

**OBSERVATIONS OF A NEST OF
RED-CROWNED ANT-TANAGERS
IN PARAGUAY**

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Abstract.—The nest and nesting behavior of a pair of Red-crowned Ant-Tanagers (*Habia rubica rubica*) from Paraguay is described. Results are compared with those from studies of other subspecies. Because the species occurs in temperate, subtropical, and tropical habitats from Mexico south to Paraguay, northern Argentina, and southeastern Brazil, we expected details of breeding to differ in different parts of the range. Other than differences in the timing of breeding north and south of the equator, only details of nest structure and egg coloration showed geographic variation.

OBSERVACIONES SOBRE UN NIDO DE *HABIA R. RUBICA* DEL PARAGUAY

Resumen.—Se describe el nido y el comportamiento reproductivo de un par de Cardenal Hormiguero (*Habia rubica rubica*) del Paraguay. Se comparan los resultados con los de otras subespecies estudiadas. Debido a que la distribución del ave se extiende desde México al Paraguay, norte de Argentina y sureste de Brasil, e incluye los hábitats templados, tropicales, y subtropicales, se esperaban encontrar diferencias regionales sobre la biología reproductiva de la especie. Además de las diferencias en la época reproductiva al norte y al sur del ecuador, solo los detalles de la estructura del nido y del color de los huevos manifestaron variación geográficamente variables.

The Red-crowned Ant-Tanager (*Habia rubica*) ranges from approximately 23.5°N in Mexico, to nearly 30°S in southern Brazil (Isler and Isler 1987), a span of more than 50° latitude. Not surprisingly, the species is divided into 17 subspecies, groups of which occupy disjunct areas in Central America, northernmost South America, the Amazon basin, and southeastern South America (Isler and Isler 1987, p. 140). The subspecies are distinguished by differences in size and coloration (Hellmayr 1936, Isler and Isler 1987, Parkes 1969). Given their disjunct distributions as well as their use of temperate, subtropical, and tropical habitats on both sides of the equator, one might also expect the subspecies to differ in ecology and behavior.

Willis (1972) described such differences among the species of *Habia* as well as among certain allopatric forms that he tentatively designated conspecific. For the Red-crowned Ant-Tanager, he noted moderate differences between nests and behavior of Amazonian and northern (Trinidad to Mexico) forms and suggested that they might eventually warrant separation as different species. Willis (1972) did not report on Red-crowned Ant-Tanagers from the southeastern part of the range in southern

Brazil, northern Argentina, and southeastern Paraguay. We report on a nest and associated activities of *H. r. rubica* in Paraguay and compare our findings with those for the species in other areas.

METHODS

The nest was located in the forest adjacent to Hotel El Tirol, 19.5 km by road, NNE Encarnación, Dept. Itapua, Paraguay (ca. 27°11'S, 55°47'W). The area, which lies in a zone of warm, temperate moist forest is described in Smith and Foster (1984). Observations were made with 7 × 35 binoculars from dense vegetation that hid the observer, 4 m from the nest, for a total of 15 h between 19–30 Sep., 1982. Observation periods, other than brief checks of the nest, were 35–212 min.

Nestlings were numbered on the abdomen with a marking pen, weighed with a spring balance and measured with calipers. Vocalizations were recorded with a Uher 4000 Report IC tape recorder at a speed of 7.5 ips. They were analyzed on a Kay Digital Sonagraph Model 7800, with a 0–8 kHz range, on a 300 Hz band setting, using a high pass filter at 500 Hz.

Specimens collected at Tirol are deposited in the National Museum of Natural History, Washington, D.C. and in the Museum of Vertebrate Zoology, University of California, Berkeley.

RESULTS AND DISCUSSION

Breeding season.—Eight of 10 Red-crowned Ant-Tanagers collected at Tirol from early September through early January (1976–1982) had enlarged gonads, suggesting that breeding spans at least this period. Specimens from August are not available, but many other species breed then. The January specimen was molting, which probably indicates the end of the breeding season.

