

Feather Mites of the Superfamily Analgoidea (Acari: Astigmata) from Passerines (Aves: Passeriformes) in South Dobrudzha, Bulgaria

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Abstract: In the region of South Dobrudzha (Bulgaria), 50 species of feather mites belonging to 12 genera and 5 families of the superfamily Analgoidea were found. They were collected from 47 species of birds of the order Passeriformes. Twenty eight species of the feather mites are new for the Bulgarian fauna. Seventeen species of passeriform birds are reported for the first time as hosts of feather mites for the territory of Bulgaria.

Key words: Analgoidea, feather mites, faunistic, checklist, passerine hosts, Bulgaria

Introduction

The feather mites are a highly-specialised group of avian ectoparasites. They occur on birds of all orders excluding penguins (Sphenisciformes). The feather mites belong to the order Astigmata, which is divided in two superfamilies, i.e. Analgoidea and Pterolichoidea (EHRNSBERGER, MIRONOV, DABERT, 2001). There are more than 2,400 species of this group, which are classified in 444 genera and 33 families (GAUD, ATYEO 1996, MIRONOV 2003), it is estimated that the total number of species worldwide is about 10,000 (GAUD, ATYEO 1996).

Feather mite species are specialised to a certain area of plumage of a specific avian group (DUBININ 1951). There is no direct evidence about their origin due to the lack of fossil data. The strong morphological and biological specialisations as well as the large number of species recorded in almost all contemporary orders of birds indicate a long period of co-adaptation. According to DABERT, MIRONOV (1999),

the first feather mites lived on the skin surface and the proximal parts of the feathers, where the temperature is relatively constant and the air influence is subtle. One group of them adapted to the down feathers, and another specialised in a subcutaneous microhabitat. According to these authors, the next plumage area colonised was the feather vane surface; however, new morphological and biological adaptations were required for it. This microhabitat is rich in nutrients (because of the thin layer of secretion of the uropygial gland) and this is the reason by which most of the contemporary mites live in it. The last invaded microhabitat was the feather quill. DABERT, MIRONOV (1999) believed that the analgooids were the first mite invaders of the birds and that, very likely, all feather mites had a common ancestor but the analgooid mites adapted faster to the new niches.

Today the Analgoidea constitute about 50% of the feather mite fauna on non-passeriform birds,

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whereas their supremacy is practically absolute on passeriform birds (DABERT, MIRONOV 1999), with a single exception, *Gabucunia delibata* (ROBIN, 1877) (Pterolichoidea, Gabucinidae) on birds of the family Corvidae (Passeriformes).

Review of previous studies in Bulgaria

In Bulgaria, feather mites were studied mostly by IVAN VASSILEV in the period 1957-1965 (VASSILEV 1957a,b,c, 1958a,b,c, 1959a,b,c, 1960, 1961, 1962a,b, 1965, DUBININ, VASSILEV 1958, ATYEO, VASSILEV 1964, VASSILEV, KOLEBINOVA 1965a,b). In these papers, 108 species were reported (Analgoidea – 72, Pterolichoidea – 36). Out of the reported 72 species of the Analgoidea, 48 were reported from birds of the order Passeriformes collected mostly in South Bulgaria. These data were also summarised in recent faunistic surveys (DOBREV 1998, BERON 2005).

The information on feather mites from birds of the order Passeriformes in South Dobrudzha (NE Bulgaria) is scarce. From this region, two species of feather mites have only been reported, i.e. *Dolichodectes edwardsi* and *Pteroherpis pallens* collected from *Acrocephalus arundinaceus* in the Srebarna Biosphere Reserve (VASSILEV 1957b, 1958c, DOBREV 1998). In addition, there is information for two undetermined species of the genera *Analges* and *Trouessartia* (see VASSILEV 1958c).

Materials and methods

In the present article, mite specimens collected in the period 2005-2007 from ornithologically important sites located on the migration route *Via Pontica* are included (Fig. 1). Most of the materials were collected from birds captured in the area of the Biological Experimental Station (BES) “Kalimok” of the Institute of Zoology, Bulgarian Academy of Sciences. The station is located near the village of Nova Cherna, Silistra District (UTM: MJ57; 44°00'41"N 26°26'10"E) (Fig. 1). The remaining part of the material was collected in August 2006 from birds captured at the Shablenska Tuzla Lake (Tuzlata) (UTM: PJ22; 43°33'40"N 28°35'24"E) and

at the Durankulak Lake (UTM: PJ23; 43°40'00"N 28°32'00"E) (September 2006) (Fig. 1).

