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Description of a new *Ornithomya* Latreille, 1802 (Diptera: Hippoboscidae) species with a key to all species of this genus

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ABSTRACT

The family Hippoboscidae Samouelle, 1819 includes approximately 213 species. The genus *Ornithomya* Latreille, 1802 (Diptera: Hippoboscidae) is one of the largest louse fly genera and now includes 31 species. These flies are parasites of different small birds from the order Passeriformes. Many of them specifically prefer swallows as hosts. Swallows have a wide beak, short legs, dense plumage and poor preening abilities. They feed in flight and therefore do not associate insects in their nests with food. A new species of the genus *Ornithomya*, *O. delichoni* sp. nov., is described. A female of *O. delichoni* sp. nov. was collected in the Spassk district of Primorskiy Territory (Far East, Russia) from western house martin. The new species differs from other *Ornithomya* species from this region in its combined length of the head and thorax, eye width, number of large setae on the scutellum, and arrangement of microtrichia on the wings. The new species is named after the bird from which the fly was collected. An updated key for 32 species of the genus *Ornithomya*, including the new one, is provided. These key is based on the following morphological features: head and thorax length combined, wing length, number of scutellum and mesonotum setae, ratio of sections of costal vein between junctions of R1 and R2+3 and between junctions of R2+3 and R4+5 and arrangement of wing microtrichia. Additionally, known data on the hosts and distribution of the *Ornithomya* species are provided.

Key words: Diptera, Far East, Hippoboscidae, louse flies, new species, *Ornithomya*

Описание нового вида рода *Ornithomya* Latreille, 1802 (Diptera: Hippoboscidae) с ключом для всех видов из данного рода

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РЕЗЮМЕ

Семейство Hippoboscidae Samouelle, 1819 включает около 213 видов. Род *Ornithomya* Latreille, 1802 (Diptera: Hippoboscidae) является одним из крупнейших родов мух-кровососок и в настоящее время включает 31 вид. Эти мухи паразитируют на различных мелких птицах из отряда воробьинообразных. Многие из них предпочитают в качестве хозяев ласточек. У ласточек широкий клюв, короткие ноги, густое оперение и плохие способности к чистке оперения. Они питаются в полете и поэтому не ассоциируют насекомых в своих гнездах с пищей. Описан новый для рода *Ornithomya* вид *O. delichoni* sp. nov. Самка *O. delichoni* sp. nov. была собрана в Спасском районе Приморского края (Дальний восток, Россия) с западной городской ласточки. Этот новый вид отличается от остальных видов *Ornithomya* из данного региона размером головы и груди, шириной глаз, числом щетинок на щитке и расположением микротрихий на крыльях. Новый вид назван в честь птицы, с которой была собрана муха. Приводится переработанный ключ для 32 видов рода *Ornithomya* Latreille, 1802, включая новый. Этот ключ основан на следующих морфологических признаках: общей длине головы и груди, длине крыла, количестве щетинок на щитке и среднеспинке, соотношении отрезков костальной жилки между жилками R1 и R2+3 и между жилками R2+3 и R4+5, а также на расположении микротрихий на крыльях. Дополнительно приводятся известные данные о хозяевах и распространении видов *Ornithomya*.

Ключевые слова: Diptera, Дальний восток, Hippoboscidae, мухи-кровососки, новый вид, *Ornithomya*

INTRODUCTION

The family Hippoboscidae Samouelle, 1819, or louse flies, includes approximately 213 species worldwide (Dick 2018; Oboňa et al. 2019). Hippoboscids feed on blood of their hosts – mammals and birds (Hutson 1984). Louse flies are vectors of many dangerous pathogens (Bequaert 1954; Doszhanov 1980), both in mammals (Doszhanov 1980) and birds (Gancz et al. 2002; Farajollahi et al. 2005; Khametova et al. 2018). Additionally, louse flies transport phoretic mites of the family Epidermoptidae (Hill et al. 1967; Fain 1965; Philips and Fain 1991) and different Mallophaga (Matyuhin 2017).

The genus *Ornithomya* Latreille, 1802 is one of the largest genera in Hippoboscidae, along with *Icosta* Speiser, 1905 (52 species), *Lipoptena* Nitzsch, 1818 (30 species), and *Ornithoica* Rondani, 1878 (24 species) (Dick 2018). According to Dick (2018), *Ornithomya* includes 28 species: *O. ambigua* Lutz, 1915, *O. apelta* Maa, 1969, *O. areolata* Maa, 1986, *O. avicularia* Linnaeus, 1758, *O. bequaerti* Maa, 1969, *O. biloba* Dufour, 1827, *O. candida* Maa, 1967, *O. cecropis* Hutson, 1971, *O. chloropus* Bergroth, 1901, *O. nigricornis* Erichson, 1842 (= *O. clarki* Paramonov, 1969 and *O. tasmanensis* Macquart, 1851), *O. comosa* Austen, 1930, *O. fringillina* Curtis, 1836, *O. fur* Schiner, 1868, *O. fuscipennis* Bigot, 1885, *O. gigantea* Bear et Friedberg, 1995, *O. greeni* Maa, 1986, *O. hoffmannae* Bequaert, 1954, *O. inocellata* Ferris, 1930, *O. marginalis* Maa, 1964, *O. medinalis* Maa, 1975, *O. opposita* Walker, 1849 [= *O. variegata* (Bigot, 1885)], *O. papillosa* Maa, 1964, *O. parva* Macquart, 1843, *O. roubaudi* Seguy, 1938, *O. rupes* Hutson, 1981, *O. sorbens* Hutson, 1971, *O. alpicola* Maa, 1975, *O. anchineuria* Speiser, 1905 (= *O. pallida* Say, 1823). Later, 3 species – *O. triselevae* Matyukhin, Yatsuk et Nartshuk, 2023 (Matyukhin et al. 2023), *O. krivolutskii* Yatsuk, Matyukhin et Nartshuk, 2023 (Yatsuk et al. 2023) and *O. strigilis* Nartshuk, Yatsuk et Matyukhin, 2022 (Nartshuk et al. 2022) – were described. Species of *Ornithomya* are considered to be widespread but they inhabit mainly the middle latitudes of the Old World (Hutson 1984). The genus includes one fossil species – *O. rottensis* (Statz, 1940). One species – *O. chloropus* Bergroth, 1901 – is subdivided into 3 subspecies – *O. chloropus chloropus* Bergroth, 1901, *O. chloropus extensa* Maa, 1967 and *O. chloropus montivaga* Maa, 1975 (Maa 1967, 1975). All *Ornithomya* species are parasites of birds (Doszhanov 1980, 2003).

Data on the existence of several more unknown species of the genus *Ornithomya* are given for the Russian Far East by Meißner et al. (2020). The authors mention two louse flies (named "*Ornithomya* A" and "*Ornithomya* B") with unique COI sequences. So, it can be assumed that new species for this genus will be described in the future, at least from this region. Currently, the fauna of the Russian Far East and nearby territories includes *O. avicularia*, *O. candida*, *O. chloropus*, *O. comosa*, *O. fringillina*, *O. strigilis* and

O. triselevae (Matyukhin et al. 2023). The species *O. biloba* is also noted in Russia (Doszhanov 2003).

The aim of the present work was to compile a key for all species of this genus. Currently, keys exist only for individual geographic regions and are often incomplete [e.g., Maa (1963); Hutson (1984); Doszhanov (1980, 2003); Oboňa et al. (2022)]. The sex ratio in populations is often more than 2:1 in favor of females (Doszhanov 2003; Nartshuk et al. 2020; Davydova et al. 2021). Due to the difficulty of obtaining material, many species have been described from a single female specimen (Maa 1969a). A description of the new species from the Russian Far East is also given.

MATERIAL AND METHODS

Bird-parasitic flies were collected in 2016 during the bird ringing in the Spassk District, Primorskiy Territory (Russia). The names of birds are given in accordance with modern systematic data. The material was fixed in 96% ethanol. Morphological terminology follows Hutson (1984). Body length was measured using the standard method for this family of flies. The combined head and thorax length was measured from the anterior margin of the head, excluding the antennae, to the posterior margin of the scutellum. The nomenclature of wing veins and areas is shown in Fig. 1A. Both wings were measured to determine wing length.

