

A CRITICAL REVIEW OF THE TRANSOCEANIC MIGRATION OF THE BLACKPOLL WARBLER

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ABSTRACT.—Blackpoll Warblers (*Dendroica striata*) may reach their winter range in South America by migrating directly over the Atlantic Ocean from the northeastern United States (Drury and Keith 1962, Nisbet et al. 1963) and the Maritime Provinces (Richardson 1972, 1980), through the southeastern United States (Cooke 1904, 1915; Murray 1965, 1966a), or through both regions. Evidence obtained since the 1960s has been accepted as supporting the first of these hypotheses. My purpose was to provide a critical review of the evidence for and against these conflicting views.

I examined the geographic distribution and the time of occurrence of Blackpoll Warblers during migration from the northern United States to the Caribbean islands, differences in mean body mass of samples in time and place from the northeastern United States, Bermuda, and Florida, and radar and visual evidence from over the sea.

There is no unequivocal evidence that any Blackpoll Warblers migrate over the sea directly from New England to South America, and all evidence is consistent with the hypothesis that Blackpoll Warblers migrate to South America through the southeastern United States. Received 24 October 1986, accepted 29 February 1988.

DRURY and Keith (1962) and Nisbet et al. (1963) proposed that Blackpoll Warblers (*Dendroica striata*) normally migrate directly from New England to South America across the western Atlantic Ocean on their postbreeding migration. I (Murray 1965) questioned this interpretation and supported Cooke's (1904, 1915) view that Blackpoll Warblers reach their winter range by migrating through the southeastern United States. Although I pointed out that the data on migrant Blackpoll Warblers in coastal New Jersey (Murray 1966b, 1976, 1979) and in Michigan (Murray 1966a) were consistent with this hypothesis, other investigators have continued to support the transoceanic migratory route.

Initially, Nisbet et al. (1963) suggested that Blackpoll Warblers migrated not only from New England directly to South America but from south of New England because Blackpolls were commonly observed throughout October and into mid-November at Bermuda, "long after the last departures from New England" (Nisbet et al. 1963: 133). Only 17 of 141 Blackpolls recorded at Bermuda in 1962 were alleged (Nisbet et al. 1963) to have departed from New England. Later, although Blackpoll Warblers occurred throughout the coastal southeastern states, Nisbet (1970) interpreted their low frequency in the samples from the Carolinas and their occasional association with storms in Florida and the Bahamas to mean that they were stragglers

blown ashore. To account for stragglers in the southeast, Nisbet proposed that the western edge of the overwater flight must pass within 160 km of southern Florida.

The A.O.U. Check-list Committee accepted this view and summarized the fall migration of the Blackpoll Warbler as "mostly across northeastern North America to New England and the Maritime Provinces, thence at sea over Bermuda to the Lesser Antilles (north, at least irregularly, to Puerto Rico and the Virgin Islands) to northern South America (including islands north of Venezuela), also regularly in California" (A.O.U. 1983: 619).

In contrast, I argued (Murray 1966a) that Blackpoll Warblers from the western portion of the breeding range follow a zigzag route, crossing the continent on a generally southeastward course until reaching the Atlantic coastal plain, then turning southwestward to Georgia and Florida before turning southeastward for the final leg of the flight. It now seems more likely that Blackpoll Warblers funnel from the breeding range to the southeastern United States, along with the general movement of migration (Gauthreaux 1980), and depart from somewhere between Cape Hatteras and northern Florida (Fig. 1). Details of distribution and movement in the southeastern United States, however, remain to be studied.

