

## FEATHER MITES OF HIRUNDINID BIRDS FROM THE SOUTH AND SOUTH-EAST OF KAZAKHSTAN

### ПЕРЬЕВЫЕ КЛЕЩИ ЛАСТОЧКОВЫХ ПТИЦ ЮГА И ЮГО-ВОСТОКА КАЗАХСТАНА

Z.Z. Sayakova, T.N. Doszhanov

З.З. Саякова, Т.Н. Досжанов

Institute of Zoology, Almaty, Kazakhstan; e-mail: InstZoo@nursat.kz

Институт зоологии, Алматы, Казахстан; e-mail: InstZoo@nursat.kz

Key words: Astigmata, Analgoidea, fauna, seasonal dynamics, Hirundinidae, Kazakhstan

Ключевые слова: Astigmata, Analgoidea, фауна, сезонная динамика, Hirundinidae, Казахстан

#### ABSTRACT

Data on biodiversity and ecology of feather mites associated with the hirundinid birds (Hirundinidae) in the south and south-east of Kazakhstan are presented. Seasonal changes in the populations of feather mites of the genera *Scutulanysus* and *Trouessartia* (abundance, sex and age composition) were studied in four hirundinid host species.

#### РЕЗЮМЕ

Приводятся сведения по видовому составу и экологии перьевых клещей, обитающих на ласточковых птицах (Hirundinidae) на юге и юго-востоке Казахстана. Исследования сезонных изменений в популяциях клещей родов *Scutulanysus* и *Trouessartia* (численность, половой и возрастной состав) были прослежены у 4 видов ласточковых птиц.

#### INTRODUCTION

Studies of feather mites, the most numerous and highly specialized group of permanent parasites of birds, are mainly directed in the present time to recovering their biodiversity and up-dating their classification. Ecological researches dealing with feather mites are quite limited and any fundamental publications, except for the monographic works of Dubinin [1951, 1956] are absent. General studies on parasitic mites associated with the hirundinid birds were carried out by Dogiel and Navtsevich [1936] and were based on the material collected in the European part of Russia. Feather mites parasitizing the hirundinid birds were studied in Moldavia [Shumilo, 1968], Kyrgyzstan [Chirov, 1982] and Byelorussia [Efremova, 1988]. Fragmentary data on the feather mites living on this group of birds were also obtained in some areas of Russia [Mironov, 1983a; 1983b, 1989; Akhmetzyanova et al., 1991].

Feather mites associated with the galliform birds in Kazakhstan were examined by Dubinin [1950] based on the material collected in the neighborhoods of Almaty (Ili River) by E.V. Gvozdev. Later on, the studies on feather mites living on various passerine and non-passerine birds were carried out at the bird-ringing station "Chokpak".

#### MATERIAL AND METHODS

The feather mite material used in the present study was collected from the barn swallows *Hirundo rustica* L., house martins *Delichon urbica* (L.), sand martins *Riparia riparia* (L.), and red-rumped swallows *Hirundo daurica* L., which were caught for ringing in spring (May) and autumn (September) at the bird-ringing station "Chokpak" located in the foothills of the Western Tien Shan (Karatau range). Also the material was obtained from sand martins caught in summer (July) at the Ornithological station "Alakol" located on the north-west coast of the Alakol lake, south-east Kazakhstan. The material for the present study was collected in 1992–1995 according to the method proposed by Dubinina [1971]. The host data (sex, age, weight) were also registered.

#### RESULTS

Five species of hirundinid birds are known in the part of Kazakhstan surveyed. In the course of the present study, 249 bird specimens of four hirundinid species were examined: *Hirundo rustica* — 99 (39.8%), *Riparia riparia* — 78 (31.3%), *Hirundo daurica* — 45 (18.1%), *Delichon urbica* — 27 specimens (10.8%). The Crag martin, *Ptyonoprogne rupestris* (Scopoli), was not caught. Fourteen species of feather mites belonging to four genera and four families were found (Table 1).

