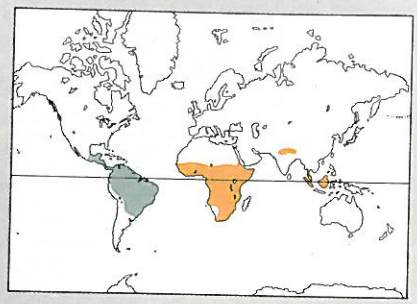
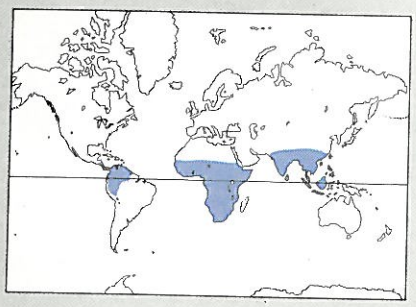
TOUCANS, HONEYGUIDES AND BARBETS

Families: Ramphastidae, Indicatoridae, Capitonidae
Order: Piciformes (suborder: Galbulae, part).
One hundred and thirty-one species in 20 genera.
Distribution: see maps and table.



Honeyguides Toucans



Barbets

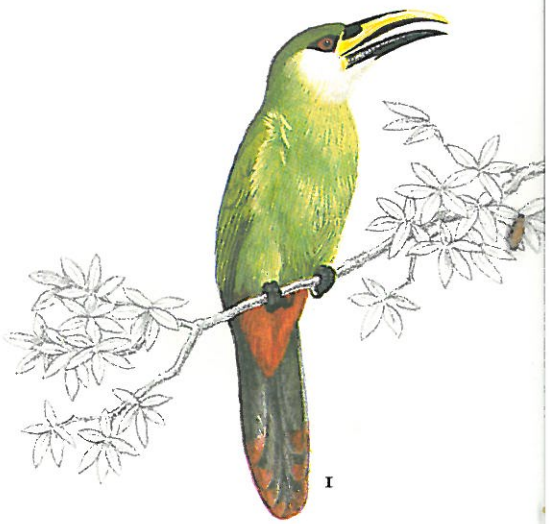
► **Representative species of toucans.** (1) An Emerald toucanet (*Aulacorhynchus prasinus*) calling. (2) A Black-billed mountain toucan (*Andigena nigrirostris*) revealing a flash of yellow on its rump as it clambers around in tree branches. (3) A Chestnut-mandibled toucan (*Ramphastos swainsonii*) tossing its head, enabling food held at the tip of the bill to be transferred to the throat. (4) A Toco toucan (*Ramphastos toco*) at full stretch searching for berries. (5) A Guianan toucanet (*Selenidera culik*) examining a possible nest cavity. (6) A Saffron toucanet (*Andigena bailloni*) flying from tree to tree. (7) A Collared aracari (*Pteroglossus torquatus*) preparing to leave its nest-hole.

Toco toucans are so often depicted by artists and designers that they have become a symbol of the warm forests of tropical America. Of all the rich bird life of the Neotropics, probably only hummingbirds are more often illustrated.

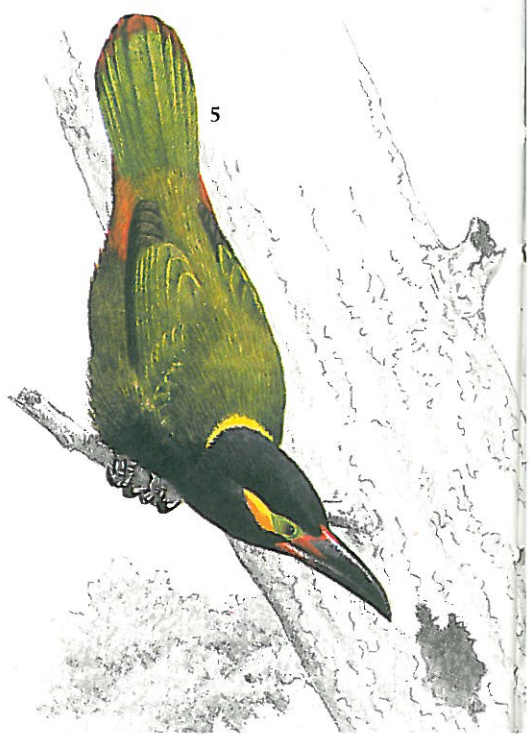
The most prominent feature of **toucans** are their bills, often vividly colored, which are much lighter in weight than they appear. A thin horny outer sheath encloses a hollow which is crisscrossed by many thin, bony, supporting rods. Despite this internal strengthening, toucans' bills are fragile and sometimes break. Nevertheless, some manage to survive a long time with part of their bills conspicuously missing. The biggest bill of any toucan is that of the male Toco toucan which accounts for 20cm of the bird's total length of 66cm (8 of 26in).

