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FALL MIGRATION OF BLACKPOLL AND YELLOW-RUMPED WARBLERS AT ISLAND BEACH, NEW JERSEY

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INTRODUCTION

The Blackpoll Warbler (*Dendroica striata*) and the Yellow-rumped (Myrtle) Warbler (*Dendroica coronata coronata*) have broadly overlapping breeding ranges in the coniferous forests of northern North America (compare maps in Murray, 1966a, for the Blackpoll Warbler and in Hubbard, 1970, for the Myrtle Warbler) but have virtually allopatric wintering ranges. Blackpoll Warblers winter in northern South America east of the Andes, and Myrtle Warblers winter throughout the eastern United States and southward through Central America to Panama and to the Greater Antilles and Virgin Islands.

Cooke (1904, 1915) suggested that Blackpoll Warblers reached their South American winter range by passing through the southeastern United States, requiring those Blackpoll Warblers from eastern Canada to fly first southwest before turning southeast, a view later supported by Murray (1965, 1966a). Drury and Keith (1962), Nisbet et al. (1963), and Nisbet (1970) presented evidence suggesting that Blackpoll Warblers migrated over the Atlantic Ocean from New England to South America.

Both Blackpoll and Myrtle warblers are common migrants at Island Beach in New Jersey, and thus a comparison of these two species there might provide further information with respect to evaluating the alternative theories regarding the migration routes of the Blackpoll Warbler.

METHODS

The data were collected by a team of birdbanders at Island Beach, Ocean County, New Jersey, between 2 August and 27 October 1963. The banders mist-netted and banded the birds, which I then examined in order to record data on age, sex (not in these species), wing length, and weight. Age was determined by the degree of skull ossification. Wing chord was measured to the nearest millimeter, and weight was recorded to the nearest 0.1 g on an Ohaus triple-beam balance. I attempted to examine all Blackpoll Warblers, but Myrtle Warblers were so common that I often examined only the first 25 or so brought to me. Further details are available in Murray and Jehl (1964) and Murray (1965, 1966b).

RESULTS

Timing of Migration

In 1963, we captured 716 Blackpoll Warblers and 1,454 Myrtle Warblers. The earliest Blackpoll Warblers (2 birds) arrived on 31 August.

Minor flights occurred on 10 September (26 birds) and 11 September (12 birds) before the first major influx on 19 September (77 birds). The last flight of over 10 birds was 4 October (46 birds), and small numbers continued almost daily through 25 October. Eighty-two percent of the Blackpoll Warblers passed through Island Beach between 19 September and 4 October, and 8% thereafter.

The first Myrtle Warbler was caught on 21 September (1 bird). Less than 10 were caught daily until 1 October (23 birds). The first big influx occurred on 4 October (142 birds). Myrtle Warblers were common throughout the remainder of October, the minimum catch being 14 birds on 26 October. Only 4% of the Myrtle Warblers were captured prior to 4 October.

The Blackpoll Warbler is primarily a late September and early October migrant, although Blackpoll Warblers occur throughout both months. The Myrtle Warbler is an October migrant (we have no data from November). The difference in migration times is consistent with the general pattern for passerine migrants in the northeastern United States. Those species wintering (for the most part) outside the United States are September migrants. October migrants winter (for the most part) in the southeastern United States.

Differential Migration

As is usual at coastal stations, immatures predominate. Only 9.6% of the 658 aged Blackpoll Warblers was adult, and only 8.2% of the 1,249

TABLE 1.
Winglengths and weights of Blackpoll and Myrtle warblers at Island Beach, New Jersey, in 1963.

	Winglengths (in mm)		Range
	n	Mean (± 1 SD)	
Myrtle Warbler			
adult	59	71.8 (± 2.84)	65-77
immature	607	70.0 (± 2.22)	63-76
Blackpoll Warbler			
adult	57	72.7 (± 2.87)	67-79
immature	552	71.4 (± 2.35)	64-79
	Weight (in g)		
Myrtle Warbler			
adult	59	12.4	9.7-15.4
immature	607	12.0	8.1-18.6
Blackpoll Warbler			
adult	57	12.9	9.5-21.9
immature	552	11.4	8.8-21.6

