Proceedings of the Zoological Institute RAS
Vol. 314, No. 1, 2010, pp. 58–66

УДК 598.296.1: 591.543.43

AUTUMN MIGRATION SPEED OF THE CHAFFINCH (*FRINGILLA COELEBS* L.) MIGRATING ACROSS EUROPE AS SHOWN BY RINGING RESULTS IN EASTERN BALTIC

V.A. Payevsky

Zoological Institute of the Russian Academy of sciences, Universitetskaya Emb. 1, 199034 Saint Petersburg, Russia;
e-mail: payevsky@zin.ru

ABSTRACT

An analysis of the speed of autumn migration is based on 224 ringing recoveries selected from 1866 recoveries of the Chaffinch caught in 1957–1997 at the Rybachy Biological station on the Courish Spit, Eastern Baltic. It was found that in all individuals pooled the migration speed varies between 20.0 and 284.8 km·day $^{-1}$ and the average speed is 53.5 km·day $^{-1}$. No significant differences in migration speed were found among different years and between males and females (aged and not aged pooled). Adults migrate significantly faster than first-year birds. Weak correlation between migration distance and speed of movement in all Chaffinches analyzed and higher speed of adults wintering further south than first-year birds implies the tendency to faster speed in birds traveled farther. No difference in migration speed was found between early- and late-migrating individuals, in contrast to findings in many other migratory species.

Key words: Autumn migration, Chaffinch, *Fringilla coelebs*, migration speed

СКОРОСТЬ ОСЕННЕЙ МИГРАЦИИ ЗЯБЛИКА (*FRINGILLA COELEBS* L.) В ЕВРОПЕ ПО РЕЗУЛЬТАТАМ КОЛЬЦЕВАНИЯ В ВОСТОЧНОЙ ПРИБАЛТИКЕ

В.А. Паевский

Зоологический институт Российской академии наук, Университетская наб. 1, 199034 Санкт-Петербург, Россия;
e-mail: payevsky@zin.ru

РЕЗЮМЕ

Скорость осеннего миграционного передвижения зяблика была проанализирована на основе 224 из 1866 находок особей этого вида, окольцованных в течение 1957–1997 гг. сотрудниками Биологической станции «Рыбачий» Зоологического института РАН на Куршской косе (Восточная Прибалтика). Было установлено, что скорость миграции варьирует от 20 до 284.8 км в сутки, составляя в общем среднем 53.5 км в сутки. Не найдено достоверных различий скорости в разные годы и между самцами и самками. Взрослые птицы мигрировали достоверно быстрее молодых. Обнаружена слабая корреляция между преодоленным расстоянием и скоростью передвижения, и эта тенденция подтверждается более дальними зимовками взрослых птиц, мигрирующих быстрее молодых. Никаких различий в скорости миграций не обнаружено между особями, летящими рано или поздно в сезон миграции, что противоречит известным в этом отношении результатам у многих других видов мигрирующих птиц.

Ключевые слова: осенняя миграция, зяблик, *Fringilla coelebs*, скорость миграции

INTRODUCTION

Estimating of migration speed is essential part of studying avian seasonal movements. Speed of migration, generally speaking, may be considered as a factor limiting the possible distance between breeding and wintering areas. Some recent studies suggest that migration speed may have a vital selective importance, because time saving leads to optimal organization of annual cycle of birds (McNamara et al. 1998; Alerstam 2003). On the other hand, a great number of factors in real natural conditions like weather, time of stopovers, stopover site quality, rate of fuel deposition, and competition influence the speed of migration.

Migration speed is commonly estimated either through ringing recoveries or by the comparing timing of occurrence of birds at different stopover sites across the known migratory routes. Although the latter way becomes more commonly used, so far there is only one comparison study to test its feasibility (Ellegren 1990). It may be safely suggested that estimates of migratory speed based on ringing recoveries are more reliable (provided a sufficient number of recoveries).

Migration strategy of long-distance nocturnal migrants wintering in Africa is one of the most extensively studied topics (Hyytiä and Vikberg 1973; Bibby and Green 1981; Fransson 1985, 1995; Ellegren 1990, 1993; Bairlein 1992; Chernetsov 1996; Alerstam 2003; Yohannes et al. 2009). Migration speed of short-distance diurnal migrants wintering in Europe was studied to a smaller degree (Hilden and Saurola 1982; Ellegren 1993; Nowakowski and Chruściel 2004; Payevsky et al. 2005; Bojarinova et al. 2008). The Chaffinch from the finches family (Fringillidae: Passeriformes) is one of the commonest and most widespread passerine species across all of its Eurasian range. Its numbers in the East European plain are second to none, reaching 12% of the pooled numbers of all birds (Ravkin and Ravkin 2005). The winter quarters of the Chaffinch occupy almost the whole western Europe (Payevsky 1973). Detailed studies in the Chaffinch population ecology are summarised in the monograph on this species (Dolnik et al. 1982). The speed of Chaffinch migration estimated from birds ringed until 1970 in the Eastern Baltic (Payevsky 1973) has been mentioned in this book. These estimates, however, were based on a limited dataset, 88 recoveries only. During the subsequent years the number of recoveries increased greatly, and this is the reason for making new estimates based on all data on migration speed.

