ORNITOLOGIA NEOTROPICAL 5: 125–128, 1994

NOTES ON THE BREEDING BIOLOGY OF THE SLATE-THROATED REDSTART (*MYIOBORUS MINEATUS*) IN VENEZUELA

Charles T. Collins & Thomas P. Ryan

Department of Biological Sciences, California State University Long Beach, CA 90840, U.S.A.

Key words: Slate-throated Redstart, Myioborus mineatus, *nest, eggs, nestling development, natal pterylosis, Venezuela.*

The Slate-throated Redstart (*Myioborus mineatus*) is generally common and widely distributed in the upper tropic and subtropic zones (500—3000 m) from Mexico south to Peru and Bolivia and east through Venezuela to northwest Guyana and extreme northern Brazil (Meyer des Schauensee 1970, Hilty & Brown 1986, Ridgely & Tudor 1989). In addition, its breeding biology has been studied in Guatemala and Costa Rica (Skutch 1945, 1954, making it perhaps the best known tropical species of the 12 currently included in the genus (Sibley & Monroe 1990). We report here additional data on the reproductive biology of this species in the coastal cordillera of northern Venezuela.

RESULTS AND DISCUSSION

Study location. All observations were made within a 1 km radius of Estación Biologíca 'Alberto Fernandez Y.' Rancho Grande located at an altitude of 1097 m 11.3 km north of Maracay, Aragua, (10° 21' N, 67° 41' W) in Parque Nacional Henri Pittier. The ecology of this montane cloud forest location has been described by Beebe and Crane (1947). The data presented here were collected during two prolonged stays at Rancho Grande: March-July 1972 (Collins) and March-July 1993 (Ryan). At Rancho Grande Slate-throated Redstarts are considered to be widely distributed but limited in their density and are attributed to *M. m. pallidiventris* (Schäfer & Phelps 1954); previously studied populations are *M. m. aurantiacus* in Costa Rica and *M. m. hellmayeri* in Guatemala (Skutch 1945, 1954).

Nest and eggs. A total of 8 nests were observed, 2 in 1972 and 6 in 1993. All were dome-shaped covered nests on steep, nearly vertical banks of a road, trail, or roadside drainage ditch. Five of these nests were placed between 30 and 52 cm above the adjacent trail and one was about 1.5 m above a well-traveled paved road. All were constructed of a mixture of twigs, moss, leaves, grass and palm fibres with a cup lining of grasses or rootlets. They were usually placed in a small niche among or behind leaves of living plants, making them extremely cryptic. This is in close agreement with Skutch's (1945: plate 12, 1954) descriptions of nests in Costa Rica and Guatemala and nests in the coastal cordillera near Colonia Tovar and Rancho Grande described by Ewert (1975). Six nests averaged 15.8 cm high and 16.3 wide externally with an internal cup diameter of 5.15 cm and depth of 2.5 cm. Nest building took a minimum of 3 days and the first egg in one nest was laid 7 days after building was first observed; eggs were laid at one day intervals. Skutch (1954) noted a similar gap of 7 days between the end of nest construction and the laying of the first egg in all 7 early season nests but a gap of only 2 days in a late season (replacement?) nest. Clutch size was 2 or 3 and averaged 2.42 (n = 7); Ewert (1975) also reported a clutch of 2 near Colonia Tovar. The date of

TABLE 1. Neossoptiles per tract or region in the Slate-throated Redstart.

	Specimen 1	Specimen 2
Coronal	5/7*	6/6
Occipital	2/3	2/3
Mid Dorsal	3/3	2/3
Scapular	5/6	5/5
Femoral	2/2	2/2
Greater Primary Coverts	0/0	1/4
Greater Secondary Coverts	5/5	5/5
Rectrices	6/6	6/6
Total		

* Number of nessoptiles on Left/right side.

confirmed laying of the first egg was between 29 March and 30 April in both years. One additional nest had unknown age small young on 6 June 1993; the date of laying of the first egg in this nest was somewhat later, probably about 15 May. These dates correspond approximately to the start of the annual rainy season at Rancho Grande (Beebe & Crane 1947). Elsewhere in its range this species appears to breed during the seasonal rainy season or during a season of lighter rains (Skutch 1945, 1954; Hilty & Brown 1986). During the period of heaviest rainfall nests may be damaged by rain or runoff as was noted in one nest, which was repaired and used, at Rancho Grande in 1993. Incubation appeared to begin with the laying of the last egg and lasted for an average of 14.25 days (range 13—15; n = 4). Fresh eggs were a pale pinkish brown with brownisch specks around the larger end; older eggs appear white with brownish specks. Egg size was 15.0—17.0 x 11.5—13.0 mm and averaged 16.33 x 12.34 (n = 11); egg mass averaged 1.52 g (range

TABLE 2. Growth of the Slate-throated Redstart.

