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OBSERVATIONS ON THE NESTLING AND PARENTAL CARE OF THE YELLOW-BELLIED CHAT-TYRANT (*OCHTHOECA DIADEMA*) IN EASTERN ECUADOR

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Observaciones sobre el pichon y el cuidado parental del Pitajo diademado (*Ochthoeca diadema*) en el este del Ecuador.

Key words: Eggs, natural history, history, nestlings, Andes, cloud forest, Yellow-bellied Chat-tyrant, *Ochthoeca diadema.*

Chat-tyrants in the genus *Ochthoeca* are represented by approximately 10 species of small flycatchers inhabiting both slopes of the Andes from Venezuela and Colombia to Argentina and Chile. They are exclusively montane in distribution, inhabiting forest edges and interiors as well as paramo, mostly between 2000 and 4000 m (Fitzpatrick 2004).

The Yellow-bellied Chat-tyrant (*O. diadema*) is found at elevations of 2100–3050 m from Venezuela to Peru, is generally uncommon and inconspicuous, and is typically found in the undergrowth of mossy forests (Ridgely & Tudor 1994). Here we describe the brooding rhythms, nestling growth, and parental care of Yellow-bellied Chat-tyrant in northeastern Ecuador.

On 10 November 2002, we discovered a nest of Yellow-bellied Chat-Tyrant in the private birding reserve of Cabanas San Isidro, next to the Yanayacu Biological Station and Center for Creative Studies (00º35.9' S, 77º53.4' W). The reserve is located in the Napo Province, 3 km west of Cosanga, on the eastern slope of the Ecuadorian Andes at elevations ranging from 1950 to 2300 m. At 12:15 h (EST) on 10 November, the nest contained two well-incubated eggs. Both were immaculate creamy white and measured 18.2 x 14.7 mm and 17.6 x 14.7 mm, respectively. One egg was damaged during handling, and subsequently removed, but the second hatched around 09:15 h on 14 November, when we observed an adult remove an eggshell from the nest. Beginning on 14 November, we monitored activity at the nest with a video camera placed approximately 6 m from the nest. The tripod and camera were partially concealed from the nest by surrounding foliage, and rarely did the adult flush during human activity at the camera. We taped from

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05:45 h to 18:15 h on 14, 16, 17, 18, 19, and 26 November. On 22 November, the nest was filmed only from 08:15 h, on 25 November from 07:35 h, and on 26 November until 16:35 h, for a total of 79.75 h. We watched and transcribed the videos at a later date when nesting behaviors were quantified and summarized. We recorded the weight of the nestling on 15, 18, 20, and 23 November, and described nestling pterolysis following Proctor & Lynch's (1993) synthesis of methods developed by Miller (1928) and Stewart (1953). A complete description of the nest architecture will be included at a generic-level synthesis in preparation (E. T. Miller in prep.).

Chronology and nest fate. The nestling developed normally throughout most of our observations. By 23 November, however, the nestling appeared weak and was developing open sores on its belly and other areas in constant contact with the nest lining. A dark crust of dried material partially blocked both nares. Sometime during the night of the 25th or the morning of the 26th, the nestling died of unknown causes. The parents returned to the nest repeatedly during the morning of the 26th, but soon abandoned the nest. While the exact cause of death is unknown, we suspect that the nestling was weakened by sporadic dusting of ash from the eruption of El Reventador Volcano only 50 km to the south. Similar crusting of nestling nares was reported for Bronze-olive Pygmy-tyrant (*Pseudotriccus pelzelni*) during this time at a nearby locality (Greeney *et al.* 2005).

Nestling description. At hatching the nestling was orange-skinned with a bright white gape and yellow-orange mouth lining. Dense grey down covered the dorsal areas, with that on the pelvic region of the spinal tract, femoral, and humeral areas being very slightly lighter. The sparse down present in the ventral abdominal area was white. By age 3–4 days, contour feathers were breaking the skin in all pterylae, most prominently on the ventral sternal tract. Wing feather pins were broken through the skin whereas retrices were only visible below the skin. Skin color was more pink-yellow. The gape had darkened to yellow and the bill was beginning to darken while the mouth lining remained unchanged. At age 6 days, the nestling's eyes were beginning to open, pin feathers of the retrices had broken the skin, yet all flight and contour pin feathers remained unbroken. By age 9 days pin feathers on all contour feather tracts (with the exception of the cural tract), tail, and secondary coverts had broken their sheaths. Primary and secondary flight feathers had not yet broken their sheaths, but likely would have the following day. Contour feathers on most dorsal regions were brown, while those on the pelvic region of the spinal tract and on the femoral tracts were more rufous. Feathers of the ventral abdominal tract were white, slowly darkening anteriorly to yellow then yellow-orange on the ventral sternal tract and to brownish in the ventral cervical region. The skin was fleshy colored, with the legs and feet light brown and the bill now mostly dark. At age 1, 4, 6, and 9 days, respectively, the nestling weighed 2.0, 6.7, 7.4, and 9.5 g.

