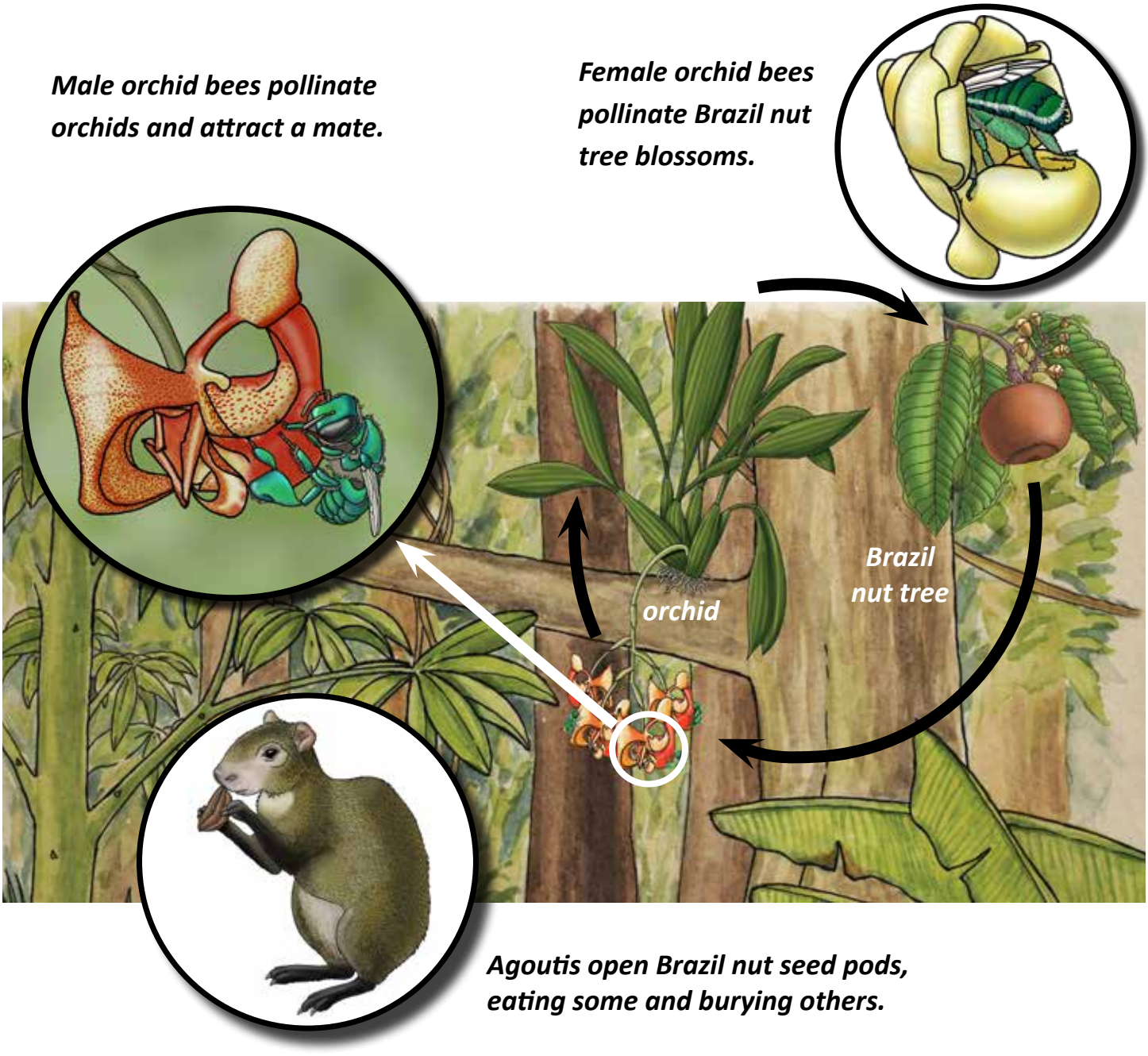
The Rodent, the Bee, and the Brazil Nut Tree

