




Limonia interjecta (Diptera: Limoniidae), a new species for Russia and the East Palaearctic

Limonia interjecta (Diptera: Limoniidae) – новый вид для России и Восточной Палеарктики

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Abstract. *Limonia interjecta* Starý, 1974 (Diptera: Limoniidae) previously known only from northern and central Europe is found from the Putorana Plateau in the north of Eastern Siberia. The species is recorded for the first time from Russia and the East Palaearctic. *Limonia interjecta* is rare in Europe but is quite common in the Putorana Plateau, with records in the boreal forest and tundra zones at altitudes from 71 to 723 m. An illustrated redescription of the male and female of *L. interjecta* is provided. Its distribution in the Palaearctic and habitats in the Putorana region are briefly discussed.

Резюме. *Limonia interjecta* Starý, 1974 (Diptera: Limoniidae) – вид, ранее известный лишь из центральной и северной Европы, найден на плато Путорана (север Восточной Сибири). Этот вид впервые отмечается для России и для восточной части Палеарктики. *Limonia interjecta* редок в Европе, но достаточно обычен на плато Путорана, где отмечен в зонах тайги и тундры на высотах от 71 до 723 м. Дано иллюстрированное переописание самца и самки этого вида. Кратко обсуждается распространение *L. interjecta* в Палеарктике и биотопы, в которых этот вид был собран в регионе Путорана.

Key words: Russia, East Palaearctic, Putorana Plateau, distribution, redescription, Limoniidae, new record

Ключевые слова: Россия, Восточная Палеарктика, плато Путорана, распространение, переописание, Limoniidae, новая находка

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Introduction

The Putorana Plateau is a trappean mountain massif situated in the northwestern part of the Central Siberian Plateau (67–71°N) and characterised by a great diversity of landscapes and habitats. The plateau reaches a height of 1.0–1.5 km and is cut by deep valleys (50–600 m a.s.l.) with

rivers and lakes. The Putorana region includes three landscape zones: boreal forests (in valleys, mostly below 600 m), mountain tundra (mostly between 600 and 1000 m) and mountain desert (mostly above 900 m).

The insect fauna of the Putorana region, in particular, the fauna of the superfamily Tipuloidea (Diptera), has so far remained almost entire-

ly unstudied. Only four species of Tipulidae and two species of Limoniidae were recorded from the Putorana Plateau (Lantsov, 2014), based on the material from one area of Putorana. Since 2019, the second author of this article conducted extensive sampling of insects in eight areas of the Putorana region, with particular attention to Diptera. Among the collected material of Limoniidae, we found a rare species *Limonia interjecta* Starý, 1974, which was described from Slovakia (type locality: Malá Studená Dolina Valley in the High Tatras; Starý, 1974) and later recorded from several European countries (Oosterbroek, 2022). The aim of this article is to provide the first records of this species from Russia and the East Palaearctic and to redescribe it.

Material and methods

The second author collected the specimens of *Limonia interjecta* during the summers of 2019 and 2021 in the Putorana Nature Reserve (Russia, Krasnoyarsk Territory, Taymyrskiy Dolgano-Nenetskiy District) in several localities. The material was collected mainly using sweep nets and stored in 80–85% ethanol at the Zoological Institute of Russian Academy of Sciences (St Petersburg) and in the private collection of V. Pilipenko (Moscow). Original numbers of samples are given in parentheses after label data.

Inner structures of the terminalia were examined after boiling in 10% solution of NaOH for 10 minutes. Specimens were studied with an Olympus SZ61 stereo microscope. A Nikon d7000 digital camera equipped with Tamron 70-300 /4-5.6 and Schneider 150/5.6 Componon-S enlarging lenses or Mitutoyo M Plan Apo 10× microscope objective lens were used to capture stacked images, which were then combined using the Helicon Focus software (www.heliconsoft.com/heliconsoft-products/helicon-focus). All pictures were adjusted and assembled into plates with Adobe Photoshop CS2. The map source is Map Maker (<https://maps.co/gis/#>).

