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**Comments on a probable gynandromorphic Black-throated Blue Warbler.**—Sexual plumage differences in passerine birds are believed to be controlled genetically and only minimally influenced by hormones (Murton and Westwood 1977). Bilateral gynandromorphs are among the most striking manifestations of chromosomal regulation of plumage (Crew and Munro 1938, Cock 1960, Witschi 1961). In these rare individuals, plumages of the left and right sides of the body are demarcated along the midline and presumably reflect gonadal placement. In most cases, an ovary and female plumage are found on the left side, a testis and male plumage on the right. Several hypotheses have been advanced to explain the

genesis of gynandromorphs and mosaics, but it is possible that several genetic mechanisms or ontogenetic tracks may produce a variety of phenotypic outcomes collectively lumped as bilateral gynandromorphs. This idea is suggested by variation in the degree of plumage asymmetry in gynandromorphs. For example, traces of definitive male plumage may appear on the "female" side and vice versa (e.g., Laybourne 1967). One problem with categorizing gynandromorphic birds, is that there are no standard conventions of analysis, such as those developed for diagnosing hybrids (Graves 1990). The following example illustrates some of the difficulties.

Patten (1993) reported an unusually plumaged Black-throated Blue Warbler (*Dendroica caerulescens*) that was photographed but could not be collected at Stovepipe Wells, Death Valley National Monument, Inyo County, California, in October 1987. Patten described (p. 696) this individual as "sexually dimorphic with respect to each lateral half of the bird, with the left side appearing to be male and the right looking like a female." While we believe the bird was correctly identified as a bilateral gynandromorph, the first such record for the subfamily Parulinae, a reappraisal of photographs suggests that its phenotype was qualitatively different from bilateral gynandromorphs previously reported among passerines (Crew and Munro 1938, Kumerloewe 1987).

We examined two color transparencies taken by Dunn (Visual Resources for Ornithology [VIREO] archives catalog numbers v06/23/001–v06/23/002) as well as those examined by Patten (taken by Paul E. Lehman, VIREO v06/12/001–v06/12/004). The left side of the bird appears to be in male first-basic plumage (hatching year), as indicated by brownish secondaries and primaries and an unusual white spot on the lower eyelid. The left side is clearly demarcated from the right side along the midline of the mantle. The right side has an enigmatic appearance not matched by any of the 1370+ study specimens of Black-throated Blue Warbler in the National Museum of Natural History (USNM), Smithsonian Institution. The principal characters of the right side include (1) pale supercilium that extends from the base of the bill posteriorly to the rear of the auriculars where it becomes broader, (2) extensively white lower eyelid, (3) grizzled black and white throat, whiter at the center, (4) pale malar mark, (5) yellowish wash on the belly and lower sides, (6) a relatively wide black stripe on the side that extends from the lower edge of the throat posteriorly past the bend of the wing to the base of the primary coverts, (7) large white triangle at the base of the primaries, and (8) mantle and crown, olive-gray, distinctly less "blue" than the left side.

A comparative description of the right side of this gynandromorph and basic plumages of male and female Black-throated Blue Warblers follows. White superciliary and lower eyelid markings occur rarely in fall male Black-throated Blue Warblers in first basic plumage but are unknown in males in definitive basic plumage. In contrast, nearly all females have pale superciliaries and lower eyelid spots (see Parkes 1979). The face pattern of Patten's bird was more strongly pronounced than that of any male or female we have examined.

Throat feathers of males in first basic plumage are often tipped with white, imparting a grizzled appearance. With very rare exceptions, females have unmarked throats. Patten's bird had a grizzled throat, whiter near the center, and a pale malar mark, thus appearing more male-like than female in this character.

A black stripe extends from the side of the throat posteriorly along the sides to the lower flanks in basic-plumaged males, whereas females in all plumages have unmarked sides. Patten's bird exhibited a distinctive black stripe that began at the right side of the throat and continued to the upper flanks, becoming more diffuse posteriorly. The extent of the black stripe was well within the range exhibited by males in first basic plumage. The remainder of the underparts of Patten's bird more closely resembled those of females in basic plumage.

In sum, the right side of Patten's bird appeared to be a mosaic of distinctive elements from both male and female plumages, but weighed more heavily toward male characters,

while the left side was typically male. However, the true nature and cause of this plumage asymmetry will never be known without a specimen.

Crew and Munro (1938) concluded that bilateral gynandromorphism in birds is of three types: (1) the finch or sparrow type where plumage is genetically determined and reflective of lateral chromosome distribution; (2) the chicken or fowl type in which sexual differences in plumage are subject to hormonal regulation so that perfect bilaterality of plumage is impossible; and (3) the pheasant type where plumage on one half of the bird is normal and the other half is an intersexual mosaic (Danforth 1937a,b). Nearly forty years later, Hollander's (1975) review of sectorial mosaics in pigeons suggested that mosaics of sex-linked plumage may be caused by bipaternity and the subsequent incorporation of tissue derived from supernumerary sperm into an embryo. This process may result in an asymmetrical patchwork of male and female plumage such that one side appears to be normal and the other side an intersexual mosaic. In any case, little has been learned about gynandromorphism in passerines other than the fact that departure from bilateral asymmetry is variable (see Laybourne 1967, Kumerlovee 1987). The appearance of Patten's bird, normal male on the left side and intersexual mosaic on the right, marks an observed extreme within the order Passeriformes.

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