

## Noteworthy nesting record and unusual bill coloration of Resplendent Quetzal *Pharomachrus mocinno*

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En la Reserva Chelemhá, Alta Verapaz, Guatemala, se observó un nido de Quetzal Centroamericano *Pharomachrus mocinno* de mayo a agosto 2011. Los dos juveniles se desarrollaron desigualmente, el primero salió del nido el 28 de julio a la edad de 30 ó 31 días, y el segundo el 1 de agosto a la edad de 28–35 días. La hembra tenía un pico casi completamente amarillo. Solamente el área alrededor de los orificios nasales fue oscura, así como dos líneas finas en la mandíbula inferior. Este es el primer reporte de una hembra con pico amarillo de la subespecie *P. m. mocinno*. Esta anomalía de coloración podría ser causada por alteraciones genéticas o alteraciones en el balance de hormonas sexuales. La hembra se observó desde mayo a julio atendiendo un nido junto con un macho que estaba por lo menos en su tercer año de edad. La hembra estaba en su segundo año de edad, determinado por la forma de sus rectrices exteriores, cuyo ancho disminuyó gradualmente hacia la punta, a diferencia de las rectrices truncadas de hembras en por lo menos su tercer año. Este es el primer reporte de anidación de *P. mocinno* en el segundo año de vida.

The range of Resplendent Quetzal *Pharomachrus mocinno* extends from southern Mexico to western Panama, with two recognised subspecies: *P. m. mocinno* in southern Mexico to Nicaragua, and *P. m. costaricensis* in Costa Rica and Panama<sup>12</sup>. Nesting has been described in detail only a few times. Clutches usually comprise two eggs<sup>12</sup>. Unger<sup>25</sup> reported a nest with two nestlings and an egg from Guatemala, probably indicating a three-egg clutch, but it cannot be eliminated that the egg remained from an earlier clutch (D. Unger pers. comm.). Whether adults start incubation after the first, second or third egg is laid is unknown, as well as the interval between eggs. In Golden-headed Quetzal *P. auriceps*, the interval was suggested to be one day inferred from the hatching interval in captivity<sup>12</sup>. In other Neotropical trogons, a gap of 1–3 days between eggs was reported or can be inferred from hatching intervals (Baird's Trogon *bairdii*, Black-headed *T. melanocephalus*<sup>21</sup> and Masked Trogons *T. personatus*<sup>9</sup>). Incubation of 17–19 days is known for Resplendent Quetzal from three nests of the southern subspecies<sup>27</sup>. Broods fledge in 23–31 days, based on three nests of *costaricensis* in Costa Rica and one of *mocinno* in Mexico<sup>1,20</sup>. Eggs and nestlings of *mocinno* were described by LaBastille *et al.*<sup>15</sup>.

The exuberant ornamental plumes of the male Resplendent Quetzal have encouraged numerous publications on its plumages, moult and subspecific differences<sup>3,4,8,10,12,18,23</sup>, while female morphology has received less attention. Immature females of nominate *mocinno* are apparently undescribed. The bill of adult females is usually dark. In *mocinno* it has been described as 'blackish'<sup>2,10,18</sup>, 'dull black'<sup>25</sup> and 'darkish grey'<sup>15</sup>. In *costaricensis* female bill colour has been described as 'black'<sup>20</sup>,

'upper mandible black' with yellow mandible<sup>23</sup>, 'maxilla black; mandible dull yellow, tinged with dull green toward base'<sup>26</sup>, 'slate to yellow'<sup>27</sup>, 'maxilla blackish, streaked with yellow, sometimes entirely yellow, mandible dull yellow, tinged with green toward base'<sup>12</sup>. Here I document a breeding female Resplendent Quetzal of the subspecies *mocinno* with a yellow bill in the second year of life.

### Study site and methods

Chelemhá Reserve (15°23'N 90°04'W), Alta Verapaz, Guatemala, is part of the Yalijux Important Bird Area<sup>6</sup>, and protects c.2,500 ha of pristine cloud forest at 1,800–2,500 m combined with adjacent private nature reserves. I observed a Resplendent Quetzal nest from 11 May to 2 August 2011, for a total of 147 observation hours. Observations were made with binoculars and a telescope from a hide at distances of 20–50 m from the nest. Plumage terminology follows Pyle<sup>17</sup>.