The mites of the family Pteronyssidae are characterized by the highest occurrence on hirund-

Table 1  
Infestation of the hirundinid birds with feather mites in Kazakhstan  
Таблица 1  
Зараженность перьевыми клещами ласточковых птиц в Казахстане

Mite species	Number of infected birds	Occurrence index (%)	Total number of mites	Abundance index
<i>Hirundo rustica</i> (n = 99)				
<i>Scutulanysus hirundicola</i> (Mironov, 1985)	99	100	2574	26
<i>Pterodectes rutilus</i> (Robin, 1877)	30	30.3	708	7.1
<i>Trouessartia crucifera</i> Gaud, 1957	27	27.2	327	3.3
<i>T. appendiculata</i> (Berlese, 1886)	6	6.1	48	0.4
<i>T. microcaudata</i> Mironov, 1983	6	6.1	147	1.4
<i>Riparia riparia</i> (n = 78)				
<i>Scutulanysus nuntiaeaveris</i> (Berlese, 1886)	12	12.5	102	1.1
<i>S. obscurus</i> (Berlese, 1886)	54	68.7	3119	32.4
<i>Anhemialges subinteger</i> (Berlese, 1883)	15	12.5	153	1.5
<i>Trouessartia piscicauda</i> Gaud, 1957	39	53.1	1470	15.3
<i>T. ripariae</i> Mironov, 1983	24	21.8	283	2.9
<i>Hirundo daurica</i> (n = 45)				
<i>Scutulanysus ottuki</i> (Chirov et Mironov, 1983)	21	47	189	3.9
<i>Delichon urbica</i> (n = 27)				
<i>Scutulanysus delichonum</i> (Mironov, 1985)	3	11.1	39	1.4
<i>S. obscurus</i> (Berlese, 1886)	9	33.3	699	25.8
<i>S. ottuki</i> (Chirov et Mironov, 1983)	24	88.8	1779	65.8
<i>Trouessartia gladifera</i> Gaud et Atyeo, 1986	3	11.1	27	1
<i>T. minutipes</i> (Berlese, 1886)	9	33.3	222	8.2

inid birds. This family is represented by five species of the genus *Scutulanysus*, and the occurrence index of these species varies from 11.1% (*S. delichonum* on the house martin) to 100% (*S. hirundicola* on the barn swallow). The genus *Scutulanysus* was represented on the barn swallow by a single species, *S. hirundicola*. The sand martin carried usually two species of this genus, rarely occurring *S. nuntiaeaveris* and *S. obscurus* being dominating by occurrence and abundance (Occurrence Index — OI 68.7%). Three species of the genus *Scutulanysus* were recorded on the house martin: *S. obscurus*, *S. delichonum*, and the dominant *S. ottuki* (OI 88.8%). It is worthy to note that only one or two species of the genus *Scutulanysus* may be present on one bird individual of the house martin. Thus, *S. ottuki* was recorded on most individuals of the house martin, and mainly it was the only species on a bird. Rarely it was recorded together with *S. obscurus*. The third

species, *S. delichonum*, was recorded only together with *S. obscurus*, which quite rarely occurred as a single species.

The mites of the genus *Scutulanysus* inhabit the primary flight feathers in the house martin, from the feathers 6 to 9<sup>1</sup>; mostly mites were located on the feathers 7 and 8. In the cases when the number of mites on the bird was high, mites could also occupy feathers 3 to 5. Mites of this genus are always located on the ventral surface of a feather between the barbs of the inner part of the vane, in the medial one third and also in the basal part, always closer to the rachis of the feathers 7 and 8 than to the free margin.

In the sand martin, mites of the genus *Scutulanysus* are located on the ventral surface of the inner vane of the primary feathers 4 to 9, usually near the rachis. Most often mites occupy the feather 8. These mites are always absent on the tail feathers. The feathers 6 to 8 and sometimes the feather

<sup>1</sup> The author uses the method of counting the primary flight feathers from the first inner feather of this group to the outer margin of the wing. According to another method, the feather marked here as the feather 9 would be referred to as the feather 2, which forms an external margin of the wing in the passerines. (*Remark of the Editor*)

Table 2  
 Infestation of the hirundinid birds with feather mites in Kazakhstan  
 Таблица 2  
 Зараженность ласточковых Казахстана перьевыми клещами

Bird species	Mite family			
	Pteronyssidae	Trouessartiidae	Analgidae	Proctophylodidae
<i>Hirundo rustica</i>	100/26	27.2/3.3	—	30.3/7.1
<i>Riparia riparia</i>	68.7/32.4	53.1/15.3	12.5/1.5	—
<i>Hirundo daurica</i>	47/3.9	—	—	—
<i>Delichon urbica</i>	100/76.6	67/10.1	—	—

Note: numerator — occurrence index (%), denominator — abundance index.

