IDENTIFICATION OF CONNECTICUT, MOURNING, AND MACGILLIVRAY'S WARBLERS

By Wesley E. Lanyon and John Bull

A discovery of two heretofore unpublished museum specimens of MacGillivray's Warbler (*Oporornis tolmiei*) in eastern North America prompted us to reexamine the problems associated with the identification of warblers of the genus *Oporornis*. These secretive birds, formerly overlooked or seldom observed during their migrations, are now handled regularly and in fair numbers by banders using mist nets. Field identification of other than adult males in this group remains difficult and often impossible. But banders should have no problem in identifying the great majority of the *Oporornis* that they process, providing they use appropriate characters. The simplified key provided here may be useful in this regard.

Those banders who presently have no difficulty differentiating between Mourning Warblers (*O. philadelphia*) and Connecticut Warblers (*O. agilis*) may find that section of the key dealing with the separation of Mourning Warblers and MacGillivray's Warblers of particular interest. Phillips (1947), in a study of geographical variation within *O. tolmiei*, stressed the value of the difference between the measurements of wing length and tail length as a means for differentiating between the immatures of *tolmiei* and *philadelphia*. We have placed considerable emphasis on this character, "wing minus tail", in constructing the key presented here. Mourning and MacGillivray's Warblers occur together as migrants, only casually from the upper Mississippi Valley to central Texas but more regularly southward through eastern Mexico and into Central America. The differentiation of migrants or winter residents of the two forms in Central America has been a concern not only of the increasing number of banders operating in that region but of museum personnel as well. It has been brought to our attention by Allan Phillips (Instituto de Biología, Universidad Nacional Autónoma de México), Emmet Blake (Field Museum of Natural History), and Eugene Eisenmann (The American Museum of Natural History) that there are some records of "*O. tolmiei*" from Panama and Colombia that are based on specimens now believed to be *O. philadelphia* on the basis of the "wing minus tail" character. Reexamination of other records of these forms from their wintering grounds would seem to be advisable.

MACGILLIVRAY'S WARBLER IN EASTERN NORTH AMERICA

To our knowledge there are no published references to specimens of MacGillivray's Warbler that have been taken east of the Mississippi Valley. The statement in the A. O. U. Check-list (1957, p. 510) that this species is "casual in migration, east to . . . Indiana (Wolf Lake, Noblesville)" is based on birds that were banded and released. According to Brooks (1925), the Noblesville bird, trapped on 29 May 1924, was identified by virtue of the incomplete eye-ring; the sex was not specified.

Griscom (1939) reported on an unusual warbler that frequented the feeding station of E. Alexander Bergstrom at Waltham, Massachusetts in February 1939. Though identified by one observer (Garrison) as a female Mourning Warbler, Griscom personally was uncertain whether it was a Mourning or a MacGillivray's; "whichever species it may prove to be, one would scarcely pick Massachusetts as the locus for the first, and successful, wintering of the bird in the United States." Attempts to collect the bird were unsuccessful. Mr. Bergstrom (personal communication) has informed us that the bird was seen as late as 26 April, at which time it was observed to have "a partial white eyering, so MacGillivray's was probable."

Both eastern specimens of *O. tolmiei* that we have recently discovered in the collection of The American Museum of Natural History are adult males, and both were taken in May 1890, though at different localities: (1) A. M. N. H. 507393; 20 May 1890, Hamilton, Ontario; identified by an unknown collector as "MacGillivray's Warbler"; (2) A. M. N. H. 507395; May (exact date not specified) 1890, New Haven, Connecticut; identified as a "Mourning Warbler" by an unknown collector, but reidentified as "*Oporornis tolmiei*" when it was originally catalogued in the Rothschild Collection. Both specimens have the characters diagnostic of adult male *tolmiei*: incomplete but conspicuous white eye-ring, black lores, chest region not conspicuously darker or blacker than the rest of the hood, and "wing minus tail" measurements of 8 mm. and 7 mm. respectively. The significance of these characters will be made apparent in the key. There is no question about the identity of the specimens and we can find nothing to indicate that there has been an error in labeling.

