Read the passage about an amazing animal and answer the questions that follow.

Flying Frog

Glider in the Treetops

by Cynthia Bix and Diana Landau

1 In 1869, the British naturalist Alfred Russel Wallace was tromping through the rainforests of Borneo when a local man brought him a surprising animal specimen. It was a large tree frog that Wallace later described as having "come down, in a slanting direction, from a high tree, as if it flew."

2 Wallace was fascinated. Examining the frog, he found "the toes very long and fully webbed to their very extremity, so that when expanded they offered a surface much larger than that of the body." He concluded that this was the first known case of a "flying frog."

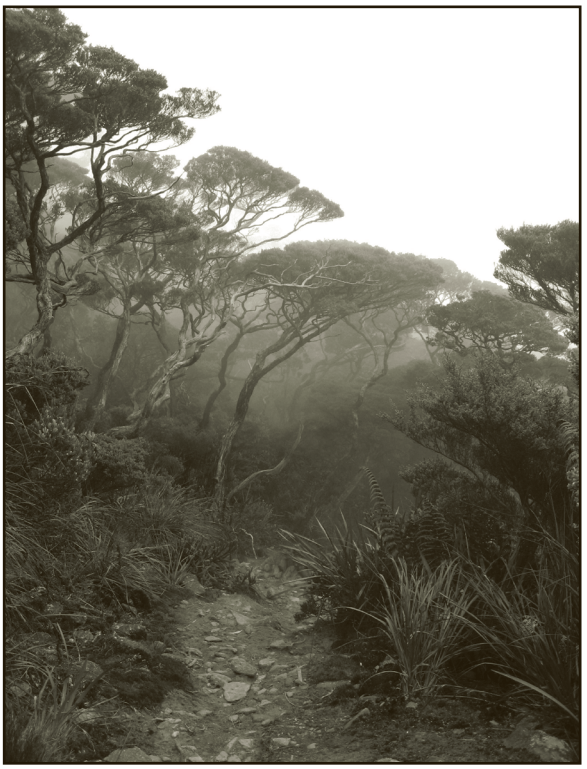
3 These frogs don't truly fly, as birds or bats do. What they do is glide—somewhat like humans piloting a hang glider. In hang gliding, the pilot jumps off a cliff or hilltop and sails through the air at a gradual downward slant, held aloft by lightweight "wings" strapped to a harness. The pilot controls the craft by shifting his or her weight, or by changing the angle of the wings.

4 Flying frogs do much the same thing. With powerful hind legs they launch their lightweight bodies from a high branch into the air. They spread out their large webbed feet and hands, as well as special flaps of skin on their legs and arms. These membranes of skin act like miniature parachutes to slow the frog's descent.

5 Some flying frogs glide as far as 40 or 50 feet as they descend by stages from the treetops to vegetation lower down. For these little animals, gliding is an energy-efficient way to get quickly from one place to another. By moving its legs or twisting its toes, the flying frog can even turn as it glides, so it can land to the right or left of its original direction of launch.

A Bornean flying frog, its foot webs stretched wide for a parachute effect, glides down for a soft landing on a fern.

6 The world in which these airborne frogs make their home is the rich and varied rainforest of Borneo, a large island that is part of Indonesia. Here, huge trees reach 100 feet into the air. Their leafy tops meet and mingle in a dense umbrella of green, casting the forest floor, or understory, into dim green shade. Up in the sunlit canopy thrives a colorful community of fruits and flowers, birds, animals, and insects—some of which never come down to the ground. Up here the flying frog finds plenty of insects to feed on, and plenty of moisture from the frequent rains that fall on the canopy.



Trees are spaced quite widely, so the flying frogs may glide up to 50 feet.

7 Like other tree frogs, the flying frog is uniquely adapted for its arboreal* life. Its feet have large, round toe pads that help it climb and cling to vertical surfaces. Though many people assume that these pads adhere by suction, they actually have tiny specialized cells that can penetrate microscopic cracks and irregularities in tree trunks and branches. The pads also have glands that produce a sticky secretion to help the frog hold tight—sort of like the "stickum" that football players once used to catch passes.

8 The frogs' long legs also aid in climbing; the strong hind legs propel their leaps through the trees. Their large, well-developed eyes help them navigate through the canopy and track down insect prey. Scientists believe frogs have good depth and color perception, as well as the ability to see in all directions at once. They can spot an insect's slightest movement, even in the dark.

9 Frogs have a unique ability to regulate their body temperature by changing the color of their skin. Because the tree frog endures greater extremes of light and temperature than its pond-dwelling relatives, it can change even more than other frogs. Light colors reflect heat, so the frog's skin may get lighter in hot, bright sunshine. When temperatures drop or when it gets dark, the frog's skin grows darker to absorb warmth. These changes are caused by the movements of various pigments within the skin cells.

10 Color changes also provide camouflage. In response to signals from its hormones or nervous system, the frog's color may change to match that of the mottled brown bark or the bright green leaf it's sitting on. Then predators such as owls or monkeys are less likely to see it. If one does spot it, the flying frog can often glide to safety.

11 One of the few times the little frogs come down from the canopy is to breed. Their eggs, like those of all frogs, must hatch near water where the tadpoles can begin their development into adult frogs.

---

* *arboreal* — of or like a tree; living in trees

12 The flying frog is a fascinating example of an animal that has taken its family traits to extremes in adapting to its special environment. With its parachute-like feet and extra-streamlined body, it swoops through the rainforest canopy while other frogs make their way along the ground and through the water.

13 But like all inhabitants of the world's rainforests, the flying frog faces the threat of displacement from its natural habitat. As more and more forest is cleared for human use, and as the effects of pollution trickle into what forest is left, the frogs may face an uncertain future. One of only about a dozen kinds of flying frogs in the world, this agile creature is a valuable member of the rainforest's community of wonders.

Flying frogs cling to tree trunks and other surfaces with their large feet and round, sticky toe pads.

14 The flying frog's skin performs many functions. Instead of drinking water, frogs absorb it through thin skin on their abdomen, called a "pelvic patch." And besides breathing through their lungs, they draw in oxygen and release carbon dioxide through their skin. To do this the skin must stay moist, a job performed by mucous-producing glands. The mucous also gives the skin a slippery film that protects against bacteria and helps the frog give predators "the slip."