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ON NORTH-EUROPEAN SPECIES OF THE GENUS
LIMOTETTIX J. SB., WITH NOTES ON NORTH-AMERICAN SPECIES
(HOMOPTERA, CICADELLIDAE)

For a long time, only two species of *Limotettix* were known in Europe, — *L. striolus* (Fn.) and *L. atricapillus* (Bh.), which were distinguished by the length of the head, somewhat differing in colouration, and especially by the form of styles (cut and dilated in *striolus* and "stocking-like" in *atricapillus* — cf. Wagner, 1939).

Only recently, Emeljanov (1964, 1966) and the present author (Vilbaste, 1965, 1966) showed the complex character of some *Limotettix* species, describing some new species collected mainly from the Eastern part of the Palaearctic region. Some additional species were described later (Dlabola, 1967; Vilbasté, 1968). Emeljanov (1966) also gave a tabular key for the identification of the known species.

According to Emeljanov, there occur three species in Europe — *L. striolus* (Fn.), *L. atricapillus* (Bh.) and *L. sphagneticus* Em. Determining materials coming from Latvia and Lithuania, four different species were found, among them three which correspond to the previous *L. atricapillus*, having a "stocking-like" tip of the style. Thereby it was found that all the species were previously known. It became clear that the species described and figured by Emeljanov (1964, 1966) as *L. atricapillus* was not the same one as described and figured by Ossiannilsson (1947) under that name. In the same sense it was recorded by the author (Vilbaste, 1965) from Altai.¹

For this reason the author has undertaken a revision of the known European species.

The first species — *Cicada striola* — was described by Fallén in 1806. This species has apparently never been misinterpreted, although type specimens have probably not been studied yet. Some 15 years later Germar (1821) described a new species — *Jassus frenatus*, from Tauria (Crimea). Unfortunately, its type specimen was not found in Germar's collection (deposited at the Museum of Zoology of the Lvov University). Probably it remained in the collection of Steven (the collector of the specimen), its site being unknown to the author. Already in 1831 Germar himself synonymized his species with *Cicada striola* Fn.

¹ In a preliminary manuscript it was treated as a new species. To be sure of it, the genitalia of the Altaian specimens were compared with those of the Estonian ones. Unfortunately, the latter proved to be specimens of one then unnamed species (it is *L. ochifrons* n. sp.).

Thamnotettix atricapillus was described by Boheman in 1845. Through the courtesy of Dr. P. I. Persson I could investigate a specimen of *L. atricapillus* from the collection of Naturhistorisk Riksmuseet, Stockholm, labelled red with "TYPE". As Dr. Persson kindly informed me, there has been some confusion about it. In the original description the locality of collection was indicated as "Annaberg" (which lies in the province Småland, and the collector was apparently Boheman. The specimen received (which was the only one in the so-called old collection) bears a label inscribed as "Ö. G., P. Wg.", which, according to Dr. Persson, should mean "Östergötland, P. Wahlberg". Consequently, it was found in a different province, apparently by a different collector. Dr. Persson (in litt.) concluded: "Wahlberg lived at the same time as Boheman, and it is quite probable that Boheman saw and determined this specimen".

Unfortunately, the specimen is a female. But from the size (length 5.15 mm.) and from the black pattern of the head it is surely *L. atricapillus* in the sense of Ossiannilsson.

Also *L. nigrifrons* Haupt, 1935, for the male holotype which I am very greatly indebted to Prof. Dr. H. J. Müller (Jena, GDR), proved to be the same species, as stated already by Wagner (1941) and Dlabola (1963).

Four European species are also externally distinguishable by the general colouration and the black pattern of the head.

1 (2) Light interocellar band reduced to small triangular spots (Fig. 1A).
Upper two (rarely three) arch-lines of frons always fused.