9 are mainly occupied by adult mites. In the feather 5, the mites may be distant from the rachis and occupy the basal part of the vane.

In the barn swallows, the mites occupy the ventral surface of inner and outer parts of vanes of all primary flight feathers and the outer part of vanes of all secondary flight feathers; the mites are mainly located near the rachis in the medial part of the vane; mites predominantly occupy the primary flight feathers 6 to 8. Few individuals occur on the tail feathers.

The red-rumped swallows were infested only by *Scutulanysus ottuki*.

The species of the family Trouessartiidae are characterized by slightly lower occurrence index than the representatives of the family Pteronyssidae. This index varies among species of the genus *Trouessartia* from 6.1% (*T. appendiculata* and *T. microcaudata* on the barn swallow) to 53.1% (*T. piscicauda* on the sand martin). Among three species of the genus *Trouessartia* occurring on the barn swallow, *T. crucifera* is a dominative species (OI 27.2%), other species specific to this host, *T. appendiculata* and *T. microcaudata*, are rare and not numerous. The sand martin carries two species of the genus *Trouessartia*, among which *T. piscicauda* dominates (OI 53.1%); the host martin also bears two species of this genus, and *T. minutipes* is a dominant one (OI 33.3%). Mites of the family Trouessartiidae were not detected on the red-rumped swallow.

Mites of the genus *Trouessartia* inhabit a dorsal surface of the inner vane of secondary flight feathers 3 and 4, usually about 2–3 mm from the rachis. Sometimes they occur on the tail feathers 2 and 3, on the inner vanes of the upper coverts of the tail.

Mites of other families have significantly lesser occurrence indices. For representatives of the family Proctophylodidae this value equaled 30.3

% (*Pterodectes rutilus* on the barn swallow), and for Analgidae it was only 12.5% (*Anhemialges subinteger* on the sand martin). The mites of the genus *Pterodectes* occupy the primary flight feathers, whilst the species of the genus *Anhemialges* inhabit the covert feathers of the body and sometimes the upper and lower coverts of the tail.

Thus, in most hirundinid species examined, the representatives of the family Pteronyssidae are the dominant feather mite species by occurrence and abundance indices. The species of mites of the family Trouessartiidae were characterized by slightly lesser occurrence index and lower abundance index. Occurrence and abundance of mites of the families Analgidae and Proctophylodidae were significantly lower than such parameters of Pteronyssidae and Trouessartiidae, which dominated on hirundinid birds in Kazakhstan (Table 2).

Different aspects of the population ecology of feather mites associated with various bird taxa including the hirundinid birds were reviewed by Dubinin [1951]. We obtained data on feather mite populations on the hirundinid birds in different seasons of the year. In both migration periods, mite populations were mainly represented by larvae and nymphs, the number of which was higher during the autumn migration, and to a lesser extent they were represented by males and females.

In the house martin and the red-rumped swallow, the total number of mites of the genus *Scutulanysus* in the period of the autumn migration is slightly higher than that in the spring migration (in summer the examinations of these bird species were not carried out). In the autumn, the abundance index for all *Scutulanysus* species on the house martin was 23, and on the red-rumped swallow was 8 (Fig. 1).

