

THE BEHAVIOR OF SCALE-BACKED ANTBIRDS

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Among birds that regularly capture arthropods flushed by swarms of army ants in South American forests (Willis and Oniki 1978), one of the species lowest in peck orders is the Scale-backed Antbird (*Hylophylax poecilinota*). Here I report on the specialized behavior patterns that allow it to become one of the few antbirds that persist in moderately regular ant-following despite being excluded by three-five larger species.

STUDY AREAS AND METHODS

Between 1961 and 1979, I studied Scale-backed Antbirds in forests of Guyana (Nappi Creek, Bartica), Colombia (Mitú, Tres Esquinas, Umbria, Leticia), Ecuador (Zatzayacu, Limoncocha, Yaapi, Putuimi), Peru (Cashibococha, Andoas), and Brazil (Tangará da Serra, Benjamin Constant, Carauari, Igapó-Açú, Borba, Coatá, Sucunduri, Maloquinha, Miritituba, Palhão, Barreirinha, Serra do Navio, Belém, and at Km 60 and Reserva Ducke near Manaus). At Reserva Ducke (entrance at 2°55'S, 59°59'W) I color banded 28 birds during a study conducted from July 1973 to August 1974. Reserva Ducke is partly upland (80-120 m elev.) forest on yellow soil, partly sandy, valley forest (60-100 m elev.) with palms and streams, and partly second growth and plantations for forestry experiments (Willis 1977).

I observed Scale-backed Antbirds mainly from behind swarms of army ants (mostly *Eciton burchelli* at Manaus; in other regions, *Eciton rapax* and *Labidus praedator* were regularly attended as well). Occasionally I watched this antbird away from ants, but it is not easy to detect or follow even over ants. Mist-netted birds were weighed with Pesola scales, cloacal temperatures taken with a Schultheis thermometer, and voice recordings were made at a tape speed of 19 cm/sec with a Uher 4000 Report-S. I examined 1482 specimens in museums of Europe, the United States, and South America.

TAXONOMY

Scale-backed Antbirds range up to 1700 m elev. in tropical forests from eastern Colombia and the Guianas south to Bolivia and central Brazil. The mostly allopatric subspecies often differ strikingly in plumage. Hybrids between nominate *H. p. poecilinota* and a western subspecies (*H. p. duidae*) are known from a narrow zone at Mt. Duida in southern Venezuela (Zimmer 1934). Specimens of *H. p. duidae* and *H. p. poecilinota* are reported from Itacoatiara, near Reserva Ducke, causing Pinto (1978) to conclude that the two represent separate species. Near Manaus, the form *H. p. duidae* is usually reported only west of the Rio Negro, allopatric with nominate *H. p. poecilinota*. I found only nominate *H. p. poecilinota* at Reserva Ducke and Km 60, and wonder if specimens of *H. p. duidae* supposed to be from east of the Negro are mislabeled.

Scale-backed Antbirds do not look or behave like other species of the genus *Hylophylax*, which are plump and short-tailed. Instead, they re-

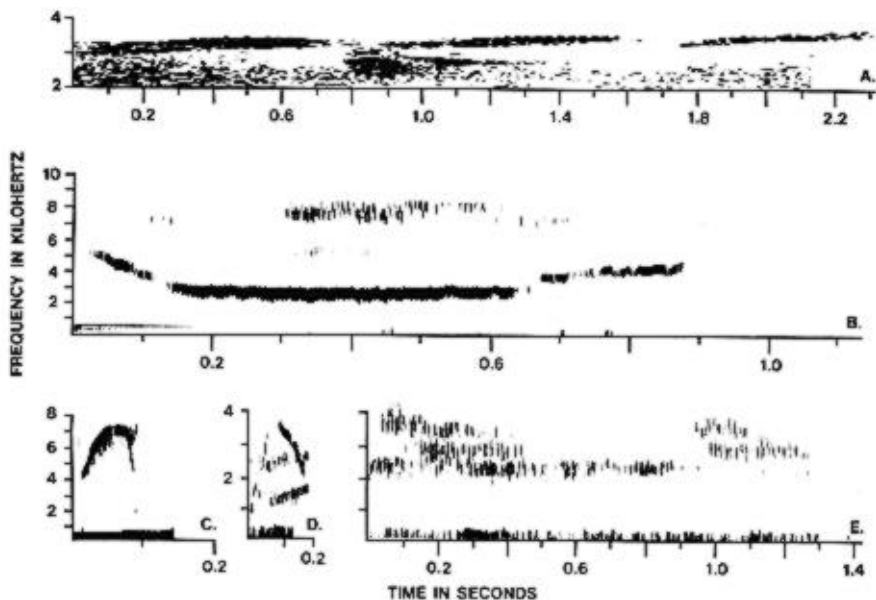


FIG. 1. Vocalizations of Scale-backed Antbirds. (A) "Song" of three notes, Manaus (narrow-band analysis); (B) "snarl" of female in the hand, Manaus; (C) "chip" of same bird; (D) "chirp" at Manaus; slightly inclined lines are background noise of other birds; (E) two faint chirrs at Manaus; band about 2.5 kHz is background noise.

semble slender swamp antbirds of the genus *Hypocnemoides*. The two genera should perhaps be combined. Birds of both genera resemble certain antwrens of the genus *Myrmotherula*: the Rufous-bellied Antwren (*M. guttata*) and the Plain-throated Antwren (*M. hauxwelli*) in morphology and behavior.