The distribution of species is given according to Oosterbroek (2022). Morphological terminology generally follows Cumming & Wood (2017); terminology for wing venation follows de Jong (2017).

Results

Family Limoniidae

Subfamily Limoniinae

Limonia Meigen, 1803

Limonia interjecta Starý, 1974

(Figs 1–18)

Limonia interjecta Starý, 1974: 1–3; Geiger, 1986: 109, 114–117 (in key, description, figs); Podenas et al., 2006: 171, 278 (figs, phenology).

Material examined. **Russia, Krasnoyarsk Terr., Taymyrskiy Dolgano-Nenetskiy Distr.:** S environs of Lake Ayan, 1 male, stream SE of “Southern Ayan” field base, upstream of canyon with columnar jointing rocks, left tributary with small waterfalls, 68°59.069'N 94°16.688'E, 723 m a.s.l., sweep-net, 6.VII.2019, 17 h., cloudy weather (PP31); NE environs of Lake Sobach'e (area of “Lake Sobach'e” field base): 19 males, “Lake Sobach'e” field base at shore of Lake Sobach'e, 69°07.679'N 91°52.727'E, 71 m a.s.l., from window in building, 8–14.VII.2019 (PP52); 3 males, same locality, sweep-net around wood-shed, 26, 27.VII.2021, ca. 23 h., warm evening after sunny day (PP277); 1 male, river bank 1–2 km NNE of “Lake Sobach'e” field base, ca. 69°08.054'N 91°52.970'E, 109–200 m a.s.l., sweep-net, 13.VIII.2019, 19–20 h., 10–15 °C, after rain (PP55); 3 males, 1 female, stream – right tributary of river 2 km NNE of “Lake Sobach'e” field base, hygropetric zone below waterfall 100 m above river, 69°08.669'N 91°52.805'E, 301 m a.s.l., sweep-net, 13.VIII.2019, 21 h., 10–15 °C, after rain (PP58); 1 male, mixed forest above left bank of river, ca. 2 km NW of “Lake Sobach'e” field base, ca. 69°07.955'N 91°50.432'E, ca. 200 m a.s.l., sweep-net, 14.VIII.2019, 17 h., 15–20 °C, sunny weather (PP60); 1 male, dry mixed forest between “Lake Sobach'e” field base (69°07.679'N 91°52.727'E) and river NE of field base (69°08.012'N 91°53.303'E), 80–100 m a.s.l., from flowers of *Rosa acicularis*, 13.VII.2021, 21 h. (PP202); 1 male, river 2.5 km NW of “Lake Sobach'e” field base, nr. confluence with right tributary, 69°08.461'N 91°49.467'E, 300–360 m a.s.l., sweep-net of alder (*Duschekia fruticosa*) and willow shrubs, 15.VII.2021, 17–18 h. (PP213); 1 male, mixed forest between “Lake Sobach'e” field base (69°07.679'N 91°52.727'E) and river 1 km NW of field base (69°07.758'N 91°51.043'E), 80–160 m a.s.l., sweep-net, 18.VII.2021, 17–22 h., sunny weather (PP230); 1 female, river 1–2 km NNE of “Lake Sobach'e” field base, 110–280 m a.s.l. (between 69°08.054'N 91°52.97'E and 69°08.847'N 91°53.254'E), sweep-net at stony river banks, 20.VII.2021, 15–20 h., sunny weather, 15–25 °C (PP238); 1 male, river