Nest placement and structure.—The nest was discovered on 19 Sep. 1982 in a 2.5 m *Faramea* sp. (Rubiaceae) shrub in an area of relatively undisturbed, closed-canopy forest. The nest sat 1.25 m above the ground in a crotch formed by three small branches (2.3–11 mm diam), and was supported by a fourth (4.5 mm) branch. The nest was shaded by the leafy extension of one branch, but received filtered sun at midday.

The outer diameter of the nest at the rim was 12 cm, and the outer height, 15 cm of which 7.5 cm represented the nest proper, and 7.5 cm was pendant, camouflaging material. The inner diameter of the nest was ca. 6 cm, and the inner depth, 3 cm, so the open cup formed a relatively small part of the structure. Measurements for nests from other areas are, *H. r. rubicoides* (Mexico, $n = 1$): outer diam × height, 10.0 × 6.5 cm, inner diam × depth, 6.0 × 4.0 cm (Alvarez del Toro 1952); (Belize, $n = 11$): 9.2 × 5.5, 6.1 × 3.0 (Willis 1961); *H. r. vinacea* (Costa Rica, $n = ?$): inner diam × depth, 7.6 × 3.8 (Skutch 1954); *H. r. rubica* (Brazil, $n = 1$): 14.0 × 7.0, 7.0 × 4.0 (Euler 1900).

The Paraguay nest was lined with a soft cushion, 1–3 cm thick, of smooth, very fine, black or dark reddish brown rootlets. The interwoven

fibers, some more than 50 cm long, generally followed a circular path parallel to the rim. The outer wall of the nest, ca. 2 cm thick, consisted of much coarser materials. Next to the inner lining was a layer of dried leaf midribs, fungal rhizomorphs (including *Marasmius* sp.), and vine tendrils. Next were small twigs and thick vine tendrils (1 mm diam), then larger twigs (1.5–2.5 mm), and finally small sticks (3.0–4.0 mm). Pieces of moss, leaves, and dried bamboo sheaths were scattered throughout the wall. Hanging from the bottom of the nest and to one side was a mass of loosely placed, randomly oriented sticks and twigs (to 6.5 mm diam).

Eggs.—The nest held three eggs when discovered toward the end of the incubation period (reported by Willis [1961] as 13–14 d). The dull white eggs were ovate with rather flat, blunt ends. Irregular brown spots formed an almost solid cap at the large end, but became dispersed toward the middle of the egg. The eggs averaged 25.9×18.7 mm (27.3×19.7 ; 25.0×18.0 ; 25.5×18.5). One day before hatching, their average weight was 3.75 g (4.0; 3.5; 3.75).

Average egg sizes reported from other localities are similar, although ground color is more variable. *H. r. rubicoides* eggs from Mexico ($n = 2$; length \times width = 26×18 mm, Alvarez del Toro 1952) and Belize ($n = 3$; 24.3×16.9 , Willis 1961) are white. Those of *vinacea* from Costa Rica ($n = 5$, 24.3×17.7) are dull white or have a faint bluish tinge (Skutch 1954). Eggs of *rubra* from Trinidad are described as glossy gray-green ($n = 2$, 23.1×15.0 , Belcher and Smooker 1937) or whitish ($n = 2$, 23.6×16.8 , French 1973). Similar variation is noted in *rubica* eggs from Brazil, which are described as white with a blue-gray cast ($n = ?$, 24×18 , Euler 1900) or shiny white ($n = ?$, 24.5×18 , Nehrkorn 1899). Ihering (1900) also reported eggs of this subspecies from Brazil ($n = ?$, $24\text{--}26 \times 18$), but did not note color.

Incubation.—The nest was checked five times between 19–21 Sep. Once it was uncovered; four times the female was incubating. The eggs hatched between 1010 on 21 Sep. and 0834 on 22 Sep. Weights of the nestlings at 1035 on 22 Sep. equaled or exceeded the egg weights about 24 h earlier.

