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Article

Mollusks in the nests of passerine birds in the south-east of Belarus

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Abstract. The material was collected in the period from 2020 to 2024 on the territory of the Gomel region (south-east of Belarus). In 30 nests of 11 species of passerine birds, we have found 139 shells belonging to 29 species of mollusks of 19 families. Based on the shells' state and their damage, three ways of the material appearance in the bird nests are discussed: 1) as a prey of birds, 2) a result of snails' migration, 3) bringing of empty shells by birds.

Keywords: Gastropoda, Bivalvia, species composition, ecology, nutrition of birds

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Научная статья**Моллюски в гнездах воробьинообразных птиц на юго-востоке Беларуси**А.М. Островский *Гомельский государственный медицинский университет, 246000, Республика Беларусь, г. Гомель, ул. Ланге, д. 5**arti301989@mail.ru*

Аннотация. Изучены сборы раковин моллюсков из 30 гнезд 11 видов воробьинообразных птиц, полученные в 2020–2024 гг. на территории Гомельской области (юго-восток Беларуси). Установлена принадлежность 139 раковин к 29 видам моллюсков из 19 семейств. На основании повреждений раковин и их состояния обсуждаются три способа, посредством которых раковины могли оказаться в птичьих гнездах: как добыча пернатых, в ходе самостоятельных перемещений улиток или же в результате переноса птицами уже пустых раковин.

Ключевые слова: гастроподы, двустворчатые, видовой состав, экология, питание птиц

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Introduction

Continental mollusks are one of the most widespread groups of animals, playing a significant role in ecosystems. Mollusks are involved in the transformation of plant residues and act as a food item for other invertebrates and vertebrates. They are typical inhabitants of reservoirs and watercourses, forest floor, trees and shrubs, dwelling in vegetation, organic deposits at the bottom of reservoirs, under rocks, leaf litter and the fallen bark of dead trees. Meanwhile, a number of literary sources describe the facts of finding mollusks and their shells in atypical conditions, i.e. bird nests, both inside and on their surface (Gembitsky, 1972; Gural-Sverlova and Meleshchuk, 2011; Meleshchuk, 2008; Sadekova and Andreev, 1977; Zemoglyadchuk, 2004).

It is known that during the breeding season and after its completion, bird nests attract a variety of invertebrates that use them as a shelter. At the same time, live mollusks and their shells can get into bird nests either intentionally or accidentally, along with building material (Baidashnikov, 1985; Gilyarov, 1965; Zeifert and Shutov, 1978). During the nesting period, mollusk shells serve as a source of calcium necessary for the normal growth and development of chicks' bones (Graveland, 1996; Kornushin et al., 1984), however, many aspects of the mollusk use by birds as an object of nutrition have not been sufficiently studied.

The study of the species composition and mollusk abundance in bird nests is of interest from several points of view. Finds of stenotopic and sparsely distributed species can provide a valuable information about the places where mollusks are collected by birds, the flight distances of the latter, etc., and malacologists, in turn, can use this material to characterize the malacofauna of a particular region and clarify the ranges of individual species.

The aim of this work was to study the species composition and mollusk abundance in the nests of passerine birds in the south-east of Belarus.

Materials and methods

The work is based on the material collected by the author from the nests of passerine birds at the end of the breeding season (May – November 2020–2024) in the Gomel region (south-east of Belarus) using the standard methods, i.e. sieving of nest material through soil sieves and manual collection. A total of 50 nests of 13 species of passerine birds have been studied. The presence of mollusks was evidenced by shells and/or their remains found in 30 nests of 11 bird species: Song Thrush *Turdus philomelos* C.L. Brehm, 1831, Common Blackbird *T. merula* Linnaeus, 1758, Fieldfare *T. pilaris* Linnaeus, 1758, Barn Swallow *Hirundo rustica* Linnaeus, 1758, Common Redstart *Phoenicurus phoenicurus* (Linnaeus, 1758), Black Redstart *Ph. ochruros* (S.G. Gmelin, 1774), White Wagtail *Motacilla alba* Linnaeus, 1758, Spotted Flycatcher *Muscicapa striata* (Pallas, 1764), Garden Warbler *Sylvia borin* (Boddaert, 1783), Common Linnet *Acanthis cannabina* (Linnaeus, 1758) and Common Starling *Sturnus vulgaris* Linnaeus, 1758. In addition to the above-mentioned species of birds, the nests of Eurasian Jay *Garrulus glandarius* (Linnaeus, 1758) and House Sparrow *Passer domesticus* (Linnaeus, 1758) were also studied.

