

## TAXONOMIC NOTES ON FEATHER MITE SPECIES (ACARIFORMES: ANALGOIDEA) DESCRIBED BY ADOLF EDUARD GRUBE

Sergey V. Mironov<sup>1\*</sup> and Fabio A. Hernandez<sup>2</sup>

<sup>1</sup>Zoological Institute, Russian Academy of Sciences, Saint Petersburg, Russia

<sup>2</sup>Departamento de Ecologia e Zoologia, Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, Brazil

\*corresponding author; e-mail: sergei.mironov@zin.ru

**ABSTRACT:** The study presents the results of our re-investigation of feather mite species described by A. E. Grube in 1859 in the genus *Dermaleichus* Koch, 1841. Grube's paper has been overlooked by most of the 19<sup>th</sup> and 20<sup>th</sup> century acarologists. Based on the study of the syntypes of four *Dermaleichus* species described by the above author, we provide taxonomic comments on them and new synonymies. We conclude the names of three species are valid (senior) synonyms, while one name is a junior synonym. *Alloptes (Alloptes) tringae* (Grube, 1859) comb.n. (Alloptidae) from *Calidris alpina* (Charadriiformes: Scolopacidae) is a new senior synonym of *Alloptes (s.str.) crassipes* (Canestrini, 1878) syn.n.; *Analgés tergisetis* (Grube, 1859) comb.n. (Analgoidea) from *Pica pica* (Passeriformes: Corvidae) is a new senior synonym of *Analgés corvinus* Robin, 1877 syn.n.; *Picalgoides caudilobus* (Grube, 1959) comb.n. (Psoroptoididae) from *Dendrocoptes medius* (Piciformes: Picidae) is an older synonym of *Dermaleichus picimajoris* Buchholz, 1869, *D. picipubescentis* Packard, 1869, *Analgés serratilobus* Giebel, 1871 and *Analgés socialis* Robin, 1877 (synonymized by Oudemans in 1939, but overlooked by subsequent researchers). *Dermaleichus albicillae* Grube, 1859 syn.n. from *Haliaeetus albicilla* (Accipitriformes: Accipitridae) is a junior synonym of *Pandionacarus fuscus* (Nitzsch, 1818) (Avenzoariidae), a common parasite of *Pandion haliaetus* (Accipitriformes: Pandionidae).

**KEY WORDS:** Feather mites, Analgoidea, systematics, taxonomy, synonymy.

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### INTRODUCTION

In his review entitled “Arachnoiden of Livonia, Kurland and Estland” (presently Latvia, Lithuania and Estonia, respectively), German zoologist Adolf Eduard Grube (1859) described four new feather mite species of the genus *Dermaleichus* Koch, 1841. This review was published in a little-known journal *Archiv für die Naturkunde Liv-, Ehst- und Kurlands* (Tartu [Dorpat], Estonia) and was focused primarily on spiders. Most acarologists of the 19<sup>th</sup> and 20<sup>th</sup> centuries did not know about this work. Although the descriptions of the new species were brief and not very informative, Grube's illustrations are suitable enough to identify the species of feather mites from a modern taxonomical point of view. Among the subsequent researchers, only Oudemans (1939) provided comments on the aforementioned work and established a new synonymy for one of the species described in that paper.

Surprisingly, ethanol-preserved specimens of the type series used by Grube in the descriptions of his feather mite species were found in the Museum für Naturkunde (Berlin, Germany). Here, we present the results of our study of these specimens and discuss their taxonomic status.

### MATERIALS AND METHODS

Grube's material was deposited in the Museum für Naturkunde (Berlin, Germany) in small glass vials (about 2 ml) filled with ethanol. The speci-

mens had labels, bearing accession collection numbers and host names; catalogue data for these samples indicate that they are “types”. Slide-mounted type specimens used by Grube (1859) have apparently been lost. Therefore, the remaining ethanol-preserved specimens were mounted for our study and treated as syntypes.