The list of species corresponds to the results of Bear and Freidberg (1995), Dick (2018), Nartshuk et al. (2022), Yatsuk et al. (2023) and Matyukhin et al. (2023). To compile the key, we analyzed the main works that provide references and descriptions of the species: Bequaert (1954), Bear and Freidberg (1995), Maa (1963, 1964, 1967, 1969a, b, 1975, 1986), Hutson (1971, 1981, 1984), Doszhanov (1980, 2003), Amiot (2015), Oboňa et al. (2019, 2022), Nartshuk et al. (2022), Yatsuk et al. (2023) and Matyukhin et al. (2023). We analyzed specimens of *O. avicularia* Linnaeus, 1758, *O. biloba* Dufour, 1827, *O. chloropus* Bergroth, 1901, *O. comosa* Austen, 1930, *O. fringillina* Curtis, 1836, *O. krivolutskii* Yatsuk, Matyukhin et Nartshuk, 2023, *O. strigilis* Nartshuk, Yatsuk et Matyukhin, 2022, *O. triselevae* Matyukhin, Yatsuk et Nartshuk, 2023 species from the collection of the Zoological Institute RAS and the A.N. Severtsov Institute of Ecology and Evolution collections.

SYSTEMATICS

Order Diptera Linnaeus, 1758

Family Hippoboscidae Samouelle, 1819

Subfamily Ornithomyinae Bigot, 1853

Genus *Ornithomya* Latreille, 1802

Ornithomya delichoni Yatsuk, Matyukhin et Nartshuk sp. nov.

(Figs 2, 3, 4D)

Holotype. Female; Russia, *Primorskiy Terr.*, Spassk District, Gaivoron (44°44'50"N 132°46'27"E), collected from western house martin [*Delichon urbicum* (Linnaeus, 1758)], 24 August 2016. Coll.: M.Yu. Markovets. The holotype was transferred to 96% ethanol and deposited in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (inventory number INS_DIP_0001106).

Etymology. The new species is named after the bird *Delichon urbicum* (Linnaeus, 1758) from which the fly was collected.

Description. Head and thorax length combined 2.6–2.8 mm.

Head with posterior part located between humeral tubercles and slightly covering anterior margin of thorax. Width of head equal to its length. Eye one-quarter as wide as head. Ocelli separated from each other by double width of ocellus. Inner orbits slightly widened posteriorly. Width of inner orbit equal to one third of mediovertex width. Length of mediovertex equal to half of head length. 8–9 orbital setae present. Posterior margin of lunula rounded. Lunula horns located between antennae, clearly separated from lunula. Anterior margin of lunula horns notched. Palpus equal in length to second antennal segment. Antennae bicolor with basal dark and apical light parts. Ventral side of head brown.

Mesonotum amber-brown, with anterior margin slightly concave. Humeral tubercles approximately cone-shaped, protruding anterolaterally. Longitudinal, transversal and scuto-scutellar sutures clearly visible. Transversal suture interrupted in middle; longitudinal suture not reaching scuto-scutellar suture. Setae of thorax: 3 long humeral setae in centre, 6 long humeral setae close to anterior margin, 8–12 long mesopleural setae, 3 black notopleural setae, 3 long and 3 short postalar setae, 1 prescutellar seta.

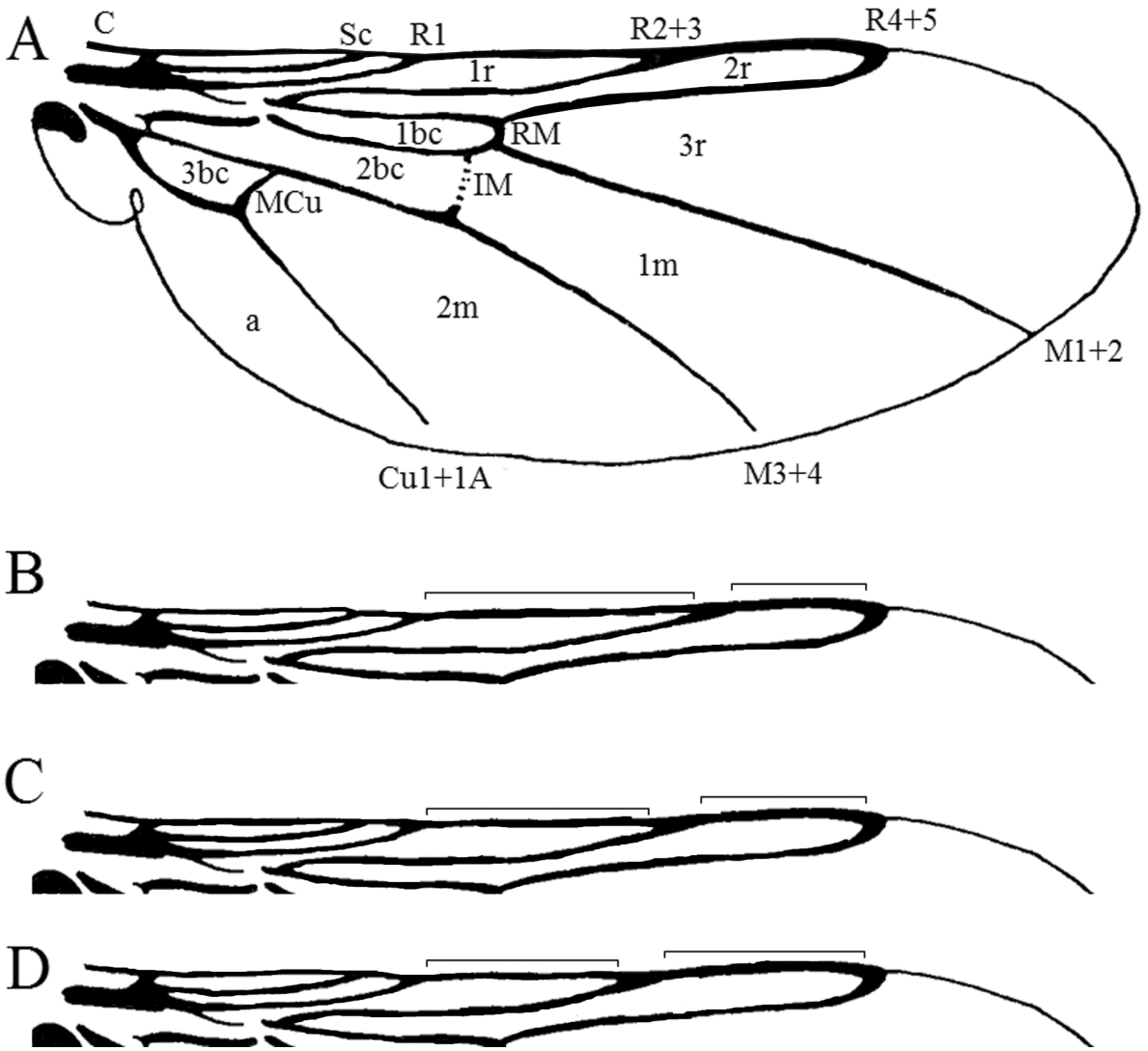

Fig. 1. *Ornithomya* spp., wings. A – wing with nomenclature of the veins and areas; B – part of wing with section of costa between the junctions of R1 and R2+3 twice as long as the section between the junctions of R2+3 and R4+5; C – part of wing with section of costa between the junctions of R1 and R2+3 1.0–1.5 times as long as the section between the junctions of R2+3 and R4+5; D – part of wing with section of costa between the junctions of R1 and R2+3 subequal to section between the junctions of R2+3 and R4+5. Costa (C), Subcosta (Sc), radial (R), medial (M), cubital (Cu; c), anal (A), basal (b).

Setae of scutellum: thin light setae forming a cluster in centre of scutellum and fringe on its posterior margin; 8 long black setae forming a transverse row along posterior margin of scutellum; 9 black seta present anterolaterally of this row and close to anterior margin. Ventral side of thorax light with brown triangles on sides.

Wing length 4.8–5.0 mm. Wing with full venation, with three crossveins and seven longitudinal veins. Costa interrupted before juncture with Sc. Longitudinal veins R1, R2+3 and R4+5 connecting with costa at acute angle. Section of costal vein between juncture of R1 and R2+3 twice as long as section between juncture of R2+3 and R4+5. Crossvein between cells 2bc and 1m mostly unpigmented. Vein M3 interrupted between cells 1bc and 2bc. Costa and basicosta covered with hairs. Microtrichia covering most of cells 3r and 1m and short part of cell 2m.

