

## LIFE HISTORY OF THE CHESTNUT-TAILED AUTOMOLUS

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The ovenbirds (Furnariidae) comprise a large family of small or middle-sized passeriform birds consisting of well over 200 species, all of which are restricted to continental areas of the Americas. The group is best represented in South America, and particularly in its more southerly portions; numerous species occur in the south temperate regions of Argentina and Brazil. Relatively few are found north of the Isthmus of Panamá and not one reaches the United States. Of all the avian families of the Western Hemisphere, this is perhaps the most heterogeneous in external form, habits, and nidification. Perhaps the greatest uniformity among its multitudinous species is in plumage, brown in many shades and tones being the prevalent color. However, gray and slate-color are prominent in some genera, and in many species bright chestnut, rufous, or cinnamon relieve the duller hues. Although this family occupies an important position in the Neotropical avifauna, we know little about its mode of reproduction. The concealment of the eggs in burrows, cavities in trees, or elaborate closed nests of clay, sticks or other materials, the virtual impossibility of distinguishing the sexes by either appearance or voice and the retiring habits of most species all combine to make the study of nest life a difficult undertaking. Our best single source of information on the nesting of the ovenbirds is W. H. Hudson's "Birds of La Plata" (1920). But Hudson's delightful accounts, based upon observations made in Argentina nearly a century ago, fail to throw light on many points which we expect to find treated in modern life-history studies. Some years ago I published a short account of the life history of the Rufous-breasted Castlebuilder (*Synallaxis erythrothorax*) of northern Central America (Skutch, 1947). The present paper is a small contribution toward filling the tremendous gap in our knowledge of this fascinating group of birds.

## APPEARANCE, HABITS, AND FOOD

Like so many members of the ovenbird family, the Chestnut-tailed Automolus (*Automolus ochrolaemus*) is clad in shades of brown, with no bright spectral colors to facilitate its recognition in the dim light of the tropical forest. The dorsal plumage of this rather large ovenbird is dark olive-brown, brightening to chestnut on rump and tail, and to russet-brown on the wings. Its ventral plumage is buffy-brown, paling to creamy-buff on the throat, the feathers of which are somewhat puffed out and conspicuous. There are indistinct light streaks on the chest. The blackish bill is moderately long and fairly stout. The sexes are alike in appearance. The species ranges from southern México to northern Bolivia, Brazil, and the Guianas, and many geographic races are recognized. The present study was made within the range ascribed to the race *exsertus*. In Central America the species is found throughout the Caribbean lowlands, and on the Pacific side from the Gulf of Nicoya, Costa Rica, southward. Here it extends to elevations at least 3500 feet above sea-level.

In the basin of El General on the Pacific side of southern Costa Rica, where my observations were made, the Chestnut-tailed Automolus is a fairly common bird of the heavy forests. Although numerous, it is shy, remains well concealed by the foliage, and is not easy to watch. One must become familiar with its voice in order to realize how abundant it is. Its most usual call is a loud, harsh, slow, long-continued rattle. This is uttered incessantly in the early dawn, when the birds first awaken, and again as the shades of night begin to fill the forest. Strong and far-carrying, sounding from every side, this call proclaims the presence of the bird in fair numbers. During the hours of

full daylight it is only infrequently voiced. The members of a pair keep in contact with each other by means of much lower, throaty notes. So far as I can discover from observation of birds so skillful in remaining concealed, the automoluses roam through the forest in pairs. Often they are in company with other small birds of the lower stories of the woodland, including antbirds, ant-tanagers and, at higher elevations, Stripe-crowned Warblers (*Basileuterus culicivorus*).

The automoluses hunt their food chiefly among curled or clustered dead leaves, sometimes those lodged in the undergrowth near the ground, sometimes those caught among the vine-tangles or the boughs of taller trees well up in the air, but apparently never in the high canopy of the forest. They are adept at clinging in an inverted position, or in any other orientation the situation may require, while they assiduously probe the folds of the leaves with their strong bills. The dead foliage of the prostrate crown of a great fallen tree is a fertile hunting ground for them. When disturbed by man, they sidle up ascending branches with frequent about-faces, nervously twitching their bright reddish-brown wings and voicing their harsh notes, then promptly dart away and vanish amid the underwood.

