TABLE 2. Reproductive performance and eggshell thicknesses for eastern North American Merlins.

Sample	Egg dates	Clutch size	Eggshell thickness index[a]	Young per nest	% nests with young
Pre-pesticide					
Eastern Canada	24 May–3 July	4.2	1.33	3.8	
(*n*)	(36[b])	(18[b])	(110[b])	(15[c])	
1969					
Newfoundland	24 May–9 July	4.3	1.21	3.0	95
(*n*)	(20)	(15)	(18[d])	(19)	(20)

[a] Index = weight in mg/length × breadth in cm.
[b] Data from museum egg collections.
[c] Data from museum specimens, Craighead and Craighead (1940), Breckenridge (1938), and Lawrence (1949).
[d] Includes post-pesticide eastern Canadian eggs from museum collections.

at Merlin nests, three species comprised over half of the Merlin's diet: the Gray Jay (*Perisoreus canadensis*), the Robin (*Turdus migratorius*), and the Savannah Sparrow (*Passerculus sandwichensis*). Since Newfoundland is essentially free of applied pesticides, it is not surprising that the resident jays have low levels of DDE while levels in the migratory robins and sparrows are higher.

The DDE residue levels found in breeding Merlins are lower than those reported in breeding Peregrine Falcons (Cade et al. 1968; Enderson and Berger, 1968) and migrant Merlins in the Midwest (Risebrough et al. 1970). Correspondingly, DDE residues in Merlin eggs were also lower than those found in Peregrine eggs.

Reproductive data are summarized in table 2. No marked delay in the breeding cycle is indicated by the range of egg dates for pre- and post-pesticide samples. Neither has the clutch size decreased significantly since pre-pesticide times. DDE residue levels in Newfoundland Merlins are apparently high enough to cause eggshell thinning. The 9 per cent reduction from pre-pesticide thicknesses is statistically significant ($P < 0.05$). Embryonic mortality appeared high in 1969; all five unhatched eggs collected for residue analysis contained dead embryos. The number of young per nest containing young decreased significantly ($P < 0.05$) since pre-pesticide times, even though no nestling mortality was recorded. This reduction in number of young seems to be due to increased egg loss and decreased hatchability. While no comparable pre-pesticide data are available on the percentage of nests that produced young, the 1969 figure is encouragingly high.

In summary, breeding Merlins in Newfoundland now carry deleterious levels of DDE in their bodies, lay thinner shelled eggs, and produce young at a rate lower than in pre-pesticide times.

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FALL NOCTURNAL MIGRATION DURING TWO SUCCESSIVE OVERCAST DAYS

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On the afternoon of 13 October 1969 a cold front passed over the southeast coast of Louisiana, bringing with it complete, low overcast that persisted without breaking until midmorning of 15 October. By 15:15 CST on the first day the overcast had passed over Grand Isle, about 65 km W of the mouth of the Mississippi River. A census of the woods on the island at that time showed only a few scattered passerine migrants.

That night I heard numerous thrush calls from aloft and decided to use a portable ceilometer and 8 × 40 binoculars to determine the direction of flight and the quantity of birds aloft (Gauthreaux, Bird-Banding 40:309, 1969). During the first watch, 20:45–21:15, I counted 32 birds (64/h), most flying towards 165° (fig. 1A). The surface winds were from the NNW at 10–20 knots, while those at about 2000 ft were from the NE. Although the great majority of call notes were from thrushes (6–7/min), both small and medium-sized passerines were observed in the ceilometer beam.

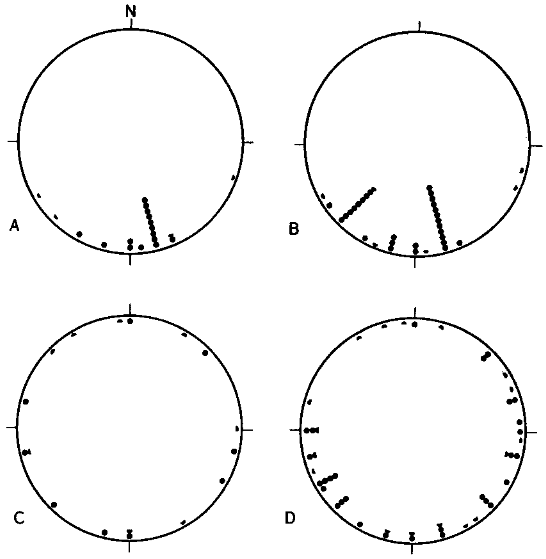

FIGURE 1. Directional data from ceilometer watches (one complete dot = 2 birds). A, 13 October, 20:45–21:15 CST; B, 13–14 October, 23:47–00:17 CST; C, 14 October, 22:24–22:29 CST; D, 14 October, 23:15–23:30 CST.