The "transoceanic hypothesis" proposes that

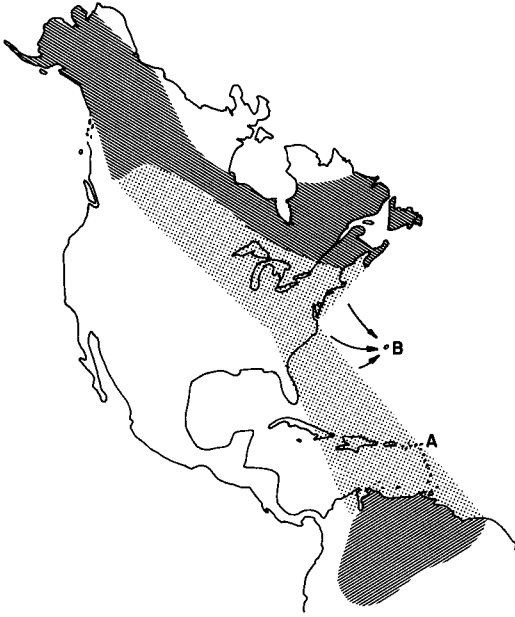


Fig. 1. The hypothetical postbreeding migration route of the Blackpoll Warbler through the southeastern United States. Hatched area shows breeding range in North America and wintering range in South America. Stippling shows actual and hypothetical distribution during migration. Short arrows over the sea show wind drift to Bermuda. B = Bermuda, A = Antigua.

Blackpoll Warblers depart from the Maritime Provinces (Richardson 1972, 1980) and the "northeastern" United States (south to Cape Hatteras?) (Drury and Keith 1962, Nisbet et al. 1963, Nisbet 1970) and cross the Atlantic Ocean directly to their South American winter range. Some birds drop out at Bermuda and in the West Indies (Fig. 2). If the western edge of this movement passes within 160 km of southern Florida, as Nisbet (1970) suggested, then some Blackpoll Warblers must fly southwestward parallel to the coast (but over the ocean) before turning southeast toward South America (Fig. 2).

The main difference between the two proposals is whether Blackpoll Warblers depart the United States from north or south of about the Virginia/North Carolina border. Because Blackpolls occur in the Carolinas in autumn and undoubtedly continue their migration from there, the question I address is whether Blackpoll Warblers normally depart the continent north of Cape Hatteras and migrate successfully on a direct transoceanic flight to their winter quarters in South America.

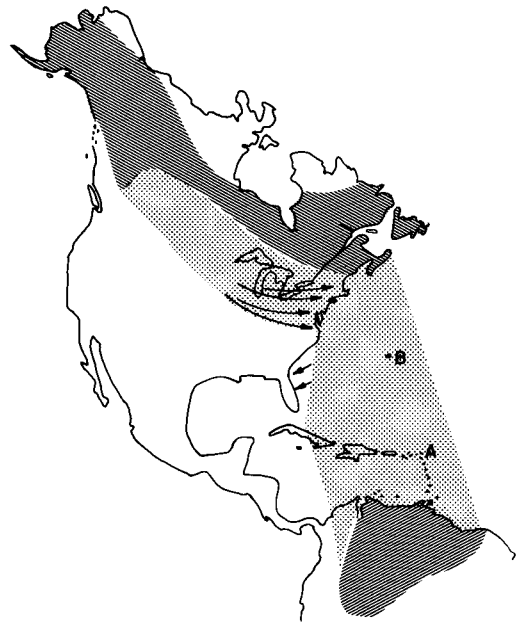


Fig. 2. The hypothetical postbreeding migration route of the Blackpoll Warbler over the western Atlantic Ocean. Symbols as in Fig. 1. Long arrows over land indicate the hypothetical direction of flight.

GROUND DATA

Geographic distribution and timing of migration.—Nisbet (1970) summarized the data available on the migration of the Blackpoll Warbler in the United States. The species was less frequent among birds killed in nocturnal accidents south of 39°N latitude than north of it, and became less common at banding stations from Maine to South Carolina. He interpreted these observations as evidence that Blackpoll Warblers could not be departing in numbers from the southeastern states, and concluded that Blackpoll Warblers must depart across the sea from the northeastern states.

I disagree with Nisbet's interpretation for several reasons.

(1) The Blackpoll Warbler is "abundant" at Bermuda throughout October and "common" through mid-November (Wingate 1973). It is (*contra* Nisbet 1970 and A.O.U. 1983) "fairly common . . . found throughout the Bahamas" between 16 September and 12 November (Brudenell-Bruce 1975). In Puerto Rico it is (*contra* A.O.U. 1983) at times the most abundant warbler on the island in October (Biaggi 1970) and rated as "fairly common" in October and November, but "uncommon" in September and

December (Raffaele 1983). Farther south, Margaret Mitchell (in litt.) observed Blackpoll Warblers almost daily between 8 October and 5 November during eight years on Barbados. In the Netherlands Antilles the species was recorded between 11 September (Curaçao) and 23 November (Aruba), but the main passage was during the middle and second half of October (Voous 1983).