VOCALIZATIONS

The vocalizations of scale-backs are for the most part inconspicuous, in keeping with their generally unobtrusive behavior. Eleven types of sounds were detected.

Singing.—The song is a slow and inconspicuous series of a few faint, quavering whistles, which can be transliterated as *treeeeees*, *treeeees*, *treeees* (Fig. 1A). Whistles are successively shorter and higher in pitch; often the first few whistles are faint and buzzy. "Faintsongs" are faint versions or variants of the normal song, some of them double-noted (*bee tipee tipee*) as in Spotted Antbirds (*Hylophylax naevioides*). Often faintsongs alternate with series of chirping notes as a "serpentine song" when calling for young or for a mate.

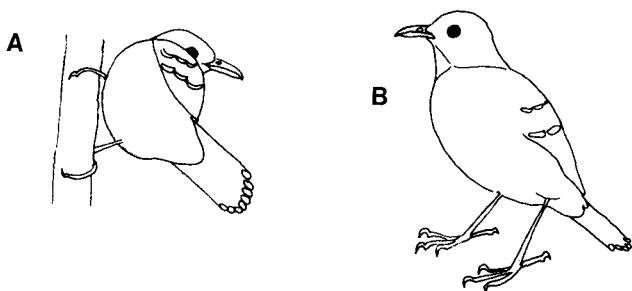


FIG. 2. Foraging postures of Scale-backed Antbirds, from field sketches. (A) Horizontal on vertical sapling, tail somewhat raised; (B) waiting on ground after prey ran under leaves.

Chirring.—A faint buzzy rattle, *chiiiiiiih*, is a common response to humans and other mammals (Fig. 1E).

Chipping.—Fleeing or fighting birds give loud *wreep* (Fig. 1C) notes (like an Acadian Flycatcher [*Empidonax virescens*]) north of the Amazon and south to the Ucayali in Peru (Cashibococha). Eastward, south of the Amazon, the call is sometimes double; and birds of the eastern subspecies (*H. p. nigrigula* and *H. p. vidua*) give a triple, high-pitched *sit-sit-sit* instead of the single-noted chip.

Growling.—During disputes, rough rising notes are commonly given two or three times: *zhaihh'eet zhaihheet*.

Snarling.—A faint *wrieeeh* sound is given toward a rival or when the bird is held in the hand (Fig. 1B).

Whimpering.—Subordinate birds give a series of three to four faint notes, *pseeh eeh eeh*.

Snapping.—The beak is snapped one to three times in supplantings.

Chirping.—Soft *peup* notes (Fig. 1D) are exchanged between mates, and parents and young, and other birds that are not fighting.

Chuttering.—A buzzy rustling, *ruh-uh-uh-uh-uh-uh-uh*, was noted at Miritituba (form *H. p. nigrigula*) when a male fed a female. A similar but high-pitched twitter was noted during feedings at Manaus.

Peepsinging.—Young birds (heard at Manaus, Cashibococha) give a loud, hawk-like *treeeee treeeeeh treeeeh* at one pitch, without quavering; at times the sound is faint or includes as many as 10 notes.

Squeaking.—Young being fed give the usual avian *chiaahhh* noises.

ALARM BEHAVIOR

Scale-backed Antbirds are inconspicuous birds that stay on one perch for long periods of time or fly rapidly and stop abruptly; they probably escape predators in large part because of these foraging patterns. Specific

