

THE STATE OF THE NIGHTINGALE IN BULGARIA

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Abstract. Nightingale is widely distributed in Bulgaria in the lowlands and in the mountains up to 1000 m altitude, but some pairs can breed up to 1350 m altitude. Except the nominate subspecies (*L. megarhynchos megarhynchos*) it is possible some other subspecies to be met in the country. It inhabits various places by reservoirs with shrubs and forests with various shrubs. The Bulgarian breeding population numbers about 320 000 pairs. The species is more numerous in the western part of the country during the breeding period as well as during migrations. The first spring migrants arrive in Bulgaria usually in the end of March and the beginning of April. Single birds arrive earlier – they have been found most early on February 16th and 24th. Migration is most intensive in April and the beginning of May. The breeding period – from the building of the first nests till the flying off of the last young, continues 105 days and proceeds from April 17th till July 30th. About 5–10 % of the breeding pairs have two hatches annually. The autumn migration is in August and the first half of September, but single birds remain till November 10th. There is a strong breeding conservatism – many adult and young birds return to breed on the old places. Many of the Nightingales flying cross the country use one and the same migratory routes and places for congregations. The population of the Nightingale in Bulgaria is submitted to many negative factors among them are the usage of chemical poisons in forestry and agriculture, numerous fires in the forests, ground predators etc. Bulgarian Nightingales reach a maximum age of 5 years and 10 days.

Key words: Nightingale, *Luscinia megarhynchos*, Bulgaria, distribution, migration, breeding biology.

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Состояние популяции южного соловья в Болгарии. - Д.Н. Нанкинов. - Беркут. 11 (1). 2002. - Южный соловей широко распространен в Болгарии на равнинах и в горах до 1000 м н. у. м., но отдельные пары могут гнездиться и до 1350 м н. у. м. Возможно, что кроме номинативного подвида *L. m. megarhynchos* на территории страны могут быть встречены и другие подвиды. Соловей населяет различные биотопы у водоемов с кустарниками и леса с кустарниками. Численность гнездовой популяции в Болгарии оценивается в 320 000 пар. Вид более обычен в западной части страны как на гнездовании, так и во время миграций. Первые птицы появляются в Болгарии обычно в конце марта – начале апреля. Иногда отдельные особи могут прилетать и раньше, известны две встречи в феврале. Миграция наиболее интенсивно проходит в апреле и начале мая. Гнездовой период от постройки первых гнезд до вылета последних птенцов продолжается 105 дней. 5–10 % пар имеют вторую кладку. Осенняя миграция проходит в августе – первой половине сентября, отдельные птицы могут задерживаться до первой декады ноября. Обсуждается влияние негативных факторов на популяцию. Максимальный известный возраст южного соловья в Болгарии – 5 лет и 10 дней.

1. Introduction

Nightingale (*Luscinia megarhynchos*) lives in North-western Africa, Western, Middle and South-eastern Europe, the Near East, Asian Minor and Central Asia, to Mongolia to east (Portenko, 1954). The territory of Bulgaria is in the middle of its breeding habitat. Here it is widely distributed and numerous in a greater part of the country. The Nightingale inhabits natural habitats as well as cultivated landscape. It has been regularly observed during the ornithological studies in Bulgaria however there is no detailed studies of its population until now.

2. Material and methods

We collected the material for the present article during the last 40 years, on our ornithological studies in different parts of Bulgaria. Especially intensive studies of the species were accomplished after 1976 when we started the establishment of the field-stations of Bulgarian Ornithological Centre – “Rupite”, “Atanasovsko lake” and “Chelopechene”.

So when writing the manuscript we had 7 029 records of Nightingales (singing and from visual observations) and information on 3 309 ringed individuals (a total of 10 338 exp.). We also received 238 recoveries (Nankinov, Grigorov, 1978; Nankinov, Djingova, 1979, 1981; Nankinov et al., 1984, 1986, 1989). When clarifying the breeding of the Nightingale in Bulgaria we collected all cases (n = 98) where we know the exact dates of flying off of the young (mainly when the young were ringed in the nests), dates of hatching, begin-



ning of eggs-laying or building of the nest. On this basic we estimated the duration of every breeding cycle (from the building of the nest till the leaving of young). We also checked all existing literary sources where the Nightingale is mentioned for the territory of Bulgaria. All the information collected make it possible to discuss questions such as subspecies belonging, distribution, habitats, breeding, migration and other sides of the biology of the species in Bulgaria.

3. Results and discussion

3.1. Subspecies belonging

On the basic of variations in size and colour of the birds three subspecies of Nightingale are usually detected on the vast habitat of the species: the nominate or European subspecies *L. m. megarhynchos* (C.L. Brehm, 1831) – living in North-western Africa, Western and Southern Europe and Asia Minor; the Iranian one – *L. m. africana* (Fischer et Reichenow, 1884) – inhabiting the eastern part of Asian Turkey, Caucasus, Iraq, North-western Iran and the Turkestan Nightingale – *L. m. hafizi* (Severtzov, 1872) – inhabiting the eastern part of the species habitat, i. e. from Iran and Tukmenistan to Mongolia. The morphological differences, the territorial relationship and the specific characteristic in their biology speak of a long standing and deep divergence, connected mainly with the space isolation between them, established still in the Quaternary period (Loskot, 1981).

It is accepted (Pateff, 1950) that the Nightingale is represented by the nominate subspecies on the whole territory of Bulgaria. However we think that there are many unclear questions about its subspecies belonging. At the beginning of Bulgarian ornithology when the birds has been studied on species level our predecessors described the Nightingale breeding in Bulgaria with many different names: *Philomela luscinia* L. (Elwes, Buckley, 1870); *Erithacus luscinia* Degland, *Luscinia luscinia*, Linn (Alleon, 1880, 1886); *Philomela luscinia*, Selvy ex Linn, *Luscicola luscinia*, Keys (Hristovich, 1890); *Sylvia*

luscinia (Shkorpil K and X. 1892); *Erythacus luscinia* L., *Luscinia minor* Br. (Reiser, 1894); *Erithacus luscinia* L. (Lorenz-Liburnau, 1893; Klain, 1903), etc. During the first decades of the 20th century when studying the passerine birds in the town of Sofia Hans v. Boetticher (1929) after consultations with the famous taxonomic O. v. Kleinschmidt, suggested the two species – Thrush Nightingale (*Luscinia luscinia*) and the Nightingale to be considered as races of one species. Doubts of the subspecies belonging of Bulgarian Nightingales arose in the 30ies of the 20th century when our famous ornithologist Pavel Pateff and his English colleague James Harrison performed excursions in different regions of the country and collected birds. Although they described the Nightingale as *L. m. megarhynchos* the individuals they had were paler and more greyish on the back and whiter on the stomach than those individuals breeding on British Islands (Harrison, Pateff, 1933). Later Ch. Vaurie (1955) found significant differences between the British and Middle European Nightingales. When comparing the behaviour of Bulgarian and West-European Nightingales some authors write that “*Bulgarian ones sing on more open places as wires and hide less than those in Western Europe*” (Mountfort, Ferguson-Lees, 1961) or that “*their alarm calls do not differ from those of the Nightingales in the Netherlands*” (Dijksen, Dijksen, unpubl. inform.). According to L.A. Portenko (1954) to the Northeast of Bulgaria on Crimean inhabit Nightingales who are paler, more chestnut and with longer wings than *L. m. megarhynchos* and they were divided in a new subspecies *L. m. tauridae*. In 1975 not far from the places where J. Harrison and P. Pateff worked, on the basic of 62 birds collected S. Eck (1975) described a new subspecies of Nightingale from the valley of river Vardar in Macedonia. He accepted as a holotype a male individual, shot on 9.04.1918 by the town Veles and kept in the Zoological Museum in München (Germany). According to S. Eck (1975) the Nightingales from the Balkan peninsula are bigger (wing: male –



83–90 (86,9 mm), female – 83–86 mm; tail: male – 65–74 (69,1 mm), female – 63–69 mm) and more greyish than the nominate race (which according to him has wing 79–89 (83,6 mm) and tail 62–71 (66,7 mm) and belong to the subspecies *L. m. bahrmanni*. Taking in consideration these investigation when preparing the Checklist of Bulgarian species (Nankinov, 1992) we assumed that except the nominate subspecies it is possible the other subspecies to be met also in Bulgaria.

