

# A STUDY OF THE RUFOUS-FRONTED THORNBIRD AND ASSOCIATED BIRDS

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## PART II: BIRDS WHICH BREED IN THORNBIRDS' NESTS<sup>1</sup>

THE open nests in which the majority of birds lay their eggs are rarely attractive to birds of other kinds, although a poor builder, such as a dove or a cuckoo, may use an abandoned nest as the foundation for its own crude construction. Closed nests, however, are eagerly sought by many kinds of birds that cannot build them, but either wait until such a structure is abandoned or forcibly evict the rightful occupants. Nests so massive and well enclosed as those of the Rufous-fronted Thornbird (*Phacellodomus rufifrons*) have many claimants, some of which are mild and inoffensive while others are mercilessly aggressive toward the industrious builders.

### TROUPIAL

The melodious Troupial (*Icterus icterus*), or *turpial* as it is called in its native land, the national bird of Venezuela, is a large oriole about 10 inches long. Its head, throat, chest, back, wings, and tail are black, with a broad white longitudinal band on each wing. The rest of the plumage is bright orange. The sharp bill is black, with the basal half of the lower mandible bluish gray. Behind each clear yellow iris is a large triangle of bright blue skin, from which a narrow extension passes forward over the eye. The legs and toes are plumbeous. The sexes are difficult to distinguish by their appearance and even by their voices.

The Troupial inhabits more or less arid, open country, with scattered trees or light woodland, in northern and central Venezuela, northern Colombia, and the islands of Curaçao and Aruba. Popular as a cage bird, it has been carried to many lands, especially the Antilles, where it has become established in Puerto Rico and St. Thomas and has been recorded in the wild in a number of other islands. On the mainland, it ranges from sea level up to about 4,250 feet (Phelps and Phelps, Jr., 1963:349). Considering the fame of this bird, surprisingly little has been published about its habits in the wild state. Todd and Carriker (1922:475) reported that it was fairly common on the Goajira Peninsula, where it often perched on the giant cactus, upon the fruit of which it fed almost exclusively when in season. In northeastern Venezuela it was rather common throughout the year along the borders of the seasonal deciduous woods (Friedmann and Smith, 1950:528).

In the vicinity of Pirapira, a region of fairly high rainfall, Troupials

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<sup>1</sup> Part I of this paper appeared in *The Wilson Bulletin*, 81:5-43, (1969).

were rare. Here I found them in the rows or clumps of trees with bushy undergrowth that interrupted the extensive pastures. They were always in pairs, and seem never to flock in the manner of many other icterids. They subsist upon fruits and insects which they find amid foliage. They hang back downward while investigating clusters of leaves or old inflorescences, and they hold the larger edible objects beneath a foot while they tear them apart with their sharp bills.

The song of the Troupial is notable for its full, mellow notes rather than for intricate structure or continuous flow, as in the thrushes. Although the phrases tend to be short and repetitious, they enchant us by their rich tones. *Come right heere* (the last syllable higher and long drawn out), *come right heere*; and *come heere come heere*; and *here come here come*, are verses that I often heard. Except in the morning twilight, I rarely heard long-continued, freely flowing song. When the Troupial sings, the long, aculeate feathers of its throat stand out like a bristly black beard.

Available accounts of the nesting of the Troupial are brief and confusing. One of the most detailed is that of Cherrie (1916:207), who wrote:

"A nest and set of eggs was collected at Caicara [Venezuela] May 4, 1907. The nest had as its foundation the half decayed mass of grasses that once served, most probably, as a nest of *Pitangus sulphuratus rufipennis*. Repairs had been made in the roof and a lining of soft grasses had been placed on the bottom of the nest cavity. From the outside there was nothing to indicate that it was more than an old nest long since abandoned. The entrance, the original one, was on one side but completely hidden from below by surrounding foliage. In the same tree were three other deserted nests of *Pitangus*, each of which was in a much better state of preservation than the one that the troupial had selected."

Phelps (1953?:75) states that sometimes Troupials construct their own nests in the form of a pouch, but generally they take advantage of old nests of other birds, making certain repairs to them. Bond (1960:222) reports that in the West Indies the Troupial nests in a deep, purse-shaped, pendant structure, built like that of the Jamaican Oriole (*Icterus leucopteryx*). Smith (Friedmann and Smith, loc. cit.) was told that the Troupial uses the nests of the Rufous-fronted Thornbird instead of building for itself. He would not vouch for this belief; but in April he did observe Troupials, on two occasions in different localities, entering thornbirds' nests. Schwartz (*in* Gilliard, 1958, color fig. 192) published a photograph of a Troupial at the entrance of a thornbirds' nest. He told me that, in his long experience in Venezuela, Troupials breed only in thornbirds' nests in regions where the two species occur together. (They were not sympatric at Caicara, where Cherrie found the Troupial using a nest of the Great Kiskadee.) It is not evident that anyone has ever watched Troupials construct the pouches in which they sometimes nest; they may have been made by some other bird. My



FIG. 1. A large nest of the Rufous-fronted Thornbird in which Troupials raised a brood. The entrance to the chamber occupied by the Troupials can be seen in the lower part of the nest. The constriction in the middle of the nest was later made much more pronounced. Pirapira, Carabobo, Venezuela, April 1966.

own experience of the nesting of the Troupial, limited as it is, makes me doubt that it could build competently.

