

A POSSIBLE *DENDROICA KIRTLANDII* HYBRID FROM HISPANIOLA

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ABSTRACT.—We used morphological measurements and plumage characteristics to identify a *Dendroica* warbler mist netted and photographed in the Dominican Republic as a possible hybrid between *D. kirtlandii* (Kirtland's Warbler) and *D. fusca* (Blackburnian Warbler). We present a detailed description of the individual which is the first presumed hybrid of *D. kirtlandii* and one of only a few possible hybrids involving *D. fusca*.
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On 24 October 1997, while SCL was mist netting birds in low elevation (30 m) desert thorn scrub near Cabo Rojo, Pedernales Province, Dominican Republic (18° 0' N, 71° 38' W), an unusual-appearing warbler was captured. The bird appeared to be most similar to Kirtland's Warbler (*Dendroica kirtlandii*), which is a hypothetical species on Hispaniola based on two unverified sight records (Keith et al. in press), but doubts existed among the banders present because of various inconsistencies in plumage characteristics. These inconsistencies included a unique facial pattern, the general olive coloration of the head and back rather than the typical blue-gray washed brown of *kirtlandii*, white margins to the tertials and secondaries, and continuous diffuse streaking rather than fine black spots or streaks on the sides and flanks. The bird was not aged by skulling because by late October pneumatization often is complete in many *Dendroica* warblers (Pyle 1997; S.C.L. pers. obs.). We did not collect the bird because of the possibility that it was a federally (USA) protected endangered species, but extensive notes were taken on plumage characteristics and physical measurements, and a series of nine photographs were taken (Fig. 1). The bird was banded with a USFWS aluminum band and released. Our identification was based on these photographs and notes.

The size, general color pattern, and shapes

of the bill, wing, and tail identified the bird as a *Dendroica* warbler. We determined that it was unlikely to be an aberrantly plumaged individual because of the variety in plumage characteristics which were inconsistent with possible species identifications. Accepting that the individual was rather clearly an intrageneric *Dendroica* hybrid, we looked for possible parental combinations among *Dendroica* warblers. All comparisons were made by KCP using specimens in the collection of the Carnegie Museum of Natural History during August 1998.

Because we did not have a specimen to determine age or sex of the bird, we began by focusing on general body size. The unknown bird was large with an unflattened wing chord of 72.5 mm and a tail of 54.0 mm (Table 1). The only *Dendroica* warblers which combine a maximum wing length of ≥ 72.5 mm and a maximum tail length of ≥ 54.0 mm are the Pine (*D. pinus*), Bay-breasted (*D. castanea*), Blackpoll (*D. striata*), Yellow-rumped (*D. coronata*), and Kirtland's (*D. kirtlandii*) warblers. Thus, one parent had to be one of these species. Resemblance to *pinus*, which is resident in high elevation pine forests of Hispaniola, was slight. Similarity to *castanea* and *striata* was seen in the distinctive wing pattern of sharply contrasting white edgings of the tertials on an essentially black background with the white edgings extending all the way (faintly) to the primaries. But neither species shows much similarity to the hybrid in terms of the face pattern. Similarity with *coronata* and *kirtlandii* was seen most plainly in the presence of the distinctive, large and conspicuous broken white eye-ring, as well as the gray uppertail coverts heavily streaked with black. There was no evidence of a yellow

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FIG. 1. Presumed hybrid *Dendroica kirtlandii* × *Dendroica fusca* mist netted in low elevation (30 m) desert thorn scrub near Cabo Rojo, Pedernales Province, Dominican Republic, on 24 October 1997. (A) lateral view, (B) dorsal view, (C) tail. Photographs by Christopher Brown.

rump nor of yellow in the crown or in the basal portions of the crown feathers as might be expected in *coronata*. Additional plumage and morphological evidence suggesting a *kirtlandii* parent included the bill, which was relatively large for a *Dendroica* and resembled that of *kirtlandii* in shape. The nature of the streaks on the back matched those of *kirtlandii*, and the spots on the rectrices were a good match in size and shape to those of *kirtlandii*. In ad-

dition, the yellowish throat and upper breast resembled that of *kirtlandii*, whereas these would be white on *coronata*. Thus, the preponderance of evidence suggested one parent was *kirtlandii*.

