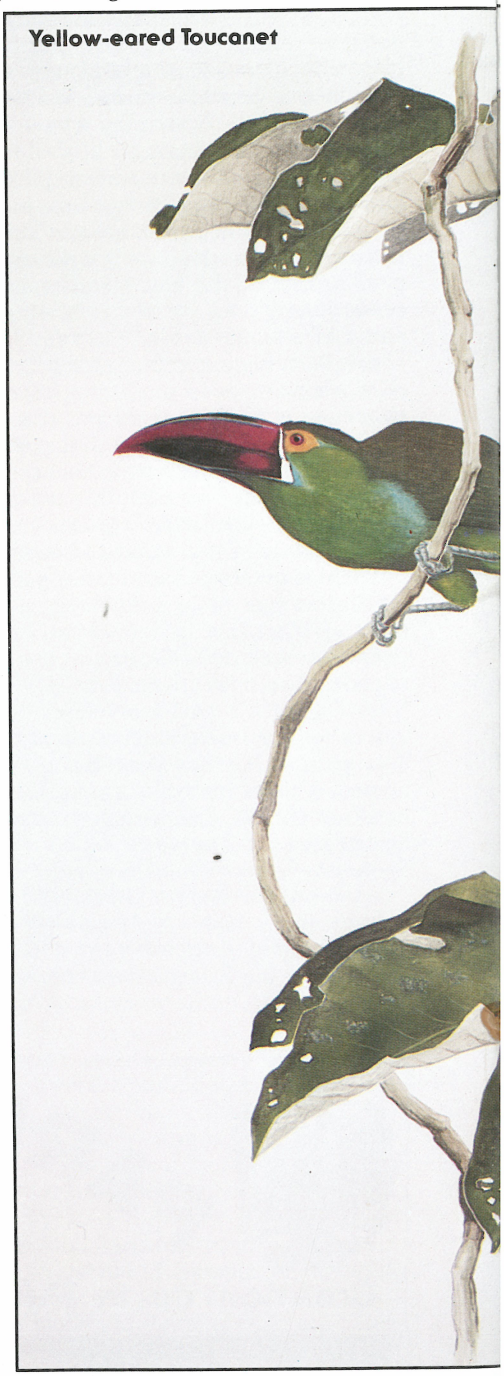
THE GREAT-BIL

by Alexander F. Skutch
Illustrations by Dana Gardner

Birds, like men, achieve fame for the most diverse reasons. Many people who have never heard of trogons, jacamars, guans, and many another notable bird family of tropical America, would recognize hummingbirds and toucans, which they may have seen in pictures or zoos, if not in their natural habitats. Yet it is difficult to imagine two bird families that contrast more strongly. Hummingbirds, which include the smallest of feathered creatures, are dainty, slender-billed, superb masters of flight, and essentially solitary. Toucans are heavy-bodied, mediocre flyers, gregarious, and have the bulkiest bills of all the woodland birds of tropical America. One seeing these bills naturally asks why are they so enormous and highly-colored. How does it help the toucans to survive? To answer these questions, we must consider how toucans live.

