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BIOMETRICAL DIFFERENTIATION OF THE COMMON SNIPE *(Gallinago gallinago)* MIGRATING IN AUTUMN THROUGH NORTH-EASTERN POLAND

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ABSTRACT

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The Common Snipe is a medium-sized wader with a broad range of distribution. The analysis of recoveries shows that most of Common Snipes migrating through the southern Baltic come from Scandinavia, Baltic countries and north-western and western Russia. In this paper differentiation in the biometrics of Common Snipes migrating through north-eastern Poland was described. The data were collected at two ringing stations in north-eastern Poland. No significant differences were found between biometrical parameters from these two ringing sites. The obtained results are similar to the ones from the Gulf of Gdańsk. Mean values of particular measurements and body mass of adult and juvenile birds did not differ significantly. There was no significant biometrical variance among juvenile birds between three analysed half month periods as well as between 5 years of study except for the seasonal differences in the mean value of tarsus with toe measurement. The mean values of measurements taken from the birds studied in this work are similar to the results obtained for the Gulf of Gdansk region, and higher than in the places located more inland (southern and eastern Poland). It might be caused by differences in the biometrical values among different populations. Low values of the body mass are characteristic for Common Snipes staying in places with different habitat conditions, which shows that this species migrates in autumn with very small energetic reserves, what is typical for strategy minimising energetic expenses during migration.

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INTRODUCTION

The Common Snipe is a medium-sized wader (*Charadrii*) with a broad range of distribution. In Western Palearctic, it breeds in the vast area from arctic, through bo-

real to temperate zone (Cramp and Simmons 1983). The analysis of recoveries shows that most birds migrating through the southern Baltic come from Scandinavia, Baltic countries and north-western and western Russia (Baumanis 1985, Kharitonov 1998). The birds continue autumn migration towards south-western and western direction and their wintering grounds span from southern Ireland, through France, Morocco and northern Italy (Meissner 2002). Over 80% of 50 recoveries of the birds ringed in autumn at the Gulf of Gdansk come from France and British Isles, and only one from northern Italy (despite the high pressure of hunters) (Meissner 2002). Autumn migration of the Common Snipe is very prolonged. An increase in the number of Common Snipes occurs between the end of June and 15 July, however, the highest number of birds is recorded between the second half of August and the end of September (Meissner and Sikora 1995, Zieliński and Studziński 1996,Włodarczyk *et al.* 2007).

The analysis of biometrical data of Common Snipes caught in Poland concerns the birds from the Gulf of Gdansk region (Meissner 2003). It was shown that mean values of biometrical measurements of adult and juvenile birds did not differ significantly, but the birds were larger than the ones from other regions of Europe (Meissner 2003). The body mass was one of the smallest among the compared places in Europe, which shows that Common Snipes are unable to fly over large distances in one go. It is characteristic for so called 'B-strategists' (Meissner 2001, 2003). The results of the research carried out at the Jeziorsko reservoir in central Poland confirm that the species does not store fat reserves sufficient for the long-distance migration (Włodarczyk *et al.* 2007). The purpose of this work is to describe differentiation in the biometrics of Common Snipes migrating through north-eastern Poland and to assess the amount of fat stored by birds caught in two different habitats.

MATERIAL AND METHODS

The data for this work were collected at two ringing stations of the Waterbird Research Group KULING: Kolonia Nisko (54°03'N, 21°03'E) and Lisewo Malborskie (54°05'N, 18°49'E) (Fig. 1).The study in Kolonia Nisko was carried out in 2001-2003, in the southern part of a shallow water reservoir formed after flooding some meadows during high level of water. The reservoir (340 ha) was surrounded by the complex of fields and meadows, and its southern part was more swampy, overgrown with reeds and dense bushes as well as single trees. Banks of the reservoir were also covered by reedbeds. In Lisewo Malborskie the walk-in traps were placed along the Vistula bank and temporarily flooded sandy patches protruding into the river's main stream. The part of area between dam and the river that have been used for pasture was periodically flooded at a very high water level. Once the water level dropped, there were small muddy ponds left, which were very attractive for waders, including Common Snipes. The data from Lisewo Malborskie were collected in 2002-2006.

