



Teeming Life of a Rain Forest

By CAROL and DAVID HUGHES

DAWN. A sudden rain drums on our tent. As the shower subsides, a dim light gradually filters through the forest in Costa Rica's Corcovado National Park. Then it begins: "zeet, zeet, zeet," an insistent, monotonous buzzing, like the sound of tiny saws rasping wood.

The droning signals courtship among poison-arrow frogs, such as this pair posed in a mushroom—a perfect "toadstool" (left). Males often seek out such high perches for broadcasting their calls to females. Poison-arrow frogs number many dozens of species. They are named for the toxic secretions of certain varieties, used by Indians to coat blowgun darts for potent hunting weapons.

We lived with such creatures for 18 months in several of Costa Rica's wildlife sanctuaries while we filmed our National Geographic Special "Rain Forest." The film will air January 12 on Public Television.

A tenacious competition for life dominates these habitats, from the Corcovado lowlands to the misty slopes of the Monteverde Cloud Forest Reserve. There an explosion of vines and epiphytes—plants such as ferns, mosses, and orchids that

grow piggyback on other plants—chokes every available tree limb and trunk (below).

The darkness beneath the canopy often frustrated our efforts as filmmakers. But once we penetrated the gloom, we witnessed miniature scenes of intense drama. Here were fearsome predators, cunning escape artists, intriguing alliances for

survival, and awesome battles for mates.

Sometimes we didn't have to go far to find them. We had been delighting in a daily chorus of calls from a pair of wrens and their nestlings, until one evening a large snake appeared in camp. The next morning we awoke to an ominous silence.



FROGS: DENDROBATES GRANULIFERUS, 2 CM (0.8 IN); MUSHROOM: COCKEINA SULCIPES (BOTH FACING PAGE)