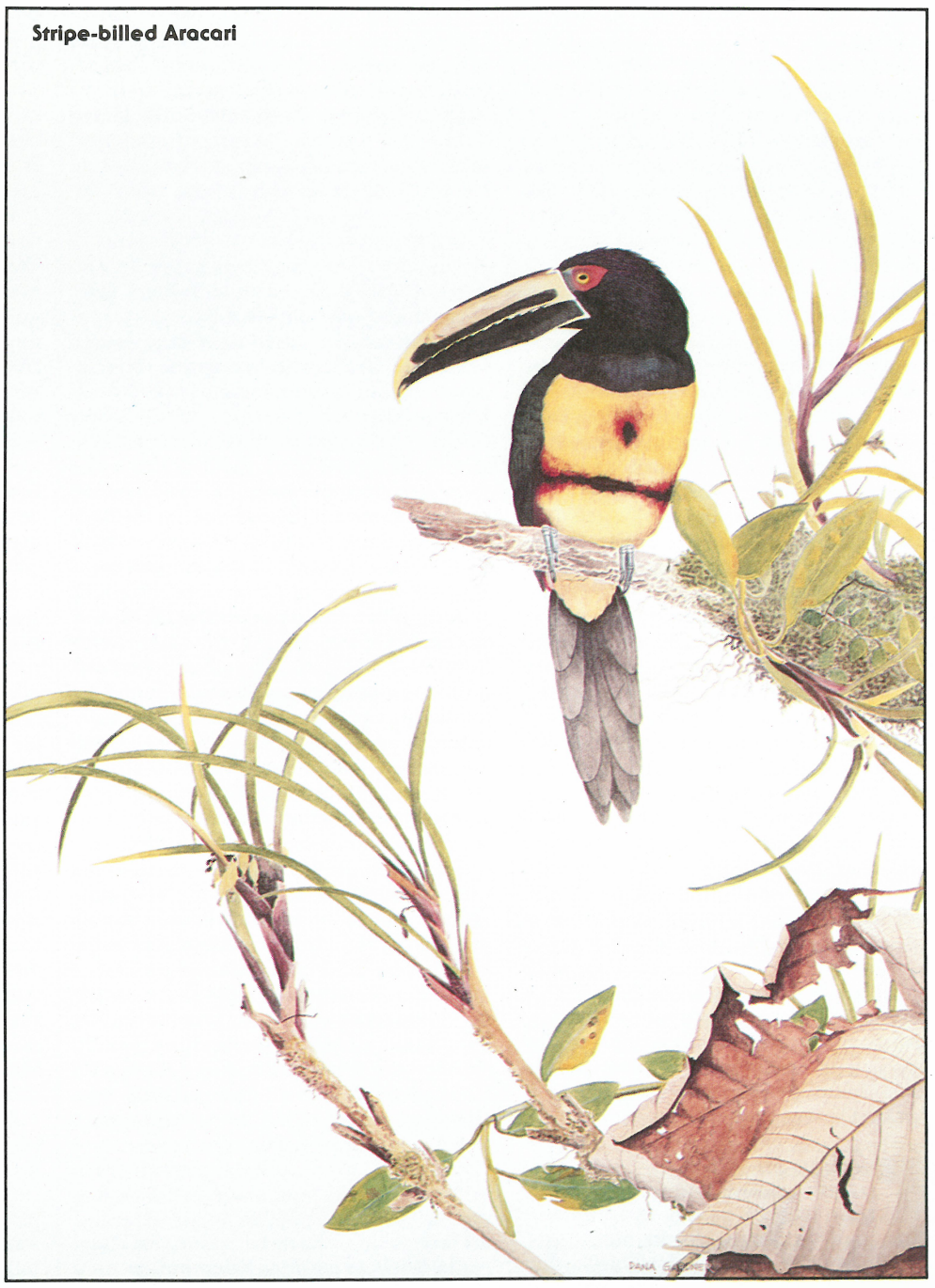
The approximately forty species of the Ramphastidae or toucan family are distributed through the forests and savannas of tropical America, from southern Mexico to Paraguay and northern Argentina, excluding the West Indies. Despite


Crimson-rumped Toucanet


Yellow-eared Toucanet

LED TOUCANS

their very different appearance, toucans are related to woodpeckers: like them, they have two toes directed forward and two backward; their structure and life histories are very similar. The largest, heaviest bodied of the toucans, with the most exaggerated bills, are classified in the genus *Ramphastos*, with a dozen species. Their plumage is largely black, with a contrasting patch of yellow or white covering the cheeks, throat, and chest, white or red upper tail coverts, and red beneath the tail. This genus contains the Toco Toucan, whose enormous bill, orange-crimson, greenish yellow, and black, accounts for eight of its twenty-six inches in total length. Most of these big toucans have highly-colored bills, but that of the Keel-billed Toucan is the most beautiful, with six colors so delicately blended that it might be called the Rainbow-billed Toucan. The flight of these heavy-bodied toucans is characteristic: after a number of rapid wingbeats, they close their wings and appear to be borne downward by their great, forward-pointing bills, By immediately spreading their wings, they convert their fall into a downward glide, which is followed by a new series of flaps that recov-



Stripe-billed Aracari

ers lost altitude. Thus the toucan traces an undulatory course from tree to tree.

