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BIRDS THAT "SEE" IN THE DARK WITH THEIR EARS

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*South American oilbirds navigate by echo
in the blackness of their cave homes*

Birds That "See" in the Dark With Their Ears

By EDWARD S. ROSS, Ph.D.

Photographs by the author

WE HEARD THE CAVE before we saw it. Climbing hand over hand up a towering cliff in the Peruvian rain forest, we were met by a wild, undulating chorus punctuated by demoniac screams.

Had we not been braced for the fiendish din—this was a follow-up to a visit I had made here 10 years earlier—we might have beat a terrified retreat. As it was, I watched with amusement the surprise and alarm on the faces of my 14-year-old son Clark and my longtime friend H. Vannoy Davis. The racket, I assured them, was the normal domestic pandemonium of our quarry, the unique *guácharo*, or oilbird.

Its scientific name, *Steatornis caripensis*—in translation, "the oilbird of Caripe"—was bestowed by the celebrated German naturalist-explorer Alexander von Humboldt, who encountered the noisy species in 1799 in a cave near Caripe, Venezuela. The local name, *guácharo*, is a Spanish word meaning "one who cries and laments."

The Author: Though his subject here is a fascinating bird, Dr. Edward S. Ross is best known as Curator of Entomology at the California Academy of Sciences in San Francisco. His specialty: a little-known order of web-spinning insects, the Embioptera. On expeditions supported by your Society to Africa, to India and Southeast Asia, and to Australia, he has discovered hundreds of species of embiids previously unknown to science.

On a wide-ranging insect-collecting trip through South America, we had driven across the Andes to the upper reaches of the Amazon River. We could not pass up the chance this gave us to visit the misnamed Cueva de las Lechuzas—the Cave of the Owls—overlooking the Monzón Valley near the remote Peruvian town of Tingo María (map, page 284). Natives of the region erroneously call the noisy oilbirds owls because of their large eyes and nocturnal habits.

Birds Give Indians Oil for Cooking

Actually, the long-whiskered oilbird is an outsize and distant relative of whippoorwills and goatsuckers. But unlike its insect-eating kin, the *guácharo* feeds only on the fruits of forest trees, chiefly palms and laurels. This diet gives the young birds an exceptionally high body-fat content.

Despite protective efforts, most known oilbird caves are regularly raided by Indians or local farmers, who rob the nests of young *guácharos*. They boil the squabs to render fat for cooking—hence the name oilbird.

The *guácharo* gathers its fare in long nighttime forays across the jungle. With its strong curved beak, the bird snatches fruit while fluttering before laden branches. With crop full, the adult may fly back to its nest four or five times during the night to regurgitate food into the mouths of the young. Before dawn,

Wings a Halo, Tail a Fan, an Oilbird Hovers in Mid-air Like a Helicopter

Hawk-size *guácharos*, as oilbirds are known in South America, possess a sonar sense shared among known birds only by Southeast Asia's swiftlets, though common among bats. Cave dwellers, they bounce echoing clicks from rock walls to help them navigate in the ink-black vaults where they nest by the hundreds. A three-foot wingspread makes them masters of flight maneuverability, capable of a quick lift, a short turn, or a stationary flutter, as this bird shows. Such power enables oilbirds to fly slowly and carry large quantities of palm and laurel fruit, their principal diet.





Owl-like eyes help the nocturnal oilbird see in the darkness of its cave home and on food-gathering forays in the jungle night. Long whiskers projecting ahead of the hooked beak may aid the bird's sense of feel.

Stygian lair of the oilbird: the Cave of the Owls near Tingo Maria, Peru. Water oozing from the ceiling created the draperies of stalactites. Broken pottery and stone ax-heads reveal that man has known this grotto for more than 3,000 years.

Inside the cave, birds swoop and wheel amid continual screeches. They sound like "a thousand mad ducks shut up in an iron boiler," says the author. At dusk, birds pour forth, returning with food for the young.

all the birds have returned to the blackness of the lonely caves where they roost and nest.