The Blackpoll Warbler is scarce in the latter half of October and virtually absent in November north of North Carolina (Nisbet 1970; see also Nisbet et al. 1963, Murray 1966b). Thus, the source of the migrants at Bermuda, the Bahamas, and the West Indies from mid-October through November cannot be the United States north of North Carolina.

A plausible source is the coastal plain from North Carolina to northern Florida. If Blackpoll Warblers are not found there in abundance, it may be because the southern coastal plain lacks the conditions that concentrate migrants in New England and the Middle Atlantic states (Baird and Nisbet 1960). Blackpoll Warblers leaving from south of Cape Hatteras would be crossing the coast at the *start* of their overwater crossing to South America. These birds would not be expected to be concentrated at the coastline or anywhere else.

(2) Because Blackpoll Warblers occur in Florida and the Bahamas, Nisbet (1970) suggested that the western edge of the transoceanic migratory route must pass within 160 km of southern Florida. If so, birds originating from north of Cape Hatteras would have to fly *southwestward* 1,200–2,000 km *before* turning southeastward into the trade winds (Fig. 2), a situation the transoceanic flight was supposed to have prevented (Drury and Keith 1962, Nisbet et al. 1963). If Blackpoll Warblers do not migrate through the southeastern states because a departure from there would lead to a difficult flight into the trade winds (Drury and Keith 1962, Nisbet et al. 1963), one can only wonder why birds should find it easier to fly into the head winds after already flying well over 1,000 km.

(3) The Blackpoll Warbler is regularly seen on fall migration in Iowa from late August to late September with a peak in mid-September (Dinsmore et al. 1984), in Illinois (except in the south) from August to mid-October with peak counts between 2 and 15 September (Graber et al. 1983), in Indiana as “a fairly common to common fall migrant throughout most of the

state” from early August to late October with the peak in late September (Mumford et al. 1984), and in West Virginia as “probably the most abundant warbler in the fall in most of the state” from early September to early October with the peak in the third week of September (Hall 1983). If Blackpoll Warblers were en route to New England (A.O.U. 1983), these records imply a movement far to the south before turning eastward and even northeastward. If they do not fly over the mountains to the southeastern coastal plain, then they would have to extend the length of both their overland migration and their over-water crossing (Fig. 2).

One banded individual (Walkinshaw 1976) was cited as evidence for an eastward movement in the fall from Michigan to New England (Payne 1983). If so, this does not explain the origin of Blackpoll Warblers in Illinois, Indiana, and West Virginia. Furthermore, if Blackpoll Warblers in these states are headed for New England, or even the Middle Atlantic states, their route is even more bizarre (Fig. 2) than my hypothesized, and now rejected, zigzag route (Murray 1966a). This eastward movement, if it exists, is not consistent with the observed direction of nocturnal migration in the region (Gauthreaux 1980).

(4) An immature bird banded on Bermuda on 11 October 1962 was shot in November 1963 near Pembroke, North Carolina, about 100 km inland from the ocean and near the South Carolina border. Although Wingate and Baird (1965) suggested that this record supported the hypothesis of a direct migration across the ocean from New England or the Middle Atlantic states to South America, this route does not pass over Pembroke, North Carolina. Furthermore, Nisbet et al. (1963) proposed that in 1962 this bird probably departed the United States south of New England. No matter what route this bird used to reach Bermuda in 1962, it was not following a transoceanic route in 1963. An alternative possibility is that in 1963 it was “retracing” the route it had followed in 1962, at least until it was killed. In 1962, however, after leaving the continent from the southeastern United States, it drifted to Bermuda and eventually was able to return to the mainland.

