Ornis Fennica, Suppl. 3:34–36, 1983

The sequential passage of different Robin *Erithacus rubecula* populations at Ottenby[1]

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Do different geographic populations within one species pass a particular resting place during separate periods within a migration season? One way to answer this question is to analyse the distribution of recoveries in summer and winter, respectively, in relation to time of passage within the migration season.

Ringing of adult birds during migration produces considerably more recoveries from winter quarters than from breeding areas, a fact which limits this report to recoveries in winter quarters of Robins *Erithacus rubecula* ringed at Ottenby during migration.

Material and methods

At Ottenby Bird Observatory (56°12'N,16°24'E) a total of 86 747 Robins were ringed from the start in 1946 until 1979, and of these were 53 460 trapped between July and November (from autumn birds, 35 % were trapped in September, 62 % in October, and 3 % in November). Autumn ringings have resulted in 265 recoveries and retraps (0.61 %) up to 1 January, 1980.

Up to 1970 only a small proportion of Robins caught in autumn were aged (either to first year birds or older ones). In the seasons 1970—76, c. 70 %, and in the years 1977—79 more than 95 %, of the birds were aged according to Svensson (1970). Sex was determined on 177 birds killed in collision with the lighthouse at Ottenby. From 1977 onwards, the maximum wing lenght (Svensson 1970) was measured from all trapped Robins. In the following analysis, only measurements from one ringer (JP, N=2095) have been used.

Results

In December through February recoveries (N=185) were regarded as coming from winter quarters. They originate from Portugal in the west to the Caspian Sea in the east, and from North Africa in the south to Southern Sweden in the north. The direction of recoveries differs in relation to the date of ringing in migration season, but not in relation to age (Table 1). 13 October was the mean ringing date of more eastern recoveries, i.e. recoveries east of south from Ottenby.

Later migrants travelled a shorter distance before they reached their winter quarters, and so did also young birds (Table 2). The monthly mean of wing length increased significantly (Student-Newman-Keuls test, for all comparisons $p < 0.01$) in the course of the autumn, and at the same time also the proportion of males increased (Table 3). Males of northern Robins have, on average, 1.6 mm longer wing lengths than females (40 spring birds in their second calendar year were measured from the collection of the Museum of Natural History in Stockholm). The difference is significant (t-test, $p < 0.025$). The increase in the winglength can well be due to the change in the sex ratio of trapped birds.

Discussion

Robins wintering in the northwestern parts of Europe are largely males (Niethammer 1937, Lack 1944). That the sex ratio changed during the autumn migration season in favour of males in late autumn could explain the more northern distribution of recoveries for the later migrants. Another possible explanation of the difference in recovery areas is that different geographical populations are involved in the passage. Comparison of recoveries of juveniles ringed prior to 15 August in southern Sweden and southern Finland shows (Figure 1) that eastern populations have also more eastern winter quarters than western ones, as suggested also by Rendahl (1966) and Högstedt & Persson (1970). The migration route shifts gradually towards the east during autumn (Table 1) which could indicate that the early autumn passage at Ottenby mainly consists of Swedish Robins, followed later on by populations breeding to the east of Sweden.

Some of these late migrants produce winter recoveries in a sector to the east of Ottenby. This could indicate

Table 1. Multiple classification analysis on the dependence of direction between Ottenby and winter quarters from the month of ringing ($F(2,138)=4.7$, $p=0.01$) and age of bird when recovered ($F(1,138)=1.3$, $p=0.26$). The deviation from the mean for the respective variable is adjusted for distance and the other independent variable.

Variable	N	Deviation from mean (°)	beta
Month			
September	42	9.1	
October	96	— 3.1	
November	7	—12.6	
			0.28
Age			
First winter	114	— 1.1	
Second or later winter	31	4.0	
			0.09
Mean=211.4°			
Multiple R^2=0.07			

Fig. 1. Winter recoveries (December-February) of juvenile Robins ringed prior to 15 August in Sweden (black dots; source Österlöf, S., Annual Report of the Swedish Bird Ringing Office 1961—70) and in Finland (black triangles; source Mem.Soc. Fauna Flora Fennica, ringing reports 1948—67). Direction and distance recalculated to apply to the coordinates of Ottenby. The Swedish recoveries have a mean direction of 223° and a mean distance of 2508 km (N=12), and the Finnish ones 207° and 1924 km (N=9), respectively. January isotherm +5° C is also indicated.

Table 2. Multiple classification analysis on the dependence of distance between Ottenby and winter quarters from the month of ringing ($F(2,138)=23.6$, $p=0.001$) and age of the bird when recovered ($F(1,138)=8.7$, $p=0.004$). The deviation from the mean for the respective variable is adjusted for direction and the other independent variable.

Variable	N	Deviation from mean (km)	beta
Month			
September	42	377	
October	96	— 94	
November	7	—970	
			0.50
Age			
First winter	114	— 67	
Second or later winter	31	247	
			0.21
Mean=1764 km			
Multiple R^2=0.30			

Table 3. Mean monthly wing lengths and sex ratios of Robins in their first calendar year trapped at Ottenby in the autumn.

Month	Wing length (mm) $\bar{x}$	± SD	N	Sex ratio males (%)	N
September	72.5	1.59	478	51	82
October	72.9	1.61	1375	62	73
November	73.7	1.81	32	82	22

Fig. 2. Hypothetical migration of eastern Robins through western Europe to their winter quarters (broken line). The Robins migrate away from the cold (±0° C isotherm of November indicated by the thin line) due to high pressures (H) with winds from the northeast (1). Tail winds bring the Robins to western Europe with its milder climate (2). The winds after low pressures (L) during late autumn favour SE migration (3) from this area.

that the late passage at least partly consists of Robin populations of even more easterly origin, that is non-Scandinavian. These birds, after arriving in western Europe, may have to shift their migration direction (Petryna 1976, Perdeck 1970) to a south-to-southeastern direction, which would take place during late October or November. This has been established for Redwings *Turdus iliacus* in a radar study in Scania by Alerstam (1975) who noted that this is not in agreement with the distribution of recoveries of the West European population. Since Robins and Redwings winter in the same geographical areas (Ashmole 1962, Mork 1974) it does not seem farfetched to expect a similar migration pattern for the Robin. Winds in October in Scandinavia are also, on an average, more advantageous to SE migration than to movements towards SW (Evans 1966, Alerstam 1975). The migration of late Robins of eastern origin would then be likely to follow the pattern presented in Fig. 2. This pattern agrees with the general one described by Richardson (1978). i.e. the most intense migration occurs just before the passage of a high pressure or immediately after that of a low pressure.

Acknowledgements. The field-work has been financed by the Swedish Environmental Protection Board. We thank B.-E. Sjölinder for translating the manuscript into English.

[1]Contribution no. 88 from Ottenby Bird Observatory

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