The identification of the second parent must explain the wing pattern and the distinctive face pattern of the possible hybrid. The pool of potential candidate species may include all species of wood-warblers that breed in East-

TABLE 1. Unflattened wing chord, tail length, culmen length from anterior edge of nares to tip, tarsus, and mass for male *Dendroica fusca*, *D. kirtlandii*, and the presumed hybrid. Measurements are in mm or g. Values are mean \pm SD (range, *n*). Measurements of *D. fusca* are from D. Ziolkowski (unpub. data) from birds in the collection of the American Museum of Natural History, except for data on mass, which are from Morse (1994) after Ridgway (1902); data for *D. kirtlandii* are from Mayfield (1992) after Goodman (1982).

Variable	Species		
	<i>D. fusca</i>	Hybrid	<i>D. kirtlandii</i>
Wing	68.3 \pm 1.5 (64–71, 20)	72.5	71.7 \pm 1.4 (69–75, 53)
Tail	48.1 \pm 1.3 (44–50, 20)	54.0	57.6 \pm 2.2 (53–67, 52)
Culmen	7.6 \pm 0.35 (7.1–8.2, 20)	7.2	8.1 \pm 0.3 (7.5–8.7, 50)
Tarsus	17.7 \pm 0.3 (17.2–18.2, 20)	21.3	21.2 \pm 0.6 (19.5–22.9, 52)
Mass	10.1 (9.5–12.6, 5)	12.2	13.6 \pm 0.6 (12.3–14.6, 31)

ern North America and migrate to or through the West Indies (Graves 1990, 1996), but must be limited to those species which also potentially co-occur with *kirtlandii* in or near the typical jack pine (*Pinus banksiana*) habitat of Kirtland's Warbler (Mayfield 1960). Although no other species of warbler is characteristic of this habitat, Mayfield (1992) reported that *D. pinus*, *D. discolor* (Prairie Warbler), and *Vermivora ruficapilla* (Nashville Warbler) nest in other habitats near jack pine stands. None of these appear to be a suitable parent for this hybrid as they fail to explain the plumage patterns of the wing and face. However, Brewer et al. (1991) also reported Blackburnian Warbler (*D. fusca*) nesting in the limited breeding range of *kirtlandii*. *D. fusca* also migrates through the West Indies enroute to South American wintering grounds (Morse 1994; Keith et al. in press), and we believe that the evidence favors this species as the other parent of the hybrid. The wing pattern in *fusca* is characterized by black feathers with white margins, which are especially pronounced in the tertials. In most museum specimens this white does not extend as far as the secondaries, but this feature apparently is vulnerable to wear as nestlings with growing wings show fine white edges on the remiges. Thus, the wing pattern seen in the hybrid resembled that of *fusca*. The face pattern of basic-plumaged *fusca*, particularly first fall individuals, also could account for that of the hybrid. In the hybrid this was seen in the upper half of the eye-ring merging behind the eye with a yellowish superciliary. There was a dark line through the eye to the lores, merging behind the eye with a distinctive, triangular, dark cheek patch, which itself was inconspicuously

outlined in pale yellow. Though *fusca* often is thought of as intensely colored below, hatching year birds have much less brightly colored underparts and are more similar in coloration to that of the hybrid.

Physical descriptions of the presumed parental species in detailed comparisons below are derived from specimens in the Carnegie Museum of Natural History, as well as from Curson et al. (1994), Dunn and Garrett (1997), and Pyle (1997) for birds in basic plumage. Accepting the hypothesis that the bird is a hybrid between *D. kirtlandii* and *D. fusca*, in these detailed comparisons we refer only to males because the maximum wing length for females of both *kirtlandii* and *fusca* is 71 mm (Pyle 1997), whereas that of the hybrid is 72.5 mm. The age of the possible hybrid remains unresolved so we refer to all age classes in these comparisons. In general though, among *kirtlandii*, adults and immatures tend to look very much alike in the fall. Immatures tend to be more strongly washed with brown, and the yellow of the underparts is paler and has a stronger buffy tinge. Among *fusca*, there are considerable differences in plumage among birds of different ages, but immature birds tend to be considerably more olive brown above and have less white in the wingbars, more blurred streaking, and the yellow of the head, throat, and breast appear more yellow-buff to yellow-ocher.