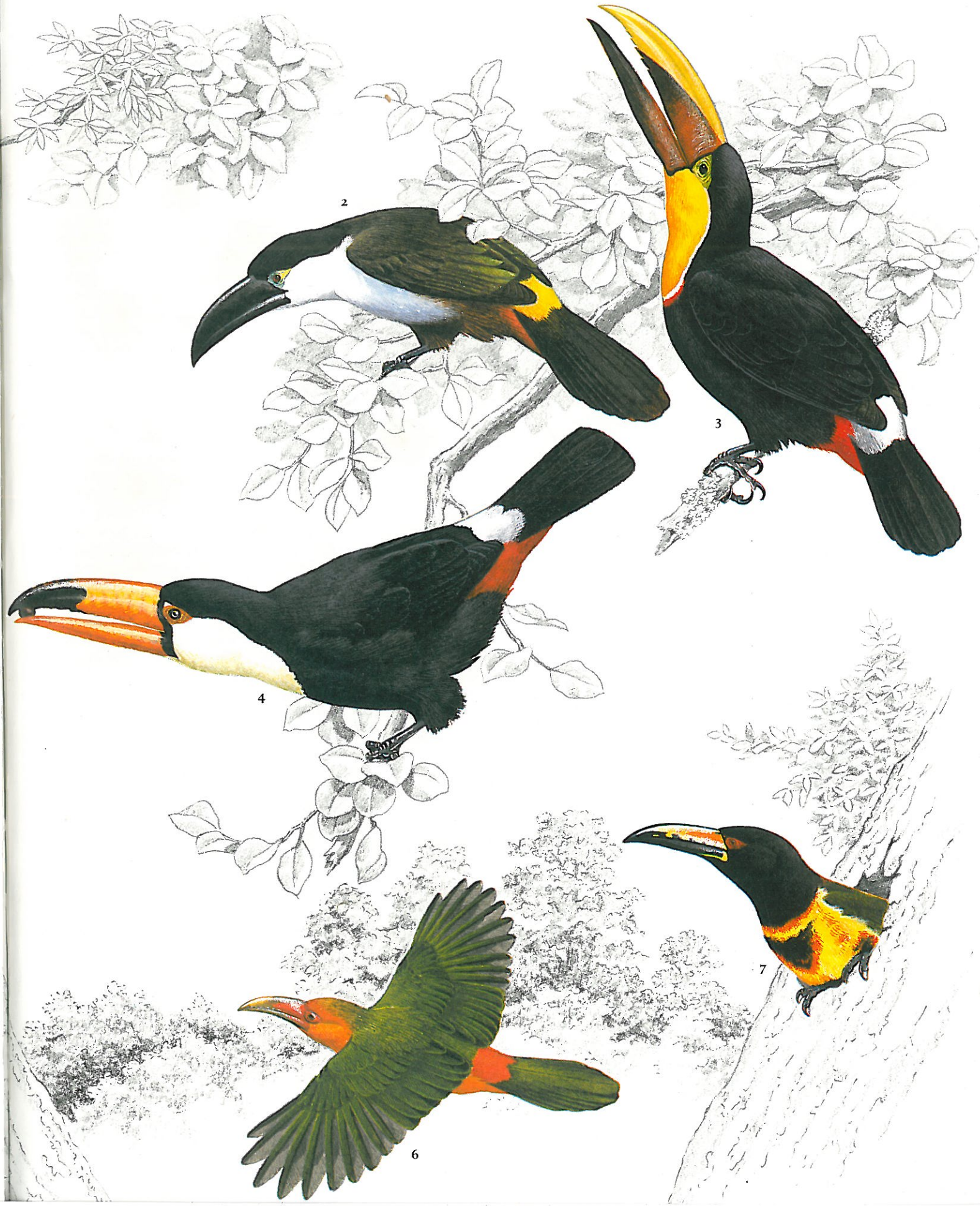
Naturalists have speculated for centuries about the uses of the toucan's exaggerated beak. It enables these heavy, rather clumsy birds to perch inside the crown of a tree, where branches are thicker, and reach far outwards to pluck berries or seeds from twigs too thin to bear their weight. Seized in the tip of the bill, food is thrown back into the throat by an upward toss of the head. This behavior explains the bill's length but not its thickness or bright coloration. The diet of toucans consists mainly of fruit but includes insects, an occasional lizard and eggs and nestlings of smaller birds. The huge, vivid beak so intimidates distressed parents that not even the boldest of them dares to attack the plunderer perching beside its nest. After the toucan flies and is unable to defend its back in the air, an enraged parent may pounce upon it, to withdraw prudently before the larger bird alights. The varied patterns of toucans' bills may help these birds to recognize each other. In Central American forests Chestnut-mandibled and Keel-billed toucans have such similar plumage that they are only readily distinguished by their bills—and voices. The Keel-billed's beak is delicately tinted with all but one of the colors of the rainbow, whereas that of its relative is largely chestnut, with much yellow on the upper mandible. Possibly the bills also play a role in courtship.

Toucans are moderately gregarious and fly in straggling flocks, one after another, rather than in compact bands, like parrots. In flight, the big *Ramphastos* toucans beat their wings a number of times, then close them, whereupon they lose altitude, as though borne downward by their great, forwardly directed beaks. Immediately the black wings are widely spread, the fall is converted into a short glide, followed by more wing beats that recover the lost altitude. Thus the toucan traces an undulatory course from one treetop to another that is rarely far distant. Toucans prefer to remain high in trees, where they hop from branch to branch. They bathe in pools of rain water in hollows high in trunks and limbs—never, apparently, at ground level. They offer food to their companions and, perching well apart, preen them with the tips of long bills.



Toucans are playful birds and often engage in various games. After striking their bills together, two clasp each other's bills and push until one is forced backward from the perch and retreats. Another individual may then cross bills with the winner, and

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▲ **Channel-billed toucan.** The ten large toucans of the genus *Ramphastos* all have black or blackish plumage. Other features are more variable. Throats and breasts are yellow or white, upper tail coverts red, white or yellow. But *Ramphastos* toucans are most easily distinguished by their bill colors. This species (*R. vitellinus*) is a medium-sized *Ramphastos* toucan widespread in South America, from the north to southern Brazil.

the victor in this bout may be challenged again. Participants in such a wrestling match reveal no sign of aggression. In another form of play, one toucan tosses a fruit which another catches in the air, then throws it in similar fashion to a third, who may pitch it to a fourth member of the flock.

