)