The identification of samples was carried out using the Keys (Balashov, 2016; Shalapenok and Meleshko, 2005; Schileyko, 1982), as well as with the help of malacologists from Tver State University and Atlantic Branch of the All-Russian Scientific Research Institute of Fisheries and Oceanography (AtlantNIRO). The MBS-10 binocular microscope was used to study the conchological features. The names of aquatic mollusks and their hierarchical classification are presented in accordance with the MolluscaBase¹. The systematics and nomenclature of terrestrial mollusks are given according to the monograph by I.A. Balashov (2016).

A total of 139 shells belonging to 29 species of mollusks from 19 families were found during the study period. The collected material is in the author's collection.

Results

The following is an annotated list of mollusk species found in the nests of passerine birds in the south-east of Belarus.

¹ MolluscaBase. Web page. URL: <https://www.molluscabase.org/index.php> (accessed: 12.12.2022).

Phylum MOLLUSCA Linnaeus, 1758
Class BIVALVIA Linnaeus, 1758
Subclass AUTOBRANCHIA Grobben, 1894
Superorder IMPARIDENTIA Bieler, Mikkelsen & Giribet, 2014
Order SPHAERIIDA Lemer, Bieler & Giribet, 2019
Superfamily SPHAERIOIDEA Deshayes, 1855

Fam. Sphaerioidea Deshayes, 1855

Subfam. Sphaeriinae Deshayes, 1855

Euglesa pseudosphaerium (Ehrmann, 1933)

Gomel region, Mirny village, in *Hirundo rustica* nest inside an abandoned brick building, 6 shells, 01.07.2023.

Class GASTROPODA Cuvier, 1797
Subclass HETEROBRANCHIA Burmeister, 1837
Superfamily VALVATOIDEA J.A. Gray, 1840

Fam. Valvatidae J.A. Gray, 1840

Valvata (Tropidina) macrostoma Mörch, 1864

Loev region, crossroad between villages Pervomaisk and Koshevoye, in *Motacilla alba* nest inside an abandoned wooden house, 1 shell, 25.06.2022; Gomel region, Rudnya Marimonova village, in *Hirundo rustica* nest inside an abandoned wooden house, 1 shell, 25.06.2024.

Superorder HYGROPHILA Férussac, 1822
Superfamily LYMNAEOIDEA Rafinesque, 1815

Fam. Lymnaeidae Rafinesque, 1815

Subfam. Lymnaeinae Rafinesque, 1815

Stagnicola palustris (O.F. Müller, 1774)

Bragin region, Gden' village, in the substrate from *Hirundo rustica* nest inside an abandoned wooden house, 1 shell (juv.), 28.07.2020.

Fam. Planorbidae Rafinesque, 1815
Subfam. Planorbinae Rafinesque, 1815

Planorbarius corneus (Linnaeus, 1758)

Bragin region, Nizhnie Zhary village, in *Hirundo rustica* nest inside an abandoned wooden house, 7 shells (juv.), 22.07.2020; Bragin region, Gden' village, in *Hirundo rustica* nest inside an abandoned wooden house, 1 shell (juv.), 28.07.2020; Gomel region, Mirny village, in *Hirundo rustica* nest inside an abandoned brick building, 6 shells (juv.), 01.07.2023.

Bathyomphalus contortus (Linnaeus, 1758)

Gomel region, SW of Zadorovka village, field, in *Hirundo rustica* nest on a shepherd's hut, 4 shells (incl. 1 juv.), 08.05.2023; Gomel region, Mirny village, in *Hirundo rustica* nest inside an abandoned brick building, 1 shell, 01.07.2023.