Legs light. Femora strong. Claws bifid. Empodium and paired pulvilli not reduced.

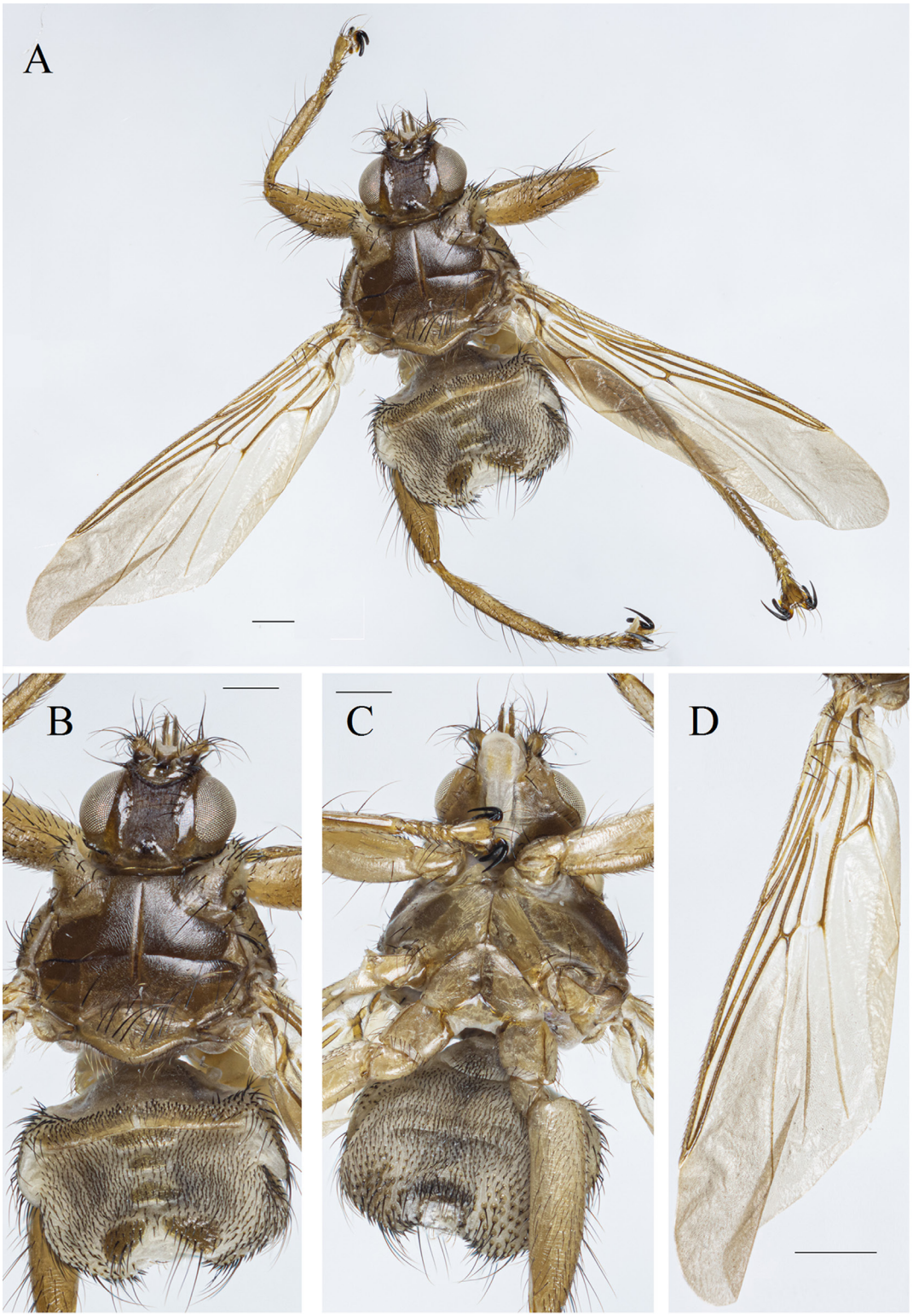

Fig. 2. *Ornithomya delichoni* sp. nov., female (holotype). A – habitus, dorsal view; B – head, thorax and abdomen, dorsal side; C – head, thorax and abdomen, ventral side; D – wing. Scale bars: 0.5 mm.

Fig. 3. *Ornithomya delichoni* sp. nov., dorsal view of mesonotum. Scale bar: 0.5 mm.

Abdomen covered with short setae. Tergite 1+2 with straight posterior margin. Tergites 3, 4, 5 approximately one third as wide as abdomen, but tergite 4 bit narrower than tergites 3 and 5. Tergite 6 divided into two oval sclerites, each with four setae.

Male unknown.

Differential diagnosis. The new species differs from all known *Ornithomya* species of the Russian Far East, to which this species is most closely related. It differs from the *O. avicularia* females by the presence of microtrichia in cell 2m, combined head and thorax length (*O. avicularia* – 3.0–3.5 mm; *O. delichoni* sp. nov. – 2.6–2.8 mm), and the number of long black notopleural and postalar setae (*O. avicularia* – 1 notopleural and 1 postalar setae; *O. delichoni* sp. nov. – 3 notopleural and 3 postalar setae). *O. delichoni* sp. nov. differs from *O. candida* female by the absence of dense long setae covering the female genital opening, the number of long scutellar setae (*O. candida* – 4; *O. delichoni* sp. nov. – 8), and the ratio of sections of the costal vein between junctions of R1 and R2+3 and between junctions of R2+3 and R4+5 (*O. candida* – 1.5 times; *O. delichoni* sp. nov. – 2.0 times). The new species differs from the *O. chloropus* females by the number of setae in a transverse row along the posterior margin of the scutellum (*O. chloropus* – 6; *O. delichoni* sp. nov. – 8), the number of postalar setae (*O. chloropus* – 2;

