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OBSERVATIONS OF THE BEHAVIOR OF THE ZIGZAG HERON

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Reliable sight records of the Zigzag Heron (*Zebrilus undulatus*) are said to be virtually nonexistent, and nothing has been recorded of the feeding, breeding or other habits of this species (Hancock and Elliot 1978). We therefore present our observations of an individual of this species and summarize several other recent sight records.

Robert Ridgely (pers. comm.) sighted a Zigzag Heron on the Rio La Torre, Madre de Dios, Peru, in October 1976. The bird was in a very small oxbow lake beginning to fill with water at the onset of the rainy season. The oxbow was completely shaded, with thick undergrowth around the edges. J. P. O'Neill (1969) collected a Zigzag Heron at Yarinachocha, Loreto, Peru; it was at the edge of a small pond (a low spot that filled in flood times), with the edge growing up in grasses (O'Neill, pers. comm.). D. L. Pearson (1975) collected one in Bolivia as it fed on the floor of primary forest. The relevant information on the two specimens, provided by J. P. O'Neill, is listed below.

LSUMZ 42681, Yarinacocha, Dpto. Loreto, Peru, ad. ♀, 24 Feb. 1965, ovary 10 × 5 mm, slightly enlarged; iris dark brown; bill dark horn, bottom of mandible yellowish brown; feet brownish with yellowish undersides. Seems to be an *adult* ♀. JPO coll.

LSUMZ 71899, ♀, probably sub adult, 6 Nov. 1972, ovary 15 × 6 mm; upper mandible gray, lower mand. dull yellow; iris yellow; 140 g; 24 km S. Riberalta, Beni, Bolivia. D. L. Pearson coll.

We observed a Zigzag Heron on 8 August 1979, at the Explorer's Inn on the south bank of the Rio Tambopata, immediately downstream from the mouth of the Rio La Torre (12°49′S, 69°18′W) at an elevation of approximately 170 m. The Inn is approximately 30 km southwest of the town of Puerto Maldonado, Department of Madre de Dios, Peru. We first saw the bird at 09:30 along a 1 m wide creek that was shallow, slow moving and completely shaded by a high, dry tropical evergreen forest with thick undergrowth and a canopy approximately 30 m high. When first observed, the heron was less than 1 m from the ground in dense underbrush at the top of a 1 to 2 m high creek bank. It flushed at our approach and crossed the creek, where it perched for several minutes at our eye level. It then flew a short distance and again perched at eye level on a fallen tree trunk, where we were able to watch it for over five minutes from a distance of approximately 7 m.

The bird was apparently an adult, dark above with buffy vermiculations and paler below. The iris was pale dirty yellow, the bill blackish and very short, and the legs were medium value greyish horn with yellowish toes. The bare facial skin was darkish gray. This bill description differs from those of O'Neill and Pearson and from that of Cherrie (1916) from a freshly killed bird as dusky above, pale yellow horn color below. The feathers of the neck and head formed a mane, especially prominent when the heron tucked or turned its head, which gave the bird a thick-headed appearance. The heron's posture and head shape (Fig. 1) differ substantially from most published illustrations of the Zigzag Heron. Our bird was less puffed-out below and its shaggy nape was not so full as illustrated by Tudor in Meyer de Schauensee and Phelps (1978); also, the neck was pulled in more and the feathers of the neck not as long and stiff as illustrated by Hayman in Hancock and Elliot (1978). The posture was more horizontal and the bill shorter than illustrated by Tudor or Hayman (cited above) or by Keane in Blake (1977), or Barruel in Haverschmidt (1968).

During the approximately seven to eight minutes of observation the heron flicked its tail with a peculiar movement. The tail was flicked from a neutral position down and to one side, then back to neutral, then down and to the other side and then back to neutral. Each element of this movement occurred approximately once a second (25 counted in 30 seconds). This tail flicking was essentially continuous, the rhythm barely interrupted during the several brief preening bouts.