One day while I sat in a blind amid the forest, watching an antbird's nest, an automolus foraged in front of me. It investigated the concavities of the curled brown leaves of a small dead tree, sometimes hanging head downward to reach them. Evidently in the course of this search an insect fell from a leaf to the ground, for the bird dropped down and hopped about on the ground-litter, flicking the leaves aside with its bill in the manner of an Ovenbird (*Seiurus aurocapillus*) or an ant-thrush. So far as I could tell, it was unsuccessful in retrieving the refugee, and soon ascended, climbing sideways up the slender trunk, to continue to hunt insects and spiders among the coiled leaves hanging on the tree. From time to time it voiced its loud rattle.

Like many forest birds, the automolus may venture forth into thickets or shady plantations at no great distance from the forest edge, making these short excursions chiefly in the dim light of early morning or after sunset, or in gloomy weather. Some years ago, I used to see one or two of these birds, especially at eventide, in a small banana plantation adjoining the forest. Here they hunted among the brown, dry leaves which thickly draped the trunks of the neglected banana plants. As they investigated the long, curling segments of the wind-torn foliage, they usually clung sideways to the thick midribs, nervously twitching their wings, and again and again repeating their loud, harsh notes. Restless creatures, they never lingered long in one spot.

#### THE NEST

In fifteen years among the forests where the Chestnut-tailed Automolus dwells, I have found only three of its nests, all in burrows in the earth. On the morning of March 26, 1939, while loitering along the Quebrada de las Vueltas in the valley of El General, a brown bird chanced to catch my eye as it flew out from the bank. Going to examine the part of the bank whence it seemed to come, I discovered a straight burrow, 26 inches long, the mouth of which was screened and rendered inconspicuous by the foliage of a slender creeper hanging before it. Even then there was no sign of the tunnel's having been freshly dug, and neither eggs nor material for fashioning a nest were to be seen within it. The nearly vertical clay bank was at this point 40 inches high, and the burrow was situated near its top. The stream which washed its foot flowed sluggishly along a narrow and extremely tortuous channel, bordered on one side by a high, fairly open thicket, on the other, beyond a fringing tangle of bushes and vines, by a small coffee plantation, shaded by trees of mango and *Inga*. But after passing the next sharp bend,

at no great distance from the burrow, the stream flowed along the base of a hillside covered with primary forest.

In the following days, I made repeated visits to this burrow, for I surmised that the still unidentified brown bird would nest in it. A few slender, brown bits of vegetation, apparently petioles, were deposited near the inner end of the tunnel; but since their number did not seem to increase, and I never again saw the brown bird near the burrow, I little by little lost interest in it, and for a week or more neglected to visit it.

When next I looked into the burrow, illuminating its interior by means of a small bulb connected by wire with the socket on an electric torch, I found that a nest was taking form at its inner end. The material of the nest, so far as I could distinguish with a small mirror tied to the end of a slender twig and pushed into the tunnel, was all of one kind: very slender, somewhat curved brown pieces several inches long, apparently petioles or rachises from which the leaf-blades had fallen. Three years earlier I had caused the desertion of a burrow such as this by attempting to watch from a blind while the owners built their nest. Accordingly I resolved not to try to watch the completion of this nest, nor to make a serious effort to see and identify the birds until after the eggs had been laid. The first of these did not appear until April 20, 25 days after I had seen the bird fly from the bank.

The second nest was discovered seven years later, on my farm in El General. Some years before this a shallow pit had been dug into the foot of a steep slope. The burrow was excavated in the low, nearly vertical wall at the back of the pit, which was now choked with weeds and low bushes. The steep hillside to the rear of the pit was covered with tall second-growth woods, which at no great distance merged into primary forest. In front of the pit was a clean, shady pasture, whence later I watched the nesting activities of these forest birds. When found on April 13, 1946, the burrow was 18 inches long; and a nest, placed a little forward of its inner end, was already well begun.

My third nest of the automolus was in a steep slope in heavy forest not far from the site of the second. Here poachers had dug into a burrow of a tipiscuinte or paca (*Cuniculus*), leaving a deep, narrow pit, in whose vertical side the tunnel of the automolus had been excavated. The narrowness of the pit, combined with the curvature of the tunnel, made it difficult to see the contents of the latter; but with electric light and mirror I managed to glimpse part of one white egg. The unfavorable situation discouraged further studies at this nest.

In all three of these burrows, the nests themselves were broad, shallow cups, composed almost exclusively of the slender, curving, secondary rachises of the twice-pinnate, acacia-like leaves of a thorny liana (*Mimosa myriadena*) that scrambles high into the tree-tops. These rachises, from which the many pairs of tiny leaflets had fallen, were brown and dry, covered with a fine pubescence, and armed with tiny retrorse spines on their basal half. They measured from  $1\frac{1}{2}$  to  $3\frac{1}{2}$  inches in length. The nests were not sufficiently cohesive to be removed from the burrow in their original form. When no longer used by the birds, they were pulled out as a loose handful of the fine brown rachises.