Toucans are often reported to sleep in holes, but this is only known to occur in the medium-sized aracaris and the Guianan toucanet (see box).

The big *Ramphastos* toucans appear to nest regularly in holes resulting from the decay of tree trunks, the availability of which may limit the number of breeding pairs. A favorable hole, in sound wood with an orifice just wide enough for the adults to squeeze through, may be used year after year. The hole may be only a few cm or 2m (6.5ft) deep. A suitable cavity near the base of a trunk may tempt toucans closer to the ground than is normal. Smaller toucans often occupy woodpeckers' holes, sometimes evicting the owners. They may clean out and enlarge existing cavities, and sometimes try to carve their own holes in soft, decaying wood, but apparently rarely with success. The nest chamber is never lined, but the 2–4 white eggs rest upon a few chips at the bottom, or upon a pebbly bed of regurgitated seeds of various sizes, shapes and colors, which grows thicker as incubation proceeds.

Parents share incubation and are, for birds of their size, impatient sitters, rarely remaining at their task for more than an hour and often leaving their eggs uncovered. Far from trying to repel intruders with their great bills, the least threat causes them to slip out and fly away.

After about 16 days of incubation the nestlings hatch blind and naked, with no trace of down on their pink skins. Like newborn woodpeckers, which they closely resemble, they have short bills with the lower mandible slightly longer than the upper. Around each ankle joint is a pad of spike-like projections, which protects it from abrasion as the nestlings stand on their rough floor, supporting themselves on heels and swollen abdomen. Nestlings are fed by both parents, with increasing quantities of fruit as they grow older, but they develop surprisingly slowly. The feathers of the small toucanets do not begin to expand until they are nearly four weeks old, and month-old *Ramphastos* nestlings are still largely naked. Both parents brood the nestlings, sometimes the male by night, as in woodpeckers. They carry large billfuls of waste from the nest, some, including Emerald toucanets, keeping the nest perfectly clean, whereas Keel-billed toucans permit decaying seeds to remain.

When finally fully feathered, young toucans resemble their parents, but their bills are smaller and less highly colored. Small toucanets may fly from the nest when 43 days old, but the larger *Ramphastos* toucans remain for about 50 days. Aracaris are led back to the nest to sleep with their parents but, as far as is known, other fledglings roost amid foliage.

The biggest toucans, 10 species of the genus *Ramphastos*, are chiefly inhabitants of lowland rain forests, from which they make excursions into neighboring clearings with scattered trees. They are rarely seen at altitudes of 1,500m (5,000ft) above sea level. Their plumage is chiefly black or blackish and their calls are largely croaks and yelps, but the vesper song of the Chestnut-mandibled toucan (*dios te dé*), is almost melodious when heard in the distance.

The 11 species of aracaris are smaller and more slender than the other toucans. They too are inhabitants of warm forests, but rarely venture as high as 1,500m (4,900ft). They have black or dusky green backs, crimson rumps and are usually black on head and neck. Their largely yellow underparts are crossed by one or two bands of black or red. Their long bills are black and ivory white, wholly ivory white or mainly fiery red. Exceptional for this group, the Curl-crested aracari has its crown covered with broad, shiny feathers that resemble curled horny shavings. The calls of the better-known species are sharp and high-pitched for such large birds. They are the only toucans which, as far as is known, regularly

Cooperative Breeding in Aracaris

Aracaris are slender, middle-sized toucans, which inhabit woods amid farmlands. Calling sharply *pitit pitit*, they fly swiftly and directly in small, straggling flocks. At nightfall they retire into old woodpecker holes or other cavities, turning their heads over their backs and their tails forward to cover them, to fit into a narrow space.

In a Panamanian forest six Collared aracaris were once observed to squeeze with difficulty through a narrow orifice in the underside of a thick horizontal branch, 30m (100ft) up in a great tree. As weeks passed the number of birds using this hole for sleeping decreased until only one remained, apparently incubating a clutch of eggs. After the eggs hatched five of the original six birds again slept in this hole, and all brought food to the nestlings, at first chiefly insects grasped in the tips of their great beaks. As the nestlings grew older the five attendants brought increasing quantities of fruits, some of which they regurgitated.

At about 43 days the first young aracari flew from its high nursery. At nightfall its attendants led it back to sleep with them. While the fledgling tried inexpertly to enter the narrow, downward-facing doorway, a White hawk swooped down, seized the piteously crying young bird in its talons, and carried it off, followed by all the adults.

Three of the attendants at this nest were probably nonbreeding helpers, possibly older offspring of the parents. In the half century since these observations were made no other nest of the Collared aracari has been available for study, and we still do not know whether cooperative breeding, widespread in other families of tropical birds, is usual in any species of toucans. AFS

▲ **Largest and most familiar** of the *Ramphastos* toucans is the Toco toucan of Brazil. It has the largest bill of any toucan, in both absolute and relative terms. In trees it is agile, but slightly awkward in flight, taking an undulating line. Here the use of the bill for holding fruit is clearly shown, as is the slightly serrated edge.

lodge in holes throughout the year.

Toucanets of the genus *Aulacorhynchus* (7 species) are small to large with mainly green plumage. Their calls are unmelodious croaks, barks and dry rattles. They chiefly inhabit cool mountain forests, between 1,000 and 3,000m (3,300–10,000ft), and rarely descend into warm lowlands.