(5) Because Burleigh (1934) and Mengel (1965) thought that Blackpoll and Bay-breasted (*Dendroica castanea*) warblers were often confused by observers in the southern states, Nisbet (1970) dismissed virtually all “undocumented” state-

ments regarding the status of the Blackpoll Warbler in the southeastern states, most of which suggested that it was "common" to "abundant" on fall migration. Nevertheless, as a result of his own survey of acceptable records, Nisbet (1970) described the Blackpoll Warbler as "common" in coastal North Carolina and as "fairly common" in coastal South Carolina. Also, even though Burleigh (1934) was aware of the difficulty in distinguishing these species, he (Burleigh 1958) concluded that the Blackpoll Warbler in Georgia was a "rare fall transient everywhere but on the coast, where it occurs commonly throughout October." More recently, Potter et al. (1980) suggested that the Blackpoll Warbler was "uncommon to fairly common" in the Carolinas east of the mountains, mainly in the latter part of October, but Denton et al. (1977) suggested that it was a "rare fall transient over most of the state" of Georgia (a statement that neither comments on Burleigh's [1958] rather different evaluation nor describes the species' status in the rest of the state).

There is no question that Blackpoll Warblers occur in the coastal southeastern United States in the fall. Why the southeastern United States is not the source of the birds involved in the frequent occurrences of migrants at Bermuda, the Bahamas, and the West Indies and occasional occurrences in Florida in the latter half of October and November has not been made clear by the proponents of the transoceanic migration route.

The Blackpoll Warblers that reach Bermuda after, at least, early October would almost have to be wind-drifted vagrants because south of Virginia (the only plausible source of Blackpoll Warblers at that time) the direction toward Bermuda is easterly or northeasterly. The evidence for the transoceanic migration from New England, then, is not the occurrence of abundant Blackpoll Warblers at Bermuda but the few birds that appear there in late September and early October. Even these birds could be wind-drifted vagrants (Murray 1965). I based that hypothesis on data indicating that (1) among eastern warblers, species common along the Atlantic coast were common at Bermuda, and the relatively rarer species were rare at Bermuda, (2) the occurrences at Bermuda followed days of westerly or northwesterly winds, and (3) Blackpoll Warblers arrived at Island Beach, New Jersey, with other species of nocturnal migrants from off the ocean.

Body mass.—The pattern of body-mass distribution is clear and consistent (Table 1). The average body masses were lowest in the north (Michigan, Pennsylvania, New Jersey, and Massachusetts), greatest in Florida, and intermediate at Bermuda. Body masses from Michigan, New Jersey, Bermuda, and Florida could be treated statistically, and all were significantly different (Table 2). The smallest average mass was of birds captured at Island Beach, New Jersey, which had just arrived from New England after a night's overwater flight (Murray and Jehl 1964). The birds captured in Massachusetts, Pennsylvania, and Michigan, however, were not particularly heavy (Table 1). The greatest average mass of Blackpoll Warblers so far recorded was of birds killed during a storm at Jacksonville and Cocoa Beach, Florida.

Most birds from Massachusetts (Nisbet et al. 1963), New Jersey (Murray 1965, 1979), and Michigan (Murray 1966a) were lighter than average. Some, however, reached a mass of over 21 g. Nisbet et al. (1963) suggested that Blackpoll Warblers departed southward with a mass of 19.9–23.1 g. If so, this could account for the body masses at Bermuda, which on average were greater than average body masses in the northeast. The low body mass of birds at Island Beach indicates that Blackpoll Warblers were departing New England at an average mass of well below 19.9 g.

A second characteristic of the body mass of Blackpoll Warblers from the northeastern United States (Nisbet et al. 1963; Murray 1965, 1966a, 1979) is that the heavier birds occur with increasing frequency in late September. In Massachusetts only 10.1% of 2,301 Blackpoll Warblers had masses greater than 14.7 g, and of these only 10.3% (i.e. 1% of the total) was captured before 23 September (Nisbet et al. 1963). In New Jersey heavy birds (more than 16 g) were unknown before 18–22 September (Murray 1965, 1979). Because Blackpoll Warblers migrated through Island Beach (and presumably much of the northeast) almost daily in September (Murray 1965, 1979), the data again indicate that Blackpoll Warblers departed from New England with a body mass below 19.9 g.

The body masses of birds taken in Florida also do not support the hypothesis of a transoceanic flight from New England. The birds grounded in Florida were heavier than those at Bermuda. If birds at Bermuda and Florida originated in New England, the Florida birds should be light-

TABLE 1. Masses (g) of Blackpoll Warblers (statistical comparisons are in Table 2).

