

AN INTERGENERIC HYBRID WOOD WARBLER
(*SEIURUS* × *DENDROICA*)

LESTER L. SHORT, JR., AND CHANDLER S. ROBBINS

WILD hybrid birds are always of interest with regard to our understanding of the variation encountered in nature. They may also be of more or less taxonomic significance, depending on the frequency of their occurrence and other factors. We herein report and describe an apparent hybrid Northern Waterthrush (*Seiurus noveboracensis*) × Blackpoll Warbler (*Dendroica striata*) taken by Robbins at Ocean City, Maryland, on 17 September 1965. The bird (U. S. National Museum, no. 481595), an immature male with no fat, weighed 13.7 g and had apparently normal testes, each measuring 2.0 × 0.5 mm. The hybrid was taken in a net situated close to the ground, inland from the beach north of Ocean City; both Northern Waterthrushes and Blackpoll Warblers were caught the same day in the same net.

The hybrid has the general appearance of a large, dark, immature wood warbler of the genus *Dendroica*. It shows a peculiar color pattern—it is streaked on its breast somewhat like a Cape May Warbler (*D. tigrina*), is dark olive with indistinct streaks on its back, and has distinct buffy superciliary stripes, narrowly barred wings, a yellowish white abdomen, long white under tail coverts, and an almost unmarked dark tail. The specimen resembles a Blackpoll Warbler in the length of its wings, tail, and bill, but it has longer legs and toes than members of that species.

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DESCRIPTION OF THE HYBRID

Mensural characters.—The wings are similar in length and shape to those of *D. striata* and *S. noveboracensis*, which overlap in these features (Table 1).

The tail is similar in length to both and slightly notched, as in both species (Table 1). The hybrid's rectrices tend in shape toward the more truncate and broader ones found in *S. noveboracensis*, rather than the slightly narrower and more tapered rectrices of *D. striata*.

The length of the bill is within the range of *D. striata* (Table 1). The gonys is more convex than in *D. striata*, thus more like *S. noveboracensis*, and the tip of the upper bill less curved in profile than that of *D. striata*.

TABLE 1
WEIGHTS (G) AND MEASUREMENTS (MM) OF *SEIURUS NOVEBORACENSIS*,
DENDROICA STRIATA, AND THE HYBRID¹

<i>Measurement</i>		<i>Seiurus noveboracensis</i>	<i>Hybrid</i>	<i>Dendroica striata</i>
Weight	N	5		6
	Mean	15.56	13.7	10.93
	Range	13.5-17.0		10.1-12.7
Wing (chord)	N	11		12
	Mean	74.83	74.6	73.02
	Range	72.7-77.4		70.4-76.0
Tail	N	8		12
	Mean	51.98	50.3	51.17
	Range	49.7-55.1		48.7-53.2
Exposed culmen	N	10		12
	Mean	12.14	10.1	9.87
	Range	11.5-12.8		9.2-10.2
Tarsus	N	11		12
	Mean	20.97	20.2	18.28
	Range	20.5-21.3		17.8-18.9
Middle toe (without claw)	N	10		11
	Mean	12.45	12.5	11.29
	Range	11.8-13.3		10.5-12.5

¹ Linear measurements were made only on immature males. Weights were from immature birds, but sexes were not known.

The rictal bristles are long, as in *D. striata*, not short like those of *S. noveboracensis*.

Both the tarsus and toes are relatively long (Table 1). The tarsal length is intermediate between *D. striata* and *S. noveboracensis*, but approaches the latter. The toe measurements of the two species overlap. The hybrid is at the upper extreme for *D. striata*, and well within the range of *S. noveboracensis* in the length of its middle toes. The hybrid's tarsi are notably weaker (thinner) than those of *S. noveboracensis*, and about like those of *D. striata*. Thus, the hybrid has long legs and toes like *S. noveboracensis*, but thinner and less sturdy legs like those of *D. striata*.

Weights were obtained on 18 Northern Waterthrushes and 18 Blackpoll Warblers which were netted and banded at Ocean City within one day of the date on which the hybrid was secured. These birds were aged by methods cited by Robbins (1964). Since the hybrid showed no fat ("none class" fat condition of Wolfson, 1954: 415) it can only be compared with similarly fatless birds. These include six immature Blackpolls and five immature Northern Waterthrushes (Table 1). Robbins has noted elsewhere (1964) a mean of 11.32 g for 64 fatless immature male Blackpolls, and 16.92 g for 71 immature Northern Waterthrushes (both sexes)

with various conditions of fat. The hybrid weight falls in the low range of fatless *S. noveboracensis*.

