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The first record of *Promyialges uncus* (Acariformes: Epidermoptidae) on the louse fly *Ornithomya chloropus* (Diptera: Hippoboscidae) in the subpolar Ural

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Feather mites are a vast group of astigmatan mites (Astigmata: Analgoidea and Pterolichoidea) being permanent and highly specialized parasites and commensals of birds (Gaud and Atyeo 1996; Proctor 2003). The family Epidermoptidae (Analgoidea) consists of four subfamilies: Epidermoptinae, Lukoschusoptinae, Myialginae and Otocoptoidinae, and includes about 57 species from 16 genera (Mironov *et al.* 2005). Feather mites of the family Epidermoptidae are ectoparasites, all stages of which are located on the skin of their hosts (Dubinin 1953; Fain 1965; Mironov 1987, 1999; Mironov *et al.* 2005). Some representatives of the subfamily Epidermoptinae and all genera of the subfamily Myialginae show phoretic relations with louse flies (Diptera: Hippoboscidae) and also chewing lice (Phthiraptera) parasitizing birds. Fertilized females of these mites use these parasitic insects for dispersal and infesting new host individuals and, in some genera, for feeding and egg laying (Cooreman 1944; Goater *et al.* 2018; Mironov *et al.* 2005; Yamauchi and Kuroki 2009; Valim and Gazeta 2007).

Promyialges uncus (Vitzthum, 1934) (Epidermoptinae) inhabits a wide variety of Passeriformes (Fain 1965; Philips and Fain 1991). Females of this mite were found on the wings of various louse fly species of the genus *Ornithomya* Latreille, 1802 (Philips and Fain 1991; Jamriška *et al.* 2011). The most common louse fly host is *O. fringillina* Curtis, 1836 (Fain 1965; Philips and Fain 1991; Mironov 1996; Jamriška *et al.* 2011). To date, this mite has been found on six species of louse flies, which were collected from 22 bird species (Table 1).

Promyialges uncus is widely distributed in Europe and North America. This species has been recorded in five countries of northern and central Europe (Fain 1965; Jamriška *et al.* 2011) and from nine states in the north of the USA and Canada (Philips and Fain 1991) (Table 1). In Russia, *P. uncus* was previously recorded on *O. avicularia* L., 1758 from the hooded crow, *Corvus cornix* (Corvidae), in the Leningrad region (Mironov 1996) that so far was the most eastern finding of this mite in Europe.

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Table 1. Distribution and host associations of *Promyialges uncus* with flies and birds.

Fly species	Bird species	Bird family	Locality	Reference
<i>Ornithomya avicularia</i> L., 1758	<i>Turdus migratorius</i> L., 1766	Turdidae	Slovakia	Jamriška1 <i>et al.</i> (2011)
	<i>Hirundo rustica</i> L., 1758	Hirundinidae	Slovakia	Jamriška1 <i>et al.</i> (2011)
	<i>Corvus frugilegus</i> L., 1758	Corvidae	Denmark	Fain (1965)
	<i>C. cornix</i> L., 1758	Corvidae	Russia: Leningrad region	Mironov (1996)
<i>O. bequaerti</i> Maa, 1969	<i>Bombycilla cedrorum</i> Vieillot, 1808	Bombycillidae	USA: PA	Philips & Fain (1991)
	<i>Picooides pubescens</i> L., 1766	Picidae	USA: PA	Philips & Fain (1991)
	<i>Zonotrichia leucophrys gambelii</i> Nuttall, 1840	Passerellidae	USA: AK	Philips & Fain (1991)
<i>O. biloba</i> L., 1758	unknown	unknown	Belgium	Fain (1965)
	<i>Hirundo rustica</i> L., 1758	Hirundinidae	Switzerland	Fain (1965)
<i>O. chloropus</i> Bergroth, 1901	<i>Catharus guttatus</i> Pallas, 1811	Turdidae	USA: ME	Philips & Fain (1991)
	<i>Geothlypis trichas</i> L., 1766	Parulidae	USA: NH	Philips & Fain (1991)
	<i>Anthus cervina</i> Pallas, 1811	Motacillidae	Russia: Komi republic	New data
	<i>A. hodgsoni</i> Richmond, 1907	Motacillidae	Russia: Komi republic	New data
	<i>Acrocephalus schoenobaenus</i> L., 1758	Acrocephalidae	Russia: Komi republic	New data
	<i>Luscinia svecica</i> L., 1758	Muscicapidae	Russia: Komi republic	New data
	<i>Scolopax rusticola</i> L., 1758	Scolopacidae	Russia: Komi republic	New data
	<i>Anthus pratensis</i> L., 1758	Motacillidae	England	Fain (1965)
<i>O. fringillina</i> Curtis, 1836	<i>A. spinoletta</i> L., 1758	Motacillidae	England	Fain (1965)
	<i>Lagopus lagopus</i> L., 1758	Laridae	England	Fain (1965)
	<i>Prunella modularis</i> L., 1758	Prunellidae	England	Fain (1965)
	<i>Agelaius phoeniceus</i> L., 1766	Icteridae	USA: PA	Philips & Fain (1991)
	<i>Colaptes auratus</i> L., 1758	Picidae	USA: NY	Philips & Fain (1991)
	<i>Dumetella carolinensis</i> L., 1798	Mimidae	USA: RI	Philips & Fain (1991)
	<i>ixoreus naevius</i> Gmelin, 1789	Turdidae	Canada: British Columbia	Philips & Fain (1991)
	<i>Melospiza lincolni</i> Audubon, 1834	Passerellidae	USA: ND	Philips & Fain (1991)
	<i>M. melodia</i> Wilson, 1810	Passerellidae	USA: MA	Philips & Fain (1991)
	<i>Spizella passerina</i> Bechstein, 1798	Passerellidae	USA: MA	Philips & Fain (1991)
	<i>Spizella</i> sp. (<i>S. passerina</i> or <i>S. pallida</i>)	Passerellidae	USA: ND	Philips & Fain (1991)
	<i>Turdus migratorius</i> L., 1766	Turdidae	USA: NJ	Philips & Fain (1991)
	<i>T. migratorius</i> L., 1766	Turdidae	USA: RI	Philips & Fain (1991)
	unknown	unknown	Belgium	Fain (1965)