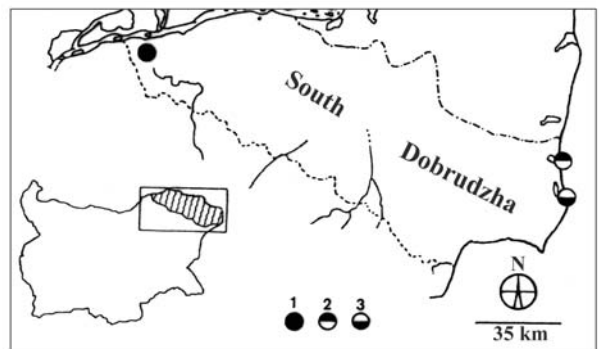


Fig. 1. Location of the study area and collecting sites.

1. – Biological Experimental Station “Kalimok”,
2. – Durankulashko Ezero Lake, 3. – Shablenska Tuzla Lake.

The birds were captured during their migration periods by standard mist nets located in reed beds and forest stands. Each bird was identified and ringed.¹ Feather mites were collected after the method of MIRONOV (pers. comm.), i.e.: for limiting movements of the bird and reducing the stress during examination, it was placed in a textile bag with holes for breathing and for the wings. Before this manipulation, the feathers of the body were examined using air jet; in this way, feathers were separated and mites were easier to spot. The examination was done under stereomicroscope. The time needed for the examination of one bird was approximately 15-45 minutes, according to its size and parasite burden. The collected material of feather mites was stored in 96% ethanol, and a part of it was mounted on 4,000 permanent microscope slides in Berlese's medium. The rest of the material was stored for future molecular studies. The specimens were deposited in the zoological collection of the Department of Zoology and Anthropology, Faculty of Biology, Sofia University.

Identified specimens from the collection of IVAN VASSILEV, deposited in the Institute of Zoology (Sofia), were used as comparative materials.

The classification and nomenclature of the feather mites follows GAUD, ATYEO (1996).

Species identifications were made according to ATYEO, BRAASCH (1966), ATYEO, GAUD (1970), ČERNÝ

¹ The birds were captured on the basis of permits: № 7/25.06.2004, № 8/26.06.2005, № 55/17.04.2006, and № 78/ 26.07.2006 of the Ministry of the Environment and Waters (MEW).

(1978, 1979), CHIROV, MIRONOV (1987), GAUD, AL TAQI (1975), GAUD, ATYEO (1996), MIRONOV (1985, 1989, 1997), PARK, ATYEO (1971) and SANTANA (1976).

Abbreviations used:

BES – Biological Experimental Station; **CH** – host confirmed for this species of feather mites for Bulgaria; **H** – host in Bulgaria; **L** – host locality in Bulgaria; **LHB** – location of the feather mites on the host's body; **NH** – new host for this species of feather mites for Bulgaria; * – new for the Bulgarian fauna feather mite species.

Results and discussion

During the present study, 507 specimens of 47 passeriform bird species were examined (Table 1). We found 50 species (12 genera) of feather mites, 28 of which are new for the Bulgarian fauna. Seventeen species of passeriform birds are recorded for the first time as hosts of feather mites in Bulgaria (Table 1). The feather mite species, with most hosts are *Analges spiniger* (with four), *Proctophyllodes doleophyes* and *P. clavatus* (each with six) (Table 1). The bird species with the greatest numbers of feather mite species on them were *Hirundo rustica* (5 mite species), *Acrocephalus arundinaceus* and *Locustella luscinioides* (each with 4 mite species) (see Table 1).

At BES Kalimok, the total number of bird species captured and ringed is 72; in our studies, we were able to examine 43 species (59.72%). For the region of Shabla, the number of the bird species ringed is 37; we studied 21 species (56.76%). From Durankulak Lake, we studied 1 host species while 23 species are captured and ringed there. The ringing data included here were kindly provided by Dr Mihaela Ilieva.

The species recorded by us represent 36.76% of the total number of feather mite species and 50% of the species of the superfamily Analgoidea reported in Bulgaria. Among them, the most species-rich genera are *Proctophyllodes*, *Analges* and *Trouessartia* represented by 21, 12, and 7 species, respectively. These 3 genera have different types of microhabitats that probably results in the lack of competition among them. The feather mites of the genus *Analges* are found on the plumage on the body of the bird. The specimens

of the genus *Proctophyllodes* are localised mostly on the ventral side of feathers of the wings and tail, and those of the genus *Trouessartia* predominantly live on the dorsal side of the wing feathers.

According to MIRONOV (1987, 1999), the feather mites can be arranged in 5 groups on the basis of their morphological characteristics and microhabitats they use. Among them, the most common is the Proctophyllodid morphotype. The species of this type live on the feathers of the wings and tail. The second is the Analgoid morphotype, which is common for feather mites living in the cover feathers (both of thin and dense layers) of the body. The feather mites of the Dermoglyphoid morphotype are localised on the inner surface of the rachis of the feathers of the wings and tail. The Epidermoptoid morphotype includes species living on the surface of the skin. In the last morphotype, Knemidocoptoid, mites living in the epidermis of the skin belong. All the species of the superfamily Analgoidea are distributed in these five morphotypes mentioned. Out of the 12 genera of feather mites found in this study, 10 belong to the Proctophyllodid morphotype while two are representatives of the Analgoid morphotype (Table 1).