Head color.—The crown is between Yellowish Olive and Olive (capitalized color names are from Ridgway, 1912), intermediate between the Light Yellowish Olive of *D. striata* and the Brownish Olive to Olive of *S. noveboracensis*. The entire crown is streaked as in some specimens of *D. striata* (streaking obscure in some individuals); the streaks are darker and more distinct than those faintly suggested in some specimens of *S. noveboracensis*. The anterior central crown, forward to the forehead, is faintly marked with yellow (between Reed Yellow and Olive Yellow), as in some specimens of *S. noveboracensis* and certain species of *Dendroica* (e.g., *D. fusca*), but not *D. striata*.

A superciliary stripe is present, and is about as in *S. noveboracensis* but narrower. It is buffy and distinct as in that species, not yellowish and indistinct like that of *D. striata*. A brown eyestripe extends farther anteriorly and posteriorly than does that of *D. striata*. The stripe is more distinct and browner (less green) than in *D. striata*, and is hence like that of *S. noveboracensis* except for being slightly narrower.

The sides of the neck are more olive (less yellow-green) than in *D. striata*, being nearly the Brownish Olive of *S. noveboracensis*. The ear coverts are similar to those of *S. noveboracensis*, but the dark markings are more olive (less brown).

The throat and chin are Naples Yellow, largely unmarked, but there are faint dusky spots on some feathers at the sides of the throat and in the malar areas (some specimens of *D. tigrina* are similarly, although usually more strongly, marked). The ground color approaches that of more yellow-throated specimens of *S. noveboracensis*, or the yellower, less yellow-green tinged throats of some *D. striata* specimens. Several feathers at the sides of the hybrid's throat exhibit a peculiar orange tinge, resembling the face color of an adult Cape May Warbler. The tinge does not appear to be a discoloration from blood. We do not know the significance of this color, but we noted such a tendency (although to a lesser degree) in a few specimens of the Northern Waterthrush.

Upperparts.—The back actually is Yellowish Olive, but it appears darker (Olive) because of a slightly grayish cast and the effect of the faint brown-black streaks. These streaks are dull, but as distinct as in some specimens of *D. striata*. The over-all appearance is intermediate between the two presumed parental species.

The rump and upper tail coverts are olive, the feathers having greenish edges and gray bases which show through between them. Over-all, this area is much like *D. striata*, but darker and less yellow.

As in *D. striata* the wings are barred, except that the bars are narrower

and exhibit a buffy rather than a yellow cast. The wing feathers are generally darker than in *D. striata*, and blacker (less brown) than in *S. noveboracensis*. The feather edges are darker and narrower than those of *D. striata*. The tertials are tipped with white, but not as extensively as in *D. striata*.

The upper tail coverts are relatively broad and taper gently toward the feather tips, being very like *S. noveboracensis*, and not as acuminate and narrow as those of species of *Dendroica*.

The tail is colored like *D. striata*, lacking the Brownish Olive of *S. noveboracensis*, but also nearly lacking the white pattern of the outer rectrices found in species of *Dendroica*. In the outer (sixth) rectrices the white is restricted to within 1 to 3 mm of the tips of the inner vanes (a little more white shows in the right sixth rectrix than in the left). The left fifth rectrix lacks white at its tip, while there is a tiny (1 mm) mark at the tip of the right fifth. Such asymmetry of tail pattern is often found in *Dendroica*, as well as in Golden-winged and Blue-winged warblers, *Vermivora chrysoptera* and *V. pinus* (Short, personal observation). Small white patches like that of the hybrid are found in some specimens of *S. noveboracensis* (see below).

Underparts.—The breast, sides, and flanks are streaked, but the streaks are finer than in *S. noveboracensis*. The ground color is pale yellow, about as in *D. striata* and the yellower specimens of *S. noveboracensis*. The abdomen is unmarked, paler than the breast, and almost white; laterally it is more yellowish. In this respect it is very similar to paler-bellied specimens of *D. striata*.

Long under tail coverts reach to within 13 mm of the tail tip (in *D. striata* the coverts reach from within 12 to 18.5 mm, and in *S. noveboracensis* from within 9 to 14 mm, of the tip). They are white with a very faint yellow wash. The basal portions of the covert feathers are dusky grayish as in *D. striata*, not olive as in *S. noveboracensis*, and the dusky color does not extend as far toward the feather tips as in the latter.