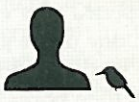
The five species of toucanets belonging to the genus *Selenidera* dwell in rain forests at low altitudes from Honduras to northeast Argentina. Their plumage is more variable than that of the foregoing species, and they are the only toucans of which the sexes differ conspicuously in color. The reddish brown bill of the Tawny-tufted toucanet is prominently striped with black. Little is known of the habits of these small toucans.

Least known of all are the four species of mountain toucans which, as their generic name *Andigena* implies, inhabit the Andes from northwest Venezuela to Bolivia. From the subtropical zone they extend far upward into the altitudinal temperate zone. One of the more colorful is the Black-billed mountain-toucan, whose light blue underparts are exceptional in the toucan family. Its crown and nape are black, its back and wings olive brown, rump yellow, throat white, undertail coverts crimson and thighs

chestnut. Although these and many other toucans are becoming rarer as their habitats are destroyed, many remain to be studied by naturalists hardy enough to pass long months in remote forests. AFS

JACAMARS AND PUFFBIRDS

Families: Galbulidae, Bucconidae
Order: Piciformes (suborder: Galbulae, part).
Forty-seven species in 15 genera.



Jacamars
Family: Galbulidae
Fifteen species in 5 genera.
Distribution: Mexico to S Brazil.
Habitat: forest, thickets, savanna.
Size: 13–31cm (5–12in) long.
Plumage: shining iridescent green above, mostly rufous below, or dull brown or blackish; white below. Slight differences between sexes.
Voice: often prolonged and complex song with whistles, squeals and trills.
Nests: in short burrows in ground or termite mounds.
Eggs: 2–4, white, unmarked; incubation period: 20–22 days; nestling period: 19–26 days (in Rufous-tailed jacamar).
Diet: insects caught in the air, including many butterflies, beetles and wasps.

Species include: **Chestnut jacamar** (*Galbalcyrhynchus leucotis*), **Great jacamar** (*Jacamerops aurea*), **Pale-headed jacamar** (*Brachygalba goeringi*), **Paradise jacamar** (*Galbula dea*), **Rufous-tailed jacamar** (*Galbula ruficauda*), **Three-toed jacamar** (*Jacamaralcyon tridactyla*).

Puffbirds
Family: Bucconidae
Thirty-two species in 10 genera.
Distribution: Mexico to S Brazil.
Habitat: rain forest, dry open woodland, shrubbery, savanna.
Size: 14–29cm (5.5–11in) long.
Plumage: black, white, brown, rufous, buff, often barred, streaked or spotted (never brilliant); slight differences between sexes.
Voice: thin and weak to loud and ringing; rarely melodious.
Nests: burrows in ground or cavities carved in termite mounds; occasionally abandoned nests of other birds, sometimes lined (leaves or grass).
Eggs: 2 or 3, occasionally 4; unmarked, white; incubation period: unknown; nestling period: 20 days (White-faced puffbird) or about 30 days (White-fronted nunbird).
Diet: chiefly insects, occasionally small frogs or lizards; rarely fruits.

Species include: **nunbirds** (genera *Hapaloptila, Monasa*), **nunlets** (genus *Nonnula*), **swallow-wing** (*Chelidoptera tenebrosa*), **White-fronted nunbird** (*Monasa morphoeus*), **White-whiskered puffbird** (*Malacoptila panamensis*).

A DAINTY, glittering green, iridescent, straight-billed hummingbird the size of a thrush or mockingbird—such would be an apt description of one of the more brilliant **jacamars**. These, however, are more closely related to woodpeckers, toucans, barbets, and puffbirds than to hummingbirds.

The jacamar's long, slender, sharp bill seems poorly fitted for its aerial insect-catching niche and for excavating its nest chamber—a broad, flat bill would seem more efficient. However, the long bill can reach across the wings of a butterfly or dragonfly (which if seized might break and release the insect) to grasp the body firmly. Moreover, it keeps the flailing wings away from the jacamar's face while it knocks its victim against a branch until the wings flutter earthward; it also holds stinging wasps at a safe distance.

Jacamars appear to be charged with irrepressible vitality. While perching on an exposed twig above a stream, path or open space in woods or thicket, they constantly turn their bright-eyed heads from side to side, looking for flying insects which they dart out to seize. The high, thin notes of their calls convey a sense of urgency. For birds that are not true songbirds, their vocal performances are surprisingly complex.

Jacamars nest in tunnels which they dig in vertical banks or sloping ground or in hard, black termite mounds. The Rufous-tailed jacamar, the best-known species, may use both sites in the same locality. The male not only helps his mate to excavate but frequently feeds her, to the accompaniment of much singing. The horizontal burrow, 29–79cm (11–31in) long, according to the species, ends in a chamber where 2–4 white eggs lie on the bare floor, which is soon covered by a growing accumulation of regurgitated beetles' shards and other indigestible parts of insects. By day the sexes incubate alternately, often for an hour or two at a time. The female occupies the nest by night. Unlike most birds of their order (Piciformes), the nestlings hatch with a thin coat of long white down. They are nourished wholly with insects by both parents, and soon become loquacious, practicing songs of the adults while they await their meals. Fledgling Rufous-tailed jacamars do not return to sleep in the burrow, but four young Pale-headed jacamars in Venezuela continued for several months to lodge with their parents in their longer tunnel.