The detailed revision accomplished by V.M. Loskot (1981) of 413 preparations in museums confirmed the first three subspecies of the Nightingale and he questioned the existence of a separate Balkan subspecies. According to him *L. m. bahrmanni* is a weakly differentiated form and when it was described many basic rules of the systematic were broken as the undifferentiated between male and female birds were compared with data from separated male and female birds, a statistical working of the information is lacking, the diagnostical importance of the noticed differences is not defined and such approach leads to chaos in zoological nomenclature (Mair, 1971). According to the studies of V.M. Loskot (1981) on the Balkan peninsula inhabits the nominate subspecies of the Nightingale which also lives on the Crimean peninsula and to the east in Precaucasus where it integrate with the Iranian subspecies. Using dispersion analyses the same author proved that the subspecies of the Nightingale are well distinguished by the wing length and mainly by the tail length. There is a certain trend of decreasing the sizes of these birds from east to west, i. e. the individuals from the Turkestan subspecies are the biggest ones (wing 84,8–97,5 (91,2 mm), tail 74,5–88,2 (81,2 mm)), followed by the Iranian subspecies (wing 81,7–91,9 (91,2 mm) tail 66,9–85,1 (74,1 mm)) and the European Nightingales are the smallest ones (wing 78,9–90,6 (85,1 mm), tail 62,1–76,3 (68,9 mm)). the Nightingales (n = 544) caught and measured on the field-station “Rupite” in South-western Bulgaria (Nankinov et al., 1985) during the period

March – October (1976–1982) had the following statistically worked somatometric measurements: wing $84,5 \pm 2,4$ (77–92 mm), tarsus $26,1 \pm 1,6$ (21–35 mm), bill $11,8 \pm 1,2$ (8–16 mm) and weight $21,5 \pm 2,4$ (16–33 g). As it could be seen the differences between the minimum and maximum values are considerable and this is due to the existence in the area of individuals from the local breeding population as well as of migrants from other more distant regions, probably representatives of different subspecies and geographic populations. The considerable variations in weight are due to the big pre-migratory fat supplies of some individuals in the end of summer and in autumn. According to the wing length individuals from the European subspecies as well as from the Iranian Nightingales (*L. m. africana*) pass over Bulgaria. However we will relay on special future studies to establish the occurrence of the last subspecies in Bulgaria. Individuals from this subspecies (*Aedon luscini* Golzi (Cabanis)) was found to the west of Bulgaria on the territory of present Slavonia still in May 1899 (Arrigoni Degli Oddi, 1902). It is possible the biggest and most eastern subspecies – the Turkestan one (*L. m. hafizi*) to be met in Bulgaria. This subspecies irregularly migrates to the west and reaches the shores of the Black Sea (Vilkonskii, 1896) and even to Sweden (Svensson, 1970). In the European part of the species habitat from 43 Nightingales – 3 were similar to the Iranian subspecies and from 55 Crimean birds – 4 had features of the Iranian Nightingale (Loskot, 1981). Therefore differences in the subspecies belonging could be expected in Bulgaria, especially between the eastern and western parts of the country but only if the studies are performed in precise series of breeding individuals as well as of migrants.

3.2. Distribution

According to P. Pateff (1950) the Nightingale is a widely distributed and always numerous bird in Bulgaria, especially in the lowlands. It penetrates no higher than 1000 m

altitude in the mountains (Figure 1). On the other hand there are records showing that in some mountains for example Belasitsa this bird is rare and penetrates no higher than 300 m altitude (Prostov, 1963). It lives between 700 and 950 m on Vitosha mountain (Donchev, 1961), up to 900 m in Ljulin mountain (Simeonov, Georgiev, 1992), between 200 and 800 m in Western Stara Planina (Feriancova-Masarova, Dontschew, 1970), up to 900 m in Pirin mountain (Balat, 1962) and up to 1100 m altitude (Simeonov, 1986). The records over 1000 m altitude published until now are without concrete data or are based on observations of migrating individuals. Most frequently the maximum altitude is 1400 m in the Slavianka mountain (Scharnke, Wolf, 1938) but it concerns a bird shot on 3.08.1936 by the village Goleshovo, i. e. at the beginning of autumn migration of the species. Similar is the record on 23.08.1962 at 1400 and 1600 m altitude in Rila mountain (Liedel, Luther, 1969). Nightingales are night migrants and without any doubts during passage they could stop, feed and rest in the lowlands as well as in the mountains to the upper boundary of the forest and even above it. During 1962–1975 we observed it many times (April – the beginning of May and August – September) in the forests of Rhodopi mountains above 1000 m altitude. Nightingales were caught and ringed above this altitude during the breeding period: by Batak reservoir in Western Rhodopi (1100 m) on 10.05.1981 – 6 birds and on 13.06.1988 – 3 birds; the place Panichishte in North-western Rila (1350 m) probably migrants on 30.04.1981, 2.05 and 31.07.1988 – 12 birds; Borovets resort in Eastern Rila (1340 m) – 9.07.1983 – 3 birds; the village Govedartsi (1200 m) – 24 and 25.05.1980 – 2 + 2 individuals, 10, 14 and 17.05.1983 – 3 + 4 + 3 individuals. Therefore the Nightingale in Bulgaria breeds up to 1000 m in the mountains, but single pairs and small groups may breed up to 1350 m altitude in years with favourable climatic conditions.

The relief of the place and even the expo-

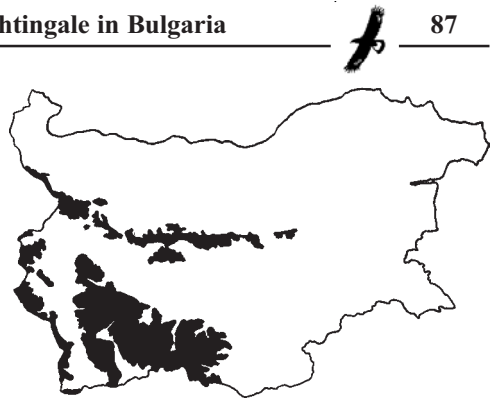


Fig. 1. Distribution of the Nightingale in Bulgaria (black colour – regions 1000 m altitude not settled by the species).