How Living Things Work Together for Survival

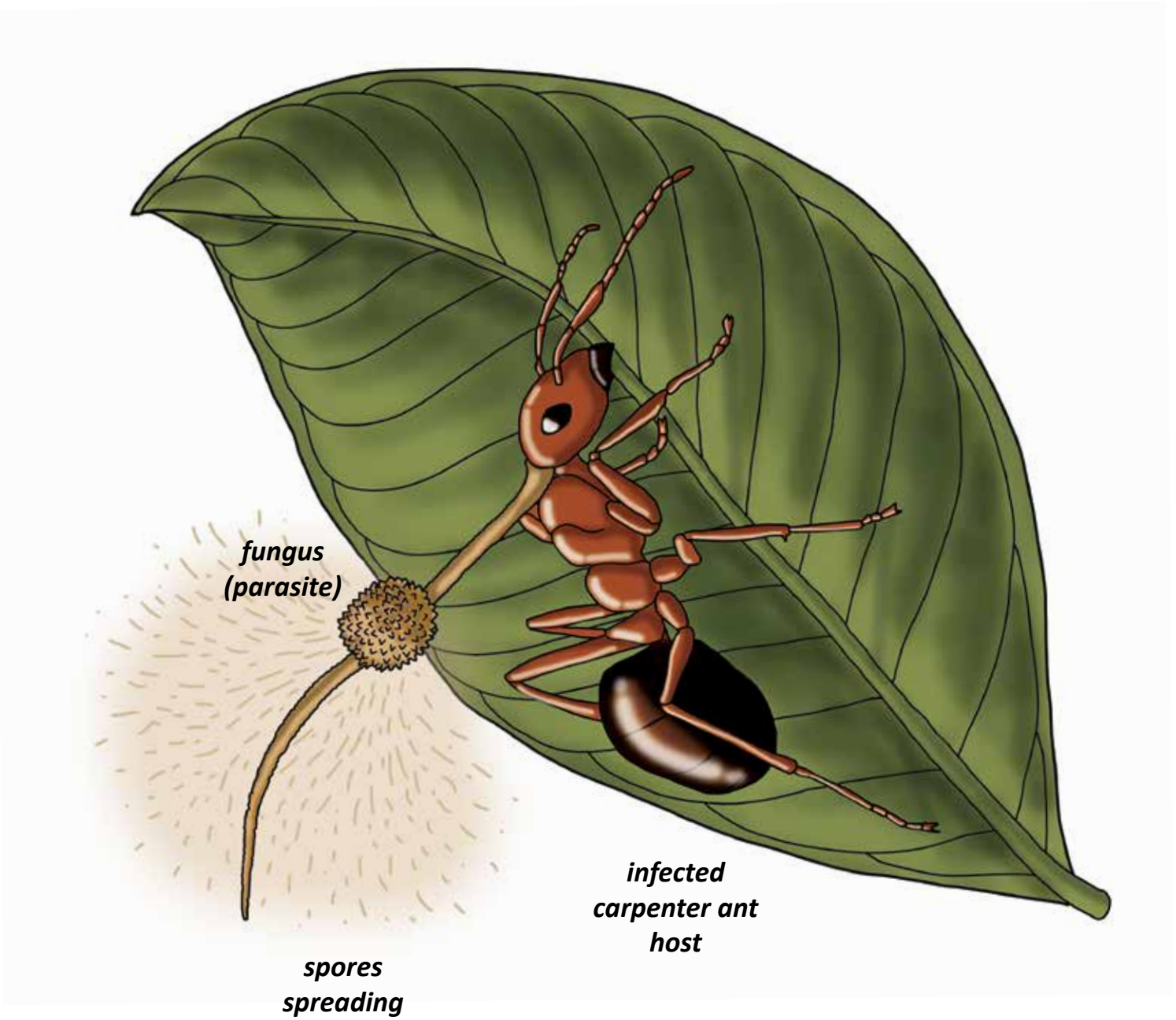
Sheri Amsel

In **mutualism**, both living things benefit from their relationship. In the story of the Brazil nut tree, several species have developed mutualistic relationships. The Brazil nut tree benefits from the female orchid bees' pollination, while the bees benefit from the nectar they collect. Likewise, the agoutis benefit from the Brazil nuts they eat while the tree population benefits from the seeds that are planted.



In **commensalism**, one species will benefit while the other is not affected by the interaction. An example of commensalism in the rainforest are bromeliads. These plants that grow up in the canopy take root on tree branches. They collect enough rainwater and sunlight to survive, but do not hurt or help the trees on which they grow. Another example are the small rainforest frogs that live inside bromeliads. They find water that pools down in the center of the leaves. They shelter there and find insects that have fallen into the water to eat. The frogs do not hurt the plant at all.

In **parasitism**, one species, called the parasite, lives off another species, called the host. The parasite benefits to the detriment of the host. Parasites can attach to a host internally or externally. A strange example of parasitism in the rainforest is a fungus that infects the brains of carpenter ants. The fungus programs the ant to anchor itself to a leaf by biting its main leaf vein with its mandibles. As the fungus grows, it bursts out of the ant's head, killing the unfortunate ant. The fungus then releases its spores. The spores rain down into the forest to infect any unsuspecting ants that happen to be down below, beginning the cycle all over again.



Research and Develop a Pollination Poster (Mutualistic Activity)

As we covered earlier, mutualism is a symbiotic relationship where species interact and benefit each other. A common example of this is when bees and other animals pollinate flowers. The flowers are fertilized and develop fruit and seeds, and the animals that pollinate the flowers receive nectar and pollen to eat.

Objective: Learn about pollination with a team and create an illustrated poster showing your discoveries.

Materials:

- access to online facts about pollination
- poster board
- drawing materials (markers, colored pencils, etc.)
- white paper
- glue stick
- scissors

Procedures:

1. Choose a team of classmates, friends, or siblings with whom you can work.
2. Decide who is best suited to research the topic (researcher), write down the important facts about pollination (recorder), and draw a diagram of each of the pollination facts (illustrator).
3. Work together to review the pollination facts collected by the researcher. Using your own words, define the facts that will go on the poster. Additionally, discuss how many images will need to be drawn to tell your pollination story.
4. Record/write each fact in marker on the white paper in little blocks of text that can be cut out and pasted onto the poster board beside the corresponding drawings.
5. Find a creative way to illustrate each fact on the poster board, leaving room for the text to be added. Outline the drawings in black marker and color them in.
6. Paste on the facts.

Discussion: Congratulations! You have created an informational poster about mutualism while simultaneously working together in a mutualistic interaction. Did you notice that while you were learning about mutualism you were also *engaging* in it with your teammates?