The eight species of *Galbula* are a glittering golden green or purple glossed with green, with chestnut or white underparts. Exceptional in the family is the long-tailed

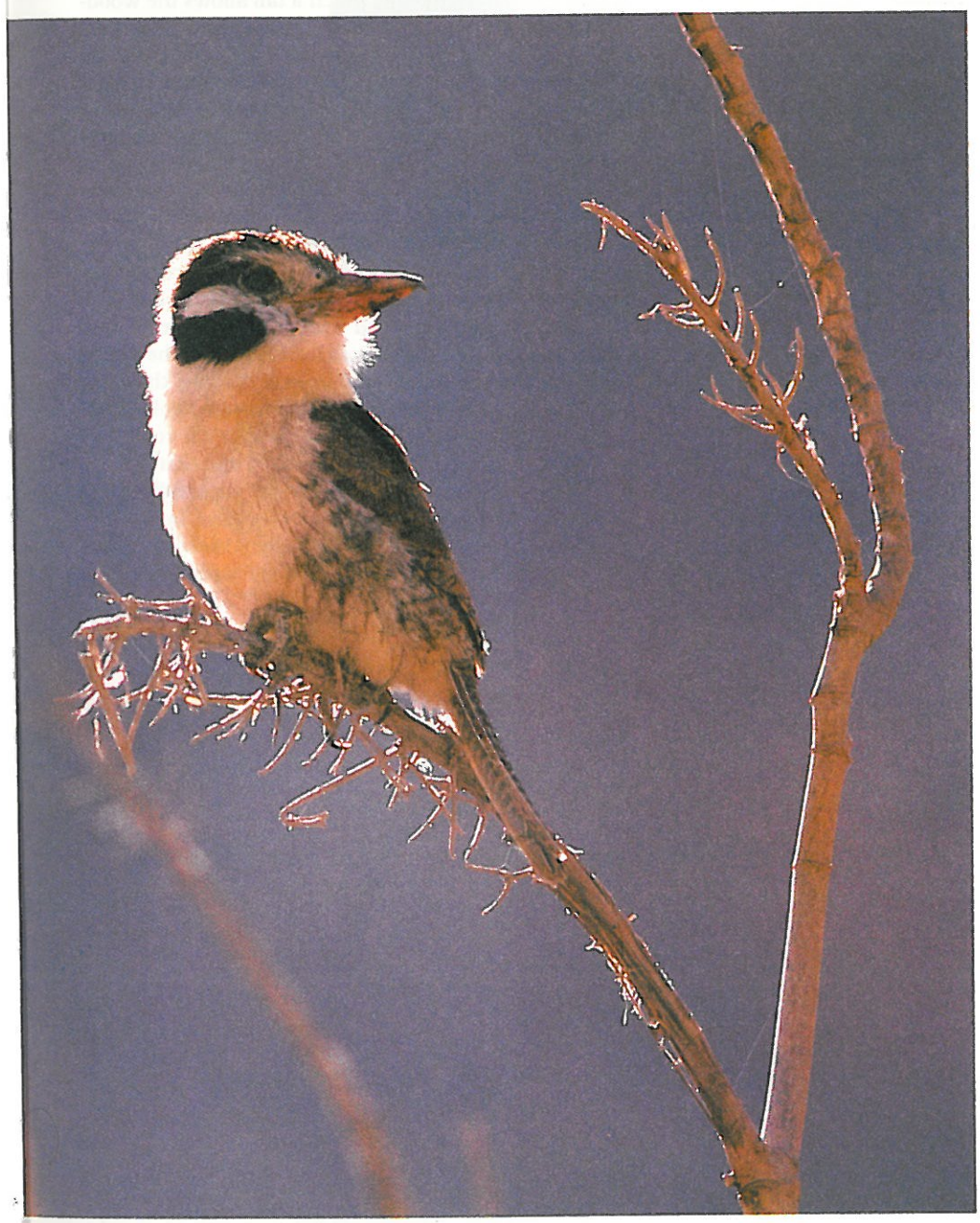
► **Waiting for a butterfly?** Jacamars use their long tapered bills to catch butterflies and insects of similar size. The Rufous-tailed jacamar (*Galbula ruficauda*) is widespread from South Mexico to Brazil.

▼ **Surveying its territory.** A White-eared puffbird (*Nystalus chacuru*) sits ready to leap out after passing prey.

Paradise jacamar of Amazonia and the Guianas with bronzy black plumage.

The Chestnut jacamar has a pink, kingfisher-like bill and the Three-toed jacamar of Brazil is a small bird with a chestnut head and blackish and grayish body. (Other jacamars have four toes, two directed forward and two backward.) The Great jacamar is a stout bird with heavier bill, golden green and rufous, like some of its smaller relatives.

Puffbirds are so named because their large heads, short tails and often loose plumage give them a stocky aspect. Their bills are usually stout and hooked at the end, less often tapering and pointed. Their habit of resting motionless and often permitting a close approach by humans causes the unperceptive to call them stupid. Actually, they are wisely conserving energy, while with keen eyes they scrutinize surrounding vegetation. Suddenly they fly out, perhaps to snatch a green insect from green foliage 20m (65ft) away.



Exceptional in the family are the swallow-wings, which are short-tailed, long-winged, blue-black birds with white rumps and cinnamon chestnut abdomens.

White-whiskered puffbirds are among the few species with sexual differences in plumage, the males being largely chestnut-brown and cinnamon, the females more olive and grayish. Although they live chiefly at mid heights of the rain forest, they nest in short, descending tunnels in the forest floor. On a bed of dead leaves they lay two or three white eggs, which the female incubates through a long morning, the male for the remainder of the time. The blind, wholly naked nestlings are at first brooded by their father and fed by their mother. After daytime brooding ceases, the father helps to feed the nestlings for the remainder of their 20 days underground.

