POSSIBLE ENDOGENOUS BASIS OF JUVENILE DISPERSAL IN THE REED WARBLER (*Acrocephalus scirpaceus*)

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ABSTRACT

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Post-fledging movements in juvenile Reed Warblers were studied in the field and in experiments. Age at the last capture at the natal site varied between 25 and 59 days, mean – 40.2 days (SD = 6.9, N = 384), median – 40 days. Besides, 16 juvenile Reed Warblers were trapped 20 km NE from their hatching area during post-fledging dispersal. Their age varied between 33 and 50 days, all these birds were in heavy moult, with average mass being 11.48 g (SD = 0.73, N = 16).

We also recorded nocturnal restlessness in hand-raised juvenile Reed Warblers. In 15 birds, nocturnal restlessness started before the age of 42 days, with the level of nocturnal activity being low – nights with activity occurred sporadically. In two birds nocturnal activity started at the age of 61 and 66 days, respectively. The level of activity was high from the beginning – restlessness was recorded nearly every night. Excluding these two birds, average age of starting nocturnal restlessness comprised 32.4 days (SD = 6.6, N = 15). We suggest that this nocturnal activity in caged individuals reflects actual movements of free-living birds. Post-fledging movements of Reed Warblers have endogenous basis, which is recorded in caged birds as a weak nocturnal restlessness.

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INTRODUCTION

The post-fledging period is a poorly studied section in the avian life cycle, primarily because of methodical difficulties (Baker 1993, Vega Rivera *et al.* 1998). However, it is of importance for survival of first-year birds and their subsequent distribution during the following breeding season. At least some passerines are believed to imprint future breeding areas during this period (Sokolov 1997).

About a decade ago it was suggested that juvenile dispersal in the Reed Warbler may occur by short nocturnal flights (Herremans 1990). Nocturnal migratory flights are known to have an endogenous basis, they take form of nocturnal migratory restlessness („Zugunruhe") in caged birds (Berthold 1988). However, up to now, there are no records of nocturnal activity referring to juvenile dispersal (Berthold 1996).

We studied movements of first-summer Reed Warblers from a population on the Courish Spit, and recorded activity of hand-raised Reed Warblers from the same population in registration cages. Our objective was to test, whether post-fledging movements in this species have an endogenous basis, or they are governed exclusively by environmental stimuli.

MATERIAL AND METHODS

Birds were mist-netted daily at the Rybachy trapping station on the Courish Spit (Kaliningrad Region, Russia, 55°12'N, 20°46'E – see Figure 1) between 30 June and 6 November, in the period 1993-1998. Trapping was conducted in the framework of joint project between Biological Station Rybachy (Russia) and Vogelwarte Radolfzell (Germany). In parallel, nest search was conducted and *pulli* of the Reed Warbler were ringed. Nestlings were ringed at the trapping site and at a reedbed area 20 km SW from the first place. Between these two sites, no reedbeds are available on the Courish Spit. Nest searches were done by Vladimir Fedorov, to whom we are much grateful for making his data available.

In parallel with the field work, juvenile Reed Warblers were taken from the nests on the Courish Spit and hand-raised in the natural photoperiod. Their locomotory activity was recorded from getting self-sufficient to the age of 60-80 days.

Fig. 1. Geographical localisation of the study area.

RESULTS

Field study of post-fledging movements

A total of 400 juvenile Reed Warblers ringed as *pulli* were subsequently mist-netted. Among them, 384 birds were hatched at the trapping site and its immediate vicinity, *i.e.* captured at their natal site. The age at the last capture varied between 25 and 59 days, mean – 40.2 days (SD = 6.9), median – 40 days. Frequency distribution of the age at the last capture is shown in Figure 2.

A proportion of Reed Warblers, especially those last captured at the age of 25-35 days, probably perished or escaped capture but remained at the study site (but see below). Nevertheless we suggest, that the age at last capture may be used as an estimate of the age when juveniles leave their natal site (*cf.* Sokolov 1976, 1981).

Twenty-two birds out of 384 (5.7%) were captured at the natal site completing post-juvenile moult or having completed it. Their age varied between 43 and 59 days, mean – 50.8 ± 4.2 days. Their average mass was 11.63 ± 1.12 g (N = 22). It was not significantly different from the average mass of all Reed Warblers at the last capture: 11.65 ± 0.77 g (N = 375). Reed Warblers having (nearly) completed moult carried significantly more fat. Fat scoring followed Kaiser (1993), ridit analysis (Fleiss 1980, Bardin 1998) was performed to compare distributions (r = 0.627 ± 0.061, z = 2.08, $p < 0.001$).