I counted 61 birds (122/hr) during another ceilometer watch between 23:47 and 00:17. There were two distinct directional components, 165° and 220° (fig. 1B). Thrush calls had increased to 30/min by this time, and the surface wind was still from the NNW, now blowing at 15–22 knots. The census the following morning showed an increase in the number and variety of passerine migrants on the ground.

The sun was not visible for the whole day of 14 October and the cloud cover persisted all that night. The surface wind early in the night was still from the NNW at 10–18 knots; after midnight it shifted to NNE.

During the first ceilometer watch on the night of 14 October, 22:24–22:29, I counted 26 birds (312/hr) flying virtually every direction on the compass (fig. 1C). Many birds had headings different from their tracks and appeared to be flying at widely varying altitudes. The second watch was made between 23:15 and 23:30. I counted 75 birds (300/hr), again flying in what appeared to be random directions (fig. 1D).

At dawn on 15 October the overcast remained, although it was higher than it had been before. At first light I looked aloft with 8 × 40 binoculars and saw a very large, high-altitude movement of passerines flying to the north over the island. I estimated that about 500 birds passed over my observation point in the hour between 05:40 and 06:40. Approximately 10 per cent of the birds dropped down and landed in the woods on the island, and the rest continued inland over the marsh north of Grand Isle. No flocking behavior was discernable, and birds were continuously visible in the binocular field.

On neither night were stars visible, yet most birds were flying in directions appropriate to the season on the night of 13 October. The two directional components corresponded to the different wind directions at the surface and at 2000 ft, suggesting that birds were merely following wind direction, as pointed out by Gauthreaux and Able (Nature 228:476, 1970). There is no evidence, however, that this was the case on the night of 14 October, even though the wind situation was virtually the same.

The results for both nights were tested statistically according to procedures given in Batschelet (AIBS Monograph 1965). The directions that I recorded the second night were random for the first watch but nonrandom for the second according to the results of the Rayleigh Test for uniform distribution. The angular deviation of 69° for the second watch was extremely high, however, compared with 30° for both watches on the first night. The one environmental factor different on the second night was that the sun had not been visible for the entire day before, whereas on 13 October the sky had been essentially clear until mid-afternoon. If nocturnal migrants receive some kind of directional information from the sun, the observed behavior might be predicted.

The reverse migration at sunrise on 15 October could have been an attempt to regain land by birds that found themselves over water at first light. This behavior has not been previously reported from the northern coast of the Gulf of Mexico.

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RESPONSES OF ADULT KILLDEERS TO A DOWNY YOUNG DISTRESS CALL

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On 21 May 1970 I encountered an adult Killdeer (*Charadrius vociferus*) with a downy young while I was tape recording birds at the University of Michigan Botanical Gardens, Dixboro, Michigan. The young crouched on the ground near me while the adult moved about 15 m away. The vocalizations of the young were recorded with a Uher 4000 Report-S tape recorder (7½ ips) as he was gently lifted several inches from the ground. The calls consisted of a series of short, piping notes between 3.6 and 5.8 kHz. Note duration was variable, but most notes terminated with a downward deflection (fig. 1a). During the recording the adult bird came to within 3–4 m of the calling young and then moved away in a broken-wing posture. When the calls were replayed about 10 m from the location of the young, the adult approached the source of the sound and again moved away in a broken-wing posture.

Later in the morning, calls were recorded by the same procedure from a downy young, probably the same one, at a location a few meters from the first site. These calls were played at high volume at another site 60–70 m from the first. Three adult Killdeers flew to within 10 m at about the same time and gave broken-wing postures. The adults were also calling loudly (fig. 1b), so that the possibility cannot

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