

NOTES ON THE BREEDING AND ROOSTING BIOLOGY OF TROUPIALS (*ICTERUS ICTERUS*) IN VENEZUELA

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Troupials, *Icterus icterus* (Icteridae), occur over much of South America, from northern Venezuela south to Paraguay and northern Argentina, in a wide variety of habitats, from arid scrub and seasonal grasslands, to lowland tropical rainforest (Meyer de Schauensee & Phelps 1978, Ridgely & Tudor 1989). This Neotropical oriole displays great diversity in nesting behavior (Pearson 1974, Pinto 1975, Thomas 1983, Robinson 1985) and it is the only icterid known to sleep in dormitories rather than amid vegetation (Skutch 1996) although knowledge of other aspects of its breeding and roosting biology are limited (Skutch 1969, 1996). The purpose of this note is twofold: (1) to provide additional information on nest usurpation and nest building by Troupials at two sites in Venezuela, and (2) to describe aspects of its breeding and roosting biology, documenting double-broodedness and simultaneous care of young from two clutches. Flexible nesting behavior in Troupials (either usurping or constructing their own nests) is of interest because it reflects the wide

range of nesting strategies employed by members of the Icteridae, and because nest usurpation has been suggested as a step leading to brood parasitism (Pearson 1974), a behavior that has evolved in several species of icterids (Orians 1985). In addition, information on the nesting biology of the Troupial is valuable because southern races of Troupials, particularly *croconotus* (with *stictifrons*), may be specifically separate from the northern nominate groups including the races *icterus*, *ridgwayi* and *metae* (Voous 1983, Hilty & Brown 1986, Ridgely & Tudor 1989).

Observations of Troupial (*I. i. ridgwayi*) nesting behavior were made by Carlos Bosque (CB) on the Paraguaná peninsula on the northern coast of Venezuela, between 11° 28' and 12° 12' N, 70° W, from August through November 1978, throughout 1979, and up until July 1980. The study site has a mean annual precipitation of about 450 mm and the mean annual temperature is approximately 28° C. The area is classified as tropical thorn scrub (Whittaker 1975). The vegetation is described in detail in Bosque & Lentino (1987).

Catherine Lindell (CL) conducted observations of Troupial (*I. i. icterus*) nesting behavior from May through September 1990, May

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through November 1991 and 1992, and March and April 1993, in the llanos of central Venezuela at 8° 34' N, 67° 35' W. Observations were supplemented with checks of nest contents at irregular intervals. The study site, Hato Masaguaral, encompasses several vegetation types, including pasture with scattered trees and shrub/woodland. The vegetation has been described in detail by Troth (1979). The observations were carried out as part of a larger study on the species that breed in nests of the Plain-fronted Thornbird (*Phacellodomus rufifrons*; Furnariidae) (Lindell 1996). From 1978 through 1988 the mean annual precipitation at Hato Masaguaral was 1662.6 mm. The mean maximum daily temperature ranges from the low to mid 30s in degrees Celsius in all months, and the mean minimum temperature ranges from the low to mid 20s in all months except December when the mean may be in the high teens.

CB discovered nine Troupial nests at Paraguaná. Nest construction by Troupials was observed at two of the nests and the deep pouches woven from plant fibers and grasses corresponded well to those described by Voous (1983) for nests built by Troupials in the nearby Netherlands Antilles. The Troupials later laid eggs in these two nests. Five other nests at which Troupials were incubating eggs or feeding nestlings were similar in shape and construction although actually building was not observed. All seven nests were built in crotches of the giant columnar cactus, *Stenocereus griseus* (Cactaceae), a dominant plant in undisturbed areas of Paraguaná. In two other cases, the Troupials laid eggs in the (seemingly) abandoned nests of other species, once in a Pale-breasted Spinetail (*Synalaxis albescens*; Furnariidae) nest and once in the pendant nest of a Yellow Oriole (*Icterus nigrogularis*). The Troupials using the Pale-breasted Spinetail nest tore a hole in the side of the globular nest chamber and used the hole as an entrance, rather than the original

doorway. Average nest height above the ground was 2.5 m (SD = 0.54, N = 9) with a range of 1.9-3.6 m.

Nesting of Troupials on the Paraguaná peninsula occurred during both the brief wet and dry seasons. Of the nine nests discovered, three were found in June and July (the dry season) and six in November and December (the wet season). The nesting attempts in the spinetail and oriole nests took place in the wet season. Clutch size from six nests with complete clutches averaged 3.17 (SD = 0.41) with a range of 3-4 eggs.