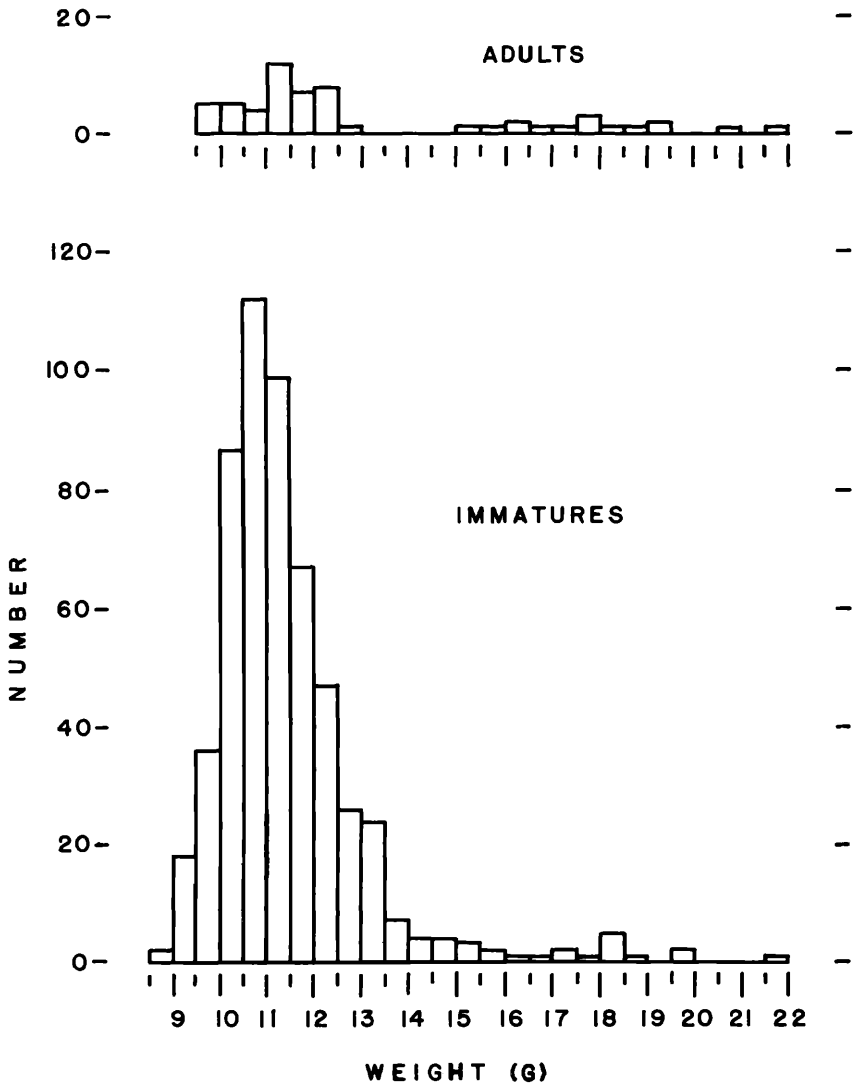


FIGURE 1. Weight distributions of adult and immature Blackpoll Warblers at Island Beach in 1963. The data are arranged by half-gram intervals (i.e., 9.0 to 9.4 and 9.5 to 9.9).

aged Myrtle Warblers was adult (Murray, 1966b). There is no difference in the timing of the passage of the adults and immatures in either species (Murray, 1966b).

Weight Analysis

Blackpoll Warblers at Island Beach are characteristically light (Table 1 and Fig. 1; also Murray and Jehl, 1964; Murray, 1965). In 1963, the