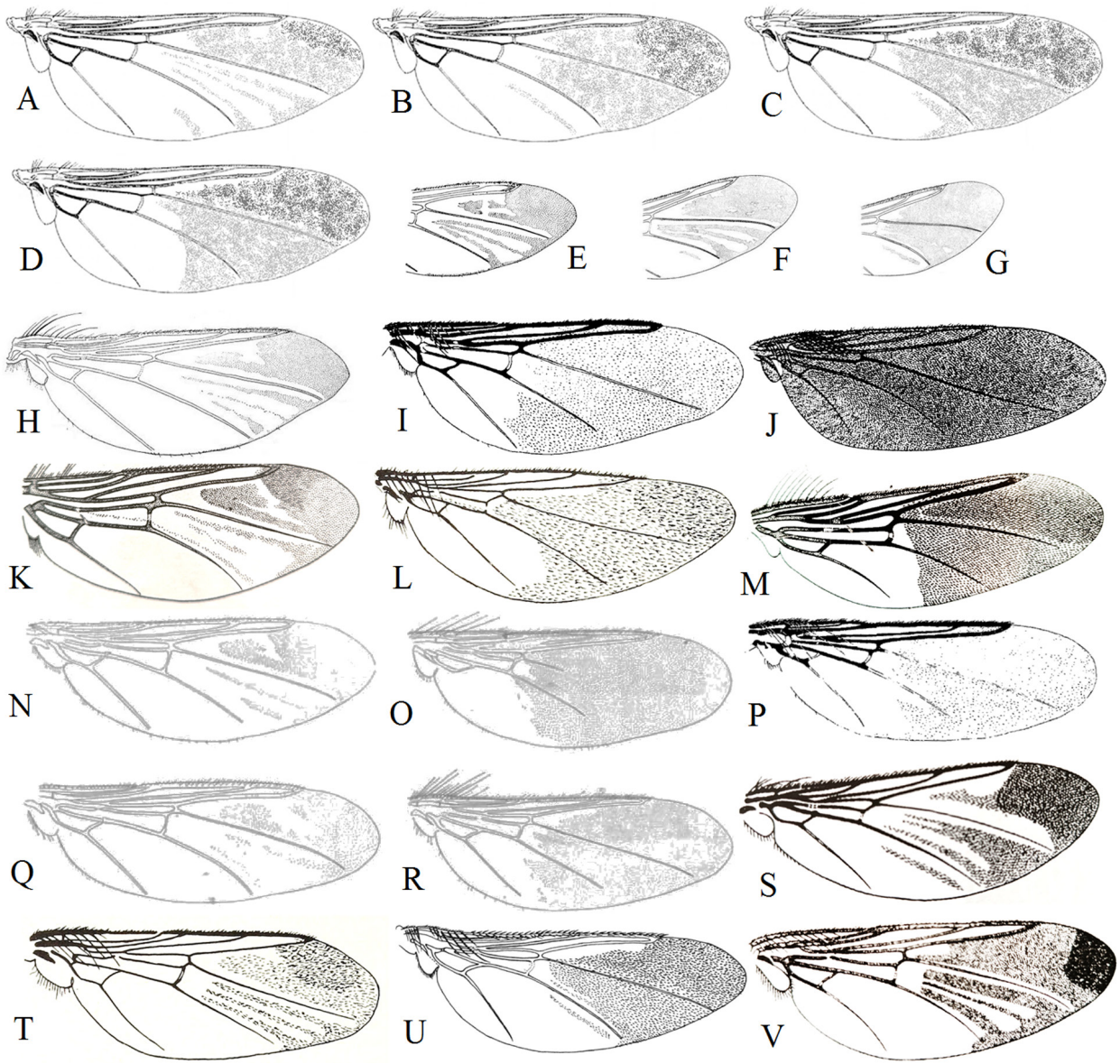

Fig. 4. Drawings of *Ornithomya* spp. wings. A – *O. strigilis*; B – *O. triselevae*; C – *O. krivolutskii*; D – *O. delichoni* sp. nov.; E – *O. apelta*, from Maa (1969b); F – *O. anchineuria*, from Maa (1969b); G – *O. bequaerti*, from Maa (1969b); H – *O. candida*, from Maa (1967); I – *O. cecropis*, from Hutson (1971); J – *O. comosa*, from Doszhanov (2003); K – *O. avicularia* and *O. opposita*, according to Maa (1962), from Doszhanov (2003); L – *O. hoffmannae*, from Bequaert (1954); M – *O. biloba*, from Doszhanov (2003); N – *O. marginalis*, from Maa (1964); O – *O. fur*, from Maa (1964); P – *O. sorbens*, from Hutson (1971); Q – *O. papillosa*, from Maa (1964); R – *O. ambigua*, from Maa (1964); S – *O. fringillina* and *O. medinalis*, according to Maa (1975), from Doszhanov (2003); T – *O. parva*, from Bequaert (1954); U – *O. rupes*, from Hutson (1981); V – *O. chloropus*, from Doszhanov (2003).

O. delichoni sp. nov. – 3), and the ratio of sections of the costal vein between junctions of R1 and R2+3 and between junctions of R2+3 and R4+5 (*O. chloropus* – subequal; *O. delichoni* sp. nov. – 2.0 times). *O. delichoni* sp. nov. differs from the *O. comosa* females by microtrichia not covering all wing cells, eye width (*O. comosa* – one third of head width; *O. delichoni* sp. nov. – one quarter of head width), the number of long scutellum setae (*O. comosa* – 10–12; *O. delichoni* sp. nov. – 8). The new species differs

from *O. fringillina* female (Doszhanov 2003) by microtrichia not forming a stripe in cell 2m, eye width (*O. fringillina* – one third of head width; *O. delichoni* sp. nov. – one quarter of head width), and the number of long setae in a transverse row along the posterior margin of the scutellum (*O. fringillina* – 4; *O. delichoni* sp. nov. – 8). *O. delichoni* sp. nov. differs from the *O. strigilis* females (Nartshuk et al. 2022) by microtrichia not forming one short narrow stripe in cell 2m, combined head and thorax length (*O. strigilis* – 4.0–4.3 mm; *O. delichoni* sp. nov. – 2.6–2.8 mm), and the number of long setae in a transverse row along the posterior margin of the scutellum (*O. strigilis* – 6; *O. delichoni* sp. nov. – 8). The new species differs from the *O. triselevae* females (Matyukhin et al. 2023) by microtrichia not forming one short narrow stripe in cell 2m, eye width (*O. triselevae* – one third of head width; *O. delichoni* sp. nov. – one quarter of head width), and the number of long setae in a transverse row along the posterior margin of the scutellum (*O. triselevae* – 4; *O. delichoni* sp. nov. – 8). *O. delichoni* sp. nov. differs from the *O. biloba* females by wing length (*O. biloba* – 5.5 mm; *O. delichoni* sp. nov. – 4.8–5.0 mm) and the number of long scutellar setae on its posterior margin (*O. biloba* – 6; *O. delichoni* sp. nov. – 8) (Doszhanov 2003).

DISCUSSION

Species of the genus *Ornithomya* are parasites of different small birds from the order Passeriformes. Many of them specifically prefer swallows as hosts. The new species expands the list of swallow parasites. According to our analyze of Maa (1969a) and Doszhanov (1980, 2003), ultimately 36.3% of *Ornithomya* species are parasites of Hirundinidae (Passeriformes). Moreover, other species of the genus, such as *O. ambigua, O. biloba*, *O. cecropis, O. comosa*, *O. fur, O. krivolutskii*, *O. roubaudi*, and *O. rupes,* prefer swallows as the primary host. In addition to *O. delichoni* sp. nov., other species of *Ornithomya* – *O. avicularia*, *O. bequaerti*, *O. chloropus*, *O. fringillina, O. greeni*, *O. inocellata*, *O. nigricornis*, *O. sorbens* and louse flies from other genera – can be occasionally found on swallows. Swallows have a wide beak, short legs, dense plumage and poor preening abilities. They feed in flight and therefore do not associate insects in their nests with food (Matyukhin and Yatsuk 2021). This is probably why swallows are attractive hosts for so many species of louse flies.

KEY TO THE WORLD SPECIES FROM THE GENUS *ORNITHOMYA* LATREILLE, 1802

The genus *Ornithomya* is characterized by a round head, large eyes and simple ocelli. The antennae are one third the length of the head. The palpi are equal in length to the second antennal segment. Cone-shaped humeral tubercles protrude strongly forward on each side of the head. The wings are well developed. There are three transverse veins that are partially covered by microtrichia. Vein R2+3 in the apical part is not adjacent to the costa. The femora are strong, the claws are bifid.

In our opinion, the most important and frequently encountered distinguishing features for *Ornithomya* are: combined length of head and thorax, wing length, number of scutellum and mesonotum setae, ratio of sections of costal vein between junctions of R1 and R2+3 and between junctions of R2+3 and R4+5, arrangement of wing microtrichia. Based on these features and literature data, we have compiled a key to the world fauna of *Ornithomya*. Although we find the features of the combined length of the head and thorax and wing length (Tabl. 2) very convenient, in cases of doubt, we advise to pay attention to the arrangement of wing microtrichia (Fig. 4) and the number of strong scutellar setae. Our key is mainly suitable for identifying females because there are some species with unknown males. Additionally, supporting Tables 1, 2 and drawings of the wings (Figs 1, 4) are provided.

1. Vein R2+3 represented by 2 short, widely separated sections: 1 at base and another near apex. Arrangement of microtrichia on the wings – Fig. 4O ..... *O. fur.*
– Vein R2+3 not divided ..... 2.
2. Ocelli rudimentary or absent ..... 3.
– Ocelli distinct, though sometimes small .. 5.
3. Scutellum with 6 (3 pairs) regularly arranged apical setae, with number of fine setae of varied length scattered over surface, and with row of 4 (2 pairs) noticeably longer setae lined near anterior margin. May be 3 additional apical setae which are more or less out of alignment. Wing membrane including alula, entirely cover with microtrichia ..... *O. greeni.*
– Scutellar setae different or differently arranged ..... 4.
4. Scutellum with numerous long and short setae, those near the scuto-scutellar suture in one

Table 1. Data on the hosts and distribution of Ornithomya spp.

