Acarina 8 (2): 157–165

GAMASID MITES FROM DIFFERENT TYPES OF BIRD NESTS IN BYELORUSSIA

ГАМАЗОВЫЕ КЛЕЩИ РАЗЛИЧНЫХ ТИПОВ ГНЕЗДОВИЙ ПТИЦ БЕЛАРУСИ

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Key words: gamasid mites, fauna, birds, Byelorussia
Ключевые слова: гамазовые клещи, фауна, птицы, Беларусь

ABSTRACT

The fauna of gamasid mites, their trophic structure as well as some peculiarities of the formation of their micropopulations in microbiocenoses of bird nests were made known in the course of the faunistical and ecological survey of the complex of bird ectoparasites and inhabitants of theirnests in Byelorussia. Both qualitative and quantitative characteristics of the gamasid mite bird nest complex were revealed. It is shown that those parameters are dependent on the bird host ecology, the placement and type of its nest, its microclimatic conditions, the origin of the nest material.

РЕЗЮМЕ

В результате эколого-фаунистического исследования комплекса эктопаразитов птиц и обитателей их гнезд выявлена фауна гамазовых клещей, их трофическая структура, а также закономерности формирования микропопуляций гамазид в микробиоценозах гнезд птиц. Установлены качественные и количественные особенности фаунистических комплексов гамазовых клещей, показана их зависимость от особенностей экологии хозяина, места расположения гнезда, типа гнездовой постройки, гнездового материала и микроклиматических условий гнезда.

MATERIAL AND METHODS

According to Chikilevskaya et al. [1998], 222 species of mesostigmatic mites are known in the fauna of Byelorussia, which belong to 25 families: Sejidae — 1 species, Microgyniidae — 2, Epicriidae — 1, Celaenopsidae — 1, Parasitidae — 30, Veigaiaidae — 5, Ameroseiidae — 7, Aceosejidae — 23, Phytoseiidae — 10, Antennoseiidae — 3, Rhodacaridae — 10, Ologamasidae — 1, Macrochelidae — 15, Pachylaelaptidae— 5, Laelaptidae — 42, Eviphididae — 6, Haemogamasidae — 7, Hirstionyssidae — 8, Macronyssidae — 7, Dermanyssidae — 5, Spinturnicidae — 2, Varroidae — 1, Zerconidae — 10, Trachytidae— 4, Uropodidae — 16. Of this number the gamasid mites account for 197 species, representing 19 families. The survey of 2039 bird nests conducted by the author in 1973–1999 and the data of other researchers obtained both for bird nests and birds themselves indicate that at least 65 species of 15 families of bird-associated mesostigmatic mites can be found in Byelorussia (Table 1). This number includes 62 species of gamasid mites belonging to 12 families, which are entomophagous (53.2%), facultative (25.8%) or obligatory (16.1%) haematophagous, and saprophagous (14.9 %). The affiliation of the particular species to a certain trophic group was made according to Zemskaya [1973] and others.

The leading factors in the formation of the faunistic complexes of gamasid mites are the following: the peculiarities of the ecology of the nest hosts; the biotope in which the nest is located; the type of the nest construction; the nature of the nest material as well as the microclimatic conditions. Correspondingly, we distinguish four types of nests in accordance with their localization:

I. Sheltered level ground nests (burrows, spaces under stumps and logs etc.): *Riparia riparia, Erithacus rubecula, Oenanthe oenanthe.*

II. Unsheltered level ground nests: *Anas strepera, Alauda arvensis, Motacillaflava, M. alba, Anthus trivialis, Phylloscopus trochilis, Emberiza citrinella, E. schoeniclus.*

III. Unsheltered above ground nests: *Ciconia ciconia, Lanius collurio, Acrophpahalus arundinaceus, Troglodites troglodites, Turdus iliacus, T. philomelos, T. pilaris, T. merula, Muscicapa striata, Sylvia nizoria, S. communis, S. atricapila, Fringilla coelebs, Chloris chloris, Cannabina cannabina, Coccothraustes coccothraustes, Garrulus glandarius, Corvus fringilegus, Pica pica, Corvus cornix.*

IV. Sheltered above ground nests (hollows, semi-hollows and various concealed places, also man-provided shelters in settlements): *Columba livia, Upupa epops, Hirundo rustica, Delichon urbi-*

Table 1. Mesostigmatic mites of birds and their nest in Belarus
Таблица 1. Мезостигматические клещи птиц и их гнезд в Беларуси