The aim of the study is to analyze the speed of autumn movements of the Chaffinch, considering spatial and temporal differences as well as the differences between sex and age classes. Moreover, the comparison of these results with the similar data on other bird species, long- as well as short-distance migrants, is of special interest.

MATERIAL AND METHODS

Migratory route of many bird species, including the Chaffinch, from the populations of north-western Russia and Finland goes through the Eastern Baltic. One of segments of this route is the Courish (or Curonian) Spit in Kaliningrad Region. The continued massive bird trapping on the Courish Spit in the south-eastern corner of the Baltic Sea provides a large data set concerning migrating birds.

Birds have been trapped and ringed since 1956 until present by the staff of the Biological Station Rybachy of the Zoological Institute from April until November at two sites on the Courish Spit: at the permanent Fringilla field station (55°05´ N, 20°44´ E) and at the Rybachy field site on Rossitten Cape (55°09´ N, 20°51´ E). At Fringilla the birds are trapped in stationary Rybachy-type funnel traps (for a detailed description of the traps see Payevsky 2000), and at Rybachy site birds are mist-netted since 1993.

All trapped birds were examined, measured, sexed and aged using plumage characteristics, moult and wear after Svensson (1970, 1992) with our additions (Vinogradova et al. 1976). Identification of age in migratory Chaffinch has become possible since1971; as a result many recovered birds sexed only.

The lists of recoveries of birds ringed on the Courish Spit in 1956-1970 (Payevsky 1973) and in 1956–1997 (Bolshakov et al. 2001) are published. In these publications all recoveries available are given with the following information: ringing and recovery dates, sex and age of birds, site and coordinates of recoveries, circumstances of recovery, time elapsed between ringing and recovery dates in days, and the direction of movement in degrees. All these data were used for the analysis of migration speed. The recoveries in recent years, including the published ones, were not used for the reason of their small number. This is explained by the fact that the Chaffinch recovery rate declined over the two last decades from 0.8 to 0.2% (Payevsky 2009). The reasons for this should lie in some changes at migratory stopover sites and in winter quarters that influence the contacts between birds and humans. It is possible also that after the implementation of legislation limiting commercial bird fowling in some European countries, the fowlers ceased to report the rings they find (McCulloch et al. 1992).

A total of 646,977 Chaffinches were caught and ringed during 41 years, 1957–1997, and these birds produced 1866 long-distance recoveries. From this amount I analyzed 225 recoveries only to exclude all unreliable data. I used autumn recoveries that fulfilled the following criteria (Hildén and Saurola 1982, with some changes): 1) ringing and recovery dates are within the normal migration period of Chaffinch, i.e. September – November; 2) time elapsed from ringing to recovery does not exceed 60 days; 3) the distance between ringing and recovery is at least 50 km; 4) the speed exceeds 10 km·day $^{-1}$; 5) in the moment of recovery the bird is alive, including sick and wounded individuals.

The individual migration speed was calculated by dividing the distance (D) between ringing and recovery sites by the time elapsed (t). The average speed was calculated as $(\Sigma D/t)/n$. From 225 values of migration speed one value, 573.5 km·day $^{-1}$, was excluded as potentially erroneous. Such migration speed provided flight speed of Chaffinch as 39–44 km·hour $^{-1}$ (Alerstam 1990) implies non-stop movement during two complete days, and this is an unlikely situation. The statistical analysis was performed using software package SPSS12.

RESULTS

According to ring recoveries, migrating Chaffinches overwinter widely across western Europe, from France to Spain, Portugal, and Italy (Fig. 1). The recoveries used for the speed estimation were from different European countries. Their distribution shows a peak at mean distance 1000–1200 km from the place of ringing (Fig. 2), and this is due mainly to intensive trapping of songbirds in Belgium during 1950s–1960s.

The distribution of all speed values in the range 20.0–284.8 is given in Fig. 3. This distribution closely resembles Raleigh distribution which approximates moderately skewed variation series. Testing for normality by Kolmogorov-Smirnov Z-test shows a significant deviation from normality ($Z = 2.24$, σ 27.3, $p = 0.00$, $n = 224$).