Superorder EUPULMONATA Haszprunar et Huber, 1990
Order ELLOBIIDA Schrödl in Bouchet et al., 2017
Superfamily ELLOBIOIDEA L. Pfeiffer, 1854

Fam. Ellobiidae L. Pfeiffer, 1854

Subfam. Carychiinae Jeffreys, 1830

Carychium (s. str.) *minimum* O.F. Müller, 1774

Loev region, E of Abakumy village, shore of Lake Bolshoye Borovoye, in *Turdus philomelos* nest in a hollow of an old oak tree, 1 shell, 10.06.2021; Loev region, E of Pervomaisk village, in *Phoenicurus ochruros* nest inside an abandoned woodshed, 2 shells, 25.06.2022.

Order STYLOMMATOPHORA Schmidt, 1855**Suborder ELASMOGNATHA Mörch, 1865****Superfamily SUCCINEOIDEA Beck, 1837****Fam. Succineidae Beck, 1837****Subfam. Succineinae Beck, 1837***Succinella* (s. str.) *oblonga* (Draparnaud, 1801)

Loev region, crossroad between villages Pervomaisk and Koshevoye, in *Motacilla alba* nest inside an abandoned wooden house, 3 shells, 25.06.2022; same locality, in *Phoenicurus ochruros* nest inside an abandoned wooden house, 1 shell, 25.05.2024.

Succinea (s. str.) *putris* (Linnaeus, 1758)

Gomel region, Rudnya Marimonova village, in *Hirundo rustica* nest inside an abandoned wooden house, 3 shells (juv.), 25.06.2024.

Subfam. Oxylomatinae Schileyko et Likharev, 1986*Oxyloma* (s. str.) *elegans* (Risso, 1826)

Dobrush region, NE of Larishchevo village, the edge of the mixed forest, in *Turdus philomelos* nest in a tree crevice on the Iput' River bank, 1 shell, 29.11.2020.

Suborder ORTHURETHRA Pilsbry, 1900**Superfamily PUPILLOIDEA W. Turton, 1831****Fam. Cochlicopidae Pilsbry, 1900****Subfam. Cochlicopinae Pilsbry, 1900***Cochlicopa* (s. str.) *lubrica* (O.F. Müller, 1774)

Gomel region, S of Sharpilovka village, cutting area in the pine forest, in *Sturnus vulgaris* nest inside an abandoned birdhouse, 3 shells (incl. 1 juv.), 21.06.2021.

Cochlicopa (s. str.) *lubricella* (Ziegler in Porro, 1838)

Bragin region, Gden' village, in *Muscicapa striata* nest in an old pear tree hollow, 1 shell, 29.07.2020.

Cochlicopa (s. str.) *pfeifferi* (Weinland, 1879)

Bragin region, Gden' village, in *Muscicapa striata* nest in an old pear tree, 1 shell, 29.07.2020; Khoyniki region, Oktyabr' village, in *Phoenicurus ochruros* nest inside an abandoned wooden house, 1 shell, 29.07.2023.

Cochlicopa (s. str.) *lubricoides* (Potiez et Michaud, 1838)

Gomel region, N of Borets village, pine forest, in *Phoenicurus ochruros* nest inside an abandoned wooden building, 1 shell, 04.06.2022; Loev region, Koshevoye village, in *Hirundo rustica* nest inside an abandoned brick building, 1 shell, 25.06.2022.

Cochlicopa (s. str.) *minima* (Siemaschko, 1847)

Loev region, Koshevoye village, in *Hirundo rustica* nest inside an abandoned brick building, 1 shell, 25.06.2022; Loev region crossroad between villages Pervomaisk and Koshevoye, in *Motacilla alba* nest inside an abandoned wooden house, 2 shells, 25.06.2022; Khoyniki region, Korchevoye village, in *Phoenicurus ochruros* nest inside an abandoned wooden house, 1 shell, 31.07.2023.