	<i>n</i>	Mean	Range	Source
Massachusetts				
Immatures	707	12.1	9.3–21.5	Nisbet et al. 1963
Adults	1,109	12.9	9.6–21.1	
Michigan				
Immatures	44	12.6	11.2–17.9	Murray 1966b
Pennsylvania				
Immatures	275	12.3	9.8–20.8	Clench and Leberman 1978
Adults	90	13.3	9.7–21.6	
New Jersey				
Immatures	552	11.4	8.8–21.9	Murray 1979
Adults	57	12.9	9.5–21.9	
Bermuda				
All birds	141	14.0	7.7–20.5	Nisbet et al. 1963
Florida (Jacksonville) ^a				
Immatures	133	16.5	11.3–19.7	This study
Adults	96	16.4	10.4–19.8	
Florida (Cocoa Beach) ^a				
Immatures	13	16.1	7.6 ^b –19.3	This study
Adults	20	17.0	14.2–18.6	
Fat-free mass (migrants, Michigan)				
Immatures	4	—	11.4–12.6	E. P. Odum <i>in</i> Nisbet et al. 1963
Adults	4	—	9.9–11.7	
Fat-free mass (breeders)				
Immatures	5	12.5	—	Yarbrough 1970
Adults	37	12.4	—	

^a Frozen specimens received from Ted T. Allen (Jacksonville) and Leslie D. Case (Cocoa Beach) were thawed, aged, sexed, measured, and weighed by me.

^b The next lowest mass was 15.2 g.

er. If the birds originated in the Middle Atlantic states (Delmarva: Delaware, Maryland, and Virginia), the body masses of Blackpolls should be about the same because the distance from there to Bermuda and to Florida is about the same.

The data are consistent with the hypothesis that Blackpoll Warblers fatten up in the southeastern United States before departing on their transoceanic migration. Some are interrupted early in their flight by storms near the coast and come ashore in Florida (Case et al. 1965), and others drift to the east and east-northeast (for wind data see Murray 1965) and reach Bermuda. The latter birds have the longer flight and, therefore, the smaller body mass.

BIRDS AT SEA

Many birds have been observed at sea in the western Atlantic Ocean (Scholander 1955, Wil-

liams et al. 1974, McClintock et al. 1978, Larkin et al. 1979). Among the "land birds" were 300 individuals (counting "several" as 3, and including 21 *Ardea herodias* and 1 *Gallinula chloropus*) of 77 species (Appendix). About 88% of the species and 85% of the individuals observed at sea in the western Atlantic seem unlikely candidates for transoceanic migration from New England to either the West Indies or South America (Table 3).

The diversity of North American species of migrants documented at sea (Scholander 1955, Durand 1972, Williams et al. 1974, McClintock et al. 1978, Larkin et al. 1979), in Great Britain (Sharrock and Sharrock 1976), and Bermuda (Wingate 1973) indicates that the birds over the western Atlantic Ocean represent the range of species migrating in eastern North America rather than a few that might be presumed to be migrating from New England to the Caribbean and South America.

TABLE 2. Results of median tests^a on mass data comparisons.

	χ^2	Probability of no difference ^b
Adult/immature		
Island Beach (IB)	7.8148	<0.01
Cocoa Beach (CB)	0.7933	NS
Jacksonville (J)	0.0060	NS
Bermuda (B)	3.2553	NS
Adults		
IB/CB	25.0588	<0.001
IB/J	21.3425	<0.001
IB/B	21.1199	<0.001
CB/J	1.5347	NS
CB/B	18.7013	<0.001
J/B	31.6431	<0.001
Immatures		
IB/M	34.4064	<0.001
IB/CB	7.8373	<0.01
IB/J	106.1952	<0.001
IB/B	29.7451	<0.001
M/CB	10.4280	<0.01
M/J	46.5941	<0.001
M/B	5.1211	<0.05
CB/J	0.0000	NS
CB/B	9.8406	<0.01
J/B	63.3799	<0.001

^a Siegel 1956.

^b df = 1. NS = not significant.