For proper accounting of the migration speed, the relationship between the speed and time elapsed from ringing to recovery date should be presented (Fig. 4). Short-term recoveries may distort the estimates because of failure to take into account the time spent at stopover sites. On the other hand, a limitation should be in use for the long-term recoveries when the time exceeds two autumn months. As illustrated in Fig. 4, most speed values (25–80 km·day $^{-1}$) cluster between 20 and 50 days of elapsed time. So, the total average migration speed, 53.5 km·day $^{-1}$ (Table 1), seems a plausible estimate. This estimate is similar to average migration speed of this species and for related granivorous species found for birds ringed in Finland (41–63 km·day $^{-1}$, Hilden and Saurola 1982). In order to test for persistency of migration speed in different years as well as in males and females and for different parts of the migration route, all values were accordingly grouped (table 1). Testing for normal distribution in each of the nine groups showed a deviation from normal distribution (Kolmogorov-Smirnov test: $Z = 1.43$, σ 46.1, $p = 0.03$, $n = 31$) only in one group (1959–1962). Distributions of the remaining eight groups were normal ($Z = 0.59$–0.97, σ 16.5–25.2, $p = 0.31$–0.87, $n = 13$–39).

Comparison of migration speed in different years (nine groups of years, Table 1) reveals no significant difference (Kruskal-Wallis H test: $\chi^2 = 6.10$, df 8, $p = 0.64$). The range of average values in these periods was small (46.0–57.4), without any trend. Thus, the data were pooled for further analysis.

Of all 224 recoveries available, 102 refer to birds recovered in Belgium, 43 in France, 25 in Spain, 24 in Italy, and 30 in other countries. Average speed in four of these groups (Table 1) suggests some differences. Migration speed of these groups of birds significantly differed (Kruskal-Wallis H test: $\chi^2 = 16.75$, df 3, $p = 0.001$). Pairwise comparison by Mann-Whitney U-test reveals that the recoveries from Spain indicate a higher speed than recoveries from Belgium ($U = 734.0$, $p = 0.001$) and from Italy ($U = 135.5$, $p = 0.001$), whereas no difference was found in this respect between birds recovered in Belgium vs France ($U = 1918.0$, $p = 0.234$) and in Belgium vs Italy ($U = 953.0$, $p = 0.093$).

It seems reasonable to believe that the revealed difference is related to distance between ringing and

