

MIGRATION OF RED-BACKED (*LANIUS COLLURIO*), MASKED (*L. NUBICUS*), AND WOODCHAT SHRIKES (*L. SENATOR*) AT EILAT, ISRAEL

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ABSTRACT.- Elat, on the northern edge of the Saharan-Arabian desert belt, is critical for many migrant species because it is reached after a northbound flight of almost 2000 km of inhospitable habitats of the Sahara and Sinai deserts. It is of interest to note that contrary to the expected, there are more migrant birds in Elat in spring than in autumn. Analysis of ringing data gathered at the IBCE ringing station during 1984-1994 was undertaken. A total of 186 Masked (*Lanius nubicus*), 338 Woodchat (*L. senator*), and 650 Red-backed (*L. collurio*) shrikes was trapped and measured. In addition, I established (a) seasonal passage periods, (b) identified separate mean dates of migration, and (c) identified seasonal differences in body masses. More Red-backed Shrike were trapped in autumn (535) than in spring (115). Individuals in autumn were significantly heavier than in spring (27.1 vs 22.6 g). Sixty-seven were retrapped within a season and on average stayed for 6.5 d and gained 5.4% of their body mass. Masked Shrikes were trapped mostly in spring (266 vs 72). Birds in autumn were significantly heavier than in spring (23.3 vs 19.5 g), and birds ($n = 57$) retrapped within a season on average stayed in Elat for 4.5 days and gained 4.5% of their body mass. Most Woodchat Shrike were trapped in spring (182 vs 4). The 17 retrapped were only in spring and they stayed in Elat on average for only 3.6 d and lost 0.21% of their body mass. The results for all three shrike species suggests a loop migration either in spring (Red-backed) or in autumn (Masked and Woodchat) in relation to Elat. It appears that Elat is a relatively important staging area in spring for the Laniidae. IBCE Tech. Publ. 7:5-8, 1998.

Since Safriel (1968) drew attention to the concentrations of avian migrant at Elat, several surveys of the raptor visible-migration have been made there in spring and autumn (Shirihai 1988, Shirihai and Christie 1992, Shirihai and Yekutieli 1991, Yosef 1995) and a passerine ringing station has been in operation during spring and autumn since 1984.

Eilat is located at the hub of the only land bridge between three continents and is a junction for birds migrating south between Europe and Asia to Africa in autumn and north to their breeding grounds in spring (Safriel 1968, Yom-Tov 1988). The Red Sea and the Gulf of Aqaba/Eilat act as a long deflection barrier forcing birds to concentrate in spring. Also, Elat is situated at the northern edge of almost 2000 km of continuous desert regions of the Sahara and Sinai deserts. However, to the north-north east there are still 650 km more of the Syrian Desert, and due east the vast Arabian Desert. Hence many birds land here to rest before (in autumn) or after (in spring) crossing the deserts (Yom-Tov 1988). The return journey of those that have survived the autumn migration and overwintering in Africa is directed north or north-east to their Palearctic and Holarctic breeding grounds.

As far as we are aware there are no other ringing stations in the Middle East and birds ringed at Elat in previous years have supplied limited insight into their migratory biology and destinations (e.g., Clark et al. 1986, Gorney and Yom-Tov 1994). Birds banded at

Eilat in the past were recovered across Europe, Asia, and Africa. However, the lack of ringing stations in the Middle East, Africa, and Eurasia stresses the importance of the ringing project in an bottleneck area for migrants (Clark 1995).

I analyzed data for Red-backed Shrikes (*Lanius collurio*), Masked Shrikes (*L. nubicus*), and Woodchat Shrikes (*L. senator*) that migrate through the region and are netted in large numbers. In addition, Great Grey Shrikes (*L. excubitor*) and Lesser Grey Shrikes (*L. minor*) also migrate through the study area however extremely few have ever been caught.

METHODS

Analysis of ringing data gathered at the IBCE ringing station during 1984-1994 was undertaken. In addition, I established (a) seasonal passage periods, (b) identified separate waves of migration, and (c) identified seasonal differences in body masses.

Birds were aged according to the EURING code (Bairlein 1994) wherein in autumn unaged, young, and adult birds are coded 2, 3, and 4 respectively; and from 1 January, i.e., in spring, they are coded 4, 5, or 6 respectively. All birds were weighed with Pesola 50- or 100 g scales.

