



Soar through the tops of trees
with National Geographic Explorer
Mark Olson as he discovers

The Hidden Live

Use what you know about leaves to make connections as you read.

s of Leaves

By Cynthia Overbeck Bix

Sunlight flickers through the leaves of the trees in the forest. The trees are full of life and sound.

Birds squawk and chirp. Monkeys call out to one another. Snakes hiss and slither along branches.

This morning, the forest is filled with a new sound. It begins as a faint buzzing. The buzzing grows louder and louder.

Suddenly, a man flies over the treetops. The buzzing is coming from a winged machine strapped to his back.

Meet Mark Olson. He's a botanist. He studies trees. The machine he's using is a paraglider. He zips over the treetops to look at leaves. He wants to find out how leaves gather and use sunlight. He knows it is one of the keys to a tree's survival.

Leaves at Work

Olson gets ready to land. He flips a switch, turning off the motor. The glider gently carries him to the ground. He lands near the trees he's been studying. They're called moringa trees.

Moringa trees fascinate him. People use their leaves and roots for food and their bark for medicine.

Some people call them miracle trees. To Olson, the miracle is what happens inside each leaf every day.

Like all green plants, trees make their own food. Leaves use the sun's energy to mix water with carbon dioxide, a gas in the air. This makes food for the plant. It also gives off oxygen. We call this process **photosynthesis**.

This process is as important to us as it is to the tree. We breathe in the oxygen that the tree gives off. This creates a cycle of life. It keeps life on Earth going.

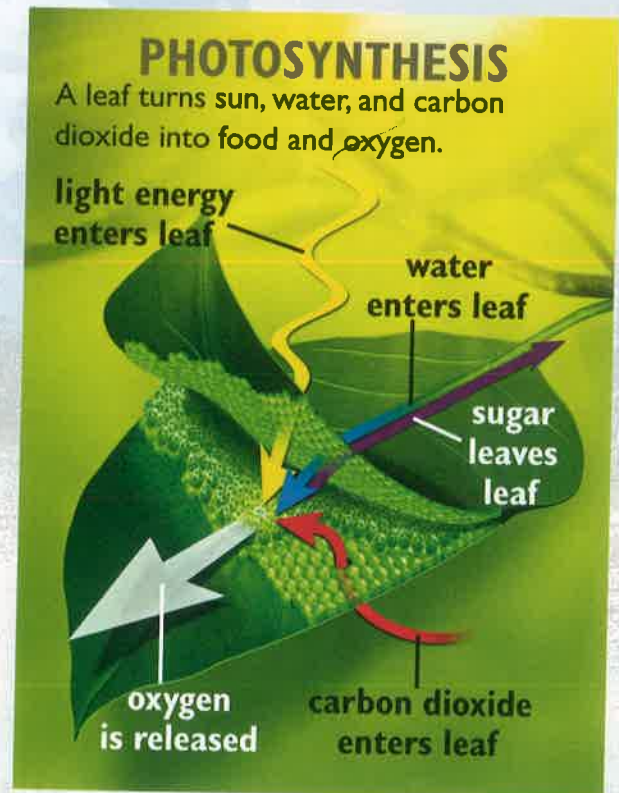
Using Sunlight

Olson looks up at the leaves of one large tree. He squints a little. It is bright and sunny now. Yet each night, this tree waits through the darkness for the first rays of the sun to appear.