L. atricapillus (Bh.)

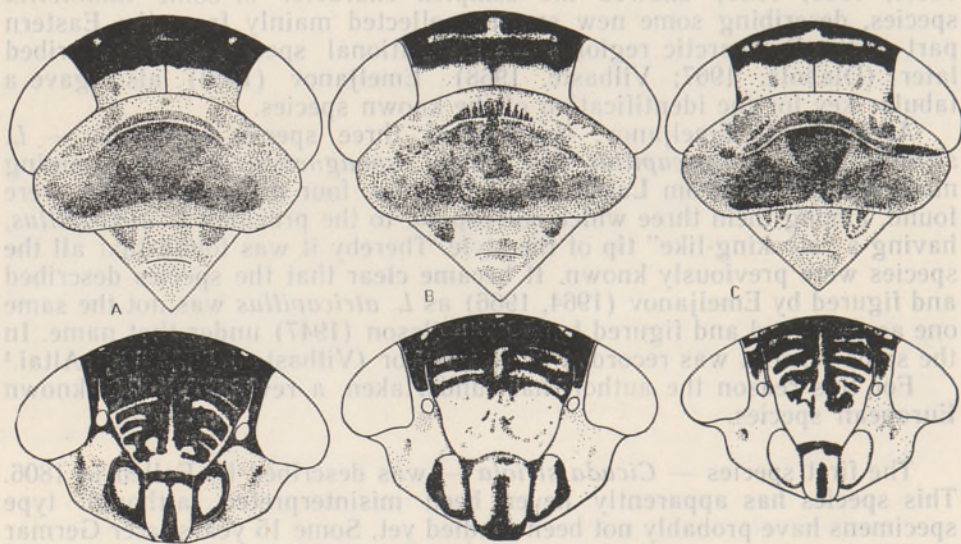


Fig. 1. Heads of *Limotettix* species (males): A — *L. atricapillus* (Bh.); B — *L. ochrifrons* n. sp.; C — *L. sphagneticus* Em.

- 2 (1) Light interocellar band distinct to the whole extent (usually narrowly interrupted beside the ocelli only, more rarely also in the middle). Upper arch-lines usually separated (fused only in especially dark males).
- 3 (4) Ground colour ochraceous (in some males the upper side is greenish-yellow). Frons usually strongly lightened in under part (Fig. 1B).

(Sutures of anteclypeus and lorae usually broadly darkened — Fig. 1B).

L. ochrifrons n. sp.

- 4 (3) Ground colour greenish-yellow. Arch-lines of frons usually distinct to the whole extent.
 5 (6) Upper pair of arch-lines is not or is only somewhat broader than the following ones (only in especially dark males it may be broader). Fore wings usually with brownish pattern or entirely brown with light veins. Sutures of anteclypeus and lorae broadly darkened.

L. striolus (Fn.)

- 6 (5) Upper pair of arch-lines distinctly broader than following ones. Fore-wings usually unicoloured light. Sutures of anteclypeus and lorae narrowly darkened (Fig. 1C).

L. sphagneticus Em.

The above key also applies well to females. For the determination of males it is useful to use genital characters. The species are distinguishable

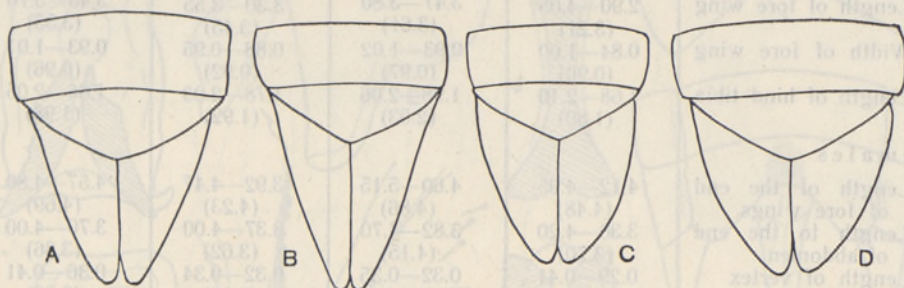


Fig. 2. Hind ends of male abdomens: A — *L. striolus* (Fn.); B — *L. sphagneticus* Em.; C — *L. atricapillus* (Bh.); D — *L. ochrifrons* n. sp.

already by the form of the subgenital plate and the genital plates (cf. Fig. 2). Below is given a key for males, using the characters of external and internal genitalia.