Fam. Valloniidae Morse, 1864**Subfam. Valloniinae Morse, 1864***Vallonia* (s. str.) *costata* (O.F. Müller, 1774)

Dobrush region, NE of Larishchevo village, the edge of the mixed forest, in *Turdus philomelos* nest in a tree crevice on the Iput' River bank, 1 shell, 29.11.2020; Buda-Koshelevo region, SW of Rudnya Ol'khovka village, mixed forest, in *Turdus merula* nest in a swampy area of a fir-grove, 1 shell, 23.10.2021; Gomel region, N of Borets village, pine forest, in *Phoenicurus ochruros* nest inside an abandoned wooden building, 1 shell, 04.06.2022; same locality, in *Turdus philomelos* nest under the roof of an abandoned wooden building, 3 shells (incl. 2 juv.), 03.09.2023; Loev region, Koshevoye village, in *Hirundo rustica* nest inside an abandoned brick building, 2 shells, 25.06.2022; Loev region, crossroad between villages Pervomaisk and Koshevoye, in *Motacilla alba* nest inside an abandoned wooden house, 1 shell, 25.06.2022; same locality, in *Phoenicurus phoenicurus* nest inside an abandoned wooden house, 3 shells (incl. 2 juv.), 25.05.2024; Loev region, E of Pervomaisk village, in *Turdus philomelos* nest

behind the window trim of an abandoned wooden house, 1 shell, 25.05.2024; same locality, in *Turdus pilaris* nest in the corner of an abandoned woodshed, 1 shell (juv.), 25.05.2024; same locality, in *Turdus pilaris* nest in the corner of an abandoned woodshed, 1 shell, 13.07.2024; Gomel region, Mirny village, in *Phoenicurus ochruros* nest inside an abandoned brick house, 1 shell, 01.07.2023; Khoyniki region, E of Krasny Pakhar' village, in *Acanthis cannabina* nest under a reinforced concrete bridge over the Veliky Canal in the field, 1 shell, 30.07.2023.

Vallonia (s. str.) *pulchella* (O.F. Müller, 1774)

Bragin region, Gden' village, in *Muscicapa striata* nest in a hollow old pear tree, 3 shells, 29.07.2020; Gomel region, N of Borets village, pine forest, in *Phoenicurus ochruros* nest inside an abandoned wooden building, 1 shell, 04.06.2022; same locality, in *Turdus pilaris* nest under the roof of an abandoned wooden building, 1 shell, 03.09.2023; Khoyniki region, Korchevoye village, in *Phoenicurus phoenicurus* nest inside an abandoned wooden house, 2 shells (incl. 1 juv.), 31.07.2023.

Сем. Truncatellinidae Steenberg, 1925

Truncatellina cylindrica (Férussac, 1807)

Khoyniki region, E of Krasny Pakhar' village, in *Acanthis cannabina* nest under a reinforced concrete bridge over the Veliky Canal in the field, 1 shell, 30.07.2023.

Fam. Vertiginidae Fitzinger, 1833

Vertigo (s. str.) *antivertigo* (Draparnaud, 1801)

Loev region, E of Abakumy village, shore of Lake Bolshoye Borovoye, in *Turdus philomelos* nest in a hollow old oak tree, 1 shell, 10.06.2021; Loev region, E of Pervomaisk village, in *Phoenicurus ochruros* nest inside an abandoned woodshed, 1 shell, 25.06.2022.

Vertigo (s. str.) *pusilla* O.F. Müller, 1774

Loev region, cutting area in the pine forest between villages Svirezha and Karpovka, in *Sturnus vulgaris* nest inside an abandoned birdhouse, 1 shell, 11.06.2021; Buda-Koshelevo region, SW of Rudnya Ol'khovka village, mixed forest, in *Sylvia borin* nest in a swampy area of the clearing, 1 shell, 23.10.2021; Gomel region, N of Borets village, pine forest, in *Phoenicurus ochruros* nest inside an abandoned wooden building, 1 shell, 04.06.2022; same locality, in *Phoenicurus phoenicurus* nest inside an abandoned brick building, 2 shells (incl. 1 juv.), 03.09.2023; Loev region, E of Pervomaisk village, in *Turdus pilaris* nest in the corner of an abandoned woodshed, 5 shells, 13.07.2024; same locality, in *Turdus philomelos* nest in the corner under the roof of an abandoned woodshed, 1 shell, 13.07.2024.