Troupials also build their own nests on the Macanao peninsula of Margarita Island, off the northern coast of Venezuela several hundred kilometers east of Paraguaná (Ascanio 1997). Nest aspect and placement in the crotches of columnar cacti is similar on Macanao to that described for Paraguaná (this note) and the Netherland Antilles (Voous 1983).

At Hato Masaguaral CL recorded 50 instances of Troupials laying eggs in Plain-fronted Thornbird nests. Thornbird nests are long (often > 1m) cylinders of sticks, many with thorns. The nests generally contain several chambers that are not connected (Lindell 1996). Several times Troupials were observed to remove numerous sticks from a chamber entrance to enlarge the opening so they would fit through it. Prior to laying in a thornbird nest, Troupials often brought strips of vegetation into the chamber as lining. Skutch (1969) and Thomas (1983) observed similar behavior by Troupials at thornbird nests in the Venezuelan llanos.

Two clutches that were definitely complete (determined by several nest checks) contained two and three eggs, respectively. Four other clutches that were likely complete each contained three eggs, for a mean clutch size of 2.83 with a SD of 0.41 (N = 6). Partial loss of the clutch and/or brood appears to be common. Of 12 nests that were checked at

least two times during incubation and/or brooding, seven (58%) had lost at least one egg or nestling.

Troupials sometimes attempted nesting two or three times in a season. In 1991 and 1992 eight thornbird nests were sites of multiple (two or three) Troupial nesting attempts within a season, with two of the sites experiencing multiple nesting attempts in both years. Not all Troupial individuals were recognizable so it is possible the identities of some of the breeding individuals shifted within a season at a given site. However, color-marked individuals provided evidence of double and triple-broodedness. In one instance a color-marked bird made at least two nesting attempts at the same thornbird territory within a season and in another instance a marked individual made at least three nesting attempts within a season. In another case two Troupials, an adult and a fledgling, were captured and banded after they both emerged from a thornbird nest early in the morning 8 June 1991. On 9 July 1991 the same adult female was incubating in a neighboring thornbird nest while her unbanded mate fed the banded fledgling in the nest tree. The fledgling was spotted several times after this date in the nest tree. On 17 July 1991 it begged from the unbanded Troupial in the nest tree but was not fed while the female incubated.

In addition to using the nests for laying eggs and raising nestlings, Troupials roosted in them throughout the year, usually with one or two Troupials roosting in a nest at a time. In 1990, 66 watches were conducted during the hour before darkness fell at 24 thornbird nest sites. Troupials roosted in these nests 30 times (45% of the watches). In 1992, Troupials were observed roosting in thornbird nests 73 times during 173 watches at 40 territories (42% of the watches) and, in 1993, 28 such instances of Troupials roosting were observed during 48 watches conducted at 35

territories (58% of the watches). (Results of 1991 are not comparable with those above because observations were conducted in a different manner).

At six thornbird nests CL witnessed adult Troupials chasing or attacking other adult Troupials. In two of these instances one Troupial chased another. In another two instances two Troupials chased a third and in the final two instances one Troupial chased another while a third Troupial was present but not involved in the chase. Three of these incidents occurred in the hour before dark at roost time.

Conflicts between adults and fledglings were also observed in the vicinity of the nests. The nesting attempt described earlier, in which a pair was incubating eggs while simultaneously feeding a fledgling, ended in failure, apparently because of predation. Several days after the failure the two adults repeatedly (>15 times) chased the fledgling away from the nest at roost time although it eventually succeeded in settling into one chamber of the nest for the night. In another case, two adults chased a young bird that had fledged approximately six weeks earlier away from the nest where it was trying to roost. Two of the three chases lasted longer than 30 seconds. CL was not able to determine if the fledgling ever succeeded in roosting in the nest because darkness fell.