- 1 (4) Side margins of genital plates \pm straight (Fig. 2A, B).
 2 (3) Tip of style abruptly cut, with two-sided extension (Fig. 3I). Genital plates as long as wide at base (Fig. 3B).

L. striolus (Fn.)

- 3 (2) Tip of style stocking-like (Fig. 4H). Genital plates longer than wide at base (Fig. 4B).

L. sphagneticus Em.

- 4 (1) Side margins of genital plates convex (Fig. 2C, D).
 5 (6) Hind contour of aedeagus rounded (Fig. 5E). Median side of style \pm straight (Fig. 5I). Genital plates approximately as long as wide at base (Fig. 2C, 5B).

L. atricapillus (Bh.)

- 6 (5) Hind contour of aedeagus angular (Fig. 6D). Median side of style S-shaped (Fig. 6G). Genital plates shorter than wide at base (Fig. 2D, 6B).

L. ochrifrons n. sp.

Measurements of the discussed species are given in Table.

Measurements in millimetres

	<i>L. striolus</i> 20 ♂, 21 ♀	<i>L. atricapillus</i> 9 ♂, 3 ♀	<i>L. sphagneticus</i> 12 ♂, 14 ♀	<i>L. ochrifrons</i> 6 ♂, 7 ♀
Males				
Length to the end of fore wings	3.63—4.35 (3.90)	4.20—4.55 (4.35)	3.92—4.22 (4.12)	4.10—4.45 (4.25)
Length to the end of abdomen	2.95—3.25 (3.07)	3.07—3.35 (3.27)	3.09—3.77 (3.33)	3.10—3.27 (3.21)
Length of vertex	0.23—0.34 (0.29)	0.29—0.33 (0.31)	0.25—0.30 (0.27)	0.29—0.33 (0.32)
Width of head	1.15—1.33 (1.24)	1.30—1.36 (1.33)	1.21—1.28 (1.25)	1.29—1.33 (1.30)
Width of vertex (between eyes)	0.60—0.73 (0.65)	0.66—0.71 (0.69)	0.63—0.67 (0.65)	0.67—0.71 (0.69)
Length of pronotum	0.43—0.54 (0.48)	0.52—0.57 (0.54)	0.48—0.51 (0.50)	0.52—0.56 (0.54)
Width of pronotum	0.99—1.14 (1.06)	1.07—1.15 (1.12)	1.05—1.09 (1.08)	1.07—1.12 (1.10)
Length of fore wing	2.90—4.05 (3.21)	3.47—3.80 (3.61)	3.30—3.55 (3.45)	3.45—3.70 (3.55)
Width of fore wing	0.84—1.00 (0.90)	0.93—1.02 (0.97)	0.88—0.95 (0.92)	0.93—1.01 (0.96)
Length of hind tibia	1.68—2.10 (1.80)	1.98—2.06 (2.03)	1.78—2.03 (1.92)	1.86—2.05 (1.98)
Females				
Length of the end of fore wings	4.12—4.95 (4.48)	4.60—5.15 (4.86)	3.92—4.47 (4.23)	4.57—4.80 (4.69)
Length to the end of abdomen	3.30—4.20 (3.70)	3.82—4.70 (4.15)	3.37—4.00 (3.62)	3.70—4.00 (3.86)
Length of vertex	0.29—0.41 (0.35)	0.32—0.35 (0.34)	0.32—0.34 (0.33)	0.36—0.41 (0.38)
Width of head	1.29—1.45 (1.39)	1.46—1.50 (1.47)	1.26—1.40 (1.32)	1.47—1.54 (1.50)
Width of vertex	0.69—0.84 (0.81)	0.77—0.80 (0.78)	0.65—0.76 (0.70)	0.80—0.86 (0.83)
Length of pronotum	0.47—0.61 (0.55)	0.59—0.62 (0.61)	0.50—0.55 (0.52)	0.57—0.65 (0.61)
Width of pronotum	1.14—1.30 (1.20)	1.23—1.29 (1.26)	1.06—1.21 (1.12)	1.23—1.30 (1.26)
Length of fore wing	3.30—4.10 (3.71)	3.85—4.35 (4.10)	3.22—3.77 (3.52)	3.75—4.12 (3.90)
Width of fore wing	0.93—1.12 (1.03)	1.07—1.15 (1.10)	0.92—1.03 (0.97)	1.06—1.14 (1.11)
Length of hind tibia	1.87—2.27 (1.95)	2.27—2.40 (2.32)	1.71—2.14 (2.01)	2.12—2.30 (2.26)

