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Bilateral Gynandromorphy in a White-ruffed Manakin (*Corapipo altera*)

Jeffrey M. DaCosta,^{1,2,3} Garth M. Spellman,¹ and John Klicka¹

ABSTRACT.—We report bilateral gynandromorphy in a White-ruffed Manakin (*Corapipo altera*) collected near Santa Fé, Panamá in 2004. The specimen had an oviduct and ovary on the left side and a single testis on the right. The plumage was phenotypically female on the right side and male on the left. The weight and genetic affinity of the specimen were characteristically female. Both Z and W chromosomes were detected in

genetic samples from multiple tissue types and toe pads from both feet. This report is a novel record of gynandromorphy in a suboscine passerine. *Received 22 July 2006. Accepted 10 September 2006.*

¹ Barrick Museum of Natural History, University of Nevada Las Vegas, 4505 Maryland Parkway, Box 454012, Las Vegas, NV 89154, USA.

² Current address: Boston University, Department of Biology, 5 Cummington St., Boston, MA 02215, USA.

³ Corresponding author; e-mail: dacostaj@bu.edu

Gynandromorphy is a rare state in which an individual exhibits both male and female traits. This condition often results in a clear bilateral demarcation of male and female morphology in sexually dimorphic species with bilateral symmetry. Gynandromorphy is rare in birds, but has been observed in a number of avian families, and is most commonly re-

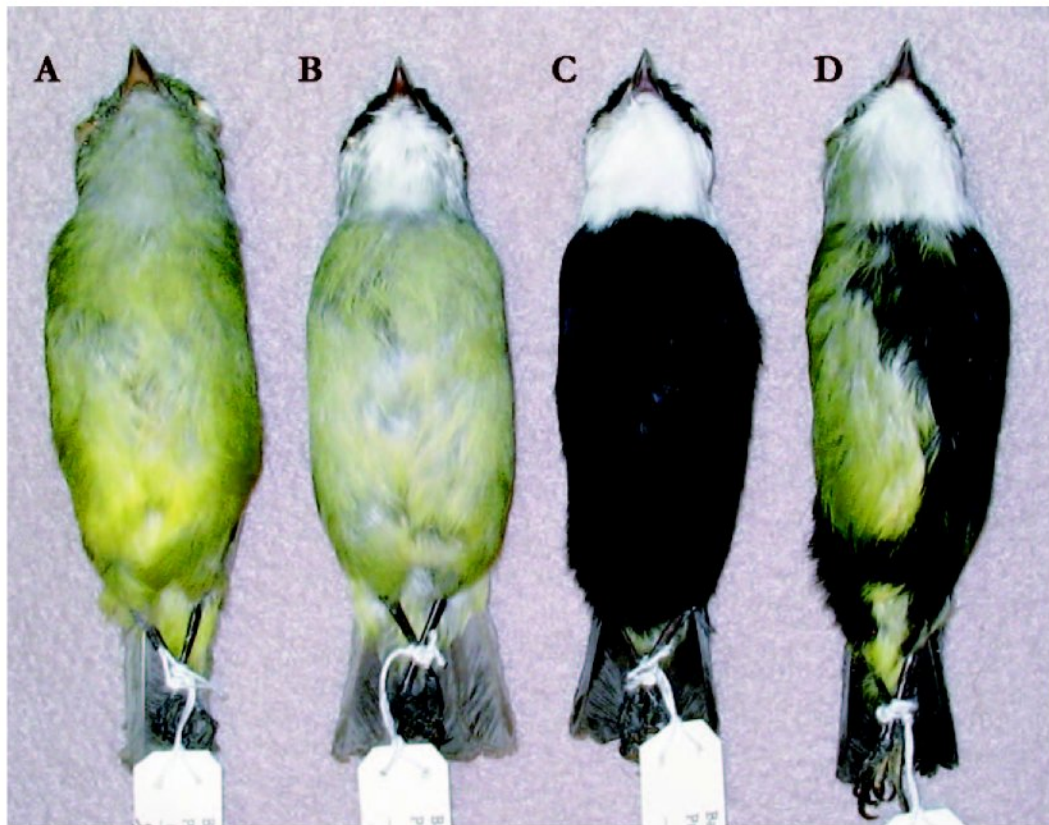


FIG. 1. Ventral views of female (A), immature male (B), mature male (C), and bilateral gynandromorph (D) White-ruffed Manakin skins.