Seed Dispersal Investigation (Commensalism Activity)

Commensalism is a symbiotic relationship where one species will benefit while the other is not affected by the interaction. An example of this is seen in some forms of seed dispersal. In this investigation, you will see the interesting adaptations that plants have developed to spread their seeds by attaching to passing animals. This activity is most effective in late summer, depending on your location.

Objective: Learn about seed dispersal by performing an experiment mimicking a seed-spreading technique found in nature. Witness commensalism in action.

Materials:

- scissors
- old white sock
- plant mister
- flower pot full of damp potting soil, uncut grassy field, and/or wetland in late summer

Procedures:

1. Put a sock on one hand and walk through the tall vegetation, sweeping the sock-covered hand through tall grass, bushes, sedges, etc. Bend down and sweep through plants closer to the ground as well.
2. Once the sock has collected an assortment of seeds, cut it up and place the pieces in a pot full of damp soil.
3. Mist the sock until it is damp every day (not soaking wet). Place the pot in a sunny spot.
4. Over the next couple of weeks, mist the sock every day. Note if there is any green growth.
5. After a few weeks, observe the plant growth on the sock. Think about how the seeds would have been spread by animals in nature in the same way.

Discussion: Think about the physical characteristics seeds require to spread from one place to another.

Tick Tag (Parasitic Activity)

Ticks attach to warm-blooded animals and feed on their blood to the detriment of the host. They sometimes transmit diseases, such as Lyme's.

Objective: Players learn about how wildlife accumulate ticks in the wild that can threaten their health and sometimes their lives.

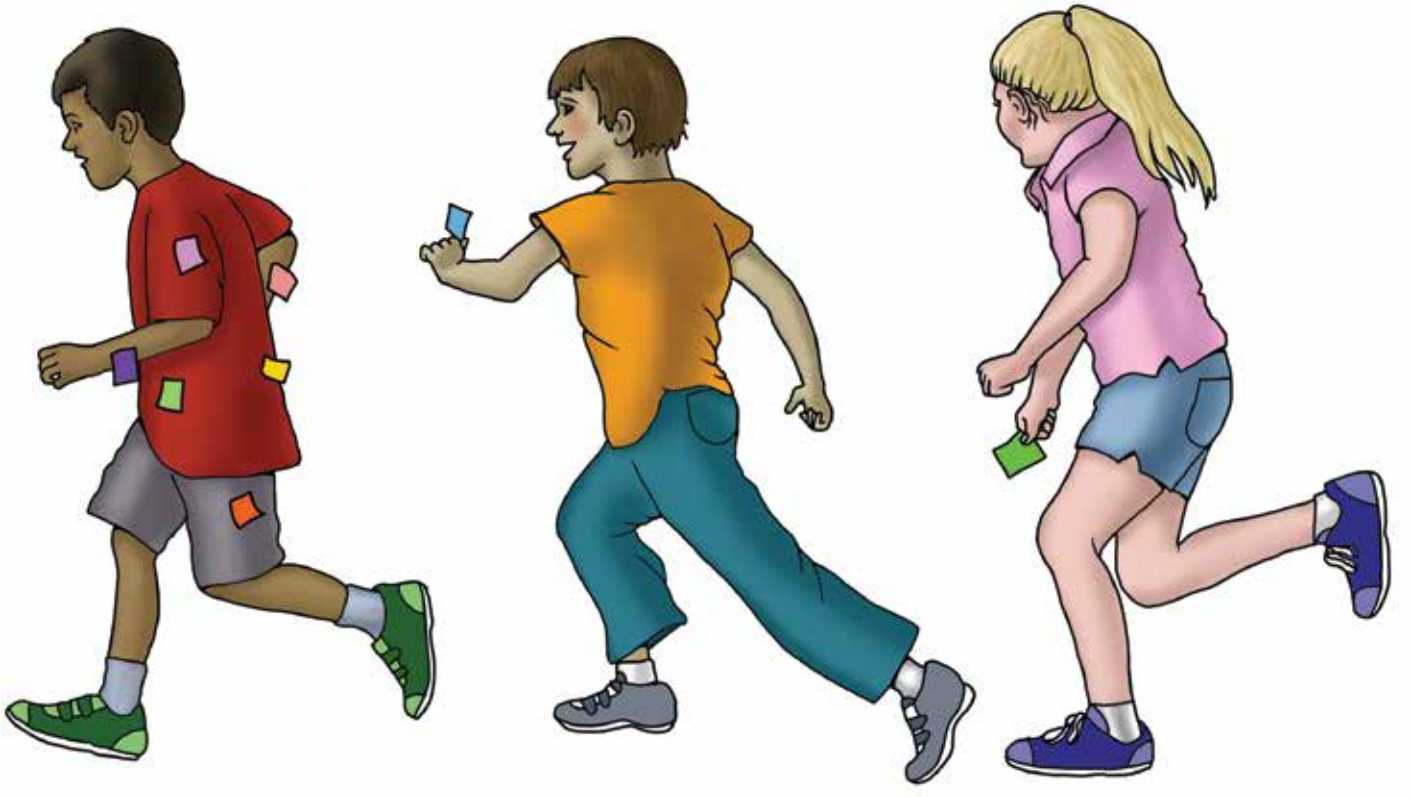
Materials:

• sticky tags • an open area to run around

Directions: This activity is for several people to play together, plus a supervisor to make sure no one is slapping tags on too forcefully. Supply more sticky tags, as needed. Announce when the "wildlife" has been compromised by parasites and the round is over.