We have mounted several specimens from each vial in Hoyer's medium according to the standard techniques used for small mites (Krantz and Walter 2009). Mite specimens, kept in ethanol for over 160 years, have become very fragile and almost completely desclerotized (transparent). Therefore, prior to mounting, the mites had been softened in 10% lactic acid at room temperature for 3–5 days. Specimens were studied using Leica DM2500 and DM5000B microscopes (Leica Microsystems, Inc.), equipped with differential interference contrast (DIC) optics. After the identification of slide-mounted specimens, the lectotypes and the paralectotypes were designated in the type series representing valid species. Since the museum specimens were too transparent, our illustrative photos depict comparative specimens of the considered species collected from the corresponding hosts. The collection UFC ZIN No. 2-2.20, deposited in the Zoological Institute of the Russian Academy of Sciences (Saint Petersburg, Russia), was used as a source of comparative material for this study.

## SYSTEMATICS

Family Alloptidae Gaud, 1957

Subfamily Alloptinae Gaud, 1957

Genus *Alloptes* Canestrini, 1879***Alloptes (Alloptes) tringae*  
(Grube, 1859) comb.n.**

(Fig. 1A–D)

*Dermaleichus tringae* Grube, 1859: 51, 65, figs. 5, 6.*Dermaleichus crassipes* Canestrini, 1878: 68 (part.) syn.n.*Alloptes crassipes*: Canestrini 1879: 38, tabs. 1–3, fig. 3 (part.); 1886: 293, tab. 44, fig. 4 (part.); Berlese 1888: fasc. 50, No. 5 (part.), 1898: fasc. 88, No. 7 (1); Canestrini and Kramer 1899: 113, fig. 25; Trouessart 1916: 220 (part.); Vitzthum 1929: 102, tab. 10, fig. 52 (part.); Dubinin 1951b: 113, fig. 25 (first reviser, species from *Calidris alpina*); Gaud 1957: 110 (part.); Gaud and Till 1961: 241 (part.)*Alloptes (Alloptes) crassipes*: Gaud 1972: 59; Vasyukova and Mironov 1991: 87, fig. 59.

**Type material examined.** Male lectotype and 1 male paralectotype (ZMB/Arach 6292) of *Dermaleichus tringae* Grube, 1859 from *Calidris alpina* (Linnaeus, 1758) [= *Tringa alpina*] (Charadriiformes: Scolopacidae), Lithuania, Salantai [Salanty], no date, coll. Hrn. v. Gorski. Lectotype designated here.

Among the mite individuals in the vial that contained the syntypes of *Dermaleichus tringae*, only two strongly desclerotized males were present. Nevertheless, they were in a satisfactory enough condition to identify them as *Alloptes (A.) crassipes* (Canestrini, 1878) known from the Dunlin, *Calidris alpina*. The latter mite species, being the type species of the genus *Alloptes*, exhibits distinct morphological features. In males, the hysterosoma is shaped as an almost equilateral triangle and the posterior end of the opisthosoma has a distinct ovate enlargement. In females, the opisthosomal lobes are absent, and the opisthosoma is almost rounded (Dubinin 1951b; Gaud 1972; Vasyukova and Mironov 1991) (Fig. 1A, B). Since the name proposed for this mite by Grube (1859) is older than that proposed by Canestrini (1878), we consider the name *A. (A.) crassipes* (Canestrini, 1878) to be a junior synonym of *A. (A.) tringae* (Grube, 1859) comb.n. The name *Dermaleichus tringae* Grube, 1859 is not a *nomen*

*oblitum* because it does not meet both conditions of Article 23.9.1 (ICZN 1999).

With the transfer of *Dermaleichus tringae* to the genus *Alloptes*, a secondary homonym, *Alloptes gambettae tringae* Dubinin, 1951, arises. However, *A. gambettae tringae* Dubinin, 1951 does not need a replacement name because it is a junior synonym of *A. (Conuralloptes) conurus* (Trouessart, 1885), already established by Gaud (1972: 64).