Species	Geographic distribution	Type locality	Holotype host	Hosts
O. alpicola Maa, 1975	Nepal	Uring Ghang, Southern side of Gasaikunda Pass, 3500 m, Nepal	*Ithaginus cruentus* (Hardwicke, 1821)	Phasianidae
O. ambigua Lutz, 1915	Colombia, Venezuela, Brazil, Peru	Minas Gerais and Santa Catarina, Brasil	*Leptotila rufaxilla* (Richard & Bernard, 1792)	Hirundinidae, Columbidae, Furnariidae
O. anchineuria Speiser, 1905	USA including Alaska, Canada, Mexico	USA	*Sialia sialis* (Linnaeus, 1758)	Accipitridae, Falconidae, Pandionidae, Cathartidae, Phasianidae, Charadriidae, Laridae, Strigidae, Alcedinidae, Picidae, Tyrannidae, Muscicapidae, Motacillidae, Laniidae, Sittidae, Paridae, Thraupidae, Fringillidae, Icteridae, Ploceidae, Sturnidae, Corvidae
O. apelta Maa, 1969	Philippines, New Guinea, Solomon Islands	Wau, 1200 m, Solomon Islands	*Zosterops rendovae* Tristram, 1882, *Zosterops japonicus* Temminck & Schlegel, 1847	Zosteropidae
O. areolata Maa, 1986	Australia, Tasmania	Loomana, King Islands	*Malurus cyaneus* (Ellis, 1782)	Zosteropidae, Muscicapidae, Meliphagidae, Ploceidae, Campephagidae, Psittacidae
O. avicularia (Linnaeus, 1758)	Palearctic, including Japan	May be Sweden?	Unknown	Birds of prey, Galliformes, Ciconiiformes, Coraciiformes, Columbiformes, Cuculiformes, Coraciae, Piciformes, Passeriformes
O. bequaerti Maa, 1969	Kurile Islands	Fort Simpson, New Territory, Canada	*Bonasa umbellus togata* (Linnaeus, 1766), *Pica hudsonia* (Sabine, 1823), *Aegolius acadicus* (Gmelin, 1788), *Zonotrichia albicollis* (Gmelin, 1789) and may be *Passer montanus* (Linnaeus, 1758)	Passeriformes
O. biloba Dufour, 1827	Africa, Europe, Asia	Saint-Sever (France)	Unknown	Hirundinidae
O. candida Maa, 1967	Japan	Jamanaka, Mt. Fuji, Honshu (Japan)	*Geokichla sibirica* (Pallas, 1776)	Muscicapidae
O. cecropis Hutson, 1971	Kenya	Kenya	*Cecropis daurica* (Laxmann, 1769), *Cecropis abyssinica* (Guérin-Méneville, 1843), *Riparia paludicola* (Vieillot, 1817), *Anthus novaeseelandiae* (Gmelin, JF, 1789)	Motacillidae, Hirundinidae
O. chloropus Bergroth, 1901	Oriental region	Tammela (Fennia australi) (Finland)	*Asione accipitrino* Pallas	Birds of prey, Galliformes, Ciconiiformes, Charadriiformes, Gruiformes, Cuculiformes, Piciformes, Passeriformes, Apodes, Laridae
O. comosa Austen, 1930	Oriental region	Pusa, Bihar (India)	Nests of *Riparia chinensis* (J.E. Gray, 1830)	Hirundinidae
O. delichoni sp. nov.	Primorskiy territory, Russia	Russia, Primorskiy Terr., Spassk district, Gaivoron (44°44'50"N 132°46'27"E)	*Delichon urbicum* (Linnaeus, 1758)	Hirundinidae
O. fringillina Curtis, 1836	Holarctic	Weston on the Geen, near Oxford (Geat Britain)	*Emberiza citrinella* (Linnaeus, 1758), *Parus major* Linnaeus, 1758, *Erithacus rubecula* (Linnaeus, 1758)	Birds of prey, Galliformes, Piciformes, Passeriformes

Species	Geographic distribution	Type locality	Holotype host	Hosts
O. fur Schiner, 1868	Republic of South Africa, Transvaal, Nigeria, Cameroon	Cap, South Africa	*Cecropis cucullata* (Boddaert, 1783)	Hirundinidae, Apodidae
O. fuscipennis Bigot, 1885	India, Myanmar, Thailand, China, Taiwan, Malaya, Sumatra, Java, Philippines, Borneo, New Guinea, Solomon Is., Australia	May be Australia	Columbidae	Ardeidae. Accipitridae, Falconidae. Columbidae, Psittacidae. Cuculidae. Strigidae, Podargidae, Trogonidae, Alcedinidae, Picidae. Muscicapidae, Motacillidae, Irenidae, Meliphagidae, Zosteropidae, Fringillidae, Sturnidae, Corvidae, Ptilonorhynchidae
O. gigantea Bear et Friedberg, 1995	Israel	Eilat, Israel	*Sylvia atricapilla* (Linnaeus, 1758)	Sylviidae
O. greeni Maa, 1986	Tasmania, possibly Australia	Campania, Tasmania	*Hirundo neoxena* Gould, 1843	Hirundinidae
O. hoffmannae Bequaert, 1954	Mexico	Chiapas Cacahoatán, Mexico	*Buteo nitidus* Latham, 1790	Falcoformes
O. inocellata Ferris, 1930	Republic of South Africa, Transvaal	Republic of South Africa	*Petrochelidon spilodera* (Sundevall, 1850)	Hirundinidae
O. krivolutskii Yatsuk, Matyukhin et Nartshuk, 2023	Curish Spit, Russia	Curish Spit, Russia	*Hirundo rustica* Linnaeus, 1758	Hirundinidae
O. marginalis Maa, 1964	Republic of South Africa	Dargle	*Cossypha dichroa* (Gmelin, JF, 1789)	Muscicapidae
O. medinalis Maa, 1975	Bhutan	Gedu, Bhutan	*Certhia discolor* Blyth, 1845	Certhiidae
O. nigricornis Erichson, 1842	Australia, Tasmania	Australia, Tasmania	Unknown	Accipitridae, Falconidae. Phasianidae, Psittacidae, Strigidae, Caprimulgidae, Muscicapidae, Meliphagidae, Corvidae, Cracticidae, Hirundinidae
O. opposita Walker, 1849	Tasmania, Australia, New Zealand	New Zealand	Unknown	Psittacidae, Ploceidae
O. papillosa Maa, 1964	Congo	Zaire	Unknown	Unknown
O. parva Macquart, 1843	Tristan da Cunha, Gough Island, Argentina, Chile	Chile	Unknown	Falconidae, Rallidae, Strigidae, Picidae, Furnariidae, Tyrannidae, Muscicapidae, Fringillidae, Icteridae
O. roubaudi Seguy, 1938	Gabon, Congo	Brazzaville, Congo	Hirundinidae	Hirundinidae, Muscicapidae
O. rupes Hutson, 1981	Gibraltar	Giblartar, Switzerland	*Hirundo rupestris* Scopoli, 1769	Hirundinidae
O. sorbens Hutson, 1971	Madagascar	Madagascar	Hirundinidae	Hirundinidae
O. strigilis Nartshuk, Yatsuk et Matyukhin, 2022	Russian Far East	Lazovsky nature reserved area, Primorsky Territory, Russia	*Ninox scutulata* (Raffles, 1822)	Strigidae
O. triselevae Matyukhin, Yatsuk et Nartshuk, 2023	Kuril Islands	Iturup Island, Kurilsky District, Sakhalin Oblast (Russia)	*Ocyris spodocephalus personatus* (Temminck, 1836)	Emberizidae

Table 2. Data on the wing length of *Ornithomya* spp.

Species	Wing length (mm)
O. alpicola Maa, 1975	6.5
O. ambigua Lutz, 1915	6.0
O. anchineuria Speiser, 1905	4.5–5.5
O. apelta Maa, 1969	4.3
O. areolata Maa, 1986	4.7–5.8
O. avicularia (Linnaeus, 1758)	5.5–7.0
O. bequaerti Maa, 1969	4.4–5.0
O. biloba Dufour, 1827	5.5
O. candida Maa, 1967	5.2–5.7
O. cecropis Hutson, 1971	4.8
O. chloropus Bergroth, 1901	4.5–5.5
O. comosa Austen, 1930	5.0–5.5
O. delichoni sp. nov.	4.8–5.0
O. fringillina Curtis, 1836	3.5–4.5
O. fur Schiner, 1868	5.5
O. fuscipennis Bigot, 1885	8.0
O. gigantea Bear & Friedberg, 1995	7.0
O. greeni Maa, 1986	5.0
O. hoffmannae Bequaert, 1954	4.5
O. inocellata Ferris, 1930	6.0
O. krivolutskii Yatsuk, Matyukhin et Nartshuk, 2023	4.0
O. marginalis Maa, 1964	5.0
O. medinalis Maa, 1975	5.5
O. nigricornis Erichson, 1842	5.5–7.0
O. opposita Walker, 1849	4.6–5.5
O. papillosa Maa, 1964	6.2
O. parva Macquart, 1843	4.5–6.0
O. roubaudi Seguy, 1938	5.1
O. rupes Hutson, 1981	4.1–4.8
O. sorbens Hutson, 1971	4.6
O. strigilis Nartshuk, Yatsuk et Matyukhin, 2022	7.5–8.0
O. triselevae Matyukhin, Yatsuk et Nartshuk, 2023	5.8–6.0

irregular row. Arrangement of microtrichia on the wings – Fig. 4R ..... *O. ambigua*.