Intermediate in size are the thirteen species of *Pteroglossus*, known as aracaris, whose more slender bodies are more variously colored with black, red, yellow, green, and chestnut or maroon. Their bills, more slender than those of *Ramphastos*, are long in proportion to the birds' size and colored in the most diverse patterns. Aracaris are more agile than the larger toucans; their swift, direct flight appears less labored and probably accounts for their survival in disturbed woodlands from which *Ramphastos* disappears.

Ramphastos and *Pteroglossus* inhabit warm lowland forests and are rarely found more than five thousand feet above sea level. The seven species of toucanets of the genus *Aulacorhynchus* prefer cool mountain heights, but their altitudinal ranges often overlap those of their larger relatives. The predominantly green plumage of these small toucans is relieved by patches of chestnut, blue, yellow, red, or white. Although rarely dull, their large bills tend to be less spectacularly colored than those of the bigger toucans.

Less well known are the four species of mountain-toucans of the genus *Andigena*, which range from subtropical forests high into the Andes and have highly variegated plumage and bills, and the four species of toucanets of the genus *Selenidera* of low and medium altitudes. These last are the only toucans of which the sexes differ in coloration. The bills of male toucans are generally longer than those of females, and in some mated pairs the difference is great enough to distinguish the sexes in the field.

The great bills of toucans are not as heavy as they appear. The thin, horny shell that bears the bright colors encloses a hollow space crisscrossed by slender, bony struts and braces that impart rigidity with a minimum of weight. Nevertheless, toucans must be careful not to use their bills too roughly, for sometimes they are broken. A Chestnut-mandibled Toucan lacking the terminal inch or two of its upper mandible somehow managed to stay alive and apparently well-nourished, in the wild, for at least two-and-a-half years. I always saw this easily recognized bird alone; but another, with half its lower mandible broken off, so that much of its tongue was visible from afar through binoculars, was accompanied by a mate, who possibly fed it. Seven weeks after I first noticed this injured toucan, it appeared to be in sound health.

Toucans are sociable birds that travel in groups, usually of no more than six or seven individuals, rarely a dozen. Unlike blackbirds, shorebirds, and many other birds that take wing together, as though moved by a common impulse, and fly in compact flocks, toucans are more individualistic. First one member of the group flies off, while the others delay, as though trying to decide whether to follow. Then a second starts in the same direction, and, after a while, a third. Thus they straggle along from tree to tree, through the upper levels of the forest or clearings with scattered trees.

Toucans not infrequently indulge in a social activity that I have never seen in birds with smaller bills. Last year I watched a party of Fiery-billed Aracaris in the tops of some tall, slender trees beside the river in front of our house in Costa Rica. They flew back and forth, then two of them grasped each other's bills, pushed, and separated. Next, one of these took on another opponent, and this continued until most of them seemed to have pushed together. Each encounter lasted only a few seconds. As far as I could tell with so much shifting around, no one tried to dominate the others; they appeared to be in a playful mood. On another occasion, two of these aracaris struck their long, red bills together, like fencers crossing swords, before they grasped and shoved. This time, the contest continued until one was forced backward and hung below the branch. Then it flew away, admitting defeat. Promptly another aracari advanced to challenge the victor. They struck bills together, clinched, and pushed until the newcomer remained as undisputed champion. Again, no aggressive pursuits followed these playful encounters, which have been witnessed in several species of toucans.

After one of these wrestling matches, an aracari rested on a high branch with head bent down, while another preened or nibbled the feathers of its nape. Such care for their companions' plumage is widespread among toucans. One morning before sunrise, in the heavy Caribbean rain forest of Costa Rica, I watched a pair of Chestnut-mandibled Toucans alight in the top of a huge leafless tree, where several pairs of Mealy Parrots were giving unrestrained play to strong, raucous voices. One of the toucans held in the tip of his great bill a fruit that he passed to his companion. This was followed by four or five other items produced from his throat or perhaps deeper regions. After accepting all these gifts, the recipient gently preened the donor's throat and neck with the tip of her bill. Sometimes two Chestnut-mandibled Toucans alternately preen each other's plumage, perching so far apart that they seem to fear each other, but the separation is made necessary by the length of their bills.