Most social of the puffbirds are the four species of nunbirds. Their pointed, bright red or yellow bills contrast with their somber, black or dark gray plumage. The calls of the White-fronted nunbird are extremely varied, ranging from wooden rattles to notes soft and deep. Up to 10 perch in a row on a high horizontal branch or vine and lift up their heads to shout all together, for 15 or 20 minutes, in loud, ringing voices. Their long burrows in sloping or nearly level ground are lined with dead leaves and have a collar of leaves and sticks around the entrance. Three or four adults, probably parents with older, nonbreeding offspring, feed three nestlings. Blind and naked, the nestlings toddle up the long entrance tunnel to receive their meals at the mouth. When about 30 days old they fly up into the trees.

The four species of *Notharchus*, boldly patterned in black and white, use stout black bills to carve nest chambers deep into hard, black termite mounds. Male and female share this task, and later take turns incubating two or three white eggs on the unlined floor. Their notes are mostly weak and low. Species of *Bucco* and *Hypnelus* also breed in termite nests.

The five species of nunlets are small nunbirds that range from Panama to N Argentina. Unobtrusive forest-dwellers colored gray, brown, cinnamon and white, their habits are little known. AFS

▲▼► Representative species of buntings and tanagers, males in breeding plumage. (1) Swallow tanager (*Tersina viridis*) catching insects. (2) Black-headed bunting (*Emberiza melanocephala*). (3) Corn bunting (*E. calandra*) in middle of "bunch-of-keys" rattling song (plumage of both sexes similar). (4) Rose-breasted thrush tanager (*Rhodinocichla rosea*) foraging in leaf litter. (5) Buff-throated saltator (*Saltator maximus*) eating a banana. (6) Rose-breasted grosbeak (*Pheucticus ludovicianus*) male in winter. (7) White-throated sparrow (*Zonotrichia albicollis*). (8) Plush-capped finch (*Catamblyrhynchus diadema*). (9) Red-legged honeycreeper (*Cyanerpes cyaneus*) feeding on nectar.

To contemplate the colorful, constantly changing throng of **tanagers**, peaceably eating in a tree laden with berries, is one of the delights of bird watching in the tropics. From warm lowlands to high, cold mountains, their amazingly varied plumage adds touches of warm color to the foliage of trees and shrubs. The small tanagers of the genus *Tangara* display every bright color in the most varied patterns: one of them, the Paradise tanager, is splendidly attired in scarlet, golden yellow, shining apple green, purplish blue, turquoise, and black.

Tanagers are compactly built, with short to medium-length and often rather thick bills, generally notched or hooked at the tip. Their tails are short to medium-length, and their wings have only nine primary feathers instead of the usual 10.

With one known exception (see box), even the most brilliant tropical tanagers wear the same colors throughout the year. Of the four species that nest north of Mexico, the Scarlet tanager, which performs the longest migration, shows the greatest seasonal color changes in the male—from scarlet to yellowish; male Western and Hepatic tanagers travel less far and change only slightly; male Summer tanagers winter in the tropics in their full coats of red. At the other extreme of the family's range, the three partly migratory species—Diademed, Blue-and-yellow, and Sayaca—that breed as far south as central Argentina change

little. Wholly tropical tanagers are nonmigratory but may wander up and down the mountains with the changing seasons. In the small tanagers of genus *Tangara*, and many other tanagers that are paired throughout the year, the sexes are nearly or quite alike. Among tanagers that travel in small flocks in which pairs are not obvious, the female may be much duller than the male, as in the Scarlet-rumped tanager and the Yellow-rumped tanager.

Largely fruit-eating, the tanagers are probably by far the most important disseminators of tropical American trees and shrubs, as they do not digest the seeds that they swallow. Tanagers vary their diet with insects gleaned from foliage or caught in the air. Some work along horizontal limbs, bending over now on this side and now on that to pluck insects and spiders from the lower side. Species other than honeycreepers (see box) occasionally sip nectar. Summer tanagers, expert flycatchers, tear open wasps' nests to eat larvae and pupae. Gray-headed tanagers regularly accompany the mixed flocks of small birds that follow army ants to capture insects that the ants drive up from the ground litter. The Rose-breasted thrush-tanager is one of its few members that forage on the ground, flicking aside fallen leaves with its bill.

Although tanagers are nearly always monogamous, bigamy is occasional in the Blue-gray tanager and Scarlet-rumped tanager. Males of many species feed their mates. The open, cup-shaped nest, high in a tree or low in a shrub, rarely on the ground, is built by both sexes in many species, by the female only, attended by a songful partner, in others. The eggs, most often two in the tropical species, are laid early in the morning and incubated by the female alone, even when she is no less colorful than her mate. He frequently escorts her when she returns to her eggs. The incubation period varies with the form and situation of the nest. In low, open, thick-walled nests, such as those of the Scarlet-rumped and Crimson-backed tanagers, it is 12 days. In the smaller, usually higher, less conspicuous mossy nests of Silver-throated tanagers and other species of *Tangara*, it is usually 13 or 14 days. In the covered nests with a side entrance that euphonias hide in crannies, it is prolonged to 15 or 18 days.