Scrambling over huge boulders, we reached the cave's vine-draped mouth and entered the high-vaulted outer room. Flocks of small green parrots complained loudly as they flew from nests hidden in rocky niches overhead. With the alarm, the oilbird chorus grew even more shrill, yet still we saw none of the birds themselves.

"It sounds as if all the foxes in the world were chasing all the hens," said Van Davis.

Beyond, deeper within the cave, our boots crunched on a thick bed of dry seeds. The cavern was like a mighty horn of plenty, spewing forth great drifts of fruit kernels. Obviously these were the seeds, or pits, cast aside by generations of guácharos.

Only the thin outer flesh, or pericarp, of the fruit is eaten, and one by one the seeds are



expelled from the birds' exceptionally large mouths.

The accumulation literally crawled and pulsated with life. The molelike burrowing of four-inch-long cockroaches, some of the largest in the world, caused the surface to surge before our eyes. Uncountable hordes of beetles, larval and adult, busily gnawed at the seeds. Skittish tailless whip scorpions used their 18-inch span of antennalike front legs to track down their favorite prey, an abundant cave cricket.

Cave Sheltered Man for 3,000 Years

Amid the cave-floor debris we spotted abundant relics of ancient human occupancy. During my earlier visit, we had picked up a small collection of pottery fragments and several stone axheads. Dr. Donald W. Lathrap of the University of Illinois and a colleague, Lawrence Roys of Moline, Illinois, made a

study of these finds and others collected from the cave.

The scientists reported that the materials provided a rare link between ancient highland and lowland Indian cultures. The pottery was related to two separate periods, 1500 B.C. and after A.D. 1000.

Our light threw weird mobile silhouettes on the cavern walls. Climbing a great mass of fallen rock, we came upon ghostly stalagmites rising from terraced pools of clear water.

At this point we saw the first oilbirds—brown, broad-winged creatures wildly swooping out of the darkness, wheeling in the dim light, and vanishing into the gloom. As they turned, they shrieked and squawked, but in direct flight they voiced evenly spaced clicks—sharp, snapping sounds.

These peculiar clicks serve as navigation echo guides, much as ultrasonic chirps aid the flight and food gathering of most bats.

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EKTACHROME (BELOW) AND KODACHROME © N.G.S.





The birds bounce the sounds off confining walls, gauging clearance by the time of return to their ears. While the chirps of bats are usually inaudible to man, oilbirds' clicks are well within the range of human hearing.*

The guácharo is one of only two birds known to use this sonarlike echolocation technique; the other, more recently studied, is the Southeast Asian swiftlet, genus *Collocalia*, whose nests are prized for bird's-nest soup.

To prove that sound reflection is indeed the means by which oilbirds guide their flight in the dark, Donald R. Griffin, then of Cornell University, and William H. Phelps, Jr., of Caracas, Venezuela, once captured several birds from a Venezuelan cave, allowed them to fly about in a dark enclosure, and noted that they never collided with the walls.

Then they plugged the birds' ears. The guácharos became completely disoriented and continually bumped against the walls.

As we worked our way deeper into the cave, the squawking and screeching became almost deafening. The cavern suddenly expanded into a huge room. The stale air moved refreshingly, stirred by the beating wings of the birds and of bats that share this underworld. We tilted and turned our lamp. What

Crevice in a cliff provides a nesting site. Birds jealously guard such ledges, which are relatively scarce for the large population of the cavern.

KODACHROMES AND EKTACHROME (BOTTOM) BY EDWARD S. ROSS © N.G.S.



*See "How Bats Hunt With Sound," by J. J. G. McCue, April, 1961, *GEOGRAPHIC*, and "Mystery Mammals of the Twilight," by Donald R. Griffin, July, 1946.

we saw exceeded our wildest expectations.

We stood as dwarfed intruders in a huge circular, rock-walled auditorium more than 200 feet across and perhaps 100 feet high. The cave was filled with sound and confusion. While scores of birds spiraled high above, hundreds more squatted contemplatively on high nesting ledges.