3.0–4.5 km NNE of “Lake Sobach’e” field base, 370–500 m a.s.l. (between 69°09.256’N 91°53.958’E and 69°09.253’N 91°53.959’E), sweep-net at stony river banks, 21.VII.2021, 13–15 h., sunny weather (PP242); 2 males, river 3 km NNE of “Lake Sobach’e” field base, 69°09.256’N 91°53.958’E, ca. 410 m a.s.l., scree above left bank, sweep-net, 23.VII.2021, 22 h. (PP263); SE environs of Lake Keta (area of “Lake Keta” field base): 2 males, “Lake Keta” field base at shore of Lake Keta 500 m E of Malyy Orokan River mouth, 68°45.517’N 91°29.707’E, 88 m a.s.l., from windows in buildings and sweep-net around them, 15–23.VII.2019 (PP118); 1 male, sparse larch forest 300–500 m S of “Lake Keta” field base (68°45.517’N 91°29.707’E), ca. 100 m a.s.l., sweep-net, 15–24.VII.2019, at night, clear weather (PP66); 1 female, lower reach of Malyy Orokan River, floodplain mostly deciduous grass forest, 68°45.226’N 91°29.647’E, 102 m a.s.l., sweep-net at river banks, 20.VII.2019, 4–5 h. (PP77); 1 male, Keta Range between lakes Keta and Kutaramakan, slope between small lake on upper reach of Malyy Orokan River (68°43.327’N 91°35.884’E, 537 m) and pass (68°42.201’N 91°36.797’E, 696 m), dry tundra, sweep-net, 22.VII.2019, 1–4 h. (PP100).

Diagnosis. Medium-sized species. Body coloration essentially dark brown, shining, with paler areas, especially on pleuron. Antenna brown, with scape and pedicel dark brown; flagellar verticils equal to or slightly longer than respective segment. Prescutum with wide dark brown median area and dark brown patch laterally. Wing membrane tinged with brownish grey, with distinct pattern. Femora yellow with narrow but distinct dark brown ring at apex preceded by pale yellow ring. Male terminalia with wide gonocoxite and large ventral lobe.

Redescription. Adult. General body coloration yellowish brown. Male (Fig. 1) body length 8.3–9.3 mm, that of female 9.2–10.0 mm; wing length of male 11.2–12.2 mm, that of female 12.1–12.7 mm. Male antenna 1.9–2.1 mm long; female antenna 1.8–2.0 mm long.

Head (Fig. 3) dark brown to black, suffused with grey pruinosity. Antenna (Figs 3–4) brown, 14-segmented. Scape elongate, nearly cylindrical, dark brown. Pedicel short, oval, dark brown except yellowish distal margin. First flagellomere pale yellow at base, light brown at apex. Basal flagellomeres oval, light brown; distal ones elongate, nearly cylindrical, light brown, with darker base. Apical flagellomeres dark brown; last flagel-

lomere equal in length to previous two combined. Verticils brown; longest verticils equal to or slightly longer than respective segments. Rostrum and palpus dark brown.