1. Choose who will be the first wild animal (e.g., any warm-blooded animal like a deer, moose, raccoon, coyote, fox, rabbit, etc.).
2. Set the boundaries on the playing field so the "wild animal" knows where he/she/they can run.
3. The ticks chase the "wild animal," tag it with a sticky, and run back to the supervisor to get another and try again.
4. Each turn ends when the "wildlife" has more than 20 tags (you can change this number as needed).
5. Take turns with all players being a wild animal once. (The wild animal should not pull off the tags, just run.)

Discussion: In real life, wildlife brushes against grass or shrubs where ticks lie in wait. Grabbing the animal's fur, ticks latch onto the skin and feed on their blood. This game is meant to enable a discussion about ticks (parasitism) and safety measures people can take to protect themselves from tick-borne diseases.



Make a Rainforest Animal Journal

To learn more about rainforest animals, do some research and create your own rainforest journal.

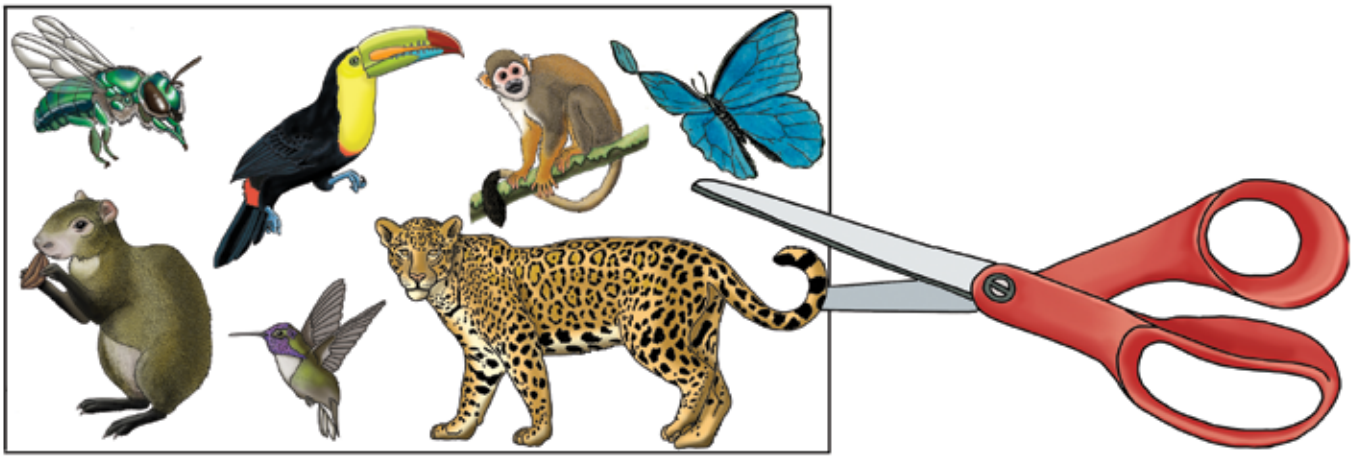
Materials:

- white construction paper (2 or more sheets folded)
- rainforest animal pictures online, printed and cut out
- white paper
- scissors
- glue
- stapler
- white pencil
- black marker

Directions:

1. Fold construction paper in half vertically to make a 5.5” x 8.5” booklet with eight pages (add more paper if desired).
2. Find Amazon Rainforest animal pictures that you want to learn about online. Print and cut them out.
3. Paste each on one page in your journal. Be sure to leave room on the top or bottom of the page for the text you will write about each animal.
4. Draw a background in colored pencil or marker.
5. Research each animal and write some of their interesting characteristics on a square of white paper that will fit on the journal page. Paste it on the page.
6. Add a folded cover if you wish.
7. To keep your pages together, you can staple the journal booklet along the folded edge (optional).

Discussion: Share what you’ve discovered about these rainforest animals with your class. Did you learn anything that surprised you?

