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# Fall Migration of Northern Orioles: An Analysis of Tower-killed Individuals

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The timing and routes of migration by different age and sex groups of a species continue to attract the attention of workers interested in the seasonal movements and non-breeding biology of birds (Ketterson and Nolan 1983). Analyses of birds that have collided at night with lighted towers are one source of information on the migrating times of birds (e.g., Tordoff and Mengel 1956, Goodpasture 1963; Taylor 1972, 1973; Crawford 1978), but relatively few Northern Orioles (*Icterus galbula*) have been reported killed in collision with towers during the fall migrations compared to many other species of passerine birds in North America. Nevertheless, I assembled 47 such specimens, of the Baltimore subspecies (*I. g. galbula*), from widely scattered localities in central and eastern North America, aged and sexed them, and determined whether they were molting. This information extends our knowledge of the timing of initiation of the fall migration by individual (*I. g. galbula*) orioles breeding at northerly localities in the breeding range, and of the duration of this migration.

## Methods

I searched the literature for reports of tower casualties of Northern Orioles, corresponded with curators of several museum collections, and finally borrowed 47 specimens. Each specimen was aged and sexed by plumages described by Rising (1968), Hubbard (1972), and my experience gained from banding about 2,500 "Baltimore" Orioles through the breeding and pre-migratory seasons of 1974-1985, in a population on the forested dune ridge, Delta Marsh, Manitoba (see Sealy 1979, 1980, 1985). Each specimen was examined for body and wing molt, and its 9th primaries were examined to determine whether they were still growing.

Composition of pre-migratory flocks of Northern Orioles was determined in 1979 on my study area at Delta Marsh, Manitoba, and in 1979 and 1985 about 7 km south of Battleford, Saskatchewan.

## Results and Discussion

Table 1, based on the information in the Appendix, summarizes the dates and localities of the tower-killed Northern Orioles examined in this study. The fall migratory period, as revealed by the extreme dates of the casualties,

spanned 21 August [1964] and 13 October [1978]. The presence of juveniles (hatching-year, or HY), ASY (after-second-year) males and AHY (after-hatching-year) females in the sample obtained on 21 August in Saskatchewan (Table 1) confirms Sealy's (1979, 1985) suggestion, based on mist-net captures and recaptures, and observations of color-marked individuals in southern Manitoba, that at least some individuals of both sexes and all ages, except SY male (second-year male, in first breeding season after hatching), begin migrating by the third week of August. The migration to the wintering grounds in Central and northwestern South America (wintering area mapped in Sealy (1985), but see Erickson (1969) and Crawford (1973) for information on the establishment of a wintering population in southeastern United States) is probably rapid, as it is in other migratory species of passerine birds (e.g., Clench 1968, Leberman and Browne 1976, Hussell 1984). Data in Table 1 also reveal that ASY males collided with towers between 21 August [Saskatchewan] and 25 September [Wisconsin], whereas AHY females and HY individuals of both sexes were killed over the entire period in which this mortality occurred. This suggests that the ASY males migrate more synchronously than do AHY and HY individuals, although much larger samples are needed to confirm this.

The SY males apparently begin leaving southern Manitoba in early July (Sealy 1985), before they have finished molting (Sealy 1979). Implicitly, these males arrive on the wintering grounds before the other age cohorts, but this requires confirmation. The lack of tower-killed SY males (Table 1) may reflect diurnal migration by individuals, lack of storm systems along cold fronts early in the season, lack of or infrequent mid-summer searches for casualties under towers, or chance.

I showed elsewhere (Sealy 1979) that the prebasic molt is generally complete, except apparently in the SY males, before individuals migrate in the fall. Only 10 of the 47 (21.3%) tower-killed specimens examined in the present study showed body molt, restricted to the sternal, mid-dorsal and/or abdominal feather tracts. Eight of these individuals were ASY males, one was an AHY female, and one was an HY male. The 9th primaries of 13 individuals (27.7%) were still sheathed; seven of these were ASY males, six were AHY females.

Do Northern Orioles migrate in fall singly or in flocks? Some clues emerge when the composition of pre-migratory flocks are examined. Adult orioles are generally secretive when they are molting in late July and early August, whereas the juveniles, as they become stronger on the wing, are conspicuous as they begin to move about in flocks. Observations on the Manitoba study area through late August in 1979 revealed that ASY males and AHY females generally were solitary up to the time they migrated. I never saw flocks of adult males or females (although under certain conditions unmarked adult females may have been indistinguishable from HY birds). Four times during the post-breeding period in 1979 single ASY males and AHY females were seen together. On 4 August 1979 a flock of 39 HY individuals was seen near Battleford, Saskatchewan, and between 8 and 16 August 1979, one flock of each of 3, 11, and 19, and three flocks of 10 HY individuals were seen in Manitoba. Groups seen south of Battleford between 25 July and 2 August 1985 consisted of two single HY individuals, three flocks of 2, one flock each of 5 and 7, two of 8, and one of 9 HY birds; three single AHY females; and one single ASY male.