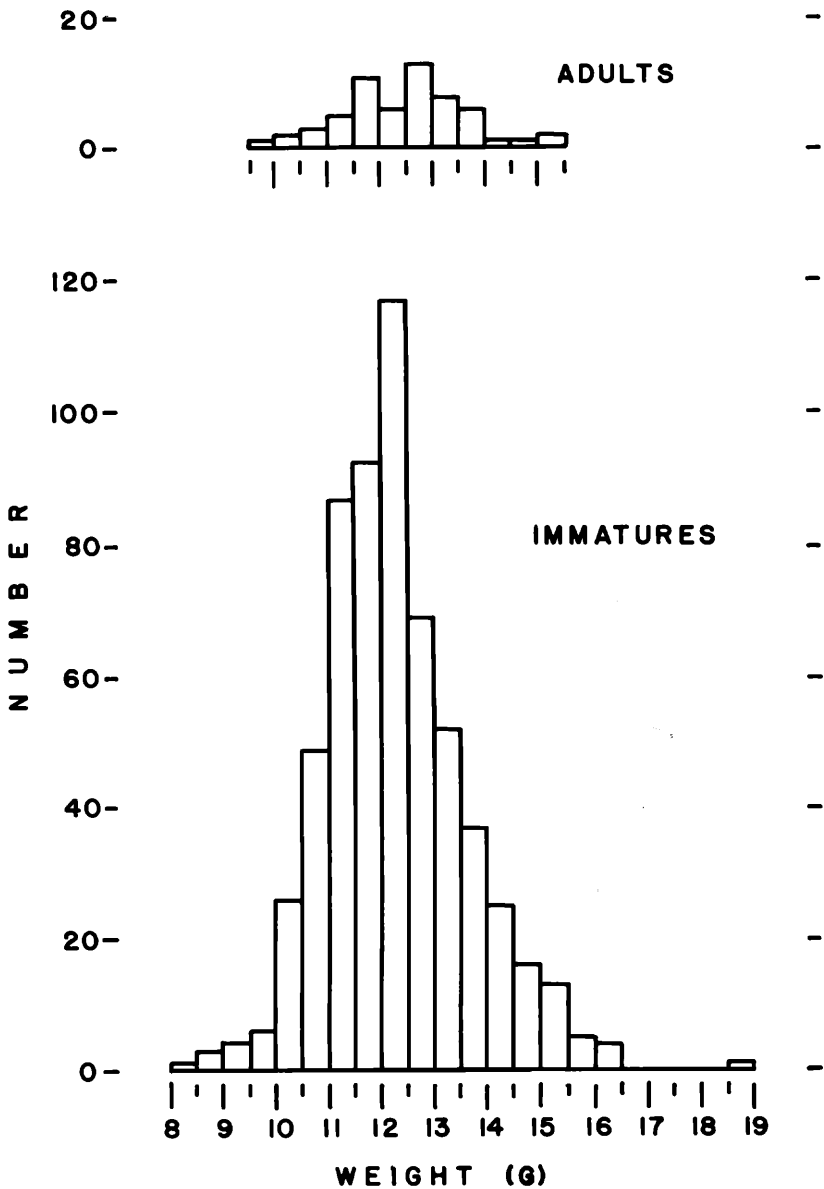


FIGURE 2. Weight distributions of adult and immature Myrtle Warblers at Island Beach in 1963. The data are arranged by half-gram intervals (i.e., 9.0 to 9.4 and 9.5 to 9.9).