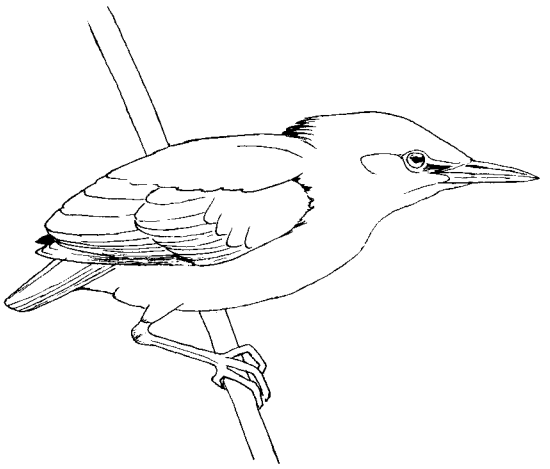

FIGURE 1. Zigzag Heron (*Zebrilus undulatus*), drawn from field sketch by Paul K. Donahue.

Nervous tail flicking also occurs in the Rufescent Tiger-Heron (*Tigrisoma lineatum*), a forest heron commonly observed at Explorer's Inn. One immature bird observed by Donahue continuously flicked its tail, bringing the tail down slowly and then flicking it up rapidly. Herons in the genus *Butorides* also flick their tails.

Although the Zigzag Heron allowed our close observation, it appeared nervous and at irregular intervals (every minute or so) performed 180° manakin-like jumping turns on its perch. Observation ended when the bird flew into the dense undergrowth.

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DEVELOPMENT OF TEMPERATURE REGULATION IN NESTLING TREE SWALLOWS

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The nestlings of several species of altricial passerines lack any thermogenic response to low ambient temperatures (T_a) during approximately the first half of their growth (see discussion in Marsh 1979; also, Mertens 1977a). Apparent improvements in the thermoregulatory capacity during the early phase of growth, as reflected by body temperatures (T_b) after a standardized cold exposure, are due to the relationship of cooling rate to size and are not due to active metabolic regulation (Marsh 1979). This pattern of development may influence the parental behavior and nesting ecology of passerines (see Dawson and Hudson 1970, Dunn 1975, for reviews). The present study examines the development of temperature regulation in individual nestling Tree Swallows (*Iridoprocne bicolor*) under laboratory conditions. These data extend the range of observations of thermoregulatory development in passerines and aid in interpreting the mechanisms underlying the maintenance of homeothermy under field conditions (cf. Dunn 1979).

I studied Tree Swallow nestlings during July 1971, at the University of Michigan Biological Station, Pellston, Cheboygan County, Michigan. Nestlings from three nests (two clutches of five and one clutch of three) located in nest boxes were used. The nestlings were individually marked, and at least two days elapsed between the successive use of any individual in laboratory tests.

Nestlings were weighed in the field to the nearest 0.1 g and were taken to the laboratory in covered insulated containers. Laboratory tests began 5–30 min after removal of the birds from the nest box. Nestlings were placed individually in open, one-pint containers lined with paper packing material, 1 cm thick, and maintained for 2 h at a T_a between 19.3 and 21.0°C in a darkened basement room. Body temperatures at the beginning and end of the tests were measured orally with a Yellow Springs Instruments thermistor probe (no. 402). The initial body temperatures varied somewhat due to cooling of the smaller nestlings in transit. However, relatively warm air temperatures (mean 26.4°C) and the insulated transport containers minimized this effect. The lowest initial T_b was 32.6°C. Nestlings were examined for shivering at the beginning and end of the tests. Feather lengths were measured to the nearest millimeter with a ruler.

Nestlings reached peak body masses in approximately 12 days (Fig. 1). The growth curve can be described by the logistic equation with a growth constant (Ricklefs 1967) of 0.391 and an estimated asymptote of 23.0 g. The asymptotic value slightly exceeds the mean adult mass of Tree Swallows in Michigan (mean = 21.2 g, n = 18, S.E. = 0.37; specimens in the University of Michigan Museum of Zoology). Dorsal contour feathers appeared at six to seven days (10–15 g) and primary