**Table 1. Northern ("Baltimore") Orioles killed in collision with lighted towers during fall migrations, 1955-1979.**

Date killed*	Locality	Males		Females	
		ASY	HY	AHY	HY
21 Aug 1964	Saskatchewan	3	1	3	1
24 Aug 1976	Ohio	1			
25 Aug 1979	Manitoba	1			
30 Aug 1959	Florida				1
1 Sep 1965	Saskatchewan			1	
4 Sep 1964	Saskatchewan	1			
5 Sep 1965	Wisconsin		1		
5 Sep 1969	Manitoba			2	
6 Sep 1974	Florida	1			
10 Sep 1962	Minnesota	9	1	1	
12 Sep 1974	Minnesota		2	1	
13 Sep 1963	Wisconsin			1	
20 Sep 1957	Wisconsin	1			
21 Sep 1972	North Carolina				1
25 Sep 1965	Wisconsin	1		2	
30 Sep 1965	Saskatchewan			1	
1 Oct 1965	Wisconsin				1
2 Oct 1957	Florida			1	
4 Oct 1971	North Carolina		1		
5 Oct 1957	Florida			1	1
9 Oct 1955	Florida			1	1
10 Oct 1958	Florida			1	
13 Oct 1978	Florida		1		
TOTALS		18	7	16	6

\*The specimens were salvaged beneath the towers on the mornings of the dates indicated. Not all specimens salvaged were prepared later as museum study skins. For example, 19 Northern Orioles were killed 9/10 September 1962 at KCMT TV tower near Westport, Minnesota (Kemper *et al.* 1966), but only 11 of these were preserved.

The timing of casualties reported in Table 1 is difficult to interpret. On most dates, only one or two individuals were killed. Kills involving three or more individuals occurred on only four of the 23 dates.

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## Appendix

**S**pecimens of the Northern Oriole (*Icterus galbula galbula*) killed in collision with TV and radio towers in central and eastern North America were examined in the present study. (Note: Bell Museum of Natural History, University of Minnesota [BMNH]; Carnegie Museum, Pittsburgh [CM]; Field Museum of Natural History, Chicago [FMNH]; Manitoba Museum of Man and Nature, Winnipeg [MMMN]; Saskatchewan Museum of Natural History, Regina [SMNH]; Tall Timbers Research Station, Tallahassee [TTRS]; University of Manitoba Zoology Museum, Winnipeg [UMZM]; University of Minnesota at Duluth [UM-D]; University of North Carolina at Wilmington [UNC-W]; University of Saskatchewan Biology Museum, Saskatoon [USBM]; and University of Wisconsin Zoology Museum, Madison [UWZM]).

*Manitoba.* —CBC, Starbuck: 1 ASY ♂, 25 Aug 1979 (UMZM 1583); 2 AHY ♀♀, 5 Sep 1969 (MMMN 3167-68). Total specimens: 3.

*Saskatchewan.* —CKCK, Regina: 3 ASY ♂♂, 21 Aug 1964 (SMNH 9369-71); 4 AHY ♀♀, 21 Aug 1964 (SMNH 9372-74) and 30 Sep 1965 (SMNH 10304); 1 HY ♂, 21 Aug 1964 (SMNH 9375), 1 HY ♀, 21 Aug 1964 (SMNH 9376). CFQC, Saskatoon: 1 ASY ♂, 4 Sep 1964 (USBM 480). CBK, Watrous: 1 AHY ♀, 1 Sep 1965 (USBM 1814). Total specimens: 11.

*Minnesota* —KCMT, Stearns Co.: 9 ASY ♂♂, 10 Sep 1962 (BMNH 21225-28, 21231-35); 1 AHY ♀, 10 Sep 1962 (BMNH 21596); 1 HY ♂, 10 Sep 1962 (BMNH 21592). Ostrander: 1 AHY ♀, 12 Sep 1974 (BMNH 28253); 2 HY ♂♂, 12 Sep 1974 (BMNH 28362, 28379). Total specimens: 14.

*Wisconsin* —WEAU, Eau Claire Co.: 2 ASY ♂♂, 20 Sep 1957 (BMNH 15197) and 25 Sep 1965 (UWZM 19008); 3 AHY ♀♀, 13 Sep 1963 (UM-D 1772) and 25 Sep 1965 (UWZM 19003, 19013); 1 HY ♂, 5 Sep 1965 (UWZM 19004); 1 HY ♀, 1 Oct 1965 (UM-D 1817). Total specimens: 7.

*Ohio* —WFMV, Mahoney Co.: 1 ASY ♂, 24 Aug 1976 (CM 7998). Total specimens: 1.

*North Carolina* —WECT, Blader Co.: 1 HY ♂, 4 Oct 1971 (UNC-W B355); 1 HY ♀, 21 Sep 1972 (UNC-W B299). Total specimens: 2.

*Florida* —WCTV, Leon Co.: 1 ASY ♂, 6 Sep 1974 (TTRS 3266); 4 AHY ♀♀, 9 Oct 1955 (TTRS 1700), 20 Oct 1957 (TTRS 1705), 5 Oct 1957 (TTRS 1706), and 10 Oct 1959 (TTRS 1704); 1 HY ♂, 13 Oct 1978 (FMNH 299486); 3 HY ♀♀, 9 Oct 1955 (TTRS 1701), 5 Oct 1957 (TTRS 1717), and 30 Aug 1959 (TTRS 1703). Total specimens: 9.

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