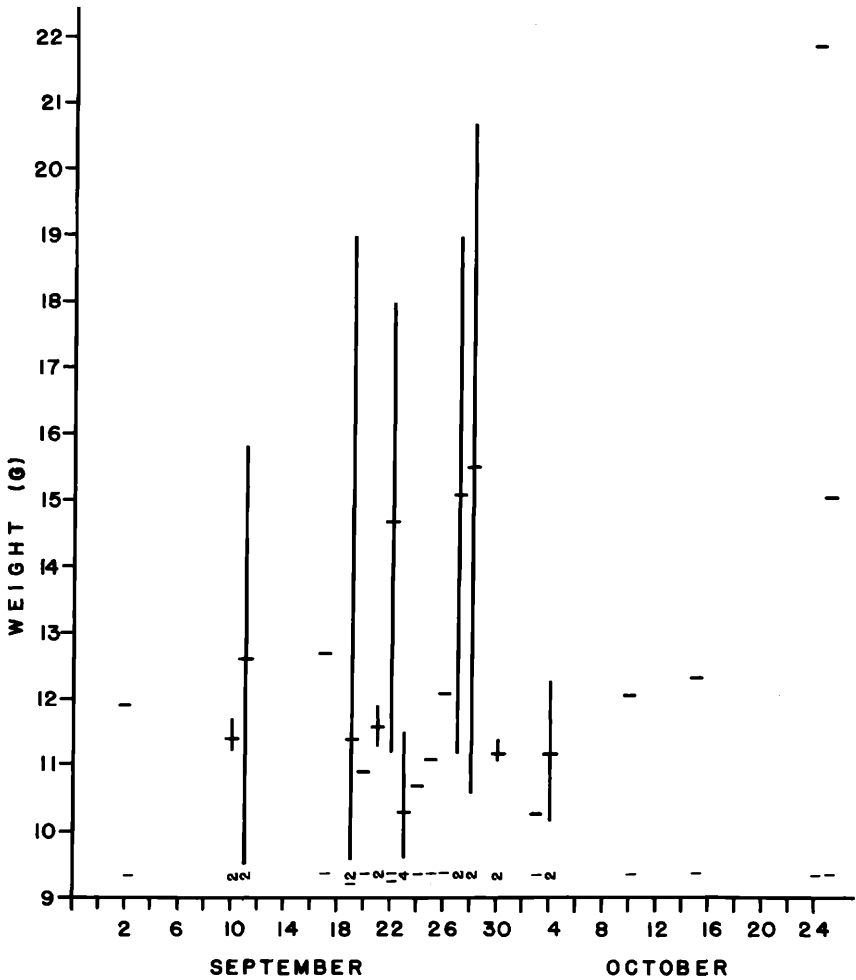


FIGURE 3. The mean and range of weights of adult Blackpoll Warblers on the day of original capture. The horizontal bar marks the mean, and the vertical bar joins the maximum and minimum weights. The sample size is at the bottom of each bar.

mean weight of the 609 weighed Blackpoll Warblers was 11.5 g compared with 11.7 g in 1962. Odum (*in* Nisbet et al., 1963) determined the average fat-free weight of eight unaged Blackpoll Warblers, taken in September in Michigan, to be 11.2 g (9.9 to 12.6). In the summer on the breeding range the average fat-free weight of 37 adult Blackpoll Warblers was 12.7 g and of five immatures, 12.5 g (Yarbrough, 1970). Thus, very few Blackpoll Warblers at Island Beach seem fat enough to undertake a long, overwater flight.

