PHENOLOGY AND BIOMETRIC MEASUREMENTS OF MIGRATORY WOODCHAT SHRIKE (*Lanius senator*) AT EILAT, ISRAEL

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ABSTRACT

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Migratory Woodchat Shrikes were mist-netted during the spring and autumn migrations at Eilat (Israel) starting from spring 1984 to autumn 2000. The majority (95.8%) was trapped in spring. This can be explained by either the species assorting to loop migration, or the higher capture rate as a result of deteriorated body condition after the arduous crossing of the Sahel, Sahara and Sinai deserts. Of 90 individuals identified to the subspecies level, 81 (90.0%) were *L. s. niloticus*, and 9 (10.0%) – *L. s. senator*. *L. s. niloticus* arrived at Eilat about two weeks before *L. s. senator* (27 March *vs* 10 April, p = 0.067). Adult males, juvenile males, adult females and juvenile females did not differ in their arrival time in spring and no significant differences in wing length or body mass were found between the four sex and age classes.

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INTRODUCTION

The breeding range of the Woodchat Shrike is restricted to southeastern Europe and the Middle East (Harris and Franklin 2000). To date, based on plumage coloration and wing length, four subspecies are recognised. The nominate subspecies – *L. s. senator* – breeds in Europe from Spain to W Turkey; *L. s. rutilians* – in Iberia and NW Africa; *L. s. niloticus* – in E Turkey, Syria, Israel and Iran; and *L. s. badius* – on certain Mediterranean Islands. All subspecies migrate mainly to sub-Saharan Africa, north of the equator, occurring in a broad belt across southern Sahara and Sahel regions, between 15°N and 5°N in the west and between 13°N and 2°N in the east, extending into the southwestern parts of the Arabian Peninsula (Harris and

Franklin 2000). Among these *L. s. niloticus* is fairly common migrant and breeding summer visitor in Israel and *L. s. senator* – rather scare migrant, occurring chiefly in spring (Shirihai 1996). Nikolaus and Pearson (1991) suggested that subspecies could be defined based on their moulting strategy. The subspecies *niloticus* has very different moult strategy from that of European birds (*cf.* Svensson 1992) and among birds captured in Sudan, all had retained some or all of their old secondaries. The best way to take biometric measurements and to understand differences between subspecies and their respective migration strategies is to analyse data from one geographical point, where at least two or more of the subspecies occur together.

Eilat, located at the southern tip of Israel, is a place through which both subspecies migrate, what offers a good opportunity to obtain comparable data and also to study the migration patterns, especially of *L. s. niloticus*, because knowledge of this subspecies is very scarce (*cf.* Harris and Franklin 2000).

The aim of this study is to identify the migration strategy of *L. s. senator* and *L. s. niloticus* based on the data of birds trapped at the banding station in Eilat (Israel), just before and after their transition of the Sahara desert belt. We hypothesized that during the spring migration, when in transition from their wintering grounds in sub-Saharan Africa, Woodchat Shrikes must stage at Eilat before accomplishing the second half of their migrations to their breeding grounds to the north. We compared the physiological state (body mass) and wing chord of Woodchat Shrikes within and between spring and autumn migrations to elucidate differences in biometrics that are sex- and age-related. We present biometrics that illustrates previously indescribed sexual differences in size in the studied species.

STUDY AREA AND METHODS

Eilat, at the northern tip of the Gulf of Aqaba, is an important site because it is located on the northern edge of the Saharan-Arabian desert belt. This place is critical for many migrant species as it is reached after a flight through almost 2000 km of continuous desert regions of the Sahel, Sahara and Sinai deserts (Safriel 1968).

Due to relatively small sample size of captured Woodchat Shrikes we analysed the data for the 16 years (1984-2000) cumulatively, assuming that the changes of the banding efforts does not affect the migratory patterns and biometrics of the study species. No ringing was conducted in 1987. The total number of individuals ringed per season varied from 1 (1989 and 1994) to over 30 (1984, 1996, 2000).