Checklist

of the feather mites of the superfamily Analgoidea on passerines found in South Dobrudzha

In the present list contains data on synonyms, hosts, locality in Bulgaria and the localisation of the feather mites of each species recorded.

Superfamily ANALGOIDEA TROUSSERT et MEGNIN, 1883

Family ANALGIDAE TROUSSERT et MEGNIN, 1883

Subfamily ANALGINAE TROUSSERT et MEGNIN, 1883

Genus *Analges* NITZSCH, 1818

1. *Analges passerinus* (LINNAEUS, 1758)

Analges passerinus (L.), 1758: VASSILEV, 1959a: p. 46 (H: *Nucifraga caryocatactes*, L: Vitosha); VASSILEV 1962b: p. 155 (H: *Fringilla coelebs*, L: Petrich, Gotse Delchev).

CH: *Fringilla coelebs* (L: BES "Kalimok")

NH: *Fringilla montifringilla* (L: BES "Kalimok"), *Carduelis carduelis* (L: BES "Kalimok")

LHB: *Analges passerinus* in Bulgaria has been found on the body plumage, primaries and their respective greater coverts of *F. coelebs* (VASSILEV, 1962b) while no information about the localisation on *N. caryocatactes*. In *F. montifringilla* and *F. coelebs*, we found *A. passerinus* on feathers of the whole body and the tail, and on *C. carduelis*, the parasite was collected from feathers of the head, chest and undertail-coverts.

2. * *Analges chelopus* (HERMANN, 1804)

NH: *Luscinia svecica* (L: BES "Kalimok")

LHB: On feathers of the head, back and chest.

3. * *Analges mucronatus* BUCHHOLZ, 1869

NH: *Parus major* and *Parus caeruleus* (L: BES "Kalimok")

LHB: In both hosts, found on the plumage of the body.

4. * *Analges spiniger* GIEBEL, 1871

NH: *Sylvia nisoria* (L: BES "Kalimok", Shablenska Tuzla Lake), *Sylvia atricapilla* (L: BES "Kalimok"), *Sylvia borin* (L: Shablenska Tuzla Lake), *Acrocephalus scirpaceus* (L: BES "Kalimok", Shablenska Tuzla Lake) (**Note:** in foreign literature (MIRONOV, 1985), *A. scirpaceus* is not listed as a host for this species).

LHB: On the plumage of the body, the tail and in the area of lesser, median and greater coverts of all the host species.

5. *Analges bidentatus* GIEBEL, 1871

Analges bidentatus GIEBEL, 1871: VASSILEV 1959b: 8 (H: *Sturnus vulgaris*, L: Sofia, Popina, LHB: On the skin in the area of the breast and feathers of the tail).

Analges bidentatus GIEBEL: VASSILEV 1961: 321 (H: *Fringilla coelebs* (L: Kazanlak, Grudovo, Borovetz), H: *Muscicapa striata* (L: Peshtera), LHB: On the skin and the plumage of the body); VASSILEV 1962b: 156 (H: *Sturnus vulgaris*, L: Petrich, LHB: On feathers of the tail; H: *Coccothraustes coccothraustes*, L: Kolarovo, LHB: On undertail coverts); VASSILEV, KOLEBINOVA 1965b: 195 (H: *Sturnus vulgaris*, L: Sofia, LHB: On the plumage of the body); VASSILEV 1965c: 134 (H: *Sturnus vulgaris* (L: Asenovgrad, Stara Zagora, Harmanli), H: *Fringilla coelebs* (L: Asenovgrad), LHB: On lesser coverts, the plumage of the body and feathers of the tail).

NH: *Prunella modularis* (L: BES "Kalimok")

LHB: On feathers of the head and on undertail-coverts.

6. * *Analges unidentatus* BERLESE, 1886

NH: *Muscicapa striata* (L: BES "Kalimok", Shablenska Tuzla Lake)

LHB: On plumage of the body of the host.

7. * *Analges odontothyrus* GAUD, 1973

NH: *Saxicola rubetra* (L: BES "Kalimok")

LHB: On plumage of the body.

8. * *Analges behbehanii* GAUD et AL-TAQI, 1975

NH: *Locustella luscinioides* (L: Shablenska Tuzla Lake), *Locustella fluviatilis* (L: Shablenska Tuzla Lake)

LHB: In *L. luscinioides*, *A. behbehanii* was found on undertail-coverts only while, in *L. fluviatilis*, there is a wider distribution in the whole body except for the area of uppertail-coverts.

9. * *Analges acanthitibius* MIRONOV, 1985

NH: *Acrocephalus schoenobaenus* (L: BES "Kalimok", Shablenska Tuzla Lake)

LHB: On feathers of the body, tail and the area of lesser, median and greater coverts.

