Is there an autumn migration of continental Blackcaps (*Sylvia atricapilla*) into northern Europe?

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Abstract. Fransson, T., & B.-O. Stolt (1993): Is there an autumn migration of continental Blackcaps (*Sylvia atricapilla*) into northern Europe? – Vogelwarte 37: 89–95.

All ringing recoveries of Blackcaps *Sylvia atricapilla* from Northern Europe were examined for a northward autumn migration into this area. The result indicates that regular northward autumn movements of Continental Blackcaps into Northern Europe exist and that these Blackcaps originate from a wide area of Continental Europe. Northward movements were recorded for distances up to about 2000 km. At ringing localities in southern Fennoscandia as much as 9% of the Blackcaps, ringed and recovered during the same autumn, moved north of an E-W axis. This northward migration differs from juvenile dispersal in time and distance. Published records of Blackcaps reaching Iceland, Jan Mayen and the vicinity of Spitzbergen in late autumn further support the existence of a northward migration. Blackcaps are reported almost annually during winter in Scandinavia but there are no ringing recoveries indicating that these are local birds. All available facts indicate that the Blackcaps observed during winter in Northern Europe have a more southern origin, and that they occur there as a result of a northward autumn migration. The evidence we found suggests that the observed northward autumn migration is a result of movements along the normal axis of migration, but in a direction reversed 180° to the normal in autumn.

Keywords: Blackcap, migration.

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1. Introduction

Normally, migrants in Europe move southward (SW-SE) to winter in more benign conditions. Although southward migration may enhance survival prospects, individuals that stay in or near the breeding area may be better off regarding access to the best breeding sites in spring, if they manage to survive. In central Europe, Langslow (1979), Fourage (1981) and Schlenker (1981) found that a substantial part of the migrating Blackcaps *Sylvia atricapilla* moved northward during autumn. Leach (1981) reported large and increasing numbers of Blackcaps wintering in Britain and Ireland. Berthold & Terrill (1988) considered the autumn movement from the continent into Britain as a novel migratory trait and proposed hypotheses for the increase in this group relative to the population as a whole.

The standard direction of migrating Blackcaps leaving Northern Europe in autumn is between S and SSE (Zink 1973, Fransson, ms). Compared with other *Sylvia* species the Blackcaps set off for their winter quarters relatively late in autumn afdsyzesxaufsqassaesaysbujdsbbsejatories in southern Sweden is in late September (e. g. Enquist & Pettersson 1986). Further south in Europe the standard direction is SW for Blackcaps west of a migratory divide at about 12–15° E, and SE for those east of this zone (Berthold & Schlenker 1991).

Blackcaps are found almost annually during winter in Scandinavia but only in small numbers (Kolthoff & Jägerskiöld 1898, Haftorn 1971, SOF 1990). Considering recent findings regarding autumn movements of Blackcaps into Britain, we decided to examine all ringing recoveries from northern Europe in order to study whether there is also a corresponding northward autumn movement into this area.

2. Material and methods

Ringing recovery data for Blackcaps were obtained from Norway (up to 1987), Finland (up to 1990), Denmark (up to 1990) and Sweden (up to 1991). Data on Blackcaps recovered in these countries but ringed abroad were also obtained. The distances between ringing and recovery sites and the angular directions were calculated according to the orthodrome (great circle). For our analysis we included recoveries for which the following criteria were fullfilled: (1) Distance between ringing and recovery site at least 100 km. (2) Direction north of an E-W axis. (3) Time of recovery within the autumn or winter following directly upon the date of ringing. Altogether 31 recoveries fullfilled these criteria. The distribution of sex and age was: 11 males, 13 females and 7 individuals without information about sex. Specific information on age was available for 19 birds; of these, 18 were juveniles and one was adult. The recovery circumstances were: 14 caught by ringers and released, 8 found dead without specified finding details, 4 hit window, 2 road accidents, 2 taken by cat and 1 killed through hunting. We also searched the literature for autumn and winter observations at northern latitudes. The proportion of Blackcap recoveries indicating northward movements within northern Europe was compared with earlier results from Belgium (Fourage 1981).