Terms of birds trapping are shown in Table 1. At both ringing stations birds were trapped mainly with the use of walk-in traps (Meissner 1998). The traps were controlled every 2 hours from dawn till dusk. Number and location of traps changed on the daily basis throughout the season to provide maximal efficiency. During the consecutive seasons the water level in the study area differed markedly.

Fig. 1. Location of the research stations

Table 1
Beginning and ending dates of trapping Common Snipes in the consecutive seasons in Kolonia Nisko and Lisewo Malborskie

	Kolonia Nisko	Lisewo Malborskie
2001	16 Jul. – 20 Aug.	
2002	12 Jul. – 3 Sep.	26 Jul. – 21 Aug.
2003	4 Jul. – 20 Aug.	5 Jul. – 14 Sep.
2004		2 Jul. – 13 Sep.
2005		1 Jul. – 12 Sep.
2006		5 Jul. – 10 Sep.

The measurements comprised the total head, bill, wing and tarsus plus toe lengths (without the nail) (Meissner 2000). The bill and total head (head with the bill) lengths were measured with a calliper to the nearest 0.1 mm. The length of tarsus plus toe and wing were measured with the accuracy of 1 mm. The birds were weighed with an electronic balance to the nearest 1 g. The age of birds was determined based on plumage criteria (Glutz von Blotzheim *et al.* 1975). There were no statistically significant differences in the mean values of measurements (except for the body mass) taken in Kolonia Nisko and Malborskie Lisewo (*t*-Student test: in all cases $p > 0.05$). Thus, in further analysis the data from both ringing stations were combined. The analysis included the data on 65 adult birds and 772 juvenile ones. Not all the measurements were taken from each individual and for that reason the sample sizes differed between consecutive analyses. Because of the very small sample size, the analysis of biometrical variance was carried out only for the juvenile birds in 2001-2005, caught in the consecutive half month periods: the second half of July and the first and the second half of August.

RESULTS

The mean values of particular measurements and body mass of adult and juvenile birds did not differ significantly (Table 2). In adult birds the distributions of measurements were bimodal only in the case of wing and total head lengths (Fig. 2). In juvenile birds the bimodality of total head length was far less marked, on the other hand their wing length distribution was characterised by at least three peaks. In other measurements there were rather unimodal distributions. There was no significant biometrical variance among juvenile birds between the three analysed half month periods as well as between 5 years of the study except for the seasonal differences in the mean value of tarsus with toe measurement (Table 3). Juvenile Common Snipes trapped in 2003 and 2004 showed a higher mean value of this measurement than the ones from 2001 and 2002 (Fig. 3). The mean body mass of juvenile birds caught at Kolonia Nisko was slightly lower (statistically significantly different) than at Lisewo Malborskie. Such difference was not recorded for adult birds (Table 4).

Table 2
Comparison of mean measurements of adult and juvenile birds

Measurement	Adult			Juvenile			*t*-Student test	
	Mean	*SD*	*N*	Mean	*SD*	*N*	*t*	*p*
Total head length (mm)	97.97	3.07	65	97.82	3.13	762	0.38	0.70
Bill length (mm)	69.14	2.92	63	69.19	2.96	759	0.14	0.89
Tarsus+toe (mm)	69.80	1.99	64	69.4	2.49	764	0.20	0.23
Wing (mm)	137.40	2.68	52	137.2	2.98	758	0.46	0.64
Body mass (g)	98.30	7.97	64	97.5	9.74	755	0.63	0.53

Table 3
Results of the two-factor analysis of variance (ANOVA II) for each biometrical measurement in years (2001-2005) and half month periods (from the second half of July till the end of August) as grouping factors

Measurement	Grouping factor	*F*	*p*
Total head length (mm)	Year	$F_{4,598} = 0.51$	0.726
	Half month period	$F_{2,598} = 0.46$	0.631
Bill (mm)	Year	$F_{4,595} = 0.82$	0.515
	Half month period	$F_{2,595} = 0.75$	0.472
Tarsus+toe (mm)	Year	$F_{4,602} = 4.10$	0.003
	Half month period	$F_{2,502} = 0.20$	0.822
Wing (mm)	Year	$F_{4,595} = 1.98$	0.096
	Half month period	$F_{2,595} = 0.14$	0.866
Body mass (g)	Year	$F_{4,594} = 0.96$	0.426
	Half month period	$F_{2,594} = 0.02$	0.976