The occasional occurrence of vagrant MacGillivray's Warblers east of the Mississippi Valley is no more unexpected, perhaps, than are the casual records of Audubon's Warblers (*Dendroica auduboni*) and Black-throated Gray Warblers (*Dendroica nigrescens*) in the East. Banders in eastern North America should be aware of the characters that distinguish this western warbler in the event that they intercept one of these strays in their nets. If such a fortuitous event should occur, however, we strongly recommend that the bander resist the temptation to add such a rarity to his banding schedule and give serious consideration to preserving the bird for permanent study as a specimen in a local, state, or national museum. The authorities at such institutions have the appropriate permits and facilities for collecting and curating rarities of this kind.

SOME MISCONCEPTIONS AND PITFALLS IN IDENTIFYING *Oporonis*

Field guides and the literature in general have placed unwarranted emphasis on the presence, absence, or degree of completeness of an eye-ring in the identification of these birds. It is probably true that all, or virtually all, Connecticut Warblers have the eye-ring complete, regardless of age or sex. We have never personally seen one that did not. The configuration of the eye-ring in MacGillivray's Warblers appears to be equally consistent, regardless of age and

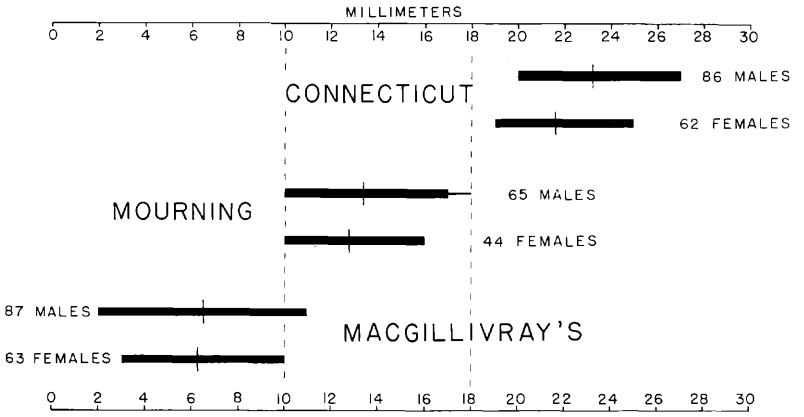

Figure 1. Population-range diagram of "wing minus tail", the most diagnostic mensural character for identifying Connecticut, Mourning, and MacGillivray's Warblers. For each sample, the broad horizontal bar represents the range of variation to be expected in 98 percent of the actual population (2.3 x standard deviation on either side of the mean, indicated by the vertical line). This statistical range of variation equalled or exceeded the range of variation observed in each of the samples except that of male Mourning Warblers, where the observed range extends beyond the statistical range as a narrow horizontal line.

sex, *i.e.* incomplete, with the white being confined to the areas above and below the eye. But the eye-ring is quite variable as a character in *all* ages and sexes of Mourning Warblers. We have recently seen two spring specimens of adult female Mourning Warblers, British Museum (Natural History) nos. 88.10.10.6179 and 88.10.10.6169, which have conspicuous and seemingly complete eye-rings. Had these birds been identified in the field, or even in the hand by a bander who was not familiar with the "wing minus tail" character, they probably would have been considered Connecticut Warblers. An adult female *Oporornis* (A. M. N. H. 788789) collected in May 1967 at the Kalbfleisch Field Research Station of the American Museum of Natural History, Huntington, New York, had a conspicuous but incomplete eye-ring confined to the areas above and below the eye. A field observer would have been tempted to identify this bird as a MacGillivray's Warbler, except for the extralimital nature of the record. But the "wing minus tail" measurement was 12 mm., clearly making it a Mourning Warbler (see Figure 1 and Table 1). The eye-ring is helpful but not wholly reliable.