Рис. 1. Распространение южного соловья в Болгарии (черный цвет – области выше 1000 м н. у. м., не заселенные видом).

sition of the mountains' slopes are not important for the settlement of the Nightingales. the existence of shrubs, loose forests, vineyards, orchards and other plantations near to water basins are of primary importance for the birds. For example on 29 and 30.04.1978 on the slopes of Kojuh mountain (South-western Bulgaria) we counted the following maximum numbers of displaying males: northern slope – 19, western – 15 and eastern – 14 individuals. Nightingale is breeding in the lower parts of the Kastrakli reserve and the Trigrad-Jagodinski region in Rhodopi mountains but it was not recorded in a century-old forest of Austrian pine at 1000–1200 m (Nankinov, 1982a). In the National Park Central Balkan it breeds in the pre-park zone, on the northern and southern slopes, in the lower parts of the forest zone and in the reserves: Stara Reka, Djendem, Peeshti Skali and Sokolna (Nankinov, Nankinov, 1999). It can be met in the forests of Wild pine under 1000 m altitude (Nankinov, 1997). In the period 1978–2001 it was breeding in all suitable habitats and in the villages in Ljulin mountain. It is extremely numerous in the rivers' canyons in Northern Bulgaria overgrown with shrubs, trees and high grass and passing cross vast, denuded and monotonous cultivated fields. It is numer-



ous in the canyon of river Chernelka (by the town Pleven) and the young forests above it till mid-July when dozens of singing males can be heard (Nankinov, Spiridonov, 1980). It is sparse in the steppe and lowland regions especially in the vast cultivated fields, where the shrubs and tree vegetation is loose. It breeds in big numbers in the forests along the Black Sea coast, but is rare in inland Dobrudja (Petrov, Zlatanov, 1955).

3.3. Habitats

Nightingale prefers to settle in mosaic landscape in the lowlands and the foots of the mountains. It inhabits mainly mixed deciduous forests with meadows, cuttings with dense shrubs, their vicinities, parks, gardens, cemetery, vineyards, clearings, places with shrubs most frequently near water basins. It is common in wet forests and rivers' valleys overgrown with shrubs. Altogether it nests everywhere in the lowlands and foot of the mountains, where there are many shrubs by reservoirs (rivers, channels, lakes, marshes, fishponds, dam lakes, temporary reservoirs), wet gulches, dingles, ravines overgrown with dense shrubs and other vegetation. It can be met all over the insular forests, woods, villages, orchards and gardens along the Bulgarian Danube coast. It prefers young deciduous forests of oak (*Quercus sp.*), hornbeam (*Carpinus sp.*), willow (*Salix sp.*), poplar (*Populus sp.*), common locust (*Robina pseudoacacia*), hazelbush (*Corylus avellana*), elm (*Ulmus sp.*), maple (*Acer sp.*), alder (*Alnus sp.*), wild pear (*Pyrus communis*), plumtree (*Prunus sp.*), walnut-tree (*Juglans regia*) etc. with many young saplings and dense shrubs of bramble (*Rubus caesius*), dog rose (*Rosa spina*), black thorn (*Prunus spinosa*), hawthorn (*Crataegus sp.*), elder (*Sambucus sp.*), lilac-shrub (*Syringa vulgaris*) etc.

It likes to breed in dense shrubs and woods on the banks of the reservoirs and by villages and also in the yards overgrown with high grass and shrubs, shrubs on the roadsides and railways and in the hedges. The pairs of Nightingales (n = 180) breeding in Gabrovo

(Stoyanova, 1996) were distributed in the following habitats: outlying residential districts with single houses – 30,08 %, intown parks and gardens – 23,61 %, parks outside the town – 14,65 %, single houses – 10,95 %, outlying residential districts with blocks and high buildings – 8,18 %, complex buildings with definite vegetation – 6,07 %, industrial zone – 4,35 % and closely situated buildings – 2,11 %. The existence of shrubs or high and dense grass near water reservoirs is of primary importance for the settlement of the Nightingales in a certain habitat. However there are exception to the rule as F. Balat (1962) found several males over the town Sliven in Stara Planina in June on a very dry place among shrubs on a parched mountain slope.

3.4. Population density

Our long-term field studies show that Nightingale is considerably more numerous in Western and Central than in Eastern Bulgaria. It is a common breeding and migrating bird in the western part of the country. It is a dominant species during the breeding period in the woods and shrubs in the rivers' valleys in Western and Central Bulgaria. For example, in the end of May and the beginning of June 1964 Nightingales were 26 % of all recorded birds in the Kresna gorge in South-western Bulgaria, 13 % in the valley of river Chepelarska in the Rhodopi mountains in Central Bulgaria and 10 % on the outfall of river Ropotamo in Eastern Bulgaria (Kih, 1976). Nightingale is a dominant species with population between 0,31 and 0,43 ind./ha in the oak forests (*Quercus cerris*, *Q. pubescens*, *Q. dalechampii*) in Central Northern Bulgaria (Ivanov, 1987) and it is completely absent in the same forests situated to the east of Ludogorie (Simeonov, Petrov, 1982). It is absent in the steppe habitats in Dobrudja, but it breeds in shrubs besides open areas – 1,74 pairs/10 ha, in forests – 2,74 pairs and by Shabla lake: 1992 – 2,14 pairs, 1993 – 4,4 pairs, 1995 – 5,0 pairs, i. e. an average of 3,85 pairs/10 ha (Ivanov, Nonev, 1997; Ivanov, 1998).



On 23.05.1987 about 50 males Nightingales were singing nearby the administrative building of game reserve "Strandja", 80 males were singing along the lower course of river Ropotamo and 30 – on the adjacent Arkutino marsh. Ten years later (20.05.1996) only 6 pairs were breeding on that marsh. In May 1998 there were singing Nightingales everywhere in Strandja mountain, especially in the rivers' valleys which shows that this is one of the most common breeding bird species. We counted 25 pairs in an area of 3 km² in 1988 on the fish-ponds of Chelopechene (nearby Sofia). The distance between the singing birds was about 100 m. Nearly the same is the population density of the Nightingales in Rhodopi mountain along the river passing through Zlatograd (25.05.1974).

S. Simeonov (1986) observed 63 birds on 1 km² in the pseudomakvis formation in Pirin mountain. There were 1,19 birds on 12 km transect in the formation of *Junipereta oxycedrii*, 1,50 in the formation of *J. exelsee*, 1,13 birds in the formation of *Phillyreta mediae* (Simeonov, 1970). In deciduous forests on 10 km transects there were: 1 bird in formation of *Quercus dalechampii*, 5 – in *Q. frainettae*, 8 – in *Q. fraineticerris*, 58 – in *Q. pubescentis*, 30 – in *Tilieta argenteae*, 19 – in *Robina pseudoacacia* (Simeonov, Petrov, 1982). On 1 km² in the Dobrostan part of Western Rhodopi mountains 168 birds were recorded in formation of *Platanella orientalis*, 36 birds in *Querceta frainettae*, 4 birds in artificial plantation of *Pinus nigra* (Petrov, 1988) and 232 birds in a forest of *Quercus pubescens* in Sredna Gora mountain (Petrov, 1981). The Nightingale is the most numerous species – 36,81 % in lower vegetation zone in the place Bojuritsa near Vidin, consisting of Cerris oak (*Quercus cerris*), *Q. frainetta* and single trees of Small-leaved Lime (*Tilia parvifolia*), Common Maple (*Acer campestre*), Tatarian Maple (*Acer tataricum*), Flowering Ash (*Fraxinus ornus*), Common Elm (*Ulmus campestris*), European Beech (*Fagus sylvatica*) with dense shrubs and grass. On 100 ha area were counted: 1973 – 238,5 birds;