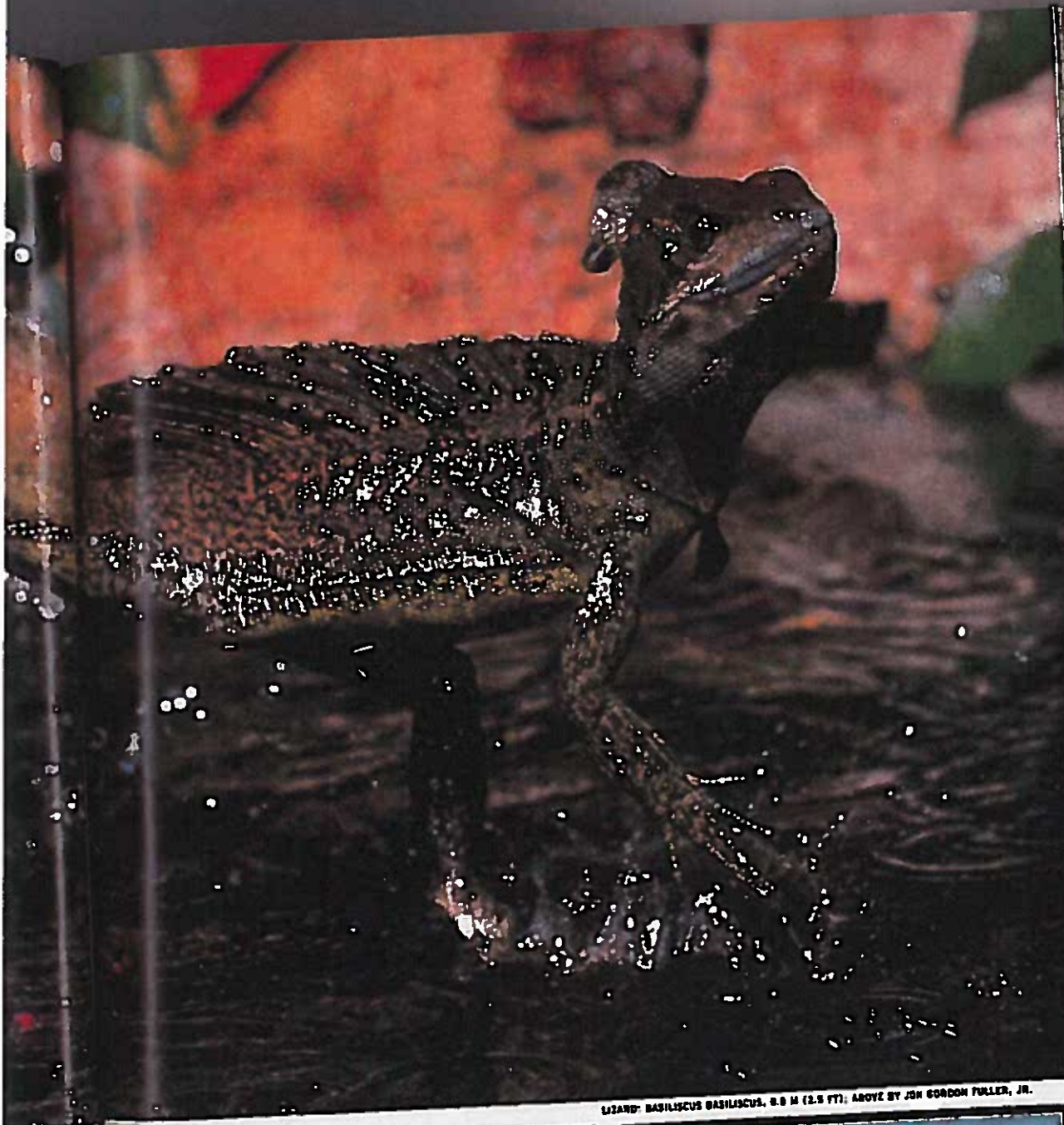


Water-skimming lizard

"JESUS CHRIST LIZARD," as the basilisk is often called in Central America, gets its name for its ability to dash across the surface of a stream (*above and right*). Rearing up on its hind legs, the basilisk stays on the surface by sheer blinding speed, using its long tail for balance. The lizard thus flees some of its rain forest predators—and takes its own prey by surprise.



National Geographic, January 1968



LIZARD- BASILISCUS BASILISCUS, 9.8 M (32.5 FT); ABOVE BY JON GORDON FULLER, JR.





Partnership between ant and plant

IN A WORLD of aggressors, specialized ants and swollen-thorn acacias have evolved an ingenious mutualism that assures the survival of both insect and tree. The acacia provides budlike leaflet tips called Beltian bodies (*right*), which the ants harvest as food for their young. The insects hollow out the tree's thorns when soft and green and thereafter raise their broods within. A worker carries a Beltian body into the nest (*left*), where it will be fed to the larvae (*below*).

The acacia lacks strong chemical defenses to repel damaging insects and demands unshaded sunlight for growth.



TREE: GENUS ACACIA, 8 M (26 FT), BY CAROL HUGHES, BRUCE COLEMAN, INC.

