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## A new species of *Liposcelis* (Insecta: Psocoptera: Liposcelididae) from Belarus

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### Abstract

In 2019 a strikingly colored species of *Liposcelis* (Insecta: Psocoptera: Liposcelididae), unknown from the Palaearctic region, was collected by A. Ostrovsky in an ant's nest near Gomel city (Belarus). It is here described as *Liposcelis aleksandrowiczi* n. sp., a bisexual sister species to the parthenogenetic (thelytokous) New World *Liposcelis ornata* Mockford, 1978. The new species can be distinguished from *L. ornata* by slight differences in body coloration, and by some details of pronotal chaetotaxy and head pilosity.

**Key words:** *Liposcelis*, new species, taxonomy, Belarus.

### Introduction

The psocid fauna of animal nests, in particular ants' nests, is rather poorly investigated (Lienhard, 1998). Therefore collections from ants' nests are always interesting and faunistical surprises are not excluded. In the western Palaearctic two species of the apterous genus *Liposcelis* Motschulsky are regularly found in ants' nests: *L. formicaria* (Hagen) and *L. myrmecophila* Broadhead (Lienhard, 1990). These species were not present in the ants' nests investigated by A. Ostrovsky in the region of Gomel (Belarus) (Ostrovsky & Georgiev, 2020), but numerous females and males of a strikingly colored *Liposcelis* species were collected in a nest of *Formica pratensis* Retzius, 1783 which could not be identified with the keys generally used for the identification of euro-mediterranean psocids (Lienhard, 1998). The specimens were tentatively assigned by their collector to the New World species *L. ornata* Mockford, 1978. However, the presence of males in the Belarus sample was surprising, because *L. ornata* was known as obligatorily parthenogenetic (thelytokous), lacking males entirely (Mockford, 1978). A detailed examination of slide mounted females revealed also some differences in coloration and chaetotaxy suggesting that the Belarus population has to be considered as belonging to a new species, which is here described and illustrated.

## Material and methods

The *Liposcelis* specimens were collected on 13 October 2019 by A. Ostrovsky by sieving of various particles from a nest of the ant species *Formica pratensis* Retz. (Fig. 1). The alcohol-preserved specimens, provisionally assigned to *Liposcelis ornata* Mockford, 1978 by their collector, were later sent to C. Lienhard and D. Georgiev for microscopical examination and final identification. The holotype and some paratypes are deposited in the Natural History Museum of Geneva, Switzerland (MHNG), some paratypes also in the collections of A. Ostrovsky and D. Georgiev (see details of material examined, below).

The morphological terminology, in particular concerning chaetotaxy, is used according to Lienhard (1990, 1998).