On the ledges the birds moved in a crouched, rather awkward diagonal or sideward waddle. But in flight the guácharos were artists. With skillful use of their wings and tails, they wheeled in tight circles or fluttered in one place (page 290).

Before getting to work, the boy in us caused us to let loose Indian war whoops to see what would happen. Bedlam ensued. Beating wings added to the din of the birds' cries, and our upturned faces were splashed with droppings and pelted by seeds swept from the ledges as birds took off.

"How in the world do we get up to the nests?" asked Clark.

No nest or perch was accessible from the floor. Those within reach of crude log ladders set up by the Indians were not worth visiting: Repeatedly robbed of squabs, they had been abandoned by their occupants.

But a decade ago I had pioneered a route that ascended the great fall of ceiling rock blocking the end of the cave. Now we found it—a series of precarious toe- and handholds leading up the 80-degree slope.

As we climbed, we tried not to think of our plight if our single lantern should slip from grasp and shatter down the cliff, leaving us marooned on the ledge in total darkness!

"Secret" Route No Secret to Indians

Eventually we found ourselves uncomfortably perched like oilbirds almost 100 feet above the cave floor. We could look across narrow chasms to nesting ledges and balconies. But what I saw dismayed me.

Ten years ago the eyes of myriad nesting birds had gleamed back at me, ruby red in the lantern light. In temporarily vacated nests I had seen naked nestlings or the normal clutch of two to four white eggs.

A chief reason for my return visit was to rephotograph the guácharo and its extraordinary cave home in color. The earlier trip had been recorded only in black and white.

Imagine my chagrin and disappointment now to discover that my formerly "private" access to the nests had been found by the

Cockroach feasts on seeds in the Tingo María cave, whose roaches, up to 4 inches long, rank among the world's biggest. After gobbling fruits on night flights, oilbirds return to their cave to digest fleshy parts and regurgitate the seeds. Decaying refuse rises in huge drifts on the cave floor and supports a host of insects.

Fringed mushrooms grow beside an oilbird eggshell in the cave's uniform 68° F. temperature and high humidity—ideal conditions for raising fungi.

Doomed forest of palm and laurel rises from seeds dropped by oilbirds. For a time, they thrive on nutrition stored in the kernel. But deprived of sunlight, the plants soon wither and die. Here the author photographs the webbing of tiny spiders.