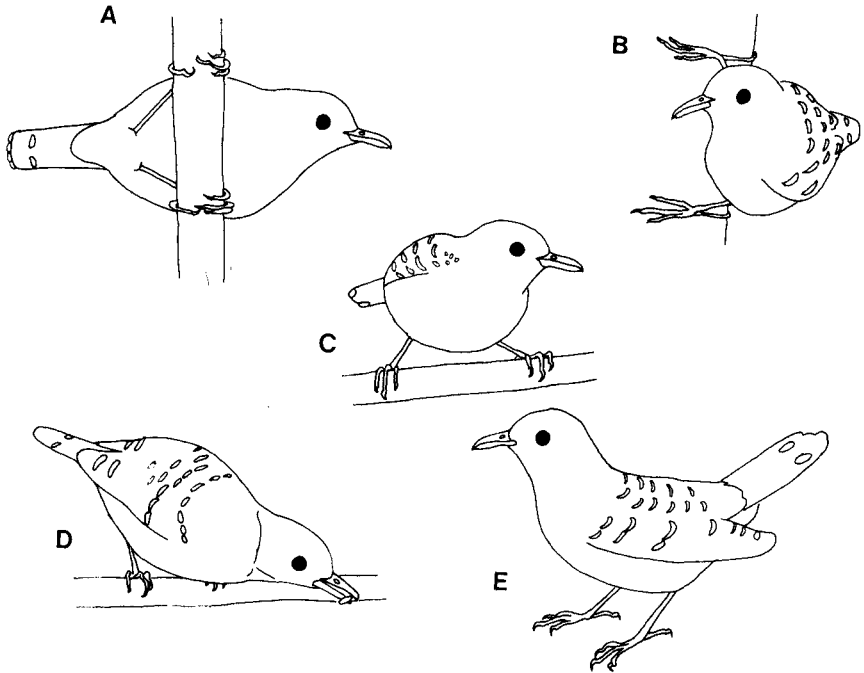


FIG. 3. Foraging and alarm postures of Scale-backed Antbirds. (A) Horizontal on vertical sapling. (B) Same, in front view, showing toe positions. (C) Crouched, freezing. (D) Head-down posture in eating prey. (E) Tail-up posture in hollow in leaf litter, waiting for prey.

responses to predators seem similar to those of related antbirds: freezing, fleeing, mobbing, struggling (in the hand), and habituation (tameness).

Freezing.—Normal foraging postures, straight and horizontal, like a study skin (Figs. 2, 3), involve so little movement (slight turning of the head or an occasional jump to a mirror-image pose) that they are essentially freezing. “Keening,” the faint call of related antbirds during freezing, is not known from this species but may occur; it is a difficult call to detect in any species. One Scale-backed Antbird (Fig. 3C) crouched at the alarm chip of a Black-headed Antbird (*Percnostola rufifrons*).

Fleeing.—At the threat of close danger, Scale-backed Antbirds “chip” and flee abruptly, generally to dense cover in a treefall or to saplings growing up around the treefall. The chipping call seems to float in the dark undergrowth like ink behind a squid, and may be equally misleading to a predator. In the presence of moderate danger, such as a slowly moving human, the bird is likely to dart either a short distance away or behind a tree trunk and freeze. In response to less danger, such as a quiet observer

nearby, the bird sometimes flicks the tail upward slightly, to 20 or 30° above the line of the body, and slowly lets it drop to near the line of the body or slightly below. At times the tail remains upward for some time, as in aggressive behavior. The wings may flit outward slightly every few seconds, whether or not the bird is flicking its tail at long intervals. Sudden "about-faces" to mirror-image poses were recorded when a leaf fell and after minor movements of the observer. None of the movements are conspicuous. Chipping and fleeing was the response observed given to Barred Forest-Falcons (*Micrastur ruficollis*) twice, to alarm notes of Rufous-throated Antbirds (*Gymnopithys rufigula*) once, to release from the hand, to a downward glide of a Red-billed Woodcreeper (*Hylexetastes perrotti*), to a jump of a squirrel (*Sciurus*), and to a falling leaf. Chipping alone was recorded to the forest-falcons three times and twice during capture of insects at the unusual height of 5 m above the ground. Flight without chipping was recorded twice in response to my presence and once to the alarm note of a Red-necked Woodpecker (*Campephilus rubricollis*). Chipping caused alarm in other species at times (*G. rufigula* twice, Lunulated Antbird [*G. lunulata*] once, Bare-eyed Antbird [*Rhegmatorhina gymnops*] once, and White-chinned Woodcreeper [*Dendrocincla merula*] once).

Mobbing.—A "chirring" buzz, accompanied by slight upward movements of head and wings or tail, is a moderately frequent reaction to an observer or to *chirrs* of other antbirds. The faint sound is seldom repeated more than a few times before the bird resumes foraging or flees.

Struggling.—In the hand or mist net, this antbird occasionally "snarls" and struggles or pecks one's finger.

Taming.—Individuals watched more than a few minutes became quite tame, but were difficult to follow because of their normal elusive foraging movements to other parts of ant swarms. I often heard this antbird without seeing it despite several hours of observation. In part, this occurred because I watched the swarm center, where many species dominant to the scale-back occur, whereas it wandered peripheral to the center most of the time. Moreover, individuals are territorial and hence seldom saw me more than a few days as the ant colony passed through their areas; they could not become accustomed to me over several weeks as did birds that followed the ants wherever they and I wandered.