*Establishment of a pair in thornbirds' nests.*—The first wild Troupials that I ever saw were a pair that on 3 April visited a thornbirds' nest that I was watching, clinging to it here and there and peering into its chambers, all in silence. During a day on the llanos of Cojedes, the only Troupials that I noticed were a pair at a thornbirds' nest. The only pair that I discovered breeding at Pirapira did so in a thornbirds' nest.

This large nest (Fig. 1), containing five compartments, hung, at a height of 12 feet, from a small leguminous tree (*Gliricidia sepium*) in the midst of a pasture, close by a much larger mango tree. When I first noticed the nest at the beginning of April, six thornbirds slept in it. As I approached this nest on the evening of 9 May, a Troupial flew from it. Soon thereafter the six thornbirds entered. I withdrew to a greater distance and stood half-concealed. Presently the Troupial returned and, with some hesitation,

entered a chamber below that in which the thornbirds rested. As the larger bird went in, some of the thornbirds came out, but they soon re-entered their dormitory. I noticed no antagonism between the two kinds of birds. Subsequent examination showed that the Troupial had made, in the side of the chamber where it slept, an opening much wider than the original doorway. It had not yet laid an egg there.

On the following evenings, the thornbirds and the Troupial entered the large nest without paying much attention to each other. Once, when the Troupial arrived while the thornbirds were retiring, the four who had just entered flew away with the other two who were still outside; and this caused the Troupial to fly off, too. The thornbirds returned first; and after all six had entered, the Troupial went into its compartment without causing them to emerge.

Meanwhile, the thornbirds had been building a new nest in the same tree, eight feet from the old one. By 18 May two thornbirds were sleeping in the new nest; and before the end of the month all six had moved to it, leaving the old one to the Troupial. This long structure was growing thinner in the middle, just above the chamber occupied by the Troupial. Although the thornbirds had transferred many sticks from it to their new nest, they removed these sticks chiefly from the top and did not seem responsible for this constriction in the middle of the old nest. One morning I surprised a Troupial clinging to the side of the nest, apparently pulling out sticks; but the bird was very shy and would not continue its activity in my presence, not even after I had hidden myself in a neighboring thicket. By the time the Troupial had finished remodeling the thornbirds' nest, it had roughly the shape of an hour-glass. The sticks that had been pulled from its side littered the ground below.

On the evening of 1 June, while from concealment I watched the thornbirds retire into their new nest, mellow whistles announced the arrival of the pair of Troupials. After clinging to the old nest here and there, one of them entered the compartment which for at least three weeks had been serving it or its mate at a dormitory, while the other continued to move among the surrounding branches. Presently the Troupial emerged from this dormitory, tried several other compartments, and finally stayed in one in the constricted middle of the nest, from which the outer layers of the wall had been torn away. This bird's mate then entered the room which the first had just vacated, so that now the two Troupials occupied chambers that adjoined each other vertically. In a little while the bird in the higher compartment, evidently not feeling at ease there, came out and tried to join its mate in the lower chamber. It forced itself most of the way in, but in the end was obliged to return to the higher compartment. Either the lower chamber was too small to hold two Troupials, or the one already within repulsed its mate. From this evening's watch I learned two important facts that were later fully confirmed: (1) that both sexes of the Troupial use thornbirds' nests as dormitories; and (2) that adult Troupials sleep singly.

As I approached these thornbirds' nests in the dim, misty dawn of 2 June, a stag was eating the ripe fallen fruits beneath the neighboring mango tree. He raised his antlered head to look at me, then trotted off toward the nearest thicket with his white tail raised above his back. The male Troupial was already looking forth from the higher chamber, singing in his velvety voice *Here come, here come, and come right here, come right here*. After continuing to sing for about five minutes, he emerged and repeated his mellifluous notes while he clung to the outside of the nest or flitted among the surrounding branches, waiting for his mate to come forth. When at last she darted from the lower chamber, the two flew away together.

That evening the Troupials arrived at the nests before the thornbirds, and one entered the lower of the two chambers which they had occupied on the preceding night. After it was well settled, its mate came and clung in the doorway, as though wishing to enter; whereupon both flew out, to rest a while in neighboring trees. This happened three times. The fourth time that one entered this lower chamber, the other followed it inside. For a few minutes, both remained out of sight; then one appeared in the doorway and slowly emerged, as though being pushed or pecked from behind and reluctant to go. When finally outside, it climbed up and entered the higher compartment. But in a little while it came out and again tried to join the other below. Repulsed once more, it re-entered the less desirable upper chamber and stayed while the dusk deepened. I was now fairly certain that it was the female who occupied the lower chamber with the wide doorway and would not permit her mate to sleep with her, but I am not sure which of the two lodged here at the beginning. Possibly the female had claimed her mate's dormitory for breeding.