EKTACHROME BY H. VANNOY DAVIS © NATIONAL GEOGRAPHIC SOCIETY



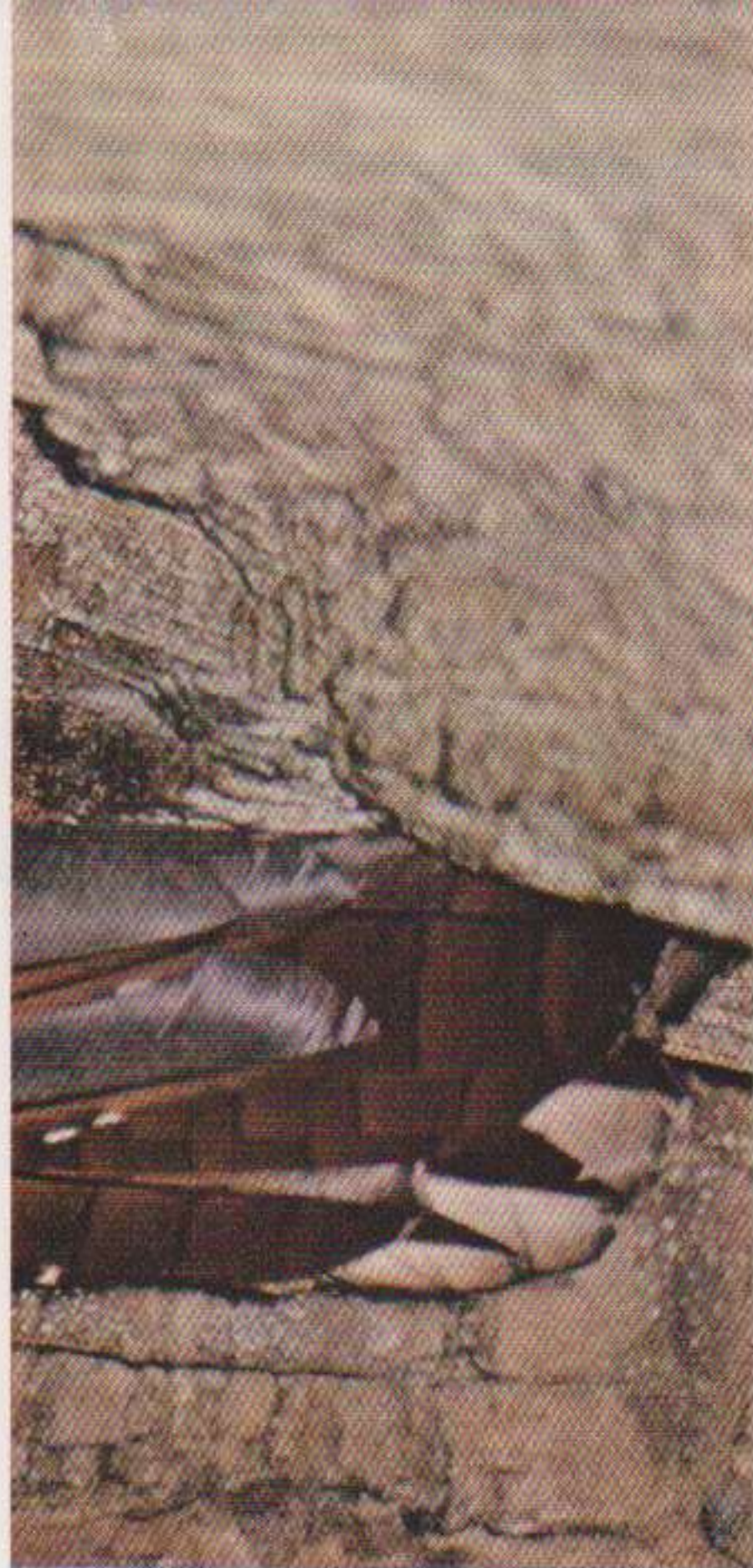


Agate-eyed in Camera's Flash,
Oilbirds Roost Amid Palm Seeds

Male and female take turns incubating eggs and stuffing fruit into insatiable young. Nestlings may weigh half again as much as their parents by the 70th day, then begin to slim down.