Nestlings and development.—Regression equations were calculated for nestling growth (Fig. 1) as indicated by weight gain (nestling #1: weight = $1.48 \pm 2.43(\text{age in days})$, $R^2 = 98.9\%$, $df = 6$; #2: wt. = $0.82 + 2.56(\text{age})$, $R^2 = 99.0\%$, $df = 6$; #3: wt. = $0.88 + 2.63(\text{age})$, $R^2 = 99.3\%$, $df = 6$ and wing chord (#1: wg chd = $-31.6 + 8.94(\text{age})$, $R^2 = 95.3\%$, $df = 3$; #2: wg chd = $-34.0 + 9.26(\text{age})$, $R^2 = 97.3\%$, $df = 3$; #3: wg chd = $-32.0 + 9.0(\text{age})$, $R^2 = 94.8\%$, $df = 3$). The two botfly larvae and open sores on nestling #1 may have contributed to its somewhat slower growth rate.

Morphological and behavioral development were also noted:

Day 1 (Sep. 22). Skin bright brownish salmon. Charcoal colored down on the head, secondaries, upper secondary coverts, scapulars, the length of the dorsal tract, lower crural tract, posterior and lateral surfaces of thighs, and in postero-lateral regions of the ventral tract. Bill cream

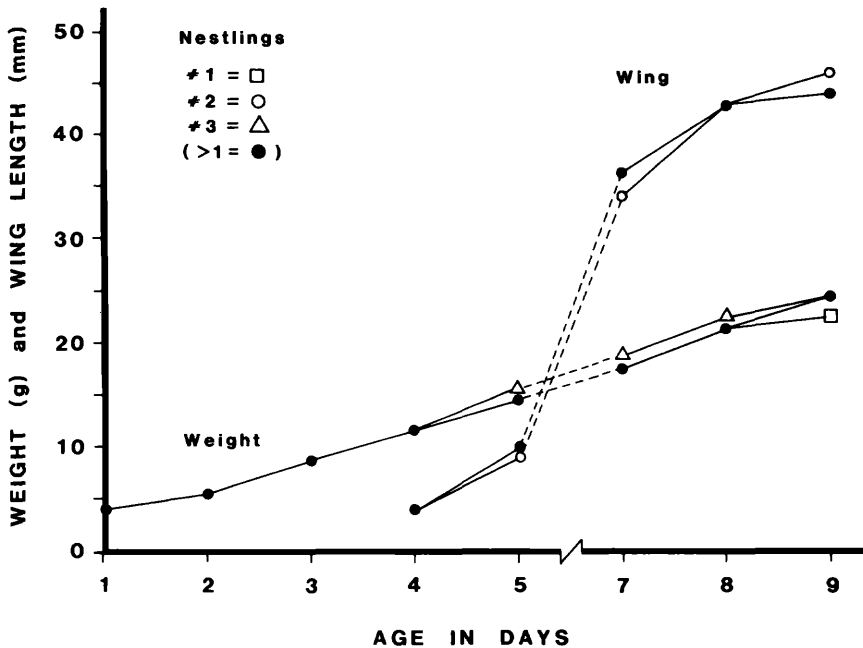


FIGURE 1. Development of *Habia r. rubica* nestlings from Paraguay. When two or three nestlings have the same value, their symbols are replaced on the graph with a black dot.

colored with brown tip; no egg tooth apparent. Abdomen greatly distended. Eyes closed, with dark gray lids. When the nest is vibrated gently, young raise heads and point open bills vertically.

Day 3. First vocalizations by young. Nestling #1 with botfly larvae under skin on abdomen and chin; two open sores on one wing.

Day 4. Primaries growing; dorsal tract developing; ventral tract with pin feathers; rectrices barely protruding. Young raise heads and are alert in response to calls of approaching adults and to gentle nest vibration; extend necks and thrust open bills toward parent when begging. When nest branch is vigorously shaken, young huddle silently at bottom of nest, perhaps to decrease conspicuousness to predators.

Day 5. Young peep softly when handled.

Day 7. Eyes partially open. Feathers of all regions protrude through skin. Young move easily around nest. One botfly has emerged from nestling #1, no evidence of infection. Young make harsh contact notes.

Day 8. Eyes completely open. Feathers in all regions breaking sheaths, brownish. Young flap wings, although remiges almost entirely in sheath. Cheep frequently. Second botfly larva of nestling #1 gone; no infection.

Day 9. Young actively scramble around nest, flap wings vigorously, but cannot fly. Two young fill nest; third nestling beneath others.