In the barn swallow and the sand martin, the mite number of *Scutulanysus* species in the period

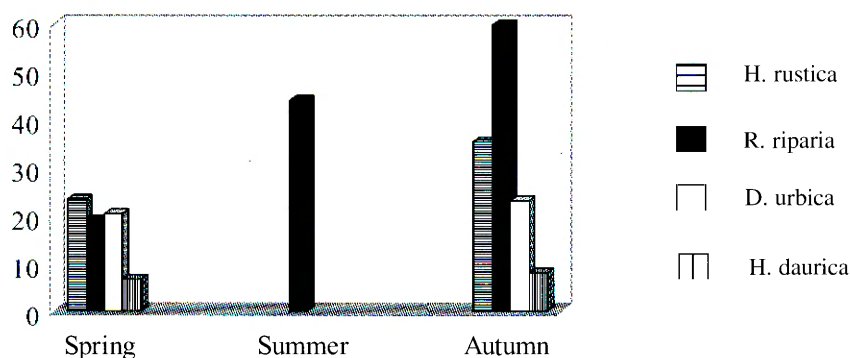


Fig. 1. Seasonal changes of the total number of mites belonging to the genus *Scutulanysus* on the hirundinids. (Here and in the Figures 2–6, the ordinate — abundance index).

Рис. 1. Сезонные изменения численности клещей рода *Scutulanysus* на деревенской, береговой, городской и рыжепоясничной ласточках. (Здесь и на Табл. 2–6 по оси ординат — индекс обилия).

Table 3

Seasonal changes of the abundance index of the most numerous species of mites on the sand martin

Таблица 3

Сезонные изменения индекса обилия массовых видов перьевых клещей на береговой ласточке

Month	Number of birds	<i>Scutulanysus obscurus</i>				<i>Trouessartia piscicauda</i>			
		Female	Male	LN	Σ	Female	Male	LN	Σ
V	48	6.5	5.5	7.1	19.2	1.6	1.4	0.75	3.8
IX	30	19.3	19.1	21.4	59.8	18.9	17	4.9	40.8

of spring migration was slightly higher (Table 3), than that in the house martin. The mite number on the red-rumped swallow was significantly lower than in other three hirundinid species in both migration periods. In the period of the autumn migration, the number of *Scutulanysus* species on the barn swallow and the sand martin was significantly higher than that on the house martin. In this period the abundance index of *Scutulanysus* on the barn swallow has increased from 23.5 to 35.4, and on the sand martin it has changed from 19.2 to 59.8 mites. On the sand martin the increase of the mite number was observed already in the summer period (the abundance increased almost two times), and in the autumn the mite number increased almost three times compared to that in the spring period. Increasing of the feather mite number during the autumn migration can obviously be explained by an intensive reproduction of mites during the summer time.

Another type of seasonal changes in abundance was observed in the mites of the genus *Trouessartia*. The species *T. appendiculata*, *T. crucifera* and *T. microcaudata* were recorded on the barn swallow only in spring. *Trouessartia piscicauda* and *T. ripariae* were recorded on the sand martin in May, July and September; the number of

mites in autumn was significantly higher than that in other seasons. *Trouessartia minutipes* and *T. gladifera* were found on the house martin only in September (Fig. 2).

The mites of the genus *Scutulanysus* occurring on the hirundinids, which migrate through the Chokpak mountain pass, do not show a tendency to decrease the reproduction rate in the autumn season. During the spring-autumn period the age and sex composition of mite populations undergoes certain changes.

In the period of spring migration of the barn swallow, the most part of the *Scutulanysus hirundicola* population consists of females and males, and the total number of all nymphs and larvae slightly exceeds that of females. In the autumn, the total number of mites is significantly higher than in the period of spring migration. In the autumn period the females predominate in the mite populations, the number of males is also increased. The number of larvae and nymphs decreases in the autumn. However the total sum of these stages is less than the number of males or females (Fig. 3).

In spring, the total sum of larvae and nymphs of *S. obscurus* parasitizing the sand martin slightly overruns the number of females or males (Fig. 4).