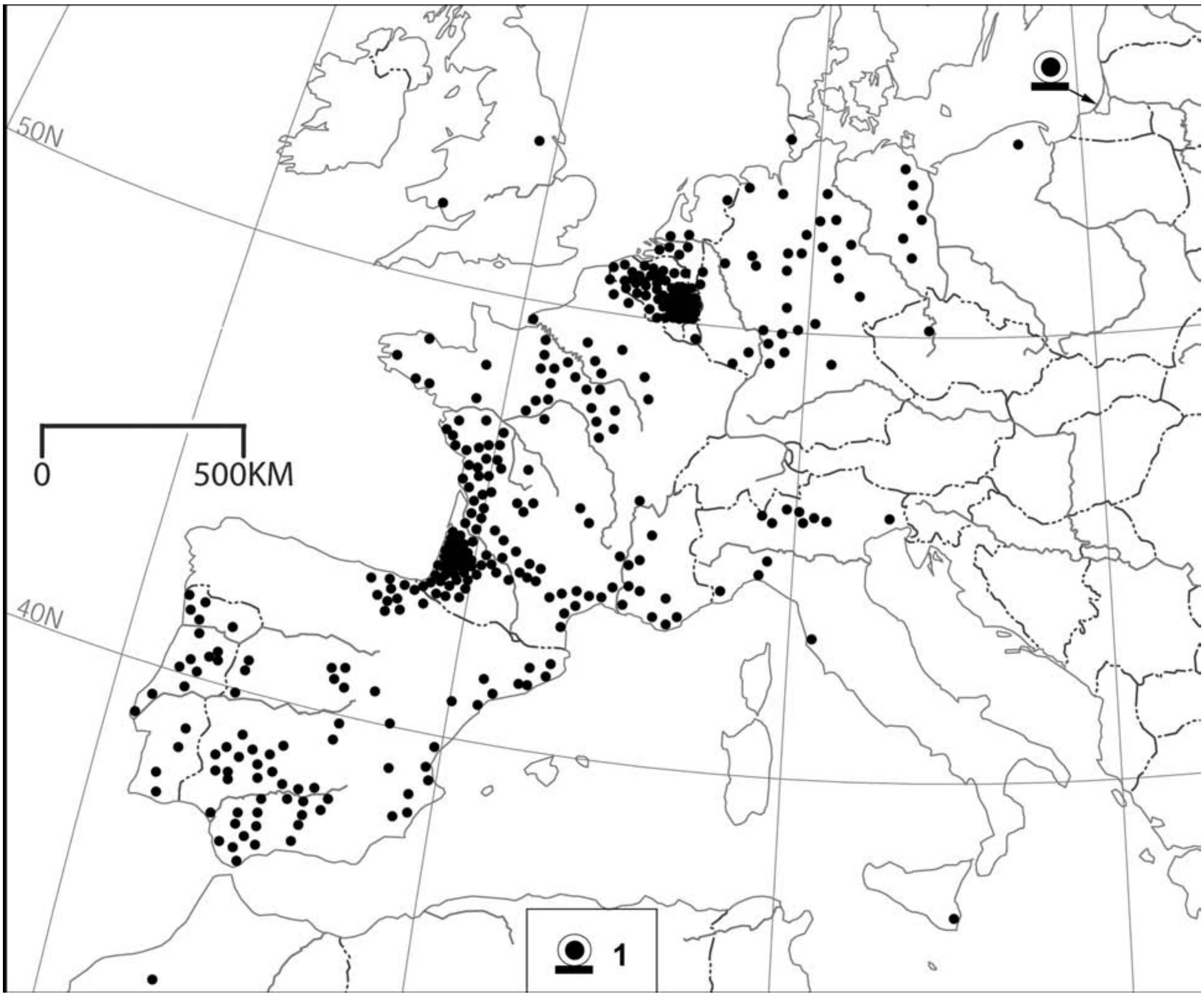

Fig. 1. Recovery sites during autumn passage and wintering of ringed Chaffinch migrating through the Courish Spit (after Payevsky 1973). Each dot is a recovery site; 1 – site of ringing.

recovery sites. To test this assumption, I calculated correlation between distance traveled and migration speed in all 224 birds analyzed. The correlation found was rather weak (Spearman rank correlation, r_s = 0.214, n = 224, p < 0.01).

In order to investigate whether a correlation exists between the time of migration and migration speed I used ringing dates (dates from 15 September to 28 October performed in the number series). However, no correlation was found (Spearman rank correlation, r_s = –0.02, n = 224, ns).

Apparent difference between average migration speed in males and females (50.7 and 57.5 km·day $^{-1}$, respectively, Table 1) is not significant (Mann-Whitney test: U = 5370.0, Z = –1.51, ns; Student's t-test: t = –1.84, df = 222, ns).

The possible influence of age on migration speed was tested in 79 birds only, categorized according to four age/sex classes (Table 2). Migration speed in these classes differed significantly (Kruskal-Wallis H test: χ^2 = 9.32, df = 3, p < 0.05). Mann-Whitney U test showed that the difference is due to age-related migratory speed (U = 446.5, p = 0.002): adult individuals migrate faster (59.6 km·day $^{-1}$) than hatching-year birds (45.7 km·day $^{-1}$).

Table 1. Speed of migration (km·day $^{-1}$) in Chaffinches ringed during autumn migration on the Courish Spit (Eastern Baltic) and recovered during the same autumn in western Europe.

Years	Sex of birds	n	Range of speed values	Average speed of the birds, recovered in:				Average speed
				Belgium	France	Spain	Italy	
1957–1958	♂♂	12	28.8–91.6					47.1 ± 5.2
	♀♀	6	20.5–61.4					43.8 ± 5.9
	♂♂+♀♀	18	20.5–91.6	47.9	46.2	–	–	46.0 ± 3.9
1959–1962	♂♂	13	30.9–72.4					46.1 ± 3.1
	♀♀	18	23.1–284.8					65.6 ± 13.9
	♂♂+♀♀	31	23.1–284.8	65.3	53.0	75.8	–	57.4 ± 8.3
1963	♂♂	15	29.6–80.0					51.9 ± 3.9
	♀♀	14	41.1–140.8					61.6 ± 7.5
	♂♂+♀♀	29	29.6–140.8	56.6	46.3	–	–	56.6 ± 4.2
1964–1966	♂♂	26	20.0–124.6					54.0 ± 5.2
	♀♀	13	25.8–92.1					55.3 ± 6.4
	♂♂+♀♀	39	20.0–124.6	54.7	58.7	65.9	47.7	54.4 ± 4.0
1967–1968	♂♂	23	26.7–91.0					52.3 ± 3.9
	♀♀	15	31.7–143.5					57.8 ± 6.8
	♂♂+♀♀	38	26.7–143.5	56.6	42.6	78.7	–	54.5 ± 3.6
1969–1973	♂♂	13	23.0–120.1					46.8 ± 6.9
	♀♀	6	22.4–94.6					50.5 ± 10.8
	♂♂+♀♀	19	22.4–120.1	52.5	55.9	–	36.6	48.0 ± 5.6
1974–1979	♂♂	9	27.6–92.0					51.5 ± 6.8
	♀♀	10	27.4–154.8					61.5 ± 11.5
	♂♂+♀♀	19	27.4–154.8	–	37.4	–	58.6	56.7 ± 6.8
1980–1982	♂♂	11	20.1–95.8					48.4 ± 6.4
	♀♀	7	28.4–76.2					51.6 ± 7.1
	♂♂+♀♀	18	20.1–95.8	–	52.5	59.2	57.4	49.6 ± 4.7
1983–1995	♂♂	9	22.0–101.1					54.2 ± 8.3
	♀♀	4	30.9–55.2					43.5 ± 5.1
	♂♂+♀♀	13	22.0–101.1	44.1	–	73.2	–	50.9 ± 6.0
1957–1995	♂♂	131	20.0–124.6					50.7 ± 1.8
	♀♀	93	20.5–284.8					57.5 ± 3.6
Total	♂♂+♀♀	224	20.0–284.8	55.8	49.9	68.1	49.2	53.5 ± 1.8