We suggest that the most important feature of these data is their large variation (Fig. 2). Even if we assume that the left part of the distribution represent birds that perished or escaped mist-nets, variation of the age at last capture is still over 20 days. Two peaks may be distinguished – at 38 and at 45 day. We believe that this variation is not of purely statistical nature, but reflects actual polymorphism in the age of leaving the natal site. Some birds leave it in the course of post-fledging dispersal, which may commence at different age, whereas others (a minor fraction) complete moult and start pre-migratory fattening at their natal site. Condition (moult stage and fat score) of birds leaving their natal area at different age also varies.

Apart from birds mist-netted at their natal site, 16 juvenile Reed Warblers were trapped 20 km NE from their hatching area. These birds moved to the opposite direction to their normal autumn migratory movements and were trapped during post-fledging dispersal. Their age varied between 33 and 50 days (Fig. 2), *i.e.* as early as at the age of 33 days a juvenile Reed Warbler may move 20 km from its hatching site. All these birds were in heavy moult, their average mass was 11.48 g (SD = 0.73, N = 16).

Experimental data

Nocturnal restlessness started rather early in both early- and late-hatched birds, at the average age 36.1 days (SD = 12.1, N = 17). The variation was 25 to 66 days.

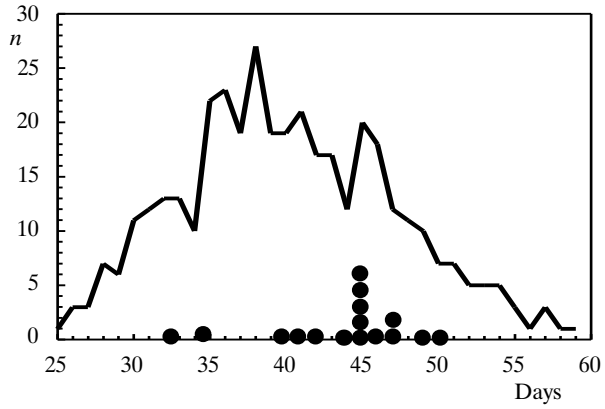

Fig. 2. Age of the last capture at the natal site (line – *n* individuals) and age of the capture after dispersal (dots – every dot is one individual).

In the bulk of birds the onset of nocturnal restlessness occurred before 42 days, with the level of nocturnal activity being lower than the level of diurnal locomotion. Nights with activity occurred sporadically. Two birds from early broods behaved differently: they started nocturnal activity at the age of 61 and 66 days, respectively, the level of activity was high from the very beginning (reaching diurnal level), with activity being recorded nearly every night. Excluding these two birds, the average age of starting nocturnal restlessness comprised 32.4 days (SD = 6.6, N = 15).

All experimental birds had the lowest mass over the study period at the age of 35-40 days (11.9 ± 0.6 g), whereas at the age of 60-65 days their mass reached 14.2 ± 1.8 g. At the age of 35-40 days Reed Warblers were in heavy moult, and at the age of 60-65 days they were completing moult or had completed it (mean age of finishing moult – 62.4 ± 3.5 days).

CONCLUSIONS

The time of onset of the weak nocturnal restlessness in caged Reed Warblers is in good accordance with the age when their free-living conspecifics leave the natal sites. We suggest that this nocturnal activity in caged individuals refers to actual movements of free-living birds. In two birds out of 17, this weak nocturnal restlessness was not recorded. They started classical migratory restlessness (Dolnik 1975; Berthold 1975, 1988) at the age of 61 and 66 days, respectively. This is in accordance with the field data (Fig. 2) suggesting that a minor fraction of juvenile Reed Warblers does not participate in post-fledging movements, but completes moult and starts fattening at the hatching site.

It has been suggested that juvenile dispersal of Reed Warblers may take place in the form of short nocturnal flights (Herremans 1990). Trapping first-year Reed Warblers taking off for nocturnal flights supports this hypothesis (Bolshakov *et al.*

2000). We suggest that post-fledging movements of Reed Warblers (and their lack in a fraction of the population) have endogenous basis which in caged birds may be recorded as a special type of nocturnal activity, *i.e*. dispersal restlessness.

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