Feather mites of hirundinid birds

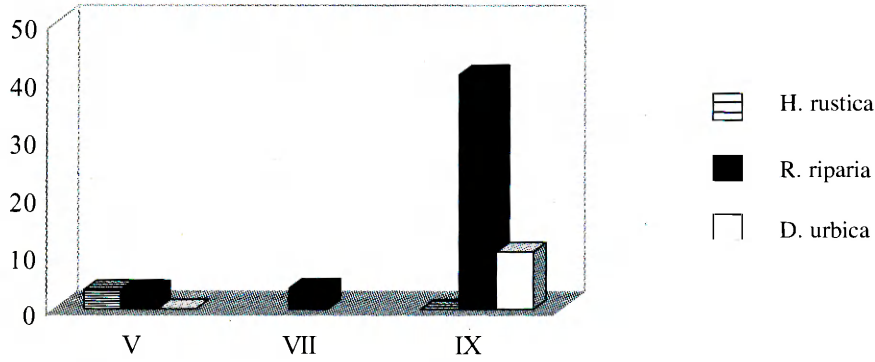


Fig. 2. Seasonal changes of the total number of mites belonging to the genus *Trouessartia* on the hirundinids.  
Рис. 2. Сезонные изменения численности клещей рода *Trouessartia* на ласточках.

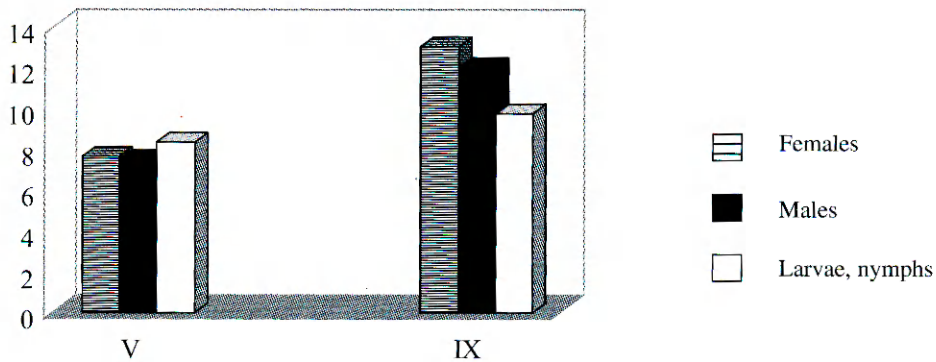


Fig. 3. Seasonal changes of sex and age composition in the population of *Scutulanysus hirundicola* on the barn swallow.  
Рис. 3. Сезонные изменения полового и возрастного составов клещей *Scutulanysus hirundicola* на деревенской ласточке.

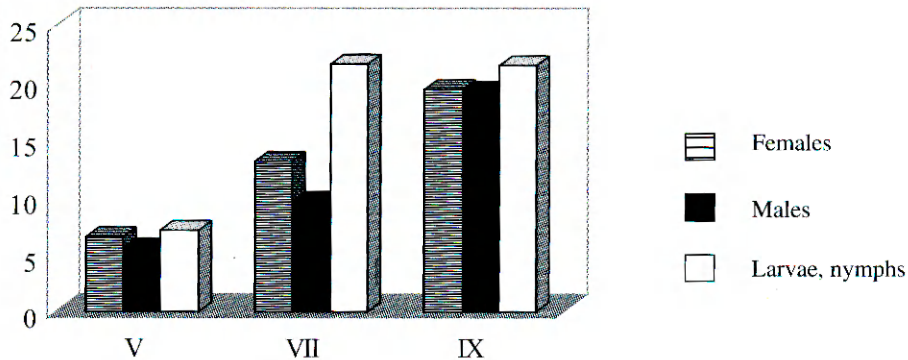


Fig. 4. Seasonal changes of sex and age composition in the population of *Scutulanysus obscurus* on the sand martin.  
Рис. 4. Сезонные изменения полового и возрастного составов клещей *Scutulanysus obscurus* на береговой ласточке.

In summer, the number of males and females increases two times, and the total sum of larvae and nymphs increases 3 times. Up to the autumn migrations, the numbers of adult stages increases two times once more, whilst the number of immatures does not significantly changed, but exceeds the number of males or females.

In spring, the females of *S. ottuki* dominate in the mite population on the house martin from the south

Kazakhstan; the number of males is two times less than the number of females, and the sum of larvae and nymphs is three times less than the number of females. During the autumn migration, the number of adult stages slightly decreases, while the total sum of larvae and nymphs increases two times and overruns the sum of males and females (Fig. 5).

