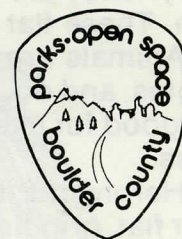


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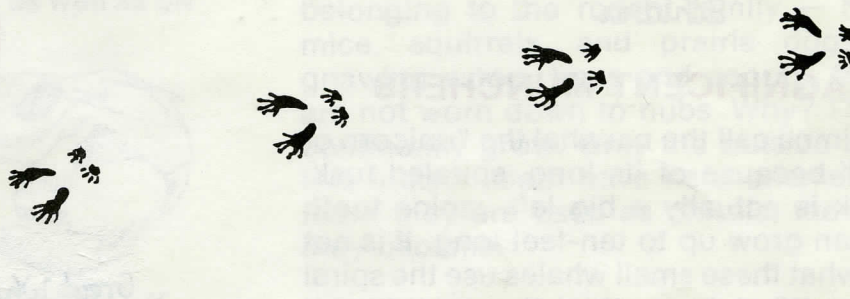


Nature Detectives

Who's been here? What were they doing and why were they doing it? When did it happen? Nature detectives try to answer questions like these by looking for clues and evidence of the activities of creatures in the outdoors.

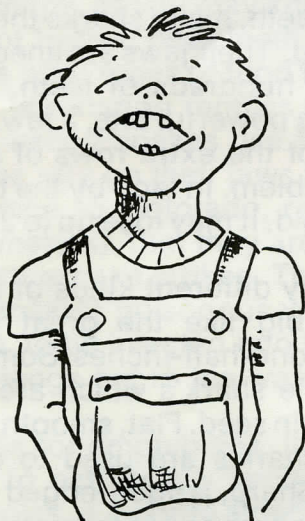
Have you ever wondered about teeth marks on the trunk of a tree, or strange footprints in the snow or mud? If you have, then you are already a nature detective.

THEME:



TEETH TALK

Your first ones grow when you are a baby. You don't take much notice of them, unless they are loose and wobbly, or fall out. At about five, you begin to get grown-up ones. You don't think about them except when you brush. So what's so special about teeth? They are super tools. Their design fits the food we eat. They last us a lifetime of munching.



In the world of animals, teeth come in many shapes and forms. A fox that eats meat needs tearing teeth to pull flesh off bone. A leaf and twig nibbler, like the rabbit, needs sharp, cutting teeth. A beaver needs chisel-teeth to fell trees and strip bark. Grazing animals, from bison to grasshoppers, all feed on grass. Grass is tough! It's stems are gritty like sand, and wear down teeth. How on earth can teeth be strong enough to spend years mowing the prairie?

Skulls and teeth provide clues about the animals they belonged to, long after the body has rotted. And the mark that teeth make on leaves, twigs, bark, and even old bones show where some mystery animal has been actively feeding. Can you tell who was there?

Then there are animals with **no** teeth! How do they eat? What do they eat? And if they have to mush up their food, what tools do they use?

Read on to discover that there's more to teeth than just brushing!

CRUSHERS AND GRINDERS

Did you know that just by looking at an animal's teeth you can tell what type of food it eats? Animals have four different types of teeth. The sharp front teeth are called incisors and are for cutting or biting off mouthfuls of food. The canine teeth are sharp and pointed, named for the dog family. They are for holding prey, stabbing and tearing food. The premolar and molars are cheek teeth. These flat teeth grind and crush food.

Animals are grouped by the food they eat. Carnivores are animals that eat meat. Wolves, coyotes, and dogs belong in this group. Their canine teeth curve back in their mouths and are not very good for chewing. Meat eaters have special molars that are pointed and can be used to crack bones.

Herbivores, including horses, elephants, deer, and goats eat grass, leaves, and entire plants. Their flat, grinding molars and premolars are just right for chewing rough grasses. Also helpful for munching on plants are the herbivores' incisors.

Omnivores, like bears and people, eat both meat and plants. We both have sharp canine teeth and broad, flat molars.