The new species is characterized as follows:

Limotettix ochrifrons n. sp. Ground colour predominantly ochraceous, only the upper side of male is often greenish. Interocular black band is of \pm equal width, its fore and hind margin are \pm straight, the hind margin is seldom toothed. Interocellar light band mostly distinct, rarely (in dark males) confluent. Between the light band and the uppermost arch-line there is often a narrow cross-line, which can also confluence with the latter. On the hind angle of crown there is usually a small black or dark-brown point.

Of the arch lines of the frons (all together up to 8 pairs), the uppermost pair is usually broad and distinct, the following ones have \pm become lighter. In males there are usually 1—3 (rarely 4) rather narrow black

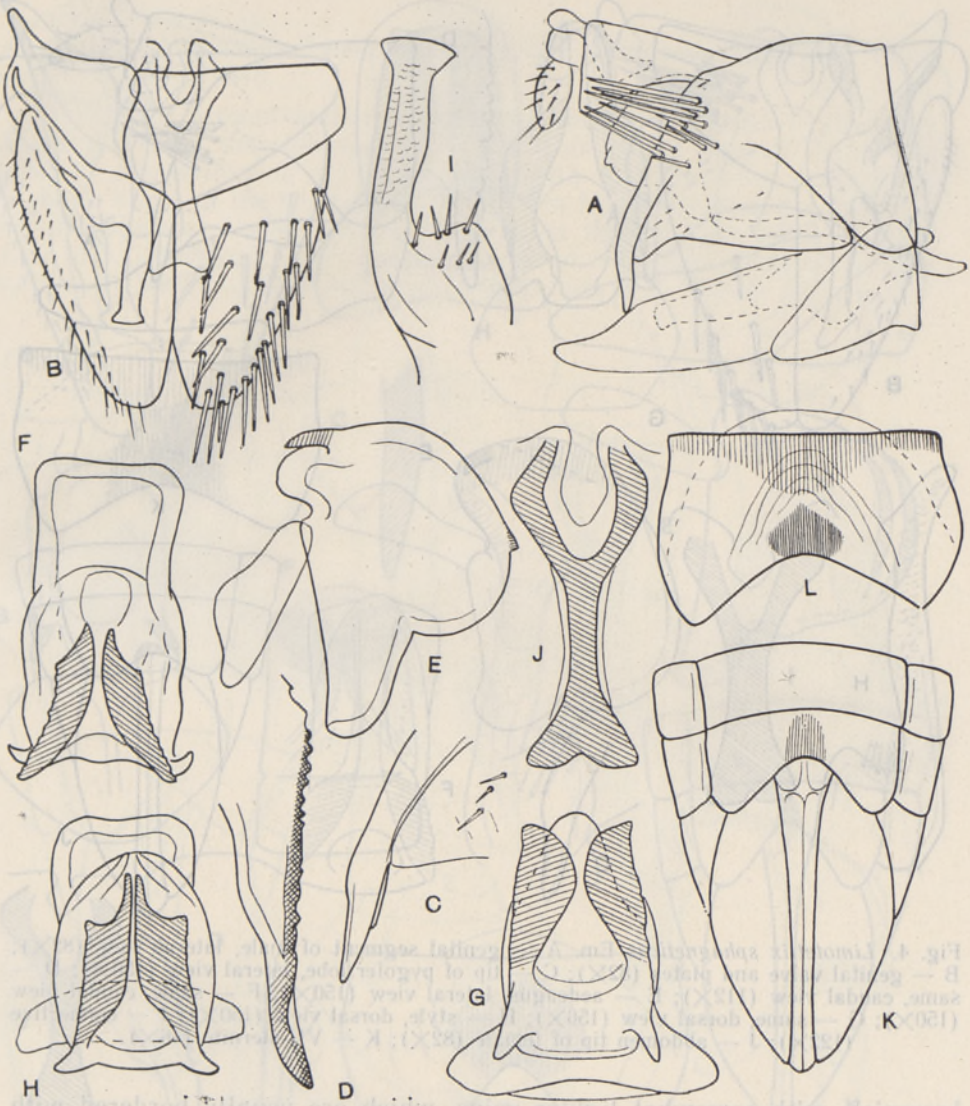


Fig. 3. *Limotettix striolus* (Fn.): A — genital segment of male, lateral view (enlargement 82X); B — genital valve and plates (right ventral, left dorsal view, 82X); C — tip of pygofer lobe, lateral view (150X); D — same, caudal view (150X); E — aedeagus, lateral view (150X); F — same, caudal view (150X); G — same, dorsocaudal view (150X); H — same, dorsal view (150X); I — style, dorsal view (150X); J — connective (150X); K — abdomen tip of female (82X); L — VII-sternite (46X).

arch-lines in the upper part, whereas the under part is quite light. In light females there may exist only the upper pair of arch-lines, all the remainder of the frons being light. Anteclypeus with a dark cross-band at the upper margin and a dark longitudinal band. Lorae usually broadly bordered with black. Ocellocular area black, with a light spot above the antennal pits and often a light triangular spot in the middle, next to the eye.