– Scutellum with few setae, none forming row near scuto-scutellar suture. Arrangement of microtrichia on the wings – Fig. 4L .... *O. hoffmannae*.

5. Combined length of head and thorax 4 mm or more ..... 6.
– Combined length of head and thorax less than 4 mm ..... 8.
6. Wing length 7.5–8.0 mm ..... 7.
– Wing length 7.0 mm. Microtrichia a cover cell 3r except near veins, a small area in middle and proximally and forming three narrow longitudinal stripes in cell 1m ..... *O. gigantea*.
7. Width of head equal to its length. Other body and wing features – Figs 4A, 7 ... *O. strigilis*.
– Width of head is greater than its length ..... *O. fuscipennis*.
8. Combined length of head and thorax more than 3 mm. Wing length 5.5 mm or more .. 9.
– Combined length of head and thorax 3 mm or less. Wing length less than 5.5 mm ..... 17.
9. Apical half of wing densely covered with microtrichia ..... *O. inocellata*.
– Wing microtrichia cover this area in the usual way ..... 10.
10. Scutellum with 2 apical setae. Arrangement of microtrichia on the wings – Fig. 4S .... *O. medinalis*.
– Scutellum with more than 2 apical setae .. 11.
11. Section of costal vein between apices of R1 and R2+3 twice as long as the section between the junctions of R2+3 and R4+5 (Fig. 1B) ... 12.
– Section of costal vein between junctions of R1 and R2+3 1.0–1.5 times as long as its section between junctions of R2+3 and R4+5 (Fig. 1C) ..... 15.
12. Wing microtrichia uniformly covering upper surface of cells 2r (apical 1/3), 3r (except very small bare area at base) and 1m (except narrow bare stripe along basal margin). Lower surface of cell 3r bare at base with narrow bare stripe along vein M1+2, otherwise uniformly microtrichose. Cell 2m anteriorly with triangular microtrichia area ..... *O. alpicola*.
– Microtrichia cover less wing area ..... 13.
13. Scutellum with at least 7 apical setae. Female genital opening not covered with dense long setae ..... 14.
– Scutellum with 6 apical setae. Female genital opening covered with dense long setae. Arrangement of microtrichia on the wings – Fig. 4Q ..... *O. papillosa*.

Fig. 5. Photos of *Ornithomya* spp. from Russia. A, B – female of *O. triselevae*; C, D – female of *O. krivolutskii*. Scale bars: 0.5 mm.

14. In Australian temperate zone .. *O. nigricornis*.
– In Palaearctic region. Some body and wing features – Figs 4K, 6 ..... *O. avicularia*.
15. Section of costal vein between junctions of R1 and R2+3 subequal to section between junctions of R2+3 and R4+5 (Fig. 1D). Tarsi tinged with green. Arrangement of microtrichia on the wings – Fig. 4F ... *O. anchineuria*.
– Section of costal vein between junctions of R1 and R2+3 1.3–1.5 times as long as section between junctions of R2+3 and R4+5 (Fig. 1C) ..... 16.

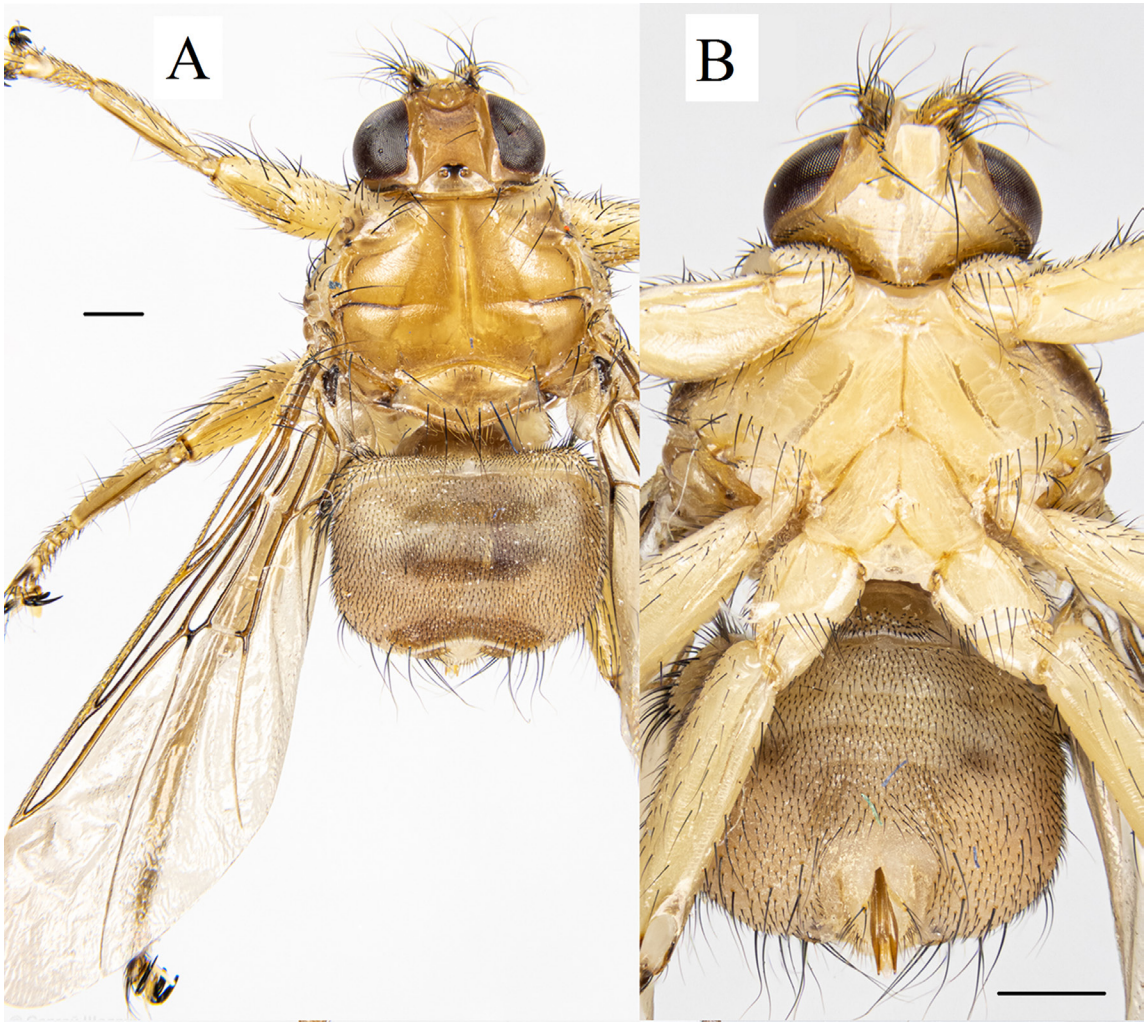

Fig. 6. Photos of *O. avicularia*, male from Russia. A – habitus, dorsal view; B – habitus, ventral side. Scale bars: 0.5 mm.

16. Section of costal vein between junctions of R1 and R2+3 1.5 times as long as section between junctions of R2+3 and R4+5. Female genital opening covered with dense long setae. Arrangement of microtrichia on the wings – Fig. 4H ..... *O. candida*.
– Section of costal vein between junctions of R1 and R2+3 1.3 times as long as section between junctions of R2+3 and R4+5. Female genital opening not covered with dense long setae (Fig. 5B). Other body and wing features – Figs 4B, 5A ..... *O. triselevae*.
17. Microtrichia covering all wing cells .... 18.
– Microtrichia covering only the cells 3r, 1m and apical part of the cell 2m ..... 19.
18. Only half of mesonotal setae fairly long, strong and dark. Other body and wing features – Figs 4J, 10A ..... *O. comosa*.
– More than half of mesonotum setae fairly long, strong and dark ..... *O. roubaudi*.
19. Combined length of head and thorax more than 2.6 mm ..... 20.
– Combined length of head and thorax 2.0–2.5 mm ..... 23.
20. 4–5 short postalar setae. About 9 long setae of scutellum (Fig. 5C). Other body and wing features – Figs 4C, 5D ..... *O. krivolutskii*.
– 3 postalar setae (1 large, 2 small and pale). Combination of other features is different ..... 21.