10. * *Analges berleseii* MIRONOV, 1985

NH: *Acrocephalus arundinaceus* (L: BES "Kalimok", Shablenska Tuzla Lake)

LHB: On feathers of the body, underwing coverts and the tail.

11. * *Analges luscinae* MIRONOV, 1985

NH: *Luscinia luscinia* (L: Shablenska Tuzla Lake)

LHB: On plumage of the body and feathers of the tail.

12. * *Analges opistostriatus* MIRONOV, 1985

NH: *Acrocephalus palustris* (L: BES "Kalimok")

LHB: On feathers of the body (with the exception of the area of undertail-coverts).

Genus *Anhemialges* GAUD, 1958

13. * *Anhemialges longipes* (TROUESSART, 1899)

NH: *Hirundo rustica* (L: Shablenska Tuzla Lake)

LHB: On plumage in the area of the chest, tail, undertail-coverts and uppertail-coverts.

Anhemialges sp.

Note: One further species belonging to this genus has been collected. According to Dr S. MIRONOV (pers. comm.), it represents a new taxon. It was collected from *Locustella luscinioides* (L:

BES “Kalimok”, Shablenska Tuzla Lake; LHB: On feathers of the throat, chest, belly, uppertail-coverts and undertail-coverts).

Family PSOROPTOIDIDAE GAUD, 1958

Subfamily PANDALURINAE GAUD et ATYEO, 1982

Genus *Mesalgoides* GAUD et ATYEO, 1967

14. *Mesalgoides megnini* (OUDEMANS, 1937)

Mesalgoides oscinus KOCH, 1840 (sic): VASSILEV 1960: p. 431 (H: *Pyrrhula pyrrhula*, L: Rila); *Mesalgoides oscinum* KOCH: VASSILEV 1962b: p. 155 (H: *P. pyrrhula*, L: Petrich, Gotse Delchev) (synonymy after MIRONOV, 1997).

NH: *Carduelis chloris* (L: BES “Kalimok”)

LHB: VASSILEV (1960, 1962b) reports this species on the skin of *P. pyrrhula* as well as on the secondaries and the tail. From *C. chloris*, we collected it from the primaries and secondaries.

Family PTERONYSSIDAE OUDEMANS, 1941

Genus *Pteronyssoides* HULL, 1931

15. *Pteronyssoides parinus* (KOCH, 1841)

Pteronyssus parinus Koch: VASSILEV 1961: p. 320 (H: *Parus caeruleus*; L: Peshtera) (synonymy after MIRONOV (1989), GAUD, ATYEO (1996)).

CH: *Parus caeruleus* (L: BES “Kalimok”)

LHB: The parasite has been found in Bulgaria on greater coverts (VASSILEV 1961). We found it also on feathers of the head.

Genus *Scutulanyssus* MIRONOV, 1985

16. * *Scutulanyssus hirundicola* (MIRONOV, 1985)

NH: *Hirundo rustica* (L: BES “Kalimok”, Shablenska Tuzla Lake)

LHB: On the primaries.

Genus *Pteroherpus* GAUD, 1981

17. *Pteroherpus pallens* (BERLESE, 1886)

Pteronyssus pallens BERLESE, 1898: VASSILEV 1957b: p. 338 (H: *Acrocephalus arundinaceus*, L: Lake Sreburna); VASSILEV 1958c: p. 1332 (H: *A. arundinaceus*, L: Lake Sreburna); DOBREV 1998: p. 72 (H: *A. arundinaceus*, L: Lake Sreburna) - (synonymy after FACCINI & ATYEO, 1981).

CH: *Acrocephalus arundinaceus* (L: BES “Kalimok”)

LHB: In Bulgarian literature (VASSILEV 1957b, 1958c; DOBREV 1998), it is not stated where on the body *P. pallens* has been found. We recorded it on the primaries.

Family TROUESSARTIDAE GAUD, 1957

Genus *Trouessartia* CANESTRINI, 1899

18. * *Trouessartia bifurcata* (TROUESSART, 1884)

NH: *Acrocephalus agricola* (L: Shablenska Tuzla Lake)

LHB: On feathers of the head and the secondaries.

19. *Trouessartia appendiculata* (BERLESE, 1886)

Trouessartia appendiculata Berl.: VASSILEV 1962a: p. 237 (H: *Hirundo rustica*, L: Gara General Todorov); VASSILEV 1962b: p. 161 (H: *H. rustica*, L: Gara General Todorov); SANTANA 1976: 22 (H: *H. rustica*).

CH: *Hirundo rustica* (L: BES “Kalimok”, Shablenska Tuzla Lake)

LHB: On feathers of the throat, back and the secondaries. In Bulgaria, VASSILEV (1962a, 1962b) reported it on the primaries and the corresponding greater coverts.

20. * *Trouessartia trouessarti* OUDEMANS, 1904

NH: *Acrocephalus arundinaceus* (L: BES “Kalimok”, Shablenska Tuzla Lake)

LHB: On the down feathers, flight feathers, the area of upperwing coverts and underwing coverts and tail.