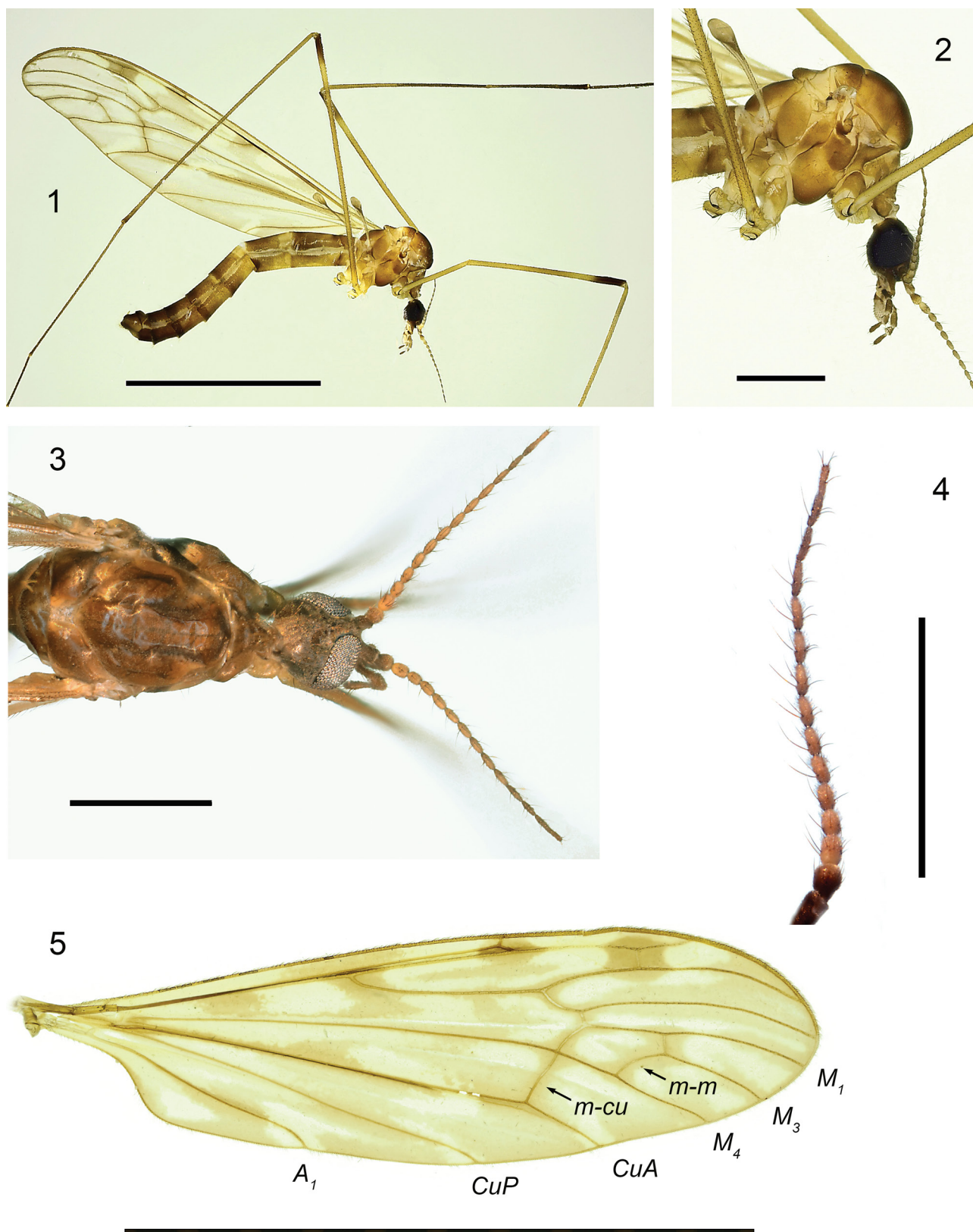
Thorax (Figs 2–3). Pronotum brown throughout. Prescutum and presutural scutum shining, with dark brown median area and dark brown patch laterally; interspaces and ventral margin paler. Postsutural scutum with scutal lobes dark brown, with yellowish brown area in between. Scutellum yellowish brown anteromedially, otherwise dark brown. Mediotergite yellowish brown anterolaterally, with remainder dark brown. Pleuron generally dark brown, with paler areas on dorsal part of katepisternum, laterotergite and around base of wing and halter.

Wing (Fig. 5) brownish with small brown spots at base of R_s , apex of Sc_2 and R_2 , brownish area surrounding cord, distal end of discal cell and Cu , and indistinct smoky areas in all cells. Veins brown. Venation usual for *Limonia*, with lower margin of discal cell shorter than high; $m-m$ slightly arcuate; $m-cu$ near base of discal cell. Halter 1.9–2.1 mm long in male, 1.8–2.1 mm in female; stem of halter yellow at base, turning greyish distally; knob pale blackish at base.

