

Definition

Adaptations are features and characteristics of an organism that help it to survive in its environment.

Types of Adaptation

In the Polar and Alpine regions plant species have to adapt to some of the most extreme conditions on Earth. In these conditions, not only vascular plants (such as trees, bushes, grasses) but mosses, fungi, lichens and liverworts have adapted to survive the extremes. Unlike animals, the majority of plant species do not have a way by which they can move when their environment dramatically changes. Arguably this means that the adaptations that develop as a response to changes in an organism's habitat are vital for survival.

Characteristics of an extreme cold environment

- Very cold (between -20°C and -50°C) and very dry conditions (between 50 and 400 mm a year).
- In the Antarctic, lack of water, not the cold temperatures, is the biggest restriction to plant growth.
- Some extreme cold environments are found at high altitudes: air temperature drops by 1°C every 150m climbed.
- High latitudes (greater than 66° north or south) are colder as heat energy from the sun is less concentrated.
- Long winters and short, intense polar summers.
- A thin layer of soil, (active layer) thaws throughout the year. The rest remains frozen (permafrost), which is uninhabitable for almost all species.

Examples of adaptations to extreme cold environments



Snow Saxifrage



Common Orange Lichen

Photo source: Smudge9000 / dration

Description	Explanation
Grow close to the ground	Reduce damage caused by wind and ice particles
Small leaves	Conserve water which can be lost through the leaf surface
Shallow root systems	Allows the plant to grow in the active layer and avoid the permafrost
Grow in close proximity to one another	Each plant acts as a barrier for others for the wind and ice particles
Stem, buds and leaves are covered in small hairs	Creates a layer of insulation for protection against cold temperatures
Can photosynthesise in extremely cold weather conditions	Allows the plant to store energy despite a lack of sunlight for large parts of the year
Develop and produce seeds in a relatively short time	Allows for germination to be possible in a small favourable climatic window of time
Ability to survive on bare rock (Lichen)	Survival of a species where soil does not exist