

*Mandy*  
 please proof-read carefully  
 before I print a final version.  
 is 8 1/2 x 14" okay! - or paper 8 1/2 x 11!  
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 call me!

# THE COLIBRI TRAIL

(Coterc scan of hands holding trees will go here)

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**CANO PALMA RESEARCH  
 STATION**  
 BIOLOGICAL

*copy*  
*date* →

## *BEFORE YOU START*

Here are a few things to keep in mind as you walk this trail:

- **Please stay on the trail. There are poisonous snakes in this area, so watch where you're putting your feet and hands. Also, please don't trample the plants.**
- **Please don't handle any animal or plant you find. Some animals may bite, sting, or be chemically toxic. Certain plants have thorns and can be chemically toxic also.**
- **The trail is less than a kilometre long, and should take less than an hour to complete.**
- **Insect repellent is advised.**
- **As you walk, remember to look around you, and to use your senses of smell as well as hearing.**
- **Finally, please do not molest, remove, or collect any animal or plant you encounter. Collecting specimens from any reserve is illegal, and we want future visitors to enjoy them also!**



STOP NO. 1

Welcome to the Caño Palma Biological Station's Interpretive Trail. The relatively consistent humidity and temperature in this area have created one of the most varied and species-rich areas of Costa Rica. Although this forest is home to many strange and wonderful animals, many of them make an art out of not being seen by humans. However, with the help of this brochure you can learn a few things about the internal workings of one of the most diverse, vibrant and threatened ecosystems on earth: the Atlantic Lowland Rainforest.

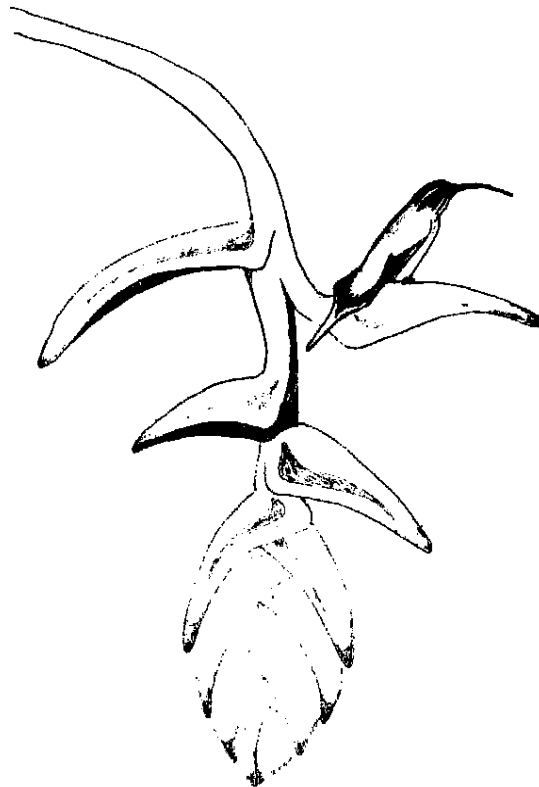
The Trail borders on the edge of secondary growth — an area used for farming coconuts, bananas and papaya by the previous owner. We are allowing Nature to have its way in generating undergrowth, bushes and small trees making a rich environment for hummingbirds and myriads of butterflies.

## **STOP NO. 2 HUMMERS AND HELICONIA**

These banana-like plants with their large red blooms are members of the large Heliconia family. Instead of a sweet smell, these tubular flowers rely on their bright red colour to attract hummingbirds such as the Little Hermit or Long-Tailed Hermit Hummingbird. They move from flower to flower drinking nectar and cross-pollinate the plants in the process. Hummingbirds seem to be strongly attracted to the colour red.

Flowers use many different techniques to attract pollinators. Some use odours to attract insects — smells can range all the way from sweat to the stench of rotting meat! Those flowers which are pollinated by bats tend to be large and light-coloured, in order to be seen well at night.

Flowers in the orchid family definitely win the award for deception. Some orchids mimic nectar-bearing flowers, attracting nectar-hungry insects that receive no nectar meal as a reward for pollination. One orchid produces a flower that resembles a female wasp, and is pollinated by eager males that fly from flower to flower, attempting to mate with each one!