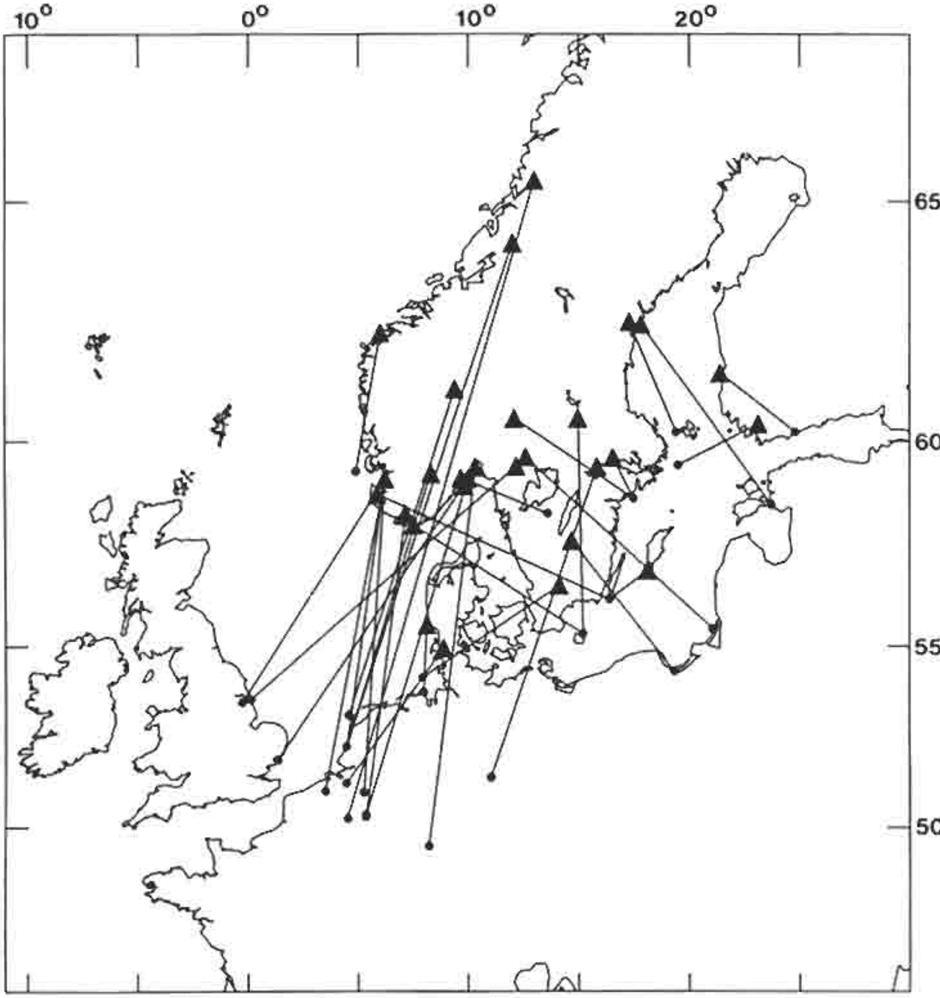

Fig. 1: Geographical distribution of northward autumn movements of ringed Blackcaps recovered in northern Europe. The birds were ringed during the period late July-October and recovered north of an E-W axis after less than three months.

3. Results

Areas of origin. The ringing sites for Blackcaps recovered after northward autumn movement are distributed from England in the west to Estonia in the east, with a concentration in Belgium and Holland (Fig. 1). Thus, a considerable part of the birds involved were ringed in and evidently originated from Continental Europe. Most of these Blackcaps were recovered in Norway (18) and Sweden (10). Considering the migratory divide to be at approximately 13°30'E, 17 of the Blackcaps were ringed west of this dividing line and 13 east of it. The southernmost ringing sites were between 49°N and 51°N and 19 (61%) of the Blackcaps were ringed outside Norway, Sweden, Denmark and Finland.

Out of 119 recovered Blackcaps ringed after 1 July in northern Europe and found later during the same season at a distance of more than 100 km from the ringing site, 9% (11) moved in directions north of an E-W axis. Most of these birds were ringed at bird observatories in southern Fennoscandia. Fouarge (1981) found that 35% of Blackcaps ringed in Belgium in autumn moved in a direction north of an E-W axis. The proportion of Blackcaps in Fennoscandia undertaking a northward movement is significantly lower than in Belgium ($\chi^2 = 19.73$, d. f. = 1, $p < 0.01$).