Here, we also comment on the identity of *A. crassipes*. Canestrini (1878) originally described this mite under the name *Dermaleichus crassipes* from the following four charadriiform birds: *Limosa limosa* (Linnaeus) [= *L. melanura*], *Phylomachus pugnax* (Linnaeus), *Calidris alpina* (Linnaeus) (Scolopacidae) and *Sternula albifrons* (Boie, F) [= *Sterna minuta*] (Laridae). Based on the modern knowledge of the taxonomy and the host associations of the genus *Alloptes* (Dubinin 1951b; Gaud 1972; Vasyukova and Mironov 1991; Mironov and Palma 2006), it is obvious that Canestrini dealt with several *Alloptes* species (at least 4), representing different subgenera of *Alloptes* (*Alloptes* s.str., *Conuralloptes* and *Sternallopates*). Each of the four host species listed above is known to host a distinct species of the genus *Alloptes* (Dubinin 1951b; Gaud 1972; Vasyukova and Mironov 1991). However, until the end of the 1950s, most researchers considered “*A. crassipes*” a single species associated with many scolopacid hosts (Canestrini 1879, 1886; Berlese 1888, 1898; Canestrini and Kramer 1899; Vitzthum 1929; Gaud 1957; Gaud and Till 1961). Meanwhile, the illustrations of *A. crassipes* provided in some of these works (e.g., Canestrini 1879: pl. 1–3, fig. 3, 1886: pl. 44, fig. 4; Berlese 1888: fasc. 50, No. 5; Vitzthum 1929: fig. 25) clearly show different *Alloptes* species. Among the publications of that period, only the drawing by Berlese (1888: fasc. 88, No. 7, 1) corresponds to the modern taxonomic interpretation of this species. Dubinin (1951b), in his re-description of *A. crassipes* based only on specimens from the Dunlin, *Calidris alpina*, provided clear diagnostic characteristics and outlined the modern taxonomic identity of this mite species. Therefore, we consider this author to be the first reviser. Subsequent researchers (Gaud 1972; Vasyukova and Mironov 1991) added a few additional diagnostic features to this species (in particular, the structure of the festoons of terminal membranes and the spiculiform seta *mG* of genu II; Fig. 1C, D) and provided some better illustrations.