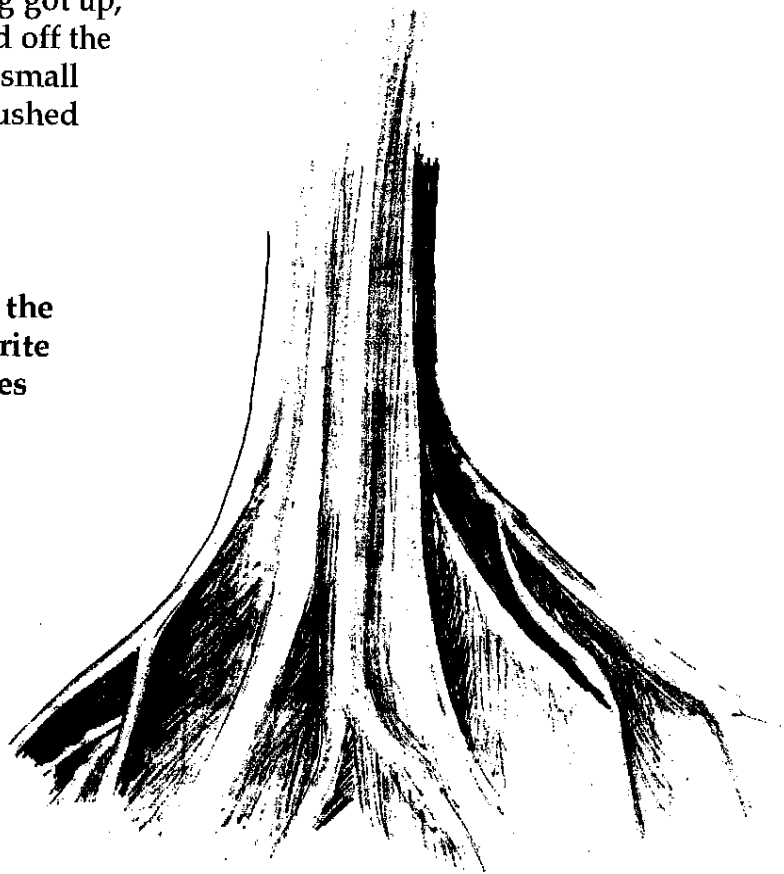


## **STOP NO. 3 BUTTRESSES**

Look to your right to find the large tree that has odd-looking roots. These are called buttresses, and many species of rainforest trees have them.

There are a number of theories as to why buttresses evolved. There is a story told about a scientist who was trying to convince his colleagues that buttresses act to support and anchor trees against the winds that can blow in the treetops, high above the forest floor. In the midst of the scholarly debate a Costa Rican assistant who had been listening got up, without a word, sawed off the buttresses of a nearby small tree and effortlessly pushed the tree over — which seemed to end the argument!

**The hollows between the buttresses are a favourite resting place for snakes such as the Boa Constrictor and the venomous Fer-de-Lance. Keep an eye out for them!**



## STOP NO. 4 THE POISON DART FROG

*"I like the look of frogs and their outlook, and especially the way they get together in wet places on warm nights and sing about sex".*

*- Archie Carr, The Windward Road*

Look carefully around your feet. You might see <sup>ITALIC S</sup> one species of the "Poison Dart Frog" family (*Dendrobates pumilio*, or the strawberry frog). Although less than an inch long, its bright red skin makes it easy to see again the gloom of the forest floor. But don't pick it up — the skin of this frog contains poisonous toxins. Indeed, three of this frog's Colombian cousins contain enough poison to kill as many as ten people! This toxin is still used by the Choco Indians in the preparation of their blow-pipe arrows — hence the name.

Why are these frogs so brightly coloured? Their bright red skin serves as an easy-to-remember characteristic for predators — any animal that attempts to eat one of these frogs will have a bad enough experience that they'll avoid any red frogs for the rest of their lives!