RADAR DATA

Radar data on fall migration have been obtained from the Maritime Provinces to the Caribbean (Drury and Keith 1962; Drury and Nisbet 1964; Richardson 1972, 1976, 1978, 1980; Hilditch et al. 1973; Williams et al. 1974; Ireland and Williams 1974; Williams et al. 1977a, b; McClintock et al. 1978; Larkin et al. 1979). These authors accepted the notion of transoceanic migration of passerines from New England and the Maritimes to South America. Birds observed on radarscopes are rarely identifiable to species, however, and the range of observation is about 160 km. There are other reasons for being skeptical of this interpretation.

(1) Passerines leaving New England in the fall track from southwest (the main movement) to south, southeast, east, and northeast (Drury and Nisbet 1964). The eastward movements of passerines were in fact more frequent although smaller in size than the southward movements (Drury and Nisbet 1964). The eastward movements, like the northeastward movements, were interpreted as "reverse" migration, even though there is no normal westward migration in the

TABLE 3. Land birds observed at sea (species list and counts in Appendix).

Category	Species		Individuals	
	No.	%	No.	%
I. Eastern North American populations that rarely migrate south of the southeastern United States	34	44.2	164	54.7
II. Winter mainly in the southeastern United States (some individuals reach Caribbean)	9	11.7	43	14.3
III. Trans-Gulf migrants to Central America and western South America	22	28.6	43	14.3
IV. Mainly winter in or migrate through the Caribbean	9	11.7	46	15.3
V. Unlikely transoceanic migrants	3	3.9	4	1.3
Total	77	100.1	300	99.9

region. That the southward movements comprise transoceanic migrants is no more than a guess.

Second, the southward and southeastward movements of passerines from New England occurred from mid-August through late October (Drury and Keith 1962; Nisbet et al. 1963; Drury and Nisbet 1964; Richardson 1972, 1980). These dates do not correspond well to the dates of migration of the Blackpoll Warbler in the northeastern United States. Most of the passerines leaving New England in August and October are not Blackpoll Warblers. Furthermore, virtually no passerines can be departing New England bound for the West Indies after early October because, except for the Yellow-rumped Warbler (*Dendroica coronata*), species migrating to the Neotropics have largely passed through the northeastern states by early October. Eastern populations of the Yellow-rumped Warbler winter mainly in the United States. Those that reach the West Indies probably do not make transoceanic flights during October. It is an uncommon species over most of the island of Puerto Rico and the Virgin Islands and does not normally begin to arrive in Puerto Rico until November (Raffaele 1983).

The case for transoceanic migration of Black-

poll Warblers would be strengthened if we had some idea of the identity and fate of the species taking part in eastward and northeastward movements and if we had some idea of the identity and destination of species departing southward and southeastward before late August and after early October.

(2) Despite the intensity of radar observations along the coast and over the sea, no southward or southeastward departures have been tracked from New England to the Caribbean or South America. Besides the original attribution of observed arrivals at Bermuda to a departure from New England (Nisbet et al. 1963), only one putative movement from Virginia to the Caribbean has been described (Williams et al. 1974). Even considering the difficulties of this kind of research, these two apparent movements do not constitute sufficient evidence to confirm the importance and regularity of a transoceanic route for Blackpoll Warblers or any other passerine (the transoceanic route of shorebirds is undoubted).

(3) Many of the flight speeds estimated from tracks of targets on radar over the sea are slow. The *mean* airspeed determined from 371 tracks in 1971 was 8.70 m/s (31 km/h) and from 556 tracks in 1972, 5.32 m/s (19 km/h) (Larkin 1980), with, respectively, 26% and 43% of the tracks southeast of Bermuda slower than 6 m/s (22 km/h) (Larkin et al. 1979). In contrast, in most studies (reviewed by Larkin and Thompson 1980), estimated flight speeds were generally faster than 6 m/s. In New York state, however, Larkin and Thompson (1980) recorded the airspeeds of 3,515 birds, of which 33.5% were less than 5 m/s, but they pointed out that the slow speeds often occurred on nights with unfavorable winds.