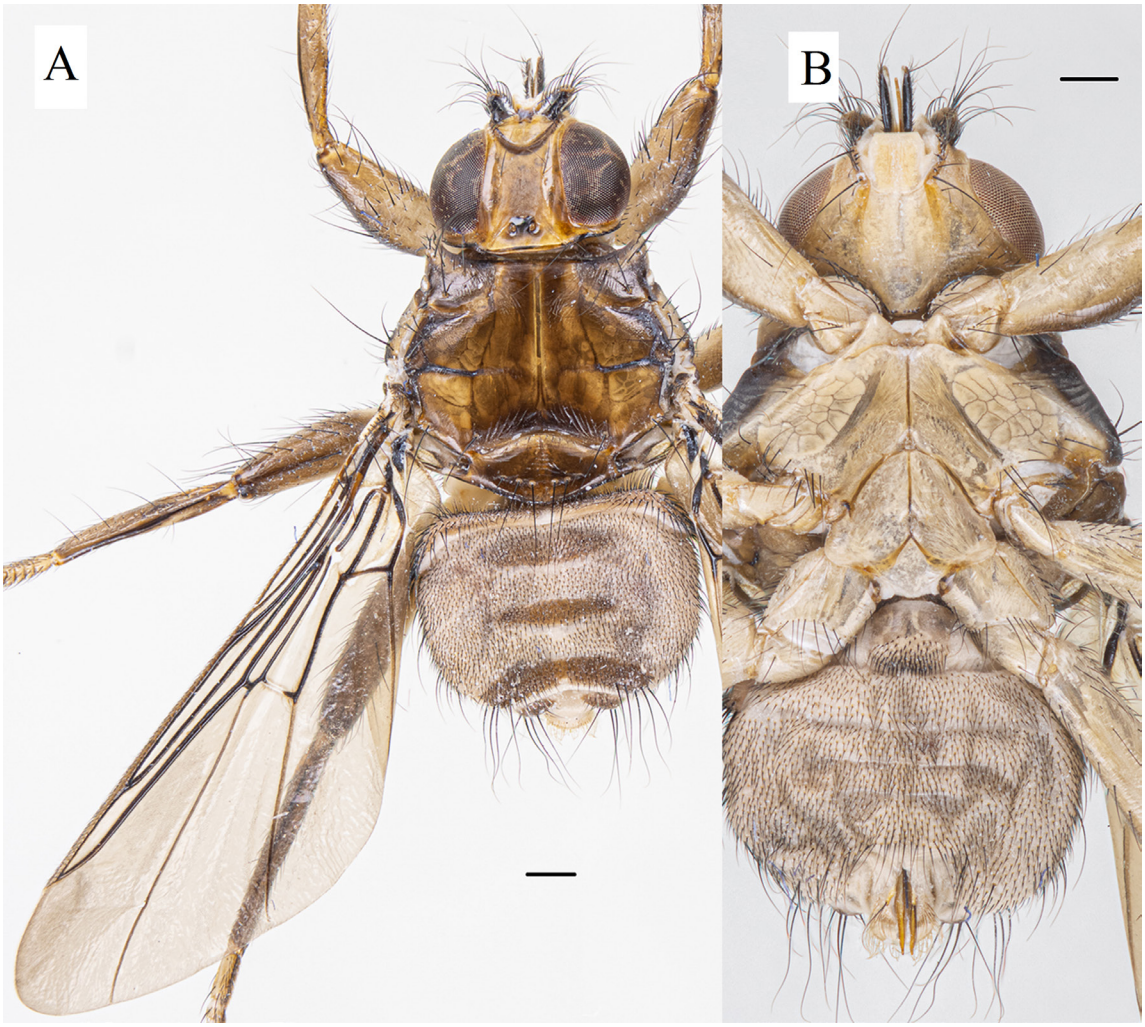

Fig. 7. Photos of *O. strigilis*, male from Russia. A – habitus, dorsal view; B – habitus, ventral side. Scale bars: 0.5 mm.

21. Scutellum with 3–5 apical setae ..... 27.
– At least 8 long setae of scutellum ..... 22.
22. Microtrichia covering short part of cell 2m (Fig. 4D). 8–12 long mesopleural setae (Figs 2B, 3) ..... *O. delichoni* sp. nov.
– Microtrichia covering half of cell 2m. 3–6 long mesopleural setae. Arrangement of microtrichia on the wings – Fig. 4I ..... *O. cecropis.*
23. Areole, or isolated roundish bare area in cell 3r next to the apex of cell 2r, present .... *O. areolata.*
– Areole absent ..... 24.
24. Thorax with 1–10 mesopleural setae .... 25.
– Thorax with more than 10 mesopleural setae ..... 30.
25. Thorax with 5–10 mesopleural setae ... 26.
– Thorax with 1–3 mesopleural setae ..... 29.
26. Scutellum with short setae, with a transverse row of four (rarely, six) long setae at posterior margin and 3–4 long setae anterior of this row. Arrangement of microtrichia on the wings – Fig. 4U. Mesonotum with 6–10 mesopleural setae, four of which long ..... *O. rupes.*
– Scutellum with 6 strong setae. Arrangement of microtrichia on the wings – Fig. 4P. Mesonotum with 5–6 mesopleural setae ..... *O. sorbens.*
27. Arrangement of microtrichia on the wings – Fig. 4G. Wing length 4.4–5.0 mm .... *O. bequaerti.*

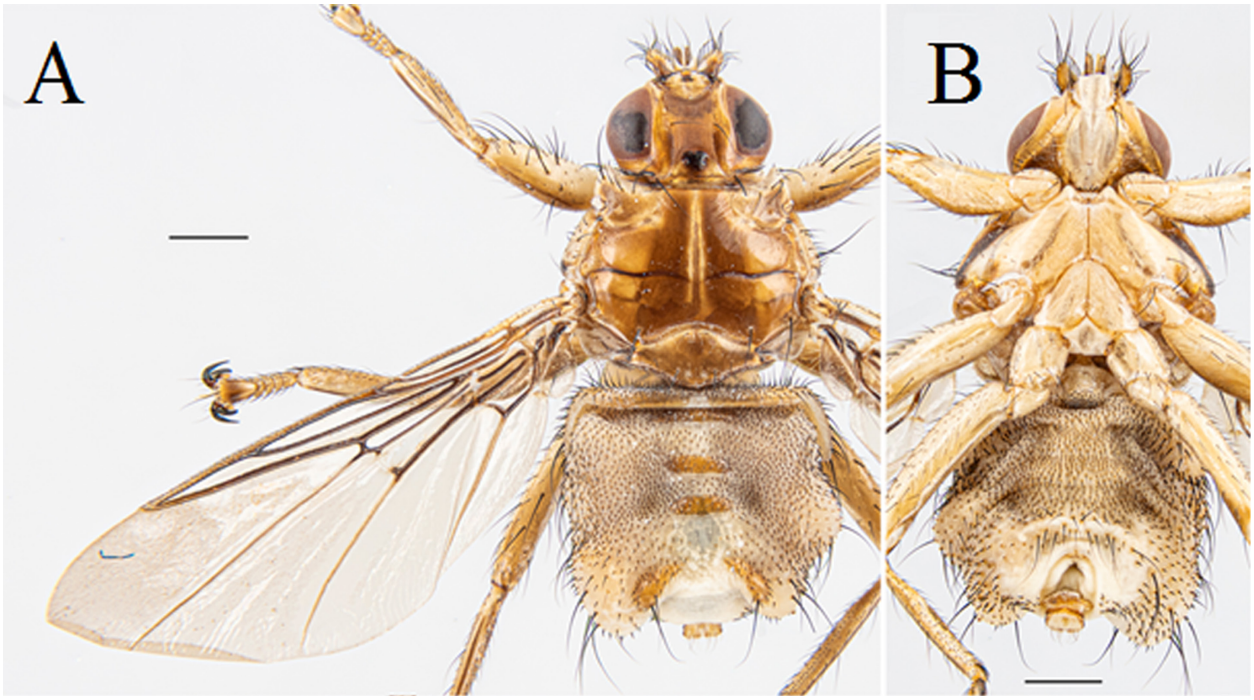

Fig. 8. Photos of *O. fringillina*, female from Russia. A – habitus, dorsal view; B – habitus, ventral side. Scale bars: 0.5 mm.