FORAGING BEHAVIOR

Scale-backs usually cling quietly and horizontally (Figs. 2, 3) to slender or thick saplings low (Table 1) in the understory of forest or second growth, dart quickly for any small prey that appears on the ground or on low foliage, and flee rapidly with prey unless it is swallowed immediately. Quiet, gray ghosts of the understory, scale-backs seem to appear and

TABLE 1
HEIGHTS OF PERCHES OF SCALE-BACKED ANTBIRDS

Height (m)	Over ants (%) N = 417	Before prey (%) N = 55
0 (ground)	1.6	—
0.1	4.8	20
0.2	13.7	24
0.3	13.7	15
0.4	13.4	11
0.5	13.4	7
0.6	10.1	7
0.7	6.2	—
0.8	5.5	7
0.9	1.0	—
1.0	3.4	—
2	11.0	5
3	1.0	2
4	1.2	2

disappear as if by magic; and they wander around the distant edges of ant swarms whenever large antbirds are present. All of these patterns could serve to reduce predation, but may also be adaptations to avoid being detected by larger competitors. Scale-backs occasionally forage in open undergrowth, where many of their larger and more conspicuous relatives show alarm behavior even when no predator is present. Use of thick saplings, otherwise occupied mainly by vertically-perching woodcreepers, differentiates the Scale-backed Antbird from other crosswise-perching antbirds. Its unusually long claws and toes, plus light body weight, allow it to perch crosswise on upright trunks over 4 cm diameter (Table 2). Other antbirds perch on large trunks mainly if the perch angle is under 45° from the horizontal, and slip or flutter even in brief attempts to perch on vertical thick trunks. Thirty-seven of 45 *H. poecilinota* perches over 4 cm diameter were over 45° angle, which is a ratio like that for perches of any diameter (318/383); one vertical perch was 35 cm diameter.

Scale-backs sometimes arrive at dawn at army ant colonies, chipping occasionally as they dart to perches nearby and then circle ahead of the ants. Others, following lines of ants past the observer to the swarm, arrive late in the day. At times, birds search and sing near areas where ants had been active the previous day. They regularly visit stately (Willis and Oniki 1978) colonies of ants, which are poorly attended by large antbirds because stately colonies do not swarm every day. These behavior patterns are characteristic of regular ant followers. I think that individual *H. poecili-*

TABLE 2
PERCH ANGLES AND DIAMETERS FOR SCALE-BACKED ANT BIRDS

Angle (°)	Over ants (%) N = 383	Before prey (%) N = 55	Diameter (cm)	Over ants (%) N = 357	Before prey (%) N = 52
0-20	10.2	13	0-1	33.6	46
21-40	5.7	7	2	38.4	37
41-60	4.2	6	3	13.7	6
61-80	9.9	14	4	5.0	8
81-100	69.5	58	5	2.2	—
101-120	0.5	2	6-15	6.4 ^a	4
—	—	—	16-25	0.3	—
—	—	—	26-50	0.3	—

^a 2.5% between 5.1 and 6.0 cm.

nota normally follow any army ants in their territories, but regularly forage away from ants when no ants are available. Wandering immatures probably follow ants even more regularly than do settled adults.

Birds waiting over ants or near them sit patiently up to 7 min, turning the head rarely. Now and then the closed tail twitches sidewise rapidly, or is lowered and then flicked upward. They pivot around their perches or reverse on them at times. Sidestepping crosswise down a perch before a prey attempt was recorded once. Movement of distant prey sometimes prompts a bird to fly to and watch from a perch above where the prey had hidden under the leaf litter. At long intervals there is a rapid flight to a more or less distant perch, occasionally to a perch near a large bird that is capturing prey. At Manaus, perches ahead of ants were used more (N = 291) than perches behind ants (N = 69); left (N = 158) and right (N = 148) ends of the swarms were used more than swarm centers (N = 16). They frequently (N = 41) used small branch raids, where there were few dominant antbird species. Treefalls (N = 14) and dense undergrowth (N = 12) were visited, as well as open understory (N = 6).

Over or near army ants, a quick sally to the ground and back to a perch is the most common foraging pattern (Table 3), as in most ant-following birds. Eight of 12 sallies were under 0.5 m from the perch; only two were 1.3-1.5 m off. Often the bird misses prey even on short sallies to the ground. Pecking an arthropod off the ground is fairly common, as is standing on the ground with tail up to toss leaves and peck any prey uncovered (Fig. 3E). Both grasping a leaf in the bill to toss it and nudging leaves aside with swipes of the bill were observed. Once a leaf-tossing bird pecked a tiny prey, then tossed more leaves and got a large prey. Occasionally a bird flies to the ground and waits before pecking prey or tossing leaves

TABLE 3
PLACES AND METHODS OF FORAGING: SCALE-BACKED ANTBIRDS OVER ANTS

Place	Method (% of N = 213)		
	Sally	Clean	Toss
Ground	69.0	7.0	3.8
Trunk, log	1.4	0.5	—
Liana	0.9	0.5	—
Stem	—	4.7	—
Foliage	7.0	1.4	—
Debris	0.5	—	—
Air	0.5	0.5	—
Unknown	2.3	—	—

(Fig. 2B) or even waits in a cavity among the litter. The scaled pattern may resemble leaf litter and conceal such waiting birds from predators or competitors. Pecking prey is also inconspicuous, involving sudden rotation downward and back from a vertical perch but then quiet eating (Fig. 3D) or waiting. Short sallies to leaves, lianas, trunks, or debris above the ground are conspicuous only briefly. Pecking at lianas sometimes involves rapid pecking at ants fleeing with larvae from a nest; larvae are eaten but worker ants tossed away.