GENERAL COMMENTS AND COMPARISONS

After comparing the hybrid with specimens in all plumages of the various parulid species, we concluded that it appears to represent a cross between *Seiurus noveboracensis* and *Dendroica striata*. Using specimens available in the U. S. National Museum, we explored other possibilities. The hybrid resembles an immature Cape May Warbler in breast streaking and breast color, but the hybrid's larger size, differently shaped bill, lack of neck markings, and absence of any indication of a yellow rump patch seem to rule out that species as one of the parents. Although there is also some resemblance to the immature Palm Warbler (*D. palmarum*),

TABLE 2
WHITE TAIL MARKINGS IN ADULTS OF THREE SPECIES OF *SEIURUS*,
IMMATURE MALES OF *DENDROICA STRIATA*, AND THE HYBRID

<i>Species</i>	<i>Number</i>	<i>Number with white</i> ¹	<i>Per cent with white</i>	<i>Mean extent of white</i> ¹	<i>Maximum extent of white</i>
<i>S. noveboracensis</i>	626	52	8.0	1.84 mm	7.0 mm
<i>S. motacilla</i>	199	11	5.5	3.72 mm	9.9 mm
<i>S. aurocapillus</i>	454	22	4.8	3.25 mm	12.1 mm
<i>D. striata</i>	10	10	100.0	13.89 mm	17.0 mm
hybrid	—	—	—	3.0 mm	—

¹ Those specimens were counted which exhibited in their outer rectrices white markings measuring one mm or more from the edge of the inner vane just below the feather tip toward the rachis and base of the feather.

the hybrid is larger, has a heavier bill and wider wing bars, and it lacks rusty coloring on its crown and indications of a yellow rump patch and yellow under tail coverts. No other *Dendroica* shows a particular resemblance to the hybrid except *D. striata*. As noted above, the hybrid approaches *striata* particularly in size, bill shape, wing markings, back and rump color, color of the breast, and color of the under tail coverts. Since the features of an intergeneric hybrid are not necessarily intermediate between those of the parents or simply a mixture of those of the two parents, there exists a remote possibility that the *Dendroica* parent was of some species other than *striata*.

The hybrid particularly resembles the Northern Waterthrush in size, in its long tarsi and toes, its breast streaking, and its eye-stripe and superciliary stripe; it resembles variant specimens of this species in its white tail spots. Also, it tends somewhat toward *S. noveboracensis* and away from *D. striata* in dorsal coloration. Among other species of *Seiurus*, the Ovenbird (*S. aurocapillus*) is excluded as a possibility because the hybrid lacks signs of crown stripes, has a more definite superciliary stripe, and is much too dark, especially on the wings. The hybrid also lacks signs of the rufous in the flanks of the Louisiana Waterthrush (*S. motacilla*), has a buffy rather than white superciliary stripe, and has no indication of the very large bill of that species. Also, the breeding ranges of the Blackpoll and the Louisiana Waterthrush are not known to overlap.

Tail markings of Seiurus and Dendroica.—It has been noted above that the hybrid's tail bears small white spots. Eaton (1957: 234–235) discussed the white markings in the tails of Northern Waterthrushes, and concluded that all adults (over one year of age) normally have white edges or spots of variable size on their outer rectrices. However, he made no distinction between the typical white edges found in that species, and the more extensive spots that are occasionally seen. Examination of all