Day 10. Young move around nest, cheep frequently. Parents within 10 m of nest, chatter continuously. 1142: nestling #2, calls steadily, crawls to nest rim and jumps to leaf litter. 1202: nestling #3 walks to nest rim, toes catch in nest lining; 1205: jumps to leaf litter. 1207: nestling #1 walks to rim and jumps; lands on a branch, is unable to perch, hangs upside down briefly, falls to ground. Young move in leaf litter, cheep steadily; parents vocalize continuously.

Fledglings (Day 10).—Bill dark gray above, pale below. Lateral flanges, yellow. Dorsal head feathers with complete sheaths. Down remains on five superciliary feathers on each side and four lateral occipital feathers on one side. Anterior spinal tract ca. $\frac{1}{3}$ out of sheath, to tips out only in extreme posterior tract. Feathers dark yellowish brown. At least five feathers still with down in posterior dorsal region and two pairs anterior to uropygial gland. Under chin feathers with complete sheaths, breaking skin. Rest of underparts, feathers with half sheath, cinnamon brown as in adult female. Femoral tract, five down feathers remaining on one side, four on other; anterior feathers with three-fourths sheath, posterior with $\frac{1}{3}$ – $\frac{5}{8}$ sheath; cinnamon brown. Crural tract, tips breaking sheath, cinnamon brown.

Wing feathers dark brown. Outer primaries and secondaries 75–80% sheathed to inner secondaries breaking sheaths. Greater primary coverts half sheath, upper greater secondary coverts, tips out. Other upper coverts $\frac{1}{2}$ – $\frac{1}{3}$ out of sheath. Under wing coverts with complete sheath except for a few on distal margin, with no sheath; cinnamon brown. Outermost rectrices ca. 5 mm long; central pair, ca. 3 mm. Lateral remiges breaking sheaths. Anal circlet well developed, complete sheaths.

A single fledgling (#2) was collected and measured on day 10: weight = 24.5 g; bill length/depth/width = 5.6/4.7/5.6 mm; wing chord = 46 mm; tail = 5 mm; tarsus/middle toe = 24.8/11.5 mm. The fledglings seemed relatively undeveloped when compared to adults from Tirol. Fledgling weight was only ca. 72% of that of adult males (\bar{x} = 34.0, n = 7) and 80% of that of adult females (\bar{x} = 30.5, n = 3). Wing chords were about 60% those of adults (3 $\delta\delta$, \bar{x} = 80.4 mm; 1 ♀ = 72.8 mm), with remiges 75%–80% ensheathed, and tails were hardly grown. Fledglings were unable to fly. Bill dimensions were ca. 45%–79% those of adults (3 $\delta\delta$, \bar{x} s = 11.9/7.9/7.1; 1 ♀ = 12.4/8.5/7.6). In contrast, tarsus and middle toe lengths were close to those of adults (3 $\delta\delta$, \bar{x} s, = 26.0/16.0; 1 ♀ = 26.2/16.0), and young moved quickly and easily on the ground.

Care of young.—We observed 20 bouts of brooding, which totaled 5 h 45 min. Only the female brooded. Brooding was more extensive during the morning (53.2% of 8 h 32 min observation), than in the afternoon (18.7% of 6 h 26 min). Brooding decreased through the nestling period, except on two cold days with heavy rain (days 4–5) when it increased (day 1 = 67% of 212 min observation; day 2 = 47.7% of 175 min; day 3 = 24.8% of 125 min; day 4 = 42.7% of 75 min; day 5 = 82% of 45 min; day 7 = 14.6% of 130 min; days 8 and 9 = 0% of 96 and 40 min).

When entering the nest, the female hopped from the rim into the middle,

lifted her wings, and rocked side-to-side for several seconds as she settled on the young. She sat quietly with her head above the nest rim, her tail over the edge, and much of her body visible. This reflects the small size of the nest. Brooding bouts ranged from 2 to 110 min, with bout length decreasing through the nestling period (e.g., on day 1 bouts = 2–110 min; on day 7, 2.5–13 min). Brooding bouts ended when the female just flew from the nest (11), flew in response to a call from the male who then fed the young (6), or was flushed by humans (3). When leaving, the adults dropped below the nest and flew near the ground; they approached along a similar path.