Pronotum and scutellum are of the ground colour, the latter being somewhat more greenish than the other parts. Fore-wings slightly



Fig. 4. *Limotettix sphagneticus* Em. A — genital segment of male, lateral view (82 \times); B — genital valve and plates (82 \times); C — tip of pygofer lobe, lateral view (150 \times); D — same, caudal view (112 \times); E — aedeagus, lateral view (150 \times); F — same, caudal view (150 \times); G — same, dorsal view (150 \times); H — style, dorsal view (150 \times); I — connective (122 \times); J — abdomen tip of female (82 \times); K — VII-sternite (46 \times).

brownish, with somewhat lighter veins, which are usually bordered with brown pigment. In light specimens there is only a dark band along the corioclaval suture. Hind wings are provided with brownish veins. Legs with irregular remains of rings and longitudinal bands. The outer side of fore tibiae and the hind side of middle tibiae with black longitudinal band.

The abdomen black, with narrow hind and quite broad side margins of segments. Under side is \pm lightened. Genital segments are predominantly light. Spines darkened towards the tips. In females the under side may be mostly light. Only the ovipositor is black.

Holotype δ , allotype f , 13 δ and 26 f paratypes: USSR, Lithuanian SSR, Ilgininkiai, fen, 13th July 1966.

The distribution of the species discussed is insufficiently known. *Limotettix striolus* is apparently a holarctic species, although the genitalia of North-American specimens (cf. DeLong, 1948; Beirne, 1956) differ somewhat from those of the European ones (besides, the figures of these two authors are somewhat different). *L. atricapillus* is a North-European