In the spring period, the females dominate in the *S. ottuki* population on the red-rumped swal

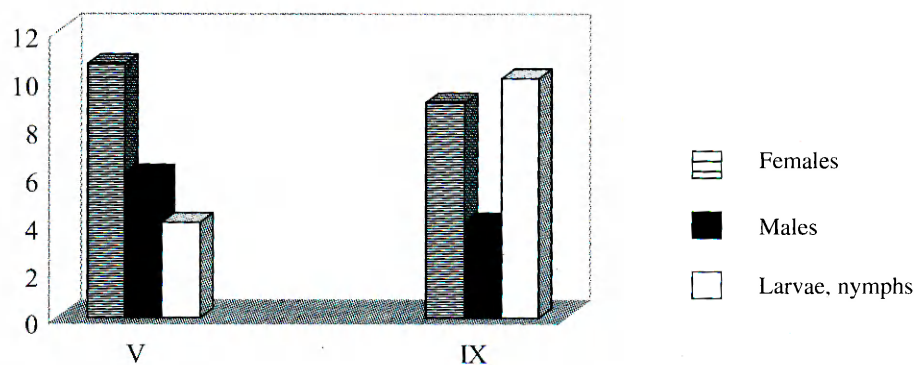


Fig. 5. Seasonal changes of sex and age composition in the population of *Scutulanysus ottuki* on the house martin.  
Рис. 5. Сезонные изменения полового и возрастного составов клещей *Scutulanysus ottuki* на городской ласточке.

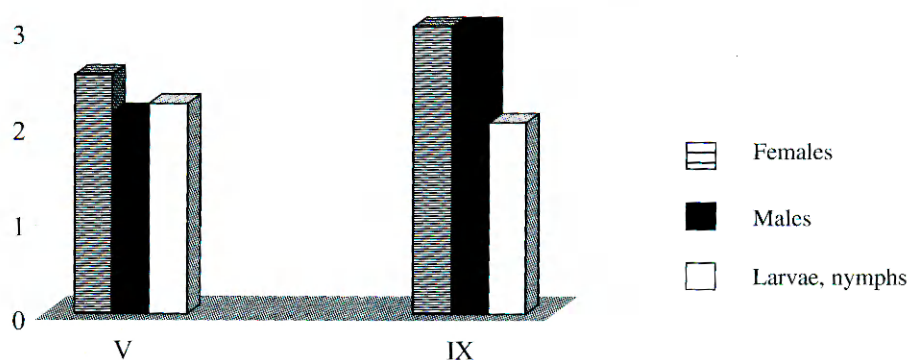


Fig. 6. Seasonal changes of sex and age composition in the population of *Scutulanysus ottuki* on the red-rumped swallow.  
Рис. 6. Сезонные изменения полового и возрастного составов клещей *Scutulanysus ottuki* на рыжепоясничной ласточке.

low, while the number of males was less than the number of females and the total sum of larvae and nymphs (Fig. 6). In the autumn, the number of males and females increases, and the total number of larvae and nymphs decreases.

During the season of research, the mites of the genus *Trouessartia* are represented on the sand martin by all stages, and their number in the autumn is higher than that in spring. In the spring period, adult mites dominate; whilst in autumn the larvae and nymphs dominate in the mite populations that means the reproduction process of *Trouessartia* species continues in the period of the autumn migration. As for the house martin, the mites of the genus *Trouessartia* had been mainly recorded in the period of the autumn migration. The mite population on this host was represented by all stages.

Thus, in the south and south-east of Kazakhstan, 14 feather mite species of the superfamily Analgoidea have been recorded on 4 hirundinid species. On the sand martin and the barn swallow, species of 4 genera have been recorded: *Scutulanysus*, *Trouessartia*, *Anhemialges* and *Pterodectes*. The representatives of two former genera were

found on the house martin, and the red-rumped swallow carried only one species of the genus *Scutulanysus*.