NH: *Acrocephalus palustris* (L: BES “Kalimok”)

LHB: On feathers of the head, back, belly, tail, uppertail-coverts, primaries and secondaries and upperwing coverts.

NH: *Acrocephalus agricola* (L: Shablenska Tuzla Lake)

LHB: On the primaries and secondaries.

21. * *Trouessartia simillima* GAUD, 1957

NH: *Muscicapa striata* (L: BES “Kalimok”, Shablenska Tuzla Lake)

LHB: On feathers of the head, back, chest, tail and secondaries.

22. * *Trouessartia crucifera* GAUD, 1957

NH: *Hirundo rustica* (L: BES “Kalimok”, Shablenska Tuzla Lake)

LHB: On feathers of the chest, head and secondaries.

23. * *Trouessartia swidwiensis* JABLONSKA, 1968

NH: *Luscinia luscinia* (L: BES “Kalimok”, Shablenska Tuzla Lake)

LHB: The parasite inhabits feathers of the head, uppertail- and undertail-coverts, also on the secondaries and upperwing coverts.

24. * *Trouessartia kratochvili* ČERNÝ, 1979

NH: *Locustella luscinioides* (L: BES “Kalimok”, Shablenska Tuzla Lake)

LHB: On feathers of the head, chest, uppertail-coverts, tail and secondaries feathers.

NH: *Locustella fluviatilis* (L: BES “Kalimok”, Shablenska Tuzla Lake)

LHB: On feathers of the body (except those on the belly), uppertail-coverts, tail, flight feathers and upperwing coverts.

Family PROCTOPHYLLODIDAE TROUESSART et MEGNIN, 1883

Subfamily PROCTOPHYLLODINAE TROUESSART et MEGNIN, 1883

Genus *Proctophyllodes* ROBIN, 1868

25. *Proctophyllodes pinnatus* (NITZSCH, 1818)

Proctophyllodes pinnatus NITZSCH, 1818: VASSILEV 1960: p. 433 (H: *Muscicapa striata*, L: Peshtera); ATYEO, BRAASCH 1966: p. 179 (H: *Acanthis cannabina*, *Carduelis carduelis*, *C. spinus*, *C. chloris*).

CH: *Carduelis chloris* (L: BES “Kalimok”), *Carduelis carduelis* (L: BES “Kalimok”)

LHB: *Proctophyllodes pinnatus* is reported for Bulgaria on flight feathers and corresponding greater coverts (VASSILEV 1960). During the present study, the parasite was not found on upperwing coverts, but we found it on feathers of the tail of *C. carduelis* and *C. chloris*.

26. *Proctophyllodes glandarinus* (KOCH, 1840)

Proctophyllodes glandarinus KOCH, 1840: VASSILEV 1959a: p. 47 (H: *Garrulus glandarius*, L: Sofia, Vakarel, Peshtera); VASSILEV 1962b: p. 158 (H: *G. glandarius*, L: Kolarovo, Koprivlen; VASSILEV 1965: p. 139 (H: *G. glandarius*, L: Stara Zagora, Asenovgrad, Harmanli, Topolovgrad, Elhovo; H: *Coccothraustes coccothraustes*, L: Asenovgrad, Stara Zagora); ATYEO, BRAASCH 1966: p. 40 (H: *C. coccothraustes*, *Pyrrhula pyrrhula*, *G. glandarius*); MACK-FIRA, CRISTEA 1966: p. 682 (H: *G. glandarius*).

Proctophyllodes ampelidis (BUCHH.): VASSILEV 1960: p. 432 (H: *P. pyrrhula*, L: Vitosha, Rila); VASSILEV 1962b: p. 157 (H: *C. coccothraustes*, L: Kolarovo; H: *P. pyrrhula*, L: Gotse

Delchev) (synonymy after ATYEO, BRAASCH 1966).

CH: *Garrulus glandarius* (L: BES “Kalimok”, Shablenska Tuzla Lake)

LHB: *Proctophyllodes glandarinus* has been found in Bulgaria (VASSILEV 1959a, 1960b, 1962b, 1965) on flight, and the corresponding greater coverts and the tail. We found *P. glandarinus* in the same areas of the plumage.

27. *Proctophyllodes rubeculinus* (KOCH, 1841)

Proctophyllodes mandulovi VASSILEV 1960: VASSILEV 1960: p. 434 (H: *Erithacus rubecula*, L: Rila); VASSILEV 1962b: p. 159 (H: *E. rubecula*, L: Petrich) (synonymy after GAUD, BRAASCH (1966)).

Proctophyllodes rubeculinus (Koch): ATYEO, BRAASCH 1966: p. 67 (H: *Erithacus rubecula*).

CH: *Erithacus rubecula* (L: BES “Kalimok”)

LHB: In the previous studies in our country (VASSILEV, 1960, 1962), *P. rubeculinus* was reported on flight feathers and tail, while we found it on feathers of the chest and uppertail-coverts.