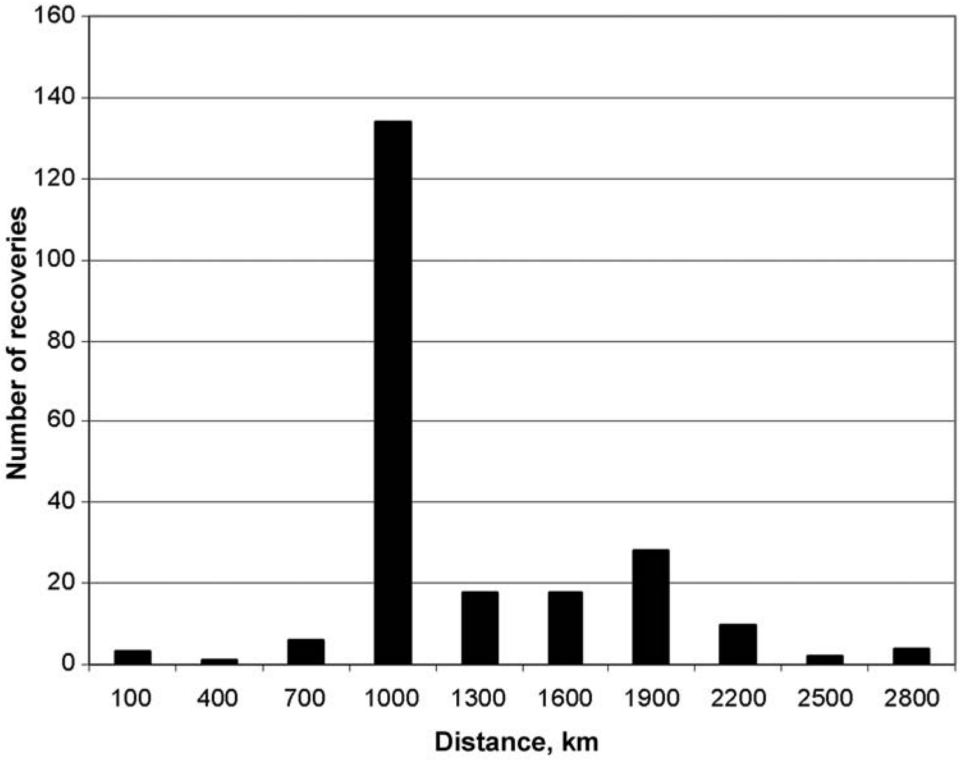

Fig. 2. Frequency distribution of recovery distances in birds used for speed estimation.