These are the only nests of the Chestnut-tailed Automolus which I have seen. Van Tyne (1926:546) described a nest of another race of the same species (*A. o. pallidigularis*) found on Barro Colorado Island in the Canal Zone. It was situated at the end of a horizontal tunnel, over two feet long, in a perpendicular cut-bank beside a small stream flowing through heavy forest. The bulky, shallow structure was composed almost entirely of a single kind of slender leaf-stalk about ten centimeters in length. In Brazil, Euler (1867:399) found two nests of the White-eyed Automolus (*A. leucophthalmus*),

likewise built in burrows beside streams in heavy forest. They were composed wholly of the fine inflorescence stalks of some plant of the verbena family, interlaced to form a compact fabric. One of the nests, built in a burrow which sloped outward at an angle of 45 degrees, was made twice as thick at the front as at the rear, thereby giving the cup a horizontal position.

#### THE EGGS

At the nest found in 1939, the first egg was laid between April 18 and 20. The second was present on April 21. Fearful of causing desertion, I did not revisit the nest until April 25, when three eggs were present, forming the full set. Although my nest of 1946 was nearing completion, if not actually finished, when discovered on April 13, the first egg was not laid until April 26, the second two days later. In this nest two eggs formed the full set. My third nest contained at least one egg on April 9, 1947. Thus April appears to be the chief month for laying in the basin of El General, at about 2500 feet above sea-level. The eggs, as seen in the mirror, were pure white and unmarked. To avoid putting further studies of nest life in jeopardy, no attempt was made to remove them from the burrows for measurement. Euler's nest of the White-eyed Automolus contained three white eggs of oval form, almost equally blunt on the two ends.

#### INCUBATION

In an effort to discover the pattern of incubation, I devoted nearly 12 hours to watching the first burrow and nearly 18 to the second, all the while hidden in a blind. Seldom have I watched so long before the nest of an incubating bird and learned so little about its habits, or been so bored. I saw exceedingly little of the birds I studied. The record made at the second burrow on May 6 and 7, 1946, after incubation had presumably been going on for eight or nine days, is short enough to be given in full:

- May 6, 12:30 p.m. I enter the blind; bright sun, clouding over. Shower falls at 2 p.m.  
 2:48. An automolus suddenly leaves the burrow, flying out across the edge of the pasture.  
 4:11. An automolus arrives through the thicket behind the burrow and silently enters.  
 6:05. I leave the bird in the burrow in the failing light. Rain fell hard during the late afternoon.  
 May 7, 5:10 a.m. I resume watch at dawn.  
 5:21. An automolus leaves the burrow, flies silently out over edge of pasture.  
 5:53. An automolus enters, voicing only a few low notes.  
 6:55. The mate arrives with bill full of material (rachises of mimosa?), clings to vertical stem of sapling in front of the burrow. The one which has been incubating darts out and away. The new arrival is alarmed when I too suddenly raise my field glasses to the window of the blind. It retreats into the bushes behind the burrow and skulks there for 25 minutes, moving around mostly out of my sight and constantly voicing rattling notes.  
 7:20. At length this bird enters the burrow.  
 8:23. It darts out and away.  
 9:37. A bird silently enters the burrow.  
 11:35. It darts out and away. I go.

During my long vigil I had proved, by seeing one member of the pair come to replace the other at 6:55 a.m., that both male and female share the task of incubation; but I could not distinguish the sexes nor learn how they divided the day between them, nor which sat through the night. On the afternoon of May 6, I timed one long session on the eggs lasting more than 138 minutes, and next morning three sessions lasting 62, 88 and 118 minutes, respectively. Morning and afternoon, the eggs had been left unattended for three periods of 83, 32 and 74 minutes' duration. Such periods of neglect appear to be typical of the ovenbirds; I have found them at nests of the Guatemalan

Leaf-tosser (*Sclerurus guatemalensis*), Minute Xenops (*Xenops minutus*), and two species of *Synallaxis*, in all of which the two sexes together fail by a good deal to keep the eggs constantly covered, although those that I watched did better than the automolus. The bringing of material to the nest during the course of incubation (as at 6:55 on May 7) is also characteristic of the family, as of other birds which build very bulky or loosely constructed nests.

