

***LIMOTETTIX CARNIOLICUS* SP. NOV.,
A NEW WEST-PALAEARCTIC LEAFHOPPER SPECIES
(HEMIPTERA, CICADOMORPHA, CICADELLIDAE)**

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Abstract - A new species of the leafhopper genus *Limotettix* Sahlberg 1871 is described. In outer appearance it is similar to *L. ochrifrons*, *L. aviger* and related species. It is easily distinguishable from all other species of the genus by the peculiar shape of aedeagus and by its smaller body size. The species was found in western Slovenia in a montane intermediate bog living on *Eleocharis quinqueflora*, most probably monophagously. It is univoltine and hibernates in the egg stage. Adults have been found from early July until mid-August. Temporary, the species is considered as highly vulnerable and in danger of extinction.

KEY WORDS: Cicadomorpha, new species, Slovenia, intermediate bog.

Izveček – *LIMOTETTIX CARNIOLICUS* SP. NOV., NOVA ZAHODNOPALEAR-KTIČNA VRSTA ŠKRŽATKA (HEMIPTERA, CICADOMORPHA, CICADELLIDAE)

Opisana je nova vrsta škržatka iz rodu *Limotettix* Sahlberg 1871. Po zunanosti je podobna vrstam *L. ochrifrons*, *L. aviger* in njima podobnim vrstam. Od podobnih vrst tega rodu se razlikuje predvsem po svojski obliki aedeagusa in manjši telesni velikosti. Vrsta je bila najdena v zahodni Sloveniji v montanskem prehodnem barju na malocvetni siti (*Eleocharis quinqueflora*), verjetno edinem gostitelju. Razvije en rod na leto in prezimuje kot jajčece. Odrasli škržatki se pojavljajo od začetka julija in vsaj do sredine avgusta. Vrsta je začasno opredeljena kot zelo ranljiva in v nevarnosti za izumrtje.

KLJUČNE BESEDE: Cicadomorpha, nova vrsta, Slovenija, prehodno barje

Introduction

The genus *Limotettix* belongs to the subfamily Deltocephalinae Fieber 1869 and according to most authors to the tribe Athysanini Van Duzee 1892 (ANUFRIEV & EMELJANOV, 1988; HAMILTON, 1994; HOLZINGER & al., 1997). Recently, ZAHNISER & DIETRICH (2013) have placed it into the tribe Limotettigiini Baker, 1915, which includes only *Limotettix* s.l., *Ophiola*, *Ophiolix* and *Scleroracus*. Leafhoppers of the genus *Limotettix* have a cosmopolitan distribution. However, the great majority of species are confined to latitudes north of 40°N of the northern hemisphere. The ancestral origin of this genus is assumed to be North America, where the fauna of this genus is comparatively rich and diverse (HAMILTON, 1994). This genus has received a rather diverse taxonomic interpretation among authors. The majority of European authors treat it in a restricted sense, where only the subgenera *Limotettix* Sahlberg 1871 s. str., *Neodrylix* Emeljanov 1966 and *Dryola* Hamilton 1994 are included. The subgenera *Ophiolix* Ribaut 1942 and *Scleroracus* Van Duzee are placed as separate genera or as subgenera of the genus *Ophiola* Edwards 1922 (EMELJANOV, 1966; OSSIANNILSON, 1983; NAST, 1987; BIEDERMANN & NIEDRINGHAUS, 2004). On the other hand, American and some other authors consider this genus in a broad sense with all the above mentioned (sub)genera included in a single genus *Limotettix* (RIBAUT, 1952; ANUFRIEV & EMELJANOV, 1988; HAMILTON 1994; ZAHNISER, 2007). Here, I follow the restricted interpretation of the genus *Limotettix*.