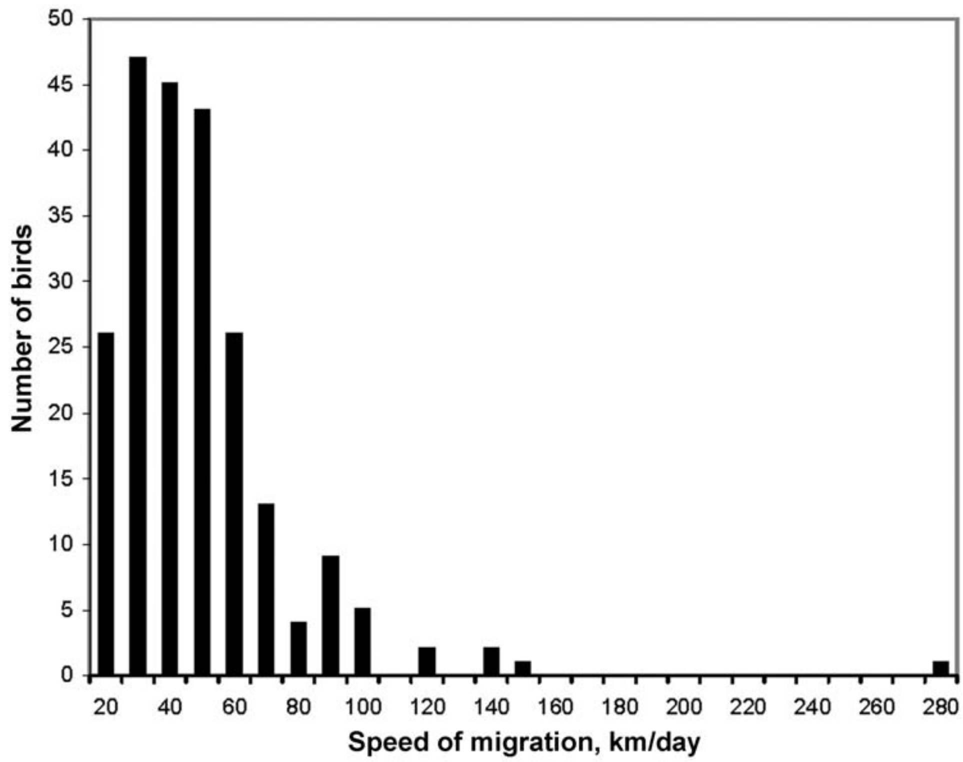

Fig. 3. Frequency distribution of migration speed in the Chaffinch.

Table 2. Speed of migration (km·day $^{-1}$) in different age and sex classes of the Chaffinch.

Age and sex of birds	n	Range of speed values	Average speed
Adult males	14	23.0–92.0	58.9 ± 5.2
Adult females	18	22.4–154.8	60.1 ± 6.6
Immature males	29	20.1–101.1	46.0 ± 3.7
Immature females	18	25.8–94.6	45.1 ± 4.1
Total adult birds	32	22.4–154.8	59.6 ± 4.3
Total immature birds	47	20.1–101.1	45.7 ± 2.7

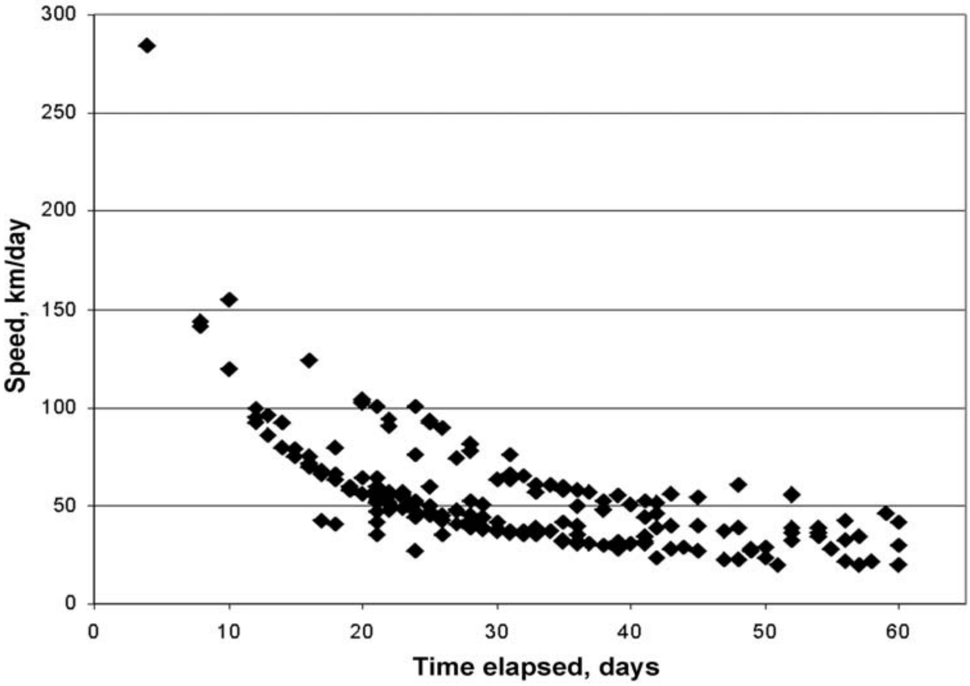

Fig. 4. Relationship between individual migration speed and time elapsed from ringing to recovery date in the Chaffinch.

DISCUSSION

This study was aimed to elucidate intraspecific variation in autumn migration speed in relation to seasonal timing, traveled distance, sex and age of Chaffinches. The results obtained show that the only age-related difference in the speed of migration movements of this species is significant: adults seemed to migrate faster than immature birds. No significant differences in migration speed were found between males and females (aged and not aged pooled), even though at first glance seems that females migrated faster than males (57.5 vs 50.7 km·day $^{-1}$).