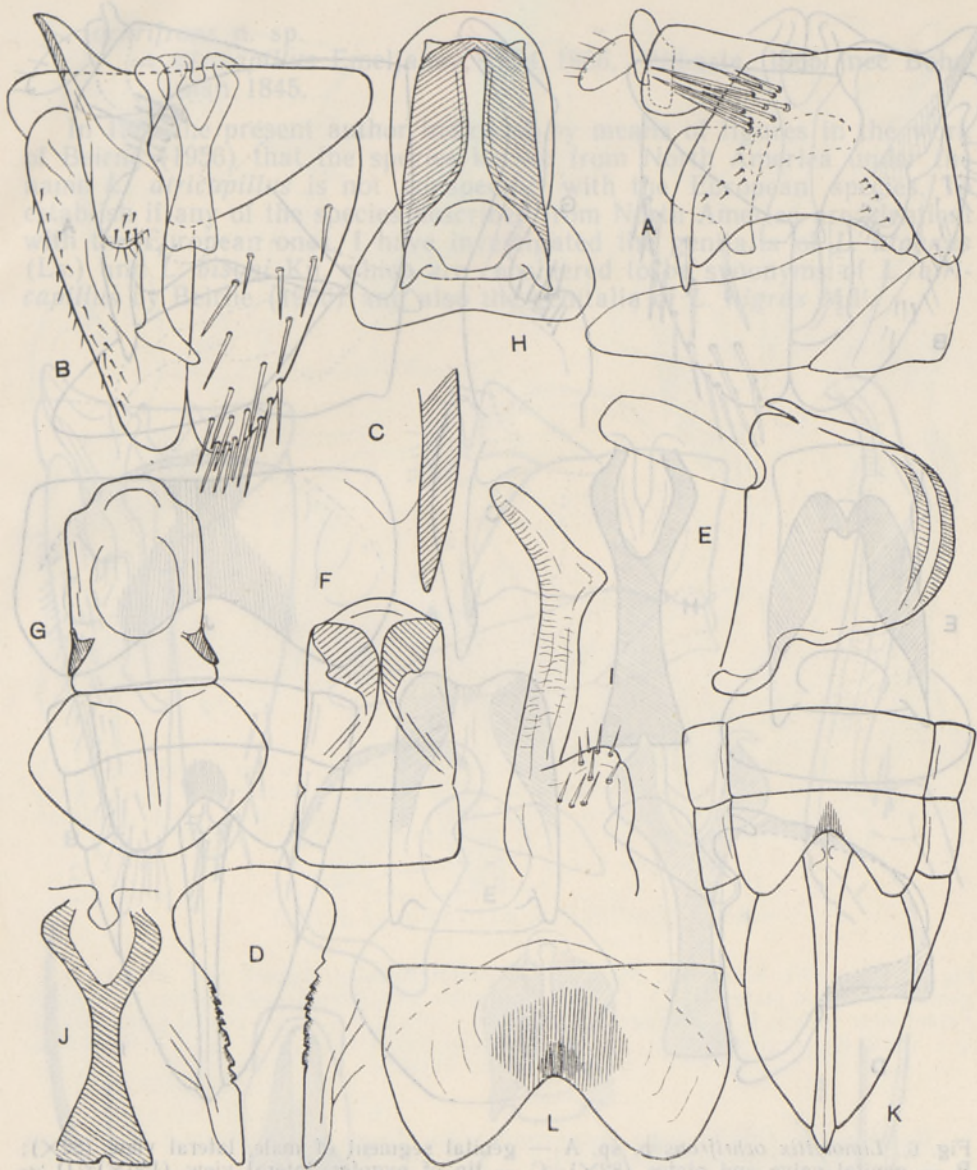


Fig. 5. *Limotettix atricapillus* (Bh.). A — genital segment of male, lateral view (82×); B — genital valve and plates (82×); C — tip of pygofer, lateral view (150×); D — pygofer lobes, caudal view (82×); E — aedeagus lateral view (150×); F — same, caudal view (150×); G — same, dorsal view (150×); H — same, dorso-caudal view (150×); I — style, dorsal view (150×); J — connective (112×); K — abdomen of female (82×); L — VII-sternite (46×).

species — in the sense used here, it is known only from Sweden, England (Le Quesne, 1969), the Baltic Republics of the USSR, the German Democratic Republic (environs of Dresden). *L. sphagneticus* is also a North-European species — it has since been found, besides the Baltic Republics, also in the Leningrad and Moscow provinces as well as in the Ural Mountains. *L. ochrifrons* seems to be a Eurasian species whose range

