

EGGS, NESTS, AND NEST-BUILDING BEHAVIOR OF THE LARGE-FOOTED FINCH (*PEZOPETES CAPITALIS*) IN COSTA RICA¹

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Key words: Neotropics; emberizinae; nesting; clutch size; *Pezopetes capitalis*.

The Large-footed Finch (*Pezopetes capitalis*) is a neotropical species whose natural history is poorly documented. It has a restricted range, breeding only in the dense undergrowth of forest clearings and borders at middle to upper elevations in the highlands of Costa Rica and northwestern Panama (Carriker 1910, Skutch 1967, Wolf 1976, Wetmore et al. 1984). There are only two published descriptions of the nest and eggs (Carriker 1910, Stiles and Skutch 1989) and no published accounts of nest-building behavior. We here present observations by Klein and Schulenberg of nest-building behavior on Cerro de la Muerte, Costa Rica, and provide additional descriptions of the nests and eggs of this species.

NESTS

Carriker (1910) described the nest of *Pezopetes* as "bulky, loosely built, and constructed of seed-stalks and bamboo leaves, lined with soft blades of grass and placed in a thick bush or on a bamboo spray not far above the ground." Four nests with their eggs are in the collection at the Western Foundation of Vertebrate Zoology (WFVZ 78,155, 20 April 1974; WFVZ 154,801, 21 March 1986; WFVZ 154,802, 21 March 1986; and WFVZ 154,803, 7 April 1986). Three (154,801; 154,802; 154,803) are massive cups built with bamboo (*Chusquea* sp.) leaves, grasses, mosses, stems, and sticks. The nest (uncollected) found by Klein and Schulenberg was similarly constructed. WFVZ nest #78,155 is a large open cup of dead leaves and fern fronds. All are lined with yellowish-brown grass blades. Mean measurements from three of the WFVZ nests are: external depth 12.5 cm, external diameter 22.3 cm, cup diameter 8.2 cm, and cup depth 6.7 cm. All nests were placed between 1.5 and 2.5 m above ground.

EGGS

On 27 March 1988 the nest found in the construction stage on 8 March by Klein and Schulenberg contained one egg (UMMZ 227,841) without a discernible embryo. Two of the WFVZ single-egg sets contain eggs that showed signs of embryonic development. *Pezopetes* eggs in the collections at WFVZ and UMMZ, as well as those previously described (Carriker 1910), are long and elliptical or subelliptical in shape (egg shapes as defined in Preston in Palmer 1962). Most have a pale blue background with irregular blotches and spots of brownish-black or purplish-brown and lilac; the dark markings are concentrated mostly on the larger ends. One of the eggs (Carnegie Museum of Natural History #688) described by Carriker (1910) is immaculate. Mean measurements of the eggs at WFVZ and UMMZ are (length \times breadth, $n = 6$) 27.9 \times 19.5 mm. Carriker (1910) reported similar measurements.

NEST-BUILDING BEHAVIOR

A presumed pair of *Pezopetes capitalis* engaged in nest-building activities was discovered by Klein and Schulenberg on 8 March 1988. The birds were at 3,100 m elevation in the dense bamboo-dominated undergrowth bordering the powerline clearing north of Pension La Georgina, Cerro de la Muerte, Cartago Province, Costa Rica (see Wolf 1976 for a description of the area and its vegetation).

After the location of the nest was determined, Klein observed the birds' activities for 52 min. During this time one of the birds (bird A) was constantly in view and it brought material to the nest 54 times. The other bird (bird B) did not bring material to the nest. Of the 54 visits to the nest by bird A, bamboo was brought 45 times; green moss and/or twigs were brought on the other visits. Virtually all of the nest material was taken from the ground within a 5-m radius of the base of the nest plant.

The Large-footed Finch is unusual among mainland emberizine finches in regularly having a clutch size of one. Three of the four nests mentioned by Carriker (1910) contained one egg and one had two eggs. The

¹ Received 25 August 1990. Final acceptance 20 November 1990.

same clutch size distribution was found among the four nests at the WFVZ.

The current taxonomic placement of the Large-footed Finch is in the monotypic genus *Pezopetes*, although it has been suggested to be more appropriately placed in *Atlappetes* (Paynter and Storer 1970). The known nest and egg characteristics of *Pezopetes* are not inconsistent with such placement. Some species of *Atlappetes* lay spotted or blotched eggs, although all of the Middle American members of this genus lay unmarked white or pale blue eggs (Paynter 1978).

There is not yet enough information on nest-building behavior to aid in making taxonomic decisions regarding these finches. Our observations suggest that only one sex does the nest-building in *Pezopetes*, although both sexes are active in defense (Wolf 1976). There is no information in the literature regarding nest-building behavior in *Atlappetes*, but only female *Atlappetes torquatus* incubate the eggs (Paynter 1978).

M. Sc. Guillermo Canessa Mora, Servicio de Vida Silvestre, Ministerio de Recursos Naturales, Energia y Minas, granted permits to work in Costa Rica. Funding for Klein was provided by the Bird Division, Museum of Zoology, The University of Michigan, and a Block Grant from the Department of Biology, The University of Michigan, Ann Arbor, MI. Marin and Kiff would like to acknowledge the field assistance of F. Gary Stiles and Maxine Kiff, and thank D. Scott Wood for the loan of egg specimens from the Carnegie Museum of Natural History.

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The Condor 93:448-452
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GEOGRAPHIC VARIATION IN THE ONTOGENY OF BEAK COLORATION OF GRAY-BREASTED JAYS (*APHELOCOMA ULTRAMARINA*)¹

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Key words: *Gray-breasted Jay; Aphelocoma ultramarina; beak coloration; ontogeny; maturation; geographic variation; sociality.*

The three species of jays in the genus *Aphelocoma* have been the subject of interest among ornithologists during recent decades. Aspects of geographic variation (Pitelka 1951), genetic differentiation (Peterson 1990), ecology (Edwards 1986; Peterson and Vargas, in press), and social behavior (Woolfenden and Fitzpatrick 1984, Brown 1974, Brown and Brown 1985) have been stud-

ied. Comparative studies linking different aspects of the jays' biology are now being conducted with rewarding results (e.g., geographic variation and social behavior, Brown and Horvath 1989; social behavior and genetic differentiation, Peterson, in prep.). A detailed base of information on all aspects of *Aphelocoma* jay biology is critical to these integrative studies.

A question linking behavioral biology and morphology is the effect of delayed maturation of coloration on social behavior (reviewed in Lawton and Lawton 1985). Several investigators have suggested that retention of juvenile coloration by subordinate individuals allows improved group cohesion by reducing aggression among individuals (e.g., Hardy 1961, 1974; Lawton and Lawton 1985). Because Gray-breasted Jays (*A. ultramarina*) exhibit geographic variation in both the ontogeny of beak coloration (Pitelka 1945, 1951) and in social behavior (Ligon and Husar 1974, Strahl and Brown 1987, Brown and Horvath 1989), geograph-

¹ Received 31 August 1990. Final acceptance 30 November 1990.

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