1974 – 238,5; 1977 – 215,4; 1978 – 223,1; 1979 – 200,0; 1980 – 192,3 and 1995 – 223,1 birds (Penev, 1982). About 10 pairs breed annually on an area of 775 ha in forests of *Q. frainetta* and *Carpinus sp.* in "Valchi Dol" reserve (300–700 m altitude) in Eastern Rhodopi (Iankov, Nyagolov, 1988). An average of 7,7 birds live on an area of 100 ha between the oak and elk zones in the game reserve "Vitinya" (Western Stara Planina) (Botev et al., 1968). There are singing males on every 50–70 m in the forests with dense shrubs in Sakar mountain and for the whole studied area of 100 km² the number of breeding pairs exceed 200 (Borisov, 1988). Its number in Shumensko plateau (North-eastern Bulgaria) is 1 pair/km² in formations of elk, shrubs, rocky habitats and near meadows (Nankinov, 1996).

From the detailed numerical counts during the breeding season in different villages in Bulgaria (Nankinov et al., 1990) we received the following average number (pair/km²) of Nightingale: towns – 1,2, villages – 2,17, hamlets – 3,71, shacks – 7,22, railway stations – 2, industrial villages – 0,12. For the concrete ecological complexes in Sofia these indexes are: cottages – 3,23, green part – 9,11, industrial zone – 0,13, roads – 0,03, village zone – 0,44, around water basins – 13,11 pairs. The density of the breeding population of Nightingale in oak forest pestered by caterpillars is double (44 singing males on 5 km transect) than in untainted forests (22 males) (Nankinov, 1981), which shows that when choosing the future breeding territories the birds head for areas with plenty of food. Its number in the young deciduous forests in Eastern Stara Planina is also high. Only in the area of Cape Emine there were over 100 singing males on 14.06.1998. On the next day about 50 males were singing by the village Popovjane (Gabrovo) in the northern outskirts of Central Stara Planina.

On the background of European population (3 184 886 – 4 617 751 pairs) it is accepted that Bulgarian breeding population of Nightingale numbers according to some au-



thors 100 000 – 500 000 pairs (Grull, Fracaso, 1997) and according to others – 1 000 000 – 10 000 000 pairs (Kostainova, 1997).

As it could be seen there are big variations in the result of numerical counts and in the final estimation of the number of Bulgarian breeding population of Nightingale. Therefore on the basis of counts, which we had performed during the breeding period in different regions of the country we estimated that an average of 3,2 pairs breed on every 1 km² in Bulgaria. So we can suppose that annually about 320 000 pairs of Nightingale breed in Bulgaria.

3.5. Spring migration

Usually people start speaking about the spring migration of the Nightingale when they heard the singing males when green leaves appear on the trees and shrubs and according to the people belief the Nightingales arrive towards 10–15.04 when the Sugar Cane (*Prunus spinosa*) covers with white flowers (“Priroda”, 1936, 8: 4). In reality the first spring migrants arrive much earlier. They alight after a night migration in the green parts in Sofia still in the end of March and the beginning of April, but ordinary people learn about them after 10–15.04 when the birds start singing (Nankinov, 1982b). According to the weather in spring they may arrive from about 2 months till several days before the beginning of the displaying songs.

The start of spring migration can be recorded the best with the help of regular trapping and ringing. During the years Nightingales were ringed or heard most early on the field-station “Rupite” on: 2.04.1976, 31.03.1977, 17.04.1978, 5.04.1989, 5.04.1980, 27.03.1981, 6.04.1982, 8.04.1983, 5.04.1984, 5.04.1985, 2.04.1986, 10.04.1987, 6.04.1988, 30.03.1989, 14.04.1990, 27.03.1991, etc. In years with early and warm spring the first Nightingales arrive in Bulgaria still in March: the second half of March in North-eastern Bulgaria (Simeonov, 1975), 17.03.1980 – Ograjden mountain (Simeonov, Baeva, 1988); 28.03.1963 – Lozenska mountain (Simeonov,

Bogdanov, 1967); 30.03.1960 – A. Prostov (pers. com.) observed and heard a bird nearby the village Kolarovo (of Petrich). In such springs the Nightingales reach to the Crimean peninsula still in March – 29.03.1959 (Kostin, 1983). In Bulgaria there are also birds ringed in March in 1983: on 16.03 – 2 birds by the village Opitsvet (of Sofia) and on 24.03 – 2 birds by the village Koshava (of Pernik), in 1986 – 27.03 by the village Eremia (of Kjustendil), in 1989 – on 16.03 – 2 birds, 27.03 – 7 birds, 30.03 – 4 birds by the town Varna, on 17.03 – 3 birds by the outfall of river Kamchia (of Varna) and in 1991 – 26.03 – 5 birds near Sveti Vrach. However, the most early records of Nightingales are on 16 and 24.02.1985, when P. Chochev ringed at 1 individuals each time by the village Plana (of Sofia). A Nightingale was found in February on Pelopones peninsula in Greece – 18.02.1965 (Handrinos, Akriotis, 1997). These February observations of Nightingales in Bulgaria and Greece are probably due to very early spring migration with favourable weather situation in the end of the winter or to individuals remaining in mild winters, i. e. to the establishment of new wintering grounds of the species in the southern regions of Balkan peninsula. Sudden and sharp cold spells in April may lead to reverse migration or to death of the early migrants. In the morning of 13.04.1986 about 10 males were singing in the Western Park in Sofia. At the afternoon the temperature fall to –2° and a heavy snowfall started. The snow cover reached 15 cm. The snowfall continued the next two days. No Nightingales were heard. A Nightingale and a Pied Flycatcher (*Ficedula hypoleuca*) were observed in a hot-house where they entered to search for insects.

The main spring migration often proceeds in short terms (from 10 to 24 days) gradually increasing its intensity. First single individuals appear, followed by more and more birds and as a rule towards the end the migration is most intensive (Figure 2). In 1976 the spring migration started on 2.04 on the field-station “Rupite” and only after a week we counted 21 singing birds in the foot of Kojuh moun-



tain (Nankinov et al., 1979). Sometimes towards 10–15.05 the density of the spring migrants in South-western Bulgaria is so big that literally a Nightingale is singing on every shrub and in this choir of singing males it is hard to estimate their number. On 24.04.1984 we counted 60 singing males on a 10 km transect along the river Fakiiska (South-eastern Bulgaria). From 25 to 27.04.1973 along the river Struma (from the town of Pernik to the village Kulata) the Nightingale was a numerous migrant and there was a singing male on every 100 m. At that time there were 40 singing males along one of the tributaries of river Struma between the town Melnik and Rojen monastery.

The numerous retraps of Nightingales show that the spring migrants crossing the territory of Bulgaria stay in favourable habitats for feeding and resting from 2 to 20 days at an average of 8,13 days. The birds from the local breeding population arrive and settle on the breeding territories from 27.03 to 3.05.