Scientists have recently discovered some amazing facts about the strawberry poison-dart frog. Several days after the eggs are fertilized (usually on a wet leaf on the forest floor) the female will pick up the eggs and separately move them to a moist bromeliad. She then feeds the growing larvae by laying a number of unfertilized eggs in the water that are then greedily consumed. This act — feeding one's young with unfertilized eggs — is the only known example in the world of this bizarre behaviour,

*italics*

and is shared by species closely related to D. pumilio. In other species of poison-dart frogs, it is the father who carries the larvae on his back to a suitably wet environment for hatching, and parental care then ends at this particular point.

As you walk, closely examine the forest floor on both sides of the trail — you may see this small red frog.

### ***The Golden Toad of Monteverde***

The Golden Toad, once a treasured symbol of the Monteverde Cloud Forest Reserve in Costa Rica, is widely believed to have become extinct in the past few years — despite the fact that its habitat has been preserved for decades. It is possible that they were killed by atmospheric pollutants — a sobering thought to remind us that protection of our environment must extend beyond that of a few nature reserves here and there. Let's ensure that the Poison Dart Frog doesn't suffer the same fate.

SECTION OF KANANASKIS RIVER VALLEY

KANANASKIS COUNTRY

KEY

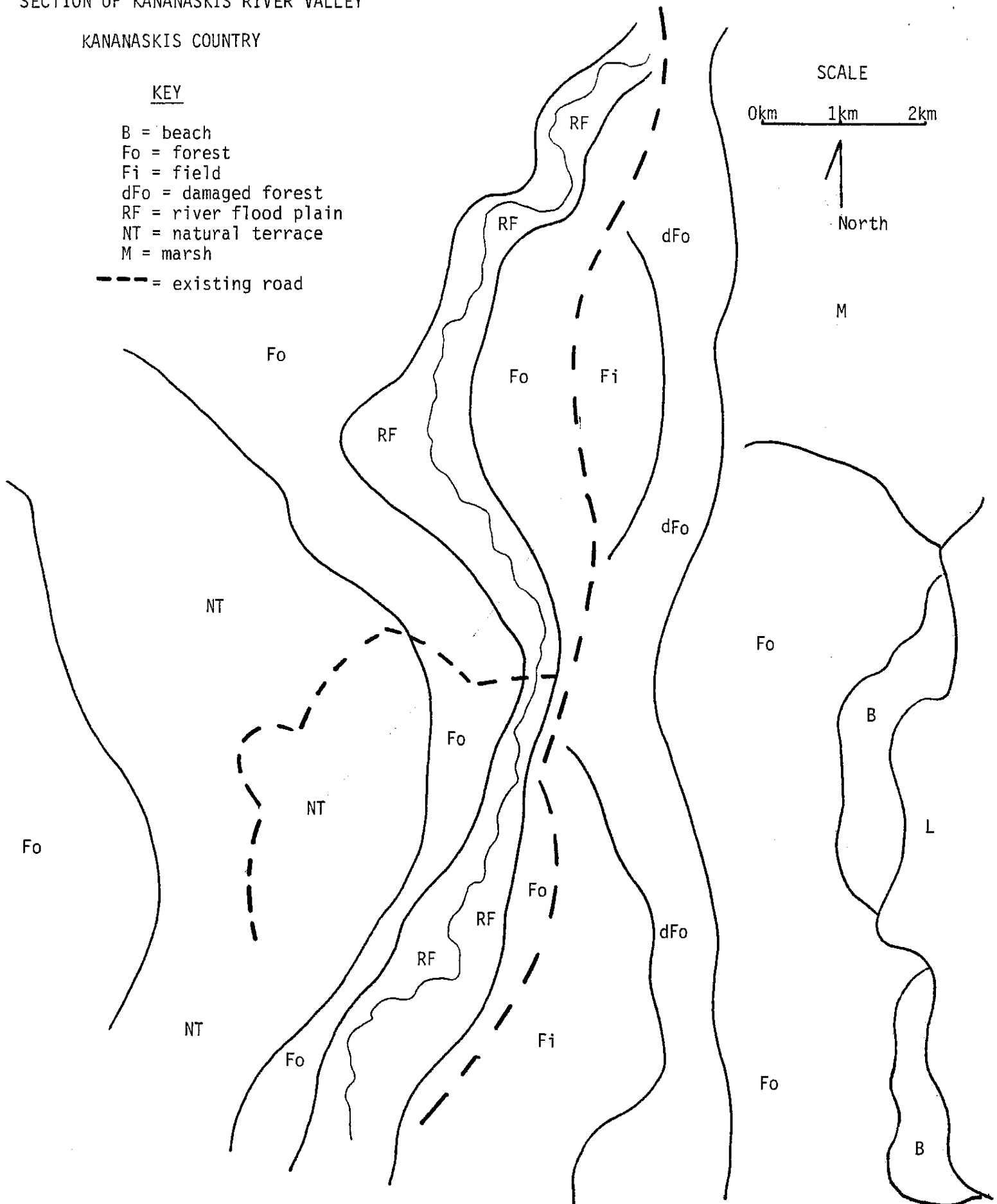
- B = beach
- Fo = forest
- Fi = field
- dFo = damaged forest
- RF = river flood plain
- NT = natural terrace
- M = marsh