Detailed comparisons of morphological and plumage characteristics of the hybrid and the presumed parental species follow. The bill in *kirtlandii* is blackish, with brown often showing at the base of the bill in winter. In *fusca*, the bill is blackish with a fleshy-brown base of the mandible during winter. In the hybrid,

the upper mandible was blackish and the lower mandible was dark with a fleshy-brown base. The bill of the hybrid was shorter than that of *kirtlandii* (Table 1) but fell within the range of values for bill length of *fusca*.

In *kirtlandii*, there is no noticeable facial pattern other than a broken eye-ring which is either off-white or buffy in color. The black lores and forehead stripe which extend down into the anterior cheek and malar area generally are reduced or absent during winter. In *fusca*, the triangular auricular patch, pointed at the rear and bottom, is distinctive. A blackish eyeline borders the auriculars. The color of the broad supercilium, sides of neck, and the arc under the eye vary from yellow to yellow-ochre to very pale yellow-buff. The remainder of the head and auriculars are olive, brownish-olive, or gray-brown. All ages show a pale median forehead stripe but this may be inconspicuous. In the hybrid, a conspicuous broken eye-ring was a rich buffy yellow. The upper half of the eye-ring merged with a yellowish to buffy yellow superciliary. There was a dark line through the eye to the grayish lores. The dark line merged behind the eye with a dark, triangular cheek patch which was pointed at the rear and bottom, and which was itself inconspicuously outlined in pale yellow.

The crown, hindneck and sides of the face are gray in *kirtlandii*, but suffused with brown during winter. There are fine black streaks on the crown and nape. In *fusca*, the crown is olive, brownish-olive, or gray-brown. The forecrown patch and the thin central stripe on the forehead vary from yellow to yellow-ochre to very pale yellow-buff and may be olive-tinged. In the hybrid, the crown and nape were olive-gray washed brownish with no sign of streaking. What appears as fine streaking on the crown (Fig. 1A) is shadowing caused by raised crown feathers.

The back in *kirtlandii* is gray, strongly suffused with brown, with fine black streaking on the upper back. The back has a brownish wash during winter, which wears away by spring to reveal the typical blue-gray plumage of breeding birds. Juvenile birds in general are less bright overall. In *fusca*, the back is primarily olive, brownish-olive, or gray-brown, sometimes with a buffy cast in immature females. Black or dusky centered feathers give a streaked appearance to the back. On each side

of the back, a pale or creamy stripe or "brace" is present and is diagnostic, but this may appear as several shorter pale streaks when the feathers are disarranged. In the hybrid, the back generally was olive-gray with a buffy cast. The upper back was streaked black, and the trace of an indistinct buffy brace was visible.

The rump and uppertail coverts in *kirtlandii* are gray. There is fine black streaking on the rump and heavier streaking on the uppertail coverts formed by black centers to gray feathers. In *fusca*, the rump and uppertail coverts are similar to the back and are primarily olive, brownish-olive, or gray-brown without streaking. In the hybrid, the rump was olive-gray tending to blue-gray with sparse black streaking. The blue-gray uppertail coverts were streaked with black.

The tail in *kirtlandii* is blackish-brown with white spots or ovals near the tips on the inner webs of the outer two or three pairs of rectrices (R4–R6). In *fusca*, the tail is dusky with narrow olive-gray edges. The inner webs of the outer three or four pairs of rectrices (R3–R6) show elongated white spots. In the hybrid, the tail was dark with narrow buffy edgings to the outer rectrices, tending toward blue-gray edging to inner rectrices. There were large white ovals near the tips on the inner webs of the outer two rectrices (R5–R6). The length of the tail (Table 1) was at the low end of the range for *kirtlandii* and longer than that of *fusca*.