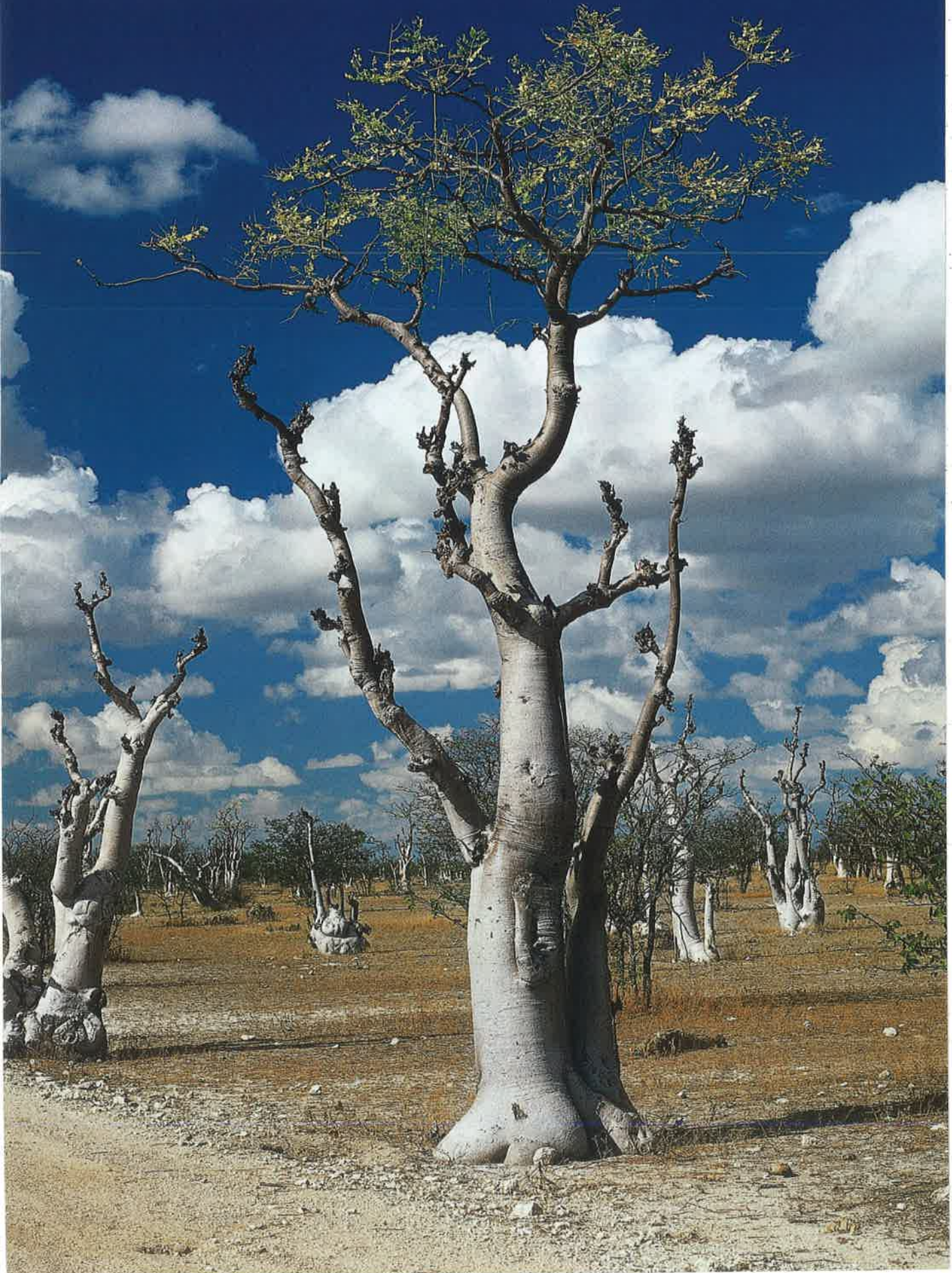
As the sun comes up, it begins to warm the tree's many leaves. Tiny pores on the leaves open. A little bit of water evaporates through them. Carbon dioxide from the air goes into the pores. Inside each leaf, **chlorophyll** soaks up the sunlight.