Family and species of arthropods	Localization	Species of birds	Reference
Sejidae Berlese,1895			
Sejus togatus C.L.Koch, 1836	Nest	*Turdus philomelos, T.merula*	5, 6
Celaenopsidae Berlese, 1892			
Celaenopsis badius C.L.Koch, 1836	Nest	*Sturnus vulgaris*	5, 6
Parasitidae Oudemans, 1901			
Parasitus (*Eugamasus*) *kraepelini* Berlese, 1904	Nest	*Riparia riparia*	9, 5, 6
P.(E.) oudemansi Berlese, 1903	Nect	*Riparia riparia*	5
P.(E.) berlesei (Willmann, 1935)	Nest	*Riparia riparia*	5
P.(E.) magnus Kramer, 1876	Nest	*Corvus frugilegus*	Unpubl. Data
P. (Coleogamasus) lunaris (Berlese,1882)	Nest	*Riparia riparia, Corvus frugilegus*	9, 5, 6
P.(C.) coleoptratorum (Linne, 1758)	Nest	*Riparia riparia*	9, 5, 6
P.(C.) fimetorum Berlese, 1903	Nest	*Riparia riparia*	9, 5, 6
Gamasodes bispinosus (Halbert, 1915)	Nest	*Corvus frugilegus*	9, 5, 6
Poecilochirus necrophori Vitzthum, 1930	Nest	*Riparia riparia*	9, 5, 6
Pergamasus (*Pergamasus*) *crassipes* (Linne, 1758)	Nest	*Riparia riparia, Turdus philomelos, Parus major, P.caeruleus*	9, 5, 6
P.(Paragamasus) misellus Berlese, 1903	Nest	*Corvus frugilegus*	5, 6
P.(P.) lapponicus Tragardh, 1910	Nest	*Corvus frugilegus*	5, 6
Holoparasitus excipuliger (Berlese, 1905)	Nest	*Anas strepera, Turdus philomelos, Sylvia nisoria, Corvus frugilegus*	5, 6
Veigaidae Oudemans, 1939			
Veigaia nemorensis (C.L.Koch, 1839)	Nest	*Riparia riparia*	9, 5 ,6
Aceosejidae Baker et Wharton, 1952			
Lasioseius penicilliger Berlese, 1916	Nest	*Corvus frugilegus*	5, 7
Proctolaelaps pygmaeus (Muller, 1860)	Nest	*Jynx torquilla, Riparia riparia, Turdus pilaris, Lanius collurio, Corvus corone, C.frugilegus, Sturnus vulgaris, Carduelis cannabina*	9, 5, 6
Rhodacaridae Oudemans, 1902			
Asca bicornis (Canestrini et Fanzago, 1877)	Nest	*Turdus philomelos*	5, 6
Cyrtolaelaps chiropterae Karg, 1971	Nest	*Turdus pilaris, Corvus frugilegus, Sturnus vulgaris*	5, 6
C. mucronatus G.et Canestrini, 1881	Nest	*Turdus merula, Sturnus vulgaris*	5, 6
Euryparasitus emarginatus (C.L.Koch, 1839)	Nest	*Riparia riparia*	9, 5, 6

Notes.The numerals in the table correspond to the numbers in the list of the quoted literature.
Примечание. Цифры в таблице соответствуют номерам в списке цитированной литературы.