### Results

The nest cavity of Resplendent Quetzal was located in an 8 m-tall, half-rotten oak stump (*Quercus* sp.), with a diameter at breast height of 90 cm and diameter at nest height 70 cm. Nest entrance was 4.8 m above ground, facing north-east. The stump was within 30 m-tall, oak-dominated cloud forest at 2,500 m.

**Noteworthy nesting data.**—I observed the female Resplendent Quetzal inside the nest cavity for >1 hour on 11 May 2011. Given the time between this observation and the first confirmation of nestlings, the bird may have been excavating or resting in the cavity, or there may have been an earlier clutch that was lost. Both adults were still incubating on 14 and 26 June. During brief



Figure 1. Unequally developed siblings of Resplendent Quetzal *Pharomachrus mocinno* perched at nest entrance, at age 29–30 days (large young) and 23–30 days (small young), Chelemhá Reserve, Alta Verapaz, Guatemala, 27 July 2011 (Knut Eisermann)



Figure 2. Female Resplendent Quetzal *Pharomachrus mocinno* with unusual yellow bill at nest entrance, Chelemhá Reserve, Alta Verapaz, Guatemala, 16 July 2011 (Knut Eisermann)

observation on 27 June, the male and female were in the nest at unusual times compared to the day before. On 28 June both adults were seen for the first time bringing food to the nest. Based on the adults' behaviour, the first young presumably hatched on 27 or 28 June. Food provided to the nestlings by both adults consisted mainly of fruit (different species of Lauraceae, *Parathesis* sp. [Myrsinaceae], *Rubus* sp. [Rosaceae]). Occasionally lizards (including *Abronia* sp.), golden beetles (*Chrysina* sp., Scarabeidae), crickets (*Ensifera*) and landsnails (Gastropoda) were also brought. Once the female was observed feeding a small snake to one of the fledglings. Details of food and parental care will be presented elsewhere.

Juveniles were seen perched at the nest entrance for the first time on 18 July at the age of c.3 weeks. On 22 July, when the oldest young was 24 or 25 days old, I noticed that the nestlings were unequally developed, which became more obvious thereafter (Fig. 1). Both siblings fledged, the larger bird on 28 July and the smaller one on 1 August. Assuming that the large nestling was older, it fledged when aged 30 or 31 days. If the smaller young hatched on the same day as its sibling, fledging occurred at age 34 or 35 days. If the small young hatched 1–6 days after its sibling, which appears possible based on the interval between eggs of 1–3 days in other Trogonidae<sup>9,21</sup>, it fledged at age 28–34 days.

**Description of the female.**—Observed for the first time on 11 May, perched in the nest entrance,

the yellow bill was noticeable. The female was paired with an adult after-second-year male, aged by the fully developed uppertail-coverts. Based on careful observation and photographs made in the following weeks, the female had distal sections of the maxilla (including all of the exposed culmen) and mandible bright yellow, the area around the nostrils blackish, and the bill base dull yellow. The distal mandible had two fine blackish lines opposite the blackish mark on the maxilla (Fig. 2). No change in bill coloration was noticed from May until the last sighting on 28 July 2011. The bare skin of the narrow eye-ring was grey, the iris dark brown and feet pale grey. The head was brownish-green, breast grey and lower belly red. Back, rump and wing-coverts were green, remiges blackish, the outer vanes of the primaries fringed buff. Inner rectrices were blackish, the outer three rectrices (rr4–6) on both sides basally blackish. The distal parts of these rectrices were white, irregularly barred blackish (more extensive on the inner vanes), in r4 the distal c.40% was white, in r5 c.50%, and in r6 c.80% (Fig. 3). Outer rectrices were tapered (Fig. 4).

