Curing What Ails You

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Curing What Ails You

What can elephants teach us about medicinal plants?

By Alex Greene, ethnobotanist and National Geographic Explorer
As you read, think about what people have learned from observing elephants.
A truck stops in front of a large, open-air structure. Elephants stand beneath the shade of trees. Several mahouts, the caretakers of the elephants, help unload spiky vines from the truck. We are at the Thai Elephant Conservation Center (TECC) in northern Thailand. These vines will be used to make an herbal medicine for the elephants.

I first came to TECC in 2017, while working as a guide for student groups. I quickly noticed several interesting things. First, TECC had one of the most advanced elephant hospitals in the world. One of the ways they treated elephants was with herbal medicine. As an ethnobotanist, I study the ways that people use, rely on, and relate to plants. So, this caught my attention.

I knew that plant-based medicine and biomedicine (or “Western” medicine) aren’t often found together. Why did TECC use both when caring for their elephants?

Next, I noticed the elephants’ interest in their herbal medicine. I knew that elephants love sweet foods, just like humans. They eat grass, but sugarcane and corn are favorite snacks here.

One of the mahouts told me that the spiky vines are a powerful medicine for people. I took a tiny nibble. It was so bitter that I needed a drink of water.

The elephants, however, happily ate the bitter plants. Why? Did they know it was medicine? A year and a half later, National Geographic Society gave me a grant. I would return to Thailand to try to find the answers.
Working With Elephants

Elephants have coexisted with people for thousands of years in Thailand. I decided to work with a group of highland people called the Karen. They live in the mountains of northern Thailand and neighboring Myanmar.

The Karen are famous for their knowledge of elephants. How did this relationship begin? One story tells of how the elephant was originally human. Then it lost its humanity and became a helper of humankind.

Elephants played a role in nearly every aspect of life here, similar to horses in other parts of the world. Their knowledge of the forest meant they were the best way to travel long distances over land.

Their incredible strength allowed them to move heavy objects like stones and sacks of rice. Many elephants worked in the logging industry. But as cars and tractors replaced older ways of life, elephants’ usefulness fell.

Logging with elephants is considered more environmentally friendly than using machines. But, centuries of overharvesting threatened remaining forests. In 1989, logging was banned.

Elephants were no longer needed for this type of work. People tried to find new ways to keep these incredible animals. By now, most elephants have been moved to elephant camps for tourists.

I work in the field with a Karen interpreter and a master healer.

Elephants use their trunks to lift grasses to their mouths.
Research Begins

My first goal in returning to TECC was to document which plants were being used to treat sick elephants. How did they use these plants and for what health complaints? I set out to visit four Karen communities in northern Thailand. I worked with an interpreter. We explained my interest to village leaders, elephant camp owners, and mahouts. We told them how I would use the information provided. They agreed to help. We set up interviews with the mahouts and asked them to describe what plants they used for elephant medicine.

One of the greatest challenges I faced was language. I speak English and am just starting to learn Thai. The Karen people speak their own language, Pakinyaw. Many also speak Thai. At times, a question had to be translated twice! With patience and lots of repetition, we made progress.

After interviews, I would ask the most knowledgeable mahouts to bring me into the forest. There, I collected samples of key plants and dried them in a plant press. The plants were identified and then taken to an **herbarium**, a kind of library for plant specimens.

**Analyzing Data**

After several months, we had learned about 34 plant species that were used in more than 40 different treatments. The most common use was as a tonic. This herbal supplement keeps the elephants healthy. It increases energy and regulates digestion.
Raw or cooked rice is added to the tonic, as well as tamarind fruits and bananas. Afterward, mahouts make balls or pellets of this bittersweet mixture. They feed one or more to the elephants each day. A sick elephant is given more doses of the tonic.

Other plants were used to treat wounds, eye problems, broken bones, skin problems, fatigue, and snakebites. To help elephant mothers produce more milk, banana flower and ginger root are fed to a mother elephant. For eye problems, plants are ground up and placed in the eye. Other plants are boiled in water for elephants to drink.

Recording Data

Number of plants used for medical treatments of elephants:

- Skin: 1
- Fatigue: 1
- Snakebites: 2
- Milk production: 2
- Broken bones: 2
- Indigestion: 3
- Eye problems: 5
- Internal injuries: 5
- Wounds: 8
- Health tonic: 13

Here is some of the data I collected.