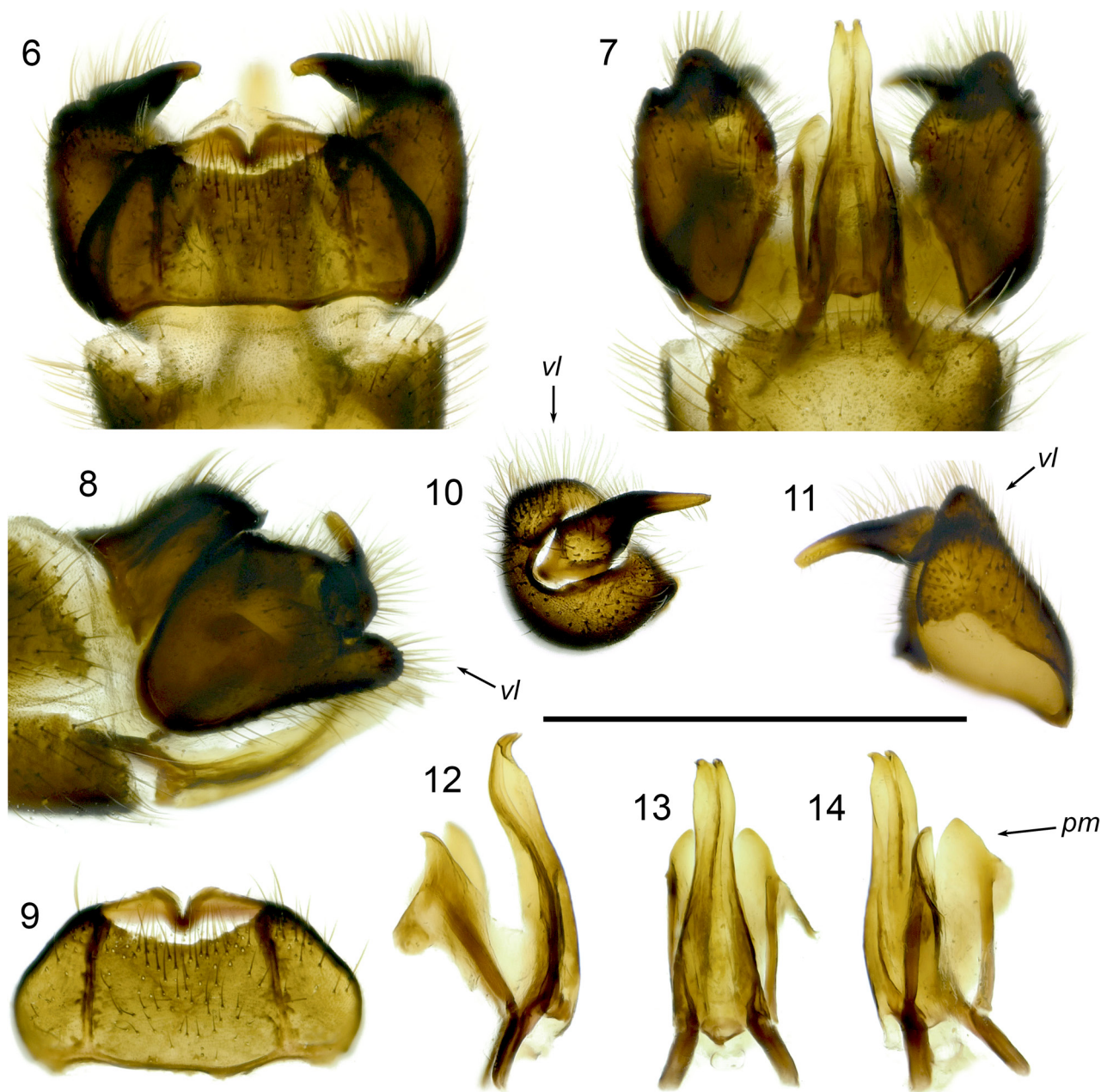
Legs (Figs 1–2). Fore coxa brown, middle and posterior coxae yellow; trochanters yellow. Femora yellow with distinct narrow dark brown ring at apex preceded by pale yellow ring. Tibiae obscure yellowish brown with slightly darkened apex. Basal tarsomere obscure yellow at base, turning brown to apex; remaining tarsomeres brown to dark brown.

Abdomen (Fig. 1) brown to dark brown; basal tergites lighter at frontal margin. Sternites yellow, with brown posterior margins. Darkening turning wider towards distal end of abdomen. Sternite 8 entirely dark brown.