I have seen toucans bathe only in aerial pools, such as a water-filled hollow in a crotch or a cavity in the upper side of a stout horizontal branch of some great forest tree. The members of a pair or flock take turns splashing in the high bathtub, then emerge to preen, scratch, and arrange their plumage in a spot of sunshine amid the foliage.

Where not persecuted, toucans are sometimes unmistakably curious about man's activities. Years ago, while I collected botanical specimens beside a rivulet flowing through mountain forest where few people came, a party of Chestnut-mandibled Toucans flew about in the treetops. Presently, two of them descended to perch no more than five yards above me. Head and great bill cocked to one side, a toucan watched, with a large brown eye set amid pale green bare skin in a yellow face, while I arranged ferns between the papers of my plant press. The companion of this inquisitive bird soon became more interested in the fruit of a forest tree, which it held beneath a foot while pulling it apart with the hooked tip of its bill.

Long familiarity with toucans in their native forests has convinced me that their extraordinary bills are worn by birds of extraordinary character. With their angular bodies and movements that often appear clumsy, their far from melodious, often croaking voices, and their playfulness, they remind me of feathered clowns. What a contrast between these restless, excitable toucans and their neighbors in the tropical American forests, the staid, dignified, usually mellow-voiced trogons, clad in the elegant plumage that befits such gentlemanly birds!

Toucans are largely frugivorous, eating a great variety of the fleshy fruits of forest trees and soft, nutritious arils that surround hard, indigestible seeds. Too inexpert on the wing to snatch fruit in flight as trogons, manakins, and many other birds do, too heavy to cling near the slender tips of the twigs that bear these fruits, the toucan perches farther in, where the supporting branch is stronger, and stretches out to pluck a fruit or seed in the tip of its long bill. Then, with an upward toss of its head, it throws the article back into its throat and swallows it. Toucans vary their diet with such insects as they can catch. When termites release their winged sexual brood, providing a feast for the whole avian community, toucans manage to catch some of the slowly fluttering, soft-bodied insects that fill the air around them.

No one who watches a toucan plucking berries can doubt that its great bill is serviceable to it. Nevertheless, this observation furnishes only a partial answer to the problem of the toucan's bill. It tells us why the bill is long, but not why it is so bulky and highly colored. A slender,

dull-colored bill of the same length would be equally efficient for gathering fruits.

Toucans, including the big *Ramphastos,* the middle-sized aracaris, and the little green toucanets, occasionally take eggs or nestlings from the nests of other birds, mostly smaller than themselves. While they stand beside a nest, pludering it, I have never seen an outraged parent, not even the biggest and boldest of the "tyrant" flycatchers, dare to attack them. A friend even watched a toucan swallow an egg of a small hawk, after driving the female from her nest. Those huge, menacing beaks effectively hold angry parents at bay.

Here we have a clue to the high coloration of toucans' bills. Bright colors make friendly things more attractive, but they make hostile things appear more formidable. Men of many races have painted or gaudily attired their bodies not only for their festivities and wooing but also to confront their enemies in battle; bright hues serve as the "warning coloration" of unpalatable or effectively protected animals as well as in courtship. Doubtless, the conspicuous colors of toucans' beaks make parent birds less ready to attack these plunderers. But when the toucan flies and cannot turn his head to defend his back, kingbirds and other large flycatchers harry and sometimes buffet him. Nesting Boat-billed Flycatchers may fly a long way to harass an approaching toucan.

Although it is sometimes stated that toucans sleep in cavities in trees, neither from personal observation nor search of the literature have I found any evidence that this is true, except for the aracaris. As I and others have repeatedly seen in several species of these middle-sized toucans, at nightfall they enter a hole carved by one of the larger woodpeckers, or sometimes one resulting from decay. Up to five or six may crowd into the same high hole, or a large party may divide up between two neighboring holes. Often they appear to have several available dormitories; if alarmed when about to retire into one, as by too-obvious watching, they fly off to another. Aracaris' bills appear to be inconveniently long for a crowded dormitory, but these birds have solved the difficulty. As the last aracari pushes into a bedroom already packed with his companions, one may see him tilt his tail forward and lay it along his back to save space. His bill is also laid upon his back, beneath his tail, converting a body with long, projecting extremities into a rotund mass of outfluffed plumage. Larger toucans also fold themselves up in this manner when they roost amid the foliage of trees.