A week later, on May 15, I again devoted a morning to watching this burrow. I thought that perhaps the automoluses would incubate more constantly now that their eggs were almost ready to hatch, but the contrary was true. The member of the pair that spent the night in the burrow darted out and away at 5:39 a.m., leaving the eggs uncovered until 6:14, a period of 35 minutes. Then this bird or its mate came and sat for 89 minutes, or until 7:43. At this hour an automolus approached through the thicket and darted into the burrow, and almost at once one shot out and away. Although I could not actually see the change-over at the nest far back in the burrow, I believe it a fair assumption that the individual who entered was not the one that came out so promptly, and that an exchange of duty did actually occur. The newcomer sat for 86 minutes, as though it felt obligated to incubate just as long as its mate had done, but no more. It flew away at 9:09, and then for 2 hours and 2 minutes, or until 11:11, the nest was left unattended. I was in front of the burrow, looking in to assure myself that one of the pair had not slipped in unnoticed by me, when the automolus which at last had remembered its eggs darted out of the thicket and almost bumped into me.

To summarize: In 18 hours of watching at this nest, I timed six diurnal sessions on the eggs, ranging from 62 to 138+ minutes in length (this longest was begun before I started to watch) and averaging 96.8 minutes. There were five periods of neglect ranging from 32 to 122 minutes, averaging 69.2 minutes. Computing by these averages, the eggs were incubated only 58 per cent of the time. The birds always approached the burrow through the thicket behind it; they invariably left flying rapidly and low over the edge of the clean pasture in front to enter a stand of tall second-growth woodland to the south.

At the nest beside the Quebrada de las Vueltas in 1939, I failed during 12 hours of watching to witness a single change-over on the eggs; but later I saw that both sexes brooded the nestlings, so without much doubt they both incubated the eggs. I timed four sessions, two not in their entirety, lasting 78, 183+, 124+ and 72 minutes. There were two periods of neglect, of 64 and 52 minutes' duration. Thus this pair kept the eggs covered more constantly than the second pair. They approached through the thicket behind the bank, and on leaving flew down the river.

At the burrow watched earlier, the parents always flew out before I could approach and look in. Probably this was because, to reach the mouth of the tunnel, I had to jump or slide down the river-bank close by, and the noise or vibration warned the automolus of my approach. The bird in charge of the eggs would move forward to the mouth of the tunnel, remain there for a few moments with head and shoulders projecting but screened by the foliage of the creeper that draped over the edge of the bank, then dart rapidly and silently across the stream and away. At the second burrow, when I began daily visits of inspection to time the hatching of the eggs, I sometimes surprised a parent inside when I threw in the beam of the electric torch. Hearing my approach, it had apparently moved slowly and reluctantly toward the entrance to look out and see what was happening. When the beam of light fell into its face, it would retreat to the end of the burrow behind the nest and remain there. Then no moderate amount of stamping on the ground a few yards away would send it into the open.

At the first nest, the three eggs hatched on May 12. Because of the uncertainty as

to the date of laying the third egg, it is not possible to give an exact incubation period. The second egg had been laid on April 21 and if, as seems likely, the third followed after an interval of two days, or on April 23, the incubation period was 19 days; but it may have been a day more or less. At the nest studied in 1946, the two eggs had not hatched 20 days after the set was complete. When I returned the following day, fully expecting to see the nestlings, the nest was empty, probably having been raided by a snake! For small birds, ovenbirds have long incubation periods. That of the Guatemalan Leaf-tosser was, in one instance, at least 21 days. In *Synallaxis* the period is 17 or 18 days.

#### THE NESTLINGS

The newly hatched automoluses in the first burrow had pink skin, with sparse gray down of the usual passerine type, and tightly closed eyes. The empty shells were promptly removed from the nest, whether swallowed by the parents or carried out in their bills I do not know. On the morning when the nestlings were two days old I watched their burrow for three hours. I had not long to wait to learn that both parents attended them. Between 5:30 and 8:30 a.m. they jointly fed the nestlings nine times. This was only three feedings for each little one, assuming that only one was fed on a visit and that all received equal shares. But the articles brought were big for such small nestlings. The food served to them seemed to consist wholly of adult insects, of which I did not recognize the kinds, and larvae. Both parents warmed the nestlings, and thrice I saw one, arriving with food, remain in the burrow after the departure of the mate, who had been brooding. In the three hours, the nestlings were brooded eight times, for periods ranging from 2 to 17 minutes, a total of 75 minutes. Usually a parent did not continue to cover the nestlings until the mate arrived, but after an interval of brooding flew away, leaving them unattended. At dawn the parents rattled loudly as they approached the nest, but soon they came and went in silence.