3.6. Breeding

Although that in spring the first Nightingales arrive in Bulgaria in April sometimes in March and even the second half of February, the individuals from the local breeding population start the pair-formation and the building of nests towards mid-April. In the end of April the males are with active gonads and some females have well developed brood-patches although their ovaries just start activating (Prostov, 1963).

The males singing is most intensive from the last days of April till the end of May, i. e. during the time when in the most of the birds the pair-formation, the building of nests, the laying and brooding of eggs take place. At the beginning of the breeding period the males sing night and day. Usually they are at 80–100 m from one another but in suitable habitats and at the first stage of the breeding some males may sing every 10 m. It was proved (Horstkotte, 1968) that the breeding territories of the Nightingales are plastic and during changes in the habitats (building, roads

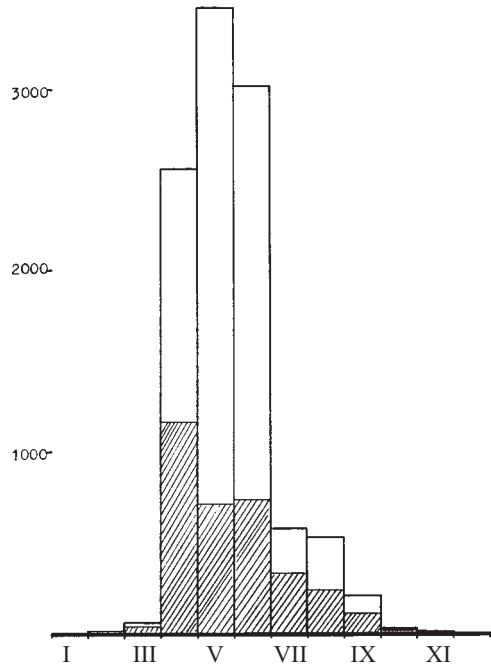


Fig. 2. Number dynamics of the Nightingale in Bulgaria (n = 10338); shading – data from ringing (n = 3309), white colour – data from field studies (n = 7029).

Рис. 2. Динамика численности южного соловья в Болгарии (n = 10338); штриховка – данные кольцевания (n = 3309), белый цвет – данные полевых исследований (n = 7029).

and so on) they are compensated from the neighbouring breeding territories. The singing of Nightingales is different in the different parts of the country. In the surroundings of Sofia there are good singers by the villages Gnilyane, Obelya and Suhodol. On these places some of the males use elements from the songs of the Skylark (*Alauda arvensis*) and Song Thrush (*Turdus philomelos*) (Nankinov, 1982b). After the hatching the singing sharply decrease as the males join the feeding of young. During the second half of May and in June the males with late, repeated or second broods continue to display, but with lower intensity. Single individuals sing in July and also during the August migration. Therefore singing Nightingales can be heard in Bulgaria



Fig. 3. Times of breeding of the Nightingale in Bulgaria (n = 98 pairs).

Рис. 3. Сроки размножения южного соловья в Болгарии (n = 98 пар).

during 5 months, i. e. from the end of March till the end of August. During the breeding period the male Nightingales sing among the shrubs, but seldom during the last stages of the reproductive cycle, i. e. in June some males start singing from the tops of the trees. These are probably males, who still have no partner or have lost their females. Both parents build the nest for 3–5 days most frequently in the

lower branches of the shrubs, but also on the ground sometimes in the basic of a tree trunk or stump, especially on places thickly covered with fallen leaves. Nests were found built at 1–1,6 m high (Nankinov, 1982b). One nest was built in a shrub hanging at 1 m above water and another in a climbing plant. They built the nests from the last year's dry leaves which can be easily found around, from grass stems, roots and moss, inside covered with gentle leaves, plant fibres, wool and hairs.

Nests with clutches (of 5 eggs, seldom of 4 or 6 eggs) can be found especially in May – 63,26 % (Figure 3), less in April – 23,47 %, June (11,22 %) and July (2,04 %). When loosing the first clutch, especially at the beginning the pairs proceed towards a second breeding. The incubation continues for 11–12 days and only the female takes part in it. At that time the male is actively singing and guarding the breeding territory and sometimes it feeds the female.

After the hatching both parents participate in their feeding as at the beginning the male collects food more often. Its singing sharply decreases or nearly stops. The parents search for food on the ground, among the old leaves, in the grass, shrubs and the lower branches of the trees. They collect insects and their larva, spiders (*Araneae*), worms (*Lumbricidae*), as they prefer ants (*Formicidae*), coleoptera (*Curculionidae*, *Scarabaeidae*, *Carabidae*), diptera (*Diptera*) and butterflies (*Lepidoptera*). During the post breeding roaming and the autumn migration they feed on the fruits of the elder (*Sambucus sp.*), currants (*Ribes sp.*), blackberry, strawberry (*Fragaria sp.*) and other juicy wild and cultivated fruits. A. Prostov (1963, 1964) found in the stomachs of shot birds remnants of coleoptera: *Carabidae*, *Curculionidae*, *Chrysomelidae* (*Halticinae*, *Donaciinae* – *Plateumaris serica L.*), *Hymenoptera* (*Formicidae*), *Diptera* (*Tipula*) and *Lepidoptera*. We observed flying young and adult Nightingales to feed on caterpillars of *Lymantria dispar*, *Laspeyresia nigricana*, *Geometridae*, *Malocosoma neutria*, *Euproctis chrysorrhoea*,



Macrothylacia rubi and other pests in the woods (Nankinov, 1981).

Young Nightingales just left the nests and still not flying well can be observed from the last ten days of May to the beginning of August. When approaching the nest especially if there are young in it the adult birds produce a special snoring and hissing sound accompanied by a characteristic posture: half-open wings, body bend towards, widely open bill. The cry increases when trying to touch the nest and eggs. seldom the birds attack and beat with their bodies the arm of the intruder (Paspaleva-Antonova, 196a). The Nightingales produce hoarse, snoring sound when disturbed, especially when the young leave the nest and can not fly well. Such sound can be heard mainly during the period of leaving the nest of the young – till the beginning of the autumn migration, i. e. from the end of May – till the end of July and the beginning of August. The young birds often leave the nest before they can fly well. We observed cases in which when in danger the adult birds lead away from the nest the still not flying young. They spend the first 10–15 days around the nest. They rest in the shrubs, where they can be found especially early in the mornings. The time of roaming of the young near the nest is different for the different broods. Some young leave the area around the nest soon after flying off while others were retrapped several times on the same places in the course of more than 2 months (63 days) – nearly to 29.08.

The breeding period of the Nightingales in Bulgaria (from the building of the first nest till the flying off of the last young) is stretched to 105 days and proceeds from 17.04 till 30.07. The breeding is most intensive in May and the beginning of June, when the prevailing number of pairs build nests, lay eggs, brood and raise young (Figure 3). Most of the Nightingales have only one hatch in Bulgaria. The gonads of the males shot by A. Prostov (1963, 1964) between 15.05 and 11.06 were not active. However, the active displaying of part of the male Nightingales at the beginning or mid-June (Nankinov, 1981, 1982) the

founding of nests with eggs and young in the end of June and in July and also the observation of young just after leaving the nests in the second half of July and even the beginning of August make us state that there are pairs which raise two hatches annually. M. Paspaleva-Antonova (1961b) shot a male and female birds with activated gonads on 11.06. 1960. According to the terms of breeding we suppose that 5–10 % of the pairs of Nightingales have a second reproductive cycle in Bulgaria.