In determining the "minimum total flight time" of birds over the ocean, Larkin et al. (1979) extrapolated the flight paths forward and backward of 36 birds tracked south and east of Bermuda. The slow-flying birds (<6 m/s) could not have made landfall in <150 h. The shortest flight estimated was 40 h for a bird with a flight speed of about 20 m/s (i.e. 72 km/h [certainly not a passerine]). Of interest are the 22 birds tracked in 1971, when the average flight speed of all birds was greater than in 1972 and the birds were, thus, more likely to complete a transoceanic crossing. Thirteen of the 22 had calculated departure points south of Cape Hatteras, 2 apparently had been flying westward from farther

out in the ocean, and 5 had minimum times since departure of 100 h. These data hardly support the notion that the birds detected by radar over the sea were transoceanic migrants.

(4) Hilditch et al. (1973) sampled bird migration with radar over Antigua, at the extreme northeastern corner of the West Indies, from 28 September to 14 October 1970 and from 24 September to 16 October 1971. No migratory movements of small passerines were detected. Considering the abundance of Blackpoll Warblers in the Bahamas (Brudenell-Bruce 1975), on Puerto Rico (Biaggi 1970, Raffaele 1983), and on the Netherlands Antilles (Voous 1983), and the detection by radar of passerines migrating over and past Puerto Rico (Richardson 1976), the migration route of the Blackpoll Warbler should lie to the west of Antigua rather than to the east, which is consistent with the route suggested by me (Fig. 1) rather than by the proponents of transoceanic migration (Fig. 2).

(5) In another computer simulation of transoceanic flight, Stoddard et al. (1983) examined the hypothesis of Williams and Williams (1978) that migrants maintain a southeastward heading while over the sea and reach the Lesser Antilles and the South American mainland by being drifted laterally by the Northeast Trade Winds. They chose to simulate the migration departing North America on the nights of 3 October 1971, 2 October 1972, and 3 October 1973 because these nights were associated with cold-front passage in the eastern United States, there were no tropical storms in the western Atlantic, and radar in the Caribbean detected arrivals shortly thereafter. For simulations of the effects of heading, departure site, and altitude, they assumed a flight speed of 45 km/h (12.5 m/s). They also simulated airspeeds of 35 and 75 km/h (9.7 and 20.8 m/s, respectively). With several assumptions regarding the average speed of winds in the area, they calculated that birds leaving on the selected dates with a south-southeast heading usually could reach the South American mainland within 100 h.

There are several problems with this analysis. First, southward and southeastward departures from New England and the Maritimes occur frequently from mid-August through October (Drury and Keith 1962; Drury and Nisbet 1964; Richardson 1972, 1980). If these departures are of transoceanic migrants, then we should want to know the probabilities of successful flights under all conditions throughout the season

rather than on three selected nights, each from a different year. Second, the assumed airspeeds, from 9.7 to 20.8 m/s, are faster than the average speeds reported for many birds over the sea (Larkin et al. 1979).

(6) Although some birds detected by radar on ships at sea are flying southward or southeastward, birds are in fact flying in all directions (Larkin et al. 1979, Larkin 1980), giving the impression of disorientation. As Larkin et al. (1979: 261) pointed out, there are "immense numbers of birds which are, by any conventional interpretation, traveling in a 'wrong' direction." These results are hardly convincing evidence that birds over the sea are flying toward South America.

CONCLUSIONS

A transoceanic migration of passerines is of sufficient biological significance that one should be cautious in accepting the hypothesis as probably true on the basis of evidence that is consistent with a more conservative, alternative hypothesis, while at the same time one is ignoring contradictory evidence. No doubt, the observation on radar of passerines departing the New England coast in southward and southeastward directions and the occurrence of Blackpoll Warblers on Bermuda constitute sufficient evidence to propose that the Blackpoll Warbler and perhaps other species are migrating over the ocean to their winter ranges in the West Indies and South America. Such an extraordinary flight, however, requires further corroborating evidence. What evidence exists seems contradictory to the hypothesis: Blackpoll Warblers (1) migrate through the southeastern United States, (2) have migrated through New England before most are recorded on passage through Bermuda and the West Indies, and (3) are smallest in body mass in the northern states, greatest in Florida, and intermediate on Bermuda. Furthermore, (4) the southward and southeastward departures from New England, observed on radar, occur long after the Blackpoll Warbler and other migrants to the Neotropics have left New England, (5) observations with radar at sea show that most presumed passerines are disoriented, if they were destined for South America, and flying too slowly to make landfall, and (6) passerines observed at sea include a wide range of species, most of which are unlikely migrants to South America.