The chin usually is whitish in *kirtlandii*, while the rest of the underparts including the throat, breast, and belly are yellowish to buffy. Occasionally, fine black spots are present on the breast, with black spots or black streaks on the sides and flanks partly veiled by yellowish-white. The pattern and spotting on the breast, however, are highly variable among individual *kirtlandii*. Undertail coverts are white. In *fusca*, the throat and breast vary from yellow to yellow-ochre to very pale yellow-buff. In young birds, the throat patch, in addition to being less bright, often is reduced and does not extend as far down on the lower breast and flanks. The lower breast, belly, and flanks may show a variable yellow wash which may be quite pale in some individuals. Streaking on the sides of the breast, and sparse streaking on the flanks, may be black and bold

or blurred, dusky and grayish. Undertail coverts are whitish to pale buffy yellow. In the hybrid, the chin was yellowish and unstreaked. The throat and upper breast were yellowish, with continuous diffused streaking on the sides and upper breast. The flanks also were yellowish, but with a grayish wash and indistinct black streaking. There was no sign of yellow on the sides as in *D. coronata*. Undertail coverts were white, tipped pale yellowish.

In the wing of *kirtlandii*, the lesser wing coverts are gray; the median and greater coverts also are gray but with blackish centers and grayish white fringes forming thin, indistinct wing bars. There are no white margins on the tertials or secondaries. The wings are browner in juveniles and winter birds. In *fusca*, the primaries and secondaries are dusky blackish, narrowly edged with olive-gray. The tertials are black with conspicuous white fringes. The median and greater coverts are broadly tipped white forming two wide wing bars, but these may vary in width and prominence. In the hybrid, the dark, almost black wings showed two pronounced whitish wing-bars. These were formed by sharply contrasting white edgings to the greater and median coverts. The tertials also were edged whitish, with the white edgings extending all the way (faintly) to the primaries. The length of the wing (Table 1) was at the low end of the range for *kirtlandii* and longer than that of *fusca*.

The body parts, including the tarsi, toes, and nails, all are blackish in *kirtlandii*. Eyes are dark brown. In *fusca*, the legs and feet are dusky brown. Eyes are dark brown. In the hybrid, the legs and feet were uniformly dark. Eyes were dark brown. The length of the tarsus of the hybrid (Table 1) was similar to that of *kirtlandii* and longer than that of *fusca*.

With all factors considered, we are satisfied that Kirtland's Warbler \times Blackburnian Warbler represents the best hypothesis for parentage of this individual. This represents the first reported presumed hybrid of *D. kirtlandii* and one of few records of a possible hybrid involving *D. fusca*. There is a photographic record of a presumed *D. fusca* \times *Mniotilta varia* (Black-and-white Warbler), a sight record of a possible *D. fusca* \times *D. castanea*, and another record of *D. fusca* and *D. castanea* paired and nesting (Dunn and Garrett 1997). Among

parulid warblers, intrageneric hybrids are less common than intergeneric hybrids (Parkes 1961, 1978; Latta et al. 1998), but a common explanation for the existence of these hybrids is that one of the parental species is at the very edge of its range in the area of sympatry and thus limited in the availability of more suitable mates. Because the hybrid described here was captured on migration we do not know where the hybridization took place, but almost all Kirtland's Warblers are found in a small area of the northern lower peninsula of Michigan and we can assume that the mating most likely took place there. *D. kirtlandii* is indeed rare, with an estimated population size of 733 singing males during 1997 (H. Mayfield pers. comm.); *D. fusca*, at the very southern edge of its breeding range in northern Michigan (Brewer et al. 1991), also would be uncommon. Further, breeding habitats of the two species are sufficiently different that either species may be comparatively rare, thus creating conditions whereby hybridization may be expected to occur more often (Parkes 1961, 1978). *D. kirtlandii* breeds exclusively in jack pine plains; *D. fusca* prefers coniferous and mixed coniferous-deciduous forests and in Michigan often places its nests in white pine (*Pinus strobus*) trees (Doepker et al. 1992, Morse 1994). While hybridization events such as that reported here which possibly involve threatened or endangered species such as *D. kirtlandii* may be of concern to managers and conservationists and should be monitored, we suspect that in this case it was a very rare occurrence. Nevertheless, this report adds to the evidence for widespread genomic compatibility and hybridization potential among strikingly different birds (Gill 1998).

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