Male terminalia (Figs 6–14) dark brown. Tergite 9 (Figs 6, 9) with posterior margin broadly rounded, formed by sclerotised bar, with distinct narrow V-shaped median notch. Gonocoxite (Figs 8–11) wide at base and narrow at apex, with large setose ventral lobe (*vl*). Gonostylus elongate, setose, widened at base, with distal part turning narrower towards apex, slightly arcuate (Figs 10–11). Paramere (*pm*) with wide rounded distal appendage (Figs 12–14). Aedeagus elongate, narrow and slightly curved in lateral view, distinctly pro-



Figs 1–5. *Limonia interjecta* Starý, 1974 (male). 1, habitus, lateral view (in ethanol); 2, head and thorax, lateral view (in ethanol); 3, head and thorax, dorsal view (dry); 4, antenna (dry); 5, wing (in ethanol). Scale bars: 5 mm (1), 1 mm (2–4), 10 mm (5).



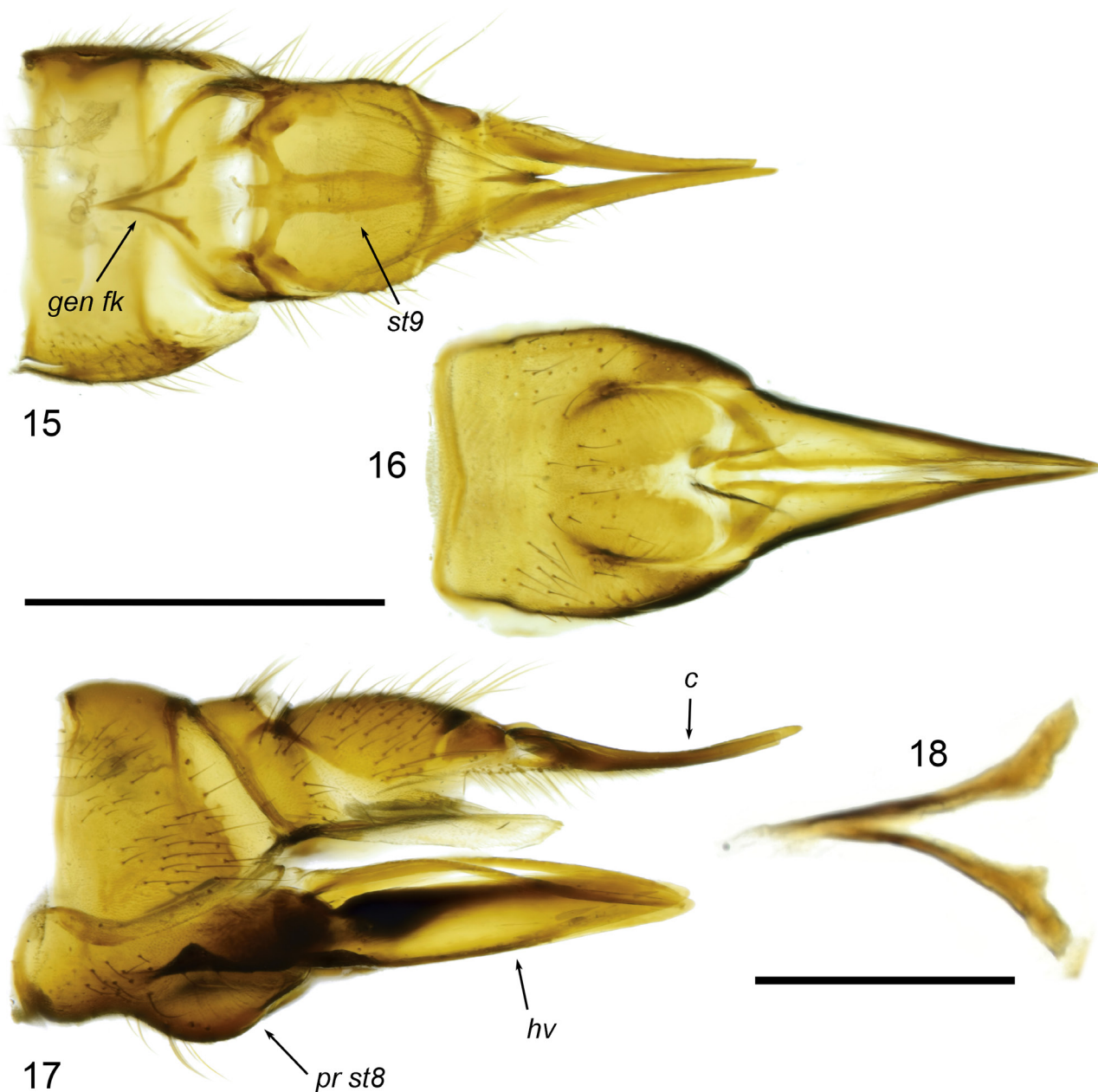
Figs 6–14. *Limonia interjecta* Starý, 1974 (male terminalia and their parts, in ethanol). 6–8, hypopygium (6, dorsal view; 7, ventral view; 8, lateral view); 9, tergite 9, dorsal view; 10–11, left gonocoxite and gonostylus (10, caudal view; 11, ventral view); 12–14, aedeagus and parameres (12, lateral view; 13, ventral view; 14, dorso-lateral view). Abbreviations: *pm*, paramere; *vl*, ventral lobe of gonocoxite. Scale bar: 1 mm.