Our study reports *P. uncus* from five new avian hosts captured in foothills of the subpolar Ural, Russia. The material (louse flies with mites) used in this study was collected from recently dead

birds near Syktyvkar (Komi republic, Russia) (coordinates: 61.824124, 56.827802) in August-September 2020 and fixed in 96% ethanol. Females of *P. uncus* were found on seven louse flies *O. chloropus* Bergroth, 1901 from the following birds: *Anthus hodgsoni* Richmond, 1907 (1 louse fly with 1 mite female), *An. cevinus* (Pallas, 1811) (3 flies, 4 mite females), *Acrocephalus schoenobaenus* L., 1758 (1 fly, 1 mite female), *Luscinia svecica* L., 1758 (1 fly, 1 mite female) and *Scolopax rusticola* L., 1758 (1 louse fly, 1 mite female). The mites were mounted on slides in Hoyer's medium according to standard technique used for small mites (Walter and Krantz 2009) and examined with Keyence BZ-9000 microscope. Mite specimens were identified using the key by Fain (1965), and identification of flies species was based on the keys by Maa (1969) and Doszhanov (2003). The material used in the study is deposited in the collection of the A.N. Severtsov Institute of Ecology and Evolution (Moscow, Russia).

A total of eight *P. uncus* females was collected. Their morphological features are shown in Figure 1. The mites were found on the ventral surfaces of the basal parts of the fly's wings where they were surrounded by eggs attached to the cuticle of wings (Fig. 2).