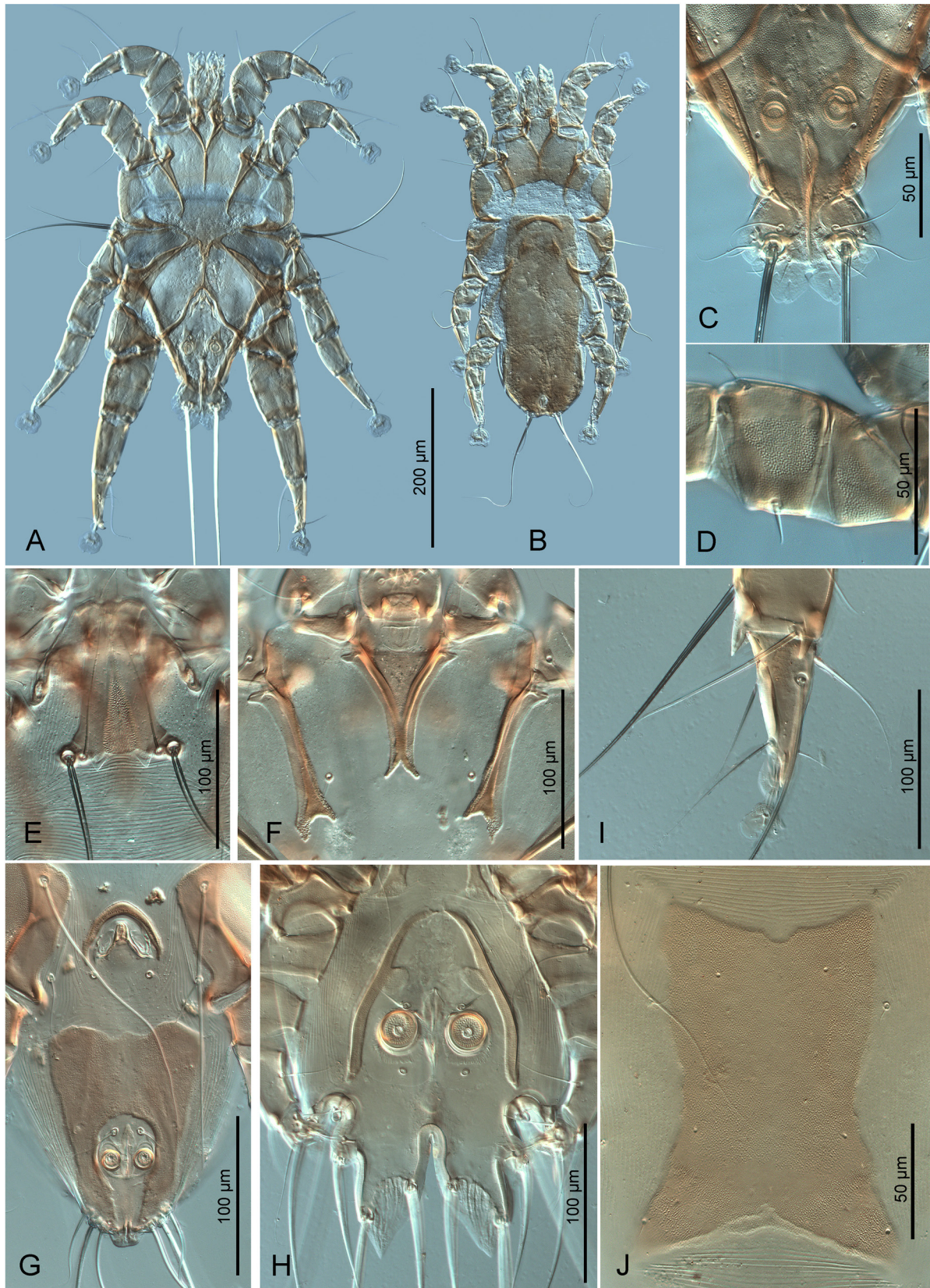


Fig. 1. Morphological details of feather mites. A–D—*Alloptes (A.) tringae* from *Calidris alpina*: A—ventral view of male, B—dorsal view of female, C—posterior end of male opisthosoma, D—femur and genu II of male. E–G—*Analges tergisetis* from *Pica pica*: E—prodorsal shield of male, F—epimerites I and II of male, G—opisthosoma of male, ventral view. H–J—*Picalgoides caudilobus* from *Dendrocopos major*: H—ventral view of male opisthosoma, I—left tibia and tarsus III of male, dorsal view, J—hysteronotal shield of female.

In his review of the generic content of “Analgesinae”, Trouessart (1916) designated *A. crassipes* as the type species of the genus *Alloptes* and mentioned the Black-tailed Godwit, *L. limosa*, as its sole host. However, in our opinion, Trouessart (1916) did not act as the first reviser because merely mentioning a host does not constitute a valid species description, definition or indication (ICZN 1999: Article 12.3). It is also necessary to mention that Gaud (1972) and Vasyukova and Mironov (1991), in fact, followed Dubinin (1951b) as the first reviser and for this reason incorrectly indicated *C. alpina* as the type host instead of *L. limosa*, formally designated by Trouessart (1916).

Family **Analgidae Trouessart & Mégnin, 1884**  
Subfamily **Analginae Trouessart & Mégnin, 1884**

Genus ***Analges* Nitzsch, 1818**

***Analges tergisetis* (Grube, 1859)**

(Fig. 1E–G)

*Dermaleichus tergisetis* Grube, 1859: 64, figs. 7, 8.

*Analges tergisetis*: Mironov 2019: 42.

*Analges corvinus* Mégnin in: Robin and Mégnin, 1877: 503; Berlese, 1886: fasc. 24, No. 4; Canestrini 1886: 285; Oudemans 1897: 258; Canestrini and Kramer 1899: 88; Vitzthum 1939: 86; Dubinin 1951a: 38, 293, figs. 97(1), 115, 131; Mironov 2019: 32, syn. n.

*Analges (Analgopsis) corvinus*: Gaud 1958: 34, fig. 3A; Gaud and Mouchet 1959: 157, fig. 4b, (part.).

*Analges (Analges) corvinus*: Mironov, 1985: 173, fig. 6 (3, 4).

*Dermaleichus makowski* Zimmermann, 1894: 219, syn. n.

**Type material examined.** Male lectotype, 1 male and 3 females paralectotypes (ZMB/Arach 6295) of *Dermaleichus tergisetis* Grube, 1859 from *Pica pica* (Linnaeus, 1758) (Passeriformes: Corvidae) Latvia [Livland], no date, coll. A. E. Grube; 4 female paralectotypes (ZMB/Arach 6294), same collection data. Lectotype designated here.

