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Canopy Cruising

by Karen L. Castro-Esau

Illustrations by Sam Logan

Tarzan. George of the Jungle. Me. We all have something in common — lianas. But while Tarzan and George swing their way from adventure to misadventure, I dig into the science of this woody vine found in tropical forests. And by the way, you can't always swing on them. They're usually firmly rooted to the ground.

I'm a canopy scientist. Being sensible, I use a crane to cavort through the trees. And I don't rely on a chimp and a bunch of elephants for help — I'm part of a team from Edmonton's University of Alberta Earth Observation Systems Laboratory.

Knot Easy

A day of field research begins in sunny Panama, at the Metropolitan Nature Park near Panama City. We're at the base of a construction crane installed in the forest. I prepare my equipment in the crane's gondola while the operator climbs the lo-o-o-ong ladder to the operator's cab. We carry two-way radios for communication. Other necessities include climbing equipment and a fire extinguisher. The climbing equipment is for getting down in case the crane motor stops working. The fire extinguisher? For blasting away swarming wasps! Thankfully, I've only used the radio so far.

"Súbanos lo más alto!" In Spanish, I tell the operator to bring us to the top. A taxonomist (an expert at classifying living things) comes with me to help identify the liana and tree species. In less than a minute, we glide 40 metres (about the width of a soccer field) from humid, shaded understorey and chirring of

Rising to New Heights

To get to the canopy, scientists have put their imaginations to the test. Besides canopy cranes, other methods include:

- Climbing ropes
- Canopy walkways
- Inflatable rafts deployed with dirigibles
- Canopy towers
- Cable tramways

Photos courtesy Karen L. Castro-Esau

Mark Kachmar (left) and Karen Castro-Esau (right) in the crane gondola at Metropolitan Nature Park in Panama.

cicadas to the breezy, sunlit canopy and occasional croak of a toucan.

From ground level, lianas knot, braid, and loop-the-loop their way toward the Sun. They use tree trunks or other lianas on their climb and nimbly spread out over tree crowns. Spreading lianas have scientists concerned. For the past 20 years, the vine has become increasingly dominant in Amazonian forests.

Because of their mobility and deep root systems, lianas have the winning edge in the competition for light and water. With time, their weight brings tree branches or entire trees crashing to the forest floor. Neighbouring trees, caught up in tangled webs, may be pulled down, too. Overall, liana-supporting trees grow slower, produce less fruit, and are more likely to die than liana-free trees. When lianas thrive, trees do not.

Light-Lite

At this site in Panama, and several others, our team has found that liana leaves reflect more light. The spectrometer (light mesuring device) showed our team something else worrisome about lianas at this site. Liana leaves reflect more light in the visible part of the electromagnetic spectrum than tree leaves do. This difference is related to a lower chlorophyll content in liana leaves. A thick carpet of liana leaves at the top of a tropical forest could change the forest ecology. So we want to keep an eye on lianas. And we might just do that from space. The difference in leaf reflectance could possibly be detected from airborne or satellite-borne sensors and used to track the spread of the vines over time.

For the moment, however, we're still Earth-bound. From the crane I at least get a bird's-eye view of the forest canopy. We go left, right, up, or down, to specific sites within the crane radius where I measure how much sunlight is reflected off liana leaves. I can see the vines spreading out. It's a big job and many questions remain about the spread of lianas, and about the canopy in general. Scientists call the forest canopy "the last biotic frontier".

Tarzan. George of the Jungle. Me. Who knows, maybe you someday.

Tops in their Field

The forest canopy teems with biodiversity, yet it is one of the planet's most poorly studied habitats, likely because it is hard to get up there!

Canopy scientists have a wide range of interests. Dr. Nalini Nadkarni, one of the world's leading canopy scientists, studies epiphytes (canopy-dwelling plants) in Costa Rica. Her research has led to a better understanding of how epiphytes, high up in tree crowns, get nutrients from the atmosphere and from nearby plants.

Dr. Margaret Lowman, also known as "Canopy Meg", investigates relationships between plants and insects in Australian forest canopies. Her studies have answered important questions about leaf defences against herbivores (plant-eaters).

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