These plant parts are the most commonly used for elephant medicine:

- Bark: 32%
- Stems: 18%
- Roots: 15%
- Whole plants: 15%
- Fruits: 15%
- Leaves: 12%
- Flowers: 3%
- Seeds: 3%

I use a special press to preserve plant specimens.
After documenting the plants, I wondered: Where did this knowledge of medicine come from? In ancient India, whole books were written about caring for elephants. But, many of the plants that we learned about were not in those books. Was the knowledge of how to use these plants coming from human medicine?

We learned that many of these plants are used for people in the same way that they are used for the elephants. The plants used to treat elephant eye infections, for example, were the same remedies used for eye infections in people. In fact, 55 percent of the elephant medicines had the same use for people!

There was another knowledge source, too. The elephants themselves! Several of the elephant medicine plants didn’t have any uses in human medicine. And many healing plants were sought out by elephants.

Eighty-four percent of these plants were eaten by elephants when they were free to choose in the forest. So, the elephants were independently eating many of these medicines. Did they know that these plants were medicinal?

We identify and label each specimen, such as this plant used to treat elephants’ broken bones.
**Going Further**

To prove scientifically that elephants eat medicinal plants on purpose would be challenging. But, the Karen mahouts weren’t interested in having their knowledge scientifically proven. After all, generations have observed elephants in the jungle. Many believed that the elephants did eat specific plants to treat specific problems.

Karen mahouts reported 19 plant species that were used by the elephants themselves to treat specific conditions. Quite a few of these plants were the same ones used by the mahouts to prepare medicine for the elephants!

Many of the medicines used to treat elephants had come first from human medicine. Some plants used by the elephants first, only later were used by people. Other medicines were used by both, so it was hard to tell their origins.

**Learning From Others**

In our human-centered world, it can be hard to remember that other species have their own knowledge, which sometimes can be even greater than our own. We learned how to build dams from beavers. We copy the shapes of airplanes from birds. “Biomimicry” is a kind of design that uses the forms and processes of nature to design new human technologies.

Similarly, the Karen have borrowed from elephant knowledge, especially their knowledge of plants.

The next time you see your dog or cat chew up strange plants in the yard, watch closely. They may be snacking on a remedy. There’s much we don’t know about our animal companions!

**WORDWISE**

biomedicine: the branch of medicine concerned with the application of biology and biochemistry to medical research or practice

ethnobotanist: a person who studies how communities traditionally use plants

herbarium: a systematically arranged collection of dried plants

mahout: a person who works with, rides, or takes care of an elephant
This stone moved on its own. How?

Come along as scientists try to solve this and more of nature's mysteries.

By Lynn Brunelle
CIRCLES IN THE SAND

A dragon stirs deep under a desert. It slithers through the sandy dirt. It breathes a fiery, poisonous gas as it goes. The gas bubbles up to the surface. There, it burns circles of bare dirt in the grass.

Or so one story goes. No one has seen this mythical beast. Yet some people in southern Africa say it’s there. It’s how they explain mysterious dirt circles that dot the eastern edge of the Namib Desert.

Thousands of circles stretch as far as the eye can see. Some are small, just one meter (three feet) wide. Others are as wide as 50 m (164 feet). The dragon has been busy.

Searching for a Cause
Not everyone believes in dragons. Scientists have looked for other causes for the circles. Some think that, like the mythical dragon’s fiery breath, a gas bubbles up. Others think that ants may chew the roots of the grasses. Still others think that toxic plants may spread their poisons. Any of these actions could have the same effect. They could kill the grasses.

These are all theories, or ideas. They seem possible. Yet, scientists have to prove a theory before it’s accepted as fact.

Desert Discoveries
One scientist thinks he may have solved the mystery. Biologist Norbert Juergens has visited the desert 40 times. He’s studied 1,200 circles. He’s looked for patterns among the circles, trying to discover what they have in common.

The biologist sifted through the dirt inside the circles. He tested it for chemicals and measured how much water was in it. He recorded the animals he saw in the circles. He wrote down the names of plants growing nearby.
Common Clues
Juergens found some similarities with the circles. Each circle had dry, sandy soil in its center. He also found something surprising. Even in the dry season when it barely rains, the grasses around the circles stayed alive. To find out why, he dug deep into the soil. He discovered wet sand under each circle. The grass roots tapped into the water to keep the grasses alive.