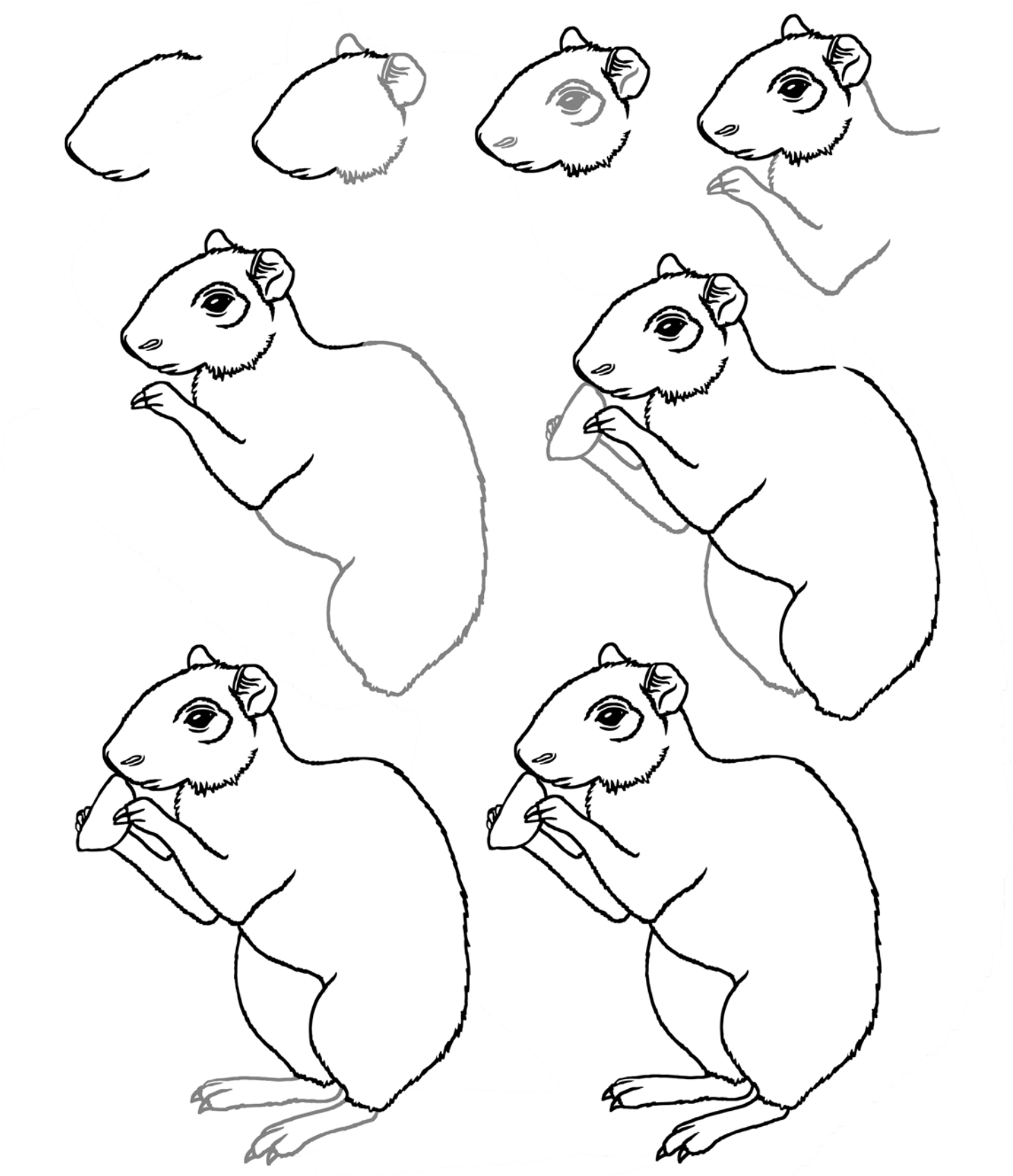


Rainforest Hidden Picture

Find eight things that people might carry while hiking in the rainforest: a backpack, a hat, bug repellant, a pocketknife, a shovel, rope, silverware, and a brush.

Learn to Draw an Agouti

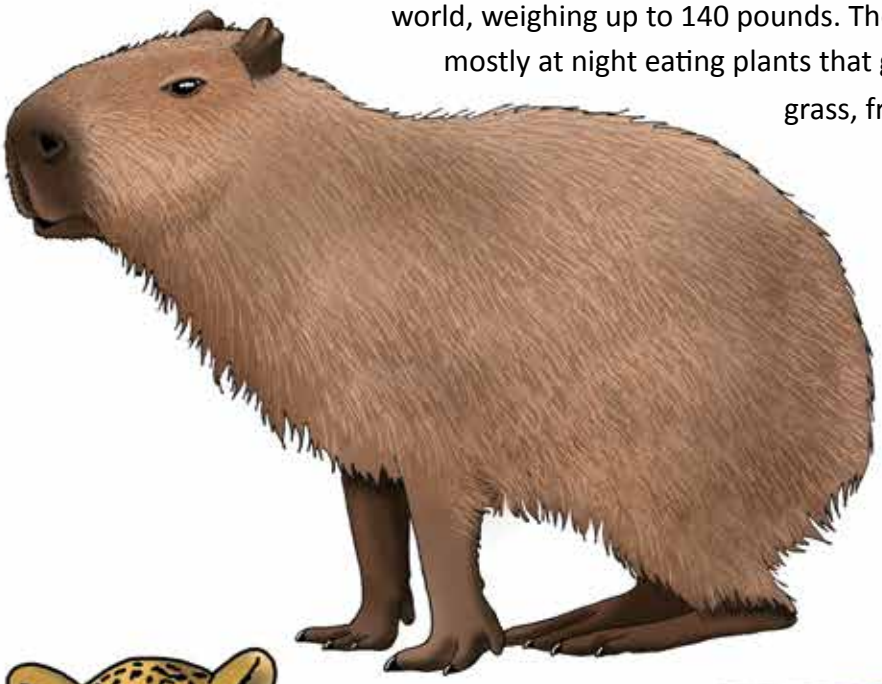
Grab a pencil and a blank sheet of paper and follow these step-by-step instructions to draw an agouti.