This genus comprises currently about 35 described species that are allocated in three subgenera: subgenus *Limotettix* - 28 species, *Neodrylix* - 5 species and *Dryola* - 2 species (ZAHNISER, 2007). All Palaearctic species (16 in number) belong to the subgenus *Limotettix* s. str., while the subgenera *Neodrylix* and *Dryola* are entirely Nearctic (EMELJANOV, 1966; HAMILTON, 1994). The majority of the Palaearctic species



Fig. 1: *Limotettix carniolicus* sp. n. - male



Fig. 2: *Limotettix carniolicus* sp. n. - female

occur very scattered over the vast area of Russia and adjacent countries. Outside of Russia, four species have been recorded in Europe. Only *L. striola* (Fallén 1806) is widely distributed across Europe, while *L. atricapillus* (Boheman 1845), *L. ochrifrons* Vilbaste 1973 and *L. sphagneticus* Emeljanov 1966 are confined to the north-eastern Europe (OSSIANNILSSON, 1983; NAST, 1987). All these species inhabit permanent moist peatland, raised bogs and fens and are associated with various Cyperaceae, mostly *Eleocharis* spp. (HAMILTON, 1994; NICKEL, 2003).



Fig. 3: *Limotettix carniolicus* sp. n. - head of a male



Fig. 4: Type locality of *L. carniolicus* sp. n.

In Slovenia, only *L. striola* has been recorded so far and has been revealed as rather rare and scattered throughout (SELJAK, 2004; SELJAK, 2016). During entomological trips in summer 2016 another *Limotettix* species was discovered in a montane intermediate bog near the village Vojsko, which differs from all species described so far by a very characteristic shape of its aedeagus. It is described here as a new species.

The genus *Limotettix* is well defined by the combination of the following characters: distinctive dark patterns on the head, short male anal tube with little expanded dorsal sclerotization, strong dorsal processes on pygopher, disorderly arranged setae on the lower side of the subgenital plates, connective Y-shaped with long base and shorter branches; short and stout aedeagus indistinctly separated from the base; sclerotized dorsal phragma articulates free with the base (OSSIANNILSSON, 1983, ANUFRIEV & EMELJANOV, 1988). There is no monographic work dealing with the Palaearctic *Limotettix* species. Data on single species are mainly scattered in different papers. Emeljanov's account on this genus is still the most comprehensive one, dealing with 10 species occurring in the territory of former USSR (EMELJANOV, 1966). The most comprehensive taxonomic and evolutionary study on Nearctic species of the genus *Limotettix* s. l. was done by HAMILTON (1994) providing also an illustrated comparative set of morphological details for all North-American species.

Material and methods

The holotype and all paratypes were dry mounted on mounting boards of appropriate size. The holotype male (♂) and the allotype female (♀) are designated with a red label. The holotype, allotype and four paratype specimens (2 ♂♂ and 2 ♀♀) have

been deposited in the Slovenian Museum of Natural History (SMNH). The rest of the material is currently in the author's private collection. Drawings were handmade on the basis of microscopic photographs of single details. Photographs of subgenital plates, the stylus and connective have been applied directly after they were processed with Adobe Photoshop software. Colour photographs were taken with a Canon EOS 70D camera by using the lenses Canon MP-E 65mm and Canon EF-S 18-135mm.

Description

Limotettix (Limotettix) carniolicus sp. nov.

Material examined: Holotype: 1 ♂ - dry mounted, 8.8.2016, Vojsko (Gačnik) - 910 m (coord.: 46°03' N/ 13°52' E); paratypes: same locality 12.7.2016 (1 ♀); 3.8.2016 (8 ♂♂ and 15 ♀♀) and 8.8.2016 (26 ♂♂ and 28 ♀♀).

Etymology: The name derives from the historical name of the central region of what is nowadays Slovenia (Carniola, Krain, Kranjska), where the species occurs.

Body length: Rather small for the genus; males 3.2 - 3.8 mm (holotype: 3.47 mm), females 3.5 - 4.2 mm (n = 25+25 - fresh specimens).

Male (Figure 1): Head typical for the genus; clearly broader than pronotum, broadly rounded frontally, yellow to pale yellow; vertex subparallel, in the middle only slightly longer than near the eyes; a sharp black band runs between the eyes just



Fig. 5: *Limotettix carniolicus* sp. n. - head of a female

Fig. 6: *Eleocharis quinqueflora*, the host plant of *L. carniolicus* sp. n.