Age (day)	Mass (g)	Wing (mm)	Tail (mm)	Appearance
	1.53 (1. 2.—1. 9.) [9]	6.16 (6.0—6.5) [3]		Sparse greyish natal downs on dorsum, egg tooth present
	2.12 (2.0—2.2) [3]	6.50 (6.5—6.5) [3]		Contour feathers observable as dark dots beneath the skin.
	3.24 (3.0—3.3) [5]	8.33 (8.0—8.5) [3]		Primaries (in pin) emerging through the skin.
	4.25 (4.0—4.4) [5]	11.33 (11.0—11.5) [3]		Pterylae distinct, no pins through skin, eyes partially open.
	5.83 (5.1—6.4) [5]	15.00 (14.5—15.5) [3]	0.5 (0.5—0.5) [3]	Primary pins 5—6 mm, contour and rectrix pins emerging through skin; eyes half open.
	6.93 (6.5—7.4) [4]	20.00 (20.0—20.0) [3]	1.66 (1.5—2.0) [3]	All pterylae in pins, egg tooth observable, eyes open, wings and legs long and awkward. Nestlings fill the nest cup.
	7.93 (7.4—8.5) [3]	25.50 (25.0—26.0) [3]	3.16 (3.0—3.5) [3]	Contour feathers beginning to errupt through sheaths.
	9.09 (8.4—9.9) [7]	28.83 (29.0—31.0) [3]	4.83 (4.5—5.0) [3]	Longest primaries 20 mm and errupting through sheaths.
	8.82 (8.4—9.3) [3]	33.66 (33.0—34.0) [3]	9.16 (8.0—11.5) [3]	Contour feathers almost covering body, some downs still present
10	9.03 (8.7—9.5) [3]	37.33 (37.0—37.5) [3]	9.66 (9.5—10.0) [3]	Young more active, made short jump-flights while being handled
	8.91 (8.5—9.5) [3]	40.17 (39.5—41.0) [3]	12.83 (11.5—14.5) [3]	Young difficult to keep in nest. Two fledged young seen to make 10—12 m flight from vicinity of nest later in the day.

* Ranges are given in parentheses and sample size [n] in brackets.

1.2—1.9; n = 6). Newly hatched chicks had pinkish-orange skin and mouth linings and were covered with sparse pale greyish natal down.

Natal pterylosis. The natal pterylosis was examined in two newly hatched specimens (Stage A. Wetherbee 1957) collected from the same nest on 16 May 1972. Short greyish neossoptiles approximately 1—6 mm long were noted in 8 tracts or regions (Table 1), all on the dorsum. The total number of neossoptiles was 60—63. This is a substantially reduced total compared to an array of North American parulids even though the Parulidae show a 43 % reduction compared to other passerines (Wetherbee 1957). The low total in the Slate-throated Redstart may be related to either (1) its being a closed-nest building species which, as in flycatchers (Collins & McDaniel 1989), typically have reduced numbers of neossoptiles, or (2) the fact that tropical passerines tend to have fewer neossoptiles than closely related temperate zone species (Collins & Minsky 1982, Wimer & Collins 1994).

Nestling development. The chicks grew rapidly over a period of 8 days (Table 2) at which time body mass leveled off at 8.99 g or 94.8 % of the adult mass of 9.48 g ± 1.36 SD (Hartman 1961, n = 37; given as 9.5 g in Dunning 1993); a single unsexed adult at Rancho Grande weighed 10.25 g (Collins 1972). The plumage also developed rapidly after day 3 when the first pin feathers emerged through the skin (Table 2). By fledging the young were fully covered with the juvenal plumage but the wing and tail had not reached full length and most contour feathers were still ensheathed at their bases.

The growth rate of one brood of three nestlings measured in 1972 was analyzed using a logistic equation and summarized by Ricklefs (1976: 207): asymptotic weight 9.5 g, growth rate (K) 0.522, and t_{10-90} = 8.4 days. The few additonal chicks weighed in 1993, and included in Table 2, did not appreciably change the overall growth pattern shown by the 1972 nestlings. It is notable that the growth rate of *Myioborus mineatus* "approaches that of temperate zone species of the family Parulidae (0.53—0.68 for six species)" (Ricklefs 1976: 207). However, earlier studies (Ricklefs 1968) had "suggested that tropical passerine birds, particularly species with small clutches, grow more slowly than passerines in termperate regions" (Ricklefs 1976).

Both adults fed the chicks in the nest and fecal sacs were removed by the departing adults. Brooding and incubating adults were very tenacious, waiting until the last possible moment to flush from the nest as also noted by Skutch (1945, 1954). Nest predation was high with five of six nests in 1993 suffering loss of eggs or chicks (Table 3). In Costa Rica only 32 % of eggs laid resulted in fledglings and only 45 % of all nests of Slate-throated Redstarts produced at least one fledgling (Skutch 1945). The lower survival of nestlings in the humid tropics compared to temperate areas has been reviewed by Ricklefs (1969).

These observations on nests, nest placement, clutch size and incubation period are in close agreement with those of other authors, particularly Skutch's detailed observations in Costa Rica and Guatemala (Skutch 1945, 1954). The

TABLE 3. Synoptic history of Slate-throated Redstart nests at Rancho Grande, Venezuela.

