

ON PINS AND NEEDLES

Extreme heat and cold are
no match for Minnesota's
tough little **cactus species**.

Say the word “cactus” and most people will think of thorny plants growing in a hot, sandy desert.

There's some truth to that image—most of the nearly 2,000 species of cactus are found in warm regions of North and South America. But did you know that you can also find *cacti* (that's the plural of cactus) in parts of western and southern Minnesota? In fact, our state is home to three cactus species: brittle prickly pear (*Opuntia fragilis*), plains prickly pear (*Opuntia polyacantha*), and ball cactus (*Coryphantha vivipara*).

I wish I could share that information

with my grandmother. She had a special love for rocks and cacti, and, on road trips we took together, she taught me to appreciate parts of nature that are often feared or overlooked.

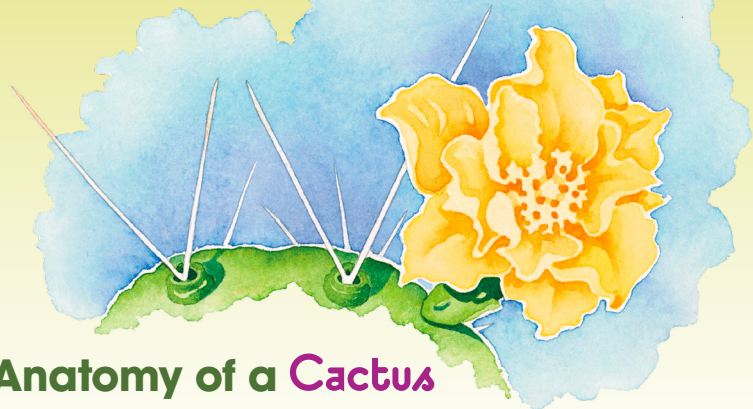
If she were still alive, I'd take my grandmother to Minnesota's cactus country, a place she never got to visit. We'd wander among the ancient rocks and prairie grassland in search of these special plants. Will you come with me instead? Read on!

The cacti of Minnesota (clockwise from upper left): brittle prickly pear in bloom, brittle prickly pear, plains prickly pear, and ball cactus in bloom.

By Christine Petersen



THREE PHOTOS ON LEFT: COURTESY OF MINNESOTA WILDFLOWERS. RIGHT: CHRISTINE PETERSEN.



Anatomy of a Cactus

Roots and Stems. The cactus is a *succulent* plant, meaning it can store water inside its body to survive in dry places. But how does it pull off this trick? Let's start with its roots, which anchor it in place and are usually located near the surface of the soil to allow the plant to absorb even the slightest bit of rain. This way cacti can live in harsh conditions of heat, drought, and even cold.

Helping the cactus in its hydration journey is the plant's weirdly shaped body, which is actually its stem. After the roots suck up water, they pump it into the spongy stem of the cactus, giving the plant a built-in supply of H₂O to use in drier times. The stem is covered by thick, waxy skin, which seals water inside while allowing air to pass through.

The stem is also where *photosynthesis* takes place in a cactus. Photosynthesis is the process where green plants convert sunlight into *glucose*, a sugary liquid that is the plant's source

of food. As long as a cactus has sunlight, air, and a bit of stored water, it can continue to make its own food in some seriously nasty climates.

A Prickly Defense. Cactus plants don't usually have anything you'd recognize as leaves. But biologists have learned that a cactus's spines are actually a special kind of leaf used for protection from thirsty or hungry animals. Spines grow from raised areas on the surface of the stem, and they are found even on some cactus fruits.

Look closely at a cactus's needle-shaped spines—but don't touch! Cactus spines are very sharp and sometimes hooked. That hurts, so deer and larger animals don't often try to eat these plants. Spines help cacti in other ways. Like regular leaves, they cast some shade on the stem to reduce the sun's burning heat. And when it rains, droplets slip along the spines and drip onto the soil, where the water can be absorbed.

BILL REYNOLDS



Cacti in Minnesota

Let's learn about the three cactus species that call our state home.

Brittle Prickly Pear

This is the most common of Minnesota's three cactus species. You might have seen larger relatives of this plant in photos or movies. This prickly pear's stem is divided into many flat segments, or *pads*, that grow one atop the other.

Brittle prickly pear is a small cactus. Each pad is just a couple of inches tall, barely thumb-sized. Instead of getting taller as it adds pads, brittle prickly pear droops down, forming a small mat over the ground. The plant spreads when spines get caught in the fur, feet, or skin of a passing animal. The tangled pad tears off and is carried away. Eventually, it falls to the ground and takes root. That's how this plant gets its name—*brittle* means easily broken.

Brittle prickly pear can be found in grasslands and deserts across the central United States. It's even able to grow in northern Canada. Here in Minnesota,



we might find this plant on rocky outcrops in the southern half of the state. One good place to see the cactus is at Pipestone National Monument.

Plains Prickly Pear

This cactus looks like a larger version of its brittle cousin. Its pads are wider and taller—like green, pear-shaped pancakes. The mats may spread for several feet across the ground.

To tell Minnesota's two prickly pears

apart, check the spines. On plains prickly pear, the spines may be more than two inches long, while brittle prickly pear spines are half as long.

If you see a prickly pear with butter-yellow flowers, that's probably plains prickly

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pear. It blossoms almost every year, while brittle prickly pear flowers only occasionally.