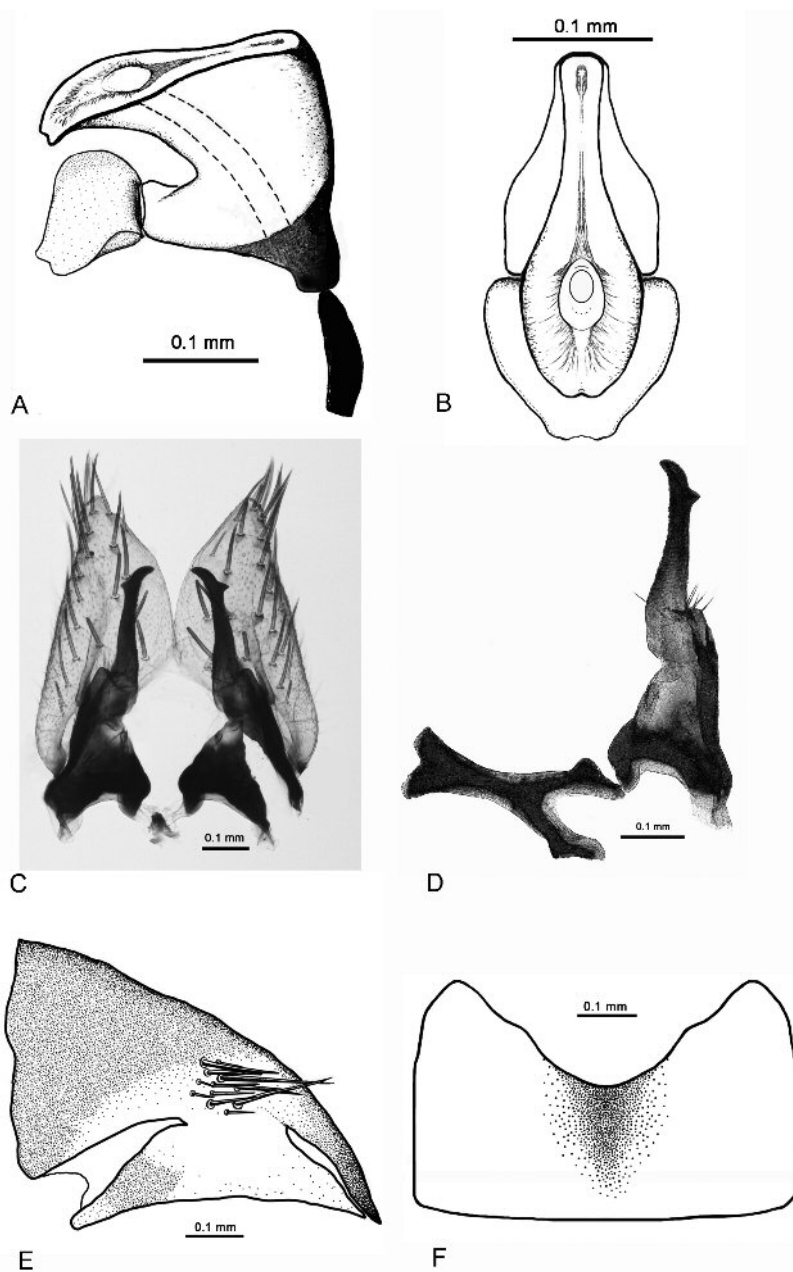


Fig. 7: *Limotettix carniolicus* sp. n.: A - aedeagus (postero-lateral view); B - same (posterior view); C - subgenital plates and styluses; D - left stylus and connective; E - left pygofer; F - female's sternite VII.

behind the ocelli (only rarely it may be interrupted by paler sections), continuing ventrad along the inner eye margin and fusing with two semi-separated spots on the inner eye margin. In specimens with paler band, a dark brown to black spot is always present behind of each ocellus just at the point where frontal sutures terminate; light interocellar band distinct for its whole extend. Face base colour pale yellow, frontoclypeus with 7- 8 black to brown transverse streaks; the upper two or three fused in the middle in a black macula, the others fused medially with two parallel longitudinal bands that are divided by a light median stripe (Figure 3); anteclypeus regularly parallel-sided, normally dark edged and with a median brown to black elongated patch; lorae mainly dark edged; area around antennae slightly nigrescent. First antennal segment yellow or rarely with a dark dorsal patch; second segment mainly bicoloured, the basal half or two thirds dark (brown to black), yellow on the apex. Pronotum narrower than the head, yellow, semi-transparent in the distal half, very subtle transversely wrinkled (observe at lateral light fall); scutellum uniformly yellow with the scare right in the middle. Legs yellow with dark dotted longitudinal patches or strips on femur; the inner side of the hind tibia mainly dark brown to black at least in the upper half, the outside macrosetae of the hind tibia arise from dark spots; hind tarsal segments as well as hind tibia darkened apically. Fore wings longer than abdomen, transparent pale yellowish, in apical cells slightly fumose, venation bright yellow; hind wing transparent, veins in apical third brownish; abdomen predominantly black or dark brown with yellow side margins; genital segment in general yellow, but genital valve sometimes darkened.