Suborder ACHATINOIDEI Schileyko, 1979

Infraorder CLAUSILIOINEI Nordsieck, 1993

Fam. Clausiliidae Gray, 1855

Subfam. Alopinae Wagner, 1913

Tribe Cochlodinini Lindholm, 1925

Cochlodina (s. str.) *laminata* (Montagu, 1803)

Dobrush region, NE of Larishchevo village, the edge of the mixed forest, in *Turdus philomelos* nest in a tree crevice on the Iput' River bank, 2 shells (juv.), 29.11.2020; Gomel region, N of Borets village, pine forest, in *Turdus philomelos* nest under the roof of an abandoned wooden building, 1 shell (juv.), 03.09.2023.

Suborder SIGMURETHRA Pilsbry, 1900

Infraorder ENDODONTOINEI Schileyko, 1979

Fam. Punctidae Morse, 1864

Punctum (s. str.) *pygmaeum* (Draparnaud, 1801)

Gomel region, N of Borets village, pine forest, in *Turdus philomelos* nest under the roof of an abandoned wooden building, 1 shell, 03.09.2023; same locality, in *Phoenicurus ochruros* nest in the column recess of a brick building, 1 shell, 03.09.2023; Loev region, E of Pervomaisk village, in *Turdus philomelos* nest in the corner under the roof of an abandoned woodshed, 1 shell, 13.07.2024.

Fam. Discidae Thiele, 1931*Discus* (s. str.) *runderatus* (Hartmann, 1821)

Gomel region, S of Gomel city, Novobelitsa forestry, swampy forest near the horticultural partnership “Rodnichok”, in *Turdus philomelos* nest in a hollow of an old pine tree, 1 shell, 03.06.2021.

Infraorder LIMACOINEI Schileyko, 1979**Superfamily ZONITOIDEA Mörch, 1864****Fam. Gastrodontidae Tryon, 1866****Subfam. Gastrodontinae Tryon, 1866***Zonitoides* (s. str.) *nitidus* (O.F. Müller, 1774)

Loev region, E of Abakumy village, shore of Lake Bolshoye Borovoye, in *Turdus philomelos* nest in a hollow of an old oak tree, 1 shell, 10.06.2021.

Fam. Zonitidae Mörch, 1864**Subfam. Godwiniinae Cooke, 1921***Perpolita petronella* (Pfeiffer, 1853)

Loev region, cutting area in the pine forest between villages Svirezha and Karpovka, in *Sturnus vulgaris* nest inside an abandoned birdhouse, 4 shells, 11.06.2021; Gomel region, S of Sharpilovka village, cutting area in the pine forest, in *Sturnus vulgaris* nest inside an abandoned birdhouse, 1 shell, 21.06.2021; Gomel region, N of Borets village, pine forest, in *Phoenicurus ochruros* nest inside an abandoned wooden building, 1 shell, 04.06.2022; Loev region, crossroad between villages Pervomaisk and Koshevoe, in *Motacilla alba* nest inside an abandoned wooden house, 2 shells, 25.06.2022; Gomel region, Mirnyi village, in *Phoenicurus ochruros* nest inside an abandoned brick house, 1 shell (juv.), 01.07.2023; Khoyniki region, E of Krasnyi Pakhar’ village, in *Acanthis cannabina* nest under a reinforced concrete bridge over the Veliky Canal in the field, 2 shells, 30.07.2023.