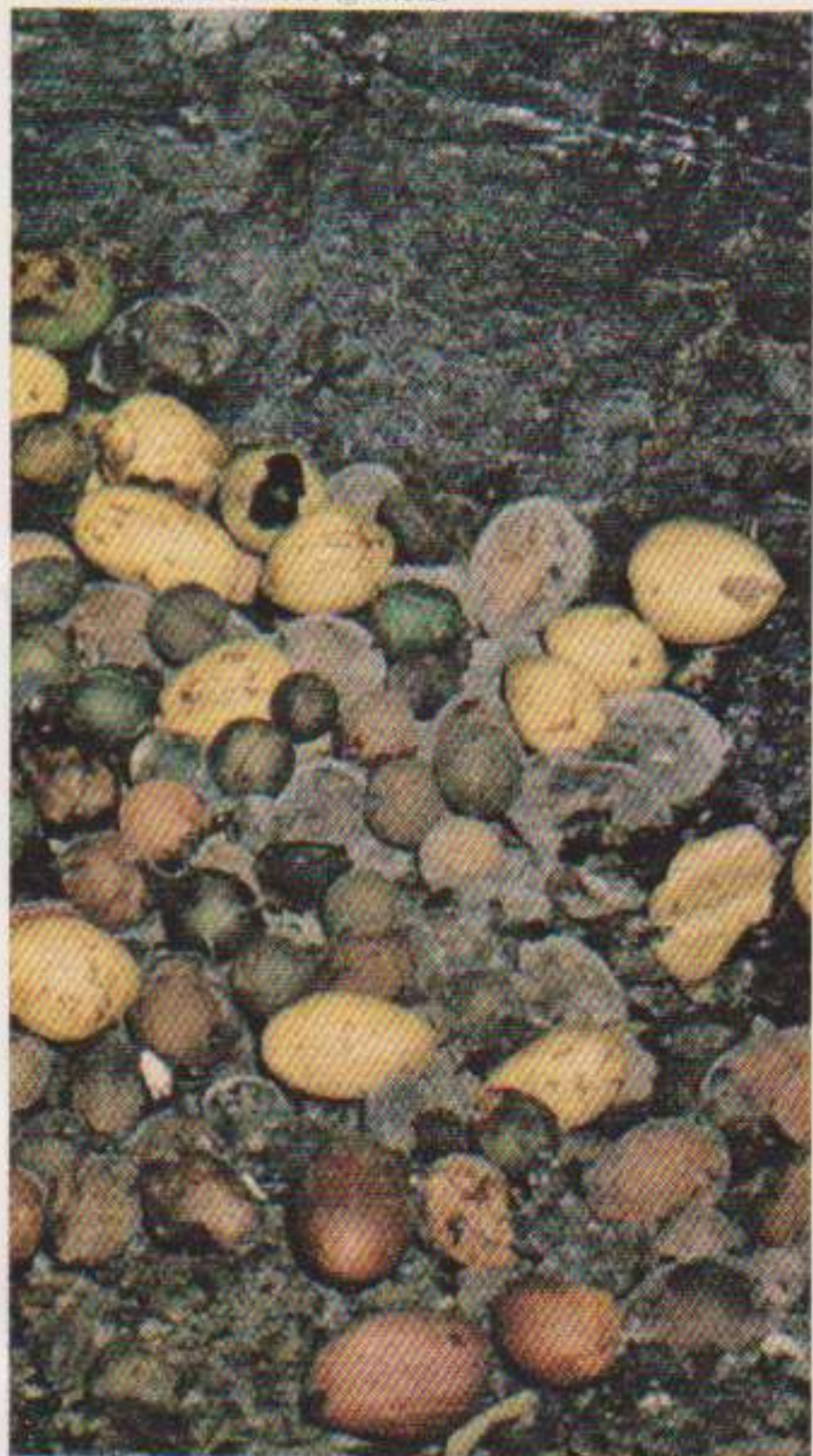
KODACHROMES BY SAMUEL A. GRIMES (BELOW)





Indians raid nests and boil squabs for fat; thus the name oilbird. Peru now protects Tingo María's cave.

AND EDWARD S. ROSS © N.G.S.



Indians. The chasms were bridged by logs, and the birds' sanctuary had been recently robbed. Only empty, eroded, cuplike nests remained.

Inviolate nests were within sight at a little distance, but out of range of our flash equipment. For this reason, many of the accompanying photographs were made in another cave, a smaller one we visited in Trinidad, at the northern limit of the oilbirds' range (map, page 284). The guácharo, wherever found, is the same bird. There is only one species, and it occupies a genus and family all its own in the order Caprimulgiformes.

The oilbird remains the subject of many questions. Ornithological literature records only a few, often widely separated cave homes from Peru and Colombia to Venezuela, British Guiana, and Trinidad. Its Andean range is largely unexplored, and doubtless there are many unrecorded colonies known only to the Indians. Some, we may hope, are forever unreachable by man.

Slip in Darkness Brings a Near Tragedy

Despite the inroads we discovered in the Cave of the Owls, there seems little danger that its oilbird colonies will be completely exterminated. Most of the nesting ledges are at inaccessible heights, probably permanently out of reach of the Indians.

For us, our watches gave warning that it would soon be as dark outside the cave as in. Apprehensively, we began the descent of the bare, slick cliff. As we backed down in our own shadows, young Clark, being the most agile and sure-footed, led the way. I took the middle, and Van Davis followed. Not a hand moved from crevice or crack until a foothold was firm.

Suddenly the worst happened: Van Davis's feet slipped and down he slid, falling past me on his way to almost certain death.

