Observations on the breeding biology of Eared Pygmy Tyrant *Myiornis auricularis*

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A partir da observação de cinco ninhos encontrados na Mata Atlântica do sudeste do Brasil, apresentamos aqui informações acerca da incubação e do cuidado parental no miudinho *Myiornis auricularis*, um dos menores passeriformes do mundo. Ambos os pais alimentam os filhotes, mas apenas as fêmeas parecem ser responsáveis pela incubação dos ovos. Em comparação com outros tiranídeos, tanto a constância de incubação quanto a taxa de alimentação dos filhotes são mais elevadas no miudinho, o que pode ser reflexo da relação em geral negativa entre massa corporal e taxa metabólica observada em animais.

Eared Pygmy Tyrant *Myiornis auricularis* is one of the smallest passerines in the world[4]. It inhabits the forest interior and borders of Atlantic Forest, from south-east Brazil to south-east Paraguay and north-east Argentina[4]. Very little is known about its breeding biology other than the period of reproduction[1,4], and the description of nests[3,4]. Here we report observations made at five nests found in south-east Brazil. We especially studied the incubating, brooding and food-provisioning behaviour of parents.

Observations were made at Parque Estadual Intervales (24°16'S 48°25'W; c.650–800 m), a reserve of 490 km^2 in the state of São Paulo. The vegetation is a mosaic ranging from early second growth near settlements to old-growth vegetation (*sensu* Clark[2]). Climate is generally wet, with frequent rain or fog. Mean annual precipitation is c.1,500 mm, with a dry-cold season in April–August (winter), and a wet-hot season in September–March. Mean annual temperature is 17.6°C.

Nests were found opportunistically along the margins of dirt roads when adult birds were observed carrying nest material or food to nestlings. The behaviour of the adults attending three of the nests was observed from concealed positions 5–10 m from the nests, to record incubation, brooding and food provisioning. Because the sexes are alike, we did not distinguish males from females. In total we made 19.8 hours of observations. In one nest the eggs were measured with callipers and weighed using a spring scale. Following the departure of the nestlings, two of the nests were measured.

The nest is a pensile, domed structure with a side entrance (closed / ovoid / pensile *sensu* Simon & Pacheco[8]) made of dried leaves attached to branches of shrubs and fern fronds no more than 1 m above the ground. The total length, diameter, and the height and width of the nest entrance were, respectively, 12.0, 6.5, 2.7, and 2.5 cm for one nest, and 13.0, 5.0, 3.0, and 2.8 cm for the other.

Nest 1 was found in October 1990 with three eggs and observed in the morning of 24 October during a single seven-hour observation period seven days before hatching. An adult stayed in the nest for 65.4% of this period, with each incubation period lasting on average 27.2 ± 7.0 minutes (range 18–41 minutes, n=10). Incubation sessions were interspersed by off-bouts lasting 14.4 ± 6.8 minutes (range 10–31 minutes, n=10). In no instance did we observe the adults change-over at the nest. While one adult incubated (presumably the female; see below) the other remained nearby, frequently vocalising. On 2 and 5 November, when the three nestlings were two and five days old, respectively, we resumed observations. At this stage, the two adults fed the nestlings, occasionally simultaneously. On 2 November observations were undertaken in the afternoon for two hours. The provisioning rate was 9.0 meals / hour or 3.0 meals / nestling / hour, and the nestlings were brooded for 30.8% of the observation period in sessions that lasted 10–16 minutes. Faecal sacs were removed at a rate of 0.8 sacs / nestling / hour. In the late afternoon one adult fed the other, which was brooding the nestlings. On 5 November observations were conducted in the late morning for 1.5 hours. By then, food provisioning and faecal sac removal rates had increased to 11.5 meals / hour (3.8 meals / nestling / hour) and 0.9 sacs / nestling / hour, respectively. Brooding effort had also increased to 52.9% of the observation period.

Nest 2 was found on 4 November 1990 with three full-grown nestlings and observed for 1.5 hours during the late afternoon. Again both adults fed the nestlings, at a rate of 7.9 meals / hour or 2.6 meals / nestling / hour. Brooding occurred for only 16.5% of the observation time.

Nest 3 had three eggs with length 15.4 ± 0.4 mm (range 15.0–15.8 mm), width 11.6 ± 0.2 mm (range 11.4–11.8 mm), and weighed 2 g each. This nest was observed for a total of 7.8 hours on 2 and 4 December 1990, eight and six days before hatching,

respectively. As at nest 1, we did not observe any evidence that both adults participate in incubation, which comprised 73.0% of the observation time. Incubation sessions lasted 60.5 ± 19.1 minutes (range 36–83 minutes, *n*=5), whilst off-bouts lasted 21.4 ± 7.4 minutes (range 11–31 minutes, *n*=5).

Nests 4–5 were discovered in the final phase of nest construction in October of 1990 and 1992, respectively. No observations were made at these nests.

The low heights of the nests reported here (<1 m) differ from those reported in the literature (1–3 m high[3,4]), and also from two nests of Short-tailed Pygmy Tyrant *Myiornis ecaudatus*, one found 2 m above ground in an abandoned cocoa plantation in Venezuela[6] and the other c.7 m above ground at the edge of a road through *terra firme* forest in east Amazonian Brazil[5]. However, all the nests we found were in early second growth at road margins where herbs and small shrubs predominate. It is therefore possible that, in more developed forest physiognomies, nests are placed higher in the vegetation, thus mirroring what Skutch[9] found for Black-capped Pygmy Tyrant *M. atricapillus* in Costa Rica, where nests were placed 1.3–7.3 m in lowland forest or in forest clearings.

Taking into account the pattern for the family[4,9], it is probable that only females incubate the eggs and brood the nestlings of *M. auricularis*. Males guard the nest and participate in food provisioning and nest sanitation. The data presented for tyrant flycatchers by Skutch[9] suggest a general positive correlation between body mass and constancy of incubation, defined as the percentage of a bird's active day spent incubating. Applying the formula provided by Skutch[9] to the pooled data for *M. auricularis* we obtained a constancy of 67.8%, which is high for such a tiny bird. In comparison, the constancy of incubation in a nest of the 6.3-g Common Tody-Flycatcher *Todirostrum cinereum* was only 35%[9].

Concerning food provisioning, the rate presented by *M. auricularis* (3.1 meals / nestling / hour; data from nests 1–2 pooled) is within the range for tyrant flycatchers (0.6–16.5 meals / nestling / hour[9]), but slightly higher than the rates recorded at nests of other species with a comparable number of nestlings and nestling age: Ochre-bellied Flycatcher *Mionectes oleagineus* (0.6 meals / nestling / hour), Bright-rumped Attila *Attila spadiceus* (0.3) and Dusky-capped Flycatcher *Myiarchus tuberculifer* (1.1)[9]. As one of the smallest passerines and given the general negative relationship between body mass and metabolic rates in animals[7], one might expect a faster food-provisioning rate in *M. auricularis* compared to larger species. It is thus possible that body size interplays with brood size and nestling age to determine the provisioning rate in tyrant flycatchers, a topic meriting more detailed investigation.

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