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Plant Adaptations to Alpine Environments

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The alpine biome is the life zone above the climatic treeline in mountains. It is the only biome that has a global distribution, with its elevation varying with latitude. Being naturally treeless by definition, its vegetation is composed of small stature plants belonging to the life form graminoids (grasses, sedges, and rushes), herbs, dwarf shrubs and cushion plants covering c. 3.55 Million km² or 21.5% of the global mountain area of 16.5 Million km². Driven by the combination of small, compact plant stature and topography effects (exposure, direction to the sun and shelter) the actual climate experienced by these plants and the animals and microbes associated with them is much warmer (heated by the sun) than one would expect from weather station data. This physical manipulation of an otherwise harsh climate explains much of the physiology observed in alpine plant taxa. Because nights are cool, and—at extra-tropical latitudes—as the growing season gets increasingly short the productivity of alpine ecosystems is limited by the duration of favorable daytime periods and the slow nutrient cycle. Alpine plants are well adapted to the life conditions they experience, and counter wide spread belief, are not particularly stressed. Because topographic diversity provides escapes from unpleasant habitat conditions over very short distances, the alpine biome and its biodiversity are nor particularly vulnerable to climatic change, but rather represent refugia that deserve protection.

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