– Another arrangement of microtrichia. Wing length 3.5–4.5 mm ..... 28.
28. The width of the eye is one third of the width of the head. Arrangement of microtrichia on the wings – Fig. 4S. Other body features – (Fig. 8) ..... *O. fringillina*.
– The width of the eye is one quarter of the width of the head. Arrangement of microtrichia on the wings – Fig. 4K ..... *O. opposita*.
29. 2 microtrichia stripes in cell 1m. Arrangement of microtrichia on the wings – Fig. 4N ..... *O. marginalis*.
– 3 microtrichia stripes in cell 1m. Arrangement of microtrichia on the wings – Fig. 4E ..... *O. apelta*.
30. Microtrichia covering cell 1m almost completely. Other body and wing features – Figs 4M, 10B ..... *O. biloba*.
– 3 microtrichia stripes in cell 1m ..... 31.
31. 14 mesopleural setae (Fig. 9C). Other body and wing features – Figs 4V, 9A, B .... *O. chloropus*.
– Less mesopleural setae. Arrangement of microtrichia on the wings – Fig. 4T .... *O. parva*.

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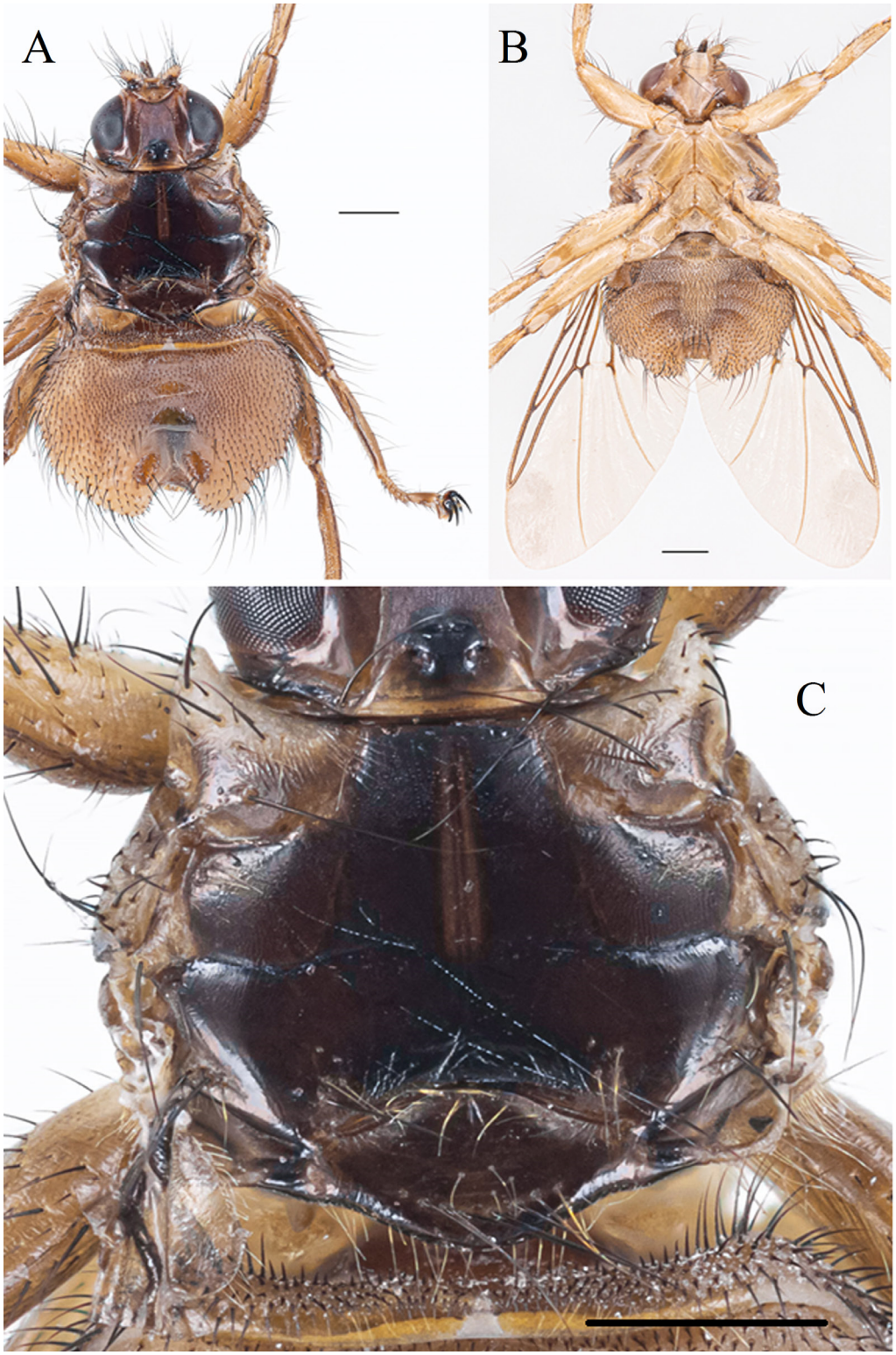

Fig. 9. Photos of *O. chloropus*, female from Russia. A – habitus, dorsal view; B – habitus, ventral side; C –mesonotum, dorsal view. Scale bars: 0.5 mm.

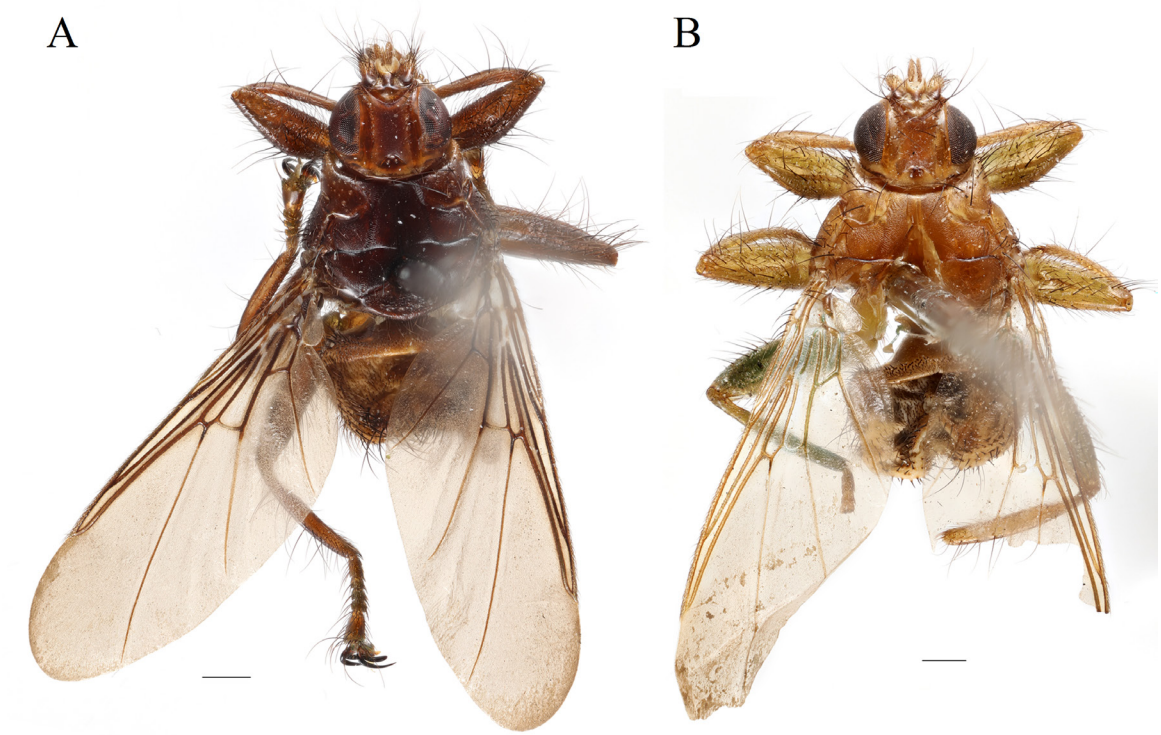

Fig. 10. Photos of *Ornithomya* spp. from Russia (photos made by V.V. Neimorovets). A – female of *O. comosa*; B – female of *O. biloba*. Scale bars: 0.5 mm.

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