Each bird ringed was aged and sexed based on plumage (Svensson 1992). Maximum wing chord and tail were measured using a graded wing-ruler (± 1 mm), and mass was determined with a Pesola 50-g (± 1 g) spring balance. However, biometric data were not available for all individuals and has resulted in a large variation in sample sizes. We classified the birds into five age and sex classes: adult male (EURING code 4 and 6), juvenile male (EURING code 3 and 5), adult female (EURING code 4 and 6), and juvenile female (EURING code 3 and 5). Individuals not ascribed to one of the above mentioned classes were not included in the biometric analyses. Some of the ringed birds were also identified to the subspecies level (Svensson 1992, Shirihai 1996).

We computed the phenology of spring and autumn migration in Julian dates. However, to show the pattern of migration in both sexes and sub-species, we pooled the capture records for half-month intervals in both seasons.

Standard statistical methods were used to describe and analyse the data (Sokal and Rohlf 1995). Calculations were conducted using the SPSS for Windows package (Norusis 1986).

RESULTS

During the 16 study years, we caught 216 Woodchat Shrikes. Of these 207 (95.8%) were ringed in spring and only 9 (4.2%) – in autumn. A total of 102 (50.7%) were identified as males, 99 (49.3%) – as females, and 15 (6.9%) juveniles remained undetermined. Owing to very small sample in autumn, further analyses are restricted only to the spring data.

Data at the subspecies level was available for 90 individuals, of which 81 (90.0%) were *L. s. niloticus*, and 9 (10.0%) – *L. s. senator*.

The subspecies *L. s. niloticus* migrate through Eilat about two weeks earlier than *L. s. senator* (27 March *vs* 10 April, $z = -1.83$, $p = 0.067$), although the restricted sample size of *L. s. senator* does not allow us to reach significant conclusions and also because the data for sex and age classes was analysed together.

Allowing for the fact that we did not find any significant differences in body mass and wing length between the two subspecies (in both comparisons p 0.57), we treated all further analysis based on sex and age as a whole data set of all the individuals ringed.

Adult males, juvenile males, adult females and juvenile females did not differ in their spring arrival time (median test, $\chi^2 = 0.55$, $p > 0.9$). No significant differences were found between the four sex and age classes in wing length and body mass (Table 1, ANOVA, $F_{3,186} = 1.23$, $p = 0.29$ and $F_{3,173} = 1.85$, $p = 0.14$, respectively).

Table 1
Wing length (mm) and body mass (g) of the Woodchat Shrike on spring in Eilat, Israel. All values given as mean ± *SD*, sample size in parentheses

	Wing	Body mass
Male adult	99.8 ± 2.3 (40)	29.4 ± 3.3 (32)
Male 1st year	100.3 ± 2.4 (57)	30.0 ± 3.1 (56)
Females adult	99.7 ± 2.2 (70)	28.5 ± 2.6 (20)
Females 1st year	99.7 ± 2.5 (23)	29.1 ± 2.5 (69)

Among males, body mass changed significantly with the date of arrival ($r = -0.26$, $p = 0.014$), but was insignificant for females ($r = -0.16$, $p = 0.14$). For both sexes, wing length did not change significantly with the date of arrival ($p > 0.11$ in both cases).

DISCUSSION

The Woodchat Shrike is a common passage migrant in spring at Eilat, with smaller numbers in autumn (Morgan and Shirihai 1997, Yosef 1998). Our data concur with the previous studies. Authors link this fact with the migration pattern of many species, mainly with the phenomena of loop migration or autumn non-stop migration hypothesis (*e.g.* Biebach 1995). In spring, the Woodchat Shrike arrived at Eilat during late February and peaked in March. A similar migration pattern was observed independent of age or sex of the birds.

We found significant differences between the two subspecies migrating over Eilat. However, further explanations about differences between the two subspecies, and linking these facts with data from their respective breeding ranges, is impossible owing to the lack of breeding data for *niloticus*. We surmise that these differences are not connected to either the wing length or body size in the migrating individuals because we have not found any significant differences between the two subspecies. This suggests that only variations in plumage are good criteria for separating the individuals of the two subspecies. The data presented here are the first based on a good sample size for the *niloticus* subspecies (Harris and Franklin 2000), but number of *senator* subspecies was low.

We have no significant differences in timing of migration between age and sex categories. It is in contrast to data from breeding grounds (Kańuśćak and Śnajdar 1977, Ullrich 1993) and more northern localised migration points (Spina *et al.*

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