Birds that nest in holes but cannot carve them often covet the aracaris' dormitories. One of these is the Masked Tityra, a starling-sized bird of the forest treetops. Too timid to attack the much bigger aracaris, the female tityra proceeds in a more subtle fashion to evict them. During the day, when they are out of sight, she carries dead leaves and twigs into their hole. Each evening, when they return, they find less room in their dormitory. Finally, feeling too crowded, they abandon it, and the tityra moves in, to lay her eggs and raise her brood.

Sometimes the most obvious difference in the appearance of two species of toucans that inhabit the same forest is in the colors of their bills. Bill coloration, in addition to differences in voice, probably helps toucans to recognize members of their own species and prevent mismating. The conspicuously and often beautifully colored bills may also enter into courtship displays; but, as is true of many tropical birds that form enduring pairs, we know little about how these pairs originate.

As far as we know, all toucans nest in holes in trees but are unable to make them. Once, indeed, I watched a pair of Blue-throated Toucanets trying to carve into a decaying trunk, pecking so hard that I could hear them a hundred feet away; but the undertaking proved too difficult and was soon abandoned. The smaller toucans often breed in holes made by the larger woodpeckers, or sometimes in one made by a small woodpecker, if the surrounding wood is soft enough for them to enlarge it. The big *Ramphastos* toucans appear always to occupy a cavity made by decay, which may be shallow or several feet deep. The nest may be very high, but sometimes, probably because no loftier hole is available, it is within hand-reach of the ground, where toucans are rarely seen. No toucan is known to line its nest cavity, the bottom of which is soon covered by seeds of many shapes and colors that the parents have regurgitated after digesting the surrounding flesh. On this pebbly bed rest the two to four pure white eggs.

Nothing so well reveals the restless, mercurial, suspicious temperament of the toucan as its manner of incubating. In forests where many sparrow-sized birds sit on their eggs for several hours continuously, and male trogons and pigeons incubate without intermission through most of the day, toucans don't usually remain at their task for as long as an hour, and almost never as much as two hours. The male and female take turns on the eggs, but often one leaves before the other arrives to replace it. The same bird may leave and return to the nest several times during its period of duty, sometimes after sitting for only a few minutes. Thus, despite the cooperation of both parents, the eggs are commonly left unwarmed for from twenty to thirty percent of the daytime. Although I have watched toucanets and aracaris attend their nests while I stood or sat unconcealed, usually at a good distance, the big *Ramphastos* toucans are often so suspicious that they are difficult to watch even from a camouflaged blind. Either sex may incubate or brood nestlings through the night. I found the female of a pair of Blue-throated Toucanets in Costa Rica taking charge by night; but at a nest of Red-billed Toucans in Guyana, Godfrey R. Bourne discovered that the male usually did so. In woodpeckers, to find the female caring for the eggs or nestlings by night is most unusual.

After about sixteen days of incubation, the nestlings hatch. Blind, prognathous, with no trace of down on their pink skins, they are grotesque little creatures. The lower mandible of the short bill is broader as well as longer than the upper mandible, which bears at its end the white egg-tooth that helps the little bird to break out of the shell. Each heel is covered with a pad of thick skin studded around the edge with tiny spikes, a development that protects this joint from abrasion as the nestling shuffles around on its pebbly bed, supporting itself on its heels and posterior end. From the day they hatch, these nestlings make a sharp, squeaky buzz while one looks in at them. The parents promptly remove the empty shells.