Perpolita hammonis (Strøm, 1765)

Loev region, cutting area in the pine forest between villages Svirezha and Karpovka, in *Sturnus vulgaris* nest inside an abandoned birdhouse, 4 shells, 11.06.2021; Gomel district, S of Sharpilovka village, cutting area in the pine forest, in *Sturnus vulgaris* nest inside an abandoned birdhouse, 2 shells, 21.06.2021; Loev region, crossroad between villages Pervomaisk and Koshevoe, in *Motacilla alba* nest inside an abandoned wooden house, 2 shells, 25.06.2022; same locality, in *Phoenicurus phoenicurus* nest inside an abandoned wooden house, 1 shell, 25.05.2024; Gomel region, N of Borets village, pine forest, in *Turdus philomelos* nest under the roof of an abandoned wooden building, 2 shells (juv.), 03.09.2023; Loev region, E of Pervomaisk village, in *Turdus philomelos* nest behind the window trim of an abandoned wooden house, 3 shells (incl. 2 juv.), 25.05.2024.

Superfamily VITRINOIDEA Fitzinger, 1833**Fam. Vitrinidae Fitzinger, 1833****Subfam. Vitrininae Fitzinger, 1833***Vitrina pellucida* (O.F. Müller, 1774)

Loev region, cutting area in the pine forest between villages Svirezha and Karpovka, in *Sturnus vulgaris* nest inside an abandoned birdhouse, 1 shell, 11.06.2021; Loev region, crossroad between villages Pervomaisk and Koshevoe, in *Motacilla alba* nest inside an abandoned wooden house, 1 shell, 25.06.2022; same locality, in *Phoenicurus phoenicurus* nest inside an abandoned wooden house, 2 shells, 25.05.2024.

Superfamily HELICARIONOIDEA Bourguignat, 1877**Fam. Euconulidae Baker, 1928****Subfam. Euconulinae Baker, 1928***Euconulus* (s. str.) *fulvus* (O.F. Müller, 1774)

Loev region, E of Abakumy village, shore of Lake Bolshoye Borovoye, in *Turdus philomelos* nest in a hollow of an old oak tree, 2 shells, 10.06.2021; Loev region, cutting area in the pine forest between villages Svirezha and Karpovka, in *Sturnus vulgaris* nest inside an abandoned birdhouse, 1 shell,

11.06.2021; Loev region, E of Pervomaisk village, in *Turdus pilaris* nest in the corner of an abandoned woodshed, 1 shell, 13.07.2024.

Infraorder HELICOINEI Schileyko, 1979
Superfamily XANTHONYCHOIDEA Pfeffer, 1880

Fam. Bradybaenidae Pilsbry, 1939
Subfam. Bradybaeninae Pilsbry, 1939
Fruticicola fruticum (O.F. Müller, 1774)

Dobrush region, NE of Larishchevo village, the edge of the mixed forest, in *Turdus philomelos* nest in a tree crevice on the Iput' River bank, 5 shells (juv.), 29.11.2020; Buda-Koshelevo region, SW of Rudnya Ol'khovka village, mixed forest, in *Sylvia borin* nest in a swampy area of the clearing, 1 shell (juv.), 23.10.2021; Loev region, E of Pervomaisk village, in *Turdus pilaris* nest in the corner of an abandoned woodshed, 1 shell (juv.), 1 living snail, 13.07.2024.

Superfamily HYGROMIOIDEA Tryon, 1866

Fam. Hydromiidae Tryon, 1866
Subfam. Trochulinae Lindholm, 1927
Tribe Trochulini Lindholm, 1927
Trochulus (s. str.) *hispidus* (Linnaeus, 1758).

Buda-Koshelevo region, Uza village, railway station, in *Phoenicurus ochruros* nest in the wall recess of an abandoned brick building, 1 shell, 01.11.2020.

Discussion

The results of the conducted research suggest that the collected shell samples belong to 29 species of mollusks, 5 of which are aquatic (*Euglesa pseudosphaerium*, *Valvata macrostoma*, *Stagnicola palustris*, *Planorbarius corneus*, *Bathymphalus contortus*) and 24 terrestrial (*Carychium minimum*, *Succinella oblonga*, *Succinea putris*, *Oxyloma elegans*, *Cochlicopa lubrica*, *Cochlicopa lubricella*, *Cochlicopa pfeifferi*, *Cochlicopa lubricoides*, *Cochlicopa minima*, *Vallonia costata*, *Vallonia pulchella*, *Truncatellina cylindrica*, *Vertigo antivertigo*, *Vertigo pusilla*, *Cochlodina laminata*, *Punctum pygmaeum*, *Discus ruderatus*, *Zonitoides nitidus*, *Perpolita petronella*, *Perpolita hammonis*, *Vitrina pellucida*, *Euconulus fulvus*, *Fruticicola fruticum*, *Trochulus hispidus*) species.