Female (Figure 2): In general brighter than the males in all body parts; transversal band on vertex is mainly much paler, light to \pm darker brown, sometimes almost dissolved; in some specimens the middle part of the band may be darker; a small spot behind each ocellus, just at the point where frontal sutures terminate, but inside the band, always present and mostly much darker than the band itself, black to dark brown, in specimens with dark band not clearly noticeable (Figure 5). Also transversal streaks on frontoclypeus are mostly significantly paler than in males, the upper one or two, rarely three fused in the middle.

Male genitalia: **Anal tube** short with deep dorsal excision at the base. **Lobes of pygofer** typical for the genus with a dorsal down directed process on each (Figure 7D); a cluster of setae at the base of these processes; **genital valve** broad triangular, roughly 2.5 times as broad as long. **Subgenital plates** elongated triangular with slightly attenuate apices, diverging in the apical half, medially approximately as long as at the base broad; lateral margins more or less straight; setae yellowish brown, arranged disorderly over the entire lower surface; **Stylus** apically angled with inwards directed apices, looks like an upside turned human leg (Figure 7C), distal part transversely rugose especially the inner side. **Connective** is typical for the genus, Y-shaped, its stem longer than the fork (Figure 7C). **Aedeagus** very unusual for the genus, in lateral view like an upside turned ankle boot (Figure 7A and B), aedeagal shaft well developed laterally strongly compressed, distal part flat, ventrally very narrow, widening then gradually towards the gonopore area; apex in lateral view sharp thinned and slightly twisted basad, rounded and with a shallow apical notch in



Fig. 8: *Limotettix carniolicus* sp. n. - type locality

posterior view, but without apical teeth; gonopore is in a small depression, which is placed towards the apical third; basal phragma sclerotized, broadly cordate in dorsal view, free articulated with the phalobase.

Female genitalia: ventral border of sternite VII (Figure 7E) concave, broadly V-shaped, medially half as long as on its margins, mostly with a brown or black median streak or patch; gonopods dark brown to black, bright towards the apex and as long as or only slightly longer than the pygofer (tergite IX).

Diagnosis

In outer appearance, this new species is similar to *L. atricapillus* (Boheman 1845), *L. aviger* Emeljanov 1964, *L. ochrifrons* Vilbaste 1973 and related species, but markedly smaller. The most distinguishing character is the characteristic shape of aedeagus; its apex is only shallowly notched but with no apical teeth and distinctly remote from the dorsal base, so that the shaft builds a clear lamellate stem. Most probably, females cannot be reliably discriminated by morphological characters, except perhaps by smaller size.

Host plant: *Eleocharis quinqueflora* (Hartmann) O. Schwarz (Cyperaceae) (Fig. 6); 1st degree monophagous at the type locality. Further findings on other localities are necessary to find out its real diet breadth.

Life history: Like all other species of the genus *Limotettix* also *L. carniolicus* hibernates in egg stage. First - still teneral - specimens were caught on July 12. The species is more abundant in August. According to my observations, the species is univoltine.

Distribution: Currently, *L. carniolicus* is only known from the type locality (Figures 4 and 8). Several other wetland habitats in the area were visited during summer 2016; however, no specimens of this species were found. The species is most probably monophagous on *Eleocharis quinqueflora*. This plant species is rather rare in Slovenia (JOGAN & al., 2001) and also in rapid decline because of continuous loss of wetland habitats. However, there are still many fens and intermediate bogs along the Dinaric mountain chain and in South-eastern Alps that might be suitable habitats for the species.

Conclusions

L. carniolicus is apparently another relict of the last glaciations in Europe. The unusual aedeagus shape that significantly differs from all other Palaeartic as well as from Nearctic species suggests a rather ancient separation from other related species. It might be another case of east-Alpine or Dinaric endemism. As the whole known population is limited to a single patch of the host plant covering only a few square metres in a permanently moist intermediate bog, the species is highly vulnerable and in high risk of extinction.

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