On the following evening, again, the male joined the female in the lower chamber but stayed only a few minutes, then entered the upper chamber. Soon after this, he provided a more satisfactory bedroom for himself by opening the side of the lower chamber of the nest which the thornbirds had newly built in the same small tree. The wide gap that he made was below the entrance which the thornbirds had provided for this chamber. They had already begun to incubate, and I found a broken white shell on the ground below their nest. Doubtless the Troupial had devoured the contents of the egg. By this time, the female had laid and started to incubate in the older nest, in the chamber where I had first found a Troupial sleeping a month earlier. Throughout the incubation period, and until the young Troupials were almost ready to fly, the female slept in the brood chamber, while he mate lodged nightly in the newer nest nearby.

Where did the poor thornbirds sleep after being evicted from both of their nests? While I watched in the evening from a neighboring thicket, the male Troupial entered the new nest, so early that the long ridge across the valley was bathed in bright sunshine from base to crest, although the nest itself had long been in shadow. After a while, the female Troupial came and clung in front of the compartment with the eggs, but, shyer or more suspicious than the male, she would not enter. As she flew off, her mate emerged from his dormitory and followed her. Soon he re-entered; then the female alighted in front of her nest, only to leave without entering; and again he came out to join her. This happened over and over, while the shadows crept to the summit of the eastern ridge. Although the male Troupial apparently could not see the female from inside his bedroom, somehow he sensed her departure and emerged to learn what was wrong. Retreating then to a more distant observation post, I had the satisfaction of seeing both Troupials settle down for the night in their respective chambers. Then, peering through my binoculars in the deepening dusk, I saw the six thornbirds, or most of them, arrive and enter the compartment above the incubating female Troupial, where

far a while her mate had reluctantly slept. The male Troupial and the thornbirds had, unwillingly on their part, exchanged dormitories. The thornbirds were back again in the chamber where they had slept before the Troupials had torn away the outer layers of the wall.

For a week or more, the thornbirds lodged above the incubating Troupial. Sometimes the male Troupial chased them as they left in the morning. Meanwhile, the thornbirds were building a third nest, on the farther side of the spreading mango tree, 65 feet from their first nest. Nevertheless, they occasionally visited the old nest where the Troupials had eggs, bringing a twig to it, or climbing over it to arrange the sticks of which it was composed. When a Troupial found one of them there, it chased the smaller bird. One morning I saw a Troupial drive a thornbird from the old nest or near it. The brilliant bird hotly pursued the dull one through the crown of the large mango tree, thence to a smaller tree, then across 25 yards of open pasture into a thicket. Even here the aggressive Troupial did not relent, but continued to chase the poor fugitive through the close-set bushes until I lost sight of its glowing plumage. Rarely have I seen one bird pursue another so long or with such fierce persistence. Since I heard no outcry from the thornbird, who in the dense thicket had the advantage over the bigger assailant, I believe that it escaped. Soon thereafter the thornbirds moved to their newest nest and had fewer encounters with the Troupials.

*The eggs.*—On 6 June, nearly a month after I discovered that a Troupial was sleeping in the thornbirds' nest, I for the first time found one member of the pair inside in the daytime. Next day I brought a ladder and found three eggs, the full set. They differed considerably in shape and pigmentation. One was long and strongly tapering, the others shorter and relatively broader. On a dull white ground, they were irregularly speckled, blotched, and scrawled over the whole surface, but most heavily on the thicker end, with shades of brown and pale lilac. A few of the heavier spots were almost black. These eggs measured  $28.3 \times 17.8$ ,  $26.0 \times 18.1$ , and  $25.5 \times 17.8$  mm. The three eggs in a set found by Cherrie (1916:208) at Caicara, Venezuela, on 4 May 1907 were similar but slightly larger.

The eggs in the thornbirds' nest rested on a thick pad of finely shredded, light-colored vegetable material, which the Troupials had placed over the sparser lining originally applied by the thornbirds. At the rear of the chamber, where the wall of sticks was thin, it had been covered with coarse grass stalks and the like, shutting out most of the light. The nest chamber was  $4\frac{1}{2}$  to 5 inches in diameter by 5 inches high. The opening that the Troupials had made in the front was  $4\frac{1}{2}$  inches wide by  $3\frac{1}{2}$  inches high. Recalling how difficult I had found it to open a thornbirds' nest with my fingers, I marvelled that the Troupials had succeeded, with their slender,

sharply pointed bills, in making this wide gap in the wall. This, and the removal of sticks from the part of the nest immediately above their chosen chamber, represented by far the major part of their labor in preparing a receptacle for their eggs and young. The application of a bit of lining was, for an oriole, a paltry effort at nest making.

*Incubation.*—While incubation was in progress, I passed two mornings watching the Troupials' nest from a blind. Although I could not distinguish the sexes of this pair, my failure to witness a change-over during 13 hours of watching makes it almost certain that only the female incubated, as in all other icterids for which information is available.