The collected shells could get into the nests of passerine birds in different ways. Some of the terrestrial mollusks could theoretically appear in bird nests due to their characteristic vertical movements (Gnatina and Ribka, 2013; Zemoglyadchuk, 2004). This can explain, for example, the presence of *Fruticicola fruticum* in the nests of Song Thush, Fieldfare and Garden Warbler, as well as *Cochlodina laminata* shells in the nest of Song Thush. Similar, *Vertigo antivertigo* could get into the nests of Song Thush and Black Redstart, *Vertigo pusilla* into the nests of Common Starling, Song Thush, Fieldfare, Garden Warbler, Common Redstart and Black Redstart, as well as *Truncatellina cylindrica* into the nest of Common Linnet. It is noteworthy that the latter mollusk is considered rare and is included into Appendix of the Red Book of Belarus (2015).

It is known that many passerine birds feed mollusks to chicks (Allen, 2004; Akramovsky, 1970; Bel'sky et al., 1998; Berezantseva, 1997; Kiss et al., 1978; Korniyushin et al., 1984; Prokofieva, 2008; Rosin et al., 2011). Findings in the nests of damaged shells of *Cochlicopa* spp., *Zonitoides nitidus*, *Perpolita hammonis* and *Vitrina pellucida* with mollusk remains indicate that they were apparently brought by birds as food for chicks.

When feeding chicks, birds sometimes lose some food they bring. This can happen both when approaching the nests, and already in the nest itself. In addition, chicks regurgitate some invertebrates with rough coats (Bel'sky et al., 1998; Graveland, 1996). Mollusks fallen to the ground may find themselves in suitable conditions for life. Since the individual activity of many of them is limited both by their slowness and specific habitat conditions, the participation of birds in their settlement is of great importance in the formation of the malacofauna of natural and anthropogenic ecosystems (Maciorowski et al., 2012; Shikov and Vinogradov, 2013).