The timing of occurrence of fat Blackpoll Warblers at Island Beach

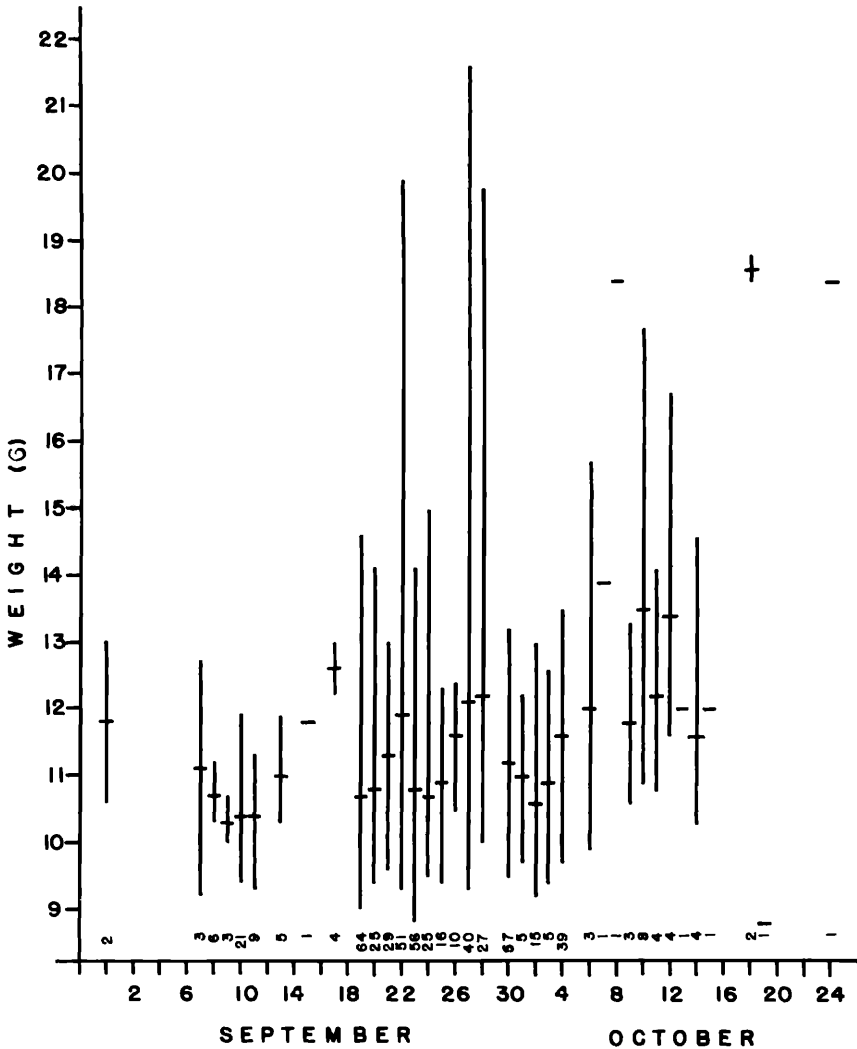


FIGURE 4. The mean and range of weights of immature Blackpoll Warblers on the day of original capture. The horizontal bar marks the mean, and the vertical bar joins the maximum and minimum weights. The sample size is at the bottom of each bar.

in 1963 was the same as in 1962. In 1962, the few fat Blackpoll Warblers occurred after 18 September (Murray, 1965). In 1963, only one of the 48 birds over 13.5 g was captured before 19 September (Figs. 3 and 4).

In 1963, I aged and weighed a sufficient number of adult Blackpoll Warblers to permit comparison with the immatures. The distribution of weights of adults and immatures is significantly different (Mann-Whit-