**Figure 1.** Habitat of *Liposcelis aleksandrowiczi* n. sp. at the type locality (nest of *Formica pratensis* Retz.).

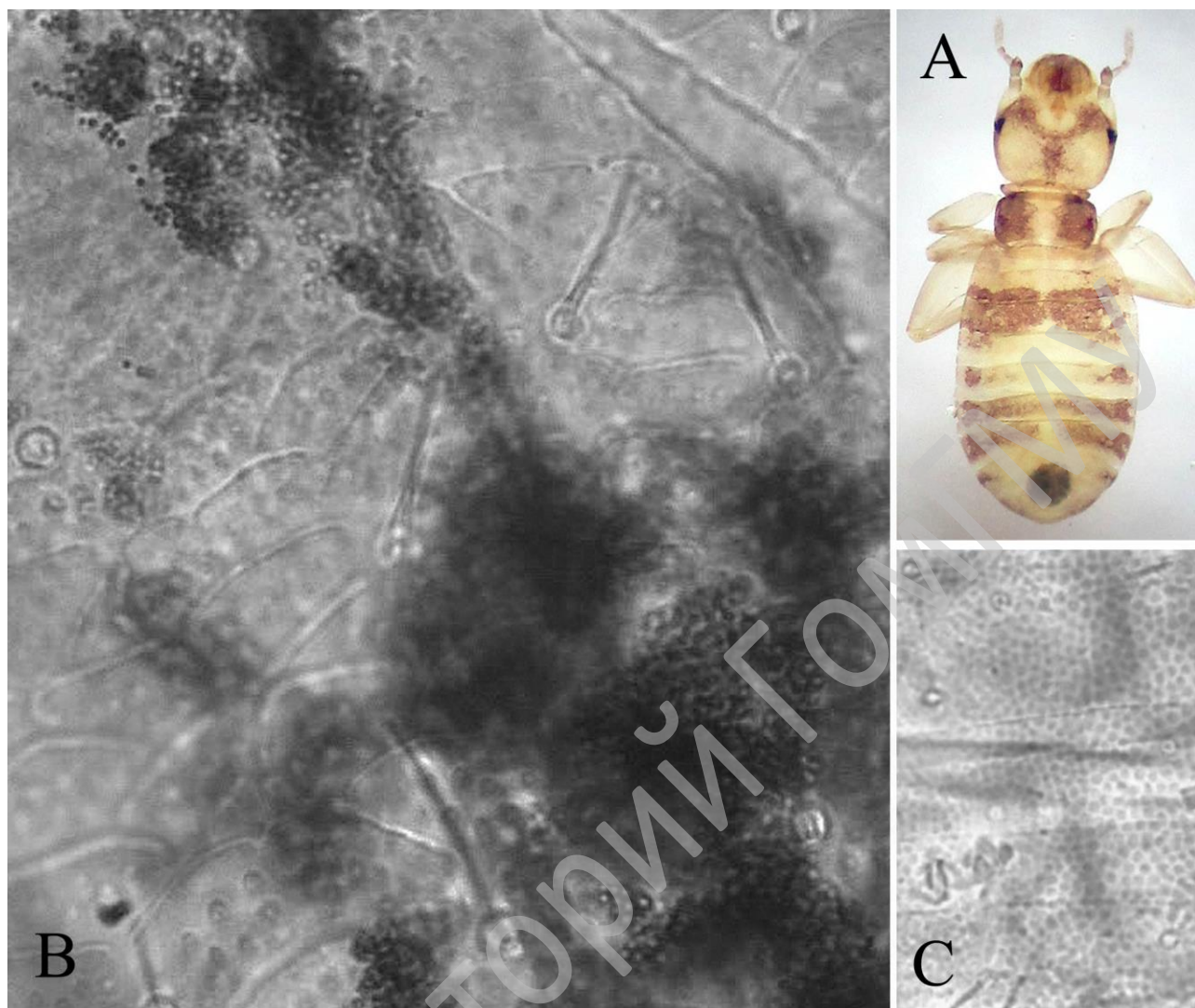
## Results

### *Liposcelis aleksandrowiczi* n. sp.

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**Etymology:** The species is named in honor of Prof. Dr. Hab. Oleg Aleksandrowicz, Institute of Biology and Earth Sciences, Pomeranian University in Słupsk, Poland.