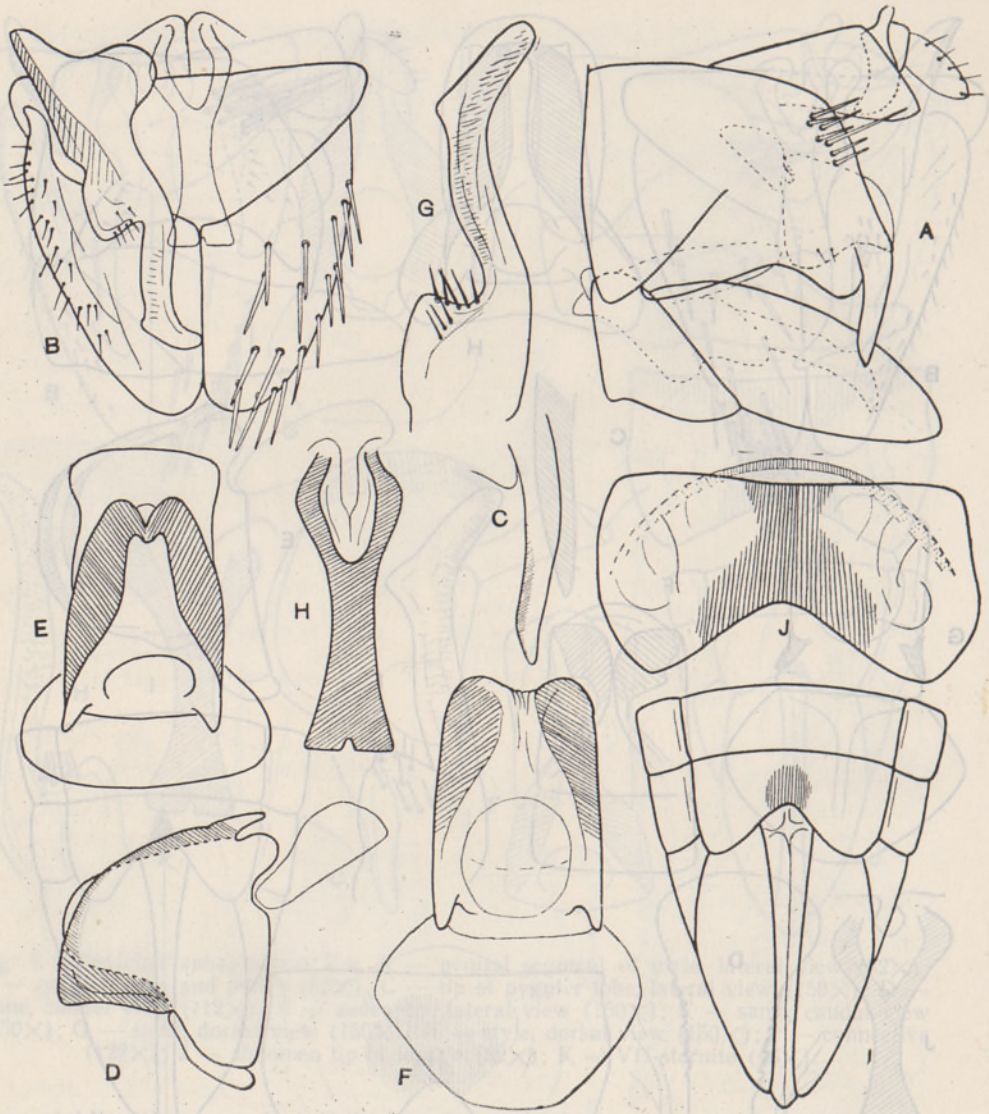


Fig. 6. *Limotettix ochrifrons* n. sp. A — genital segment of male, lateral view (82 \times); B — genital valve and plates (82 \times); C — tip of pygofer, lateral view (150 \times); D — aedeagus, lateral view (150 \times); E — same, caudal view (150 \times); F — same, dorsal view (150 \times); G — style, dorsal view (150 \times); H — connective (112 \times); I — abdomen end of female (82 \times); J — VII-sternite (46 \times).

extends from the Baltic Republics to Central Asia (Emeljanov, 1969) and Central Siberia.

The relations of the discussed species are as follows:

***Limotettix* J. Sahlberg, 1871**

- striolus* (Fallen, 1806) [*Cicada*]
- = *frenatus* (Germar, 1821) [*Jassus*]
- atricapillus* (Boheman, 1845) [*Thamnotettix*]
- = *nigrifrons* Haupt, 1935
- sphagneticus* Emeljanov, 1966

ochrifrons n. sp.

= *atricapillus* Emeljanov, 1964, 1966, Vilbaste, 1965 nec Boheman 1845.