Table 1. Continued
Таблица 1. Продолжение

Macrochelidae Vitzthum, 1930			
Macrocheles decoloratus (C.L.Koch, 1839)	Nest	*Riparia riparia, Passer montanus*	9, 5, 6
	Bird	*Dendrocopos major, Turdus pilaris*	5, 6
M. glaber (Muller, 1860)	Nest	*Turdus pilaris, Passer domesticus, Emberiza citrinella*	
M. matrius matrius (Hull, 1925)	Bird	*Passer domesticus, P.montanus*	5, 6
Laelaptidae Berlese, 1892			
Hypoaspis (Geolaelaps) heselhausi Oudemans, 1912	Nest	*Ciconia ciconia, Anas platyrhynchos, Columba oenas, Coracias garrulus, Turdus philomelos, Parus major, Sturnus vulgaris, Passer montanus, Fringilla coelebs*	5, 6
H.(G.) aculeifer Canestrini, 1883	Nest	*Riparia riparia*	9, 5, 6
	Bird	*Passer montanus*	5, 6
H.(G.) lubrica Oudemans et Voigts, 1904	Nest	*Riparia riparia, Dendrocopos major, Turdus vulgaris, Ficedula hypoleuca, Parus major*	28, 9, 10, 11, 15, 5, 6
H.(Gymnolaelaps) austriacus (Sellnick, 1935	Nest	*Alauda arvensis*	5, 6
H.(Euandrolaelaps) sardous (Berlese, 1911)		*Parus major*	5, 6
H.(E.) karawaiewi (Berlese, 1903)	Nest	*Passer montanus*	5, 6
Androlaelaps glasgowi (Berlese, 1903)	Bird	*Aquila pomarina, Riparia riparia*	34, 1, 5
	Bird	*Dendrocopos major, Picus viridis, Anthus trivialis, Lanius collurio, Turdus pilaris, T.philomelos, Sylvia atricapilla, S.nisoria, Fringilla coelebs, Coccothraustes coccothraustes, Corvus monedula*	34, 1, 22
A. casalis (Berlese, 1887)	Nest	*Columba livia, Apus apus, Coracias garrulus , Dendrocopus major, Alauda arvensis, Hirundo rustica, Delichon urbica, Anthus trivialis, Motacilla alba, Erithacus rubecula, Turdus philomelos, T.merula, Sylvia atricapilla, S.isoria, Ficedula striata, F.hypoleuca, Parus major, P.caeruleus, Fringilla coelebs, Chlorus chlorus, Cannabina cannabina, Coccothraustes coccothraustes, Passer montanus, Sturnus vulgaris, Corvus frugilegus, C.cornix*	21, 1, 20, 22, 26, 27, 7, 28, 8, 9, 10, 11, 15, 16, 18, 23, 25, 5, 29, 17
	Bird	*Asio frammeus, Dendrocopos major*	34
Eulaelaps stabularis (C.L.Koch, 1836)	Nest	*Dendrocopos major, Passer montanus, Hirundo rustica, Erithacus rubecula, Ficedula hypoleuca, Parus major, Passer montanus, Sturnus vulgaris, Corvus frugilegus*	34, 1, 22, 26, 9, 24, 5

Table 1. Continued
Таблица 1. Продолжение

E. novus (Vitzthum) in Davidova et Nicolsky, 1986	Nest	*Riparia riparia*	35, 25, 26, 27, 9, 10, 11, 15, 16, 24, 5
E. kolpakovae Bregetova, 1950	Nest	*Riparia riparia*	31, 5
Laelaps muris (Ljungh, 1799)	Bird	*Asio flammeus, Dendrocopos major, Phylloscopus sibilatrix, Pica pica*	5
L.algericus Hirst, 1925	Bird	*Columba livia*	1
	Nest	*Columba livia, Passer domesticus*	1, 5
L. agilis C.L.Koch, 1836	Bird	*Dendrocopos major, Lanius collurio, Anthus trivialis, Emberiza citrinella, Fringilla coelebs*	2, 34, 4, 1, 33, 5
L. hilaris C.L.Koch, 1836	Bird	*Turdus merula, Phylloscopus trochilus*	34
L. pavlovskyi Zachvatkin, 1948	Bird	*Turdus merula, Anthus trivialis, Lanius collurio*	34, 1, 5
Hyperlaelaps amphibius Zachvatkini, 1948	Bird	*Asio flammeus*	1, 5
H. arvalis (Zachvatkin, 1948)	Bird	*Asio flammeus, Dendrocopos major, Pica pica*	1, 5
Myonyssus rossicus Bregetova, 1948	Bird	*Anas strepera*	34
Eviphididae Berlese, 1913			
Eviphis ostrinus (C.L.Koch, 1936)	Nest	*Turdus philomelos, T.pilarus, Phylloscopus trochilus*	30, 1
Haemogamasidae Oudemans, 1926			
Haemogamasus pontiger Berlese, 1914	Nest	*Ficedula hypoleuca, F. sriata, Parus major, Fringilla coelebs*	2, 3, 1, 22
Hg. horridus Michael, 1892	Bird	*Dendrocopos major, Turdus philomelos*	34, 32, 1
	Nest	*Turdus merula*	34
Hg. nidi Michael, 1892	Bird	*Dendrocopos major, Turdus merula*	2,3,32,1,22
Hg. hirsutus Berlese, 1889	Nest	*Turdus merula*	2, 32, 22, 28
Hg. ambulans (Thorell, 1872	Bird	*Asio flammeus*	32
	Nest	*Riparia riparia, Sturnus vulgaris*	1, 21, 25, 26, 28, 9, 11, 24,15
Hirstionyssidae Evans et Till, 1966			
Hirstionyssus isabellinus Oudemans,1913	Bird	*Aquila pomarina*	2, 30, 1, 5
	Nest	*Turdus merula*	34
Hi. pauli Wilmann, 1952	Bird	*Parus major*	30
	Nest	*Passer montanus*	1, 5
Hi. musculi (Johnston, 1849	Bird	*Erithacus rubecula*	1, 5