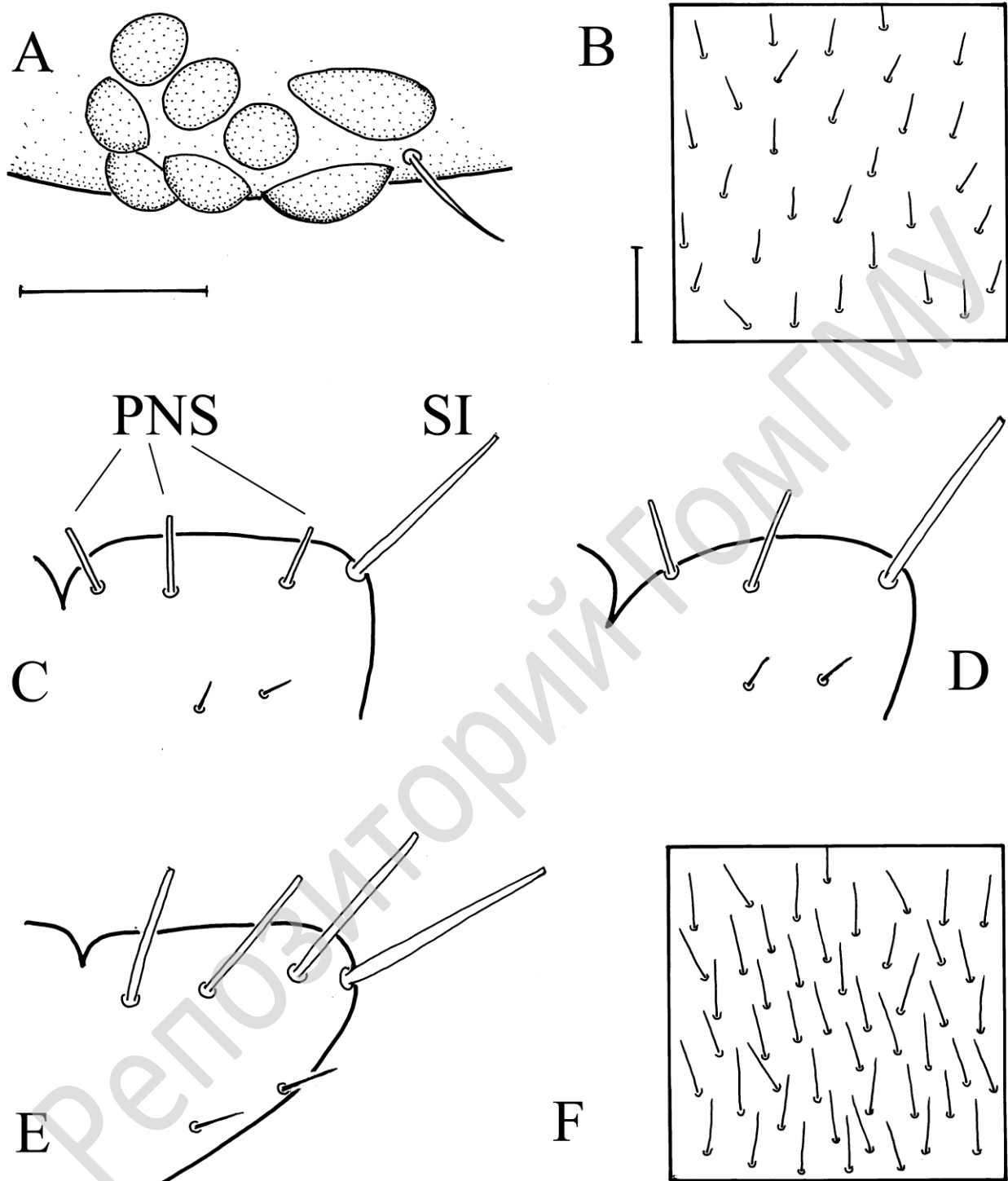
**Material examined: Holotype** 1♀, slide-mounted (MHNG): BELARUS, Gomel area, Gomel district, roadside of the railway embankment East of the horticultural partnership “Lisichki”, in the nest of *Formica pratensis* Retz., in sparse growth dominated by *Populus tremula*, *Betula pendula* and *Quercus robur*, 52°22'41"N, 31°04'22"E, 128m a.s.l., 13.10.2019, leg. A. Ostrovsky. **Paratypes**, same data as holotype: 31♀, 7♂, one of them allotype mounted on same slide as holotype (MHNG), 5♀, 2♂ (coll. A. Ostrovsky), 3♀, 1♂ (coll. D. Georgiev).