The research on seasonal changes of the mite abundance points out an increase in mite number up to the autumn migration on most host species examined, mainly by increasing the number of immatures. On the barn swallow and red-rumped swallow, an increase of the *Scutulanysus* mite population in the autumn was mainly caused by the increase in the adult mite number, which significantly exceeded the total number of immatures found in this period. In the sand martin, a gradual increase of *Scutulanysus* male and female numbers is observed from spring till autumn; an abrupt increase of immatures started in summer. These stages predominate during the autumn migration of birds. In the house martin, the adult stages of *Scutulanysus* species dominate in the spring period but in the autumn the number of immatures increased and the larvae and nymphs predominated in the mite populations. In the autumn, the total number of mites on hirundinids was higher than that in spring, that probably can be explained by the loss of ectoparasites during the

migration of birds and the period of hibernation, and the following increase of the population of mites during the bird nesting period.

#### REFERENCES

- Akhmetzyanova N.Sh., Kharambura Ya.I., Medynski B.L., Nazarova I.V. 1991. [Acaroid mites]. *In: Ektoparazity ptits v srednem Povolzhye. Part 1. Kleshchi. Kazan, pp.99–122. [In Russian]*
- Chirov P.A. 1982. [Feather mites (Analgoidea) of birds of the family Hirundinidae in Kirgizia]. *In: Entomologicheskie issledovaniya v Kirgizii. Frunze, Ilim Publ., 15: 117–124. [In Russian]*
- Dubinina V.B. 1950. [Feather mites of the galliform birds of Kazakhstan]. *Izvestiya Akademii Nauk Kazakhskoy SSR, ser. parazitologicheskaya, 8: 62–79. [In Russian]*
- Dubinina V.B. 1951. [Feather mites (Analgosidea). Part 1. Introduction to study]. *Fauna of the USSR, Paukoobraznyye, 6 (5). Publisher: Nauka, Moscow-Leningrad, 363 pp. [In Russian]*
- Dubinina V.B. 1956. [Feather mites (Analgosidea). Part III. Family Pterolichidae]. *Fauna of the USSR, Paukoobraznyye, 6 (7). Publisher: Nauka, Moscow-Leningrad, 817 pp. [In Russian]*
- Dubinina M.N. 1971. [External observation of birds and collecting ectoparasites. 8. Feather mites and other sarcoptiform mites]. *In: Parazitologicheskoye issledovaniye ptits. 4. Leningrad, Nauka, pp.45–54. [In Russian]*
- Dogiel B.A., Navtzevich N. 1936. [Parasite fauna of the house martin]. *Uchenye zapiski Leningradskogo gosudarstvennogo universiteta, ser. biol. nauk. Leningrad-Moscow, 7 (3): 80–113. [In Russian]*
- Efremova G.A. 1988. [Dwellers of nests and ectoparasites of the hirundinid birds of Byelorussia]. Abstract of the Candidate of Biological Sciences thesis. Alma-Ata. 18 pp. [In Russian]
- Mironov S.V. 1983a. [Feather mites of the genus *Trouessartia* of the fauna of the USSR and descriptions of new species (Acariformes: Analgoidea)]. *Parazitologiya, 17 (5): 361–369. [In Russian]*
- Mironov S.V. 1983b. [Feather mites (Sarcoptiformes, Analgoidea) of the passerines of the Nizhnesvirskii reserve]. *In: Parazitologicheskoye issledovaniya v zapovednikakh. Moscow, Publ. TzNIL Glavnogo Upravleniya Zapovednikov I okhotkhozyajstv, pp.82–94. [In Russian]*
- Mironov S.V. 1989. [A review of feather mites of the subfamily Pteronyssinae of the fauna of the USSR (Analgoidea, Avenzoariidae)]. *Parazitologicheskij sbornik. Leningrad, Publ. ZIN AN SSSR, 35: 96–124. [In Russian]*
- Shumilo R.P. 1968. [Parasite fauna of birds of the family Hirundinidae and its practical importance]. *In: Parazity zhivotnykh i rasteniy. Kishinev, Publ. Kartya moldovenyasko, 3: 62–73. [In Russian]*