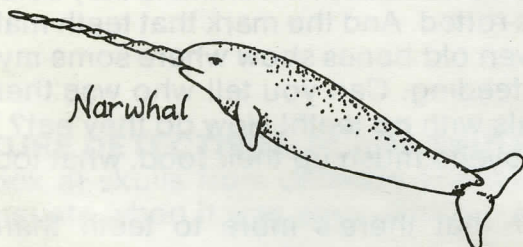
Echidna

MAGNIFICENT MUNCHERS

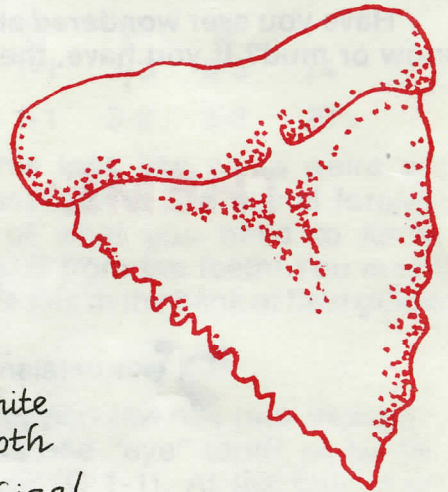
Eskimos call the narwhal the "unicorn of the sea" because of its long, spiraled tusk. The tusk is actually a big left canine tooth which can grow up to ten-feet long. It is not known what these small whales use the spiral sword for. What do you think they might use it for?

The long-beaked echidna, also called the spiny anteater, has no teeth. It catches worms and insects with a sticky, spiny tongue. Then it mashes them between its tongue and the roof of its mouth. You won't see any echidnas in Colorado — they live in Australia!

Elephant tusks are really just overgrown incisor teeth. The tusks keep growing as the elephant gets older. The big teeth are used by the animal to defend itself and its young. Elephant teeth are the largest in the world. During its lifetime an elephant may carry around as much as a half-ton of ivory — that's as much as a horse weighs! The smallest teeth in the world are on a slug's tongue!



Narwhal



Great White
Shark Tooth

Actual Size!

SEA CHOPPERS

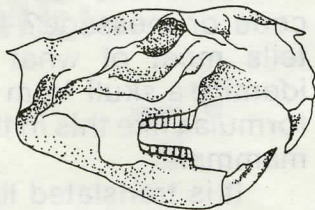
Powerful jaws, containing many and different kinds of teeth, make sharks the best hunters in the world. Their jaws are lined with rows and rows of hundreds of teeth. Each time a shark takes a powerful bite, a few teeth fall out. Because of the extra rows of spare teeth, this is no problem. In fact, by the time a shark is ten years old, it may lose up to 24,000 teeth.

There are many different kinds of shark teeth. Some are big like the great white shark's — two and one-half-inches! Some are small like the whale shark's which are only the size of a pumpkin seed. Flat, smooth teeth like the basking shark's are used to crush snails and clams. Sharp, jagged-edged teeth like the tiger shark's are used to tear into prey.

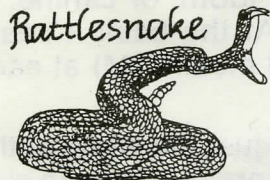
NIBBLE SIGNS

A nature detective can learn about animals by reading nibble signs! Let's start by looking at tree trunks. What about those large tooth marks on the aspen tree? They are only about one and a half feet up, and there are chunky wood chips on the ground below. Yes, probably a beaver was gnawing on that tree. Do you think he will use it to build a dam? There are more big tooth marks, but they are as high as your head or higher. Most likely a hungry elk ate some aspen bark last winter, when snow covered the grasses and shrubs it prefers.

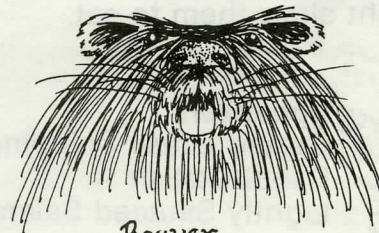
Do you see the low twig on that shrub that was bitten off so neatly? If a deer or elk had eaten it, the end would be jagged. They only have sharp incisors on their lower jaws, and must grind and tear with their molars to eat a twig in one clean bite. Maybe a snowshoe hare ate that one. Have you seen any nibble signs lately? Look for them this fall on pine cones and mushrooms, as well as on trees and shrubs.



Beaver Skull



Rattlesnake



Beaver

THEY JUST KEEP GROWING

Gnawers have special front teeth called "incisors." When the two top teeth meet the two lower teeth, they automatically sharpen one another. These gnawers are herbivores belonging to the rodent family — beavers, mice, squirrels, and prairie dogs. After gnawing wood, trees and acorns, the teeth are not worn down to nubs. Why? The teeth continually grow. Only the outside of these two incisor teeth have hard enamel so the more they are used as chisels, the sharper they become.