Prey items recorded at Manaus included ant larvae, roaches, a spider, a centipede, a grasshopper, and a gecko. The largest items were about twice the length of the exposed bill, or about 3 cm long (Table 4). At other

TABLE 4
PREY AND PREY SIZES: SCALE-BACKED ANTBIRDS OVER ANTS

Prey	Number prey of given size (mm)			
	0-10	11-20	21-30	41-50
Spider	—	(1) ^a	1	—
Centipede	—	—	1	—
Roach	(1)	1	1 (2)	—
Katydid	—	—	1 (1)	—
Caterpillar	—	—	—	(1)
Ant, larva	10 (1)	1	—	—
winged	(2)	—	—	—
Gecko	—	—	1	—
Unknown	2 (2)	3 (3)	2	—

^a Records at localities other than Manaus in parentheses.

localities, similar prey were recorded, plus several winged ants and a caterpillar about 4.5 cm long.

Scale-backs rarely flail or eat large prey near the capture sites. They normally flee several meters away, at times taking prey to the ground to dissect. Larger competitors, attracted by prey captures, often supplant birds that do stay after a conspicuous capture. Legs of large prey are often eaten first. Scale-backed Antbirds at times angle downward on a vertical perch to crush and shake small prey before eating.

In southeastern Colombia to Peru (Cashibococha), I often noted these antbirds moving as much as 8 m above the ground near ant probes up trees. In such wet or disturbed forests, there are enough vines and other foliage above the ground that the antbirds can use the zone, whereas at Manaus there is little vegetation 4–8 m up. Also, there are more competing low-foraging species of antbirds along much of the western edge of Amazonia, notably Lunulated Antbirds at Cashibococha.

Away from army ants, scale-backs wander near treefalls or dense undergrowth, taking perches like those used when above ants, then dropping to the ground for prey. Since I saw many individuals away from ants, even though they are hard to detect, I doubt that the species gets even half its food over ants.

COMPETITIVE BEHAVIOR

Most competitive interactions were intraspecific (Table 5), but this was mainly because this species avoids places where other antbirds congregate. Supplanting by larger birds mainly results in a chip of alarm and flight; no aggressive display was noted to other species. However, 18-g Scale-backed Antbirds should dominate 13-g Spot-backed Antbirds (*Hypophylax naevia*), which (unlike the very closely related 17-g Spotted Antbird west of the Andes) seldom follow ants persistently.

At localities away from Manaus, species recorded attacking Scale-backed Antbirds included Lunulated Antbirds (five supplantings, three displacements) at Cashibococha (Willis 1968), Sooty Antbirds (*Myrmeciza fortis*) (four supplantings), White-plumed Antbirds (*Pithys albifrons*) (two supplantings, one displacing), White-cheeked Antbird (*Gymnophrys leucaspis*), Salvin's Antbird (*G. salvini*), White-breasted Antbird (*Rhegmatorhina hoffmannsi*), and the Crested Antbird (*R. cristata*) (one supplanting each). Twelve intraspecific supplantings were recorded in the same sets of observations. The rather frequent supplantings by Lunulated Antbirds are interesting, because females of that species have a scaled pattern above. Both *G. lunulata* and *G. salvini* forage somewhat like *H. poecilinota*.

Intraspecific competitive behavior is based on resident pairs and fairly strict territoriality. Wandering immatures and other birds are chased about

TABLE 5
COMPETITIVE INTERACTIONS OF SCALE-BACKED ANTBERDS AND OTHER BIRDS AT MANAUS

Species	Supplant	Displace	Return	Ignore
<i>Hylophylax poecilinota</i>	67	—	—	—
<i>Gymnopithys rufigula</i>	/3 ^a	/5	1	—
<i>Pithys albifrons</i>	/4	/3	—	—
<i>Percnostola rufifrons</i>	/1	/1	—	—
<i>Dendrocincla merula</i>	—	/1	1	—
<i>D. fuliginosa</i> (Plain-brown Woodcreeper)	/1	—	—	—
<i>Hylexetastes perrotti</i>	—	/1	—	—
<i>Myrmeciza ferruginea</i> (Ferruginous-backed Antbird)	—	—	—	1
<i>Conopophaga aurita</i> (Chestnut-belted Gnateater)	—	/1	—	—
<i>Attila spadiceus</i> (Bright-rumped Attila)	—	/1	—	—

* Records below diagonal are of attacks on *H. poecilinota* by another species.

and threatened repeatedly. Chases often bring chipping notes, usually from the aggressor, as a subordinate bird whimpers or pivots backward and forward indecisively before fleeing. Other than whimpering, submissive behavior is not conspicuous: the closed tail is lowered, the head feathers are slightly ruffed, and the bird flees rapidly from one perch to another 10–50 m apart. Young or wandering subordinate birds commonly circle about an ant swarm despite chases, but trespassing neighbors are likely to go to a different swarm fork or to leave.