Nest 1.	Observed being built on 23 April 1972; three eggs present on 2 May (one collected); 2 newly hatched chicks collected on 16 May.
Nest 2.	Found with 3 eggs present on 18 May 1972; young hatched on 29 May; 3 young successfully fledged on 8 June,
Nest 3.	Found with 1 egg in 11 April 1993; 2 eggs present on 12 April; 2 newly hatched chicks on 27 April; nest empty on 3 May.
Nest 4.	Found with 2 eggs on 29 March 1993; 3 eggs present on 1 April, nest empty on 3 April.
Nest 5.	Found with one egg on 7 April 1993; 3 eggs present on 9 April (one damaged during handling); 2 young in nest 25 April; nest empty on 28 April.
Nest 6.	Nest being built on 13—15 April 1993; no further activity noted although nest appeared to be complete.
Nest 7.	Found with 2 eggs on 30 April 1993; newly hatched chicks present on 13 May; nest empty on 21 May.
Nest 8.	Found with unknown age small young on 6 June 1993; nest empty on 9 June.

degree of intraspecific agreement in these reproductive parameters is perhaps to be expected in this geographically widespread species, which appears to be a lower altitude habitat generalist. It is frequently replaced at higher altitudes in various parts of its range by congeners (Ridgely & Tudor 1989, Hilty & Brown 1986), most of which are unstudied with respect to their reproductive biology. Further studies of these species would provide valuable data for comparison to that presented here.

ACKNOWLEDGMENTS

The Frank M. Chapman Fund of the American Museum of Natural History, the C. S. U. Long Beach Foundation and Pomona Valley Audubon Society provided essential financial support for our field work in Venezuela. We are grateful to the government of Venezuela, INPARQUES, and PROFAUNA for permission to study in Parque Nacional Henri Pittier and to the Facultad de Agronomia, Universidad Central de Venezuela, and Sociedad Cientifica Amigos del Parque Nacional Henri Pittier for use of their facilities. The Sociedad Conservacionista Audubon de Venezuela, Miguel Lentino, Clemencia Rodner, Juan Garcia, Ernesto Fernandez B., and Alberto Fernandez B. and their families provided much appreciated help and hospitality.

REFERENCES

Beebe, W., & J. Crane 1947. Ecology of Rancho Grande, a subtropical cloud forest in northern Venezuela. Zoologica 32: 43—60.

Collins, C. T., 1972. Weights of some birds of north-central Venezuela. Bull. Brit. Orn. Cl. 92: 151—153.

Collins, C. T., & D. Minsky. 1982. Natal pterylosis of three Neotropical blackbirds (Icteridae). Bull. Brit. Orn. Cl. 129—131.

Collins, C. T., & K. M. McDaniel. 1989. The natal pterylosis of closed-nest building tyrant flycatchers (Aves: Tyrannidae). Bull. Southern Calif. Acad. Sci. 88: 127—130.

Dunning, J. B., Jr. 1993. CRC handbook of avian body masses. Boca Raton.

Ewert, D. 1975. Notes on nests of four avian species from the coastal cordillera of Venezuela. Wilson Bull. 87: 105—106.

Hartmann, F. A. 1961. Locomotor mechanisms of birds. Smithsonian Miscl. Coll. 142: 1—91.

Hilty, S. L., & W. L. Brown. 1986. A guide to the birds of Colombia. Princeton.

Meyer de Schauensee, R. 1970. A guide to the birds of South America. Wynnewood.

Ricklefs, R. E. 1968. Patterns of growth in birds. Ibis 110: 419—451.

Ricklefs, R. E. 1969. An analysis of nestling mortality in birds. Smithsonian Contrib. Zool. 9: 1—48.

Ricklefs, R. E. 1976. Growth rates of birds in the humid New World tropics. Ibis 118: 197—207.

Ridgely, R. S., & G. Tudor. 1989. The birds of South America. Vol. 1. The Oscine Passerines. Ausin.

Schäfer, E., & W. H. Phelps. 1954. Las aves del Parque Nacional "Henri Pittier" (Rancho Grande) y sus funciónes écologicas. Boll. Soc. Venez. Cien. Nat. 83: 1—167.

Skutch, A. F. 1945. Studies of Central American redstarts. Wilson Bull. 57: 212—242.

Skutch, A. F. 1954. Life histories of Central American birds. Pacific Coast Avifauna 31: 357—370.

Sibley, C. G., & B. L. Monroe, Jr. 1990. Distribution and taxonomy of birds of the world. New Haven.

Wetherbee, D. K. 1957. Natal plumages and downy pterylosis of passerine birds of North America. Bull. Amer. Mus. Nat. Hist. 113: 339—436.

Wimer, M. C. & C. T. Collins. 1994. Natal pterylosis of some Neotropical thrushes (Muscicapidae: Turdinae). Bull. Brit. Orn. Cl. 114: 170—173.

Accepted 28 November 1994.