



# NATURE DETECTIVES

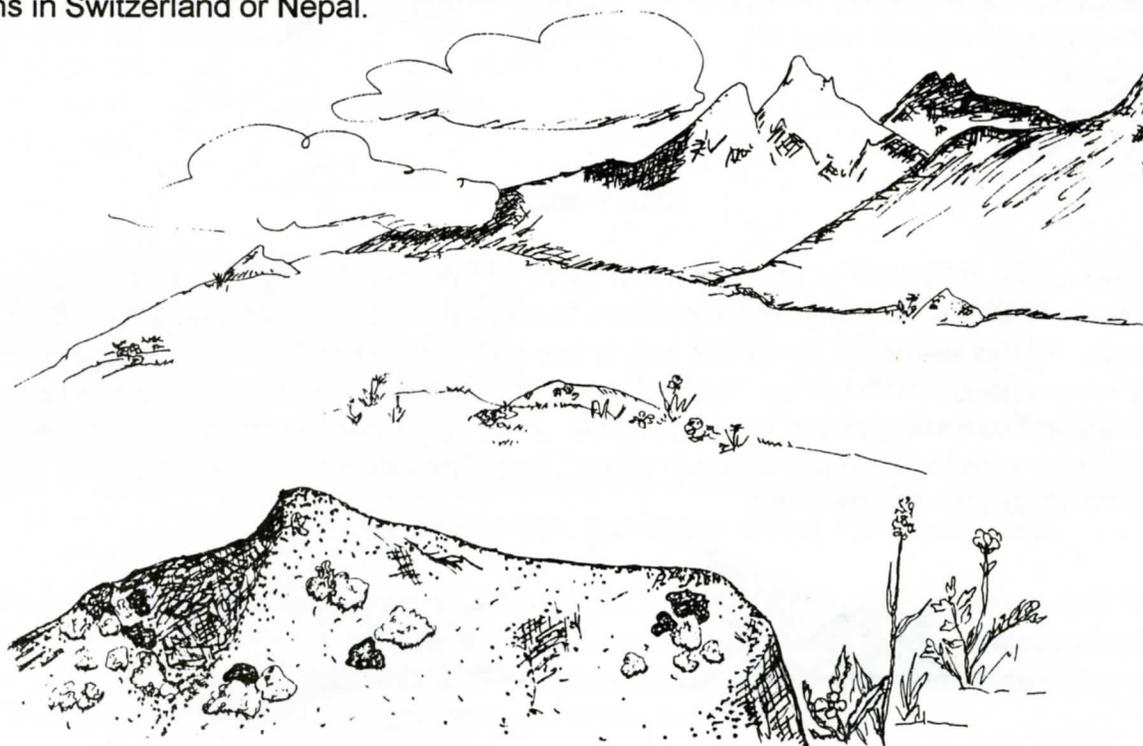
SUMMER 1996

## Tales of the Alpine Tundra

On the tops of tall mountains around the world there is a bright and spacious environment called the alpine tundra. The tundra begins where the trees stop growing. It is a land of extremes - extremely low temperatures, extremely fast winds, extremely long winters, and extremely bright sunlight. There are plants as tiny as pennies and boulders larger than trucks. In the alpine tundra it can snow even in summer!

Life survives in the tundra because of adaptations to these harsh conditions. An adaptation is something special about a plant or animal that helps it to live in a specific environment. For example, because wind speeds are lower at ground level, tundra plants tend to hug the earth. They often grow only as high as your toes.

And because the alpine tundra occurs throughout the world, some of the same species of plants and animals that live above treeline on Colorado mountains also live on mountains in Switzerland or Nepal.



## Tundra Whistlers

Did you ever hear a whistle coming from rocky areas in the tundra? While you search for a singing bird, a fat marmot or tiny pika may be watching you. These small mammals are year round residents of the tundra. They make their homes in rocky areas on sloping terrain. This type of location provides a clear view of their surroundings, adequate drainage of their burrows, and plenty of sunshine.

The pika is a six ounce furball that defends its rock-pile home with squeaks and warning barks. Unlike his relative the rabbit, the pika has small round ears that are less likely to freeze during winter. He also has fur on the soles of his feet, a nonskid device for rocky surfaces. Pikas stay active on the tundra all winter. They harvest grasses and wildflowers in July and pile them on sunny rocks to dry. They store these "haystacks" to be eaten throughout the long winter.