Juergens also found sand termites. They tunnel through dirt and chew on plant roots. He studied these common clues. Then he came up with his own theory.

Mystery Solved?
Juergens thinks that termites eat some grass roots. That kills the grass growing above the roots and forms a circle of bare dirt. When it rains, water soaks into the dirt. It’s saved in a pool under the dirt. The termites drink this water. The grasses around the circle soak it up. It’s how these insects and plants survive in the desert during the dry season.

Juergens will have to study more circles to prove if his theory is correct. While not fire-breathing dragons, these termites may have created one of nature’s mysteries.
Yoji Okato pulled on his dive gear. The underwater photographer gathered his waterproof cameras. Then he dove into the sea off southern Japan.

When he reached the seafloor, he saw something odd. It was a giant circle in the sand that was two meters (six feet) wide. The sand in the center looked smooth. A pattern of symmetrical ridges piled up around the edge of the circle.

Okato took pictures of the sand sculpture. When he shared his photos, other divers said they’d seen these mysterious circles, too. Yet, no one had ever seen what made them.

A pufferfish swims back and forth as it makes a sand circle.
Searching for a Cause

People had theories about these sea circles. Some said they formed when a UFO landed on the seafloor. The spaceship left a mark in the sand, they said. Others thought ocean currents sculpted the sand. The moving water could push the sand into ridges. Yet, the circles seemed too perfectly round to be formed by shifting water currents.

To solve the mystery, Okato teamed up with scientists and filmmakers. Time after time, they returned to the dive site. The team watched and waited to see how the circles formed. Dive after dive, they saw nothing and swam away without any clues.

Finally, the team caught the artist in the act. It wasn’t an alien, and it wasn’t an ocean current. It was a male pufferfish. He swam back and forth. The motion made tiny waves. These waves moved the sand, forming a circle. Then the fish used his fins to dig into the sand. He flipped fine sand into the center of the circle. He dug dips and built ridges around the edge. Finally, he collected bits of shells in his mouth and carefully placed them on the ridges.

Mystery Solved

Okato’s team didn’t just find out what builds the mysterious sea circles. They learned why the pufferfish builds it.

When a female pufferfish swam by, the male zipped back and forth inside the circle to get the female fish’s attention. It worked. She decided to lay her eggs in the center of the circle. It took patience and a lot of observation, but Okato finally solved the mystery of the sea circles.
A big boulder sticks out of the dried mud. This rock is too heavy to pick up. Yet, it has mysteriously moved. A few days ago, it was 250 meters (820 feet) away. A trail shows where it moved across the dirt.

This isn’t the only rock on the move here. Many of the rocks in this part of Death Valley don’t stay in one place. Their trails crisscross the cracked mud of a dried lake.

Some glide in straight lines, then stop and settle into the dry mud. Some rocks move in pairs. Others zigzag this way and that, leaving a jagged trail.

How did they move? No one has ever seen it. It’s a mystery.

Searching for a Cause

Over the years, people have come up with wild ways to explain how the rocks move. Some people say the rocks are magical and move on their own. Others say aliens from space are moving them. Still others think pranksters are playing tricks, moving the rocks when no one is looking. Scientists have looked for evidence in nature to find answers.

An early theory was that gravity moves the rocks. This force could tug on the rocks and pull them downhill. Even though this area looks flat, it actually slopes a little.

So, scientists looked for patterns in which direction the rocks moved. That’s when the gravity theory fell apart. Most of the rocks had moved uphill. Gravity pulls things down, not up.

Another theory was that winds pushed the rocks. The winds here are strong. The scientists did experiments to test the wind theory. One even used the wind from a plane propeller to try to move the rocks. The tests showed that winds aren’t strong enough to move the biggest boulders.

Cold Clue

Finally, scientists noticed that the rocks seem to move only in the winter. That’s when this area sometimes floods. A thin layer of water surrounds the rocks.

Studying the water led scientists to new theories. Geologist Paula Messina observed a thin layer of slimy bacteria growing in the water. The slime makes the ground really slippery, so the rocks can slide easily. Even a small wind may be able to push the rocks.

An Experiment

The water gave scientist Ralph Lorenz a different idea. Could rings of ice form around the rocks? Since ice floats on water, the ice might lift even the biggest rocks a little. Then a light wind could push them.