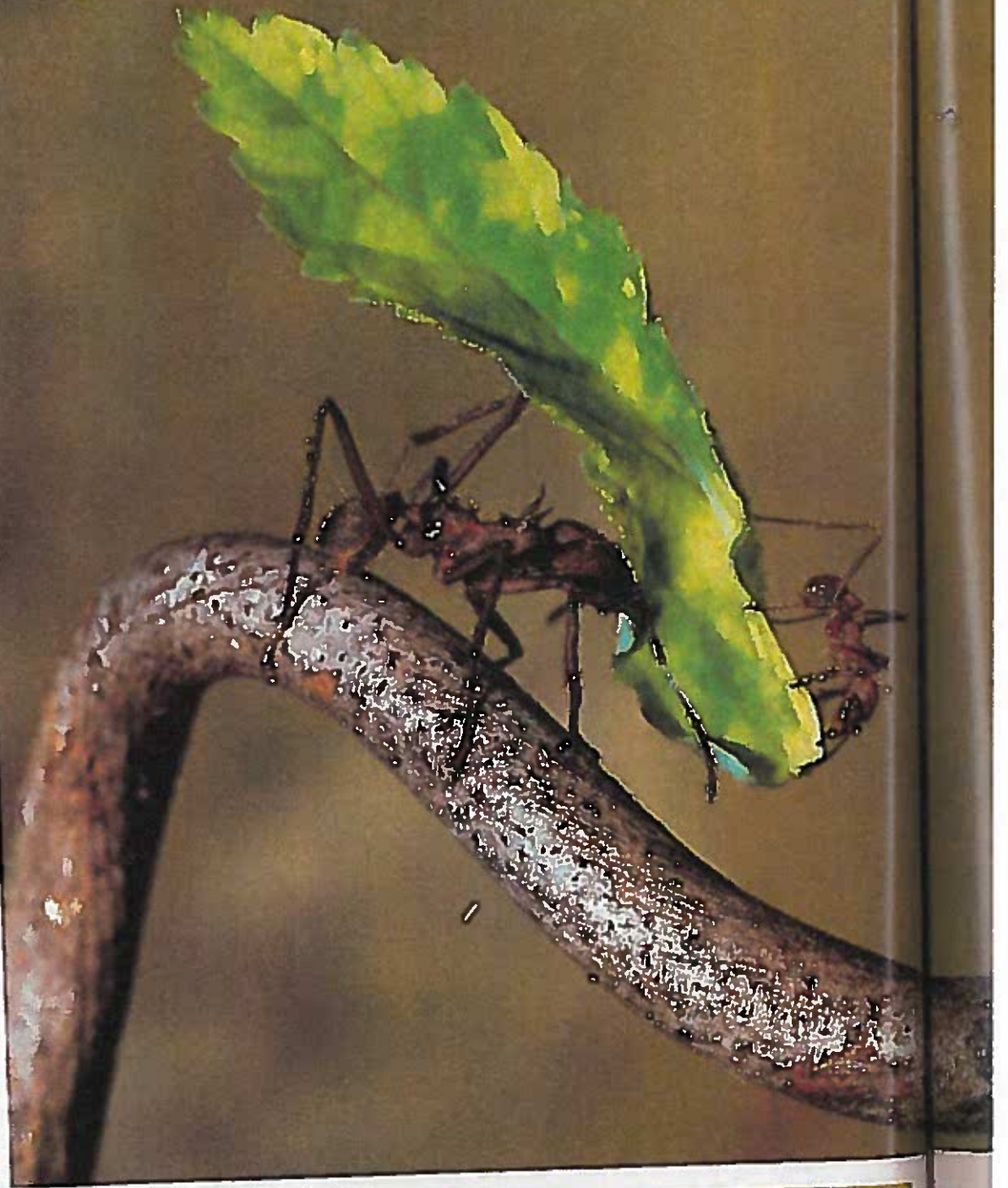


In exchange for food and lodging, the ants patrol the tree day and night. They put up an instantaneous, ferocious defense, biting and stinging invaders like this short-horned grasshopper (*bottom right*). They also attack encroaching plants, such as a vine (*center right*), that touch their host's foliage, clearing a circular swath for the tree to grow unfettered.