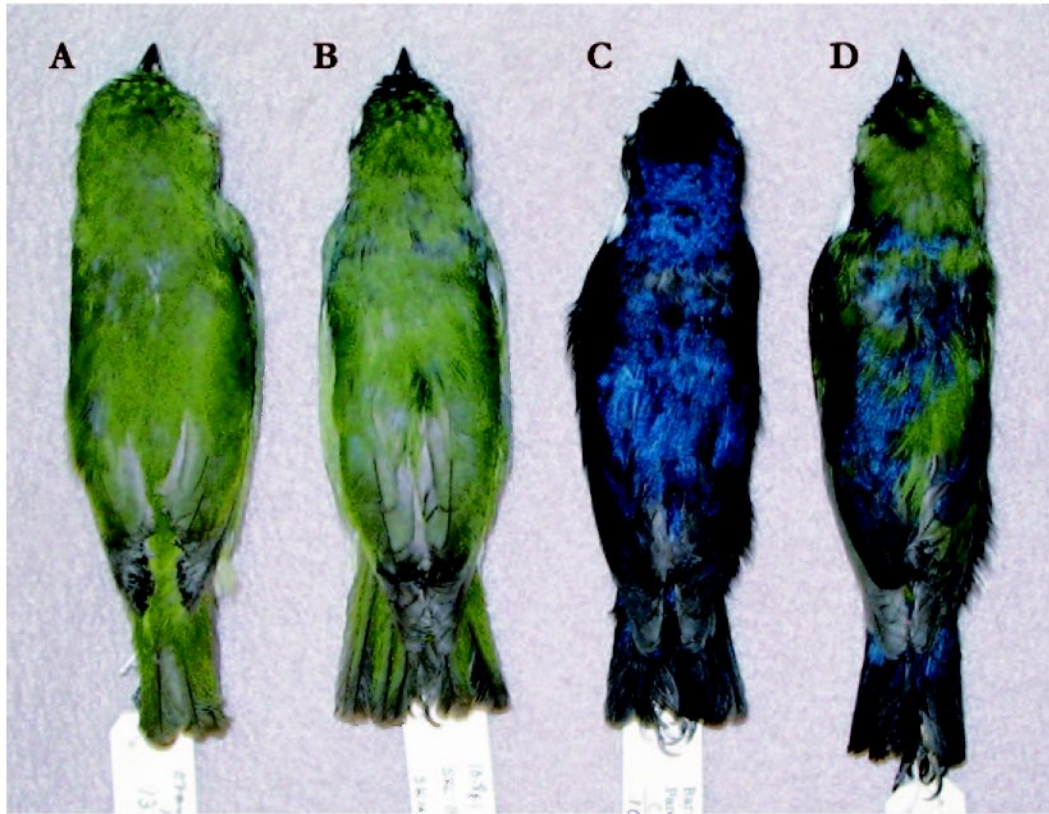


FIG. 2. Dorsal views of female (A), immature male (B), mature male (C), and bilateral gynandromorph (D) White-ruffed Manakin skins.

ported in the Fringillidae (Kumerloeve 1987, Patten 1993). The general pattern in gynandromorphs is female plumage characters on the left side and male characters on the right, corresponding to the orientation of the ovary and testis in birds (Crew and Munroe 1938,

Kumerloeve 1954). The plumage patterns of avian gynandromorphs can be driven by genetic or hormonal factors, although direct mechanisms are not well known; it is possible that a variety of pathways can lead to the condition (Graves et al. 1996).