Unless otherwise stated, all measured data are presented as mean + SD, n , and range and I employed Chi-square, t -test, or Wilcoxon Signed-Rank tests for comparison of data between age groups, or sexes.

Table 1. Measurements of Red-backed, Masked and Woodchat shrikes ringed at Elat on migration in Spring and Autumn during 1984-1994.

	WING CHORD (mm)				BODY MASS (g)			
	Mean	SD	n	Range	Mean	SD	n	Range
Red-backed Shrike (<i>Lanius collurio</i>)								
MALE	93.3	2.9	97	85 - 104	25.3	4.8	98	10-37
FEMALE	90.4	2.8	183	70 - 98	24.6	4.3	78	14-35
AGE 3	93.3	2.8	150	82 - 104	24.2	4.5	144	10-36
AGE 5	93.2	2.0	18	90 - 97	25.6	3.9	17	21-37
Masked Shrike (<i>L. rubicus</i>)								
MALE	90.4	2.8	183	70 - 98	19.9	2.4	193	13-30
FEMALE	89.8	2.2	153	84 - 90	20.0	2.4	157	16-29
AGE 3	89.0	0.8	4	88 - 90	20.9	2.0	9	18-25
AGE 5	90.1	3.8	65	70 - 96	19.8	3.3	98	13-28
AGE 6	89.4	2.1	144	84 - 96	19.9	2.1	148	15-30
Woodchat Shrike (<i>L. senator</i>)								
MALE	99.9	2.9	95	94 - 114	29.9	3.3	93	20-42
FEMALE	100.1	2.8	81	94 - 114	29.3	2.9	8	20-41
AGE 3	99.3	3.7	28	94 - 114	29.1	4.6	23	20-41
AGE 5	100.0	2.2	43	95 - 104	29.9	2.7	46	21-38
AGE 6	100.2	1.1	5	99 - 102	29.0	1.4	5	27-30
<i>L. s. niloticus</i>								
	100.2	2.9	93	95 - 114	29.1	2.8	94	20-38
<i>L. s. senator</i>								
	99.62	2.1	99	96 - 103	30.4	2.8	8	27-36

I chose $P = 0.05$ as the minimum acceptable level of significance.

RESULTS AND DISCUSSION

A total of 338 Woodchat Shrikes, 466 Masked Shrikes, and 678 Red-backed Shrikes was trapped and measured. More Red-backed Shrike were trapped in autumn (563) than in spring (115). Conversely, Masked Shrike were trapped mostly in spring (394 vs 72) as were most Woodchat Shrike (319 vs 19). The disproportionate capture of shrikes between the two seasons suggests a loop migration for all three species in relation to Elat. Red-backed Shrike appear to take a different (more easterly?) route in spring, and Masked and Woodchat shrikes in autumn.

A total of 252 (38.8%) Red-backed Shrikes was aged. Although, on average, individuals in autumn were significantly heavier than in spring ($27.1 \text{ g} \pm 4.0$, 535, 14.0 - 39.5 vs $22.6 \text{ g} \pm 3.0$, 115, 10.5 - 37.0; $t = -16.3$, 114 DF, $P < 0.0001$), first year birds (code 3) were significantly lighter ($z = -2.11$, $P = 0.04$; Table 1) than the same cohort captured as second year birds (code 5). Wing chord of 171 (31.3%) individuals was measured and on average males did not differ from that of females ($z = -1.68$, $P = 0.092$; Table 1), however, males were heavier than females ($z = -2.48$, $P = 0.01$).

A total of 394 (94.7%) Masked Shrikes was aged but only four were first year birds. This small sample size

prevented comparison with other age groups to check for age-effects on body mass and wing chord length. Individuals caught in autumn were significantly heavier than in spring ($23.3 \text{ g} \pm 2.6$, 72, 18-28 vs $19.5 \text{ g} \pm 2.3$, 266, 15-29.5; $t = -27.7$, 265 DF, $P < 0.0001$). Similarly, although mean body mass of males was not different from that of females ($z = -1.353$, $P = 0.1736$; Table 1), females had on average shorter wing chord ($z = -3.355$, $P = 0.0007$).

A total of 181 (53.6%) Woodchat Shrike was aged. There was no significant difference in body mass between autumn and spring ($t = 1.74$, 3 DF, $P > 0.18$; Table 1), and age did not affect body mass or wing length. Two sub-species identified were - *L. s. senator* ($n = 9$) and *L. s. niloticus* ($n = 93$). No difference in body mass ($z = -0.21$, $P = 0.831$) or wing chord ($z = -0.77$, $P = 0.441$) was found.