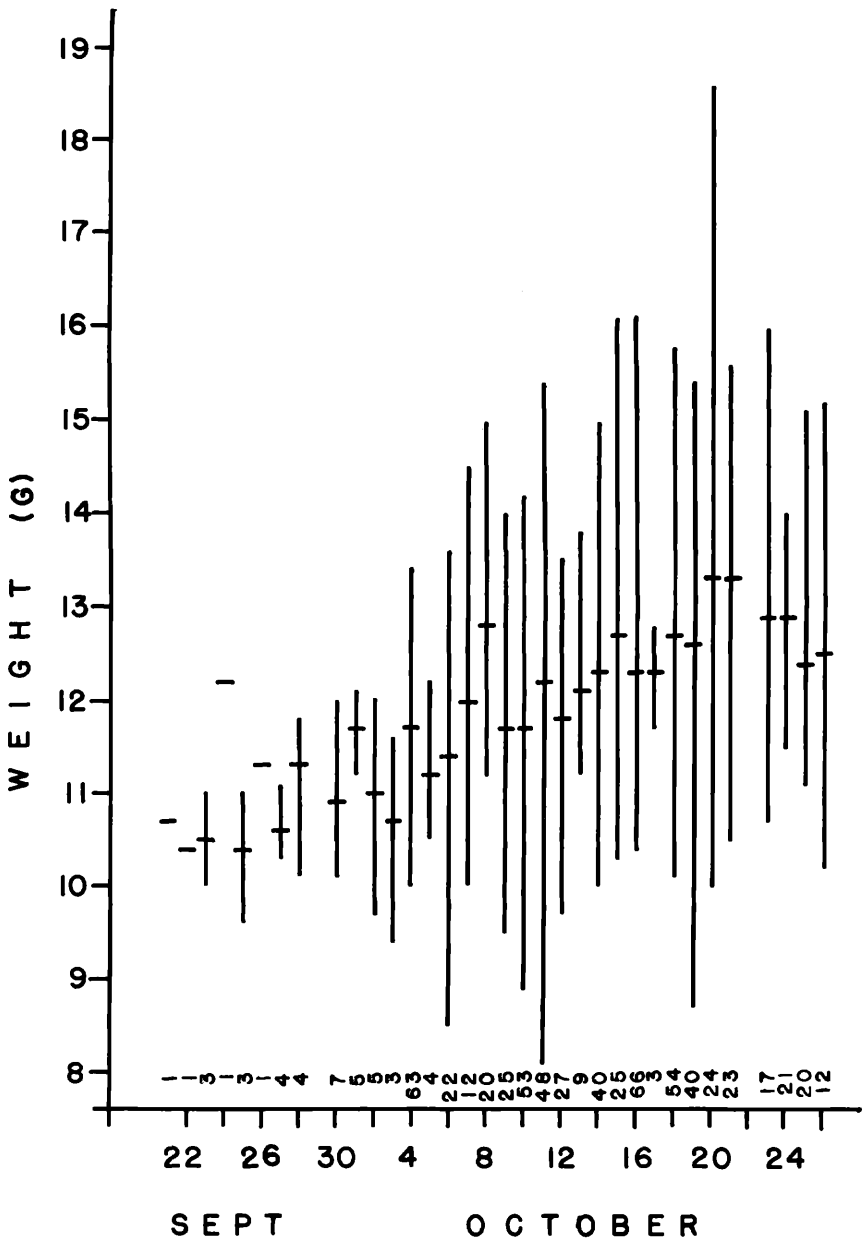


FIGURE 5. The mean and range of weights of adult and immature Myrtle Warblers on the day of original capture. The horizontal bar marks the mean, and the vertical bar joins the maximum and minimum weights. The sample size is at the bottom of each bar.

ney U test, $P \leq 0.001$), the adults being somewhat heavier (Table 1) and their weights less skewed (Fig. 1).

Adult Myrtle Warblers at Island Beach in 1963 weighed more than the immatures (Table 1). This difference is statistically significant (Mann-Whitney U test, $P \leq 0.001$). The weights of both adults and immatures were more normally distributed than Blackpoll Warbler weights (cf. Figs. 1 and 2). Curiously, adult Myrtle Warblers were significantly lighter than adult Blackpoll Warblers (Mann-Whitney U test, $P \leq 0.001$), whereas immature Myrtle Warblers were significantly heavier than immature Blackpoll Warblers (Mann-Whitney U test, $P \leq 0.001$).

As with the Blackpoll Warblers, the later migrating Myrtle Warblers tended to be heavier than the earlier migrants, but the trend was steadier in Myrtle Warblers (cf. Figs. 3, 4, and 5). Although Myrtle Warblers were on average heavier than immature Blackpoll Warblers, no Myrtle Warbler was as heavy as some Blackpoll Warblers were (Table 1).

The wing lengths of adult and immature Blackpoll Warblers do not differ (*t*-test), nor do the winglengths of adult Blackpoll and Myrtle Warblers (*t*-test), but the winglengths of immature Myrtle Warblers are

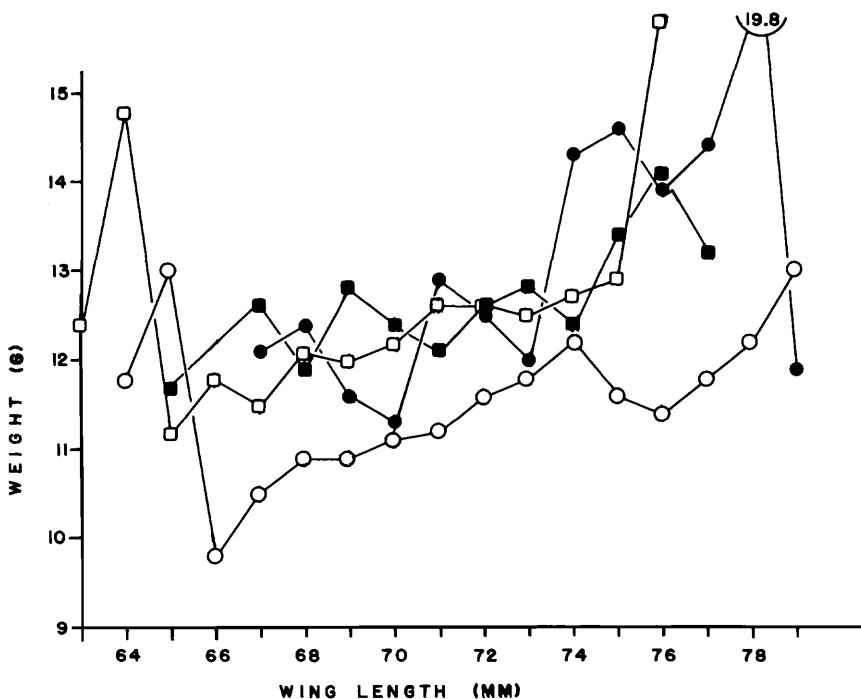


FIGURE 6. The average weight at each wing length for adult Blackpoll Warblers (●), immature Blackpoll Warblers (○), adult Myrtle Warblers (■), and immature Myrtle Warblers (□).

significantly shorter than those of both adult Myrtle Warblers and immature Blackpoll Warblers (*t*-test, $P < 0.01$ and $P < 0.005$, respectively).