Table 1. End
Таблица 1. Окончание

Macronyssidae Oudemans, 1936			
Steatonyssus periblepharus Kolenati, 1858	Nest	*Sturnus vulgaris*	22
	Bird	*Motacilla alba, M. flava, Saxicola rubetra, Dendrocopos major, Turdus philomelos, Passer montanus, Oriolus oriolus*	30, 32, 1
Ornithonyssus sylviarum (Canestrini et Fanzago, 1877)	Nest	*Columba livia, Jynx torquilla, Alauda Columba livia, Jynx torquilla, Alauda arvensis, Motacilla alba, Anthus trivialis, Erithacus rubecula, Turdus pilaris, T.philomelos, T.iliacus, Parus major, Sylvia nisoria, S.communis, S.tricapila, Acrocephalus paludicola, Muscicapa striata, Fringilla coelebs, Cannabina cannabina, Chloris chloris, Parus montanus, Sturnus vulgaris., Garrulus glandarius, Corvus frugilegus*	22, 27, 23, 24, 5, 29, 17, 18
O. pavlovskyi Lange, 1959	Nest		19
Dermanyssidae (De Geer, 1778) Duges, 1834			
	Bird	*Philomachus pugnax, Picus viridis, Delichon urbica, Hirundo rustica, Sturnus vulgaris*	3, 1, 29
Dermanyssus gallinae (De Geer, 1778)	Nest	*Columba livia, Motacilla alba, Lanius collurio, Erithacus rubecula, Troglodytes troglodytes, Turdus iliacus, T.philomelos, Sylvia atricapilla, Phylloscopus trochilus, Emberiza schoeniclus, E.citrinella, Parus major, Fringilla coelebs, Chloris chloris, Cannabina cannabina, Passer domesticus, P.montanus, Garrulus glandarius, Corvus monedula, C. frugilegus, Pica pica*	32, 19, 20, 21, 27, 23, 24, 12, 13, 14, 15, 5, 29, 17, 18
	Bird	*Hirundo rustica, Delochon urbica*	31, 32, 19
D. hirundinis (Herm.) Berlese, 1804	Nest	*Columba livia, Delichon urbica, Hirundo rustica, Riparia riparia, Parus major, Passer domesticus, P. montanus, Sturnus vulgaris, Corvus frugilegus*	20, 22, 27, 9, 23, 24, 12, 13, 5, 29, 14, 15, 18
D. passerinus (Berlese et Trouessart, 1885)	Nest	*Hirundo rustica, Passer montanus, P. domesticus, Sturnus vulgaris*	32, 19, 20, 22, 27, 9, 5, 29, 18
D. quintus Vitzthum, 1920	Bird	*Dendrocopos major, Corvus monedula*	1, 5
D. grochovskae Zemskaja, 1961	Bird	*Dendrocopos major, Lanius collurio, Tringa ochropus, Passer domesticus*	30, 32, 5
Zerconidae Canestrini, 1891			
Zercon zelawaiensis Sellnick, 1944	Nest	*Ficedula hypoleuca, Lanius collurio*	5, 6
Z. triangularis C.L.Koch, 1836	Nest	*Turdus pilaris, Ficedula hypoleuca*	5, 6
Uropodidae Berlese, 1892			
Uroseius (Apionoseius) infirmus (Berlese, 1887)	Nest	*Corvus frugilegus*	6

ca, Apus apus, Coracius garrulus, Jynx torquilla, Parus caeruleus, P. palustris, P. major, P. cristatus, Certhia familaris, Ficedula hypoleuca, Passer domesticus, Passer montanus, Sturnus vulgaris.