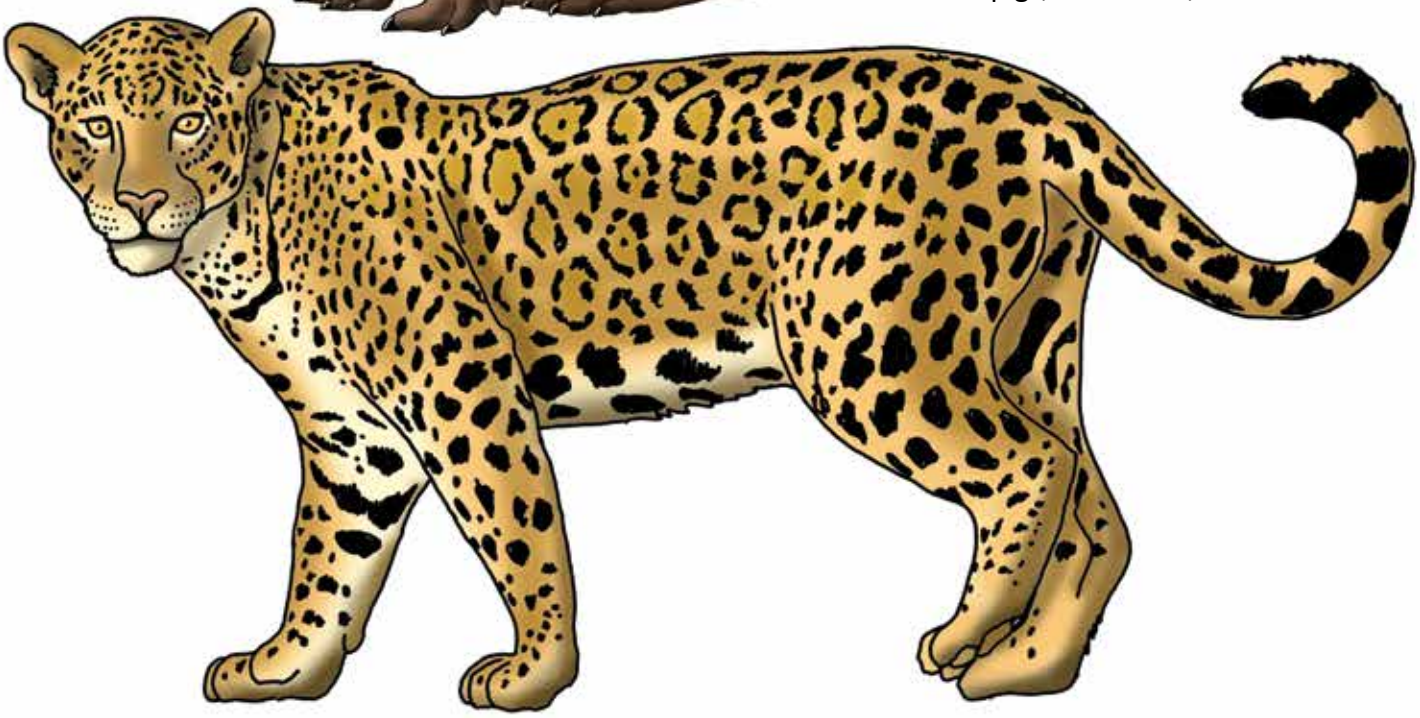
Amazon Rainforest Mammals

Agouti live in the Amazon rainforests of Brazil, hiding in thick brush near rivers, streams, and swamps. They are small, shy rodents that eat only plants, fruits, and seeds. They bury leftover seeds for later, which often grow into trees, so they have earned the nickname *seed spreader*.

Capybara live in thick, brushy areas (always near water) of the Amazon rainforest in Central and South America. They are the largest rodents in the world, weighing up to 140 pounds. They are active mostly at night eating plants that grow in the water, grass, fruit, and tree bark.

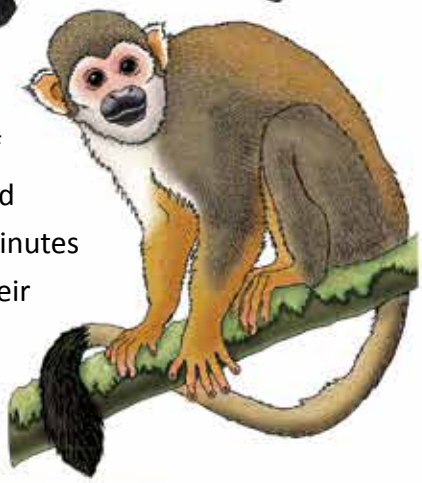


Jaguars live in rainforests, scrublands, and swamps from Mexico to Northern South America. They can be up to eight feet long (including their tail) with markings that are actually rings with spots inside them. They hunt capybara, wild pigs, crocodiles, and rodents.