On 10 June I began my vigil at 05:55, while the waning moon still shone brightly. The earliest birds had just started to sing. I did not see the male Troupial fly from his dormitory, but presently I heard him singing superbly. Then five or six thornbirds emerged from the compartment above the incubating female and spent many minutes climbing over their ruined nest, passing from chamber to chamber (except the one where the Troupial was incubating) until, at 06:25, the last of them flew away. The female Troupial did not leave her eggs until 06:32. By 12:43 she had taken nine sessions, ranging from 12 to 45 minutes and averaging 28.9 minutes, and the same number of recesses, ranging from 4 to 23 minutes and averaging 12.3 minutes. She was in the nest for 70 per cent of the morning.

Five days later, on 15 June, the male Troupial left his dormitory and began to sing at 06:03. Then he chased the thornbirds as they sallied from the chamber above his incubating mate. She first flew out at 06:33, for a recess lasting 13 minutes. When she returned at 06:46, her partner accompanied her and entered the compartment where the thornbirds had slept, remaining about two minutes. By 13:06 the female had taken nine sessions, ranging from 15 to 61 minutes and averaging 31 minutes. Her longest session began just after noon; the next longest was 43 minutes. Her nine absences ranged from 5 to 22 minutes and averaged 12.7 minutes. She incubated for 71 per cent of the morning. The similarity of the records for the two mornings, both of which were sunny, is noteworthy.

Sometimes, after leaving the nest, the female sang and was answered by her mate in the distance. Occasionally she sang loudly as she was about to enter. Once she returned to her nest with something small, probably a particle of food, in her bill. She seemed to be anticipating the hatching of the nestlings. After she had entered, the male followed her into the nest, where he stayed for less than a minute. I could not see whether he carried anything. Although the male sometimes escorted the female back to the vicinity of the nest, he rarely went as far as the doorway. Evidently the sight of food in his mate's bill stimulated him to look for nestlings. This observation suggests one of the means by which a male bird who does not incubate discovers that the eggs have hatched and it is time to begin feeding them. Since the male Troupial found only eggs in the nest, he did not again enter it during the next four hours. Five more days passed before the eggs hatched.

*The nestlings.*—By the morning of 21 June there were two newly hatched Troupials. The third egg contained a small dead embryo. The nestlings' pink skin bore sparse gray down. The interior of their mouths was red, and the flanges at the corners were white. When they were only three or

four days old, the nestlings were heavily infested with *tórsalos*, the white larvae of a dipterous insect that formed relatively huge swellings under the skin. One nestling bore 10 of these parasites, including three on its head and three on one leg. When the young Troupials were a week old, their eyes were open. The sheaths of their remiges had already become long, and the feather rudiments in other tracts were sprouting through the skin. When the nestlings were 10 days old, their plumage began to expand. The *tórsalos* that had infested them had gone, leaving superficial scars that were already disappearing; but the nestling who had fewer of these larvae was far ahead of the more heavily parasitized one in size and the development of its plumage. When two weeks old, the more advanced of the young Troupials was fairly well feathered, but it remained in the nest for another week.

These nestlings were fed chiefly on insects, larval and mature, with a liberal admixture of fruit pulp. As they grew older and the items delivered to them became larger, it was evident that orthopterons, resembling grasshoppers and crickets, formed an important part of their diet. Some of the larger articles brought by the parents were too badly mangled for identification. The fruit given to the nestlings seemed never to come from the neighboring mango tree, although sometimes a parent visited the ripening fruits that it bore, sticking its sharp bill far into the juicy pulp. Both parents fed the young, seeming to take fairly equal shares in this task. When the two nestlings were five days old, they received 51 meals during four hours of the morning. Some of these meals were delivered while the parent clung in the doorway, back outward; but on other occasions the parent went inside, even when it did not stay to brood. Apparently it was the female who entered, sometimes pushing past her mate who stood in the doorway, feeding, in order to deliver her billful inside. When the two nestlings were 12 days old, they received only 38 meals during four hours of the morning; but now the items given to them averaged larger. Seventeen was the greatest number of feedings in a single hour that I recorded on either morning. To feed the 12-day-old nestlings, the parents always stood in the doorway, often side by side. Frequently they sang while coming with food in their bills.

During four hours of the morning when the nestlings were five days old, they were brooded 10 times, for intervals ranging from 5 to 16 minutes and totalling 106 minutes. Evidently only the female covered the nestlings. Sometimes she ended a session of brooding by pushing past her mate while he clung in the doorway to feed them, but after delivering the meal he never stayed. When 12 days old, the nestlings were brooded through the night, but not after the parent flew from the nest at dawn. Thornbirds of the same age are still brooded much by day.



At first excessively shy, the parent Troupials became bolder after their eggs hatched. When the nestlings were five days old, their mother entered the nest to brood them while I set up the blind in the open pasture about 40 feet in front of the nest; and later that same morning the parents continued to feed the nestlings while I folded up the blind. After a few more days, at least one of the parents would deliver food while I stood exposed only 30 feet away. When I climbed a ladder to look into the nest, the parents would come into the small tree that supported it, alighting a few yards above me and singing rather than scolding with harsh notes. This reminded me that many years before, in Honduras, a Black-cowled or Lesson Oriole (*Icterus prothemelas*) would intersperse his nasal scolding notes with song when I visited his nestlings. Although the Troupials' vocabulary included nasal notes similar to those of other orioles, they did not use such notes to protest my intrusion at their nest.