--- = existing road



North

M



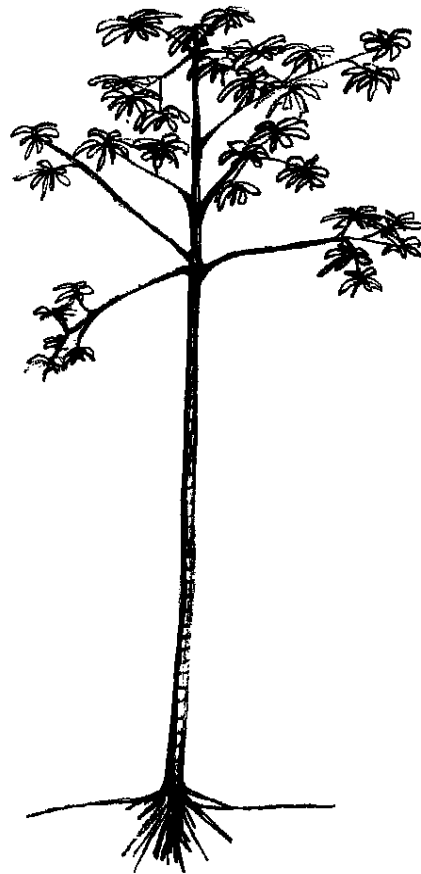


## **STOP NO. 5 CECROPIA TREE**

Look closely at the bark of this tree — do you see any small brown ants walking around? Rap on its trunk with your knuckles (don't let those ants get you!) — does it sound hollow? This tree, the Cecropia, is similar to bamboo in that its skin is hollow, providing a home for a colony of Azteca ants. The tree and the ant are joined together in a special sort of relationship known as mutualism, one that is mutually beneficial to both species.

Not only does the hollow tree provide the ants with a home, but the tree also secretes nutrient-rich liquids that the ants feed upon. Further, the tree also provides its sap as food to an insect called the mealy bug, which is tended by the ants as if they were shepherds looking after their sheep! Although there is a cost to the tree to support the ants, it is more than paid back by the ants themselves. The ants groom the tree, keeping it relatively free of leaf-eating insects. Any large disturbance to the tree causes the ants to come boiling forth — their tough bite into which they rub a stinging chemical, is not soon forgotten by anyone who has tried to cut down a Cecropia tree!

**The Two and Three-toed Sloths are associated with the Cecropia tree. Although sloths make their homes in a number of species of trees, they are much more visible in the open foliage of the Cecropia tree.**



## **STOP NO. 6 AT THE BOTTOM OF THE SEA**

Compare a tropical rainforest to the sea? Ridiculous! But wait — let's see if there are any similarities.