Aggressive behavior is well developed, but inconspicuous and hard to follow. The closed tail is often raised to 30° above the line of the body, showing the pale undertail coverts (Fig. 4A). At times, an upwardly pointed bill displays the pale throat of some races or a dark throat in others. The bird sometimes snarls before flying at an opponent, or snaps its bill as it chases another. Strong threats between evenly matched birds commonly include rather loud “growls.” The sleeked head is jerked up with each growl note (Fig. 4B). Some races have white bases to some dorsal feathers, and these bases are probably displayed by back-fluffing in threat display. I did not see strong forms of threat, for it was difficult to follow birds as they moved rapidly during disputes; fluffed-bodied or spread-winged types of threat are likely to occur as in most related species.

Songs seem faint, and are mostly used between mates, but often follow or precede territorial disputes. I doubt that any but the loudest songs are audible across a normal territory, but the birds may detect their own

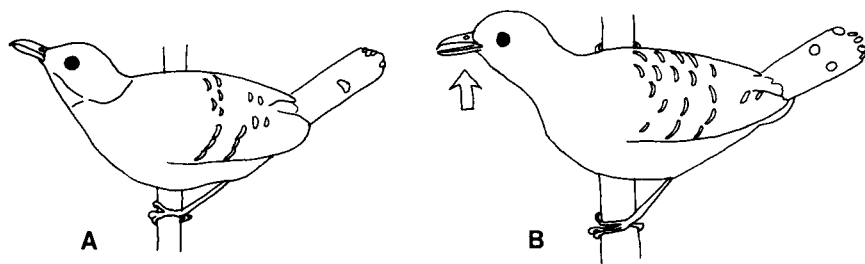


FIG. 4. Aggressive posture of Scale-backed Antbirds. (A) Head-up tail-up posture. (B) Head jerking during snarling.

sounds better than I did. Songs are as rare at dawn as during the day throughout the year.

REPRODUCTIVE BEHAVIOR

Pairs of Scale-backed Antbirds wander separately around swarms of ants if other dominant birds are present, but associate loosely away from competitors or away from ants. Often one does not see both birds at first, but occasional chirping or faintsong exchanges show that the mate is somewhere near. (One male kept chirping and singing to a female that took me 1 h to see.) Distant mates give fairly loud songs and move together. One female supplanted her mate.

As in most antbirds, males feed females. The male, prey in bill, faint-sings or serpentine-sings until the female flies up or responds, then flies to her and gives her the food. Usually there is a *chuttering* sound. The female normally flees with prey, dissecting it on the ground at times; the male chirps or faint-sings and returns to foraging. Occasionally the female stays near the male and, her head down, chews the prey. Presumably, as in related antbirds, copulation occasionally follows the last type of feeding.

One male at Miritituba serpentine-sang between the buttresses of a small tree, pecking at the ground and flicking his tail as if showing a nest-site to his nearby mate, after feeding her several times. (Such nest-showing behavior by males occurs in several antbird species [Willis 1967, 1972]). He ignored a nearby seedling. Pinto (1953) recorded a ground nest and two eggs, found by C. Estevão next to a tree trunk at Orá near Belém on 2 December 1924; the male was incubating. Snethlage (1935) found a nest in a low stub that contained two reddish-violet eggs with dark streaks and flecks.

Several well-grown young birds were banded out of the nest at Manaus between early November and early December 1973 (two broods) and from early June–late July 1974 (four broods). When separated from their par-

ents, the fledglings have “peep-singing” calls that are often very loud, so much so that I thought them calls of some hawk at first. One such young circled about when I tried to chase it, staying near the dense undergrowth in which the parent had presumably left it. Young following their parents peep faintly, like crickets. The male cares for one young and the female for the other whenever there are two young. One parent sometimes supplants the young of the other. A parent with food utters chirps or serpentine-songs and feeds the squeaking young. Young follow adults for at least 1 month (3 December–1 January in one case) and probably longer. All banded young had tails as long as those of adults and thus (judging from normal growth rates in antbirds) were at least 2 weeks out of the nest when discovered, so that care of fledglings lasts at least 6 weeks.

Young never stayed with their parents after independence. Banded young males wandered, often following army ants, in limited areas. One settled and found a mate in the same general area where banded (male GYRO, Fig. 5).