Brooding and nestling provisioning. Two adults provisioned the nestlings. We were unable to determine if both brooded, but suspect that only one individual did. Beginning on 14 November, the nestling was brooded 63%, 56%, 55%, 57%, 65%, 50%, and 47% each day until age 11 days. On 26 November the nestling, presumed dead at this time, was brooded 11% of daylight hours until abandonment at 10:00 h. Beginning on 14 November, feeding rates were 1 (calculated after hatching), 4.8, 5.6, 7.6, 6.3, 10.5, and 10.8 feeds/h, respectively.

Other behaviors. Two means of food transfer to the nestling were observed, one where it was directly fed by the arriving adult, and the second where the arriving adult passed food to the brooding adult, which transferred it to the nestling. Typically, one adult fed the nestling by perching on the lip of the entrance, which we called "direct feed." Thirty-three percent of the observed feeds were "indirect feeds," where one adult delivered prey to the second adult already sitting in the nest engaged in brooding the nestling. The delivering adult perched on the lip or hovered near the entrance to pass the prey item to the brooding adult. Occasionally, the brooding adult consumed the prey, but normally fed it to the nestling. Hovering occurred 35 times and generally took around 2 s. This behavior lured the brooding adult off the nest several times and within seconds an adult was on the rim feeding. We presume the hovering adult fed the nestling, however, once the brooding adult made a short sally from the nest and returned with prey. In one incident, the adults experienced difficulties transferring a large caterpillar (Nymphalidae, Satyrinae, Pronophilini). They struggled at the rim of the nest, while pulling opposite ends of the prey for 7 s. For an additional 8 s after the successful transfer, the delivering adult attempted to assist the brooding adult with mastication of the caterpillar. The brooding adult knocked the delivering adult off the rim while turning around, then fed the nestling. The adults also experienced difficulties transferring a large-winged Orthoptera (c. 2 cm). The delivering adult assisted the brooding adult, which jumped out of the nest onto the other adult after 9 s. While brooding, the adult often thrust its bill rapidly in and out of the inner nest lining. We observed this behavior on 234 occasions, with movement during this activity totaling 20.9 min (mean = 5.4 s per bout). This behavior has been documented in other species and, while its purpose remains unclear, is hypothesized to be some form of nest maintenance (see Greeney *et al.* 2006 for a summary). Aside from this behavior, which shook the entire nest, the adult remained very vigilant and still while brooding.

Conclusions. As is typical of most flycatchers, both adults participated in nestling provisioning (Skutch 1960, 1967, 1972, 1981). Although sexes cannot be distinguished by sight or voice, we are certain that both adults fed the nestling and we observed them team feeding, a common behavior among nesting birds (Skutch 1960). Feeding rate of a one-day-old nestling was slightly lower than that reported for three Dusky-capped Flycatcher (*Myiarchus tuberculifer*) nestlings (Skutch 1981). However, it was higher at age 5 days as well as higher than that reported for two six-day-old Bronze-olive Pygmy-tyrant (*Pseudotriccus pelzelni*) nestlings (Greeney *et al.* 2005). Feeding rate of a Yellow-bellied Elaenia (*Elaenia flavogaster*) nestling of similar age was higher than for the Yellow-bellied Chat-tyrant (Skutch 1960).

In 1986, Lanyon proposed to divide the chat-tyrants into two genera, *Silvicultrix* and *Ochthoeca*, based on morphological differences of the syrinx, nesting behavior, and external morphology, all of which he considered to be derived characters. The Yellow-bellied, Jelskii's (*O. jelskii*), Crowned (*O. frontalis*), and Golden-browed (*O. pulchella*) chat-tyrants were placed in *Silvicultrix*. Subsequently, however, mitochondrial DNA sequence data showed that *Silvicultrix* is a monophyletic internal branch within *Ochthoeca*, and should therefore be merged back into *Ochthoeca*, which is where the taxonomy remains today (Garcia-Moreno & Arctander 1998). Further detailed studies of nesting behavior for this genus are needed to fully elucidate phylogenetically informative behavioral characters.

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