28. *Proctophyllodes stylifer* (BUCHHOLZ, 1869)

Proctophyllodes stylifer (BUCHH.), 1869: VASSILEV 1959a: p. 48 (H: *Nucifraga cariocatactes*, L: Vitosha); VASSILEV 1962b: p. 159 (questionable record) (H: *Pyrrhula pyrrhula*, L: Gotse Delchev); VASSILEV 1965c: p. 140 (H: *Parus caeruleus*, L: Stara Zagora, Harmanli, Asenovgrad; H: *P. major*, L: Pazardzhik, Asenovgrad, Stara Zagora, Harmanli; H: *Parus palustris*, L: Asenovgrad; H: *P. lugubris*, L: Stara Zagora, Harmanli).

CH: *Parus major*, *Parus caeruleus* (L: BES “Kalimok”)

LHB: In all the hosts mentioned by VASSILEV (1959a, 1962b, 1965), *Proctophyllodes stylifer* was found on flight feathers and the corresponding greater coverts. We discovered that this mite is found in *P. major* on feathers and on the area of head, chest, back, undertail-coverts and on the tail. We also found it in *P. caeruleus* in the area of underwing coverts and the body plumage.

***Proctophyllodes* sp.**

Note: Specimens resembling *Proctophyllodes stylifer* were collected from *Troglodytes troglodytes* (L: BES “Kalimok”; LHB: On the primaries and secondaries). MIRONOV (pers. comm.) also found similar feather mites from the same host species; however, their genital sheath is longer than in

P. stylifer from tits (*Parus* spp.). The taxonomic status of these feather mites requires further studies.

29. *Proctophyllodes truncatus* ROBIN, 1877

Proctophyllodes truncatus ROBIN, 1877: VASSILEV 1959a: p. 48 (H: *Coloeus monedula*, L: Aytos); VASSILEV 1965c: p. 144 (H: *Galerida cristata*, *Lullula arborea*, L: Harmanli, Asenovgrad, Pazardzhik).

NH: *Passer montanus*, *Passer hispaniolensis*, *Passer domesticus* (L: BES “Kalimok”)

LHB: *Proctophyllodes truncatus* has been collected on flight feathers and the corresponding greater coverts and the tail of the above-mentioned hosts (VASSILEV 1959a, 1965). In the three species of sparrows, *P. truncatus* was found by us on the flight feathers and, only in *Passer hispaniolensis*, on feathers of the chest, tail, the area of upperwing coverts and underwing coverts.

30. * *Proctophyllodes caulifer* TROUESSART, 1886

NH: *Luscinia svecica* (L: BES “Kalimok”)

LHB: On primaries and secondaries.

31. *Proctophyllodes cotyledon* TROUESSART, 1899

Proctophyllodes dontchevi VASSILEV, 1958: VASSILEV 1958a: p. 27 (H: *Phoenicurus ochruros*, L: Vitosha) (synonymy after ATYEO, BRAASCH 1966);

Proctophyllodes cotyledon TROUESSART, 1899: ATYEO, BRAASCH 1966: 67 (H: *Phoenicurus ochruros*, *Saxicola torquata*).

CH: *Phoenicurus ochruros* (L: BES “Kalimok”), *Saxicola torquata* (L: Shablenska Tuzla Lake)

LHB: In our country, the species has been collected from primaries of *P. ochruros*. For *S. torquata*, it has not been mentioned on which feathers. In the present study, *P. cotyledon* is found on flight feathers of both hosts while, in *P. ochruros*, it also occurs on the tail and uppertail-coverts.

32. *Proctophyllodes musicus* VITZTHUM, 1922

Proctophyllodes musicus VITZT. 1922: VASSILEV 1960: p. 432 (H: *Turdus merula* L: Sofia, Vitosha, Plovdiv, Peshtera, Bourgas); VASSILEV 1962b: p. 159 (H: *T. viscivorus*, L: Kolarovo); VASSILEV 1965c: p. 141 (H: *T. merula*, L: Stara Zagora, Harmanli, Asenovgrad, Pazardzhik, Topolovgrad); ATYEO, BRAASCH 1966: 266 (H: *T. viscivorus*, *T. merula*).

NH: *Turdus philomelos* (L: BES “Kalimok”)

LHB: The parasite has been collected from flight feathers of *T. merula* and *T. viscivorus* and the corresponding greater coverts (VASSILEV 1960,

1962b, 1965). In *T. philomelos*, this species is found only on flight feathers.

33. * *Proctophyllodes weigoldi* VITZTHUM, 1922

NH: *Turdus merula* (L: BES “Kalimok”)

LHB: On flight feathers.

34. *Proctophyllodes hipposideros* GAUD, 1953

Proctophyllodes hipposideros GAUD: ATYEO, BRAASCH 1966: p. 280 (H: *Phoenicurus phoenicurus*, *Saxicola rubetra*).