The female fed the young considerably more often than the male did, making 48 (70.6%) of 68 feeding visits observed. She fed an average of 1.9 young/trip, the male, only 1.6. These values decreased through the nestling period, presumably reflecting growth of the young. For both sexes during days 1–4, young fed/trip averaged 2.3 ($n = 39$ trips); for days 5–9, the mean was 1.0 young/trip ($n = 29$). More young were fed/trip in the morning ($\bar{x} = 2.2$, $n = 28$) than in the afternoon ($\bar{x} = 1.3$, $n = 40$). However, there were fewer trips/hour in the morning ($\bar{x} = 3.5$, $n = 30$ trips) than in the afternoon ($\bar{x} = 6.0$, $n = 38$), so young fed/hour was approximately equal for both periods (7.7 vs. 7.8).

Parents thrust their bills deep in the throats of the young to feed them. Generally, an entire insect was provided to a single nestling. If an insect was too large for the nestling (observed 8 times), the adult removed it, mashed it, and fed it to the nestling again, behavior also observed by Willis (1961). Recognizable food items included orthopterans, caterpillars and other larvae, and one walking stick.

The female removed 17 fecal sacs, the male six. This parallels the differences in their rates of feeding young, probably because nestlings commonly defecate when fed. When extruding a sac, a nestling raised its posterior, and the anus opened and closed. This may have alerted the adults (females, especially, peered closely at the young after feeding), who often grabbed a fecal sac as it appeared and helped to remove it. Sacs ranged from ca. 6 mm in diameter early in the nestling period to ca. 12 mm toward the end. The female swallowed six sacs during days 1–4, but only one of 11 after day 7. Others were carried from the nest. The male swallowed three during days 1–4, and one of three after day 7.

Vocalizations.—On day 3, the young gave soft peeps and harsh, loud *cheeps* (Fig. 2). The latter were given singly, from 0.8 to several seconds apart, when an adult approached. The calls were 0.17 to 0.37 s long ($\bar{x} = 0.27$, $SD = 0.061$, $n = 9$). Usually, frequency increased and decreased twice, with the amplitude of the second modulation smaller than the first. Occasionally, frequency decreased and then showed a greater increase, followed by a small decrease and increase. In form the calls resemble the dawn song of this species from Belize (Willis 1960) and may represent stages in its development. The calls had a harmonic structure, with the fundamental apparently not expressed. The harmonic with the greatest intensity had a lower frequency of 1.74 kHz ($SD = 0.13$, range = 1.58–