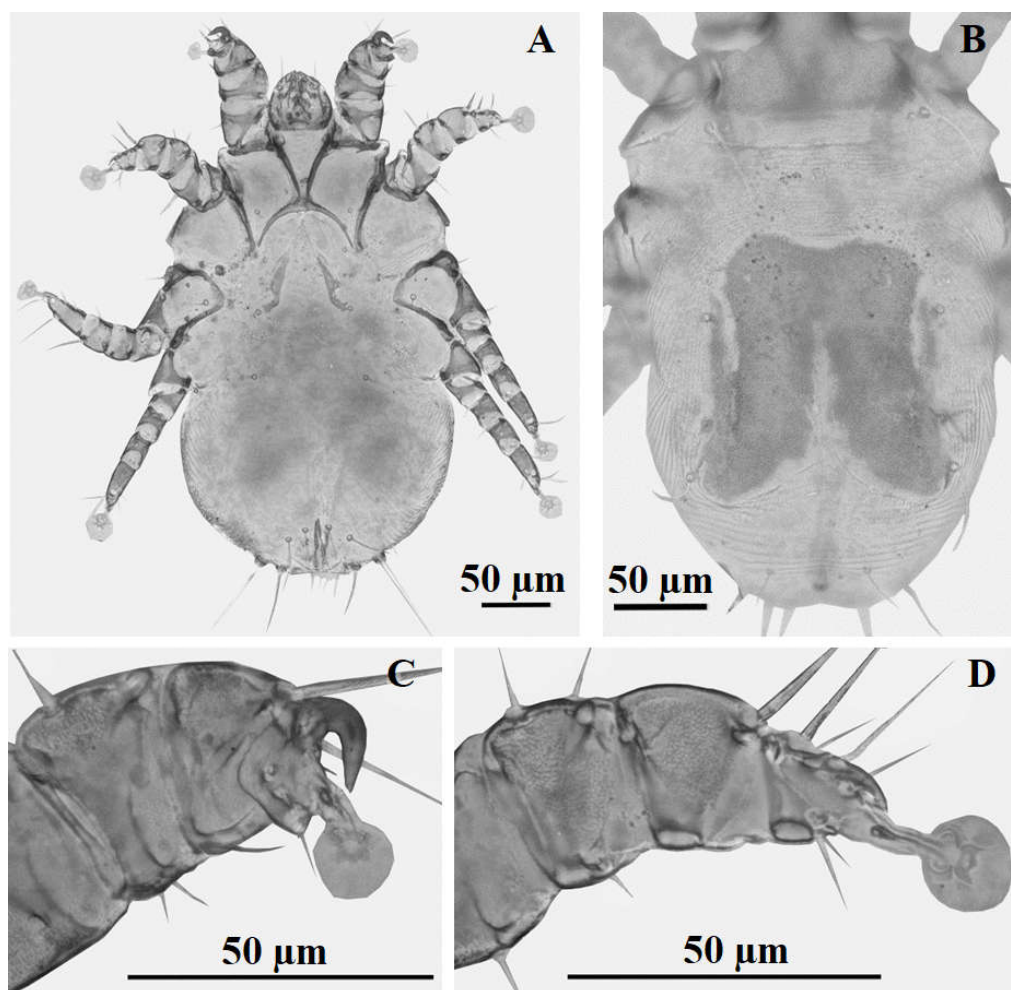


Figure 1. *Promyialges uncus* (female) – **A.** Non-engorged mite, ventral view of body; **B.** Engorged mite, dorsal view of body; **C.** Tibia and tarsus I; **D.** Genu, tibia and tarsus II.

The geographical range of five bird species, on which *P. uncus* was found in Russia, is large: *An. hodgsoni* is distributed across southern, north central and eastern Asia; *L. svecica* is distributed across the Palearctic; *Ac. schoenobaenus* occurs throughout Europe and western Asia; *An. cevinus* is found in northern Eurasia in the taiga and tundra zones; and *S. rusticola* inhabits the forest and

forest-steppe zone of entire Eurasia. It is not known well, whether the parasite composition changes throughout the range of these bird hosts. However, *P. uncus* was found in 1000 km to the east from its previous finding in Russia (Mironov 1996), in other climatic conditions and on other bird species, formerly not recorded as hosts. Taking into account the previously known records of *P. uncus* in Europe and North America and wide ranges of its bird hosts, it can be assumed that its distribution area includes the entire Holarctic region.

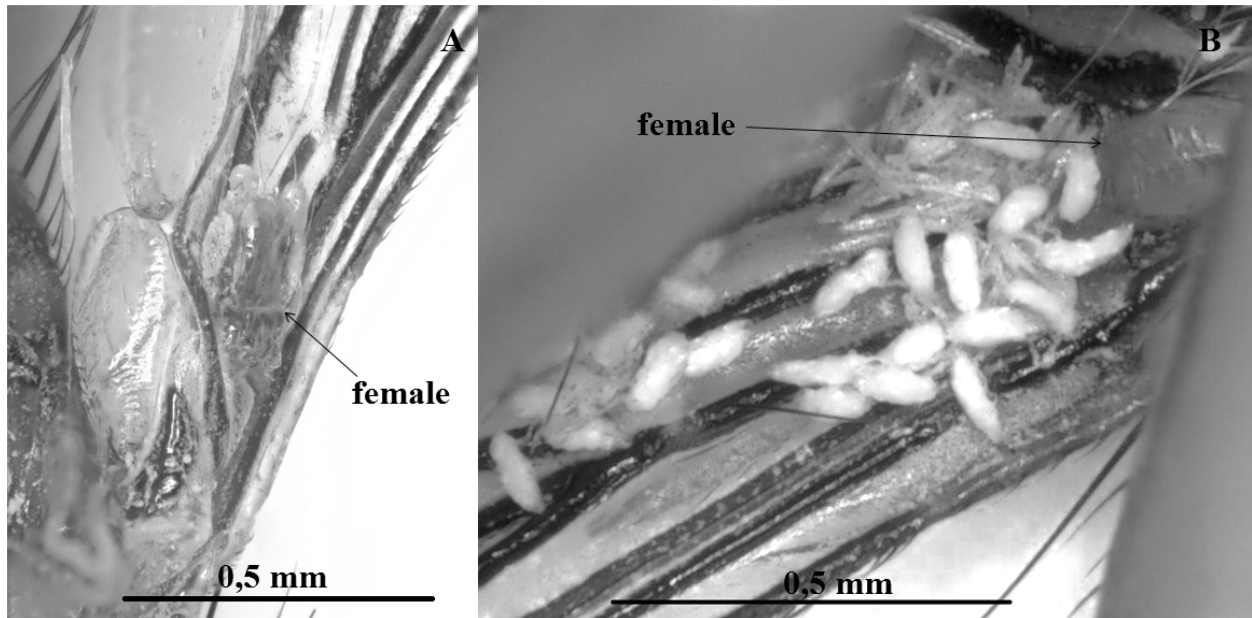


Figure 2. *Promyialges uncus* (female) – **A.** Mites attached to the basal part of the fly's wing; **B.** Female and eggs attached to the basal part of the fly's wing.

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