With the help of recoveries we managed to determine that there is a strong breeding conservatism of some Nightingales. We trapped adult birds again on their old breeding places in the next year (29 cases), after 2 years (9 cases) and after 3 years (5 cases). Young birds return for breeding in the places where they had hatched on the next year (12 cases) and after 3 years (2 cases).

3.7. Autumn migration

The youngs from the first brood and their parents live secretly, roam and go towards safe places (dense shrubs and forests) with abundant food till the beginning of autumn migration. The autumn passage can be missed if we rely only on visual observations. In comparison with spring the autumn migration proceeds “unnoticeably” as the males do not sing (or sing seldom), the birds fly in the nights and at day time the congregate on definite places for feeding and resting. The birds arrived after a night migration can be easily found in the outskirts of forests or shrubs and on other suitable habitats, where they sing or show themselves early in the mornings. In August in days with intensive migration numerous Nightingales can be observed in the mornings on cultivated fields, sew with maize, sunflower, lucerne and even on stubbles and fallow land. During trapping and ringing on the filed-station we observed that in different years the autumn migration starts on different dates (Figure 2). In some years the Nightingales from the Bulgarian breeding population fly away during the last days of July and



the beginning of August. In other years they start disappearing at the end of August and the beginning of September. As a whole the birds from the local population leave the area from the end of July till 12.09. At the same time the autumn migration of birds hatched in northern part of the breeding habitat also pass over our country.

The autumn migration proceeds on several waves at intervals of 5–8 days. A great part of the birds ringed in the end of July, in August and the beginning of September are moulting. The autumn migrants stop for resting and feeding from 2 to 30 days at an average of 11,7 days. With the help of ringing and visual observations we found out that the spring as well as the autumn migration of this species are very intensive in Western Bulgaria and weaker in Eastern Bulgaria. In days with intensive passage we counted 10–30 birds on a 300 m transect along the mist-nets of the field-station “Rupite”. The autumn migration stops after 15.09 (1978 the field-station “Rupite”) or at the end of September (Nankinov, 1982b), but single individuals pass over the territory of Bulgaria also during the next two months. There are October observations: on 2.10.1980 in Ograjden mountain (Simeonov, Baeva, 1988) and on 18.10.1981 in Pirin mountain (Simeonov, 1986). Late migrants were ringed in October: 2.10.1983 – 4 birds near Sofia, 20.10.1985 – by the town Plovdiv, 5.10.1988 by the village Lesovo of Jambol, 3.10.1989 – 2 birds by the town Lom, on 14.10.1976, 1.10.1977 and 19.10.1989 on the field-station “Rupite”. On 10.11.1982 the latest Nightingales found in Bulgaria was recorded on same place.

Many of the Nightingales passing over the territory of Bulgaria use one and the same places for congregation (for resting and feeding) after a night passage. Birds ringed on the field-station “Rupite” during the spring migration were retrapped there on their reverse migration in the autumn of the first year (17 birds), on the second (2 birds), third (3 birds), fourth (1 bird) and fifth year (2 birds) and the spring of the second year (21 birds),

third (9 birds) and the fourth year (5 birds). Birds ringed during the autumn migration were retrapped during the spring passage of the second year (18 birds), third (3 birds), fourth (7 birds) and fifth year (1 bird) and during the autumn migration of the second year (3 birds) and fifth year (1 bird). According to the direction of migration of the Nightingales ringed in Europe (Zink, 1973) we assume that over Bulgaria fly Nightingales hatched on the territories of Romania, Moldavia, Ukraine and some individuals from Central Europe. A Nightingale ringed in Hungary has been found in Greece (Handrinos, Akriotis, 1997).

3.8. Negative impact and nature conservation status

The population of the Nightingale in Bulgaria varies under the influence of different biotic and abiotic factors. These variations in its number can be found after prolong observations on one and the same places and also with the help of long trapping and ringing of birds. For example, the Nightingale was abundant in Sofia and its surroundings in 1980 and 1985. Then birds were heard and observed on every green area. Such fluctuation could be due to the weather in spring, as the late cold spell can be especially dangerous for the birds and also to many other reasons.

The most important negative factor causing mass death of the Nightingale and other passerines is the usage of chemical poisons in agriculture and forestry. During the breeding period of 1967 a struggle against the caterpillars in the forestry of Veliko Tarnovo (Botev et al., 1970) by treating the forest with “Fekama nebelmitel” (emulsion of DDT). After the treating the Nightingales decreased more than twice from 472 to 208 individuals on an area of 100 ha in the place Murgavets. At the same time the Nightingales were 1366 in the control area in the place Peshteren Dol. A year later the number of the Nightingales was also very high – 1183 individuals in the control area and only 326 individuals in the treated area. Similar experiment was conducted in 1968 by the village Gostilitsa as the



forests were treated with the organic phosphorous "Vofatoks". All Nightingales were destroyed in the treated area while in the control area their number was 333 individuals. The authors (Botev et al., 1970) made the following conclusions: 1) the chemical pest control leads to sharply decrease of the number of birds and insects and gives opportunities for quick increase of the pest insects during the next years; 2) the conduction of chemical pest control in the shrubby low-stemmed forests, which are the main habitats of the birds and the Nightingale particularly, is economic undue.

The wood fires cause tremendous damages on the flora, fauna and on the population of the Nightingale in concrete. Unfortunately these fires are very frequent and rage on nearly the whole territory of Bulgaria. The damages are extremely considerable in the oak forests in South Bulgaria, where on some places the Nightingales breed on every 100 m.

Every year part of the clutches and hatches of the Nightingale are destroyed by predators like homeless cats and dogs, foxes, martens, polecats and weasels. The adult birds are chased by different predators.

We have found Nightingales killed by cars on the roads all over the country. This happens usually in the beginning of the breeding period when the pair formation take place, and also during the post-breeding roaming before the real migration. At that time especially early in the mornings the young birds fly along the roads and some of them are killed by the fast moving cars.

The Nightingales died also in the traps or cylinders for small mammals dug in the ground in the habitats.

The existing in the towns Sofia, Plovdiv, Burgas, Varna, Shumen and Ruse illegal catching of wild birds for selling or keeping at home has a negative impact on the population of the Nightingale.

Sometimes the European Cuckoo (*Cuculus canorus*) parasites the nests of the Nightingale. Only in June 1978 4 nests of the Nightingale were found with fully grown up young

Cuckoos by the village Podgorie (of Vidin) (P. Panchev, pers. com.). The Nightingale is the host of the parasites – cestoda of the family *Dilepididae* – *Monopylidium borealis* (Krabe, 1869) Spasskaja et Spassky, 1977 (Gerogiev, 1990).

We estimated that 61,76 % of the retrapped Nightingales in Bulgaria (n = 238) are up to 6 months old, 18,49 % – one year old, 10,51 % – two years old, 5,46 % – three years old, 2,52 % – four years old, 0,84 % – five years old and 0,42 % more than five years old. The oldest Bulgarian Nightingales live to 5 years and 10 days.

The long remaining of people and animals near the nests of the Nightingale especially at the beginning of the breeding cycle cause the abundance of the nests.