Lorenz did an experiment to see if his theory worked. He tested it on a model, and the rock moved! Its bottom scraped along the sand, leaving a trail. So, it seems that ice and wind could help the rocks move. So could bacteria and wind. Both theories are possible. No one’s ever seen the rocks move, so this mystery remains unsolved.
Boulders mysteriously zig and zag in Death Valley, California, U.S.A.
Pink, poisonous, or ... polka dot? Take a tour of some of the planet’s most peculiar lakes.

By Beth Geiger
Ah, lakes! Great for fishing, swimming, and paddling. Or... maybe not. From creature features to melt-your-skin salty, these lakes are among Earth’s weirdest bodies of water.

Seeing Spots
Take a peek at Spotted Lake. It’s in British Columbia. Does it remind you of your favorite polka-dot pajamas?

Spotted Lake fills a low spot in one of Canada’s deserts. The lake is a dead end. Water rich in minerals from rain and melting snow flows in. But very little flows out.

In summer, most of the water evaporates. It leaves behind a rainbow of mineral pools. One mineral forms a white crust that surrounds the pools like a patio.

Canada’s First Nations people think the lake has healing powers. One legend even says that during a battle, both sides took a break to heal their wounds together in these waters!

Poison or Paradise?
Don’t bother taking a dip in Lake Natron, Tanzania. In the dry season, most of the water evaporates anyway. What’s left is hotter than bathwater and red from bacteria. It’s also super salty from minerals. The water is so harsh it will burn your skin.

Besides, you’d have to compete with two million loud, smelly Lesser flamingos. They are at home here. Little islands of salt stick up from the lake bed. The islands are great places for the flamingos to build nests. The poisonous water around them keeps the nests safe. A predator looking for a snack could end up dead. What protects the flamingos? Their leathery legs keep them safe from the water.
Extreme Lake

Big, bold, cold, and beautiful. That’s Lake Baikal, Russia: Earth’s deepest. It’s more than 1,000 meters (3,280 feet) deep and 636 kilometers (395 miles) long. More than 300 rivers feed it. This huge lake contains a fifth of the planet’s liquid freshwater.

Besides being big, Lake Baikal is also Earth’s oldest lake. It dates back 25 million years. The lake is home to 1,500 species. Many are found nowhere else on Earth.

The lake’s most famous animal is the nerpa. The nerpa is the only seal that lives only in freshwater. One of its favorite foods is a little pink fish. This fish is partly transparent! Look closely, and you might spot one swimming along. Lake Baikal is one of Earth’s clearest lakes, too.
Jellyfish Central

Gliding globes of golden jellies. That’s what you’ll find in Ongeim’l Tketau. This tiny lake on a tiny island in the Pacific Ocean is known as "Jellyfish Central."

Over thousands of years, the jellies here have lost most of their sting. It’s safe to swim here. But if you do, be prepared. You’ll have to keep up with the jellies’ busy schedule.

In the morning, the jellies float to the east side of the lake. In the afternoon, they bob back to the west side. At bedtime, they head toward the middle. Why? To follow the sunlight. Jellies get their energy from algae in their bodies—and the algae get their energy from the sun. Jellies avoid shadows along the shoreline. That’s where their enemy, the anemone, lives.

What’s Cooking?

Everyone likes nice warm water. But Boiling Lake on the island of Dominica, is extreme. It boils, like a pot of soup on a stove.

Dominica is built by volcanoes. And volcanoes often have fumaroles: searing hot holes where heat and gas escape. Boiling Lake fills a fumarole. No wonder it’s boiling. There’s hot magma underneath!

Getting there requires a tough hike. Tourists scramble up a slippery trail. They trek through a valley, where the air smells like rotten eggs. Finally, they reach a cliff overlooking Boiling Lake. Look, but don’t fall in!
Down the Drain
It’s summer on Greenland’s vast ice sheet. Lakes of meltwater dot the frozen surface like blue jewels. The darker the blue, the deeper the lake.

Some of Greenland’s meltwater lakes play a game of now-you-see-me, now-you-don’t. One, called North Lake, sometimes drains all at once. One year, all 45 billion liters (12 billion gallons) of it disappeared in two hours!

Scientists figured out what happens. As temperatures warm, the ice shifts. That opens huge cracks. The lakes drain down through the cracks. It’s like someone pulled the plug on a bathtub. The water runs all the way to the base of the ice sheet. Then it flows toward the sea. Who knows? Maybe one day, Greenland’s whole ice sheet might slip away. Here today, gone tomorrow.