CH: *Phoenicurus phoenicurus* (L: Shablenska Tuzla Lake), *Saxicola rubetra* (L: BES “Kalimok”)

NH: *Oenanthe oenanthe* (L: Shablenska Tuzla Lake)

LHB: In the literature, it is not mentioned from which areas of the plumage the species has been collected (ATYEO, BRAASCH 1966). In *P. phoenicurus*, we found it on the uppertail-coverts and flight feathers, in *S. rubetra* – on feathers in the area of the chest, back and the flight feathers. In *O. oenanthe*, we collected it from primaries and those of the tail.

35. * *Proctophyllodes acanthicaulus* GAUD, 1957

NH: *Muscicapa striata* (L: BES “Kalimok”, Shablenska Tuzla Lake)

LHB: On feathers of the plumage, tail, primaries.

36. *Proctophyllodes doleophyes* GAUD, 1957

Proctophyllodes doleophyes GAUD: ATYEO, BRAASCH 1966: p. 75 (H: *Ficedula hypoleuca*, *Phylloscopus sibilatrix*, *P. trochilus*, *Luscinia megarhynchos*).

CH: *Luscinia megarhynchos* (L: BES “Kalimok”); LHB: on the head, primaries and secondaries, and the area upperwing coverts); *Phylloscopus trochilus* (L: BES “Kalimok”, Shablenska Tuzla Lake; LHB: on the tail, primaries and secondaries); *Phylloscopus sibilatrix* (L: BES “Kalimok”); LHB: on the chest, tail, uppertail-coverts, primaries and secondaries).

NH: *Luscinia luscinia* (L: BES “Kalimok”, Shablenska Tuzla Lake; LHB: on feathers of the head, neck, tail, uppertail and undertail-coverts, primaries and secondaries, and upperwing coverts), *Phylloscopus collybita* and *Ficedula parva* (L: BES “Kalimok”, LHB: on the uppertail-coverts, primaries and secondaries).

37. *Proctophyllodes leptocaulus* GAUD, 1957

Proctophyllodes leptocaulus GAUD: ATYEO, BRAASCH 1966: p. 278 (H: *Lanius senator*, *L. minor*).

CH: *Lanius minor* (L: BES “Kalimok”)

LHB: On feathers of the chest, tail, primaries and secondaries, the area of upperwing and underwing coverts.

NH: *Lanius collurio* (L: BES "Kalimok", Shablenska Tuzla Lake)

LHB: On feathers of the head, back, the area of undertail-coverts, primaries and secondaries, the area of upperwing coverts.

38. *Proctophyllodes sylviae* GAUD, 1957

Proctophyllodes sylviae GAUD (sic): VASSILEV 1965c: p. 145 (H: *Sylvia atricapilla*, L: Stara Zagora, Pazardzhik, Harmanli, Asenovgrad).

Proctophyllodes sylviae GAUD: ATYEO, BRAASCH 1966: p. 182 (H: *Sylvia atricapilla*).

CH: *Sylvia atricapilla* (L: BES "Kalimok")

LHB: According to data of VASSILEV (1965c), the parasite is localised on feathers of the tail, flight feathers and their corresponding greater coverts. We found it on feathers of the back, tail and the area of the underwing coverts.

39. *Proctophyllodes clavatus* FRITSCH, 1961

Proctophyllodes clavatus FRITSCH: ATYEO, BRAASCH 1966: p. 186 (H: *Acrocephalus schoenobenus*, *A. scirpaceus*, *Sylvia nisoria*, *Locustella luscinioides*).

CH: *Acrocephalus schoenobaenus* (L: BES "Kalimok") and *Sylvia nisoria* (L: BES "Kalimok", Shablenska Tuzla Lake)

LHB: On feathers of the back, chest, tail, uppertail-coverts, primaries and secondaries and upperwing coverts.

CH: *Locustella luscinioides* (L: BES "Kalimok", Shablenska Tuzla Lake)

LHB: On the back, uppertail-coverts, primaries and secondaries and upperwing coverts.

NH: *Sylvia communis* and *Sylvia curruca* (L: BES "Kalimok", Shablenska Tuzla Lake).

LHB: On the tail, primaries and secondaries.

NH: *Sylvia borin* (L: Shablenska Tuzla Lake)

LHB: On the tail and primaries.

40. * *Proctophyllodes dasyxiphus* ATYEO et BRAASCH, 1966

NH: *Oriolus oriolus* (L: BES "Kalimok")

LHB: On the primaries.

41. * *Proctophyllodes schoenicli* ATYEO et BRAASCH, 1966

NH: *Emberiza schoeniclus* (L: BES "Kalimok", Shablenska Tuzla Lake)

LHB: On feathers of the head, chest, back, and the tail, uppertail-coverts, upperwing coverts and the flight feathers.