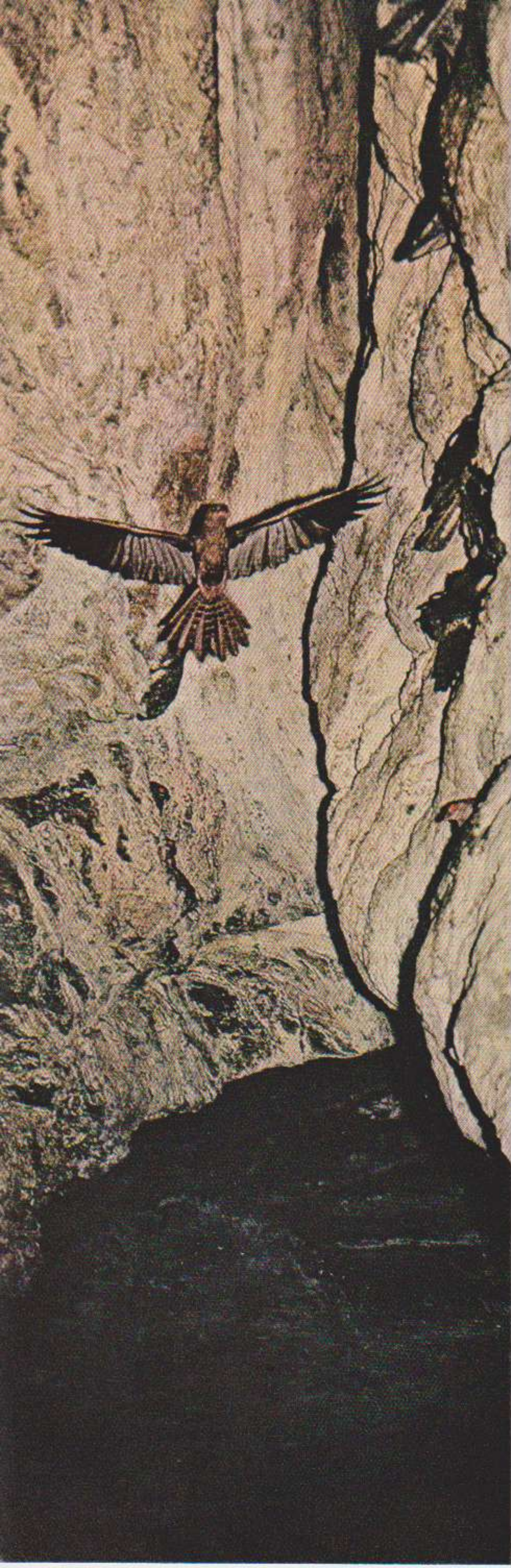
"Oh, no!" "Watch out, Clark!" Van's exclamation and my warning to my son below rang out together.

I happened to have a pretty good grip with my left hand on a thumblike stalagmite. Van instinctively caught my extended right arm. Both of us were on the brink of tumbling down the cliff together. But my toeholds and hand-grip held, and Van stopped.

Clark guided Van's toes to a crack and, after pausing for breath, we made it the rest of the way down.

Outside the cave, in the late afternoon light, all of us were dazzled by the beauty of a great forest tree in full red bloom. We felt as prisoners must feel when released from a dungeon.