Directions. The angular direction of movement for different individuals varies between 294° (WNW) and 54° (ENE) (Fig. 2). Blackcaps ringed east of the migratory divide had mainly flown towards the NW and birds ringed west of the migratory divide mainly towards the NNE.

Time table. The northward movements of Blackcaps occurred mainly during the period September-November (Fig. 3). Both ringing dates and recoveries peaked during October.

Speed. The distance between ringing and recovery site varied between 117 km and 1953 km, the longest distance being between Namur in Belgium and Nordland in Norway. In 60% of the recoveries the distance exceeded 500 km. The average speed of northward movement, calculated for birds ringed after 20 August (n = 27), was 30.7 km d^{-1} and the fastest individual speed 58.5 km d^{-1}.

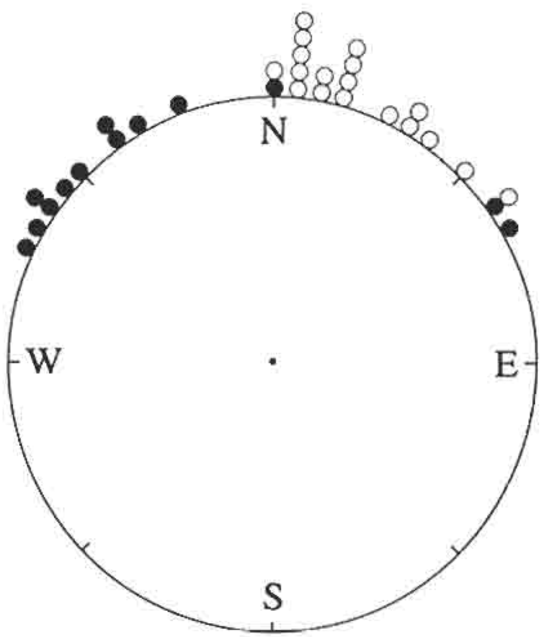

Fig. 2: Angular direction of northward autumn movements of Blackcaps recovered in northern Europe. Directions of birds ringed east of the migratory divide (13°30'E) are shown with filled symbols and directions of those ringed west of the migratory divide are shown with open symbols.

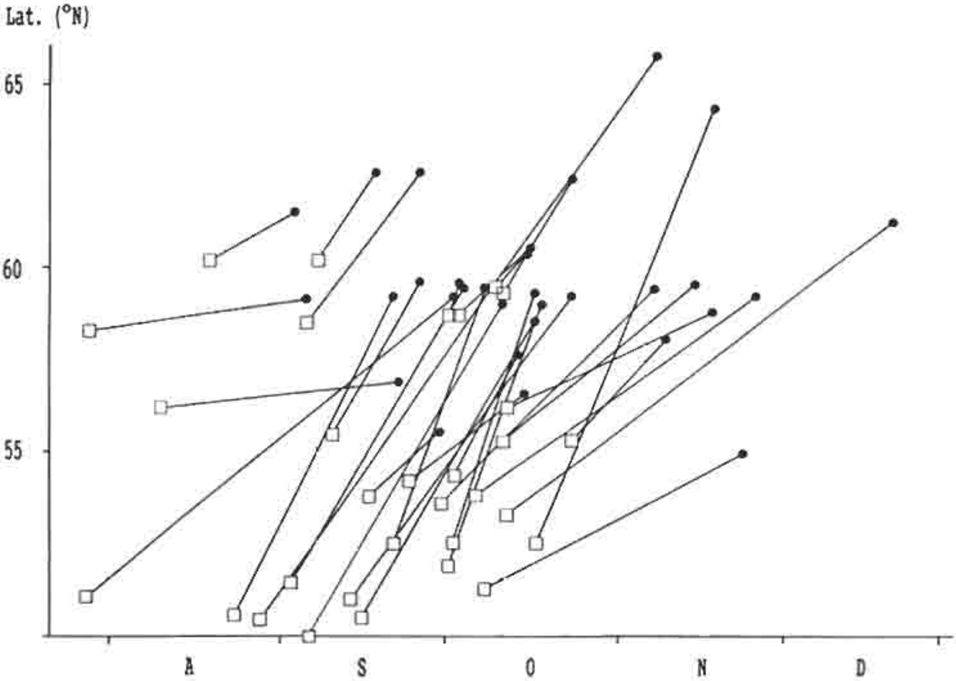

Fig. 3: The northward autumn movements of Blackcaps in Northern Europe distributed according to latitude and date. Ringing (□) and recovery (●) occasions are connected with lines.