Wing formula, *i.e.* the relative lengths of the ninth (outer) and sixth primaries, can be helpful in differentiating between Mourning and Connecticut Warblers, providing one is aware of the extent of variation that each of these species exhibits with respect to this character. Contrary to information released by the banding office several years ago, Mourning Warblers do not always have the sixth primary longer than the ninth; some individuals may have a ninth

TABLE 1. MEASUREMENTS (IN MILLIMETERS) OF SOME *Oporornis* AND *Geothlypis* WARBLERS

	Range	Mean, S. E.	Standard Deviation	Coefficient of Variability
Connecticut Warbler (*O. agilis*)				
(86 ♂♂, 62 ♀♀)				
Wing (flat)				
Males	66 - 77	71.1 ± 0.24	2.24	3.15
Females	64 - 74	69.2 ± 0.23	1.78	2.57
Tail				
Males	44 - 54	48.0 ± 0.19	1.77	3.69
Females	43 - 51	47.5 ± 0.22	1.74	3.66
Wing minus tail				
Males	20 - 27	23.2 ± 0.16	1.47	6.34
Females	19 - 24	21.6 ± 0.17	1.32	6.11
Mourning Warbler (*O. philadelphia*)				
(65 ♂♂, 44 ♀♀)				
Wing (flat)				
Males	58 - 67	62.3 ± 0.22	1.76	2.83
Females	55 - 64	60.0 ± 0.37	2.46	4.10
Tail				
Males	45 - 53	48.8 ± 0.19	1.57	3.22
Females	43 - 52	47.1 ± 0.31	2.04	4.33
Wing minus tail				
Males	10 - 18	13.4 ± 0.20	1.61	12.01
Females	10 - 15	12.8 ± 0.20	1.31	10.23
MacGillivray's Warbler (*O. tolmiei*)				
(87 ♂♂, 63 ♀♀)				
Wing (flat)				
Males	57 - 65	60.8 ± 0.19	1.81	2.98
Females	55 - 62	58.1 ± 0.20	1.58	2.72
Tail				
Males	49 - 63	54.3 ± 0.30	2.77	5.10
Females	47 - 58	51.7 ± 0.24	1.94	3.75
Wing minus tail				
Males	2 - 10	6.5 ± 0.22	2.09	32.15
Females	2 - 10	6.3 ± 0.19	1.50	23.81
Common Yellowthroat (*G. trichas brachidactylus*)				
(100 ♀♀ and immature ♂♂)				
Wing (flat)	50 - 58	53.6 ± 0.17	1.74	3.25

primary that is up to 3 mm. *longer* than the sixth. Those banders who have access to and occasion to use the key to *Oporornis* in Ridgway's *Birds of North and Middle America* (1902, p. 622) are advised that the statements in that key regarding the relationship between the ninth and sixth primary have been transposed; the ninth primary is *longer* than the sixth in Connecticut and Kentucky Warblers (*O. formosus*) and is *shorter* than the sixth in nearly all MacGillivray's Warblers and many Mourning Warblers. Here again, aside from the transposition of the statements in the key, the implication that *all* MacGillivray's and Mourning Warblers have the sixth primary longer than the ninth is incorrect.

The Connecticut Warbler moves northward in the spring from its wintering grounds in northern South America presumably via the West Indies and the southeastern states; thence in a general northwestern direction to the Mississippi and Ohio Valleys, and from there to its breeding grounds in the upper Great Lakes Region and the Canadian provinces east to central-western Quebec (Godfrey, 1966). Along the eastern seaboard in Spring, the Connecticut Warbler must be considered casual north of Maryland. Consequently, sight and banding records for the species in the mid-Atlantic and New England states in Spring must be made with great care. We have examined and authenticated four spring specimens of *O. agilis* from the northeast: (1) U. S. Natl. Museum 440457; 25 May 1917; ad. ♂, collected at Fort Lee, New Jersey by J. A. Weber; (2) Boston Mus. of Sci. 17349; 24 May 1883; ad. ♂, collected at Readville, Massachusetts by Dwight Blaney; (3) Buffalo Soc. Nat. Sci. 1124; 26 May 1929; ad. ♀ collected at Springville, New York, by John Aldrich; (4) Univ. Colorado Mus. 2784; 30 May 1889; ad. ♂ collected at Buffalo, New York, by W. H. Bergtold.