Like the pika, the yellow-bellied marmot is an herbivore. But marmots sleep all winter. They often double their weight in preparation for hibernation. Their den is below frostline, where temperatures remain fairly constant. During hibernation a marmot's temperature drops to around 40 degrees F, its pulse slows to 4-5 beats per minute, and it takes one breath per minute. This hibernation process uses only 1/7 of the energy which is used while the marmot is active. When grasses begin to green, high pips (whistles) will again be heard as the marmots emerge to feast on spring growth.



## Elfin Forest

How tall are you? Believe it or not, there is a place in Boulder County where you are as tall as the trees. At about 11,500 feet in elevation, the fierce winds and blowing snow stunt tree growth. At this elevation trees are only a few feet tall. These tiny trees are called elfin forest or krummholz, which means "twisted wood" in German. The krummholz marks tree line, the highest elevation where trees can grow. Hike up to see the small, twisted trees for yourself but be sure to leave any wood in place. Even the dead wood protects other plants from the harsh tundra environment.



the beginning of a  
krummholz forest

## Snow Birds

What would you think if you saw a bunch of black dots bobbing across the snow? Luckily for the white-tailed ptarmigan, you probably wouldn't think those black dots were the eyes and beaks of a flock of birds. These alpine residents turn pure white for the winter in order to blend into their snowy environment. This is called camouflage and helps to protect the bird from its predators.

The white-tailed ptarmigan has other special features that allow it to live in the tundra all year. When air temperatures are below zero, this smart bird burrows into its snow roost where it is 20 degrees warmer. Also, ptarmigan feathers are layered so they can trap air between them. This air acts like the insulation in your house. Unlike most other birds, the ptarmigan has feathers on its legs and feet, and even in its nostrils!



## Petite Plants

The miniature plants of the alpine tundra would make a perfect garden for elves. Tiny mounds called cushion plants are dotted with bright blossoms. Low-growing mat plants have spreading branches that send out new roots wherever they touch ground. And the flat leaves of rosettes overlap in a circle. The constant wind on the tundra passes right over this magical garden, nudging leaves and flowers only slightly. The rocky soil soaks up heat from sunlight and holds it around the dwarfed plants, keeping them a few degrees warmer than the air.

ALPINE PUSSYTOES  
(mat plant)



SNOWBALL  
SAXIFRAGE  
(rosette)



MOSS  
CAMPION  
(cushion  
plant)



Most tundra plants are perennials. Instead of an entire new plant sprouting from seed each growing season (which is sometimes only 1 1/2 months long), the roots of perennials live from year to year. During winter they store food for the rapid growth that takes place above ground as soon as the temperature reaches freezing. A 25 year old moss campion is only the size of a small pizza, but its tap root is 4 to 5 feet long!

To really know the tundra, get down on your hands and knees. You'll find leaves that feel waxy and others covered with soft hairs. You'll find plants growing in rock crevices that hold only handfuls of soil. You'll see sun-yellow buttercups blooming where the snow has barely melted. And I won't be surprised if you find a family of elves.

## Glaciers: Ice on the Move

Glaciers are huge bodies of ice that can be found in the tundra all over the world. In the mountains of Colorado glaciers begin in permanent snow fields, where snow does not melt completely in the summer. Glaciers can grow or shrink depending on the temperature, the amount of snowfall and the slope of the mountain. As more and more snow builds up in a valley, the snow underneath turns into ice. Gravity forces the ice to move downhill picking up rocks and sand along the way. However, if temperatures rise and the amount of snowfall decreases, glaciers can retreat up the valley.

As glaciers move up and down mountain valleys, they deposit soil and cause erosion. Erosion is the wearing away of rocks and soil. To better understand erosion, try this activity at home.

Mix some sand with water, pour the mixture into ice cube trays and freeze. Pick up one of the sandy ice cubes and rub it against a piece of soft, smooth rock several times. Examine the surface of the rock. Do this with a regular ice cube and compare the difference. How does this help to explain how glaciers shape the land?



### Rocks to Soil

Rumble, roar, smash... Watch out, a boulder has come loose and is moving down the mountain. It is hitting other rocks in its path and breaking them into smaller rocks, stones, and fine particles until soil is formed. A rock slide is a quick, though dangerous way to make soil from rocks. A slower, safer way is to gradually break a rock into smaller pieces by prying it apart. We would use a wedge and a hammer. In the tundra, water and ice do the job. During the day, when the temperature rises and snow melts, water enters cracks in rocks. At night when the temperatures fall, the water freezes and becomes ice. Since ice takes more space than water, it gradually enlarges the crack. Next morning, the ice melts, but since the crack is now larger, more water comes in. It in turn freezes, expands the crack, and the cycle continues until the rock breaks.