Troupial use of the hanging pouch nests of other icterids, of the large enclosed stick nests of some furnariids, and of the domed nests of one tyraniid has been documented over a wide geographic area. Troupials usurped the nests and destroyed the eggs and killed the young of another icterid, the Yellow-rumped Cacique, *Cacicus cela*, in lowland tropical rainforest in Peru (Robinson 1985). Troupials used abandoned nests of Yellow-rumped Caciues in Ecuador (Pearson 1974) and abandoned nests of the Rufous Cacholote, *Pseudoseisura cristata*, in Brazil (Pinto

1975). Sick (1993) reported that Troupials in Brazil used nests of the furnariids *Phacelodomus rufifrons*, *Pseudoseisura cristata*, and the Rufous Hornero, *Furnarius rufus*, which builds oven-like nests of mud, as well as the nests of a tyrannid, the Great Kiskadee, *Pitangus sulphuratus*. He described Troupials as sometimes throwing the host species' nestlings out of the nest before laying their own eggs. Cherrie (1916) reported Troupials in Venezuela as occupying and laying eggs in an apparently abandoned nest of *P. sulphuratus*. In addition to building their own nests, Troupials on Bonaire have been observed to usurp the nests of Tropical Mockingbirds, *Mimus gilvus*, and of Yellow Orioles, *Icterus nigrogularis* (Voous 1983).

Troupials are able to save themselves the energetic expense of building their own nests by competing for and/or usurping active nests of other species, or using abandoned nests of other species. Robinson (1985) hypothesized that Troupials may usurp Yellow-rumped Cacique nests in Peru, and destroy eggs and young in surrounding nests, to create a maze of empty nests that discourages predators. However, this explanation likely does not explain the adaptive value of the behavior to Troupials in central Venezuela because thornbirds often use another chamber in the same nest when one or more chambers are usurped by Troupials, leading to nesting associations rather than empty mazes. Although the expected advantages to Troupials using other species' nests have not been fully investigated, when Troupials become totally dependent on the nests of another species, as appears to be the case in central Venezuela, this may lead to increased intraspecific conflict, as exemplified by Troupials destroying the eggs of other Troupials laid in thornbird nests (Lindell 1996), and the competition for roost sites in thornbird nests. The fact that some nests were not used as roost sites each night suggests that some roost sites are

better than others and worth fighting for.

Friedmann (1929) hypothesized that nest usurpation may be a behavior leading to brood parasitism over evolutionary time, and Pearson (1974) suggested that in taking over abandoned cacique nests, Troupials could be evolving brood-parasitic behavior, at least in the Ecuadorian regions studied by him. In Paraguaná, CB did not find any Troupial eggs in nine nests of a likely host, the Yellow Oriole, or any other evidence to suggest brood parasitism. Two of the conditions present in Ecuador, and considered by Pearson and Hamilton and Orians (1965) as favorable for the Troupial to evolve parasitic behavior--first, the potential parasite being relatively rare with respect to the potential host and, second, the potential host species being colonial--are not met in Paraguaná or at Hato Masaguaral. Although usurpation and brood parasitism may appear to be logical steps in an evolutionary sequence, individuals using these reproductive strategies have different behaviors and morphologies. Brood parasites are usually cryptically colored individuals stealthily laying eggs in the nest of a sometimes related host species, while usurpers are often relatively large, boldly aggressive and sometimes colorful individuals that drive the more diminutive or retiring nest builders away (Friedmann 1929, Skutch 1969). The bright and conspicuous plumage of female Troupials suggests the species is far from assuming the inconspicuousness of many brood parasites. Furthermore, Troupial flexibility in nest site placement suggests that its habit of nest usurpation in parts of its broad range is less a way station along the route to brood parasitism than a successful reproductive strategy.

Our data, taken together with those of Voous (1983) and Ascanio (1997), indicate that nest building is widespread only among the northern nominate group of Troupials (which includes subspecies *icterus*, *ridgwayi*, and *metae* according to Ridgely & Tudor 1989),

although it has not been observed for the *icterus* subspecies, despite published reports of its nesting behavior (Skutch 1969, Thomas 1983, Lindell 1996) or the *metae* subspecies, for which published reports are lacking. The southern groups, the Amazonian *croconotus* (which Ridgely and Tudor (1989) indicate should probably be given full species rank) and the east Brazilian *jamaicaii*, have not been reported as constructing their own nests but seem only to usurp those of other species, mainly furnariids and other icterids (Pearson 1974, Pinto 1975, Robinson 1985, Sick 1993). We were not able to find any published reports of nesting behavior of the *stictifrons* race (grouped with *croconotus* by Ridgely & Tudor 1989). Hence, our data support Orian's (1985) behavioral distinction between southern and northern races of Troupials, which are currently diagnosed on the basis of plumage and the relative extent of the bare ocular patch (Ridgely & Tudor 1989). However, further observations of nesting behavior of all of the races are needed.

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