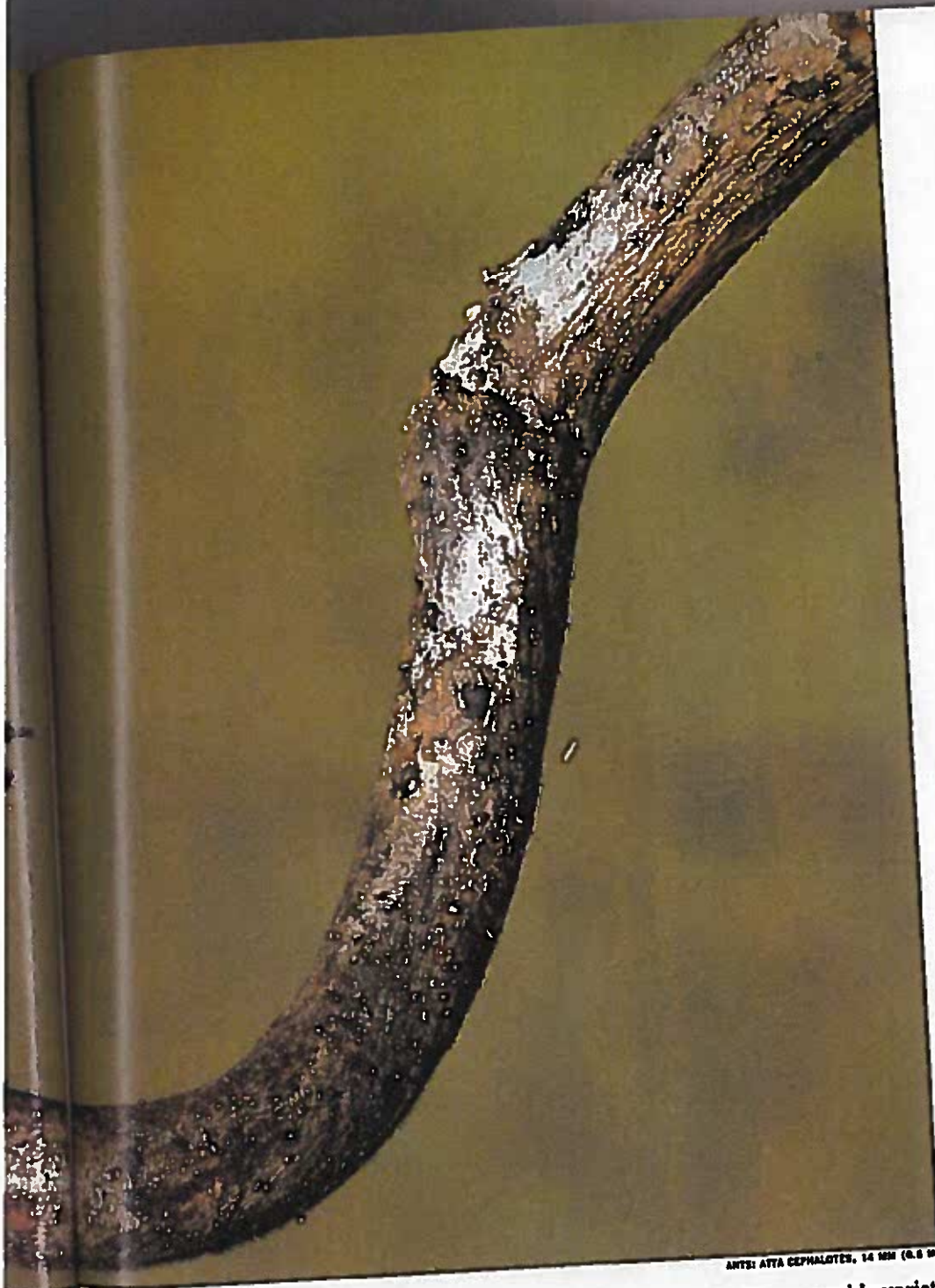
ANTS: PSEUDONYMES FERRUGINEA, 1 CM (0.4 IN)



GRASSHOPPER: FAMILY ACRIDIDAE 2 CM (0.8 IN)



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ANTS: ATTA CEPHALOTES. 14 1958 (R. B. M.)

Leaf-cutting ants farm fungus gardens

RIDING SHOTGUN, a small leaf-cutting ant may be standing guard against enemies as another worker hauls away both it and a leaf (above). After slicing a fragment with scissorlike mandibles, an ant readies its load (left) for transport to the

nest. There, a wide variety of leaves are cut up, chewed to a pulp, and laced with drops of body fluid. On this mulch grows the sole food of the colony—a fungus of only one species. Mysteriously, any spores that could contaminate the garden fail to develop.