RESULTS AND DISCUSSION

The fauna of gamasid mites of the nest type I is characterized by the absence of obligatory hematophages with only entomophagous and saprophagous mites being present. The greatest species diversity of mites (21 species) was recorded in the nests of the bank swallow.

The species diversity is found to be lower in the nests of the type II. The community included the obligatory hematophages of the family Dermanyssidae *(Emberiza citrinella, E. schoeniclus)*, *Ornithonyssus sylviarum (Alauda arvensis, Anthus trivialis, Motacilla alba),* and the facultatively hematophagous *Androlaelaps casalis.* The free-living, soil-inhabiting species are more diverse in this nest type due to their migration to nests from the ambient biotope. The greatest number of gamasid mites was recorded in the nests of *Emberiza citrinella* and *Motacilla alba.*

In the type III nests the number of nonparasitic species is reduced whereas the number of hematophages, both obligatory (the family Dermanyssidae, *O. sylviarum)* and facultative (*A. casalis*) ones, is high.

In the natural forest biotopes the high number of the mites *O.sylviarum* was recorded. The relative abundance (RA) of gamasid mites in the nests of *Sylvia atricapila* was 134.4 mites per nest, and the index of dominance (ID) equaled 97.9%. In the nests of *Chloris chloris* RA was 721.8 mites per nest and ID was 99.9%. It is worthy to note that rather a high number of nonparasitic species of mites was registered in the nests of *Corvus fringilegus* and *Corvus cornix.* Most likely this phenomenon is explained by the high humidity level of the nest material. The species of the familes Parasitidae, Uropodidae and others are abundant in the nests of this type.

The high number of mites of the obligatory hematophagous family Dermanyssidae (*Hirundo rustica, Delichon urbica, Columba livia)*, the facultative hematophagous mite *A. casalis (Sturnus vulgaris, Ficedula hypoleuca, Passer montanus*) and the nonparasitic species inhabiting the wet and decaying substrata characterize the type IV nest. The high humidity, which is attributive to this type of nests, produces a strong effect on the mite fauna. The number of *D. gallinae* in the nests of *Columba livia* was high with ID being 97.5 %, and RA 237.8 mites per nest. In the nests of *Delichon urbica* ID was 78.5 %, while RA equaled 98.5 mites per nest. The large number of the mites *A. casalis* was recorded in the nests of *Ficedula hypoleuca* (ID 57.7 %, RA 78,5 mites per nest) and *Passer montanus* (ID 60.5%, RA 66.1 mites per nest).

The phylogenetically and ecologically related species of birds of the family Hirundinidae *(Riparia riparia, Hirundo rustica, Delichon urbica*) were selected by us for the comparative analysis of the faunistic complexes of the nest-dwelling gamasid mites.

Riparia riparia and *Delichon urbica* build nests altogether, forming colonies, whereas *Hirundo rustica* is a solitary species. The nests of these three species of birds are sheltered, but in a various degree. The birds try to make a well-protected shelter. In *Delichon urbica* the relevant role is played by the closed nest chamber whereas in *Hirundo rustica* the arrangement of the nest itself is more important factor. This results in different microclimatic conditions in the nests of these species. The leading factors determining the nest microclimate are the temperature and humidity levels. As it is known most of the nest inhabitants, including gamasid mites, live in the material, of which the nest is built. The daily fluctuations of temperature are minor in the nests of a sheltered type: the burrows of *Riparia riparia* and the nests of *Delichon urbica.* The relatively unstable microclimate is a characteristic of the nests of *Hirundo rustica.* The latter species isolates the eggs and the nestlings from the strong cooling at night and superheating during the afternoon, but to a much lesser degree than *Riparia riparia* does. The daily fluctuations of the temperature and humidity levels in the nests of *Delichon urbica* have intermediate values.

Twenty-one species of gamasid mites constituting 22.9 % of all nidicolous inhabitants (RA equals 41.8 mites per bird) were registered in the nests of *Riparia riparia* in Byelorussia. *Hypoaspis lubrica* (ID is 32.04 %, and the intensity of the nest infestation (PI) is 57.7%) and *Macrocheles decoloratus* (ID 22.7 %, PI 51.2%) dominate. The species *Haemogamasus ambulans* (ID 12.1 %, PI 44.7%), *Eulaelaps novus* (ID 17.3 %, PI 50.2%) and *Proctolaelaps pygmaeus* (ID 11,12 %, PI 11.1%) are less numerous. The largest abundance is recorded for *Hypoaspis lubrica* (RI 10.5 mites per nest), *Macrocheles decoloratus* (RI 10.4 mites per nest) and *Eulaelaps novus* (RI 7.8 mites per nest). The latter species was reported only from the nests of *Riparia riparia.* The absence of obligatory hematophagous gamasid mites also characterizes the nests of *Riparia riparia.*