In the updated world checklist of *Analges* species, *Analges tergisetis* (Grube, 1859) from the Eurasian Magpie, *Pica pica*, and *An. corvinus* Mégnin, 1877 originally described from the Carrion Crow, *Corvus corone* Linnaeus, 1758, were treated as separate species (Mironov 2019). The latter mite species was reported from many species

of the genera *Corvus* Linnaeus, *Coloëus* Kaup and *Pica* Brisson (Corvidae) throughout the Holarctic region (Robin and Mégnin, 1877; Canestrini and Kramer 1899; Vitzthum 1939; Mironov 1985, 1996; Galloway *et al.* 2014). After comparing the type specimens of *An. tergisetis* with numerous specimens formerly identified as *An. corvinus* (stored in the Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia) from *Pica pica* and many other corvids of the genera *Corvus* and *Coloëus*, we have concluded that these mites are conspecific. Since the name *Analges tergisetis* is older than *An. corvinus*, the latter name is treated here as a junior synonym. Among *Analges* species with tarsus III in males lacking the finger-like process, this mite is well characterized in having the epimerites II with strongly bifurcate ends and the adanal shield with slightly concave anterior margin (Mironov 1985) (Fig. 1F, G).

Family **Avenzoariidae Oudemans, 1905**

Subfamily **Bonnetellinae Gaud and Atyeo, 1981**

Genus ***Pandionacrus* Balogh, 1937**

***Pandionacrus fuscus* (Nitzsch, 1818)**

*Analges fuscus* Nitzsch, 1818: 252; Giebel 1871: 493.

*Megninia fusca*: Mégnin and Trouessart 1884: 132.

*Pteronyssus fuscus*: Berlese 1887: fasc. 65, No. 2; Canestrini and Kramer 1899: 84; Oudemans 1937: 2199.

*Buchholzia fusca*: Trouessart 1916: 217; Bonnet 1924a: 191, figs. 50–52, Vitzthum 1929: 94, pl. 9, fig. 44; Dubinin 1951a: 74, 75, figs. 56, 57.

*Bonnetella fusca*: Trouessart in: Bonnet, 1924b: 398; Gaud 1983: 730, fig. 2; Gaud and Atyeo 1996: Part II, 69, fig. 80A, B.

*Pandionacrus fuscus*: Balogh 1937: 206; Öz-dikmen 2008: 223.

*Dermaleichus albicillae* Grube, 1859: 66, figs. 1, 1a, 2, syn. n.

*Dermaleichus haliaëti* Buchholz, 1869: 30, pl. 3, figs. 17, 18, synonymized by Canestrini and Kramer 1899: 84.

*Dimorphus haliaëti*: Haller 1878: 557, pl. 33, figs. A, B, 1, 4–6, 10, 12–14, 16, pl. 35, figs. A–F.

**Material examined.** 5 male and 5 female syn- types (ZMB/Arach 6299) of *Dermaleichus albicillae* Grube, 1859 from *Haliaeetus albicilla* (Lin-

naeus, 1758) (Accipitriformes: Accipitridae), Latvia [Livland], no date, coll. A.E. Grube.

*Pandionacarus fuscus*, the single species of the genus *Pandionacarus*, is one of the oldest feather mite species described by Nitzsch (1818) in the genus *Analges*—the first supraspecific taxon of feather mites. This species is easily distinguishable because of its giant size (with body length 1,100–1,300 µm in males and 900–1,000 µm in females) (Gaud 1983: 730, fig. 2; Moro *et al.* 2019: fig. 1). This makes *P. fuscus* one of the three largest feather mites, along with *Laminalloptes phaetontis* (Fabricius, 1775) and *Proterothrix phyllura* (Trouessart, 1899), which reach about 1 mm in length (Atyeo and Peterson 1967; Constantinescu *et al.* 2018). *Pandionacarus fuscus* was previously known only from the Osprey, *Pandion haliaetus* (Linnaeus, 1758), and is common and very abundant on this host: Dubinin (1951a: 302) reported over 12,600 mite individuals on a single bird. Just like this cosmopolitan host, the mite is apparently distributed worldwide (for major references see: Gaud 1983). The examined specimens of *Dermaleichus albicillae* agree well with the comparative material of *P. fuscus* and its (re)descriptions and illustrations (Buchholz 1869; Haller 1878; Mégnin and Trouessart 1884; Berlese 1887; Dubinin 1951a; Gaud 1983). Therefore, the name given by Grube (1859) is a junior synonym.

Grube (1859) described this species under the name *Dermaleichus albicillae* from the White-tailed Eagle, *Haliaeetus albicilla* (Linnaeus, 1758) (Accipitriformes: Accipitridae). We would like to note the possibility of an accidental contamination either in the course of collecting mites or due to natural factors (e.g., birds occupying recently abandoned nests, where some mites could have accidentally remained from before). Nevertheless, we suggest that a misidentification of the host species or a confusion of Latin names were much more probable. In particular, the spelling of the specific epithet of the Osprey (*haliaetus*) almost coincides with *Haliaeetus* (the generic name for sea eagles).