The strong urbanisation of the landscape leads to disappearing of the Nightingale in many places especially in the central urban districts or among the huge areas sew with monocrops. It will be good the existing islands of shrubs and groups of trees where the Nightingales breed to be preserved or new ones to be created. The piles of lopped of tree branches are suitable places for the breeding Nightingales. According to A. Antonov (1996), most of the nests of the Nightingale in the yards of the village Zlatia (of Vratsa) were in old fence made up from lopped off mulberry branches. These places are defended from goats and sheep as well as from unfavourable weather conditions, and also they are well camouflaged. In such fences the Nightingales breed higher than usually – sometimes up to 1,5 m. Together with the Nightingale such places will attract the Blackcap (*Sylvia atricapilla*), Lesser Whitethroat (*S. curruca*) other warblers and even the Marsh Warbler (*Acrocephalus palustris*). The birds will be attract more easily and the results will be better if the piles of branches are prepared and placed still in autumn.

The Nightingale is a stable Eurasian species with favourable nature conservation status, included in the Appendix II of the Bonn and Bern Conventions. It is protected by the



Low for protection of nature in Bulgaria, but its protection is rather formal as the birds and their habitats are submitted to numerous negative factors which destabilise its population

REFERENCES

- Alleon A. (1880): Catalogue des oiseaux observees aux environs de Constantinople. - Bull. Soc. Zool. France. 5: 80-116.
- Alleon A. (1886): Memoire sur les oiseaux dans la Dobrudja et la Bulgarie. - Ornis. 2: 397-428.
- Antonov A. (1996): Da pomognem na poinite ptici. - Neophron. 1: 13.
- Arrigoni Degli Oddi E. (1902): Atlante Ornitologico. Usselli Europei. Milano. 1-566.
- Balat F. (1962): Contribution to the knowledge of the avifauna of Bulgaria. - Prace Brnenske zaklad. CSAV. 36 (10): 445-496.
- Boetticher H. v. (1929): Die Kleinvögel der Stadt Sophia (Bulgarien) und ihrer naheren Umgebung. - Mitt. Kgl. naturwiss. Inst. Sofia. 2: 251-256.
- Borisov B. (1988): Ornitologicheski izsledvania v Jugozapadnata chast na Sakar planina. - Orn. inf. buletin. 23-24: 24-38.
- Botev N., Ganchev G., Lambrev E. (1968): Izuchavania varhu roliata na pticite pri masovo razmnojavane na niakoi listogrizeshiti nasekomi. - Nauchni trudove na Vish Lesotehn. in-t. Ser. gorsko stop. 16: 103-111.
- Botev N., Ganchev G., Lambrev E. (1970): Izuchavania varhu vlianieto na niakoi insekticidi varhu platnostta na pticite. - Nauchni trudove na Vish Lesotehn. in-t. Ser. gorsko stop. 18: 125-129.
- Donchev S. (1961): Pticite na Vitosha planina. - Izv. na Zool. in-t s muzei pri BAN. 10: 59-137.
- Eck S. (1975): Eine neue Subspecies der Nachtigall, *Luscinia megarhynchos* (Aves, Turdidae). - Zool. Abh. Staatl. Mus. Tierk. Dresden. 33 (2): 223-224.
- Elwes H., Buckley T. (1870): A list of the Birds of Turkei. - Ibis. 2-6: 188-201.
- Feriancova-Masarova Z., Dontschvew S. (1969): Gegenüberstellung der Ornithofauna der Westkarpaten (Slowakei) und der westlichen Stara Planina. Teil 1. - Biologia (ČSSR). 24 (5): 356-374.
- Georgiev B. (1990): Cestodi ot semeystvo Dilepididae, parasitirashiti po poinite ptici v Bulgaria (taksonomichni, morfologichni i faunistichni izsledvania). - Avtoreferat na kand. diss. Sofia. 1-28.
- Grull A., Fracasso G. (1997): *Luscinia megarhynchos*. Nightingale. - EBCC Atlas of European Breeding Birds. London: T. & D. Poyser. 516-517.
- Handrinos G., Akriotis T. (1997): The birds of Greece. London: A. & C. Black, 1-336.
- Harrison J., Pateff P. (1933): Contribution to the Ornithology of Bulgaria. - Ibis. 13 (4): 589-611.
- Horstkotte E. (1968): Auswirkungen einer Arealveränderung durch Strassenbau auf den Bestand der Nachtigall (*Luscinia megarhynchos* Brehm). - Natur und Heimat. 28 (2): 55-58.
- Hristocich G. (1890): Materiali za izuchavane balgarskata fauna. - Sbornik narodni umotvorenia. 2: 185-225.
- Iankov P., K. Nyagolov (1988): Vidov sastav na pticite v rezervat "Valchi Dol". - Mlad. nauchna konf. Prinosat na mladite nauchni rabotnici pri reshavane na ekolozhichnite problemi. Vratsa, 1-2.12.1988. 188-194.
- Ivanov B. (1987): Gnezdovi ornitokompleksi v darvesno-hrastovi grupirovki ot ostroven tip. - Jubileina nac. konf. po biologija. Sofia. 31-33.
- Ivanov B. (1998): The breeding birds of the Shabla lake. - Acta zool. bulgarica. 50 (1): 35-42.
- Ivanov B., Nonev S. (1997): Gnezdiashtite ptici v stepnite rajoni po kraibrejieto mejdu gr. Balchik I ez. Durankulak. - Sb. ot dokladi "Dobrudja I Kaliakra". Plovdiv: BSPCBD. 108-125.
- Klain E. (1903): Pticite v Bulgaria. - Bulgarski lovets. 5 (1): 2.
- Kostadinova I (ed). (1997): Ornitologichno vajni mesta v Bulgaria. Sofia: BDZP. 1-176.
- Kostin J.V. (1983): Pticy Krima. Moscow: Nauka. 1-241.
- Kux Z. (1976): Prispevek k poznani Balkanskeho poostrova. - Časopis Moravskeho Musea. 61: 191-218.
- Liedel-Liburnau L. (1893): Ornithologische Bruchstücke aus dem Gebiete der unteren Donau. - Orn. Jahrbuch. 4: 12-23.
- Loskot V. (1981): O podvidah jujnogo solovia (*Luscinia megarhynchos* Brehm). - Tr. Zool. in-ta AN SSSR. 102: 62-71.
- Mair E. (1971): Principi zoologicheskoi sistematiki. Moscow. 1-454.
- Mountfort G., Ferguson-Lees J. (1961): Observations on the Birds of Bulgaria. - Ibis. 103: 443-471.
- Nankinov D. (1981): Promiana v sastava na ornitofaunata v napadnat ot gasenitsi gorski uchastak. - Orn. inf. buletin. 9: 41-50.
- Nankinov D. (1982a): Ekologichen pregled na pticite v rezervata "Kastrakli" i Trigradsko-Jagodinskia rajon na Rodopite. - Ecologia. BAN. 10: 22-34.
- Nankinov D. (1982b): Pticite na grad Sofia. - Orn. inf. buletin. 12: 1-386.
- Nankinov D. (1992): Check list of bird species and subspecies in Bulgaria. - Avocetta. 16: 1-17.
- Nankinov D. (1996): Ornitofaunata na Naroden park "Shumensko plato". - Lesovadska misal. 4 (9): 84-87.
- Nankinov D. (1997): Sastav na ornitofaunata v bialborovite ekosistemi. - Nauka za gorata. 3-4: 84-95.
- Nankinov D., Grigorov B. (1978): Bulletin bird banding. Sofia: Bulgarian Ringing Centre. 5: 1-64.
- Nankinov D., Djingova M. (1979): Bulltein bird banding. Sofia: Bulgarian Ringing Centre. 6: 1-106.
- Nankinov D., Djingova M. (1981): Bulltein bird banding. Sofia: Bulgarian Ringing Centre. 7: 1-132.
- Nankinov D., Nankinov N. (1999): Avifauna of the National Park Central Balkan. - Monticola. 8 (1): 125-148.
- Nankinov D., Spiridonov Z. (1980): Izsledwane varhu ornitofaunata v kaniona na reka Chernelka. - Orn. inf. buletin. 7-8: 44-63.