Nesting apparently occurs throughout the year except in central Venezuela (see below), as specimens of young males in similar stages of molt have been taken throughout the year in most regions. From the limited data, it seems possible that there are two nesting seasons a year at Manaus, as is characteristic of Black-headed Antbirds there (Willis, in press).

MOLT AND MAINTENANCE BEHAVIOR

Young change from a dusky head and body plumage into a plumage like that of the adult female while still with their parents. The crown and chest regions of the brownish-dusky young birds tend to be especially dark, and the belly is usually downy gray. The tail feathers have white tips and black subterminal bands as in the adult female (as do some mantle feathers in subspecies in which the female is scaled above). Museum specimens in juvenal plumage include two that have short tails (a female from Borba, 15 February 1930, AMNH 279540; a male from Tome-Açú, 29 September 1965, Museu Goeldi 26176), three that are dark with little evidence of molt to the female plumage (unsexed birds from Peixe-Boi, 16 May 1908, Museu Goeldi 5797 and 9 May 1910, Munich 10–1138; a male from Tucunaré, 12 December 1908, Frankfurt 38–815), and three that are molting into the orange head feathers of the female plumage (males from São Paulo de Olivença, 27 February and 1 March 1923, Carnegie 95594 and 95626; male from Mt. Duida, 1 April 1913, AMNH 120708). Young birds at Manaus seemed more scaled above than the adult female, but this character needs to be checked.

An unknown number of months after independence, young males change to the plumage of the adult male by an obvious molt that includes the wing

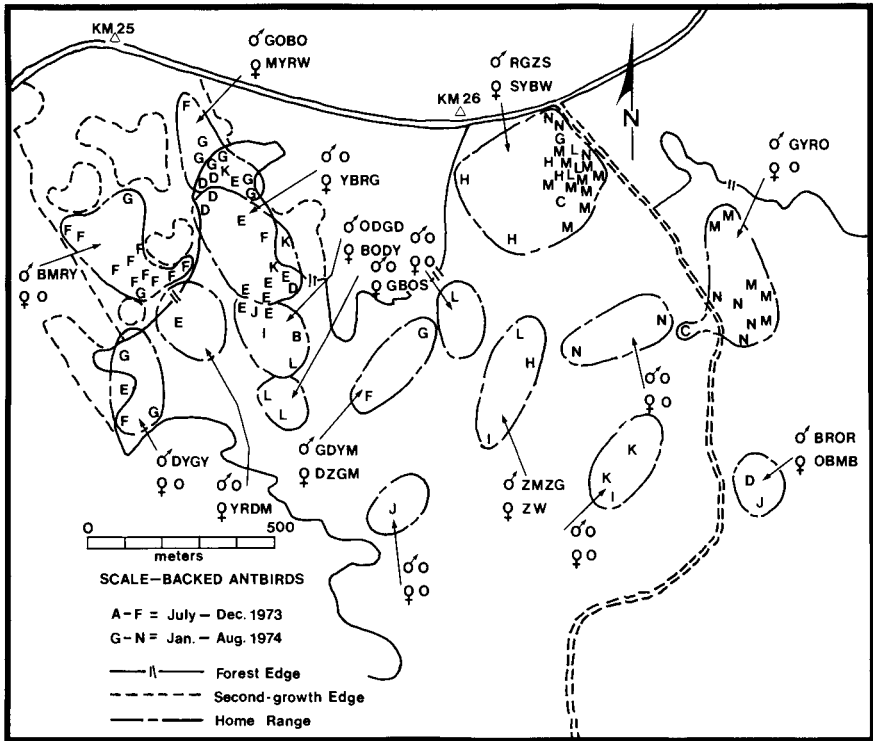


FIG. 5. Ranges of Scale-backed Antbirds near the entrance of Reserva Ducke in 1973-74. Banded birds have four-letter designations, unbanded birds are marked "O."

and tail feathers. Scattered blue-gray feathers appear on chest and head, then white-tipped ones replace rust-tipped or brown ones across the back and wings. Center tail feathers and new inner primaries are only replaced well after the start of body molt, so that the young male is very mottled by the time primary number three or four is being replaced. A few brown or orange feathers of the immature plumage sometimes remain after the outer remiges and rectrices have been replaced, however.

Unfortunately, I was unable to follow young birds to determine if young females undergo such molt or at what age the young males undergo molt. One young male, independent and in female plumage 15 September-28 October, was in full male plumage 9 July. Another, with scattered blue feathers and inner tertials 10 September, was nearly in adult plumage 25 November. Probably he started molt in late August and finished in December, 4 months later. Venezuelan specimens of young males in early molt were taken from August to February and ones in late molt from

January to May, suggesting that about 4–5 months are required for wing molt. Venezuelan birds probably nest in the rainy season, March to October, and young males are in adult plumage by the next nesting season. If so, they would keep the female plumage until about 6–8 months out of the nest and finish molt by the time they are 12 months out of the nest. Black-headed Antbirds, another antbird where young males are like females, have that type of molt schedule at Manaus (Willis, in press).

