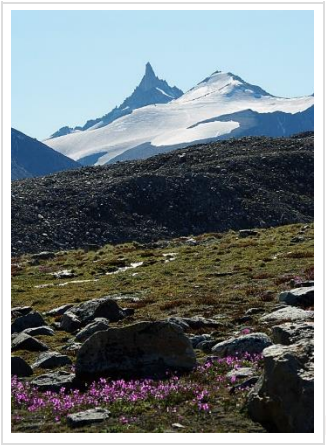
Plants information

4/ Plants



Plant life in the Arctic is characterized largely by what grows on the tundra, a vast low growing treeless area of approx. 11.5M km^2 that is mainly underlain by permafrost. There are low shrubs (as tall as 2m (7 feet) in rare places) sedges, grasses, mosses and liverworts as well as an extensive variety of alpine type flowering plants and many lichens. There are about 1,700 species of plants that live on the tundra in all. The tundra can support many larger herbivores including reindeer, musk ox, lemmings, arctic hares and squirrels. To the southern edge of the arctic, the tundra can have plant cover of 80-100%, further north, plant coverage can be 0% or just a few hardy alpines in sheltered microclimates.

Plant life in the Antarctic on the other hand is much less plentiful. Only about 1% of the continent is ice free, this is located mainly along the Antarctic Peninsula and on islands, there are some exposed rocks inland however known as nunataks where the hardiest of plants can gain a foothold. There are just two species of higher plants, a grass and a small flowering alpine, around 100 species of moss, 300-400 species of lichens and 25 species of liverworts. In very extreme conditions, algae and lichens live in tiny pore spaces *inside* rock

Often where plants are found growing in Antarctica, they are sparse and irregularly spaced.

The seas. Both the Arctic and Antarctic have highly productive seas the production being driven by phytoplankton. Upwelling currents bringing nutrients with them and long days in the summer months drive this production.

ARCTIC PLANTS

Approximately 1,700 species of plants live on the Arctic tundra, including flowering plants, dwarf shrubs, herbs, grasses, mosses, and lichens. The tundra is characterized by permafrost, a layer of soil and partially decomposed organic matter that is frozen year-round. Only a thin layer of soil, called the active layer, thaws and refreezes each year. This makes shallow root systems a necessity and prevents larger plants such as trees from growing in the Arctic. (The cold climate and short growing season also prevent tree growth. Trees need a certain amount of days above 50 degrees F, 10 degrees C, to complete their annual growth cycle.)

Tundra vegetation is characterized by small plants (typically only centimeters tall) growing close together and close to the ground. A few of the many species include:

 opyright 1995 Saint Mary's ollege of California	**Arctic willow** A dwarf shrub that is food for caribou, musk oxen, and arctic hares. The Inuit people call it the "tongue plant" because of the shape of its leaves.
 opyright 1999 Gerald and Buff orsi, California Academy of ciences	**Pasque flower**. This plant ranges throughout the northwestern United States and up to northern Alaska. Its covering of fine silky hairs provides insulation.
 opyright 2001 Robert Potts, alifornia Academy of Sciences	**Bearberry.** This low-growing evergreen's leathery leaves and silky hairs provide protection from the cold and wind. The plant was named bearberry because bears like to eat its red berries.
 opyright 2004 Gerald and uff Corsi, California Academy f Sciences	**Purple saxifrage.** This plant grows in a low, tight clump. It is one of the earliest plants to bloom. The tiny, purple, star-shaped flowers (1 cm wide) often can be seen above the melting snow.

 hoto courtesy of Ansgar Walk	**Arctic poppy.** This plant is about 10-15 cm tall, with a single flower per stem. The flower heads follow the sun, and the cup-shaped petals help absorb solar energy.
 opyright 2002 Gerald and uff Corsi, California Academy f Sciences	**Cottongrass.** Named for its fluffy, white tufts, cottongrass is an important food source for migrating snow geese and caribou.

Lichens grow in mats on the ground and on rocks across the Arctic. Lichens provide an important food source for caribou in the winter.

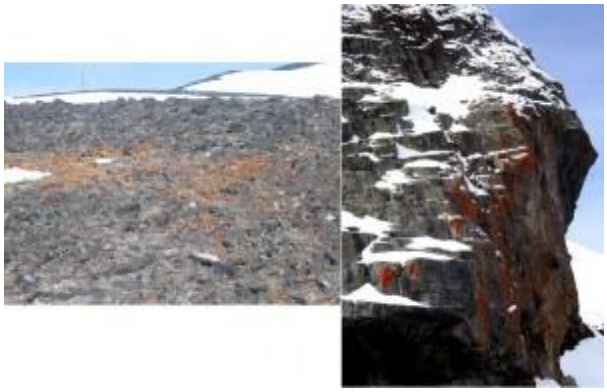
Reindeer lichen (also known as Caribou moss) is found across the Arctic. Its name comes from its resemblance of tiny antlers. Photo courtesy of Gerry Atwell, U.S. Department of Fish and Wildlife Services.

ANTARCTIC PLANTS

There are only two native vascular plants in Antarctica: Antarctic hair grass and Antarctic pearlwort. These species are found in small clumps near the shore of the west coast of the Antarctic Peninsula, where temperatures are milder and there is more precipitation.

Antarctic hair grass (Copyright 2004 Gerald and Buff Corsi, California Academy of Sciences) and Antarctic pearlwort (Copyright 2007 Gerald and Buff Corsi, California Academy of Sciences).

There are approximately 300 types of moss found in colonies, over 300 nonmarine algae species, and approximately 150 species of lichens. Lichens can tolerate very cold temperatures, and thus can live where true plants cannot. Lack of water, not cold temperatures, is the largest concern, and lichens deal with this problem by living in cracks between rocks.



Antarctic lichen. Photos courtesy of Mykle Hoban and Sam House via Flickr.

ADAPTATIONS FOR A POLAR ENVIRONMENT

Similar adaptations help plants, algae, fungi, and lichens survive in both the Arctic and Antarctic.

First, the size of plants and their structures make survival possible. Small plants and shallow root systems compensate for the thin layer of soil, and small leaves minimize the amount of water lost through the leaf surface.

Plants also grow close to the ground and to each other, a strategy that helps to resist the effects of cold weather and reduce damage caused by wind-blown snow and ice particles. Fuzzy coverings on stems, leaves, and buds and woolly seed covers provide additional protection from the wind.

Plants have also adapted to the long winters and short, intense polar summers. Many Arctic species can grow under a layer of snow, and virtually all polar plants are able to photosynthesize in extremely cold temperatures. During the short polar summer, plants use the long hours of sunlight to quickly develop and produce flowers and seeds. Flowers of some plants are cup-shaped and direct the sun's rays toward the center of the flower. Dark-coloured plants absorb more of the sun's energy.

In addition, many species are perennials, growing and blooming during the summer, dying back in the winter, and returning the following spring from their root-stock. This allows the plants to direct less energy into seed production. Some species do not produce seeds at all, reproducing asexually through root growth.

ADAPTING TO A CHANGING CLIMATE

The polar regions have been of great concern as the Earth's climate warms. While we've heard about the declining sea ice and its negative impact on marine wildlife, there's evidence to suggest that Arctic plants may be better able to adapt to a warming world. Studies of nine flowering plant species from Svalbard, Norway, suggest that Arctic plants are able to shift long distances (via wind, floating sea ice, and birds) and follow the climate conditions for which they are best adapted. Wide dispersal of seeds and plant fragments might ensure survival of species as climate conditions change. While encouraging, this data does not necessarily extend to Antarctic species or species in the temperate regions.