The insides of the hatchlings' mouths are red. Nearly always, their father helps to feed them and to clean the nest, but only their mother broods. Sometimes a young Golden-masked tanager in immature plumage helps its parents to feed a later brood; and in this and other species of *Tangara*, as also in the Dusky-faced tanager three or four adults may attend one or two nestlings. The nestling period varies in the same way as the incubation period; 11 or 12 days in species with low, open nests, 14 or 15 days in those whose nests are usually higher, 19 to 24 days in the covered nests of euphonias and chlorophonias.

The 25 species of euphonias differ in many ways from other tanagers. Among the smallest tanagers, they are mostly blue-black above and often also on the throat, with yellow on the forehead and sometimes also crown, and yellow underparts. Although not brilliant songsters, many utter bright, clear notes which make them attractive pets and, unhappily, sometimes lead them to be confined in miserably small cages. In addition to insects and many kinds of fruits, they eat so many mistletoe berries that they are among the chief disseminators of these abundant parasites on tropical trees. The tiny, nearly downless nestlings are fed by regurgitation rather than directly from the bill, as is usual among tanagers. When the parents arrive together with food, the male regularly feeds them first. Spot-crowned euphonias sleep singly in snug pockets in moss, instead of roosting amid

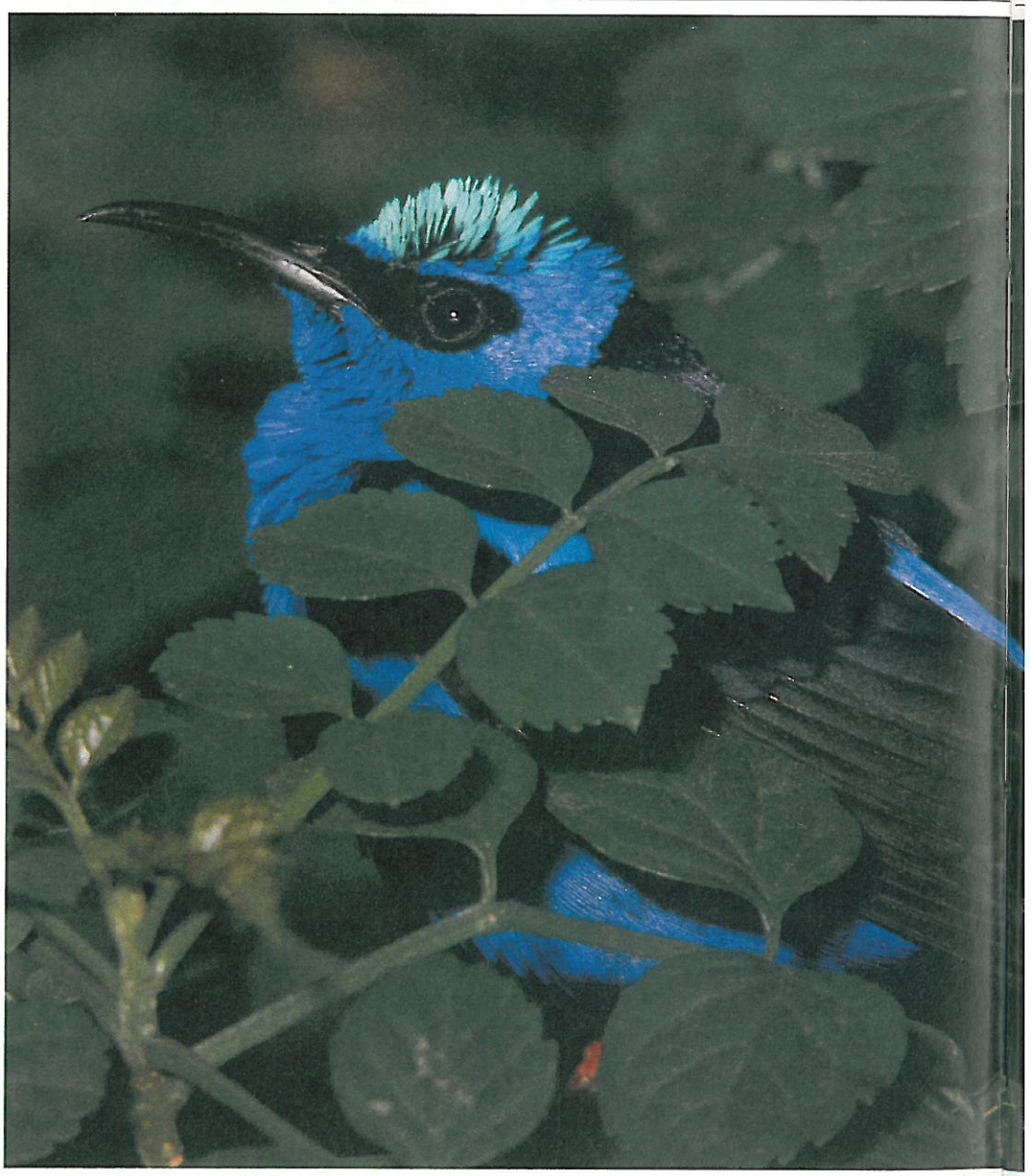
► **The cardinal.** Seen here beside Roosevelt Lake, Arizona, the cardinal may be found from the eastern and southern USA to Mexico, and is common in wood margins, hedgerows and suburbs. The more yellowish-brown female also has a crest and pink bill.

▼ **Electric breeding plumage** of the male Red-legged or Blue honeycreeper—the only tropical species of the subfamily whose males are known to shed their breeding plumage (for the green of the female). Long, downcurved bill points to its nectar staple diet, but honeycreepers take a wide range of other foods.