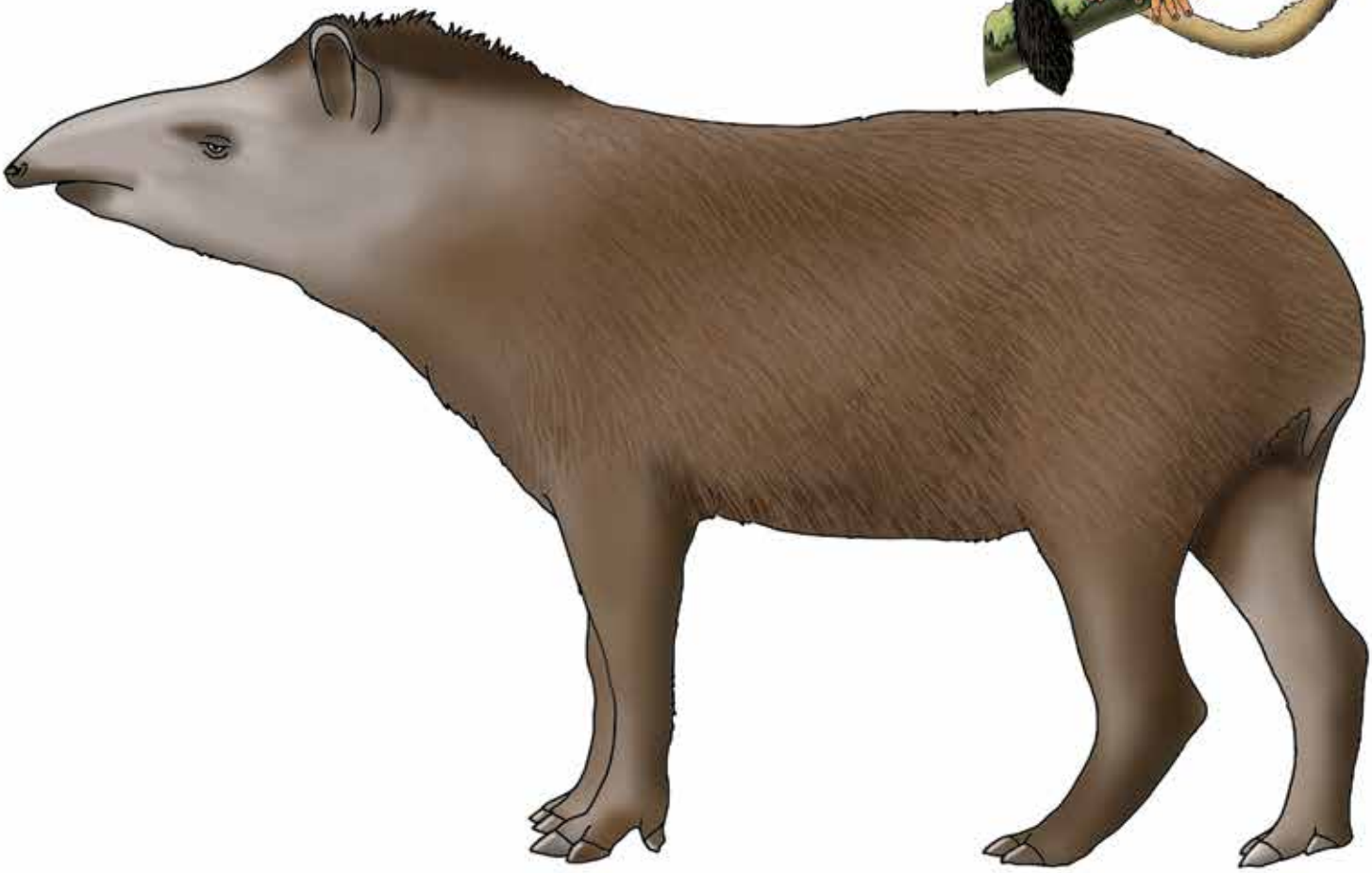


Spider Monkeys live in the rainforest from Mexico to Brazil. They have long, thin arms and legs and a very long tail that can grasp like a hand (prehensile) and carry the weight of their whole body. Spider monkeys live high in trees, sometimes 100 feet above the ground, eating fruit, nuts, seeds, leaves, insects, and even small animals.

Squirrel Monkeys live in rainforests from Costa Rica to central South America. They live high up in rainforest trees, only rarely coming down to the forest floor for food. They eat mostly insects but also ripe fruit.



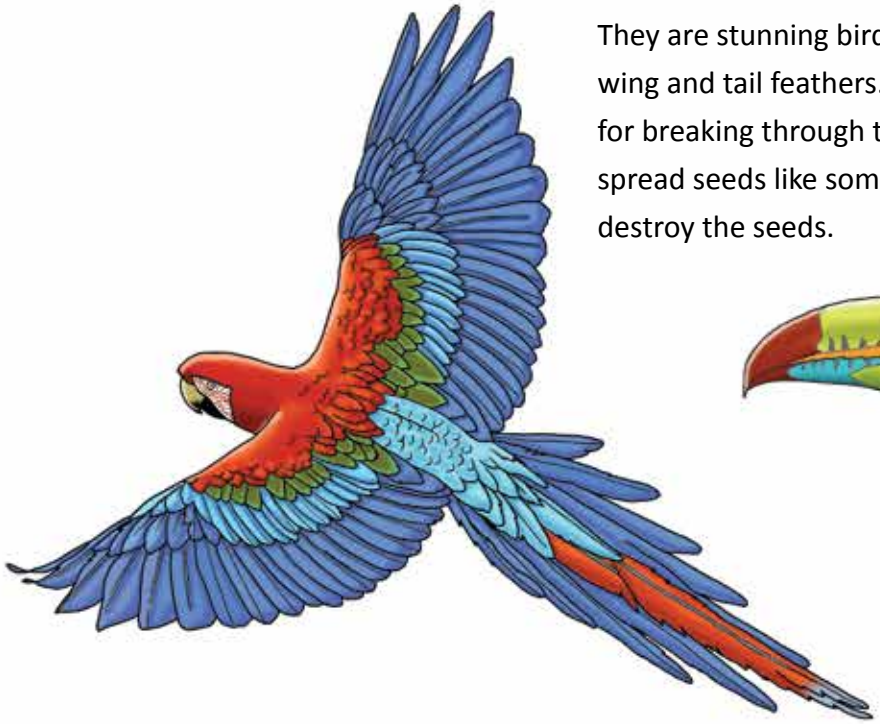
Tapirs live in dense rainforests, in river basins, or near the swamps and rivers of southern Mexico down to Brazil. They are huge, weighing up to 900 pounds, and are excellent swimmers. Tapirs can dive into water and stay under for several minutes to escape predators. If they feel threatened when they are away from water, their large size allows them to barrel through dense brush to escape.