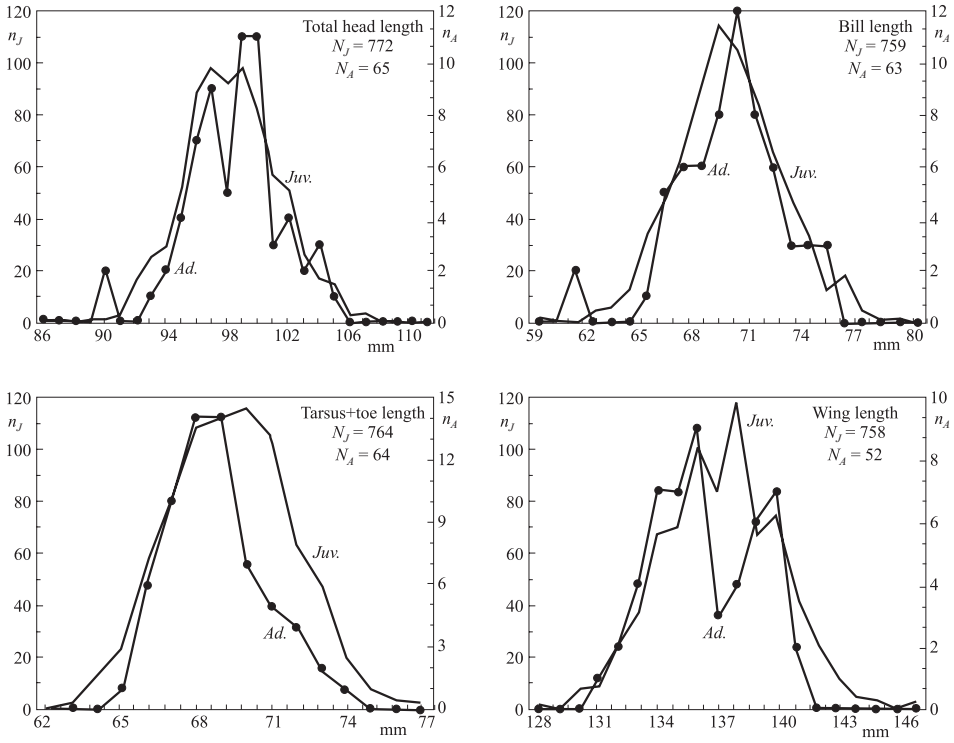

Fig. 2. Distributions of some measurements of adult (*Ad.*) and juvenile (*Juv.*) Comon Snipes caught in north-eastern Poland during autumn migration

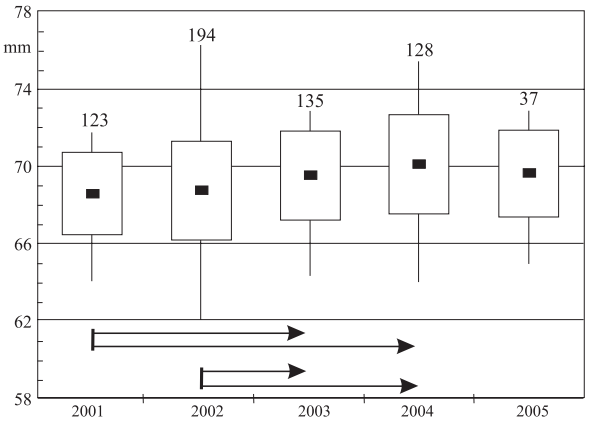

Fig. 3. Changes in the mean values of tarsus+toe length of juvenile Common Snipes in consecutive years. Black markers – mean values, rectangles – standard deviations (*SD*), vertical lines – ranges. Arrows mark significant differences between two seasons (*post-hoc* Tukey test: $p < 0.05$). The sample sizes are given over the bars.