The parents ceased to brood, even during the night, when the nestlings were only ten days old and covered merely by their sparse natal down and sprouting pin-feathers, from which the plumage had not begun to escape. I was surprised that nestlings so naked should be left uncovered during the night. I visited them again at daybreak on the following morning to confirm my observation, and again found them alone. Apparently they remained sufficiently warm in the burrow without a parent to cover them.

Each morning, when I peeped into the burrow at dawn, I saw a row of five or six, pure white, round, little objects lined up on the rim of the nest, at the front. These were the droppings of the nestlings, which during the early morning the parents carried off, one each time they visited the burrow with food, until all the waste matter had been removed.

To learn something of the nature of the food given older nestlings, I watched the burrow for a total of four hours on the mornings of May 24 and 25, when the young automoluses were 12 and 13 days old. At first I sat in the blind; but the parents coming with food flew so rapidly and directly into the burrow that I could not distinguish what they carried in their bills. Finally I took down the blind and sat openly on the shore of the river opposite the burrow. My presence there caused the parents to hesitate and waver; but they would eventually enter the nest despite their mistrust, and this delay gave me time to recognize what they carried.

From 5:35 to 8:35 on May 24, the parents brought food 12 times. The following morning they brought food five times between 5:45 and 6:45. Among the items recognized were insects, some of them very big, caterpillars (one hairy), four small lizards, and a big black spider. Van Tyne (*loc. cit.*) saw the parents bring small lizards to the

young in the nest he watched on Barro Colorado Island. The food of these nestlings resembled that of the related Streaked Tree-hunter (*Thripadectes rufobrunneus*) of the highlands. I did not see the Chestnut-tailed Automolus bring any frogs, which figure so prominently in the diet of their highland relatives, but possibly longer watching would have revealed that these, too, form part of their food.

When the nestlings heard the voice of an approaching parent, they set up a loud, clear, little chiming of their united voices, which was continued after the attendant entered the burrow. Or, if the parent approached in silence, the chorus did not begin until after the adult had flown into the tunnel. By throwing a beam of light into the burrow and clucking with my tongue, I could cause the nestlings to call in the same fashion. As all three faced me with their mouths open, expecting food, I could clearly see that the interior of the mouth was flesh-color, not bright red or orange or yellow as with so many nestlings reared in open nests; and there were no conspicuously projecting, light-colored corners.

When 14 days old these nestlings were nearly feathered. Now for the first time they shrank back in the nest, evincing fear, when I looked into the mouth of the burrow. All three flew away on May 30, when 18 days old, and promptly disappeared from the vicinity. I can not recall ever having seen an automolus attending fledglings in the forest.

#### SUMMARY

1. The Chestnut-tailed Automolus (*Automolus ochrolaemus*) inhabits lowland rain-forest, where it hunts among the underwood and lower levels of the trees. Its food consists of insects, spiders, and lizards, found chiefly among curled or clustered dead leaves hanging from dying boughs or lodged in tangles of vines. The bird investigates these while clinging in the most diverse positions, often with body inverted.

2. The call, a loud, harsh, slow rattle, is uttered very frequently in the morning and evening twilight.

3. The nest is placed in a burrow in the bank of a forest stream or other more or less vertical exposure of the soil. The tunnel is probably dug by the birds themselves, although conclusive evidence for this is lacking. Three burrows ranged from 18 to 26 inches in length.

4. At the inner end of the burrow the birds build a broad, shallow nest, consisting almost wholly of a single kind of vegetable material. In the valley of El General, Costa Rica, the secondary rachises of *Mimosa myriadena* are the preferred material.

5. The pure white eggs, two or three in a set, are laid chiefly in April in El General (elevation 2500 feet).

6. Both parents incubate, each sitting continuously for a period usually longer than one hour and sometimes more than three hours. The sitting bird often flies away before the mate comes to take over the duty of incubation, with the result that the eggs are frequently left uncovered for substantial periods, ranging from half an hour to two hours in length. At one nest the eggs were incubated only 58 per cent of the 18 hours devoted to watching.

7. At one nest the period of incubation was approximately 19 days. At a second nest the eggs had not hatched after 20 days; the next day the nest was found empty.

8. At birth, the nestlings have pink skin and sparse gray down. Both parents brood and feed them, bringing large insects, caterpillars, spiders, and small lizards. They remove all droppings.

9. After the age of ten days the nestlings were no longer brooded even by night. At 14 days they were feathered. They left the burrow when 18 days old and were not seen thereafter.

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