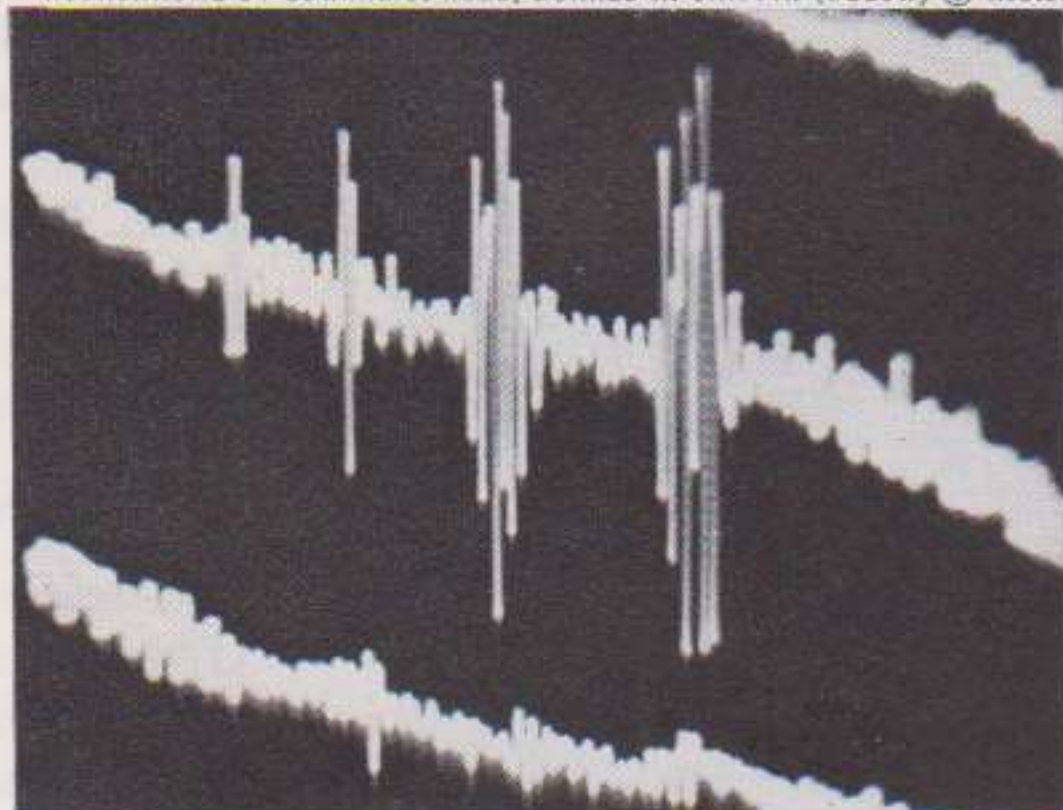
We ended our day watching the evening flight of the oilbirds from their cave. Already at 5:30 the birds were stirring about the outer room. As twilight dimmed, a few darted out of the cavern, as if to test the light, and then returned. Then emerging bats started to whiz by us in great numbers. By 6:00 the oilbirds began to leave the cave en masse, continuing for a full half hour. Hundreds of birds passed overhead. As soon as they were clear of the rocky entrance, the guácharos' sonar clicks ceased, and the birds became silent silhouettes darting out over the forest.



Adroit aerialist, an oilbird hovers in a rocky crypt in Trinidad, also visited by the author.

Oscillograph squiggles show the clicking sounds made by a bird flying in darkness. Four clicks, shown by elongated lines, occurred in $\frac{1}{60}$ th of a second; this many clicks in so short a time indicate that the bird is nearing an obstacle. When scientists experimentally plugged birds' ears with cotton in a dark room, they crashed into the walls.

KODACHROME BY EDWARD S. ROSS; DONALD R. GRIFFIN (BELOW) © N.G.S.



Back at the village hotel, Clark said, with a touch of youthful bravado, "Well, I wonder who will be first to come down with Tingo María fever."

This is the local name for a debilitating, painful malady contracted by many visitors—local and foreign—to the oilbird cave. During our first visit, my wife entered the cave only briefly. A month later she fell victim to a strange fever accompanied by severe chest pains. Fortunately she recovered promptly.

Soil samples from the cave studied by medical investigators yielded cultures of *Histoplasma capsulatum*. This fungus causes histoplasmosis, a disease prevalent in other regions, including parts of the United States. The fungus has been isolated from soil contaminated by starlings and chickens. Humans contract the disease by inhaling dust containing histoplasma spores. In serious cases, it produces lung involvement resembling tuberculosis. Some individuals—and I seem to be among the lucky ones—show less reaction or none at all, perhaps through resistance developed after an undiagnosed encounter during youth.

Luckily, none of us on the second trip caught the fever. Nevertheless, the risk of disease is the price one must pay to see and hear the oilbird. We who escaped thought the strange show—played out amid shrieks and shadows—well worth the price of admission.