jecting beyond distal margin of gonocoxite, with apex narrowed and bifid (Figs 12–14).

Female resembling male in general appearance. Female terminalia (Figs 15–17) yellowish brown. Protrusion of eighth sternite (*pr st8*) conspicuous, brown on lateral side (Fig. 16). Cercus brown, long, narrow, slightly arcuate (Fig. 16). Hypoalva

reaching to about middle of cercus, with subbasal dark brown spot on dorsal margin and along it. Genital fork of sternite 9 (Fig. 18) stout, V-shaped. Sclerotised plate of sternite 9 (*st9*) parallel-sided, reaching to anal plate.

Remarks. The specimens of *L. interjecta* from the Putorana Plateau correspond well to the origi-



Figs 15–18. *Limonia interjecta* Starý, 1974 (female terminalia and their parts, in ethanol). **15–16**, terminalia (15, ventral view; 16, lateral view); **17**, sternite 8 and hypogynial valves, ventral view; **18**, genital fork of sternite 9, ventral view. Abbreviations: *c*, cerci; *h*, hypogynial valve; *gen fk*, genital fork; *pr st8*, protrusion of sternite 8; *st9*, sternite 9. Scale bars: 1 mm (15–17), 0.25 mm (18).

nal description (Starý, 1974) but differ in the lighter antennal flagellomeres. According to Savchenko (1985), this species belongs to the *L. flavipes* species-group and in the wing pattern is similar to the European species *L. flavipes* (Fabricius, 1787) and *L. hercegovinae* (Strobl, 1898), and the East Palaearctic species *L. karafutonis* Alexander,

1924. However, *L. interjecta* is well distinguished from other species by the short flagellar verticils and the male terminalia with large ventral lobe of the gonocoxite.

Distribution. The species was recorded from Austria, Norway (north to south), Poland, Romania, Slovakia, Sweden (north), and Switzerland