Look down the trail, then gradually lift your eyes to the treetops. Like the sea, a rainforest has different zones. The treetops (also known as the forest canopy) receive most of the sun's energy, which is why it's relatively dark where you are standing. As in the ocean, most of the animal activity occurs in this highest, energy-rich zone. The Howler Monkeys that have been studied at this station are usually found at this level, and a lot of the bird calls you'll hear will come from the canopy level as they feed on fruit, flowers or insects.

Like the sea floor, the ground at your feet is where most organic debris ends up. Bend down and look closely at this leaf litter. Within a month the leaves you see will have been completely broken down, and the molecules they are made of will already be part of some rainforest organism. If you were to scuff a hole in the leaf litter you would see threadlike fungi or rootlets. The warm temperatures and high humidity found in the rainforest are ideal conditions for fungal growth, which works together with tree rootlets to rapidly decompose the litter and transport its nutrients. Unlike a temperate zone forest (such as those found in North America or Europe) nutrients in the rainforest don't go into storage in the soil — instead, they are whisked skyward to become part of the vegetation. This explains why land that has been cleared of tropical rainforest typically only supports crops for three to five years — the soil is actually very poor because most of the nutrients are in the trees, not the soil!

## **STOP NO. 7**

### **A PARADISE FOR PLANTS**

It is the epiphytes that tell you you're in a rainforest. Epiphytes are plants that use their roots only for support, deriving all their water and nutrients from airborne debris and rainfall. Ferns, orchids, and bromeliads can be seen growing on the trees around you — although not as luxuriantly as in the higher-elevation cloud forest, where they can represent up to 40% of the total living mass of the forest.

Look very closely at some of the leaves near you — you should be able to see small epiphytes such as mosses or liverworts growing on the surface of some leaves. These epiphytes rob the light that is desperately needed by the leaf for photosynthesis, and the plants have evolved some techniques for fighting back. Most leaves in the tropical rainforest have elongate tips called drip tips, designed to help the leaf quickly shed water, minimize moist surfaces where a moss spore could take hold.

This region receives so much precipitation (5,000 mm per year) that plants can afford to stay green year round.



consequently, this forest is known as an evergreen forest. But the leaves themselves don't last forever — in fact, plants here drop their leaves regularly, which helps them avoid excessive build-up of epiphytic mosses and liverworts.

Can you find any leaves that have been damaged by insects or animals? Leaf grazers range from tapirs and monkeys to katydids and caterpillars. Needless to say, some leaves have defenses against this, too! Many leaves secrete poisons that can sicken or even kill an animal that eats too much of it. For this reason, many animals will move from plant to plant as they browse, never absorbing enough of any one poison to harm them.

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On the other hand, some caterpillars such as the monarch, which spend their whole life feeding on the same plant, rely on these poisons for their survival. They begin their life as an edible insect, but as they eat they are able to incorporate these poisons into their own body, becoming a highly

toxic snack for any bird unwise enough to take a peck at one!



As you walk to the next stop, look for a climbing vine along the way that is so thick you might think it's a tree!

## **NO. 8**

### **CREEPY CRAWLIES**

There are advantages to creeping, crawling and climbing on other things — just ask a vine. A vine that picks the right tree to climb can rapidly reach the high-energy canopy zone without having to waste time growing a thick woody stem to support itself. If the tree it's on should happen to fall (perhaps pulled down by the weight of the ~~vine~~) no problem, just start climbing again!

VINE

Look at the vines growing on the trees around you, and you'll see a number of different climbing techniques. Some corkscrew their way up trees, while others use stiff tendrils that wrap themselves around small features on the bark. Other vines may use wedges, hooks or small pads that resemble suction cups to hold on as they climb. Large climbing vines similar to the liana you see before you can grow over half a mile long - which makes for some huge engineering problems when a plant has to get water from the roots to the leaves! A kink in a vine would be fatal, and these vines have developed a built-in springiness in the form of coils, twists and bends to try and avoid this. Cold temperatures or very dry conditions could likewise spell disaster for these specially-adapted plants, which explains why temperate forests aren't festooned with lianas and creepers.