In Minnesota, plains prickly pear is not very common, and patches may be far apart. We can find it alongside brittle prickly pear at Pipestone National Monument and in the nearby Blue Mounds State Park.



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Ball Cactus

Also known as the pincushion cactus, this species is named for its shape—like the round pads used to hold sewing pins.

A newly sprouted ball cactus looks like a cone-shaped pea. As it grows, the plant forms many little cones packed close together. Imagine a raspberry, but with pointed segments.

Each cone sprouts spines from its pointed top. Some reach sideways, forming a kind of cage around the plant. Others poke straight up. What a clever defense! If you are lucky enough to find this cactus in bloom, you won't soon forget it. The many-petaled flowers are neon pink.

The type of ball cactus found in Minnesota also grows in Great Plains states west and south of our state. But Minnesota lies at the farthest eastern edge of its natural range. Today it grows only in two counties right along the South Dakota border. One of the best places to see it is Big Stone National Wildlife Refuge.

Welcome to Cactus Country

Why do cacti grow in Minnesota's southwestern prairie lands but not so much in other parts of the state? For part of the answer, we can look to the ground itself. Like much of the northern United States, this area was once covered by *glaciers*—massive rivers of ice that slid slowly over the landscape, bulldozing everything in their path.

When these glaciers began to melt about 12,000 years ago, a fast-flowing river formed in their place. The water pushed huge boulders to new places and carved a deep valley into the earth's surface. In time, the river slowed and narrowed. New soil formed over the barren landscape and plants were able to take root again.

Perfect for Prairie. The *climate*, or long-term weather conditions, of this region determined the mix of plants that grew here. Southwestern Minnesota gets less rain and snow than the northern half of the state. Winter takes longer to arrive here, and spring starts earlier. The result is an environment that is hot and dry in summer, then cold and dry in winter.

Woodlands and forests don't do so well in those conditions, but it's

just right for prairie. And for a long time, that's exactly what grew here: tall wildflowers and grasses stretching to the horizon in every direction—with some cacti mixed in.

Rocky Habitat. To learn more about the state's cactus country, let's look at the important cactus habitat at Big Stone National Wildlife Refuge. A *refuge* is a place that protects rare species or unique natural areas. This one shelters a block of prairie and wetlands along the Minnesota River.

At Big Stone, rocky patches rise like islands from the prairie. Most prairie plants can't grow atop rock, but cacti can. Still, you'll have to look closely to find Minnesota's three small species. At Big Stone, you might spot them sprouting from cracks in the rock. Cacti also pop up in shallow holes on the flat rock surface.

When the sun shines on the rocks at Big Stone, they absorb the heat. Growing so close to the rock surface, cacti can soak up this heat to reduce their risk of freezing. Another benefit of growing on a rocky surface is that in the event of a prairie fire, the blaze won't easily spread over the rocks, giving cacti some protection.

Plains prickly pear cacti grow at Big Stone National Wildlife Refuge.



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Minnesota's cacti prefer a rocky habitat, such as this area at Big Stone National Wildlife Refuge.

Cactus Conservation

Since Minnesota became a state in 1858, much of its prairie has been replaced by farms and towns. With far less natural habitat, two of Minnesota's three cactus species—plains prickly pear and ball cactus—are becoming rare. That's why refuges and parks are so important for these plants.

To learn about that, I visited the Minnesota Landscape Arboretum. At this huge garden west of Minneapolis, visitors can see many kinds of trees, other plants, and their habitats. Here, plant expert David Remucal and his team are working behind the scenes

to protect the threatened ball cactus.

Remucal's office is a giant greenhouse. Walking through, I pass row after row of tiny apple trees, prairie wildflowers, and other plants being grown for the arboretum. At the back is a table containing trays of ball cacti that Remucal and his team will transplant in the wild when the plants are one year old. The researchers plan to rescue adult plants from imperiled parts of the population that are in danger of losing their habitat and then replant them in protected areas.

CHRISTINE PETERSEN

Growing from Seed. The cacti in the greenhouse are so small that I need my glasses to see details of their segments and the delicate starbursts of spines. Ball cactus grows quite slowly, taking several years to reach the size of a marble or blueberry.

"Only a couple thousand ball cactus still survive in Minnesota's prairie," says Remucal. "So we grow them from seed." His team collects cactus seeds and stores them in a *seed bank*—which is actually a big freezer. "Certain seeds can survive for a long time if they're properly cared for," he says.

The Future for Cacti. In November 2022, the researchers moved 200 teensy cacti from the greenhouse to Big Stone National Wildlife Refuge. "When these cacti grow, it's amazing," he says. "They're in cracks—or even in spots where cracks aren't visible, but they've found a layer of moss to root into. We checked them after a year and they're doing well!"

Remucal holds up a clay pot of the size you'd use for a small houseplant. In the middle is a full-grown ball cactus. Leaning over, I see a dozen or so segments piled on top of each other, like a bunch of spiky grapes. This plant, and the tiny ones in greenhouse trays, are the future of Minnesota's ball cactus population.

I'm inspired by my visit to the refuge and



Baby ball cacti growing at the Minnesota Landscape Arboretum.

my time with Remucal. As I head home, I'm already planning ways to share cactus country with others. I hope you can do the same! As my grandmother taught me, noticing and appreciating nature can make our own lives better. And that can lead to the protection of special species and places, like Minnesota's cactus country. 