### Discussion

The nesting described here was noteworthy because it differed in time of nesting, duration of brooding, nestling development and age of the female from previously reported nests. Nesting of the northern subspecies of Resplendent Quetzal ranges from the end of the dry season well into the wet season, in



Figure 3. Female Resplendent Quetzal *Pharomachrus mocinno* feeding *Abronia* sp. lizard to nestlings; note pattern of outer three rectrices and that the plumage is wet, making rectrices appear very pointed; Chelemhá Reserve, Alta Verapaz, Guatemala, 18 July 2011 (Knut Eisermann)



Figure 4: View of tapered outer rectrices of same female Resplendent Quetzal *Pharomachrus mocinno* as in Figs. 2–3, Chelemhá Reserve, Alta Verapaz, Guatemala, 14 July 2011 (Knut Eisermann)

January–June<sup>1,5,15,19,22,24</sup>. Observation of a fledgling in August supports earlier suggestions<sup>13</sup> that the breeding season in Guatemala could extend to this month. At Finca Santa Luisa in the western Sierra de las Minas, El Progreso, Guatemala, in the latest nest observed in 2007 young fledged in mid August (F. Mejilla pers. comm.). Nesting by *P. m. mocinno* therefore ranges from January to August. The observed nestling period of 30–35 days is longer than the previously recorded 27 days for *P. m. mocinno*<sup>1</sup>, indicating some variability. For *costaricensis*, a nestling period of 23–31 days was reported<sup>20</sup>, but the fledging was probably premature and provoked by disturbance at the nest<sup>20</sup>. Food quality may have impacted nestling development. Nestling period at the observed nest could have been slightly prolonged because it fell entirely within the wet season, with much rain and mist, probably inhibiting the adults ability to find sufficient energy-rich animal food, e.g. lizards.

Yellow bills in female quetzals of nominate *mocinno* have, to my knowledge, not been reported previously, nor did I note other individuals with extensive yellow bills during my observations in 1997–2011. Some birds, however, show a small extent of dull yellow on the mandible (Fig. 5), similar to some *costaricensis*<sup>12,23,26</sup>. Extensive yellow bills are rare in both subspecies; in *costaricensis* it has been reported in just a single female<sup>27</sup>. Other juvenile females, such as two from Finca Santa Luisa<sup>16</sup> and a specimen in the American Museum of Natural History, New York (AMNH 143912), have primarily dark bills. The coloration abnormality could be caused by an imbalance of sexual hormones—bright yellow bills are normal in males—or a genetic alteration.

The tapered outer rectrices indicate that the yellow-billed female had fledged in 2010. For *costaricensis*, Johnsgard<sup>12</sup> described the outer three rectrices of young females as more pointed than in



Figure 5. Adult female (after-second year) Resplendent Quetzal *Pharomachrus mocinno mocinno*; note truncated tips to outer rectrices; Refugio del Quetzal, San Rafael Pie de la Cuesta, San Marcos, Guatemala, 17 March 2011 (Knut Eisermann)

adults. In other trogons (Elegant Trogon *Trogon elegans*, Eared Quetzal *Euptilotis neoxenus*) young in the hatch year and second year have tapered outer rectrices unlike the truncated rectrices of adults<sup>17</sup>. Resplendent Quetzals retain the juvenile remiges and rectrices until aged c.1 year<sup>4</sup>. Johnsgard<sup>12</sup> indicated that the coloration of the outer rectrices is similar in young and adult females. Photographs of three juvenile females<sup>11,16</sup>, and the female in Chelemhá, however, had irregularly barred outer rectrices with the distal end predominantly white, distinctive from adult females (Figs. 3–5). The female specimen AMNH 143912 with tapered outer rectrices also has irregular barring. Irregular barring in young females (hatch year and second year) is apparently age-related and distinguishes immatures from after-second-year adults. Adult females usually show coarse, regular barring and truncated outer rectrices (Fig. 5).

Demography of Resplendent Quetzal populations is unknown<sup>8,12</sup>. To my knowledge this is the first report of breeding in the second year, which seems exceptional. I reviewed published<sup>3,7,11,13,14,16,25,28</sup> and unpublished photographs (KE & E. Col unpubl.), as well as field notes on nine females and 18 males attending nests, of which all were adults at least in their third year of life—females aged by their truncated outer rectrices and males by fully developed uppertail-coverts.

Although Resplendent Quetzal is one of the most emblematic Neotropical birds, the number of described nests is rather small. Several details of nesting ecology remain unknown or unclear given the small number of observed nests, e.g. interval between eggs, onset of incubation, frequency of three-egg clutches, nesting success and duration of pair-bonds. More detailed observations on the quetzal's natural history will help to understand demographic patterns and population changes.

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