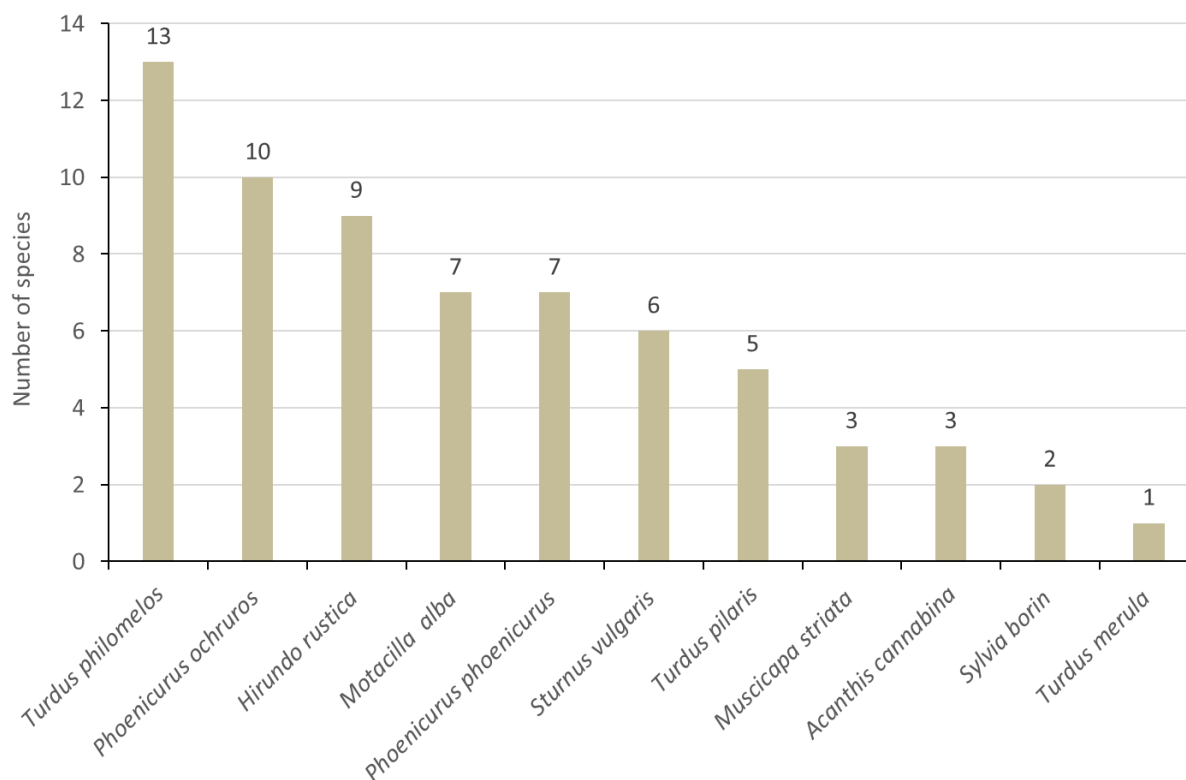


Fig. 1. The number of species of mollusks in the nests of passerine birds.

And finally, the third option is the shells entry into the nest. Inside the shells of *Valvata macrostoma*, *Carychium minimum*, *Oxyloma elegans*, some shells of *Vallonia* spp. and *Cochlicopa* spp. there were soil particles, and the shells of *Euglesa pseudosphaerium*, *Stagnicola palustris*, *Planorbarius corneus*, *Bathyomphalus contortus* and *Succinella oblonga* were completely clogged with soil. This indicates that the mollusks had died in their natural environment and were brought by birds with the substrate used in nest construction.

It should be also noted that the intact shells of *Cochlicopa* spp. and juvenile *Succinea putris*, *Cochlodina laminata* and *Fruticicola fruticum* contained remnants of mollusk tissues. This suggests that the mollusks lived in the nest for some time.

Interestingly, the species composition and abundance of mollusks vary markedly in the nests of the studied bird species. Thus, 24.5% of all collected shells were found in the nests of Barn Swallow, 20.1% – Song Thush, 12.2% – Common Starling, 9.4% – Black Redstart, 8.6% each – White Wagtail and Common Redstart, 7.9% – Fieldfare, 3.6% – Spotted Flycatcher, 2.9% – Common Linnet, 1.4% – Garden Warbler, 0.7% – Common Blackbird. The greatest species diversity of mollusk shells was noted in the nests of Song Thush, Black Redstart, Barn Swallow, White Wagtail, Common Redstart and Common Starling (Fig. 1).

The frequency of occurrence of mollusk shells in the nests of passerine birds is obviously related both to the biology of the birds themselves, and to the location of the nest, its height from the surface of the earth and, possibly, some other factors, the role of which has yet to be clarified.

Conclusions

Thus, the shells of 5 aquatic and 24 terrestrial mollusks from 19 families were found in the nests of passerine birds in the Gomel region. One of them, *Truncatellina cylindrica*, is included into Appendix of the Red Book of Belarus (2015).

The greatest species diversity and abundance of mollusk shells were noted in the nests of the Song Thush, Black Redstart, Barn Swallow, White Wagtail, Common Redstart and Common Starling. The

most widespread and numerous species of mollusks in our collections from the nests of passerine birds are *Vallonia costata*, *Vertigo pusilla*, *Perpolita petronella* and *Perpolita hammonis*.

The collected mollusk shells could have entered bird nests in three different ways: independently in search of food or shelter, brought by birds as food for chicks, and also accidentally or intentionally introduced by birds with nesting material during nest constructions.

Since many aspects of the use of mollusks by birds as a food item are still poorly understood, further research in this direction is expected to provide the additional valuable information about the places and methods of collecting mollusks by birds, the flight distances of the latter, etc. Malacologists, in turn, will be able to use this material to characterize the malacofauna of a particular region and clarify the ranges of individual species.

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