SOME TOOTHY AND TOOTHLESS HERPS

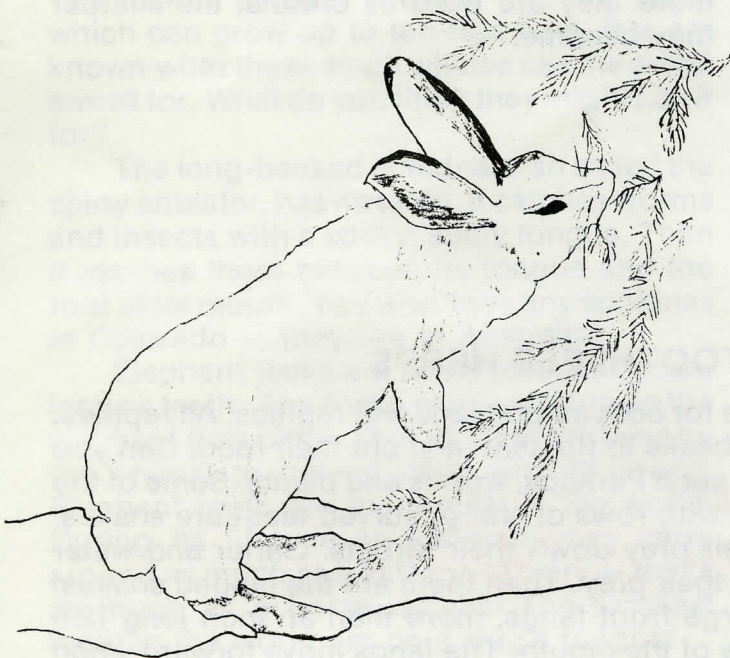
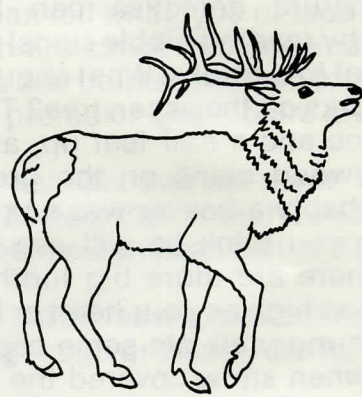
Herps, as you may know, is the collective name for both amphibians and reptiles. All reptiles, except turtles, have teeth. Turtles use their horny beaks to rip, tear, and cut their food. Can you guess what types of food turtles eat? Soft food, for sure! Perhaps, worms and plants. Some of the most fascinating reptiles that definitely have jaws with rows of sharp, curved teeth are snakes. Meat eating snakes use these teeth to "walk" their prey down their throats. Garter and water snakes rely on their jaws and curved teeth to hold their prey. Then there are the fanged snakes! Common to Colorado, rattlesnakes have such large front fangs, more than an inch long (2.5 centimeters), that they are usually folded up **inside** of the mouth. The fangs move forward when the rattlesnake strikes. The fangs are hollow, like needles that the doctor uses to give injections. The snake's poisonous venom is pushed by muscles, from sacs in the jaw, through the hollow fangs, to be injected into the prey. Can you think of another reptile that has a large toothy snout and hangs out in the water a lot? Hint, it is not a snake.

As for amphibians, these animals don't have true teeth. Instead, they use their bony-ridged jaws to eat insects, worms, and fish. Gulping is always an alternative, often used by toads. Tadpoles, a favorite amphibian of many of us, are vegetarians, since they have no teeth. They are able to eat bacteria and algae in the ponds where they live.

OUT TO EAT

What if animals ate at restaurants like humans do? Pretend that a rabbit, coyote, and a raccoon visited a restaurant for dinner. What do you suppose each one might pick from the menu below? Think about what their teeth might allow them to eat.

- Appetizers**
 - Grated Grass Snippings
 - Rabbit Relish
 - Lightly Sauteed Salamanders
- Main Course**
 - Gourmet Garbage
 - Twice-Cooked Twigs
 - Steamed Squirrels
- Dessert**
 - Porcupine Popovers
 - Honey Baked Bark
 - Sweet Bird Bread



DENTAL FORMULA

I	C	P	M		
U 0-0	1-1	3-3	3-3	14	= 34
L 3-3	1-1	3-3	3-3	20	

Does this look like some weird secret code or message? It is a dental formula. It tells most of what you need to know to identify a skull from the teeth! You may find formulas like this in the back of field guides to mammals.

It is translated like this:

The U (upper) jaw has zero incisors (I 0-0). It has one "eye" tooth, or canine, at each side (C 1-1). At the back it has 3 premolars (P) and 3 molars (M) at each side.

The L (lower) jaw is just the same at the back, but has 3 incisors (I 3-3) each side of the midline at the front.

Hum! Incisors at the bottom, but none at the top — maybe this animal browses by pulling at branches. Maybe it strips bark from the bottom up. That would leave strange tooth-prints!

This is a dental formula for an elk!

NATURE DETECTIVES: SCARY SKULLS: Scary skulls are part of Halloween! Here's your chance to look at skulls from different animals. Learn how to tell (from the skulls and teeth) what the animal ate when it was alive. Challenge yourself with the "toothmark quiz."

See "Discover Nature Calendar" for details.