ANT: PARAPONERA CLAVATA, 2 CM (0.8 IN). BY DONALD R. PERRY

Quick death, and slow...

TERRIBLE curved fangs of a tarantula doom a katydid (right). The spider lunges forward and down, impaling its victim. It ejects first venom, then an enzyme to soften the meal.

An insidious fungus killed this stinging ant, still clutching a leaf in death (above). As the fungus invaded its body, the ant, unable to fight its invisible tormentor, appeared to lash out at the nearest target—the leaf. Afterward the victorious fungus sprouted from its neck. A lichen has also overgrown its mandible, as the jungle draws a green curtain over the macabre scene.

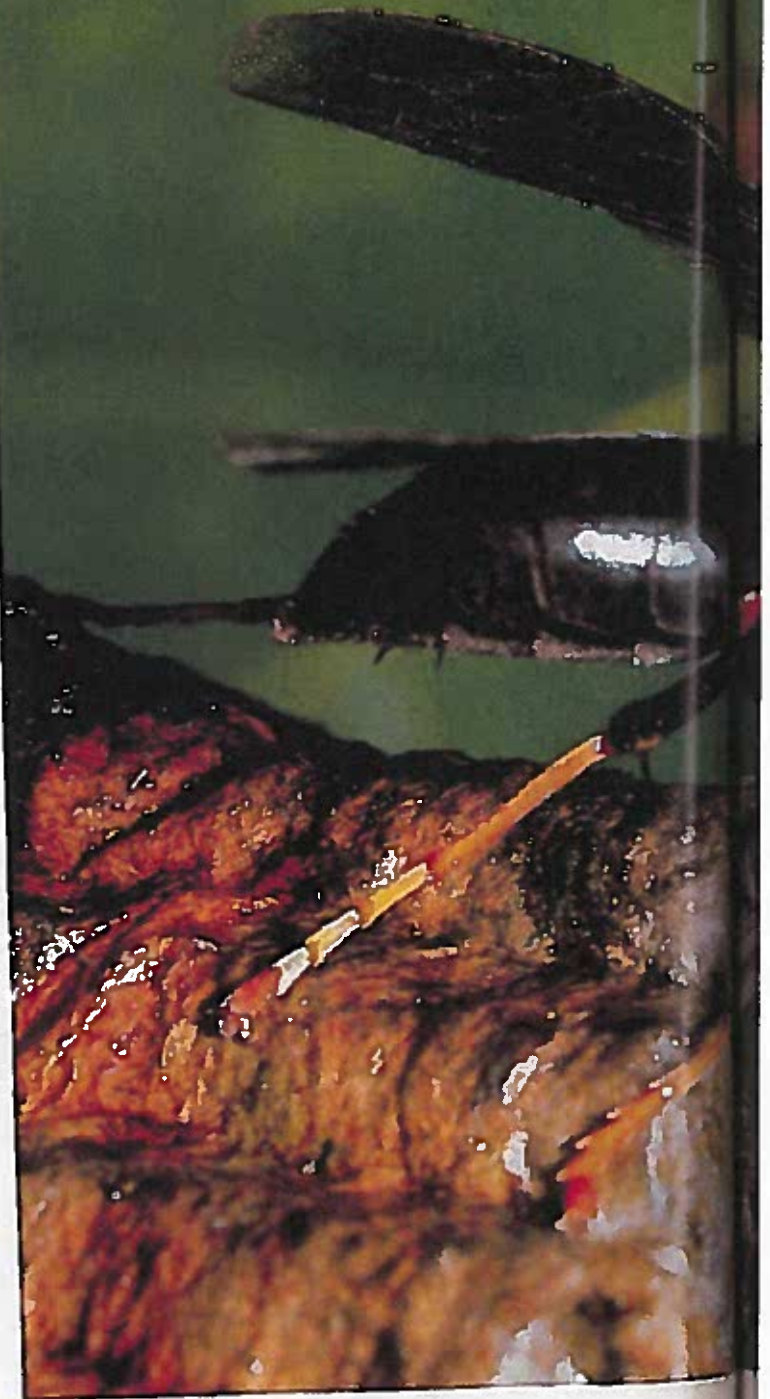




TARANTULA: FAMILY THERAPHOSIDAE, 6 CM (2.1 IN)