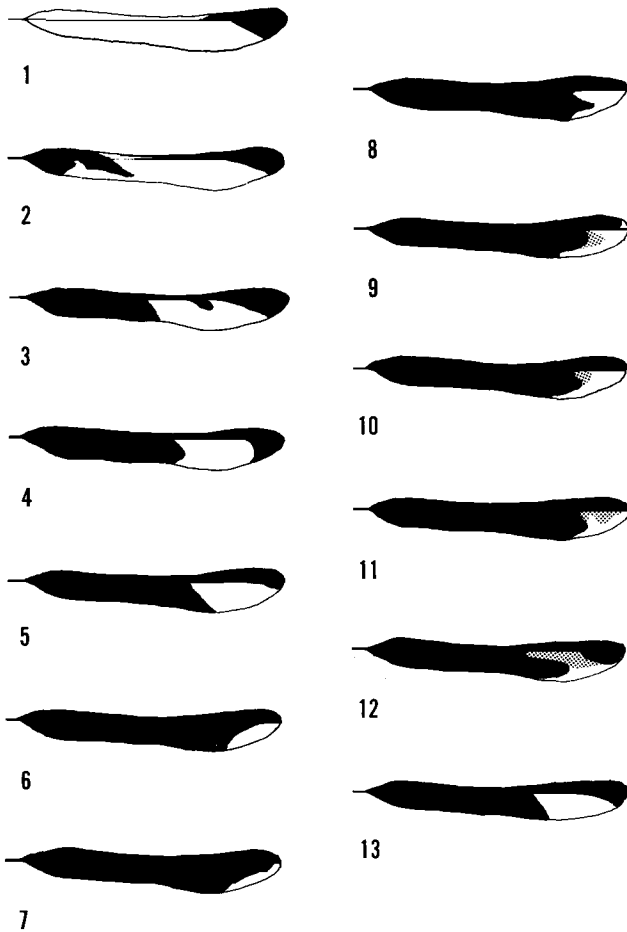


Figure 1. Patterns of outer rectrices of the following wood warblers: 1, *Dendroica fusca*; 2, *D. chrysoparia*; 3, *D. pensylvanica*; 4, *D. tigrina*; 5, *D. palmarum*; 6, *D. plumbea*; 7, *D. pharetra*; 8, *Seiurus aurocapillus* (USNM 440386); 9, *S. motacilla* (USNM 143357); 10, *S. noveboracensis* (USNM 207176); 11, *S. noveboracensis* (USNM 440427); 12, hybrid *S. noveboracensis* \times *D. striata* (right outer rectrix); 13, *D. striata*. Note the particular pattern of the white area in the various species and the hybrid.

adult Northern Waterthrushes in the U. S. National Museum showed that about 8 per cent (see Table 2) have white marks on the outer rectrices, extending toward the rachis for one mm or more from the edge of the inner vane of the feathers just below their tips. Comparative figures for the other species of *Seiurus* (Table 2) indicate that, in comparison with Northern Waterthrushes, fewer Louisiana Waterthrushes and Ovenbirds

have extensive tail markings (Figure 1). However, in those Louisiana Waterthrushes and Ovenbirds with these markings, they are larger on the average than those in the Northern Waterthrush. All birds of the three species showing extensive white are adults with the possible exception of two Northern Waterthrushes. One of these has rusty edges on its tertials, a characteristic of immature Northern Waterthrushes (Eaton, *in* U. S. Fish and Wildlife Service Bird Banding Manual, June, 1961), while the other has peculiar pale edges of these feathers. Otherwise, none of the immature and juvenal Northern Waterthrushes (N = 139), Louisiana Waterthrushes (31), and Ovenbirds (121) we examined showed extensive (1 mm or more from edge) white tail markings.

Among the three species of *Seiurus*, most birds with extensive white tail markings were males. In the Ovenbird, 95 per cent (18 of 19) of sexed specimens bearing such extensive white tail markings were males, as were 70 per cent (36 of 52) of the Northern Waterthrushes and 70 per cent (7 of 10) of the Louisiana Waterthrushes. All Blackpolls have white marks of variable size in their tails (Figure 1); the average extent of white in 10 immature male specimens of *D. striata* is indicated in Table 2.

As suggested by Table 2, the maximum extent of white in the tails of species of *Seiurus* rarely approaches or reaches the minimum extent in *D. striata* (minimum extent of latter in 10 specimens = 11.1 mm). The hybrid has white tail markings that extend from the feather edge for about 3 mm, at which point the white gradually becomes dusky gray. This pale dusky area extends proximally toward the feather base and toward the rachis for about 6 mm more (Figure 1). The pale dusky area and the contiguous white patch present a pattern typical of several species of *Dendroica*. Likewise, various specimens of the three *Seiurus* species showing white marks in the tail exhibit a pattern, or indications of a pattern, found also in *Dendroica* (Figure 1). Among species currently placed in *Dendroica*, the smallest white tail markings are those of the West Indian *D. plumbea* and *D. pharetra* (Figure 1). The latter has white spots very much like those of the hybrid, as well as like those of atypical individuals of the three species of *Seiurus*.

We consider significant the similarity in pattern of the atypical *Seiurus* specimens, the hybrid, and various species of *Dendroica*. That is, the occasional phenotypic expression of *Dendroica*-like white tail markings in individuals of extant species of *Seiurus* reflects a genetic potential suggestive of the past occurrence of such *Dendroica*-like markings in their ancestors. If the markings were indicative of a past pattern of tail spots of another type, or if the modern species evolved from ancestors lacking spots and spots were just beginning to appear in *Seiurus*, we would expect

a different, perhaps simpler, pattern rather than the *Dendroica*-like pattern actually observed.