Previously I demonstrated (Payevsky 1995, 2009) that female Chaffinches spend their winter on average further south than males, and as this takes place, adult males spend winter further south than immature males, but females showed no age-related difference. Such patterns have been shown from recoveries in many other species. Three main hypotheses have been proposed to explain the intra-species variation in winter distribution (Ketterson and Nolan 1983; Newton 2008). The 'Social Dominance Hypothesis' suggests that males and adults of both sexes dominate females and juveniles and displace them to poorer wintering areas to avoid competition in the optimal areas. The 'Body Size Hypothesis' assumed that males may winter in colder and more unpredictable regions, i.e. further north, than females, because they are larger and stronger. The 'Arrival Time Hypothesis' suggests that selection favours wintering of males closer to the breeding areas than is necessary for females, because males need to occupy breeding territories in spring as soon as possible. These hypotheses are not mutually exclusive, and it cannot be ruled out that in different species a combination of these potential explanations can determine winter distribution. The above hypotheses are only partly supported by our results for the Chaffinch. Based on these data, it may be suggested that the greater migration route is (as in females and adult males vs immature males), the higher is the speed of movement.

Actually, this is supported by comparison of birds found in different countries: recoveries from Spain indicate a higher speed than recoveries from Belgium and from Italy. However, no difference was found in this respect between birds recovered in Belgium vs. France. It may be suggested that the speed is not accelerated along the migration distance. The weak correlation nevertheless, between migration distance and speed of movement in all birds analyzed and the higher speed of adult birds wintering further south than immature birds implies the significant tendency to faster speed in birds that travel farther.

Studies of other bird species, predominantly of passerines with tropical winter quarters, show a significant increase in migration speed with increasing distance (Ellegren 1990, 1993). Comparative estimates of distance-time association for long- and short-distance migrants show a significant acceleration of migration in the former and only a tendency of minor acceleration in the latter ones (Alerstam 2003). There is a wide variation, of course, among short-distance migrants in this respect. As an example, migration speed of Goldcrest (*Regulus regulus*) tended to decrease from the north to the south both along the coast and across the sea (Bojarinova et al. 2008). In the Blue Tit (*Parus caeruleus*), which is the slowest migrant in Europe, no differences were found between speed in different parts of the migration route (Nowakowski and Chruściel 2004).

As to seasonal timing of migration speed, I found no difference between early- and late-migrating Chaffinches. This is at variance with the findings in many short- as well as long-distance migratory species. Late passerine migrants attain higher speed than early conspecifics (Ellegren 1993; Fransson 1995; Bojarinova et al. 2008). The movement behaviour thus may be under selection to minimize time on migration. A question remains unsolved why this is not true for the Chaffinch.

In the two recent decades many ornithologists agree that migration strategy is shaped by the fact that migratory birds adjust their movements regarding energy, time and predation risk (Alerstam and Lindström 1990). It is believed that the basis for this theory is the minimization of time, energy use and mortality risk from predators during the whole migratory journey. From this reason it is clear that increase of migration speed should be a necessary condition for time minimization. But it is very likely that for the Chaffinch as late migrant and granivorous bird, in contrast to insectivorous birds, there is no need for fast escape from the territories in northern Europe; therefore the Chaffinches do not accelerate their movement during later autumn.

ACKNOWLEDGEMENTS

I am most grateful to my colleagues from the Biological Station Rybachy at the Courish Spit for many years of joint efforts in bird trapping and ringing. I am indebted to Nikita Chernetsov and Thord Fransson for valuable comments and constructive criticism of the manuscript. My special thanks to Nikita Chernetsov who kindly improved the English. The study was partly supported by Russian Foundation for Basic Research (grant no. 09-04-00407-a).

REFERENCES

Alerstam T. 1990. Bird Migration. Cambridge University Press, Cambridge, 420 p.

Alerstam T. 2003. Bird migration speed. In: P. Berthold, E. Gwinner and E. Sonnenschein (Eds.). Avian Migration. Springer-Verlag, Berlin, Heidelberg: 253–267.

Alerstam T. and Lindström A. 1990. Optimal migration: the relative importance of time, energy and safety. In: E. Gwinner (Ed.). Bird Migration: Physiology and Ecophysiology. Springer, Berlin-Heidelberg, New York: 331–351.

Bairlein F. 1992. Recent prospects on trans-Saharan migration of songbirds. *Ibis*, **134**(Suppl. 1): 41–46.

Bibby C.J. and Green R.E. 1981. Autumn migration strategies of Reed and Sedge Warblers. *Ornis Scandinavica*, **12**: 1–12.

Bojarinova J., Ilves A., Chernetsov N. and Leivits A. 2008. Body mass, moult and migration speed of the Goldcrest *Regulus regulus* in relation to the timing of migration at different sites of the migration route. *Ornis Fennica*, **85**: 55–65.