**Figure 2.** Light microscope photographs of a female *Liposcelis aleksandrowiczi* n. sp.: A – habitus, dorsal view (10x), B – sculpture and pilosity on middle surface area of the vertex (100x), C – sculpture on abdominal tergite 5 (40x).

**Description: Female. Coloration.** Body whitish to light yellowish-brown with a complex reddish-brown color pattern (Fig. 2A): postclypeus medium brown, vertex with Y-shaped brown marking with stem along the middle line; lateral lobe of pronotum brown, synthorax brown laterally, pale in the middle; abdomen with an irregular transverse brown pigmentation on posterior half of tg3 (tergite 3) and on tg4, extending laterally into anterior half of tg5; tg6 with brown patches laterally; tg7 and tg8 often almost completely brown, usually somewhat paler in the middle; tg9 and tg10 with a small brown patch laterally, pale in the middle.

**Morphology.** Belonging to section I, group A (see Lienhard 1990, 1998): Abdominal tg3 and tg4 lacking posterior delimitation by intersegmental membrane; lateral lobe of pronotum, in addition to the long humeral seta (SI), with a row of 2-3 apically truncated pronotal setae (PNS) situated towards anterior margin. PNS relatively short, at most 1/2 length of SI (Fig. 3CD). Compound eye with 8 ommatidia (Fig. 3A). Vertex not densely pilose (hairs in average only about half as long as distance between their alveoli, Figs 2B, 3B), its surface sculpture with more or less spindle-shaped transverse areoles bearing small tubercles, the latter smaller than the alveoli of the hairs (Fig. 2B). 5-6 long apically truncated setae in anterior half of prosternum and 8-10 such setae along anterior margin of mesosternum. Abdominal marginal setae M8, Md9, Mv9, Md10, Mv10 and discal setae D of tg10 well differentiated; Md10, Mv10 and Mv9 of about same length, but Md9 somewhat shorter; epiproctal setae Se straight, apically truncated, not longer than abdominal marginal setae. Abdominal tergites not densely pilose, with distinct tubercles but lacking well defined areoles (Fig. 2C).



**Figure 3.** A-D: *Liposcelis alexandrowiczi* n. sp. (female): A – left compound eye (dorsal view, head slightly squashed by slide-mounting, left in figure = anteriorly on head), B – pilosity in middle of vertex, C and D – variation of pronotal chaetotaxy (PNS pronotal setae, SI humeral seta). E-F: *Liposcelis ornata* Mockford (female, det. E. L. Mockford, MHNG): E – pronotal chaetotaxy, F – pilosity in middle of vertex. Scale bars 0.03 mm, same for A and C-E, respectively for B and F.

**Male.** Much smaller than female, but body pigmentation, general pilosity, surface sculpture and chaetotaxy essentially as in female. Compound eye with 5 ommatidia. 4 prosternal setae, 7 mesosternal setae. Phallosome typical for the genus (Lienhard, 1990, 1998).

**Measurements:** Body length (slide-mounted): female holotype 1.3 mm; male allotype 0.9 mm.

**Diagnosis** (based on females): Very similar to *Liposcelis ornata* Mockford in body color and general morphology (see Mockford, 1978). Differing from *L. ornata* by the presence of a brown patch laterally on tg6 (tg6 unpigmented in *L. ornata*) and by the often almost completely brown tg7 and tg8 (only laterally brown in *L. ornata*). Large brown transversal band in anterior half of abdomen covering posterior half of tg3 and most of tg4 in the new species, covering most of tg3 and tg4 in *L. ornata*. The latter having always 3 long PNS (each of them at least 2/3 length of SI, Fig. 3E), while the 2-3 PNS in the new species are much shorter (at most 1/2 length of SI, Fig. 3CD). Pilosity on vertex less dense in the new species than in *L. ornata*, in which the hairs are 1-2x as long as the distance between their alveoli, Fig. 3F).