I never touched the nestlings after they were feathered. One left the nest on 11 July, while the other, doubtless the one who had had the heavier infestation of *tórsalos*, remained two days longer. The first departed at the age of about 21 days, the second at 23 days. Like the adults, they already had bare skin behind and above the eyes, but it was of less intense blue. I last saw these young Troupials, with a parent who fed them, 10 days after their first flight. The pattern of their plumage was much the same as in the adults, but the colors were less intense. The parts of the body which on the adults are bright orange were on them pale yellow. The prominent longitudinal band on their wings was an impure white. They flew well and soon vanished into a patch of woods.

The female parent continued to pass the night with the nestlings until they were at least 17 days old and well feathered, but during their last nights in the nest they were alone. The other parent still slept in the newer thornbirds' nest in the same tree. About this time, I noticed a wide gap in the lower chamber of a thornbirds' nest situated about 250 feet from the Troupials' nest. This nest did not belong to the large family of thornbirds which the Troupials had hitherto persecuted, but to another family, consisting of a single pair. The nestlings which this pair of thornbirds had been feeding a few days earlier had vanished, and they were trying to repair the breach in their wall. A few days later, however, the hole gaped as widely as before, and I suspected that a Troupial was sleeping here.

Watching in the evening, well concealed in a thicket, I saw the thornbirds bring sticks to their nest, spend some time arranging the top of the structure, then enter their upper chamber, which they were now building up. Presently a Troupial arrived and, after much hesitancy, went to the nest, removed a stick from the wide opening and dropped it to the ground. Finally, it entered

to sleep in the lower chamber, while the two thornbirds remained in the upper one.

The last of the young Troupials had just flown, and their nest remained vacant after nightfall. I could not discover where they slept. Probably they roosted in the open until mature enough to capture a thornbirds' nest for their dormitory. Although many birds that sleep in dormitories, including Rufous-fronted Thornbirds, some wrens, some woodpeckers, certain barbets and jacamars, lead their newly fledged young to a suitable nest, other dormitory-using birds, such as Bananaquits (*Coereba flaveola*) and a number of woodpeckers, carelessly leave their fledglings to spend the night in the open while they themselves take shelter in the nest.

After the middle of July, I could find the sleeping place of only one Troupial, an adult who now occupied the chamber whence the young had flown. To my great surprise, it remained within, staring at me, while I directed the beam of my flashlight into its dormitory in the deepening twilight. Two brightly gleaming eyes, like those of some nocturnal creature, reflected the rays from the darkness of the chamber. I was amazed to find such an intense eye gleam in a bird which, as far as I know, is never active by night.

I am aware of no other member of the oriole family that sleeps in a dormitory instead of roosting amid foliage. This pair of Troupials had taken possession of three thornbirds' nests, in all of which they slept and in one of which they later raised nestlings. Their two young were reared at the price of two broods of thornbirds, representing, probably, six young thornbirds. If Troupials were more abundant, they would certainly be one of the chief enemies of thornbirds. Fortunately, these brilliant rascals are, in many parts of their range, far less abundant than the obscure, industrious birds whose nests they steal.

It is evident from this account that the Troupial is not typical of the American orioles currently classified in the genus *Icterus*, of which technically it is the type. In external morphology, it differs in having bare skin around the eye and lanceolate neck feathers. Behaviorally, it differs in stealing the nest of some other bird instead of weaving a deep cup or pouch for itself, and in sleeping in a closed chamber instead of roosting amid foliage. No other oriole that I am familiar with is so aggressive.

#### PIRATIC FLYCATCHER

The thievish ways of the small, vociferous Piratic Flycatcher (*Legatus leucophaeus*) are well known. It appears never to build a nest for itself but captures a covered structure made by some other species. In an earlier work (Skutch, 1960:453-455), I listed nine kinds of birds in whose nests it has been found breeding; and I have no doubt that when the habits of

Neotropical birds have been more extensively studied, the number of its known hosts will be greatly increased. While the prospective victim is industriously building, a pair of Piratic Flycatchers perches nearby, calling breezily and from time to time chasing the builder. To persecute it more vigorously would defeat the Piratic Flycatchers' purposes; but after the nest has been finished and the maker has laid in it, the pirates throw out the eggs, thereby causing it to abandon the nest. Occasionally Piratic Flycatchers even pull out nestlings; once I watched them tear the young from a retort-shaped nest of the Sulphury Flatbill (*Tolmomyias sulphurescens*). This seemed an act of wanton destruction, as the pirates never used the nest.