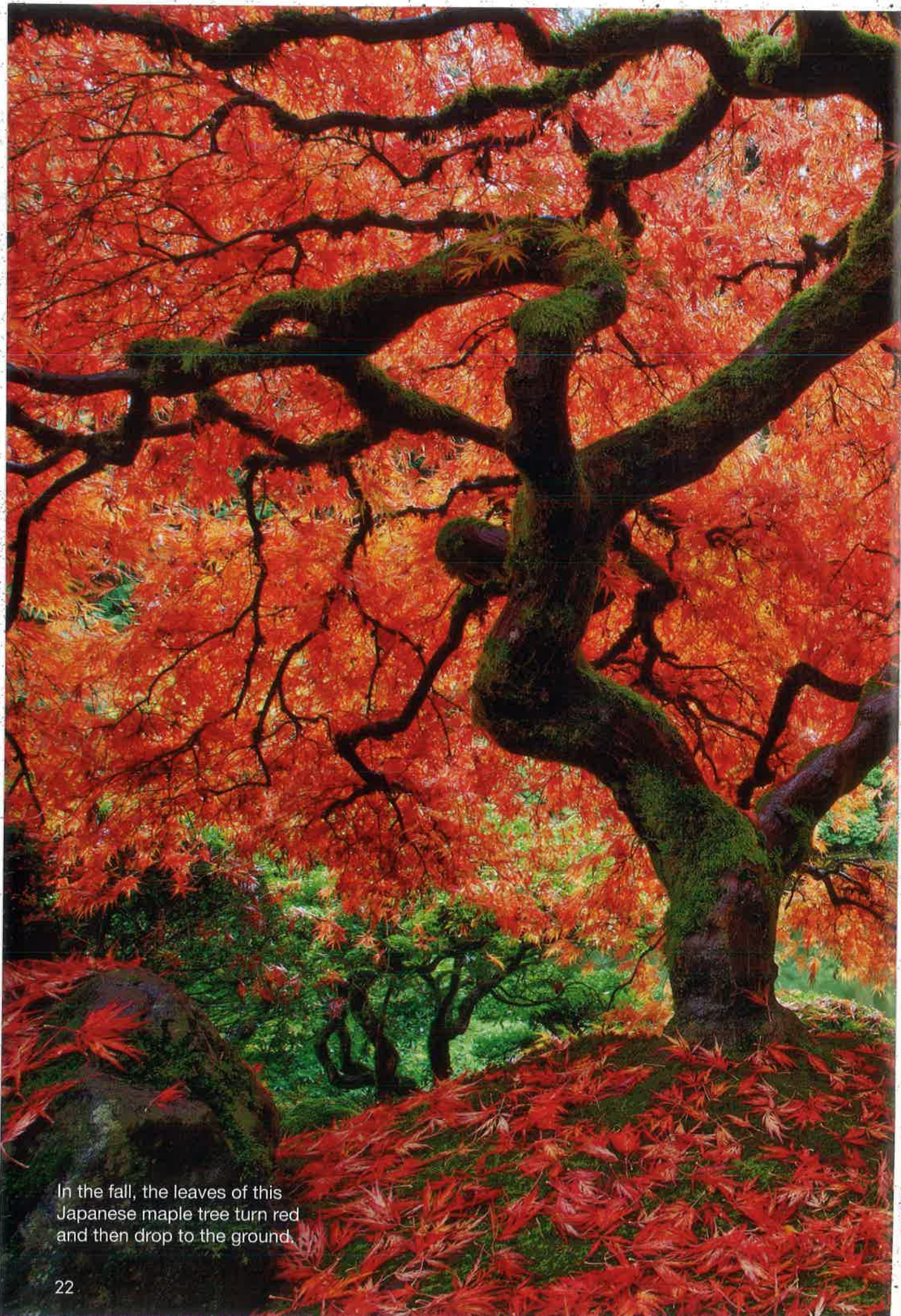
At the same time, the moringa's roots take in water and minerals. The roots reach deep into the soil. Water travels up the roots to the trunk. Then the water flows into the tree's branches and into each leaf.

Each leaf makes only a tiny amount of food. So the more sunlight the leaves capture, the better. A grown moringa needs thousands of leaves to keep it alive. Together, the leaves have until evening to make food to feed the tree.



The tiny green leaves on this ghost tree make food for the entire plant.





In the fall, the leaves of this Japanese maple tree turn red and then drop to the ground.

Above and Below

Olson heads back to his lab on foot. He always takes photos during his flights so he can study how the leaves spread out to capture sunlight.