4. Discussion

Blackcaps are found in Sweden almost every winter and observations have been reported from all winter months. November reports exist from areas as far north as 65°50'N (Holm 1971). In several cases birds have been observed at the same site, usually a bird table, for more than a month. Norström (1968) reported one case where a Blackcap stayed at a bird table at 60°30'N from November through the very cold winter of 1965–1966 with much snow. Wintering of Blackcaps at nothern latitudes seems to be more common in Norway than in Sweden (Haftorn 1971, SOF 1990). That there is a northward migration during autumn is further supported by the large number of Blackcaps reaching Iceland in late autumn (Pétursson & Olafsson 1988). From 1979–1985 no less than 357 Blackcaps were found in Iceland, mainly during October and November. One male ringed in Belgium on 3 September 1990 was found dead in Iceland on 31 October 1990 (Anon. 1991a). The direction of this movement is 328° (NNW) and the distance is 1862 km. Four Blackcaps have been found on Jan Mayen (71°N 9°W) in October (van Franeker et al. 1986), and one male in Greenland on 15 November 1916 (Salomonsen 1967). In the Spitzbergen area, a male was found in October at 72°58'N 15°08'E and a female in November at 77°49'N 11°26'E (Lambert 1989). To judge from published reports, e. g. the record of a Blackcap in Greenland in the autumn of 1916 and late autumn and winter records in Scandinavia more than 100 years ago (Nilsson 1858, Kolthoff & Jägerskiöld 1898), autumn migration of Blackcaps into northern Europe has probably occurred for a long time.

Evidently, migration in the Blackcap is not only for southern wintering sites but a substantial proportion of Blackcaps move north in autumn. This proportion of northward movements is, as far as we know, much higher than observed in other comparable passerine migrants (cf. recoveries listed in Reports on Swedish Bird Ringing for the years 1960–1990. Swedish Museum of Natural History. Stockholm). The observed difference between northern Europe (9%) and Belgium (35%) in the proportion of Blackcaps moving northward during autumn indicates that the phenomenon is more common in Continental populations than in Fennoscandian populations, although differences in human population density in recovery areas may lead to an underestimation in northern areas. The origin of the Blackcaps ringed at stopover sites in southern Fennoscandia and recovered further north in autumn may well have been on the Continent and they may have continued their northward migration after ringing. The scatter of the ringing sites over Continental Europe and England (Fig. 1) indicates that these northward-moving birds originate from a large part of central Europe and not from any small specific area of central Europe. The concentration of ringing sites found in Belgium and Holland may be a result of largescale intensive ringing of Blackcaps (cf. Anon. 1990 and 1991b).

There is no clear indication that Blackcaps observed in Fennoscandia during winter are local birds. Of Blackcaps ringed, only a few local recoveries during winter (December-March) are available (Fransson, ms). None of these birds was ringed during the breeding season, before 30 August, so the exact origin of these birds is not known. Therefore, it seems quite possible that most of the winter birds in Fennoscandia are there as a result of northward autumn movements.

How do these northward movements arise? Possible explanations include juvenile dispersal, variation in orientation and 180° reversed migration.

Langslow (1979) believes that northward autumn movements of Blackcaps from the Continent into Britain is part of the juvenile dispersal. Postbreeding dispersal of juvenile Blackcaps starts in July, shows no specific direction and usually involves distances less than 50 km (Bairlein 1978, Langslow 1979, Fouarge 1981). Juvenile dispersal takes place well before the start of the autumn migration, which occurs in late August or early September (Berthold and Schlenker 1991). The average speed of the northward movements (31 km d^{-1}) found in the present study was higher than we would expect for dispersal movements of juvenile birds. It was, however, much slower than the corresponding speed in the standard (southward) direction calculated from recoveries of Blackcaps ringed in northern Europe (61 km d^{-1}) but only slightly slower than that calculated from recoveries of Blackcaps ringed in Great Britain (43 km d^{-1}) (Fransson, ms). We conclude that the observed northward autumn movement of Blackcaps into northern Europe clearly differs in time and distance from what we usually mean by postbreeding dispersal of juvenile birds.