WASPS: POLISTES CANADENSIS, 2.5 CM (1 IN);
KATYID: FAMILY TENTHREDINIDAE, 3 CM



Wasps drink their nest dry

AFTER a rain shower, a paper wasp laps up water from the colony's nest and spits it away (above), thus preventing the nest from




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disintegrating. Built of wood pulp, the nest hangs from a tree and attracts some prudent katydids (above left). They stay close during the day,

probably to gain refuge from foes that shun the wasps. Over the stalk that attaches the nest to the branch, the wasps have smeared a black secretion

(left) that repels some ants. Other species, however, stand ready to attack the nest and devour the developing wasps within.





Rare toads seek mates amid the clouds

LIKE NEON SIGNALS that flash from the dark floor of Monteverde, male golden toads await mates at a tiny pool. Since the species is nearly voiceless, it pays to advertise: The males' unmistakable color seems as effective as romantic croaking in luring females, who are attired in more demure green to black with scarlet spots.

Only in a small niche of this cloud forest does the golden toad exist. Here, when the clouds lie thick upon the heights, usually in April and May, mating takes place. Water trickles down the trees to create pools where females lay about 200 eggs. After fertilization by males, the embryos depend on a few more weeks of wet weather to maintain their aquatic nursery and allow them to mature.

The discovery of this new species in 1964 helped win government protection for Monteverde, threatened by encroaching development and land speculation. The extraordinary toads amazed biologists, including Jay M. Savage, who wrote in first describing them: "I must confess . . . my . . . disbelief and suspicion that someone had dipped the examples in enamel paint."

TOADS: DUFO PEREGRINES, 4.8 CM (1 9/16)

Challenging world of the frogs



STEALTHY THIEF
purloins tadpoles-to-be. A
cat-eyed snake greedily gulps
a clutch of eggs (below left)
that had been laid by a
green leaf frog. A riot of color,