42. *Proctophyllodes vassilevi* ATYEO et BRAASCH, 1966

Proctophyllodes vassilevi: ATYEO, BRAASCH 1966: p. 84 (H: *Acrocephalus palustris*, *A. scirpaceus*, L.: "Pazardzhik, Plovdiv district").

CH: *Acrocephalus palustris* (L: BES "Kalimok"), *Acrocephalus scirpaceus* (L: BES "Kalimok", Shablenska Tuzla Lake)

LHB: In literature (ATYEO, BRAASCH 1966), there is no information for the areas of the plumage, from which *Pr. vassilevi* has been collected. We found it on the primaries and secondaries and the area of upperwing coverts of both hosts. In *A. scirpaceus*, we also collected it from the feathers of undertail-coverts and tail.

43. * *Proctophyllodes balati* ČERNÝ, 1978

NH: *Panurus biarmicus* (L: Durankulashko Ezero Lake)

LHB: On the back, uppertail- and undertail-coverts, tail and the flight feathers.

44. * *Proctophyllodes locustellae* CHIROV et MIRONOV, 1987

NH: *Locustella fluviatilis* (L: BES "Kalimok", Shablenska Tuzla Lake)

LHB: On the flight feathers.

45. * *Proctophyllodes fuchsi* MIRONOV, 1997

NH: *Coccothraustes coccothraustes* (L: BES "Kalimok", Shablenska Tuzla Lake)

LHB: On feathers of the tail and the flight feathers.

Genus *Monojoubertia* RADFORD, 1950

46. *Monojoubertia microphylla* (ROBIN, 1877)

Monojoubertia microphylla (ROB.) (sic): VASSILEV 1961: p. 322 (H: *Fringilla coelebs*, L: Kazanluk, Negovan, Groudovo, Borovets, Peshtera, Rila, Vitoshka); VASSILEV 1962b: p. 159 (H: *F. coelebs*, L: Gotse Delchev); MACK-FIRA, CRISTEA 1966: p. 680 (H: *F. coelebs*).

Monojoubertia microphylla (ROB): VASSILEV 1965: p. 146 (H: *F. coelebs*, L: Stara Zagora, Harmanli, Asenovgrad, Pazardzhik).

CH: *Fringilla coelebs* (L: BES "Kalimok")

LHB: According to data from literature this species has been reported on flight feathers, corresponding greater coverts feathers and feathers of the tail. We found it only on the plumage of the body.

47. * *Monojoubertia hemiphylla* (ROBIN, 1877)

NH: *Fringilla montifringilla* (L: BES “Kalimok”)

LHB: On feathers in the area of the back, tail and on the flight feathers.

Genus *Joubertophyllodes* ATYEO et GAUD, 1971**48. * *Joubertophyllodes modularis* (BERLESE, 1894)**

NH: *Prunella modularis* (L: BES “Kalimok”)

LHB: On feathers of the body, tail and flight feathers.

Subfamily PTERODECTINAE PARK et ATYEO, 1971**Genus *Pterodectes* ROBIN, 1877****49. *Pterodectes rutilus* ROBIN, 1868**

Pterodectes rutilus ROB.: VASSILEV 1962a: 237 (H: *Hirundo rustica*, L: Gara General Todorov); VASSILEV 1962b: p. 160 (H: *H. rustica*, L: Petrich).

CH: *Hirundo. rustica* (L: BES “Kalimok”, Shablenska Tuzla Lake)

LHB: VASSILEV (1962a, 1962b) reported the parasite on flight feathers, corresponding greater coverts and the tail. In our collection, we found *P. rutilus* only on primaries.

Genus *Dolichodectes* PARK et ATYEO, 1971**50. *Dolichodectes edwardsi* (TROUESSART, 1885)**

Pterodectes edwardsi (TRT.): VASSILEV 1957b: p. 338 (H: *A. arundinaceus*, L: Lake Sreburna); VASSILEV 1958c: p. 1335 (H: *A. arundinaceus*, L: Lake Sreburna) (synonymy after PARK, ATYEO 1971).

CH: *Acrocephalus arundinaceus* (L: BES “Kalimok”, Shablenska Tuzla Lake)

NH: *Acrocephalus schoenobaenus* (L: BES “Kalimok”)

LHB: *Dolichodectes edwardsi* has been collected from primaries and on the tail of *A. arundinaceus* (see VASSILEV 1958c). We found it also on feathers uppertail-coverts while in *A. schoenobaenus* – only on flight feathers.

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Перови акари от надсемейство Analgoidea (Acari: Astigmata) по врабчоподобни птици (Aves: Passeriformes) от Южна Добруджа, България

Н. Коларова, П. Митов

(Резюме)

В района на Южна Добруджа от надсемейство Analgoidea са установени 50 вида перови акари (от 12 рода и от 5 семейства) по 47 вида птици от разред Passeriformes. От перовите акари 28 вида са нови за фауната на България, а 17 от изследваните врабчоподобни птици се съобщават за първи път като гостоприемници на тази група акари.