At Manaus, several adults were in molt between August and January. One banded adult female, ending molt (primaries 9 and 10 in molt) in early October, was at nearly the same stage of molt (primary 10 in molt) in mid-January. She then had young out of the nest by 15 July, and had not started molt by 27 July. Unless molt is rapid, taking fewer than the 4 months common among tropical antbirds, she must have arrested her molt in late 1973 (perhaps to attempt a nesting?) and delayed her molt in 1974 until the young were relatively independent. No birds with dependent young out of the nest were in molt, suggesting that molt does not overlap nesting or care of fledglings (unless arrested molt does so). Specimens in or not in molt date from all months of the year; there is no season of molt evident even in Venezuelan specimens.

Preening birds often sit and fluff out their body feathers; dense cover away from the ants is preferred. A few records (7–9) range to 0.7 m and up, 5 cm diameter, and 35° perch angle, suggesting that high and vertical perches are not used for preening. The head is scratched over the wing or wiped on the side of the perch. A full left stretch (wing, leg, and half the tail) interrupted one preening session.

SPATIAL BEHAVIOR

I have seen Scale-backed Antbirds mainly in the shady understory of upland forests and nearby tall second growth, or in the dense rows of forest plantations. At Belém, they usually avoided flooded forests (várzeas), but at Maloquinha and Carauarí I found them in várzea edges. They forage in relatively open understory, near dense cover.

Ranges of pairs overlapped little, although birds sometimes wandered undetected on each others' areas or followed large ant swarms into each others' areas (Fig. 5). Normally only one bird or pair, rarely a pair and a wandering bird, or one or two young, followed a given ant colony (Table 6).

Two territories in tall second growth had centers about 300 m apart, but several territories in the nearby forest had centers 200–300 m apart. There were 13 or 14 territories in the mature-forested northwestern 106 ha of the study area at Manaus, or about 8.2 ha per pair. Within the 106 ha there were at least 10 wandering immatures. Based on a mean body

TABLE 6
 SWARMS OF *ECITON BURCHELLI* (FORMICIDAE) WITH GIVEN NUMBERS OF SCALE-BACKED ANTBIRDS

Month	No. of swarms with given no. of birds				
	0	1	2	3	4
July 1973	13	4	2	—	—
August	41	10	6	—	—
September	60	19	1	—	—
October	33	14	12	—	—
November	50	17	10	2	1
December	31	15	12	2	4
January 1974	40	23	8	—	—
February	37	18	3	—	—
March	37	11	2	—	—
April	53	12	3	—	—
May	36	20	3	1	—
June	30	16	9	1	1
July	24	10	17	1	—
August	15	8	10	1	—

weight of 17.9 g (15.7–19.4, N = 21) per individual at Manaus, biomass would have been approximately 4.6 g/ha for residents and 1.7 g/ha for wandering birds, or a total of 6.3 g/ha. Some of the forested area seemed not to be used by Scale-backed Antbirds, although more observation perhaps would have shown use; if some of the forest was unsuitable, density in suitable forest would have been higher than calculated above.

DISCUSSION

The foraging style of Scale-backed Antbirds differs from the styles of other ant-following birds, adding yet more diversity to that already noted among subordinate species over ants (Willis and Oniki 1978). This species is the lowest bird in ant-following hierarchies in most Amazonian localities; only species that follow ants casually are subordinate to it. The perching methods of Scale-backed Antbirds (quiet waiting on vertical perches at some distance from ants) and their silent and inconspicuous movements must help them to forage where most competitors are larger and more dominant.

Molt and breeding probably alternate and occupy much of the year, a situation permitted by the relatively nonseasonal climates of equatorial forests. It is likely that populations in central Venezuela may breed mainly in the northern summer and ones from Mato Grosso mainly in the southern

summer, but most birds probably breed two or more times a year. Two breeding seasons, one in the southern spring and one in the northern spring to summer, are suspected for Black-headed and Scale-backed antbirds at Manaus.

SUMMARY

Scale-backed Antbirds (*Hylophylax poecilinota*) are 18-g birds that follow swarms of army ants for flushed prey near the ground in South American lowland forests. They evade larger ant-following species partly by being quiet and inconspicuous or immobile for long periods; they also cling to larger vertical perches in more open understorey than do large antbirds; and they wander at the margins of ant swarms or leave the ants when many large birds are present. Horizontal postures and long toes allow them to cling to large trunks. At Manaus, Brazil, pairs occupy territories of about 8.2 ha and chase trespassing immatures or neighbors. Dusky young remain with parents at least 6 weeks after leaving the nest, while undergoing body molt to a plumage like that of the adult female. Young males later molt to a plumage like that of the adult male. Breeding and molt occur all year, but are not known to overlap in an individual bird. There may be two breeding seasons per year at Manaus.

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