Although I was aware of no record of the Piratic Flycatcher breeding in a nest of the Rufous-fronted Thornbird, from my long familiarity with this rogue in Central America I was not surprised when, on 26 March, I found a pair of these birds clinging to the front of a thornbirds' nest. This was a large structure, with three or four compartments, hanging 50 feet up in a *Cordia* tree in a pasture. Three thornbirds slept in it, and at least two of them were building a new compartment at the top. While the thornbirds worked, laboriously carrying sticks to this great height by flitting from branch to branch, the pair of flycatchers perched nearby, calling *pee-e-e-e* and *pee-de-de-de* in their usual irritating fashion, and often displaying their yellow crown patches. Frequently they clung, singly or together, in front of the next-to-lowest compartment, which they seemed to have selected to receive their eggs, and occasionally one of them entered it for a few minutes. From time to time, a flycatcher chased a thornbird as it flew down for another stick or ascended with its burden. More rarely, a thornbird chased a flycatcher from the nest, with sometimes the second flycatcher pursuing the pursuer. But neither kind of bird hurt the other, and much of the time they ignored each other.

On the evening of 26 March, I watched the thornbirds retire. After one of the flycatchers flew away, the other remained clinging in front of the nest, calling. The three thornbirds reached the top of their nest from the rear, where the foliage screened their approach. As they came down the front of the structure to enter one of the lower chambers, the pirate attacked but did not stop them. For ten minutes after they retired, the flycatcher remained clinging in front of the nest, then flew off in the dusk.

As daylight faded on 5 April, the thornbirds ascended inconspicuously through the foliage of the *Cordia* tree, and coming over the top of the nest, entered the new compartment without being molested by the flycatchers—perhaps without being noticed by them. The pirates remained clinging to the nest for many minutes, while the thornbirds stayed out of sight in the topmost chamber. At last, in the failing light, one flycatcher flew away, but the other still clung to the doorway of their chosen chamber. Of a sudden, in the twilight, a thornbird emerged from the upper compartment, came down over the side of the nest, and pushed into the lower chamber right in front of the flycatcher, who spread its wings over the entrance in a vain effort to block the way.

The other two thornbirds followed, likewise forcing their way into the opening in front of the flycatcher. The latter remained clinging there while it faded from vision in the gathering darkness. Soon I could hardly distinguish even its light head markings through my binoculars. Finally, when it was nearly dark, I thought I saw the bird fly away, not clearly enough for certainty.

By 12 April, the flycatchers seemed to be incubating in the next-to-lowest compartment; and now the thornbirds slept in their newly built chamber at the top of the nest. By 29 April the flycatchers were feeding nestlings, and by 23 May the young had gone. The number of thornbirds who slept in the upper chamber was now reduced to two. By 8 June, when the flycatchers were incubating their second brood, the thornbirds had at last begun to incubate in the chamber above them. On 28 June and 6 July, both kinds of parents were feeding nestlings. Occasionally a flycatcher would dart perfunctorily at a thornbird arriving with food, but mostly each of the four parents minded its own business. I last watched this nest on the evening of 18 July. The flycatchers had vanished, and there was no way of telling whether they had successfully raised their young, for these birds do not return to their nest to sleep. But when only two thornbirds entered the nest in the twilight, I knew that they had somehow lost their brood.

#### OTHER SPECIES

*Jinete Flycatcher*.—*Machetornis rixosa* has been variously called the Short-winged Tyrant (Hudson, 1920, I:161) and the Fire-crowned Tyrant (Phelps and Phelps, Jr., 1963:174), neither of which names serves to distinguish it from a dozen other species of Tyrannidae. Surely the Venezuelan name *Jinete*, or *Atrapamoscas Jinete*—the Horseman, the Mounted Flycatcher—is more distinctive; for the first thing that one is likely to notice about this seven-inch, brownish gray, yellow-breasted bird is its curious habit of riding on the backs of quadrupeds—horses, cattle, pigs, or dogs. This penchant has been noticed by various writers, from Argentina to Venezuela; and the first Jinetes that I ever saw, on the extensive salt meadows at Chichiriviche on the coast of the state of Falcón, were resting on the backs of the half-wild asses so numerous there. When hunger prompted them to leave these comfortable perches, they dropped down to the ground, over which they walked or ran with alternately advancing feet, catching insects stirred up by the grazing animals, much in the manner of anis. Hudson was impressed by how swiftly they ran over open ground. Friedmann and Smith (1955:506) noted the increase of these flycatchers in the well-watered camps of the oil companies in northeastern Venezuela. Here they took to following men mowing the laws, also like anis, and to capturing disabled or freshly killed insects at parked automobiles, as likewise insects that were attracted to lights during the preceding night.