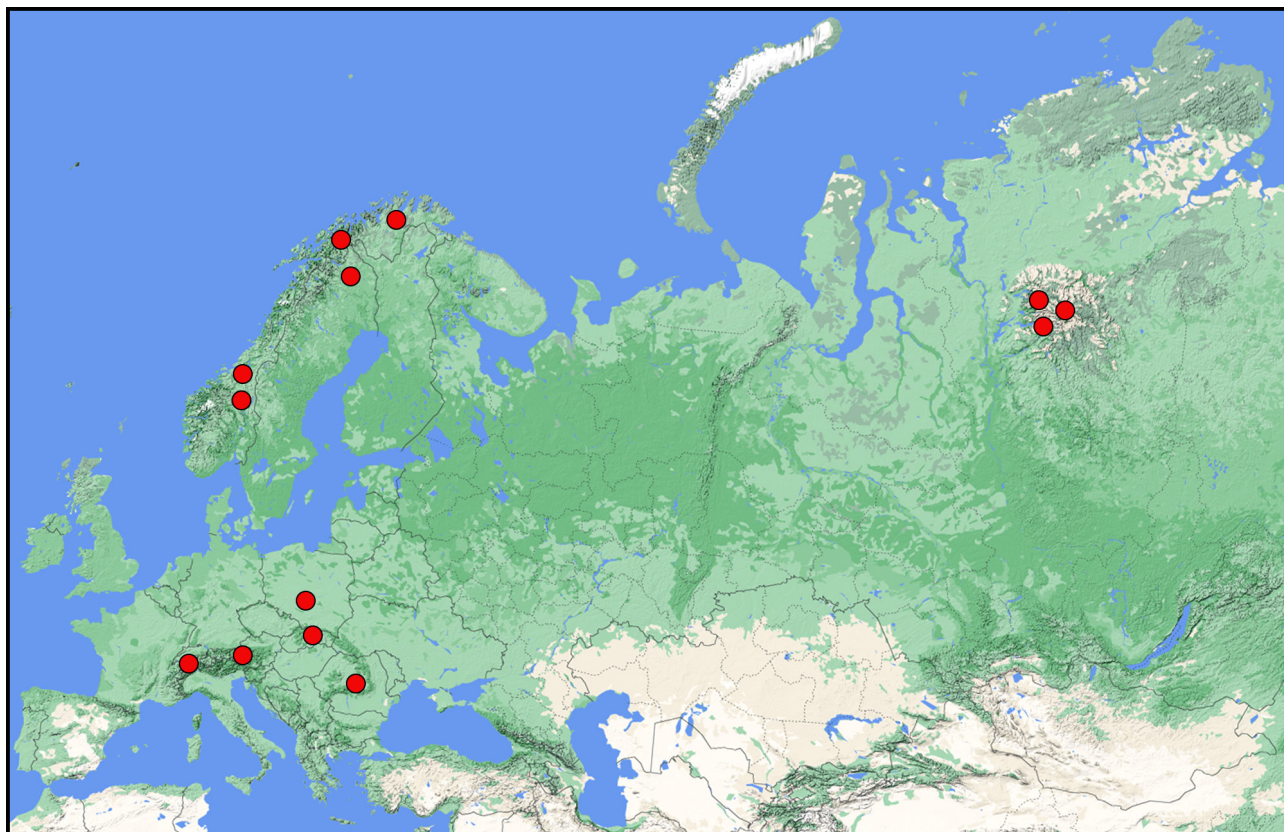


Fig. 19. The known localities of *Limonia interjecta* Starý, 1974 in Europe (according to Oosterbroek, 2022 and references therein) and the new localities in Siberia.

(Oosterbroek, 2022; Kolcsar et al., 2021). Here, it is recorded for the first time from Russia and the East Palaearctic.

Discussion

Limonia interjecta is a rare species described from the Tatra Mountains in Slovakia (Starý, 1974) and later recorded from few localities in six other countries of northern and central Europe (Fig. 19). No records outside Europe were known (Oosterbroek, 2022). The species was previously collected at altitudes from 250 to 770 m (Oosterbroek, 2022), with a recent record at a higher altitude (ca. 1000 m) in Romania (Kolcsar et al., 2021). Our records of *L. interjecta* in the north of East Siberia indicate its possible wide distribution in the Palaearctic.

We found *L. interjecta* in three of five areas of the Putorana Plateau sampled in 2019 and 2021: southern environs of Lake Ayan, northeastern environs of Lake Sobach'e and southeastern en-

vironns of Lake Keta, in one, nine and four localities of each area, respectively. The species was not found in two areas, namely, northern environs of Lake Ayan (ca. 69°20.5'N 93°33'E; sampled only in early spring season, i.e. late June 2019) and western environs of Lake Nakomyaken (ca. 68°52'N 90°33'E; sampled in the second half of summer season, i.e. since late July until mid-August 2021).

Our data indicate that *L. interjecta* is rather common in various landscapes of Putorana, dry to wet and forested to open (see Material for details). The species was collected at heights from 71 to 723 m. Most of the records were made in the forest zone in the valleys of lakes, rivers or streams, although some specimens were collected at higher altitudes in the tundra zone at a distance from forest (samples PP31, PP100). The specimens were caught in different daytime and weather. All records were made during July (from 6 to 27 of July), which was from early summer to the beginning of late summer.

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