DISCUSSION

The Blackpoll Warbler and Northern Waterthrush are very broadly sympatric across boreal North America (A.O.U. Check-list, fifth edit., 1957; Griscom and Sprunt, 1957). Within the area of sympatry both species are common, even occasionally abundant (Peters and Burleigh, 1951: 347; Todd, 1963: 612, 620). Because of their general abundance and widespread sympatry, it seems obvious that there exist many opportunities for contact between these species in the breeding season. During this period the Blackpoll prefers spruce forest (Bent, 1953: 393), open tundra-edge with scattered spruces (Todd, *loc. cit.*) and "thickets of willow and alder that are interspersed with black spruce" (Gabrielson and Lincoln, 1959: 725). According to these various authors, the Northern Waterthrush occurs in swampy, wetter portions of the same spruce forests and willow-alder situations, as well as along lakes and streams. Although the waterthrush is usually a ground-nesting bird, and the Blackpoll nests in spruces, nests of the former are occasionally placed above the ground in stumps and logs, and the Blackpoll infrequently nests on the ground. The normal nest site of the Blackpoll is from one to ten feet above the ground in a spruce tree (Griscom and Sprunt, 1957: 172). Consideration of the habits of all species of *Dendroica* with which the Northern Waterthrush is sympatric during the breeding period suggests that only the ground-nesting Palm Warbler probably comes in contact with waterthrushes more often than do Blackpoll Warblers.

Perhaps the most surprising thing about this instance of interbreeding between the Blackpoll and the Northern Waterthrush is the tremendous difference in their songs, which are about as disparate as those of any two wood warblers. Their interbreeding seems especially remarkable in view of the distinctiveness of most warblers' songs, and the likelihood that these function as isolating mechanisms. It is impossible to guess the conditions under which hybridization occurred in this case, and futile to speculate on how a female of one species might have reacted favorably to the song or other actions of a male of the other.

As to the significance of this event, we repeat the statement of Short and Burleigh (1965: 37) concerning an intergeneric hybrid tyrannid flycatcher: (1) occurrence of the hybrid suggests the close relationship of the genera involved; (2) genomes of at least some species of the two genera are sufficiently similar to allow production and survival of an F₁ hybrid; and (3) breakdown of isolating mechanisms between species of different genera indicates the likelihood of occasional intergeneric hy-

bridization. For reasons one of us has given elsewhere (Short and Phillips, 1966: 263), and also because we feel that the remarkable appearance of intergeneric hybrids renders them more likely to be noticed by collectors and banders than the usually less obvious hybrids between congeneric species, we consider unlikely any generalization (Banks and Johnson, 1961: 26; Parkes, 1961: 348–350) that intergeneric hybridization ought to occur more often than intrageneric hybridization.

Intrageneric hybrids are unknown in *Seiurus*, while probably valid hybrids within *Dendroica* listed by Gray (1958) are: *striata* × *castanea*, *striata* × *tigrina*, *occidentalis* × *townsendi*, and *dominica* × “*Parula*” *americana* (often reported hybrids of *D. coronata* × *D. “auduboni”* cited by Gray are here considered “intraspecific hybrids”). Other presumed intergeneric hybrids listed by Gray (see also Parkes, 1961) include *Vermivora pinus* × *Oporornis formosus*, *V. pinus* × *O. philadelphia*, and “*Parula*” *americana* × *Setophaga ruticilla*. The frequency of both categories of interspecific parulid hybrids is suggestive of the recent rapid evolution of and active speciation in the group (see, e.g., Mengel, 1964), while the “intergeneric” hybrids may actually indicate that we yet have much to learn about parulid generic limits (see Griscom’s remarks in Griscom and Sprunt, 1957: 349–350).

At any rate, the occurrence of this single intergeneric hybrid suggests to us a rather close relationship between *Seiurus* and *Dendroica* and tends to corroborate their adjacent position in most classifications. The detection of relatively frequent intergeneric hybrids between these two would, as in the cases of hybrids between the trochilid “genera” *Selasphorus* and *Calypte* (Short and Phillips, 1966) and the emberizine “genera” *Junco* and *Zonotrichia* (Short and Simon, 1965), strongly suggest a need for reappraisal of the genera involved.

SUMMARY

A peculiar specimen of wood warbler was taken from a mist net just inland from the beach at Ocean City, Maryland, on 17 September 1965. The specimen appears to represent a hybrid of the Northern Waterthrush (*Seiurus noveboracensis*) and the Blackpoll Warbler (*Dendroica striata*). This unique intergeneric hybrid suggests the close relationship of *Seiurus* and *Dendroica*, and thus tends to corroborate their adjacent position in most classifications of wood warblers.

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Bureau of Sport Fisheries and Wildlife, U. S. Fish and Wildlife Service, U. S. National Museum, Washington, D. C. (present address: American Museum of Natural History, New York, New York); and Migratory Bird Population Station, Laurel, Maryland.