These authors state that *Machetornis* builds bulky nests of grass under the eaves of houses and in the axils of the stout petioles of palm fronds. In Argentina, it often breeds in a hole in a tree trunk, where it builds a neat nest of slender twigs and leaves, lined with horsehair. It also takes possession



FIG. 2. A nest of the Rufous-fronted Thornbird in which a pair of Blue Tanagers built their nest. The photograph was taken in the dry season when the tree was temporarily leafless. Pirapira, Carabobo. Venezuela, April 1966.

of the bulky nests of sticks built by the Firewood-gatherer (*Anumbius acuticaudatus*), to retain which it must often battle fiercely with other claimants, such as the Bay-winged Cowbird (*Molothrus badius*) (Hudson, 1920, I:94, 163). In Venezuela, where *Anumbius* and its nests are absent, the Jinete finds a similar site in the nests of the Rufous-fronted Thornbird. Schwartz published a photograph of a Jinete at a thornbirds' nest (in Gilliard, 1958, color fig. 126). I saw no Jinetes at Pirapira; but during a day on the llanos, I found a pair of these flycatchers at a thornbirds' nest that hung in the midst of a small colony of Yellow-rumped Caciques (*Cacicus cela*). While one of the flycatchers guarded in front, the other disappeared inside; but I could not stay long enough to learn whether they were breeding or only preparing to do so. Another pair of Jinetes alternately visited two thornbirds' nests hanging in the same tree, at one of which the thornbirds were building.

*Blue Tanager*.—In South America, as in Central America, the common, widespread Blue Tanager (*Thraupis episcopus*) usually builds its neat, cup-

shaped nest amid the foliage of a tree or tall shrub. Occasionally, however, it prefers a more sheltered situation, as in the midst of a bunch of green bananas hanging in the plantation, on a beam beneath the thatched roof of an open shed (Skutch, 1954:192), or in a thornbirds' nest (Fig. 2). Early in the morning of 23 May, I stood watching a pair of thornbirds going over their large nest, entering and leaving the chambers. A pair of Blue Tanagers perched in the branches above the nest and repeatedly darted down at the thornbirds. Each time the aggressors bore down on them, the thornbirds slipped into a chamber for safety, soon to reappear. Later in the morning, when no thornbird was in sight, both tanagers arrived with nest material in their bills. Although earlier, when in an aggressive mood, they had paid no attention to my presence below them, now they showed their habitual wariness and would not come to the thornbirds' nest to deposit their loads, even after I had withdrawn a good distance to watch. In the evening I again found the tanagers at the thornbirds' nest, but they flew away before the thornbirds arrived. As far as I could learn, the tanagers never finished their nest in this inaccessible structure.

Later in the same morning, 23 May, I noticed a second pair of Blue Tanagers building in another thornbirds' nest. The bottom of this large structure was falling away, exposing the interior of a chamber. Here, sheltered by the whole mass of sticks above them, but with easy access on the open side, the tanagers were completing their cup. Both sexes brought fine fibers for the lining. On later visits, I failed to find the tanagers incubating or attending nestlings here; but in mid-June, when the supporting tree was felled for posts, I extracted their well-made nest from the ruins of the thornbirds' home.

On 25 May I noticed a third pair of Blue Tanagers carrying material into a thornbirds' nest. Apparently they never laid in this structure, which hung conspicuously from a mango tree, above the edge of a pond.

*Sayaca Tanager.*—The Sayaca Tanager (*Thraupis sayaca*) resembles the Blue Tanager but is paler, and in Venezuela it prefers more arid country. On 22 July I noticed one of these birds carrying nest material into a small, apparently unfinished nest of the thornbird, in a low, exposed tree standing on the bank of a stream in the *llanos*. Once the tanager entered through the doorway in the side and emerged through the top of the nest.

*Saffron Finch.*—The Saffron Finch (*Sicalis flaveola*) breeds in a variety of holes and crannies, ranging from a natural cavity in a tree, an old woodpecker's hole, or a space beneath a roof, to the closed nest of some other bird, such as an abandoned structure of an oriole, a cacique, a flycatcher, or a spinetail (Cherrie, 1916:191-193; Mitchell, 1957:226-227; etc.). This finch's habit of nesting beneath roof tiles is responsible for its Venezuelan

name, Canario de Tejado (Phelps, 1953?:92). It lines its chosen cranny with various soft materials. At Pirapira the Saffron Finch was far from abundant and I found no nest. Paul Schwartz told me that one June he discovered a pair of these finches breeding in a thornbirds' nest which earlier had held an active Troupials' nest.

*Striped-backed Wren*.—The Striped-backed Wren (*Campylorhynchus nuchalis*), a member of the cactus-wren group, sometimes uses an old thornbirds' nest as a foundation for its own bulky structure. I noticed such a nest above the busy old highway between Valencia and Maracay.

*Great Kiskadee*.—Although the Great Kiskadee (*Pitangus sulphuratus*) usually builds in the fork of a tree, sometimes it welcomes a broader foundation for its bulky, domed nest of straws. In mid-April I found a kiskadee incubating in such a structure that it had built atop a thornbirds' nest hanging from a mango tree, about 20 feet above the margin of a small pond.

*Thick-billed Euphonia*.—On 21 July, long after the kiskadees had abandoned the above-mentioned nest, I noticed a pair of tiny Thick-billed Euphonias (*Tanagra laniirostris*) building their own nest inside its ample chamber. As in other species of euphonias, the male and female were taking fairly equal shares in the work, usually arriving and leaving together. They did not sing while they built.