## Discussion

Being unable to identify a series of nicely colored *Liposcelis* specimens collected in an ant's nest near Gomel (Belarus) with the taxonomic literature concerning the western Palaearctic region (Lienhard, 1998) we tried to identify these specimens with the key to North American Liposcelididae published by Mockford (1993). They seemed to belong to the New World species *Liposcelis ornata* Mockford, but some differences in body coloration incited us to consult the detailed original description of this species (Mockford, 1978). And by chance we were also able to compare our specimens with three USA females of *L. ornata* identified by Edward L. Mockford which were initially given to André Badonnel and later deposited in the MHNG together with Badonnel's private Psocoptera collection. The morphological differences concerning some characters of head pilosity and pronotal chaetotaxy between the Belarus population and the data mentioned in the original description could be confirmed by the examination of these original specimens carefully slide-mounted by A. Badonnel (see Diagnosis, above). These morphological differences, together with the differences in body coloration (see Mockford, 1978: Fig. 10; 1993: Fig. 93) and the fact that the Belarus population reproduces sexually, while *L. ornata* is known to be obligatorily parthenogenetic (Mockford, 1978), strongly suggested that our population has to be assigned to a new species.

In the genus *Liposcelis*, this is not the first case of very closely related species or colonies showing parthenogenetic or sexual reproduction respectively. The widely distributed bisexual species *L. mendax* Pearman has a parthenogenetic sister-species, *L. obscura* Broadhead, much rarer than *L. mendax* (Lienhard & Smithers, 2002; Lienhard, 2008; Mockford, 2012); both living mostly in domestic situations and often as pests of stored products (Lienhard, 1998; Arif *et al.*, 2015; Opit *et al.*, 2018). These species can be distinguished by some biometrical characters and some details of thoracic chaetotaxy (Lienhard, 1998).

Contrary to this case, in the cosmopolitan *L. bostrychophila* Badonnel, the two reproductive forms have not been considered as two distinct species. The parthenogenetic form is a worldwide pest in stored products while the sexually reproducing form is very rare; only three sexual strains are known at present, one from Hawaii (Mockford & Krushelnicky, 2008), one from Arizona (Yang *et al.*, 2015) and one from Senegal (unpublished, numerous males and females in MHNG, det. C. Lienhard). The few morphological differences observed between the sexual strains and several parthenogenetic strains (Yang *et al.*, 2015) were much more subtle than the differences between *L. ornata* and *L. alexandrowiczii* n. sp. observed in the present study. And extensive molecular investigations in the case of *L. bostrychophila* did not suggest that the parthenogenetic and bisexual forms should be considered as different species. Thus, molecular investigation of the parthenogenetic - bisexual species pairs *ornata* - *alexandrowiczii* and *obscura* - *mendax* would be of great interest.

*L. alexandrowiczii* is only known from an ant's nest in Belarus, while *L. ornata* has been taken by beating a great variety of trees and shrubs (Mockford, 1978, 1993) in the USA (Florida, New Orleans, Louisiana, southeastern Texas) (Mockford, 1978, 1993; Frank *et al.*, 2004) and in Mexico (States Campeche, Nayarit, San Luis Potosi and Tabasco) (Mockford, 1978, 1993; Garcia Aldrete, 1986; Garcia Aldrete & Casasola Gonzalez, 1999). In Colombia *L. ornata* was recorded by Badonnel (1986) in soil litter consisting of dead leaves and mosses. The species is qualified as a widespread tropical American species by Mockford & Garcia Aldrete (1996) and is considered as a native New World species by Mockford (2012). It will be interesting to see if further faunistic investigations in the Palaearctic region will confirm the ecological

specialization of *L. alexandrowiczi* or show that it is also present on trees and shrubs as its New World sister-species. Another question must remain unanswered at present: has the Palaearctic form arrived from the New World, switching from parthenogenetic reproduction to sexual one, or does it represent a relictual sexual strain surviving in the Palaearctic after emigration of a phylogenetically younger parthenogenetic strain into the New World?

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