Within short-distance migratory populations of Blackcaps with a wide-angle orientation, northward movements might occur as a part of the individual variation in orientation. The difference between Continental Europe and northern Europe in the proportion of northward movements might then be explained by the fact that North European populations to a greater extent are comprised of long-distance migrants that are supposed to have a narrow-angle orientation (cf. Alerstam 1990) and hence a smaller amount of variation.

Another possibility is that some individuals migrate in a direction reversed 180° compared with the standard direction of the population. Such reversed migration has been proposed to be responsible for northward autumn movements of Yellow-breasted Chats *Icteria virens* in North America (Baird et al. 1959) and of rare migrants from Asia into Europe during autumn (Nisbet 1962, Raböl 1969, 1976). Baird et al. (1959) and Nisbet (1962) suggest that reversed movements are induced by certain weather conditions. Alerstam (1990) suggests that 180°-misorientation may be a result of polarity errors or endogenous spring/autumn ambiguity.

Ringing recoveries from the area east of the Baltic and from the British Isles are not treated in this paper. Therefore we do not have any complete picture of the distribution of migratory directions of birds from different populations. However, it seems clear that birds ringed west of the migratory divide move preferentially either NNE towards Norway (Figs. 1 and 2) or WNW towards the British Isles (Langslow 1979, Fourage 1981), but less often ENE towards southern Sweden. The NNE movement might be explained as a reversed movement of birds with a SSW autumn standard direction. In the same way the NW directed movements across the Baltic-Sea into Sweden (Figs. 1 and 2) may be regarded as reversed movements of birds with a SE standard direction. Most of these birds obviously fly along the „normal" axis of migration of their respective population, but the direction they move along this axis has been reversed, whereby they migrate in a vernal direction in the autumn. An interesting question is whether the origin of the Blackcaps reaching Iceland is to be found east of the migratory divide, and if these movements, consequently, could be regarded as reversed migration of individuals from a population with a SE standard direction. Taken together, our data indicate that the observed northward autumn migration is a result of movements reversed 180° to the normal during autumn.

How can this behaviour survive? Because there is strong evidence that the preferred migratory direction is heritable (Berthold 1988, Helbig 1991, Berthold and Helbig 1992, Berthold et al. 1992), an essential question is how the northward autumn movements can survive within European populations of Blackcaps if they are orientation errors. That these movements occur in a relatively large proportion and the fact that Blackcaps can manage to winter at northern latitudes, indicate that there is not a complete selection against this behaviour. Evidently, some of the individuals involved do survive and hence will reproduce. It would be very interesting if some of these birds could be captured and tested in orientation experiments in autumn and spring, as well as in breeding experiments, to explore the heritability of the trait.

Berthold and Terrill (1988) suggested that migration of Blackcaps into the British Isles from breeding grounds in Central Europe, previously selected against, has been strongly selected for during recent decades. This movement is hypothetically thought to be a result of a widening of the traditional direction of migration (SW) somewhat to the north. Increased winter survival due to artificial feeding as well as shorter and earlier migration, and earlier reproduction of these birds compared with those migrating to traditional wintering areas, have been proposed as factors underlying the evolution of this migratory trait (Berthold and Terrill 1988, Terrill and Berthold 1990). Our result indicates that some part of the Continental population regularly migrates northward to winter in the western part of Scandinavia as well, and we find it likely that individuals managing to survive may have migratory as well as reproductive advantages in the same way as suggested by Terrill and Berthold (1990).