Three species of gamasid mites (13.4 % from all nidicolous inhabitants, RA 117.3 mites per nest) were registered in the above ground nests of *Delichon urbica.* From them 99.9 % were represented by the obligatory hematophagous mites of

the family Dermanyssidae (*D. gallinae, D. hirundinis*). Single individuals of *A.casalis* were also found. The species *D. gallinae* and *D. hirundinis* dominate among the mites of the family Dermanyssidae in most bird nests in Byelorussia.

In the nests of *Hirundo rustica* the portion of gamasid mites among the nidicolous inhabitants was greatest (ID 94.8%, RI 575.2 mites per nest) with the mites of the family Dermanyssidae constituting 99.1 %. Of this number, 78.2 % were represented by the species *D. hirundinis*.

The faunistic complexes of gamasid mites in bird nests are formed in various ways. The parasitic species of gamasid mites are introduced into nests by birds, transferring them from their old nests, or attracted to the nest at the time of its building from the nearby last year nests. A large number of entomophagous and saprophagous species of mites are attracted from the habitat surrounding the newly built nest or brought there by birds with the nest building material. Nests provide favorable conditions and a sufficient amount of nutrition for the survival of new settlers. After the departure of nestlings from the nests the number of the nest-inhabiting species grows in a result of their continuing reproduction. Then the gradual destruction of the steady links in the nest microbiocenosis takes place. With the long absence of the host the number of hematophagous mites among the Gamasina reduces resulting from predation by their entomophagous and facultative hematophagous nest coinhabitants. Then the process of the sluggish disintegration of the nest substratum gets started. The number of saprophagous mites becomes augmented. The latter supports at a constant level those gamasid mites that retained their capacity to entomophagy. Later on, in the course of succession, the mites migrate to other substrata causing a decrease both in the gamasid mite abundance and species richness.

CONCLUSION

The high species richness of nonparasitic gamasid mites and the absence of obligatory hematophages characterize the gamasid mite fauna of the type I nests and, in particular, those of *Riparia riparia*. The parasitic species of gamasid mites, found in the nests of *Riparia riparia*, demonstrate various stages of the facultative hematophagy. They can survive unfavorable periods when the host is unavailable by practicing entomophagy. This strategy is explained by the fact that the nesting period in *Riparia riparia* is less than two months long. After the arrival in spring of the following year the birds start digging new burrows. Only in rare cases they visit the old ones as for the nighttime rest. Therefore the nests of this species of birds have unfavorable conditions for the existence of micropopulations of the obligatory hematophagous gamasid mites. The isolation of the nests of the phylogenetically and ecologically related species of birds of the family Hirundinidae, *Hirundo rustica* and *Delichon urbica*, from the soil leads to a decreased number of soil-inhabiting species of mites and the domination of the obligatory hematophagous mites there. Also this pattern results from the very favorable conditions in the nests of these species of birds for this grouping of mites: multiple usage of the nest, small distances between individual nests, organized in the colonies, the capacity of several species of mites to active moving, and also visiting of the nests of swallows by birds of other species (for example, by sparrows) during the time the host species is absent from the nest. The species richness and abundance of the nonparasitic gamasid mites in the above ground bird nests depend on the nature of the nest construction. In the nests with the closed nest chamber the microclimate conditions are most favorable for the existence of numerous saprophagous and entomophagous mites. Sharp temperature fluctuations and relatively lower humidity level in the unsheltered level ground nests result in less favorable conditions for the nonparasitic species of gamasid mites there. In this type of nests the main portion of gamasid mites is represented by the obligatory hematophagous species. The period when the birds incubate the eggs and then feed their nestlings presents the favorable conditions for the feeding and reproduction of these mites.

By inventorying the gamasid mites in the nests of birds we obtained the data supporting the conclusions of other researchers about the role played by gamasid mites as reservoirs and carriers of disease agents in the natural foci of arboviral infections. For example, the virus of the tick-borne encephalitis (TBE) was reported from gamasid mites of the bank swallow [Voinov et al., 1975].

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