WHY IS ARTIFICIAL GROUNDING OF MIGRATORY PASSERINES AT NIGHT RATHER UNSUCCESSFUL IN SOUTHERN AFRICA?

M Herremans

Senior Wildlife Biologist-Ornithologist, Department of Wildlife and National Parks, P O Box 131, Gaborone, BOTSWANA

INTRODUCTION

There has never been regular mass ringing of nocturnal long-distance migrants in southern Africa and we are in this part of the continent far from having anything similar to the exciting migration studies at Ngulia in Kenya or the Djoudj in Senegal. The knowledge and understanding of long-distance nocturnal migration is therefore dreadfully poor in southern Africa.

In the northern hemisphere, a few hundreds of thousands of nocturnal migrant passerines are now ringed each year after artificial induction of landfall by playing tape-lures overnight at random inland places. The method is widely applied in western Europe, particularly in Belgium (Herremans 1990a) where it was developed, and it works exceptionally well for the genera *Sylvia* and *Acrocephalus*. Other genera with species that migrate to southern Africa like *Phylloscopus*, *Muscicapa*, *Lanius*, *Hippolais*, *Luscinia*, *Ficedula*, *Locustella*, *Motacilla* and *Anthus* are less well explored, but many were also regular features in catches in Europe (Herremans 1990a). The method has been successfully deployed during autumn departure and post- or pre-breeding passage in western Europe, the western Mediterranean (*pers. comm.* D De Mesel), Asia Minor (*pers. comm.* D. Vangeluwe) and west and central Africa (*pers. comm.* E. Hoebrechts), but was generally experienced to be much less successful for birds arriving on the breeding grounds in Europe in spring (Herremans 1990a).

This paper reports on the rather disappointing results in the sub-Kalahari from what appears to be the first attempts to use artificial induction of landfall in southern Africa.

METHODS

In the hope of documenting phenology of arrival and departure of nocturnal migrant passerines near the Kalahari, and to be able to study migration strategies in selective samples of birds that had been active overnight (Herremans 1990b, 1991b), artificial induction of landfall was attempted in southeastern Botswana during the departure migration in March-April 1991 and arrival in November 1992-January 1993 with exactly the same equipment as used successfully before in Europe (Herremans 1989, 1990a, 1990b, 1991a).

From shortly after sunset the song of palearctic migrants was broadcast from looped cassettes at moderately amplified volume (*ca.* 7 watt) for the rest of the night. Up to three cassettes with a different species each were used over a distance of about 30 m. At dawn, the volume of the tapes was slightly reduced to attract the grounded birds into a few mistnets that were erected near the speakers. Two sites were used: i) in *Acacia tortilis* scrub at a farm 2 km from the southeastern end of the Gaborone Dam; and ii) in thick *Acacia* vegetation on a zone protruding into one of the sewage ponds of the Phakalane Sewage Works just to the north of Gaborone.

The method was used on six nights with clear skies during departure migration (four in late March and two in early April), playing tapes of Garden Warbler *Sylvia borin* (six nights), European Sedge Warbler *Acrocephalus schoenobaenus* (five nights), European Reed Warbler *A. scirpaceus* (five nights), European Marsh Warbler *A. palustris* (two nights) and Great Reed Warbler *A. arundinaceus* (one night).

Induction of landfall was tried on 13 nights with clear skies during arrival of nocturnal passerines (one in October, six in November, four in December and two in January), using tapes of European Reed Warbler (12 nights), Garden Warbler (7 nights), European Marsh Warbler (6 nights), Great Reed Warbler (four nights), European Sedge Warbler (four nights), Thrush Nightingale *Luscinia luscinia* (three nights), Icterine Warbler *Hippolais icterina* (one night), Willow Warbler *Phylloscopus trochilus* (one night) and Redbacked Shrike *Lanius collurio* (one night).

RESULTS

The results were poor by European standards. The six nights during departure migration only resulted in 20 European Sedge Warblers, eight African Marsh Warblers *A. scirpaceus baeticatus*, four European Marsh Warblers, three Garden Warblers and one Willow Warbler being caught.

The results were again very poor during the arrival of nocturnal migrants on the non-breeding grounds. Only 12 Great Reed Warblers, 7 European Sedge Warblers, 5 European Reed Warblers, 3 African Marsh Warblers, 4 European Marsh Warblers, 4 Whitethroats *Sylvia communis*, two Willow Warblers, one Icterine Warbler and one Cape Reed Warbler *Acrocephalus gracilirostris* were grounded and caught.

DISCUSSION

We can only speculate on the reasons for the poor success of artificial induction of landfall in the sub-Kalahari. Some possible causes are: 1) only a few long-distance passerine migrants were on the move over southeastern Botswana at the time of the experiments; 2) clear nights are favoured migration conditions in Europe, but may not be in southern Africa; 3) these otherwise nocturnal migrants become diurnal migrants towards the end of their journey in the southern hemisphere; 4) nocturnal migration occurs at a higher altitude in this part of the world, making the tapes less effective; 5) the birds are less responsive to tape-lures with their own song upon arrival at the non-breeding grounds.