Females and especially immatures of the Common Yellowthroat, *Geothlypis trichas*, are sometimes confused with *Oporornis*. The lack of the black mask and the presence of an eye-ring, which may be as pronounced as in Mourning Warblers in fall, contribute to this confusion. But these Common Yellowthroats can be separated from all *Oporornis* by the coloration of the underparts. Some immature females may be devoid of any yellow on the underparts, and this at once distinguishes them from all *Oporornis*. Most individuals will have some yellow below, but the yellow is always confined to the throat, chest, and crissum (under tail coverts), leaving a conspicuously paler, whiter or browner abdomen or belly. In Middle and South America, where other species of yellowthroats have the underparts wholly yellow, or nearly so, caution is necessary in interpreting this character. Wing length is also useful for separating Common Yellowthroats from most *Oporornis*. The wing measurements for Common Yellowthroats in Table 1 were taken only from the northeastern race, *G. t. brachidactylus*. Wing length in a western race, *G. t. occidentalis*, may average a millimeter longer.

Some banders may confuse immature and female *Oporornis* with Nashville Warblers (*Vermivora ruficapilla*) and Orange-crowned Warblers (*Vermivora celata*) in basic (= winter) plumage. The throat and chest of the Nashville Warbler are uniformly yellow,

with no suggestion of a hood ventrally, and the abdomen is paler as in *Geothlypis*. The under parts of the Orange-crowned Warbler are dull olive-yellowish, often indistinctly streaked with grayish-green, and never approach the intensity of yellow that characterizes *Oporornis*. If in doubt on the basis of plumage coloration, the bander should inspect the shape of the tail and bill. Both of these *Vermivora* have even or slightly forked tails (*i.e.* the outer feathers are as long as or slightly longer than the central feathers), whereas the tails of *Oporornis* are rounded (outer feathers conspicuously *shorter* than the central feathers). Both *Vermivora* have smaller, more wedge-shaped bills than do *Oporornis*.

USE OF THE KEY

Banders have little difficulty in identifying Kentucky Warblers in any plumage. That species is included in the key only to complete the coverage of all forms within the genus. The key is designed in such a way that the great majority of the remaining *Oporornis* will key out at once on the basis of a single character, "wing minus tail". The folded wing should be flattened and straightened on a ruler in order to obtain maximum possible measurement, to the nearest millimeter, from the bend of the wing to the tip of the longest flight feather. The tail should be measured with a caliper, to the nearest millimeter, from the insertion of the two central tail feathers to the tip of the longest tail feather. The difference, in millimeters, between these two measurements is herein expressed as "wing minus tail".

These measurements were taken on large series of specimens, largely from the collections of The American Museum of Natural History and the United States National Museum. We purposely avoided using specimens of *O. tolmiei* and *O. philadelphia* from localities where both of these forms could be expected to occur. The results of this study, summarized in Table 1, provided the basis for the construction of the following key. Since "wing minus tail" is the most diagnostic of these mensural characters, a statistical analysis of this measurement is presented graphically in Figure 1 and illustrates several points made in the key. It is of interest that Emmet Blake, measuring the same character, achieved results comparable to ours in an independent examination of a smaller sample of birds in the Field Museum of Natural History. Plumage coloration can be used for the few adult males which can not be separated by "wing minus tail". Wing formula is a helpful additional character for differentiating *agilis* from *philadelphia*, but should be used only with birds whose flight feathers are unworn at the tips. The difference, in millimeters, between the tip of the ninth (outer) primary and the tip of the sixth primary should be measured with the wing held in its normal, closed position alongside the body, without distortion. Be certain that none of the critical primaries has been lost or broken. Wing length alone is sufficient basis for identifying many Connecticut Warblers (see Table 1 and Figure 1).

Most but not all MacGillivray's and Mourning Warblers are

separable on the basis of this key. These two forms are, in fact, extremely closely allied and may well be conspecific. There is need for a thorough study of their relationships in areas of potential overlap of their breeding ranges. A knowledge of the sex of some "difficult" birds, either through dissection, laparotomy, or the alternate (breeding) plumage, will alleviate the problem of identification to a considerable extent.

A KEY TO *Oporornis* WARBLERS

1. A conspicuous yellow line extending from the nostrils back to and behind the eye; the entire underparts uniformly yellow, or very nearly so . . . . . Kentucky Warbler (*O. formosus*)

   (Note: All Kentucky Warblers should key out here; banders should have no trouble with this species).

   No conspicuous yellow facial pattern as indicated above; underparts not as above, but with varying amounts of brownish-yellow, gray, or black in the throat and chest region that contrast with the yellow abdomen . . 2

2. Wing minus tail equals 19 mm. *or more*; ninth (outer) primary considerably longer than sixth primary, by 3.5 mm. *or more* . . . . . Connecticut Warbler (*O. agilis*)

   (Note: All Connecticut Warblers can be expected to key out here and hence are separable from all Mourning and MacGillivray's Warblers on the basis of these two characters).