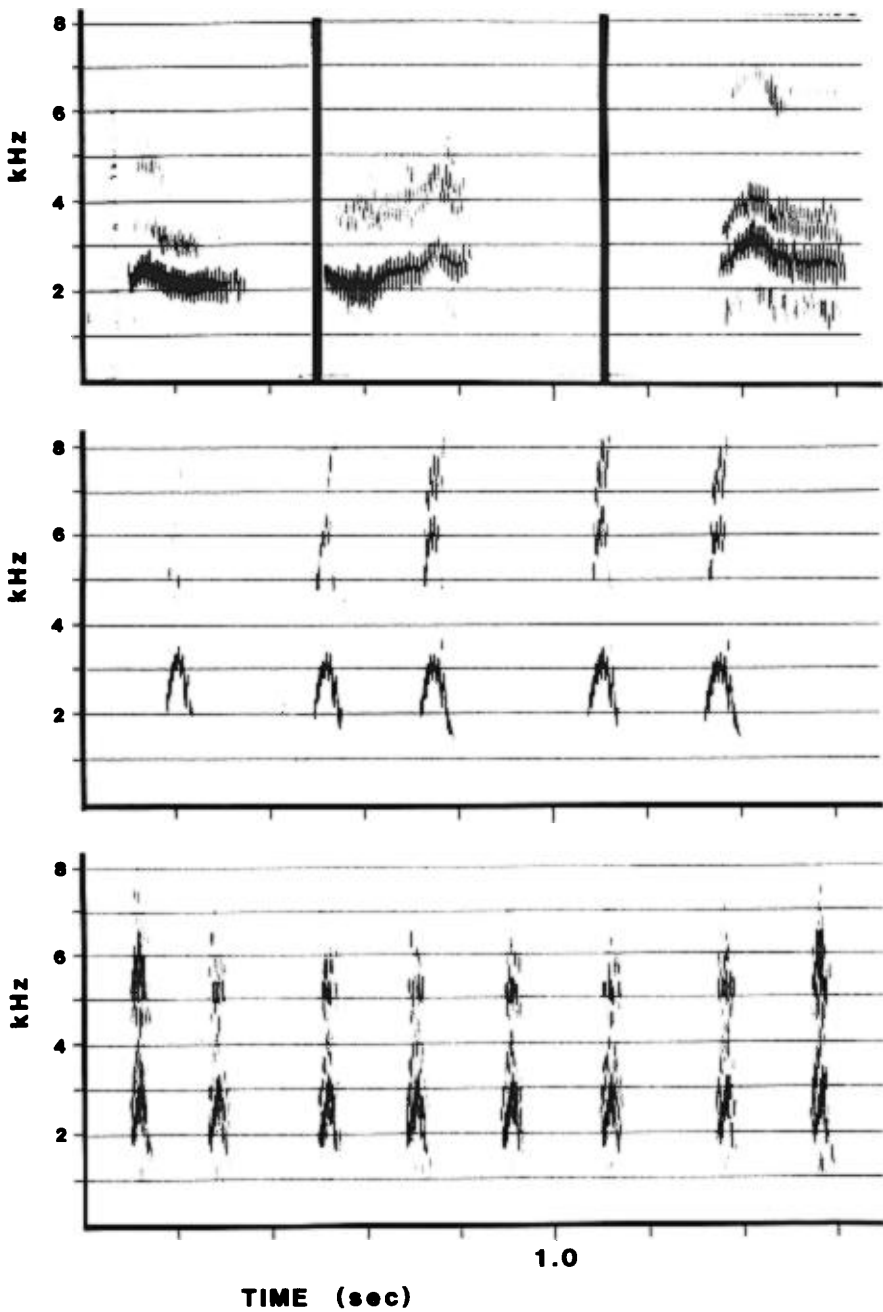


FIGURE 2. Sound spectrographs of selected vocalizations of *H. r. rubica* from Paraguay. Upper: Nestling *cheep* calls. Middle: Nestling *tshupp* calls. Lower: Adult contact calls.

2.00, $n = 8$) and a peak frequency of 3.17 kHz (SD = 0.26, range = 2.83–3.58, $n = 8$). One to three additional harmonics were usually expressed.

By Day 7 the nestlings also gave a loud, almost shrill *tschupp* call (Fig. 2), usually 3–5 times in succession. Call length averaged 0.08 s (SD = 0.01, range = 0.06–0.09, $n = 14$), with successive calls given at mean intervals of 0.27 s (SD = 0.06, range = 0.20–0.36, $n = 9$). The notes had a harmonic structure and were frequency modulated, with a chevron shape. The most intense harmonic ($n = 13$) had beginning, peak, and end frequencies of 1.56 kHz (SD = 0.30, range = 1.0–1.97), 3.47 kHz (SD = 0.16, range = 3.08–3.58), and 1.43 kHz (SD = 0.26, range = 1.17–1.92), respectively. Additional upper harmonics were frequently present.

This call resembles the one used by adults to maintain contact (Fig. 2). The adult call had a harmonic structure and was frequency modulated up and down. The harmonic with the greatest intensity ($n = 10$) had mean beginning, peak, and end frequencies of 1.53 kHz (SD = 0.11, range = 1.42–1.75), 3.45 kHz (SD = 0.12, range = 3.33–3.75), and 1.24 kHz (SD = 0.18, range = 1.00–1.42), respectively. Calls lasted an average of 0.06 s (SD = 0.02, range = 0.05–0.09, $n = 9$). Adults gave calls in more rapid succession than young, with successive notes initiated at mean intervals of only 0.18 s (SD = 0.03, range = 0.13–0.21, $n = 7$).

