



Alpine habitats

This article looks at the dynamic alpine environment and explores the range of broad habitats and ecosystems created in a rapidly changing and unstable environment.

As you look towards the high alpine summits, beyond the dark green coniferous forests, you'll see a mosaic of grassland, rock, scree and late winter snow patches as summer finally approaches. Some areas have been exposed to the intense alpine climate for a few months now but equally others remain covered under blankets of rapidly melting snow. Each of these dynamic alpine habitats forms their own unique ecosystem where communities of plants and animals interact with the physical environment. Species that occur in these different ecosystems have adapted to occupy very different niches. They've become adapted through the process of evolution and true specialists, tolerant of the conditions that control or eliminate competition.

Their novel adaptations have allowed them to extract whatever meagre nutrients, raw materials and water they can whilst gaining all the support and anchorage they need to establish, grow and survive. They also need to reproduce successfully and resist attack from pests and disease whilst the environment around them is in a state of constant change and unpredictable physical disintegration. The resilience of alpine flowers is incredible; their ability to absorb change and therefore remain and retain their character only adds to their fascination.

It is worthy to note here that geology plays a significant role as there is variation in the durability of different rock types and structures found within them (bedding, cleavage, jointing and folding). These control the development of a landscape aided by the erosive forces of water, wind and ice. The subsequent weathering releases minerals by both physical and chemical disintegration. There are many minerals in rocks but none with a more pronounced effect on vegetation than calcium. Many plants can only grow on calcium rich soils whereas others can only live on soils without calcium. These calcium-poor soils tend to be acidic and low in nutrients and the range of species within the community is far less.

Here we take a look at the broader alpine ecosystems and their general characteristics along with several key species that are commonly found amongst them.

Scree

Created by the repeated freezing and thawing of water which collects in cracks in the rock this habitat is characterised by large angular fragments at the base of the rock cliff where the material has originated. This unstable environment attracts the hardiest of alpine pioneer species. They have to cope with physical damage and being covered by rock debris. Their strength depends on



Mt. Cenis bellflower has spreading shoots that root and fragment easily into new plants, perfect for life on active scree

change and uncertainty and this makes up for being poor competitors. Characteristics of scree plants are a wide root system, spreading shoots (making new plants) and underground storage organ. They tend to have a short life and reproduce by either fragmentation (a shoot that is rooted becomes detached from the parent plant) or sending new shoots up from deep taproots. Typical examples of plants reproducing by fragmentation are seen in bellflowers and houseleeks and those from taproots are from the cabbage and daisy families.

Rock crevices and cliff

This habitat is created by the widening of cracks and fissures through surface weathering. They are relatively stable compared with scree and species are less resilient to change preferring more favourable conditions. Water and organic matter accumulate in the crevices providing a meagre source of nutrition. Deep roots and woody stems are common features in plants which inhabit these features and provide anchorage and support from exposure to the



Livelong saxifrage has tight leaf rosettes and deep roots allowing them to survive the harsh conditions of rock crevices.

harsh element. The plants are, however, still poor competitors and require space to grow but once established they can live for a long time. Some crevices develop lush hanging gardens where a seepage of water and soil adds stability where a greater variety of plants can flourish. A wide variety of plant species survive in rock crevices ranging from the short-lived plants in the cabbage and daisy families to the long-lived cushion plants such as rock-jasmines, houseleeks and saxifrages. Their tiny leaf rosettes packed tightly and perfectly formed against the cliff giving them essential shelter from the harsh winds.



Species such as Cobweb houseleek have adapted well to thrive in the adverse conditions in rock crevices.

Alpine grasslands

This habitat forms the natural alpine belt which lies above the natural treeline. The soils here are well developed and inhabited by long-lived species. The soils have accumulated organic matter over time and provide a medium for which plants, good at competing for resources and space, is of paramount importance. The relative stability of this habitat allows for a fairly constant vegetation but changes can occur following disturbance or prolonged snow cover. There are huge variations in alpine grasslands depending on climate, altitude and underlying geology and these determine the mineral content and nature of the soil. This can range from shallow, skeletal soils at high altitudes to deep, nutrient rich and damp soils in areas closer to the treeline.



Wonderful bloom of spring gentians and mountain pansies in an alpine grassland.



White crocus thriving on the thin soil in alpine grasslands.

Acidic soils develop on granite, gneiss and sandstone which weather forming soils that are rich in silica and generally low in nutrients. These largely favour heathers (such as trailing azalea), fescue and matt grasses. On calcium-rich rocks cushion sedge grasslands form with associated plants such as mountain avens, globularia, alpine aster and mountain sainfoin.

Tall herb communities

These develop on soils rich in nitrogen and are associated with alpine meadows and in the vicinity of alpine huts, essentially anywhere where nutrients accumulate. They occur below or around the natural treeline and are mostly dependent on the management of grazing animals. Tall herbs also occur naturally in unmanaged areas which experience long periods of snow cover. They also occur in sheltered gullies and hollows and can form under forests and bushes with damp, nutrient-rich soils. Typical species in this luxurious environment are adenostyles and blue sow thistle, monk's rhubarb and nettle.



Tall herb communities enjoy deep, damp and fertile soils.

Bogs and wet flushes

There are a variety of wet and damp habitats ranging from blanket bogs and mires to spring-fed flushes and seepage channels. Their soils are either intermittently or permanently wet and are inhabited by specialist plant communities. Wet soils are deficient of oxygen and build up thick peaty layers as the decomposition of dead plant matter is vastly reduced. Bogs lie in flat areas and have deep peaty soils which are raised above the water table and retain water like sponges.



Starry saxifrage and various mosses enjoying damp conditions of a spring-fed flush

These permanently wet habitats are covered with a vivid array of brightly coloured mosses along with cotton grass, rushes and sedges. Wet flushes are fed by springs or meltwater which is highly charged with dissolved salts and bases. Deeply swollen carpets of mosses are interspersed with starry and yellow mountain saxifrage, sedges and marsh marigold. Carnivorous plants also favour these habitats, as nutrients are unavailable and locked up in the soil. These plants have adapted to gain nutrition from consuming insects which are attracted by specialist leaves or flowers designed to trap and digest them. Butterworts and sundews are examples of such insectivorous plants.

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