Table 4
Comparison of the body mass between adult and juvenile Common Snipes caught in Lisewo Malborskie and Kolonia Nisko

Age class	Lisewo Malborskie			Kolonia Nisko			*t*-Student test	
	Mean	*SD*	*N*	Mean	*SD*	*N*	*t*	*p*
Adult	99.0	7.38	25	97.9	8.92	39	0.57	0.573
Juvenile	98.5	9.74	307	96.9	9.69	448	2.34	0.020

DISCUSSION

The mean values of measurements taken from the birds studied in this work are similar to the results obtained for the Gulf of Gdańsk region, and higher than in the places located more inland (southern and eastern Poland) (Table 5). The Common Snipe migrates through Europe in the broad front, since it can be observed that the birds of this species are fairly numerous in autumn in the whole inland part of our continent (Glutz von Blotzheim *et al.* 1975). The analysis of recoveries clearly shows that there is a marked variance in migration routes of different populations (Glutz von Blotzheim *et al.* 1975, Fog 1978, Kålås 1980, Baumanis 1985, Massoli-Novelli 1986). Birds ringed in the northern part of the continent show tendency to winter more in the north than birds from central Europe and Russia. These results imply that there are two groups of birds migrating in autumn through Poland. This stands in line with the analysis of recoveries carried out by Meissner (2002), which clearly showed that Common Snipes ringed in northern Poland migrated in autumn almost exclusively in western direction along the coasts of the Baltic and North Sea and reached wintering grounds in southern Europe to a lesser extent than birds from central Poland. The observed differences in the mean measurements of birds caught in different parts of Europe can result from biometrical differences among populations. In many species of birds larger individuals inhabit more northern part of the range, where the climate is more severe, according to Bergmann's rule (Ashton 2002). The most southern wintering grounds of Common Snipes migrating through central and eastern Europe reach the Mediterranean and north-western coast of Africa (Baumanis 1985, Kharitonov 1998), and most probably biometrical variance of that species follows the Bergmann's rule. This would mean that individuals inhabiting northern parts of the breeding range and wintering in north-western Europe (Kålås 1980, Fog 1978) are larger than the birds breeding and wintering further south and during autumn migration the larger birds appear in northern Poland.

The observed bimodal distributions of total head and wing lengths in adult birds result most probably from sexual dimorphism, which in Common Snipes includes differences in size (Glutz von Blotzheim *et al.* 1975). One peak distributions of tarsus plus toe and bill lengths may indicate a very weak sexual dimorphism in these measurements. It cannot be excluded, however, that the presence of birds from different populations masks the expected bimodal distributions.

Table 5
Comparison of the mean values of wing length, bill length and body mass of Common Snipes caught at different places in Europe

Place	Age	Wing length	Bill length	Body mass	Source
North-eastern Poland	*Ad.*	137.4	69.14	98.3	Present work
	Juv.	137.2	69.19	97.5	
Gulf of Gdańsk	*Ad.+Juv.*	137.4	69.4	98.8	Meissner (2003)
Jeziorsko reservoir (central Poland)	*Ad.+Juv.*	136.8	68.6	101.6	Włodarczyk and Kaczmarek (2000)
Lithuania	*Ad.+Juv.*	136.8		95.7	Švazas *et al.* (2001)
Münster (north-eastern Germany)	*Ad.*	136.4	68.5	110.1	OAG Münster (1975)
	Juv.	136.0	68.8	115.1	

Very low values of the body mass of adult and juvenile birds seem to confirm the results of earlier studies at the Gulf of Gdańsk (Meissner 2003), in central Poland (Włodarczyk and Kaczmarek 2000) as well as in Lithuania (Švazas *et al.* 2001). Low values of the body mass are characteristic for Common Snipes staying in places with different habitat conditions, which shows that this species migrates in autumn with very small energetic reserves, what is typical for strategy minimising energetic expenses during migration (Meissner 2001). The highest mean values of the body mass were recorded in Germany at the sewage reservoirs close to Münster (OAG Münster 1975). There was a great abundance of food, which was probably the reason why other species of waders stopping over there during autumn migration also showed high values and high rate of body mass growth (OAG Münster 1976, 1983). Low body mass means low overload of wings, and, as a consequence, easier manoeuvring and quicker take-off (Pennycuik 1975, Rayner 1990). The maintenance of low body mass is probably an anti-predatory adaptation.

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