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APPENDIX. Species recorded alighting on or passing ships at sea in the western Atlantic Ocean (Scholander 1955, Williams et al. 1974, McClintock et al. 1978, Larkin et al. 1979). Number counted is in parentheses.

I. Eastern North American populations that rarely migrate south of the southeastern United States: *Columba livia* (3), *Colaptes auratus* (5), *Sayornis phoebe* (1), *Eremophila alpestris* (several), *Tachycineta bicolor* (19), *Sitta canadensis* (5), *Certhia familiaris* (1), *Regulus satrapa* (1), *R. calendula* (1), *Turdus migratorius* (3), *Toxostoma rufum* (1), *Bombycilla cedrorum* (6), *Sturnus vulgaris* (5), *Dendroica coronata* (8 + several), *D. dominica* (1), *D. pinus* (13), *D. discolor* (4), *D. palmarum* (24), *Geothlypis trichas* (3), *Passerculus sandwichensis* (8), *Spizella passerina* (1), *Ammodramus savannarum* (8), *Passerella iliaca* (1), *Melospiza melodia* (1), *M. georgiana* (several), *Zonotrichia albicollis* (6), *Z. leucophrys* (1), *Junco hyemalis* (13), *Plectrophenax nivalis* (1), *Molothrus ater* (3), *Carpodacus purpureus* (1), *Loxia curvirostra* (1), *Carduelis pinus* (1 + several), *C. tristis* (2).

II. Winter mainly in the southeastern United States but some migrate to the Caribbean: *Ardea herodias* (21), *Falco sparverius* (1), *F. columbarius* (1), *Gallinula chloropus* (1), *Tyto alba* (1), *Asio otus* (1), *Dendroica coronata* (8 + several), *Sturnella magna* (2), *Agelaius phoeniceus* (4).

III. Trans-Gulf migrants to Central or South America (rare in the eastern West Indies): *Coccyzus* sp. (1), *Chordeiles minor* (2), *Chaetura pelagica* (1), *Contopus borealis* (1), *C. virens* (1), *Empidonax flaviventris* (1), *E. minimus* (1), *Riparia riparia* (2), *Hirundo rustica* (11), *H. pyrrhonota* (1), *Vireo flavifrons* (1), *Vermivora peregrina* (1), *V. ruficapilla* (2), *Dendroica virens* (2), *D. fusca* (1), *D. castanea* (1), *Wilsonia pusilla* (1), *Icteria virens* (2), *Dolichonyx oryzivorus* (1), *Icterus galbula* (6), *Spiza americana* (2), *Passerina cyanea* (1).

IV. Mainly winter in or migrate through the West Indies: *Mniotilta varia* (3), *Parula americana* (4), *Dendroica petechia* (2), *D. tigrina* (7), *D. caerulescens* (5), *D. striata* (6), *Seiurus aurocapillus* (3), *S. noveboracensis* (1), *Setophaga ruticilla* (15).

V. Unlikely transoceanic migrants: *Athene cucularia* (1), *Tyrannus dominicensis* (2), *Zonotrichia atricapilla* (1).

The 20th International Ornithological Congress will take place in Christchurch, New Zealand, on 2-9 December 1990. The Congress program will include 6 plenary lectures, 48 symposia, contributed papers (spoken and poster), workshops, discussion groups, and films. There will be a mid-Congress excursion day. Longer excursions are planned to interesting ornithological sites in New Zealand before and after the Congress.

In late 1990 New Zealand will also host the 20th World Conference of the International Council for Bird Preservation in Hamilton on 21-27 November 1990 and a Pacific Festival of Nature Films in Dunedin on 27 November to 1 December 1990. Photographic and stamp exhibitions will be held in Christchurch in association with the International Ornithological Congress. Requests for the First Circular, which includes information on the above events, should be sent to Ben D. Bell, Secretary-General, 20th International Ornithological Congress, Department of Zoology, Victoria University of Wellington, Private Bag, Wellington, New Zealand (Telex NZ30882 VUWLIB; Facsimile NZ(04)712070).