- Nankinov D., Djingova M., Schimanova S. (1984): Bulltein bird banding. Sofia: Bulgarian Ringing Centre. 8: 1-167.
- Nankinov D., Djingova M., Schimanova S. (1986): Bird banding. Bulletin 9. Sofia: Bulgarian Ringing Centre. 1-145.
- Nankinov D., Djingova M., Schimanova S. (1989): Bird banding. Bulletin 10. Sofia: Bulgarian Ringing Centre. 1-110.
- Nankinov D., Djingova M., Schimanova S. (1990): Normativi za regulirane chislenosta i opazvaneto na pticite v naselenite mesta i kraislishtnite teritorii na Bulgaria. - Slujeben buletin na BLRS. 2-3: 1-116.
- Nankinov D., Schimanova S., Nikolov H., Kantardjiev D., Djingova M. (1985): Somatometrični pokazатели na pticite, migrirali prez rajona na ornitologicheskata stanca "Rupite". - Orn. inf. buletin. 18: 1-27.
- Nankinov D., Michev T., Kostova V., Ivanov B., Penkov V. (1979): Pervie rezultati ornitologicheskikh issledovaniy na stancii "Rupite" (Jugo-zapadnaia Bolgaria). - Vestnik zoologii. 3: 45-52.
- Paspaleva-Antonova M. (1961a): Izuchvania varhu ornitofaunata na Bulgarskoto Dunavsko kraibrejje. Rakopis. Zool. in-t BAN. 1-145.
- Paspaleva-Antonova M. (1961b): Prinos kam ornitofaunata na rezervata Srebarna, Silistrensko. - Izv. na Zool. in-t s muzei pri BAN. 10: 139-163.
- Pateff P. (1950): Ptice v Bulgaria. Sofia: BAN. 1-364.
- Penev D. (1982): Chislenost na pticite v estestvenite dabovi mestoobitania na Severozapadna Bulgaria i vazmojnost za neinoto uvelichavane. - Gorskostopanska nauka. 19 (2): 41-46.
- Petrov B., Zlatanov S. (1955): Materiali po faunata na pticite v Dobrudja. - Spisanie na n.-izsl. in-t pri Min. na semedelieto. 22 (1): 93-113.
- Petrov Ts. (1981): Ptice na Sredna gora. - Izv. na muzeite ot Jujna Bulgaria. 7: 9-49.
- Petrov Ts. (1988): Ornitologichni prouchvania v Dobrostarski dial (zapadni Rodopi). - Izv. na muzeite ot Jujna Bulgaria. 14: 25-45.
- Portenko L.A. (1954): Pticy SSSR, chast 3. Moscow-Leningrad: 1-255.
- Prostov A. (1963): Prinos kam izuchavane ornitofaunata v Petrichko (Jugozapadna Bulgaria). - Izv. na Zool. in-t s muzei pri BAN. 13: 33-77.
- Prostov A. (1964): Izuchavane na ornitofaunata v Burgasko. - Izv. na Zool. in-t s muzei pri BAN. 15: 5-68.
- Reiser O. (1894): Materialien zu einer Ornithologie der Bulgarien. Wien. 1-204.
- Scharnke H., Wolf A. (1938): Beiträge zur Kenntnis der Vogelwelt Bulgarisch-Macedoniens. - J. Orn. 86: 309-327.
- Simeonov S. (1970): Prouchvane varhu gnezdovata ornitofauna v pseudomakvisite na Pirin planina. - Godishnik na Sof. un-t. Biol. fak. 63: 15-26.
- Simeonov S. (1975): Varhu ornitofaunata na niakoi rajoni ot Severoiztochna Bulgaria. - Godishnik na Sof. un-t. Biol. fak. 67 (1): 91-100.
- Simeonov S. (1986): Ptice na Pirin planina. - Fauna na Jugozapadna Bulgaria. 1: 61-81.
- Simeonov S., Bogdanov Z. (1967): Ptice na Lozenskata planina. - Godishnik na Sof. un-t. Biol. fak. 59 (1): 43-67.
- Simeonov S., Petrov Ts. (1982): Ornitologichen analiz na gnezdovata ornitofauna v niakoi shirokolistni gori na Bulgaria. - Godishnik na Sof. un-t. Biol. fak. 71 (1): 39-47.
- Simeonov S., Baeva V. (1988): Ptice na Ograjden planina. - Fauna na Jugozapadna Bulgaria. 2: 7-22.
- Simeonov S., Georgiev V. (1992): Syvremenno systoianie na ornitofaunata v Ljilin. - Godishnik na Sof. un-t. Biol. fak. 83 (1): 169-183.
- Shkorpil K. I. H. (1892): Severoiztochna Bulgaria v geografsko i arheologicheskoto otnoshenie. - Sbornik narodni umotvorenia. 7: 37-39.
- Stoyanova I. (1996): Ornitofaunata na grad Gabrovo – vidov sastav, chislenost i teritorialno rapredelenie. Rakopis. Plovdiv. in-t. 1-229.
- Svensson L. (1970): Forsta fyndet av sydnaktergal i sverige galde ostligaste rasen *Luscinia megarhynchos hafizi* (Sev.). - Vår fågelvärld. 29 (2): 67-71.
- Vaurie Ch. (1955): Systematic notes on Palearctic birds. N 14. Turdinae: the genera *Erethacus*, *Luscinia*, *Tarsiger*, *Phoenicurus*, *Monticola*, *Erythropygia* and *Oenanthe*. - Amer. Mus. Novitates. 1731: 1-30.
- Vilkonskiy F. (1896): Ornitologicheskaya fauna Adjarii, Gruzii i severo-vostochnoi chasti Lazistana. Moscow. 1-121.
- Zink G. (1973): Der Zug europäischer Singvögel. Ein atlas der Wiederfunde beringter Vögel. 1. Lieferung.

At the invitation of BirdLife Hungary the **6th WORLD CONFERENCE ON BIRDS OF PREY AND OWLS** will be held from 18–25 May 2003 in Budapest, Hungary. All persons interested in either of the two groups of birds in question (*Falconiformes* and *Strigiformes*) are hereby cordially invited to attend the Conference, irrespective of whether or not they are members of WWGBP. It is planned to hold the conference in the Hotel Agro Conference Centre, situated on Svabhegy, the highest point of the hilly district of Buda, with a panoramic view of Budapest and on the edge of forest full of bird life.

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