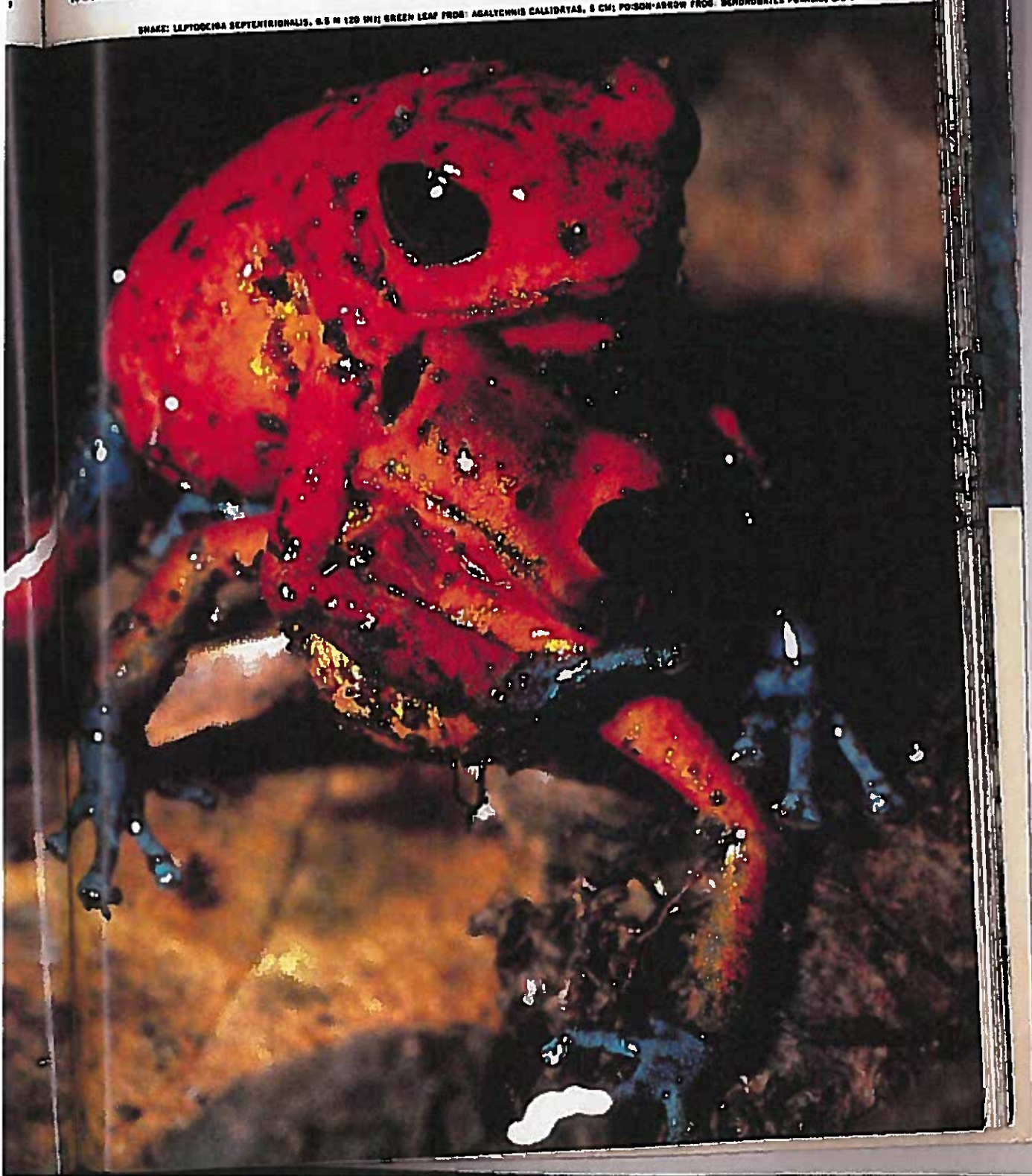


this species (left) usually extrudes and fertilizes its eggs on a leaf over water. Maturing young that escape the jaws of snakes drop into an aquatic world below.

In an amphibian wrestling match, poison-arrow frog males battle for dominance and mates (below). One challenger suddenly jumps another, and the pair grapples