Family **Psoroptoididae Gaud, 1958**

Subfamily **Pandalurinae Gaud and Atyeo, 1982**

Genus ***Picalgoides* Černý, 1974**

***Picalgoides caudilobus*  
(Grube, 1859) comb.n.**

(Fig. 1H–J)

*Dermaleichus caudilobus* Grube, 1859: 66, figs. 3, 4.

*Mesalges caudilobus*, Oudemans 1939: 188.

*Dermaleichus picimajoris* Buchholz, 1869: 43, pl. 5, figs. 28–30, synonymized by Oudemans 1939: 188.

*Dimorphus picimajoris*: Haller 1882: 57, pl. 6, figs. 1–3.

*Megninia picimajoris*: Berlese 1883: fasc. 25, No. 7; Canestrini 1886: 278, pl. 21, fig. 2, pl. 22, fig. 1, 1b; Canestrini and Kramer 1899: 96.

*Mesalges picimajoris*: Bonnet 1924: 200, figs. 60, 61; Vitzthum 1929: 98; Dibinin 1951a: 10, 33, 38, 87, 91, 129, figs. 77(4), 99(3); 1953: 6, fig. 7g.

*Mesalgoides (Picalgoides) picimajoris*: Černý 1974: 250; Mironov 1997: 466.

*Picalgoides picimajoris*: Mironov 2004: 13, figs. 3b, 4c, 5b, 6b; Mironov *et al.* 2011: 67, fig. 4A–F.

*Dermaleichus picipubescentis* Packard, 1869: 493, figs. 2, 3, synonymized by Oudemans 1939: 188.

*Analges serratilobus* Giebel, 1871: 493, synonymized by Haller 1882: 57.

*Dermaleichus socialis* Robin, 1868: 103, nom. nud.

*Analges socialis* Robin in: Robin and Mégnin 1877: 511, pl. 28, fig. 4, synonymized by Canestrini and Kramer 1899: 96.

**Type material examined.** Male lectotype, 1 female and 1 tritonymph paralectotypes (ZMB/Arach 6297) of *Dermaleichus caudilobus* Grube, 1859 from *Dendrocoptes medius* (Linnaeus, 1758) (Piciformes: Picidae), Latvia [Livland], no date, coll. A.E. Grube. Lectotype designated here.

Grube (1859) described *Dermaleichus caudilobus* from the Middle Spotted Woodpecker, *Dendrocoptes medius*, and the Lesser Spotted Woodpecker, *Dryobates minor* (Linnaeus), but all specimens from the latter host apparently have been lost. This mite species, to date well known under the name *Picalgoides picimajoris* (Buchholz, 1869), is common and abundant on many woodpeckers of Europe and North America (Canestrini and Kramer 1899; Oudemans 1939; Mironov 1997, 2004; Mironov *et al.* 2011; Galloway *et al.* 2014). After the description by Grube (1859), it was independently described four more times under the following original names: *Dermaleichus picimajoris* Buchholz, 1869 and *Analges serratilobus* Giebel, 1871 from the Great Spotted Woodpecker, *Dendrocopos major* (Linnaeus); *Dermaleichus picipubescentis* Packard, 1869 from the Downy

Woodpecker, *Dryobates picipubescentis* (Linnaeus); and *Analges socialis* Robin, 1877 from the European Green Woodpecker, *Picus viridis* Linnaeus. The oldest work by Grube (1859) was unknown to the leading acarologists of that time. Therefore, Canestrini and Kramer (1899) treated *D. picimajoris* Buchholz, 1869 as a senior synonym over three other mite species described several years later. Oudemans (1939), after establishing that *D. caudilobus* Grube, 1859 was a senior synonym of *D. picimajoris* Buchholz, 1869 and three other species, gave almost exhaustive synonymies for these mites. However, subsequent researchers did not pay attention to his paper and have until now considered this mite species under the specific epithet “*picimajoris*” (see synonymies above). After the examination of the material described by Grube and the comparative material, we agree with the taxonomic concept of Oudemans (1939) and consider the valid name for this species to be *Picalgoides caudilobus* (Grube, 1859) comb.n.

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