From the air, Olson can see how tree branches and leaves are arranged. Some look like a head of broccoli. Some look like a brain. The moringa looks like a green cloud of feathers.

These patterns help each tree get as much sunlight as possible. A tree with large leaves has leaves spaced far apart from each other. They grow on thick branches. The giant leaves of the African raffia palm are the largest tree leaves in the world. One leaf may grow as long as 20 meters (65 feet). By growing far apart from each other, each leaf can collect sunlight.

Trees with small leaves, like Olson's moringa trees, have leaves close together. They grow on many skinny branches.

Leaves have other ways to get light, too. Some leaves grow in a spiral around their stems. Others grow across from each other on the stem. Many leaves have notched or cutout edges. Light can shine around them onto the leaves growing below.

Keeping Their Leaves

Not all trees lose their leaves in winter. Most **conifers** keep their leaves year-round. The leaves on these trees are hard and narrow. They look like needles. These needles may be thin, but they can gather sunlight. Like the leaves of other trees, they carry out photosynthesis.



Life and Death

In many places, tree leaves collect sunlight and make food during spring and summer. This changes in autumn.

The days shorten, and the temperature starts to drop. **Deciduous trees** sense that it's time to shut down for the winter.

Without enough sunlight, photosynthesis slows down. The chlorophyll in the leaves starts to go away. To us, it looks like fall leaves change color when they turn red, yellow, and brown. In fact, these colors are always in the leaves. The strong green of the chlorophyll usually hides them. When that fades, the other colors get their chance to shine.

Finally, all the leaves' food is gone. The leaves die and drop off. The trees are inactive until the spring when new leaves grow.

Into the Air

Early the next morning, Olson gets up and heads for an open field. He wants to study the moringa trees in the early morning light.

He buckles himself into the harness of his paraglider. He revs up the motor. The propeller starts to spin. He moves forward. Behind him, the parachute rises off the ground. Suddenly, he's airborne.

Over the trees he soars. Birds fly under him. Above, the sky is wide and blue. The warm sun shines down onto the leafy trees below. As Olson knows, those leaves are just beginning their day of hard work.

Wordwise

chlorophyll: a chemical in leaves that catches the sun's energy

conifer: a tree that stays green year-round

deciduous tree: a tree that sheds its leaves at the end of a season

photosynthesis: the process by which organisms use sunlight to make food

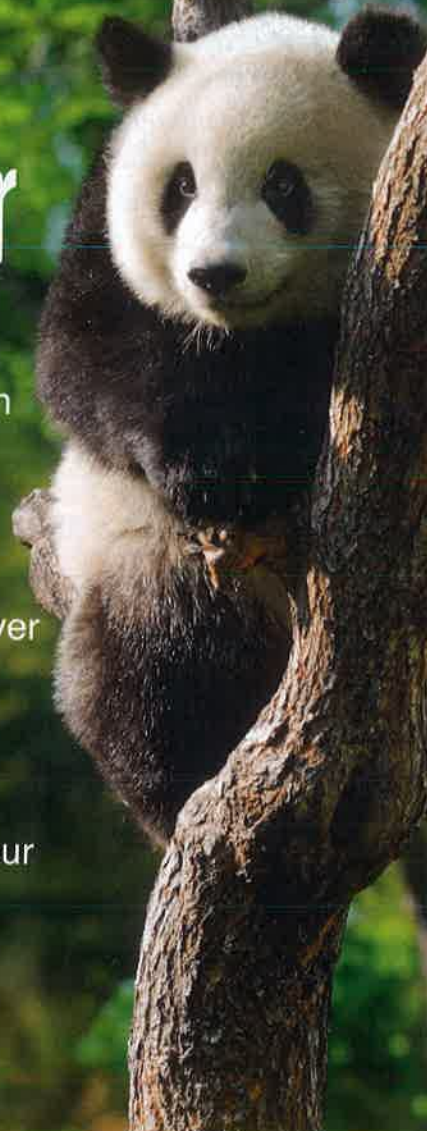
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