*Striped Cuckoo*.—Paul Schwartz told me that he once saw thornbirds feeding a fledgling Striped Cuckoo (*Tapera naevia*). This cuckoo parasitizes chiefly, if not exclusively, members of the Furnariidae, species of *Synallaxis* and *Certhiaxis* being its usual dupes.

Some account has been given of nine species of birds which, in their breeding season, derive more or less benefit from the thornbirds' massive nests. Some of these birds, such as the Troupial, appear, at least in certain regions, to be largely dependent on the thornbird for chambers in which to nest, as likewise to sleep. Although the Piratic Flycatcher is known to breed only in closed nests made by other birds, it has a wide variety of hosts, some of which it appears to prefer to thornbirds. For still other birds, such as the Jinete Flycatcher and the Saffron Finch, the thornbird's nest is an alternative to a natural or man-made hole or cranny or the nest of some other species of bird. Blue Tanagers occasionally seek the shelter afforded by a thornbird's nest instead of following their usual practice of building their open cups amid foliage, and probably the same is true of the Sayaca Tanager. For Striped-backed Wrens and Great Kiskadees, the thornbird's nest is hardly more than a foundation for their own bulky structures. For a pair of Thick-billed Euphonias, a thornbird's nest was only the support of a support.

The relations of these tenants of thornbirds' nests with the thornbirds

themselves are various. Troupials do much harm to thornbirds, often destroying eggs or nestlings in the nests they covet for breeding or sleeping. Although the thornbirds may continue to lodge in compartments adjoining those occupied by Troupials, I doubt that they could raise a brood in the same nest with these aggressive icterids. Piratic Flycatchers and thornbirds may, as we have seen, simultaneously incubate or feed nestlings in different compartments of the same nest; yet these aberrant flycatchers are potentially dangerous neighbors, for sometimes they wantonly throw eggs or nestlings from nests that they do not need. Little is known of the relations of the Jinete with its thornbird hosts. The remaining tenants of thornbirds' nests are probably not injurious to the builders. Blue Tanagers prefer old chambers so open that the thornbirds would not use them. Much remains to be learned of the interrelations of all these birds and the thornbirds. Likewise, more extended observations will certainly lengthen the list of species that breed in thornbirds nests. I should be greatly surprised if the Southern House Wren (*Troglodytes musculus*) does not at time occupy them. And not only birds, but animals of other kinds, find a lodging in these barracks of sticks. Mitchell (1957:133) quotes earlier writers who found mice established in the older parts of thornbirds' nests.

#### SUMMARY

Nine species of birds are known to make more or less use of thornbirds' nests for breeding. Most of these birds do so only occasionally, and they may occupy only old nests or abandoned parts of nests, so that they are hardly injurious to the thornbirds. The Troupial, however, appears regularly to breed in thornbirds' nests wherever the two species occur together, and it also uses them as dormitories. The nesting of a pair of Troupials was followed from beginning to end.

The Troupials did not use the entrances provided by the much smaller thornbirds, but tore a wide gap in the side of each chamber that they occupied. This pair of Troupials opened in this way two nests built successively by one family and one nest of a neighboring family, destroying one set of eggs and one brood of nestlings.

A month before laying began, a Troupial started to sleep in the chamber where the brood was reared. The male of this pair, repulsed whenever he tried to join his mate in this dormitory, slept in another chamber of the same nest and later in the replacement nest of the same family of thornbirds. While there were eggs and nestlings, he lodged alone in this nest close by the breeding nest.

The Troupials' preparation of their breeding nest consisted in lining it with fibrous materials more liberally than the thornbirds had done and in pulling many sticks from the part of the elongated structure above their chosen chamber, causing it to become constricted in the middle. The Troupial's three eggs, laid in early June, were incubated by the female, for periods ranging from 12 to 61 minutes, with a constancy of 70.5 per cent.

Both parents fed the nestlings with larval and mature insects, including many grasshoppers and crickets, and fruit pulp. Only the female brooded. Two young were reared and flew from the nest when about 21 and 23 days old. They did not return to sleep in the nest, which was now used as a dormitory by a single parent.



Neither in external morphology nor in habits can Troupials be considered typical of the group of birds commonly included in the genus *Icterus*.

Thornbirds may sleep in a chamber adjoining that occupied by a sleeping Troupial, but it is doubtful whether they could rear a brood in a structure where Troupials are breeding, as the latter become fiercely aggressive toward the builders of their stolen nest.

A pair of Piratic Flycatchers and a pair of thornbirds simultaneously incubated and fed nestlings in different chambers of the same thornbirds' nest. The latter failed to raise their brood.

In late May, three pairs of Blue Tanagers were found building in as many thornbirds' nests, but none succeeded in rearing a brood.

Other birds known to breed in thornbirds' nests include the Jinete or Fire-crowned Flycatcher, Sayaca Tanager, and Saffron Finch. The Striped-backed Wren and Great Kiskadee sometimes use thornbirds' nests to support their own bulky structures. A pair of Thick-billed Euphonias built in a kiskadee's nest atop a thornbirds' nest.

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