During the nestlings' first week or two, the two parents brood them by turns, and both bring them food. Often the adults arrive with one item in the tip of the bill, others inside the mouth or throat, to be brought up as the young are fed. After the first few days, the nestlings' diet consists mainly of fruits and arillate seeds, varied by an occasional mature insect, caterpillar, lizard, or nestling of some other bird. The surprisingly large size of some of the fruits sometimes causes amusing incidents. Once, in the Costa Rican highlands, I watched a Blue-throated Toucanet enter its nest hole, holding in its bill a big, one-seeded fruit of a tree of the laurel family. After a minute or so, the parent tried to emerge but stuck in the narrow doorway. In vain it pushed and squirmed; it seemed trapped within. Finally, it found a solution to its problem. It regurgitated the fruit that it had evidently swallowed when the nestlings were unable to do so, and, with reduced girth, passed through the orifice holding the object in its bill. While I examined a Rainbow-billed Toucan nest, a parent, perched high above me, nervously swallowed and regurgitated the same seed many times over, or restlessly shifted an insect between its bill and a foot.

Although toucans have complained loudly while I looked into their nests, none has ever attacked, or even darted at

me with clacking bill, as many a smaller bird has done. One might suppose that a bird with such a beak, ensconced in a chamber with solid walls and a narrow doorway, could repel snakes and small, predatory mammals. Nevertheless, as far as I have seen, toucans hasten to escape from their holes at the first suggestion of danger, whether from man or some other creature, leaving eggs or young to their fate. As with other birds of tropical forests, most of their nests are destroyed by predators.

At intervals, parent toucans remove large billfuls of waste, keeping their nests clean.

Nestling toucans develop very slowly. Until they are nearly a month old, they do not keep their eyes open when one illuminates their nest with a small electric bulb and looks in with a mirror. They take more than a month to become decently clad with feathers. The smaller toucans remain in their nests at least six weeks, the larger ones a week longer. When they finally emerge, they rather closely resemble their parents in plumage, but their bills are smaller and paler.

As darkness fell over the Panamanian rain forest on an evening in February long ago, I watched six Collared Aracaris squeeze through a narrow opening on the underside of a stout horizontal limb, a hundred feet up in a great tree, to enter the hollow where they slept. By the end of March, only a single aracari slept in this cavity. Now, whenever I clapped my hands loudly in the daytime, a great pied bill was thrust through the orifice, and a slender, long-tailed body laboriously followed it out, to fly away through the forest. Even so inaccessibly high, the aracari felt insecure in the hollow where it was evidently attending eggs. By early April, four of the five aracaris who had gone to roost elsewhere while incubation was in progress had returned to sleep with the nestlings. Continued watching revealed that the young, of which there were at least three, were fed by five grown birds. As I interpreted the situation, the parents had three helpers, who were probably their offspring of earlier years, and, accordingly, older siblings of the nestlings that they attended.

Although such family cohesiveness is not rare among jays, bee-eaters, wrens, and other birds permanently resident in mild climates, nest helpers have not been found in other species of toucans, not even in the closely related Fiery-billed Aracari, of which I have watched several nests. Over the years, I have searched fruitlessly for a second nest of the Collared Aracari, and nobody else appears to have found and studied one. We still do not know whether the situation that I found at the high nest in Panama is usual or exceptional in this species. So much remains to be learned about the habits of birds that yearly become rarer as the tropical American forests shrink before man's relentless inroads!

To return to our opening question: Why do toucans have such huge, highly colored bills? The bills's length enables these birds to reach fruits on slender twigs while they perch far enough inward to find support for their heavy bodies. Its bulk and vivid coloration intimidate parents whose nests they pillage. It may help to prevent mismating by associated species that differ most conspicuously in the colors of their bills, and it may also play a part in courtship. Of rather fragile construction, the bill is definitely not a weapon of defense.

Black-billed Mountain Toucan

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SCIENTIFIC NAMES OF BIRDS MENTIONED

(in the order of their occurrence)

Toco Toucan
Ramphastos toco

Keel-billed or Rainbow-billed Toucan
Ramphastos sulfuratus

Chestnut-mandibled Toucan
Ramphastos swainsonii

Fiery-billed Aracari
Pteroglossus frantzii

Mealy Parrot
Amazona farinosa

Boat-billed Flycatcher
Megarhynchus pitangua

Masked Tityra
Tityra semifasciata

Blue-throated Toucanet
Aulacorhynchus caeruleogularis

Red-billed Toucan
Ramphastos tucanus

Collared Aracari
Pteroglossus torquatus


Keel-billed Toucan
DANA GARDNER