   Wing minus tail equals 18 mm. *or less*; ninth primary shorter, equal to, or slightly longer than sixth primary, but only rarely as much as 3 mm. longer than the sixth 3

3. Wing minus tail equals 8 mm. *or less* . MacGillivray's Warbler (*O. tolmiei*)

   (Note: The majority of MacGillivray's Warblers can be expected to key out here).

   Wing minus tail equals more than 8 mm., but less than 19 mm . . 4

4. Wing minus tail equals more than 11 mm. but less than 19 mm . . . . . Mourning Warbler (*O. philadelphia*)

   (Note: The majority of Mourning Warblers can be expected to key out here).

   Wing minus tail equals 9 through 11 mm. (region of possible overlap between *tolmiei* and *philadelphia*) 5

5. In adult male plumage, *i.e.* throat and chest dark gray with some (often extensive) black flecking, or nearly all black 6

   Not in adult male plumage, *i. e.* throat and chest not as above, but pale gray, brownish white, or yellowish tinged with olive or grayish 7

6. A conspicuous white spot just above the eye and another just below the eye (incomplete eye-ring); lores (area between the eye and bill) black, sharply contrasting with the gray hood; chest region (where the hood gives way to the yellow abdomen) not conspicuously darker or blacker than the rest of the hood . . . . . MacGillivray's Warbler

   (Note: Those adult male MacGillivray's Warblers that did not key out under (3) above can be expected to key out here. They have the largest wing minus tail measurement for their species and probably represent populations from the northern part of the species' breeding range).

   No conspicuous area of white above and beneath the eye, *i. e.* no eye-ring; color of lores not sharply contrasting with that of rest of hood; chest region conspicuously darker or blacker than the rest of the hood . . . . . Mourning Warbler

   (Notes: Those adult Mourning Warblers that did not key out under (4) above can be expected to key out here).

7. This is the most difficult group to identify within the genus: females and immature males of both *tolmiei* and *philadelphia* that have a wing minus tail of 9 through 11 mm. Any female (*e.g.* spring birds not in male plumage) having a wing minus tail of 11 mm. can be expected to be *philadelphia.* Any immature male having a wing minus tail of 9 mm. can be expected to be *tolmiei.* Two remaining categories are not identifiable with certainty by this character alone: (1) females having a wing minus tail of 9 or 10 mm., and (2) immature males having a wing minus tail of 10 or 11 mm. For these birds, tail length may be a useful character, for the overlap in this measurement is not great between *philadelphia* amd *tolmiei,* particularly in birds of known sex (see Table 1).

ACKNOWLEDGEMENTS

Discussions and correspondence with Allan R. Phillips, Emmet R. Blake, and Eugene Eisenmann concerning the problems of identifying *Oporornis* have been most helpful in the preparation of this paper. We are grateful to the curators of the following museums for the opportunity to examine specimens in their care: Boston Museum of Science, British Museum (Natural History), Buffalo Society of Natural Sciences, United States National Museum, and the University of Colorado Museum. For data obtained from birds processed at the Kalbfleisch Field Research Station, Huntington, New York, we acknowledge the cooperative efforts of a number of individuals, many of whom were participants in the National Science Foundation's Undergraduate Research Program.

LITERATURE CITED

American Ornithologists' Union. 1957. Check-list of North American birds. Fifth edition.

Brooks, Earl. 1925. Macgillivray's Warbler in Indiana. *Auk,* **42:** 277.

Godfrey, W. Earl. 1966. The birds of Canada. Bull. Natl. Mus. Canada, no. 203.

Griscom, Ludlow. 1939. Boston region. *In* The Season. *Bird-Lore,* **41:** 118.

Phillips, Allan R. 1947. The races of MacGillivray's Warbler. *Auk,* **64:** 296-300.

Ridgway, Robert. 1902. The birds of North and Middle America, pt. II. Bull. U. S. Natl. Mus., no. 50.

The American Museum of Natural History, New York, New York.

Received February, 1967.