When the weights are plotted for each wing length, immature Blackpoll Warblers are consistently lighter than adult Blackpoll Warblers and adult and immature Myrtle Warblers (Fig. 6).

Non-same-day Repeats

Migrants at Island Beach rarely repeat (Murray, 1976). Only 30 (4%) Blackpoll Warblers and 63 (4%) Myrtle Warblers were caught on a day after the original capture. Twenty-five Blackpoll Warblers were weighed when first caught and on some later day. The birds that stayed one or more days and repeated were significantly lighter (10.4 g) than the overall average weight of Blackpoll Warblers migrating through Island Beach, and there is little indication that Blackpoll Warblers that stayed over gained much weight (Table 2).

TABLE 2.
Weights of non-same-day repeat Blackpoll and Myrtle warblers.

Day	Blackpoll Warbler			Myrtle Warbler					
	n	Average Weight ¹	SD	n	Average		Average		
					Weight ¹	SD	n	Weight ²	SD
0	25	10.4	0.70	15	12.2	1.10	11	12.3	1.14
1	16	10.2	0.65	8	12.1	1.03	4	11.0	—
2	6	10.0	0.70	4	10.8	—	7	12.4	1.22
3	2	10.4	—	1	12.6	—	6	13.1	1.04
4	1	11.5	—	0	—	—	1	13.0	—
5	1	10.6	—	1	13.1	—	2	12.4	—
6	1	12.0	—	2	12.3	—	3	13.5	—
7	0	—	—	0	—	—	0	—	—
8	0	—	—	0	—	—	2	13.4	—
9	0	—	—	0	—	—	0	—	—
10	0	—	—	0	—	—	1	12.3	—

¹ Non-same-day repeats were weighed on day of original capture (day 0) and on subsequent day.

² Non-same-day repeats weighed only once, either on day of original capture or on subsequent day.

Only 15 of the 63 non-same-day repeat Myrtle Warblers were weighed when first captured and on some later day, but 37 other Myrtle Warblers that repeated were weighed either on the original day or later. These groups are analyzed separately (Table 2). The average weight of the Myrtle Warblers staying over was about the average for all Myrtle Warblers captured and weighed. The average weight gained by repeating Myrtle Warblers was slight.

DISCUSSION

The data on migrating Blackpoll and Myrtle warblers at Island Beach are more similar than they are different. The species are similar in size, in the ratio of adults to immatures, in the percentage of repeating individuals, and in the lack of differential migration of adults and immatures. The major differences are in (1) the timing of migration, (2) the low weights of immature Blackpoll Warblers, and (3) the occurrence of a few very fat individual Blackpoll Warblers. This comparison of migrating Blackpoll and Myrtle warblers at Island Beach does not provide any evidence suggesting that Blackpoll Warblers are taking part in the long trans-Atlantic flight that has been postulated by others.

The birds arriving at Island Beach are probably coming from over the ocean (Baird and Nisbet, 1960; Murray and Jehl, 1964; Murray, 1976), and they are probably part of the large southwestward movements observed on radar in southeastern Massachusetts (Drury and Nisbet, 1964). Thus, they are completing at least one night's flight, and such birds are not likely to be fat. Yet, the data from Island Beach do not indicate anything unusual about the Blackpoll Warbler in comparison with other species (Murray, 1965, 1966b, 1976). If Blackpoll Warblers are migrating southward and southeastward over the ocean from New England to their winter range in South America, and if Myrtle Warblers are migrating southwestward from New England to their winter range in the southeastern United States, Greater Antilles, and the Virgin Islands, perhaps we should expect to find some differences in the migration data collected on these species as they pass through coastal stations.

SUMMARY

Blackpoll Warblers and Myrtle Warblers have sympatric breeding ranges and allopatric winter ranges. A comparison of age, weight, and recapture data on 716 Blackpoll Warblers and 1,454 Myrtle Warblers captured at Island Beach in 1963 (not all birds were measured) shows little difference between these two species, which might be construed to support the notion that Blackpoll Warblers are flying over the ocean from New England to South America in the fall.

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