Besides lianas and creepers, this Stop No. 8 has an interesting tree. Note the labelled Gavilan tree where the two paths intersect. This species grows in swampy areas, in parts of the country where there is no real dry season, such as this one. It is a reliable indicator of infertile soil conditions. Just a few feet from here a partially-fallen Gavilan tree has displayed its flexibility, as two of its former branches have taken the form of trees. Do you foresee any problems as these two young trees grow and become heavier?

Turn right and walk back towards the station and Stop No. 9.

## **STOP NO. 9**

### **WHY WORRY ABOUT THE RAINFOREST?**

Why try to save some of the earth's disappearing tropical rainforest? One of the reasons is right in front of you. The shrub with the attractive red flowers is called "Labis de Novia" (Lady's Lips). Its roots are a valuable source of a chemical that is used by doctors as an emetic.

The Labias de Novia plant is just one of a huge number of tropical rainforest plants that humans use. An incredible 70% of all anti-cancer drugs were originally derived from rainforest plants. Over half of all the world's species of plants and animals that are known to exist live in the rainforest, with many more being discovered each year. If we destroy rainforests, we may never know what we have lost — a new strain of fruit, maybe? Or perhaps a cure for AIDS?

Rainforests act as a flood control — cut it down and soil erosion greatly increases, turning rivers a muddy brown — as you might have noticed during your trip from Tortuguero. Luckily, the area drained by Cano Palma has not yet been deforested, which is why it remains its original clear dark colour.

Rainforests provide a home not just for tropical birds but also for migratory birds. The forest you just hiked through is the winter home for birds that are familiar to many North Americans such as the Wood Thrush and the Ovenbird. Destroy the rainforests and you destroy the migratory birds as well.

It seems to be humanity's role to change the earth as we move upon it. Yet, as we play our human games and tinker with the natural world, we should remember Aldo Leopold's maxim:

*"The first rule of intelligent tinkering is to keep all the pieces."*

*Aldo Leopold*

*black fill*

## **STOP NO. 10 BUTTERFLIES FOR SALE?**

On your right is the site of a project being developed by the directors of Caño Palma Biological Station, intended to assist the local villagers to shift their economy from cutting down more trees and poaching animals. We are establishing a butterfly farm here. The butterflies will be encouraged to lay their eggs on plants provided, and in time the eggs develop into caterpillars. After the caterpillars have spun their cocoons and become pupae, the majority of them are shipped to zoos and other butterfly exhibit houses in North America and Europe where they will metamorphose into beautiful butterflies for the enjoyment of their visitors. Some of the pupae will be kept back to regenerate our stock, so that we do not need to deplete the wild environment. Our goal is to teach the local villagers how to establish their own mini-farm on their own property and we will act as their agents to take care of the administrative details. They will in turn receive an income for their active participation. Others will be hired to assist in our operations here.

The directors of Caño Palma Biological Station feel very strongly that we must assist our neighbours to appreciate their natural heritage and to find alternative means of income. We cannot simply isolate ourselves from the very real economic problems surrounding us, and we hope that the butterfly farming project will contribute to these goals.

This field station receives funding through visitors and a non-profit charity. Any donation that you care to make to help us preserve the wonders you've just witnessed will be greatly appreciated.

## REFERENCES

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Janzen, D.H., ed., 1983. Costa Rican Natural History. Chicago. University of Chicago Press.

## ABOUT COTERC

The Canadian Organization for Tropical Education and Rainforest Conservation (COTERC) is a registered charity in both Canada and Costa Rica. COTERC established Caño Palma Biological Station to help preserve tropical rainforests. At the station, research is being conducted to find out more about the rainforest and its inhabitants, knowledge which is shared with our Costa Rican colleagues. By protecting these hundred acres of rainforest, we've also preserved the plants, birds, mammals, reptiles and insects that make this area their home. COTERC's Save An Acre program seeks to preserve adjacent lands and extend the area of protection. Educating visitors, local residents and their children on the importance of this resource will, we hope, ensure that rainforest preservation will flourish here and elsewhere.

For more information on COTERC or the Save An Acre program, please contact the Caño Palma Station Manager, or write to COTERC, Box 335, Pickering, Ontario L1V 2R6, Canada.

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