Bolshakov C.V., Shapoval A.P. and Zelenova N.P. 2001. Results of bird ringing by the Biological Station "Rybachy" on the Courish Spit: long-distance recoveries of birds ringed in 1956-1997. Part 3. *Fringilla coelebs, Fringilla montifringilla. Avian Ecology and Behaviour*, Suppl. **3**: 1–130.

Chernetsov N. 1996. Preliminary hypotheses on migration of the Sedge Warbler (*Acrocephalus schoenobaenus*) in the Eastern Baltic. *Vogelwarte*, **38:** 201–210.

Dolnik V.R. (Ed.). 1982. Populyatsionnaya ekologiya zyablika. [Population ecology of the Chaffinch]. Nauka, Leningrad. 302 p. [In Russian]

Ellegren H. 1990. Autumn migration speed in Scandinavian Bluethroats *Luscinia s. svecica*. *Ringing & Migration*, **11**: 121–131.

Ellegren H. 1993. Speed of migration and migratory flight lengths of passerine birds ringed during autumn migration in Sweden. *Ornis scandinavica*, **24**: 220–228.

Fransson T. 1985. The migration and wintering area of Nordic Spotted Flycatcher, *Muscicapa striata*. *Vår Fågelvärld*, **45:** 5–18.

Fransson T. 1995. Timing and speed of migration in North and West European populations of *Sylvia* warblers. *Journal of Avian Biology*, **26**: 39–48.

Hilden O. and Saurola P. 1982. Speed of autumn migration of birds ringed in Finland. *Ornis Fennica*, **59**: 140–143.

Hyytiä K. and Vikberg P. 1973. Autumn migration and moult of the Spotted Flycatcher *Muscicapa striata* and the Pied Flycatcher *Ficedula hypoleuca* at the Signilskär bird station. *Ornis Fennica*, **50**: 134–143.

Ketterson, E.D. and Nolan, V., Jr. 1983. The evolution of differential bird migration. *Current Ornithology*, **1**: 357–402.

McCulloch M.N., Tucher G.M. and Baillie S.R. 1992. The hunting of migratory birds in Europe: a ringing recovery analysis. *Ibis*, **134(**Suppl. 1): 55–65.

McNamara J.M., Welham R.K. and Houston A. 1998. The timing of migration within the context of an annual routine. *Journal of Avian Biology*, **29**: 416–423.

Newton I. 2008. The Migration Ecology of Birds. Academic Press, London, 976 p.

Nowakowski J.K. and Chruściel J. 2004. Speed of autumn migration of the Blue Tit (*Parus caeruleus*) along the eastern and southern Baltic coast. *The Ring*, **26**: 3–12.

Payevsky V.A. 1973. Atlas of bird migration according to banding data from the Courland spit. In: B.E. Bykhovskii (Ed). Bird migration – ecological and physiological factors. Halstead Press of John Wiley and Sons, New York: 1–124.

Payevsky V.A. 1995. Differential migration and survival of age/sex groups in some finch species. *Zoologicheskiy zhurnal*, **74**: 129–135. [In Russian]

Payevsky V.A. 2009. Songbird Demography. Pensoft Publishers, Sofia-Moscow. 260 p.

Payevsky V.A. and Shapoval A.P. 1998. Ringing efficiency of birds depending on their species, sex, age, season, and place of ringing. *Ornithologia (Moscow)*, **28**: 212–218.

Payevsky V.A., Shapoval A.P. and Vysotsky V.G. 2005. Spatial distribution of thrushes migrating through the eastern Baltic area as shown by ring recoveries. *OMPO Newsletter*, **25**: 5–12.

Ravkin E.S. and Ravkin Yu.S. 2005. The birds of plains of Northern Eurasia. Numbers, distribution and spatial community organization. Nauka, Novosibirsk, 304 p. [In Russian]

Svensson L. 1970. Identification Guide to European Passerines. Naturhistoriska Riksmuseet, Stockholm, 152 p.

Svensson L. 1992. Identification Guide to European Passerines. 4th edition. Stockholm, 368 p.

Vinogradova N.V., Dolnik V.R., Yefremov V.D. and Payevsky V.A. 1976. Opredelenie pola i vozrasta vorob'inykh ptits fauny SSSR [Identification of Sex and Age in Passerine Birds of the USSR]. Nauka, Moscow, 192 p. [In Russian]

Yohannes E., Biebach H., Nikolaus G. and Pearson D.J. 2009. Migration speeds among eleven species of long-distance migrating passerines across Europe, the desert and eastern Africa. *Journal of Avian* Biology, **40**: 126–133.

Submitted December 1, 2009; accepted January 20, 2010.