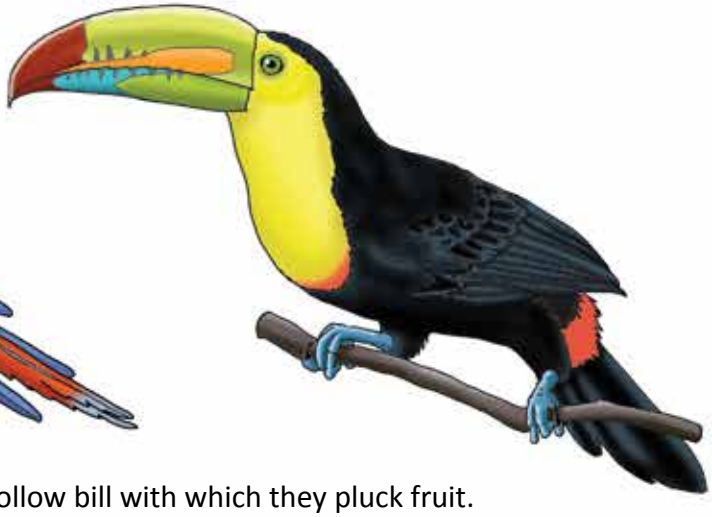
Amazon Rainforest Birds

Harpy Eagles live in forests from Central America down to South America. They are very large eagles, growing to 3.5 feet tall and have a large head crest. These eagles have short wings, so they can weave in and out of the forest hunting prey. Their prey includes opossums, sloths, and monkeys.

Ruby-throated Hummingbirds winter in tropical forests. They have a long, slender bill for collecting nectar. They are often seen hovering near tubular flowers.



Scarlet Macaws live in wild forests in Central and South America. They are stunning birds with bright red, yellow, blue, and green wing and tail feathers. They have a large, curved, powerful beak for breaking through the husks of rainforest fruits. They don't spread seeds like some fruit-eating animals but actually eat or destroy the seeds.



Toucans live in lowland forests from southern Mexico to northern South America. They have a giant, hollow bill with which they pluck fruit. Then they flip their heads back and gulp the fruit down. They spit out the seeds, which helps to spread them.

Amazon Rainforest Butterflies

Glasswing Butterflies fly close to the ground in the forest. Their delicate, transparent wings often are decorated with eyespots.

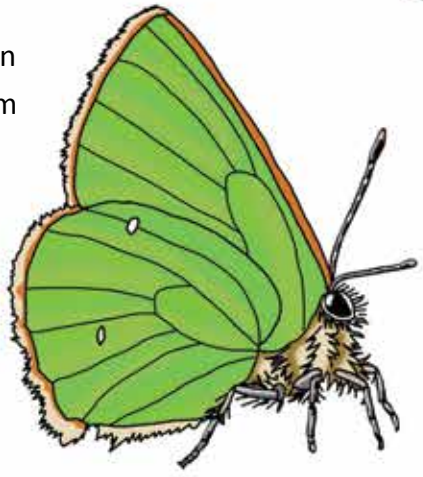
Julia Butterflies are found in clearings and along the margins of the forest. They are fast fliers feeding on nectar. They also seek out minerals from puddles and water droplets pooling on reptiles.

Kite Swallowtail Butterflies are bright, white butterflies with some black striping and a small dab of red near the tail. They flutter their wings while feeding.

Morpho Butterflies are huge and bright iridescent blue. They feed on rotting fruit on the forest floor.

Owl Butterflies are big, brown butterflies with large eye spots on their back wings. They feed on rotting fruit on the forest floor.

Sulfur Butterflies gather around puddles of water to sip on dissolved minerals found on the forest floor and even from water pooling on turtles or other reptiles.



At Eifrig Publishing, our motto is our mission —
"Good for our kids, good for our Earth,
and good for our communities."

We are passionate about helping kids develop into caring, creative, thoughtful individuals who possess positive self-images, celebrate differences, and practice inclusion. Our books promote social and environmental consciousness and empower children as they grow in their communities.

Edited by Jason Gruhl and Brianna Peterson
Printed in the United States of America

Published by Eifrig Publishing,
PO Box 66, Lemont, PA 16851, USA
Knobelsdorffstr. 44, 14059 Berlin, Germany.
For information regarding permission, write to:

Rights and Permissions Department,
Eifrig Publishing, PO Box 66, Lemont, PA 16851, USA.
permissions@eifrigpublishing.com, +1-888-340-6543

Library of Congress Cataloging-in-Publication Data

Amsel, Sheri
The Rodent, the Bee, and the Brazil Nut Tree
by Sheri Amsel

p. cm.

Paperback: ISBN 978-1-63233-322-3
Hard cover: ISBN 978-1-63233-323-0
Ebook: ISBN 978-1-63233-324-7

[1. Science-Nature - Juvenile Non-Fiction.

2. Animals - Juvenile Non-Fiction]
I. Amsel, Sheri , ill. II. Title

26 25 24 23 2022

5 4 3 2 1

Printed on recycled acid-free paper. ∞