Several of the palearctic migrants that were targeted in the exercise are reasonably common in southeastern Botswana during winter (Herremans 1993) and species like Icterine Warbler, Redbacked Shrike, Willow Warbler and Spotted Flycatcher *Muscicapa striata* are certainly more common during winter in the sub-Kalahari than on the breeding grounds in most of western Europe. Phenology records (Herremans *et. al* 1992) indicated that all species were arriving during the broad time scheme of the experiments and some acceptable success rate should have been achieved at some stage.

Many more birds are on the move during clear nights in Europe (which are rather infrequent) than during poor weather. In the dry sub-Kalahari most of the nights have brilliant clear skies, and if nocturnal migrants prefer these conditions also in the southern hemisphere, there will inevitably be a dilution effect each night if only because there are so many more perfect nights for migration. However, Sinclair (1978)

demonstrated that movements of most palearctic migrants are dependent on the movements of important rain fronts since only after the passage of such fronts is there a substantial flush in food abundance. Artificial grounding of migrants might therefore be more successful on nights with widespread storms, but the extremely violent nature of local thunder storms are not conducive to undertaking fieldwork with tape-lures and other capturing equipment.

The fact that some birds were grounded at night indicates that at least part of the migration takes place at night in this part of the world, but to demonstrate movements and arrival during the day will be far more difficult.

Nocturnal migrants adjust their flight altitude according to environmental temperatures. If the air were much warmer during migration in southern Africa than in Europe, migrants could be expected to fly higher. However, nights are generally cool in the sub-Kalahari ($<15°$ at ground level) during spring and autumn, when long-distance migrants arrive or depart. Most long-distance migrants leave Europe between July and September, when nights can be much warmer than during migration in the sub-Kalahari, and no consistent effects of night temperature on the total number of grounded birds has been established so far. Furthermore, the trapping sites in southeastern Botswana were situated at an altitude of just under 1 000 m and the tape-lures can easily be heard over two kilometres away in this acoustically unpolluted environment. The thesis of altitude can therefore be disregarded.

Upon arrival at the non-breeding grounds in southern Africa, most long-distance migrant passerines immediately defend individual territories, which are advertised by singing, even by the females (Kelsey 1989). During departure from the breeding grounds, and as passage migrants, most passerine species do not defend territories by singing, and song therefore probably constitutes a behavioural 'nonsense' message other than "here is a conspecific" during that period. The presence of conspecifics might be the easiest clue to a profitable habitat for birds when migrating over unknown country, and this might be the main reason why migrants are attracted to nocturnal song. Assessment of the habitat upon landing at night does clearly occur by nocturnal migrants (Herremans 1989, 1990a) and is probably a very important ability for survival during migration. The aspect of winter territoriality means that migrants upon arrival at the non-breeding grounds should rather be repulsed by the presence of a singing bird because such indicates that the place is already occupied. The situation compares to arrival at the breeding grounds in Europe, where the method of artificial induction of landfall is much less effective in spring than in autumn (Herremans 1990a), except for species for which we have considerable numbers of spring passage migrants from further afield (e.g. European Reed Warblers on their way to northern Europe in June, when local breeding visitors are well advanced with their first brood). The thesis of non-breeding territoriality being the main cause of reduced success of induced landfall, does not however, explain why interspecific response to the general vocal ambience created by the tapes, as widely experienced in the palearctic (Herremans 1990a), was not more pronounced in southern Africa.

It is probably significant therefore, that the catching success per night during departure migration in autumn was double that of arrival in spring in

Botswana. It is also interesting to note that the African Marsh Warbler, a species which is uncommon as a breeding visitor to southeastern Botswana, is so well represented in the samples; most of these birds might have been passage migrants from the Cape that were still/already several hundred kilometres from the destination or origin. The nocturnal grounding of a Cape Reed Warbler is also remarkable since this species is considered sedentary (Masterson 1991, Maclean 1993) and the individual caught was the very first to arrive at the sewage works. In southeastern Botswana the Cape Reed Warbler is, however, among the best colonizers of new sites among the swamp vegetation-dependent passerines. Experimental work might show this species to exert nocturnal restlessness associated with nocturnal dispersal, as known from other members of the genus (Merkel 1956, Herremans 1990b).

Under the above discussion, it can be hypothesized that artificial induction of landfall in southern Africa will be more effective the more it is applied away from the final wintering grounds. For many species with important non-breeding grounds in Namibia, Botswana and South Africa, the method can be predicted to be more effective in Zimbabwe, Zambia, Mozambique, Angola or Malawi.

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