A White-ruffed Manakin (*Corapipo altera*) bilateral gynandromorph was collected on 3 March 2004 near Santa Fé, Panamá during a scientific expedition co-sponsored by the Barrick Museum of Natural History (MBM) and the Smithsonian Tropical Research Institute. The bird was collected during passive mist netting and was not observed before its capture. This specimen was deposited in the MBM (voucher MBM 15715) and represents the first record of a bilateral gynandromorph in a suboscine passerine.

Mature male White-ruffed Manakins have a glossy blue-black plumage with white undertail coverts and throat. Females are mostly ol-

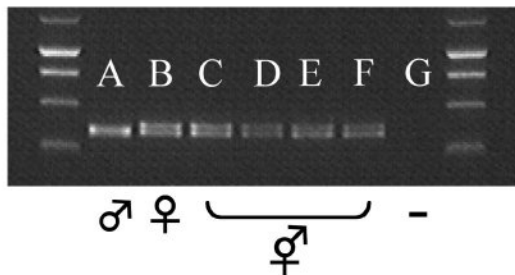


FIG. 3. Gel electrophoresis of amplified CHD products. Male heart (A), female heart (B), and negative (G) controls were run with gynandromorph products from heart (C), pectoral muscle (D), left (E), and right (F) toe pads.

ive green with a pale gray throat, while immature males have a patchy appearance where blue-black feathers are mixed with a generally olive green plumage (Snow 2004). The ventral side of the gynandromorph specimen has male plumage characters on the left side and female characters on the right (Fig. 1). This configuration is “reversed” in regards to the orientation of the gonads, which is a rare condition for avian gynandromorphs (Kumerloeve 1954). There is some overflow of sexual traits across the bilateral line with mostly male traits extending toward the right side. The dorsal side of the specimen has a mosaic of male and female colors throughout (Fig. 2), similar to known specimens of Evening Grosbeak (*Coccothraustes vespertinus*) gynandromorphs (Laybourne 1967).

Female White-ruffed Manakins are generally larger than males, but there is considerable overlap in wing, tail, and tarsus measurements (Wetmore 1972). Weights (mean \pm SD) for a series of males (10.99 ± 0.69 g, $n = 16$) and females (12.69 ± 0.96 g, $n = 12$) were measured in the field during the same expedition; females had significantly greater mass (two-tailed independent t -test, $t_{25} = -5.36$, $P < 0.001$). The gynandromorph specimen weighed 13.1 g, differing from the distribution of male weights ($P = 0.001$) but not from females ($P = 0.33$). An oviduct and granular ovary (7.0×3.5 mm) were observed on the left side with a testis (2.5×1.5 mm) on the right side. During preparation of the gynandromorph specimen, three MBM staff verified observations of both male and female gonads. The specimen had a fully ossified skull and internal organs appeared normal with pectoral muscle, liver, and heart samples collected and frozen.

The genetic affinity of the specimen was assessed by amplification of the sex-linked chromo-helicase-DNA-binding (CHD) genes (Griffiths et al. 1998). The utility of the CHD protocol was tested in this species with male and female controls, which produced single and double bands, respectively. DNA was extracted from heart, pectoral muscle, and toe pad samples of the left and right foot of the gynandromorph. All samples produced double bands, indicating a female genetic affinity (ZW) throughout the body (Fig. 3).

This is the first record of bilateral gynandromorphy in Pipridae, but this condition could be easily overlooked in the field. Immature male White-ruffed Manakins look like females or display a mosaic of female and male plumage characters making the detection of a gynandromorph difficult in the field. Manakins are well known for their lekking behavior and courtship displays, and White-ruffed Manakin males engage in a variety of solitary and coordinated displays (Rosselli et al. 2002). It is unknown how this, or other, gynandromorphic Pipridae might behave in such a system.

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