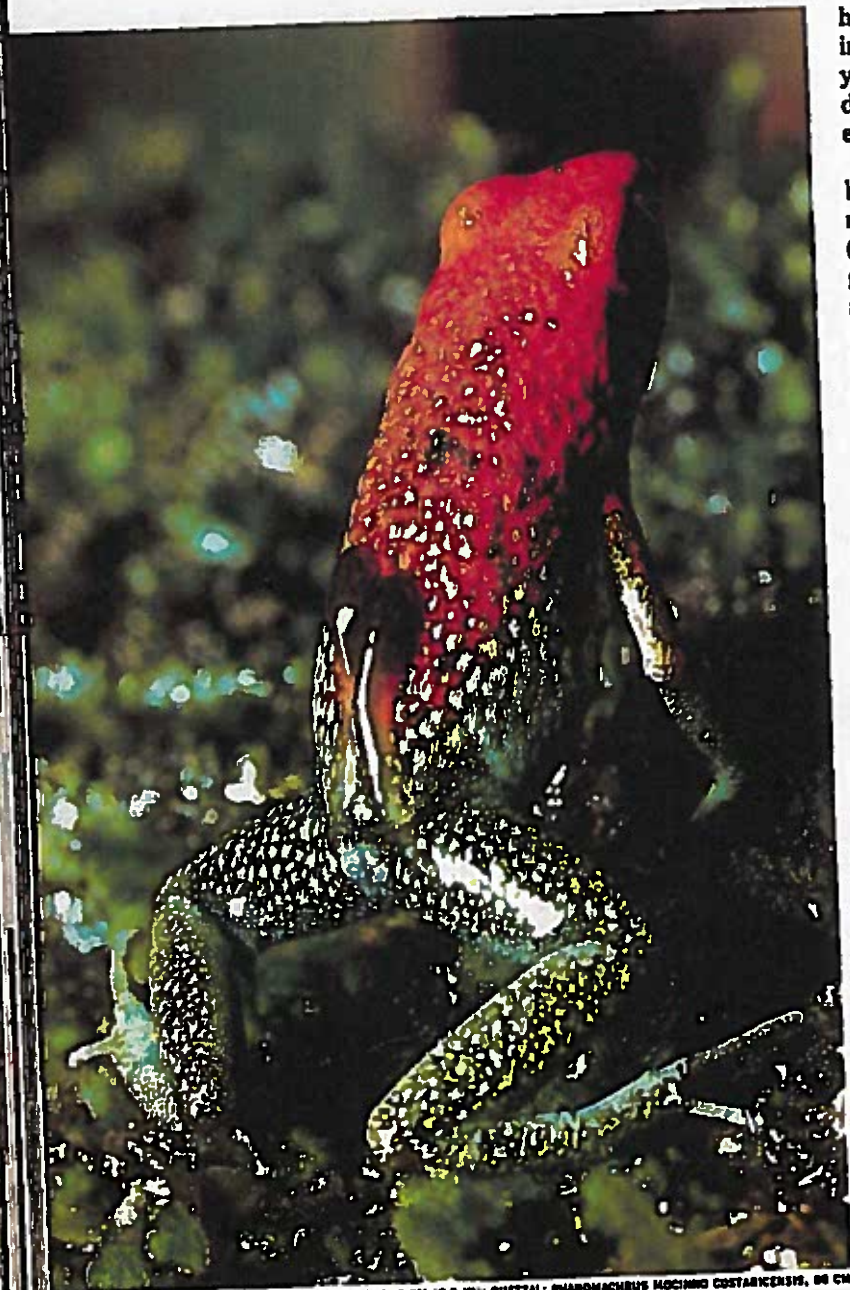
for hours before one croaks "uncle" and hops away. Poison-arrow frogs' vivid coloration warns predators of acute gastric distress should they make a meal of the toxic midgets.

SNAKE: LEPTOCECHUS SEPTENTRIONALIS, 0.5 M (120 IN); GREEN LEAF FROG: AGALYCHNIS CALADRYAS, 5 CM; POISON-ARROW FROG: DENDROBATES PUMILIO, 2.5 CM



Lofty haven among the trees

AQUATIC CRADLE in the sky awaits two poison-arrow tadpoles clinging to



FROG: DENDROBATES GRANULIFERUS, 2 CM (0.8 IN); QUETZAL: PHAROMACHRUS MOCIMMO COSTARICENSIS, 60 CM

their mother's back (left). She will transport them up a tree that hosts a bromeliad plant, its leaves centrally cupped to hold rainwater. In it she immerses herself until her young release their grip to develop in the bromeliad's embrace.

A sunbeam spotlights the breathtaking elegance of a male quetzal in Monteverde (right). Long tail coverts, grown only by males, adorned royalty of many pre-Columbian Indians, who held the birds sacred. Aztecs depicted their god Quetzalcoatl, the Feathered Serpent, with a headdress of such plumes.

Quetzals carve nests in decaying tree trunks and feed on fruits and insects in mountain forests. The birds demand this high habitat for breeding. Where it has disappeared in Central America, so have they. But quetzals seem to be holding their own in Monteverde and some of Costa Rica's other 34 wildlife sanctuaries.

Perhaps the birds' example will spur other nations to spare more of their own rain forests, and to look more closely at the rich life within them. □