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References

Alerstam, T. (1990): Ecological causes and consequences of bird orientation. Experientia 46: 405–415. * Anonymous, (1990): Bilan pour l'annee 1989. B.U.B.O. 5: 63–65. * Anonymous, (1991a) Selection de Reprises. B.U.B.O. 6: 11–12. – * Anonymous, (1991b): Bilan pour l'annee 1990. B.U.B.O 6: 20–21. * Bairlein, F. (1978): Über die Biologie einer sydwestdeutschen Population der Mönchsgrasmücke (*Sylvia atricapilla*). J. Orn. 119: 14–51. * Baird, J., Bagg, A. M., Nisbet, I. C. T. & Robbins, C. S. (1959): Operation Recovery – report on mist-netting along the Atlantic coast in 1958. Bird-Banding 30: 143–171. * Berthold, P. (1988): Evolutionary aspects of migratory behaviour in European warblers., J. evol. Biol. 1: 195–209. * Berthold, P. & Schlenker, R. (1991): *Sylvia atricapilla* – Mönchsgrasmücke. In: Glutz von Blotzheim, U. N. (ed.). Handbuch der Vögel Mitteleuropas. Band 12/II, pp. 949–1020. * Berthold, P. & Terril, S. B. (1988): Migratory behaviour and population growth of Blackcaps wintering in Britain and Ireland: some hypotheses. Ring. & Migr. 9: 153–159. * Berthold, P. & Helbig, A. J. (1992): The genetics of bird migration: stimulus, timing, and direction. Ibis 134 suppl. 1: 35–40. * Berthold, P., Helbig, A. J., Mohr, G. & Querner, U. (1992): Rapid microevolution of migratory behaviour in a wild bird species. Nature 360: 668–670. * Enquist, M. & Pettersson, J. (1986): The timing of migration in 104 bird species at Ottenby – an analysis based on 39 years trapping data. (In Swedish with English summary). Special report from Ottenby Bird Observatory no 8. ✻ Fouarge, J. (1981): La Fauvette à tête noire (*Sylvia atricapilla*). Exploitation des données Belges de baguage. Le Gerfaut 71: 677–716. ✻ v. Franeker, J., Camphuijsen, K. & Mehlum, F. (1986): Status over Jan Mayens fugler. Vår Fuglefauna 9: 145–158. ✻ Haftorn, S. (1971): Norges Fugler. Oslo-Bergen-Tromsö. ✻ Helbig, A. J. (1991): Inheritance of migratory direction in a bird species: a cross-breeding experiment with SE- and SW-migrating blackcaps (*Sylvia atricapilla*). Behav. Ecol. Sociobiol. 28: 9–12. ✻ Holm (1971): Om fågelfaunan i Norrbottens län. Norrbottens Natur 26 (2): 1–175. ✻ Kolthoff, G. & Jägerskiöld, L. A. (1898): Nordens fåglar. Stockholm. ✻ Lambert, K. (1984): Ornithologische Beobachtungen im Europäischen Nordmeer (Barentssee-Svalbard-Jan Mayen). Beitr. Vogelkd. 30: 284–296. ✻ Langslow, D. R. (1979): Movements of Blackcaps ringed in Britain and Ireland. Bird Study 26: 239–252. ✻ Leach, I. H. (1981): Wintering Blackcaps in Britain and Ireland. Bird Study 28: 5–14. ✻ Nilsson, S. (1858): Skandinavisk fauna. Foglarna, första bandet. 3rd ed. ✻ Nisbet, I. C. T. (1962): South-eastern rarities at Fair Isle. Brit. Birds 55: 74–86. ✻ Norström, S. (1968): Rapport över fågellivet i Dalarna 1962–1965. Vår Fågelvärld 27: 174–183. ✻ Péturrsson, G. & Olafsson, E. (1988): Sjaldgaefir fuglar á Islandi 1985. (Rare birds in Iceland in 1985). Bliki 6 (1988): 33–68. ✻ Raböl, J. (1969): Reversed migration as the cause of westward vagrancy by four *Phyloscopus* warblers. Brit. Birds 62: 89–92. ✻ Raböl, J. (1976): The orientation of Palla's leaf warbler *Phylloscopus proregulus* in Europe. Dansk orn. Foren. Tidsskr. 70: 5–16. ✻ Salomonsen, F. (1967): Fuglene på Grönland. Köbenhavn. ✻ Schlenker, R. (1981): Verlagerung der Zugwege von Teilen der sudwestdeutschen und österreichischen Mönchsgrasmücken (*Sylvia atricapilla*). Population. Ökol. Vogel 3: 314–318. ✻ SOF (1990): Sveriges Fåglar. 2nd ed. Sveriges Ornitologiska Förening, Stockholm. ✻ Terrill, S. B. & Berthold, P. (1990): Ecophysiological aspects of rapid population growth in a novel migratory blackcap (*Sylvia atricapilla*) population: an experimental approach. Oecologia 85: 266–270. ✻ Zink, G. (1973): Der Zug europäischer Singvögel. Ein Atlas der Wiederfunde beringter Vögel. 1. Lieferung. Herausgegeben von der Vogelwarte Radolfzell am Max-Planck-Institut für Verhaltensphysiologie.