Comparison with other Habia rubica populations.—Birds in Mexico and Central America may begin breeding as early as February (Skutch 1954) and continue into August (Alvarez del Toro 1952; Thurber and Villeda 1980; Wetmore et al. 1984). In Trinidad, nests are recorded for February through October, but breeding is concentrated in May through August (French 1973; Snow and Snow 1964). Willis found a nest in Pará, Brazil, in February. Other than the expected ca. 6-month offset of the breeding seasons on each side of the equator, populations differ only in details of nest structure and egg coloration.

The walls of the southern South American nests were somewhat thicker than those of Central American nests. In fact, Willis (1961), Alvarez del Toro (1952), Skutch (1954), and French (1973) specifically mentioned that walls were thin, even to the point that the eggs were visible through the bottom of the nest. Similar materials were used to build nests in all areas, with the exception of spiders' web reported only by Willis (1961) and Skutch (1954). Nevertheless, our nest (and apparently, Euler's [1900], which was made of "strong branches") had a heavier construction than the others. For example, the outer layer of our nest included twigs up to 4 mm in diameter, whereas the largest reported by Willis (1961) reached only 2 mm. Only our nest and the ones in Trinidad (Snow in Willis 1972) were described as having pendant materials.

In all areas, nests were placed from ca. 1 m to nearly 6 m up in shrubs or saplings (Alvarez del Toro 1952, Euler 1900, French 1973, Skutch 1954, Willis 1961).

Clutch size was reported as one to three throughout the range of the

species. Egg sizes and markings showed little variation. The ground color and finish of the eggs were variable, but followed no apparent geographic pattern.

All reports indicated that only females incubate, but that both parents feed the young and remove fecal sacs. In all areas, the males fed the young less frequently than did the females. In contrast with our observations, Willis (1961) found that the rate of feeding in Belize was slightly lower in the afternoon than in the morning.

The nests and nesting characteristics of *Habia rubica* show similar, but limited, variation both within and between the geographically widely separated subspecies for which data are available. The differences demonstrated do not appear sufficient to warrant specific separation of any forms at this time.

ACKNOWLEDGMENTS

We are grateful to Armando and Miguela Reynaers who granted permission for us to work at Tirol, to D. Bell for measuring specimens, to C. Angle and S. Gotte for preparation of figures, to R. C. Banks and R. B. Clapp for commenting on the manuscript, and especially to Rex Cocroft who analyzed the vocalizations and provided extensive help with their interpretation.

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Received 25 Mar. 1988; accepted 22 May 1988.

**ASSOCIATION OF FIELD ORNITHOLOGISTS—
 WILSON ORNITHOLOGICAL SOCIETY
 JOINT ANNUAL MEETING 31 MAY–3 JUNE 1990**

(TENTATIVE SCHEDULE)

- 31 May** Arrival
 Council Meetings
 Reception sponsored by the Nuttall Club
- 1 June** 0830 Welcome
 0900 Banding demonstration at Manomet Bird Observatory
 0900 Symposium: Amateur in Ornithology. Opening remarks
 0910 From the pilgrims to the present: contributions of amateur ornithologists—Mary Clench
 0940 Current role of the amateur ornithologist—Harold Mayfield
 1010 Coffee break
 1030 Contributions amateur banders have made and can make—Robert Yunick
 1100 View from the banding laboratory—John Tautin
 1130 WOS business meeting
 1200 Picture, lunch
 1330 Workshop: Endangered passerines
 1330 Contributed paper sessions 1 and 2
 1800 Dinner
 1930 Poster paper session, reception hosted by Manomet
- 2 June** 0830 AFO business meeting
 0920 Banding demonstration at Manomet Bird Observatory
 0920 Symposium: North American Avian Zoogeography. Opening remarks
 0930 Origins and development of North American avian zoogeography
 1000 Use of BBS, BBC, and WBPS to track zoogeographic change—Chan Robbins
 1030 Coffee break
 1045 Current problems and answers in zoogeography
 1115 Global warming, deforestation, and the future of avian zoogeography—Elliot Tramer
 1200 Lunch
 1300 WOS business meeting
 1400 Workshop: Conservation of coastal wetlands in the western hemisphere—Keith Bildstein
 1400 Contributed paper sessions 3 and 4
 1700 Social hour
 1800 Banquet
- 3 June** Field trips

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