Woodchat Shrike consistently migrated earlier in the season than Masked (Chi square = 118.96, 21 DF, $P = 0.0001$) or Red-backed shrikes (Chi square = 265.20, 15 DF, $P = 0.0001$) in the spring (Fig. 1). Although the same might apply for autumn, the sample size for Woodchat Shrike is very small. Further, Masked Shrike consistently migrate earlier than Red-backed Shrike in the spring (Chi square = 184.16, 15 DF, $P = 0.0001$) and autumn (Chi square = 45.78, 13 DF, $P = 0.0001$). Mean date of migration suggests that majority of Woodchat Shrike pass through on 1 April, Masked Shrike on 18 April, and Red-backed Shrike on 6 May in spring, and 2 September, 1 October, and 9 October, respectively, in autumn.

The fact that the order of migration remains consistent amongst the three species (Fig. 1) suggests that they have a similar span of time wintering in Africa and on their breeding grounds in Europe.

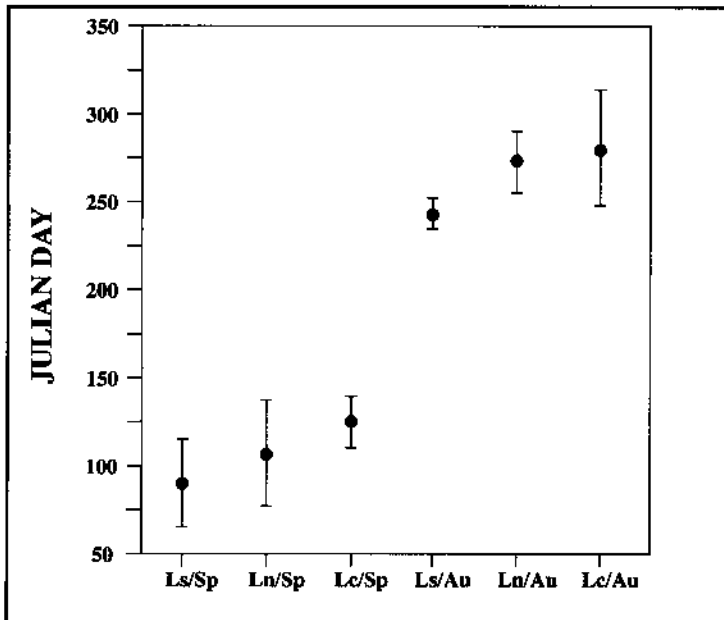


Fig. 1. Migration phenology of Woodchat (Ls), Masked (Ln), and Red-backed (Lc) shrikes during the spring (Sp) and autumn (Au) migrations for the years 1984-1994 at Elat, Israel. Data are presented ± 1 SD error bars.

In comparison, Shirihai (1996) considers all migrant shrike species as nocturnal migrants that migrate singly, and set up feeding territories during diurnal hours. He states that in Elat the Woodchat Shrike migrates in autumn in two waves - 18-25 August and mid-September. In spring, four distinct fluxes are evident - 8-19 March, 26 March - 5 April, 13-25 April, and 30 April - 5 May. the *niloticus* subspecies dominates almost throughout, and nominate *senator* represents about 10% of the migrants, mainly in mid-April to early-May. In Masked Shrike three distinct influxes are evident - 31 August - 9 September, 16-25 September, and early October. In spring four distinct fluxes October - 18-25 March, 7-16 April, 23 April-8 May, and in late-May. The Red-backed Shrike

migrates during mid-August to mid-October, and that three major influxes are evident - during mid-August to early September, mid- to late September, and 2-9 October. In spring, migration is mainly during May in two distinct waves - 29 April to 5 May and 17-27 May.

Sixty-seven Red-backed Shrikes were retrapped within a season and on average stayed for 6.5 d and gained 5.4% of their body mass. Masked Shrikes retrapped ($n = 57$) within a season on average stayed in Elat for 4.5 days and gained 4.5% of their body mass. Woodchat Shrike were retrapped ($n = 17$) only in spring and stayed in Elat on average for only 3.6 d and lost 0.21% of their body mass. It appears that Elat is a relatively important staging area in spring for the Laniidae.

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