Honeycreepers

The 27 species of honeycreepers, dacnises, flower-piercers, and allies, here included with the tanagers, are often classified with the bananaquit (*Coereba flaveola*) in a separate family, the Coerebidae. With the exceptions of the Red-legged honeycreeper in Cuba and the orangequit of Jamaica, all are confined to the tropical American mainland and closely adjacent islands. Mostly under 14cm (5.5in) long, they wear varied plumage. Most colorful are the lowland honeycreepers, whose males are clad in blue, turquoise, purple, green, and yellow. Their bills are long and slightly downcurved in the four species of *Cyanerpes*, intermediate in the Green honeycreeper, short and sharp in the nine species of *Dacnis*. More frequently than tanagers with thicker bills, these birds probe flowers for nectar. They also eat much fruit, catch insects in the air, or pluck them from foliage; they come readily to feeders where fruit is displayed. They are almost or quite songless.

The 11 species of the less colorful but more tuneful flower-piercers of the genus *Diglossa*, attired largely in blue, cinnamon, olive, and black, prefer cooler regions where flowers abound, from the upper levels of the tropical zone to the chilly *páramos*. Their queer, uptilted bills are efficient instruments for extracting nectar from tubular flowers. The tip of the upper mandible hooks over the tube and holds it while the sharp lower mandible pierces the corolla, and the two tubes of the tongue suck out the sweet liquid. Thus, they take nectar from the flower without pollinating it. Small flying insects balance their diet. They lay two eggs in thick-walled open cups at the same time as their neighbors the hummingbirds do, at a season when few other birds are breeding. Also like hummingbirds, whose diet closely resembles theirs, they feed their nestlings by regurgitation instead of directly from the bill, like other honeycreepers. AFS



foliage like other tanagers. The chlorophonias of wet mountain forests are essentially, as their name implies, green euphonias (adorned with blue and yellow), and have quite similar habits. AFS

Among the **cardinal grosbeaks** are familiar birds of suburban gardens in temperate North America and little-known species in tropical rain forests. A favorite is the high-crested, black-throated cardinal, who wears his warm red plumage amid winter's snow. His mate is much duller. Thanks largely to people who provide seeds in winter, during the last century the cardinal has extended its breeding range from the Ohio Valley to above the Great Lakes in southern Canada. Along the USA–Mexican border, it coexists

with the equally high-crested and thick-billed pyrrhuloxia, more gray than red.

The lovely little buntings of the genus *Passerina* live chiefly in the USA and Mexico. One of the most elegant, the Painted bunting, has a blue head, yellow-green mantle, red rump and underparts, and dark wings and tail. The almost solid-blue male Indigo bunting, which nests in bushy places through much of the eastern half of the USA, wears a brownish dress much like the female's in its winter home in southern Mexico and Central America. Also highly migratory is the Rose-breasted grosbeak, which after nesting in woodland edges and similar habitats in the northeastern USA and southern Canada travels as far as Venezuela and Peru. In winter plumage, males retain enough red on their breasts to distinguish them from the browner females. Equally migratory is the dickcissel, which sings its name in open fields chiefly in the Mississippi Valley and winters as far south as Venezuela and Trinidad, in vast numbers where rice is grown, sometimes causing heavy losses. Huge numbers roost on sugarcane leaves in neighboring fields.

Among the nonmigratory tropical members of this subfamily are the Blue-black grosbeak and his brown mate, both of whom sing beautifully in rain forests and bushy clearings. They eat maize, whether in the milk or dry, but, not being gregarious, they do only slight damage to the crop. More closely confined to mid and upper levels of rain forests is the Slate-colored grosbeak, whose nearly uniformly dark bluish gray plumage contrasts with his heavy, bright red bill.

Most cardinal grosbeaks consume many insects and soft fruits as well as weed seeds and grains. More closely allied to the tanagers in their preference for fruits, although least like them in their largely grayish and olive-green plumage, often with a white eyebrow, are the dozen species of saltators, which inhabit semi-open and scrub country through much of tropical America. The widespread Buff-throated saltator is a frequent attendant at feeders where bananas are offered. Never having learned to hold food with a foot while they prepare it for eating, these birds and some of their relatives rest a fruit precariously on a horizontal branch while they bite off pieces.

The social habits of cardinal grosbeaks vary greatly. Solitary and pugnacious in the breeding season, lovely male Painted buntings may occasionally wound and even kill their adversaries. At the other extreme are Yellow-green grosbeaks, who at all seasons travel in loose flocks through rain forests and shady clearings, displaying no territorial exclusiveness. Parents feeding nestlings are joined by one or more helpers.

The cup-shaped nest is usually built by the female, but male cardinals and Blue-black grosbeaks share the task. Although in most species only the female incubates, male Rose-breasted and Black-headed grosbeaks take turns on the eggs, often singing while they sit. Male cardinals, Buff-throated saltators and Blue-black grosbeaks bring food to their incubating partners. Nearly always the father helps to feed the young, but male Painted buntings are unreliable attendants, and the polygamous male dickcissel neglects his offspring. AFS

In plumage the **swallow-tanager** resembles tanagers, but differs in its broad, flat bill and pointed, swallow-like wings. Like tanagers, they eat much fruit; like swallows, they catch many insects in flight. From warm lowlands where they live when not breeding, they ascend into the mountains of northern south America to nest at 800–1,800m (2,600–5,900ft). The female, with token assistance by an attentive mate, builds the nest. She alone incubates but both parents feed the nestlings. Highly social birds, Swallow-tanagers engage in mass displays, all simultaneously "curtseying" or bowing deeply down and up, while facing one another or perching close together.

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