In 1958 the present author indicated by means of figures in the work of Beirne (1956) that the species known from North America under the name *L. atricapillus* is not conspecific with the European species. To establish if any of the species described from North America are identical with the European ones, I have investigated the genitalia of *L. utahnus* (Ls.) and *L. bisoni* Kn. which are considered to be synonyms of *L. atricapillus* by Beirne (1956) and also the genitalia of *L. nigrax* Md¹.

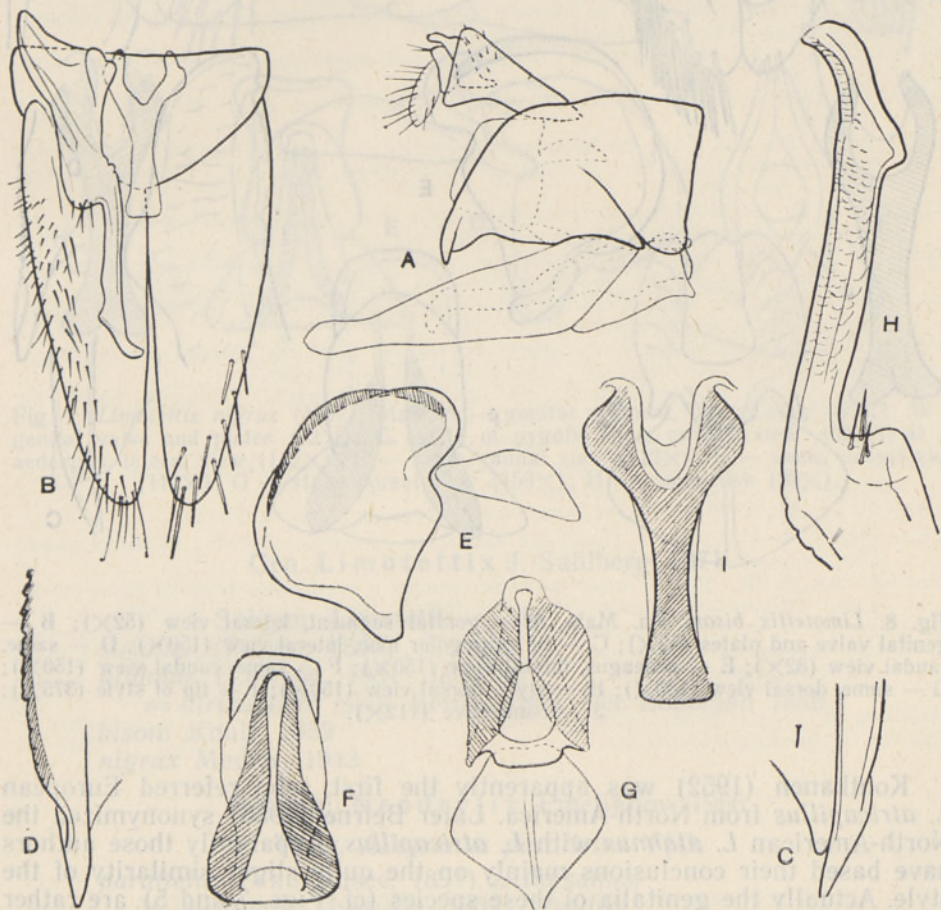


Fig. 7. *Limotettix utahnus* (Ls.). Male. A — genital segment, lateral view (63X); B — genital valve and plates (63X); C — tip of pygofer lobe, lateral view (150X); D — same, caudal view (150X); E — aedeagus, lateral view (122X); F — same, caudal view (122X); G — same, dorsal view (122X); H — style, dorsal view (150X); I — connective (122X).

¹ For the opportunity of investigating the corresponding type specimens I am much indebted to Prof. Dr. C. D. Michener and Prof. Dr. P. D. Ashlock (University of Kansas, USA), to Dr. D. J. Knull and Prof. Dr. Ch. A. Triplehorn (Ohio State University, USA) as well as to Prof. Dr. J. T. Medler and Prof. Dr. E. F. Cook (University of Minnesota, USA).

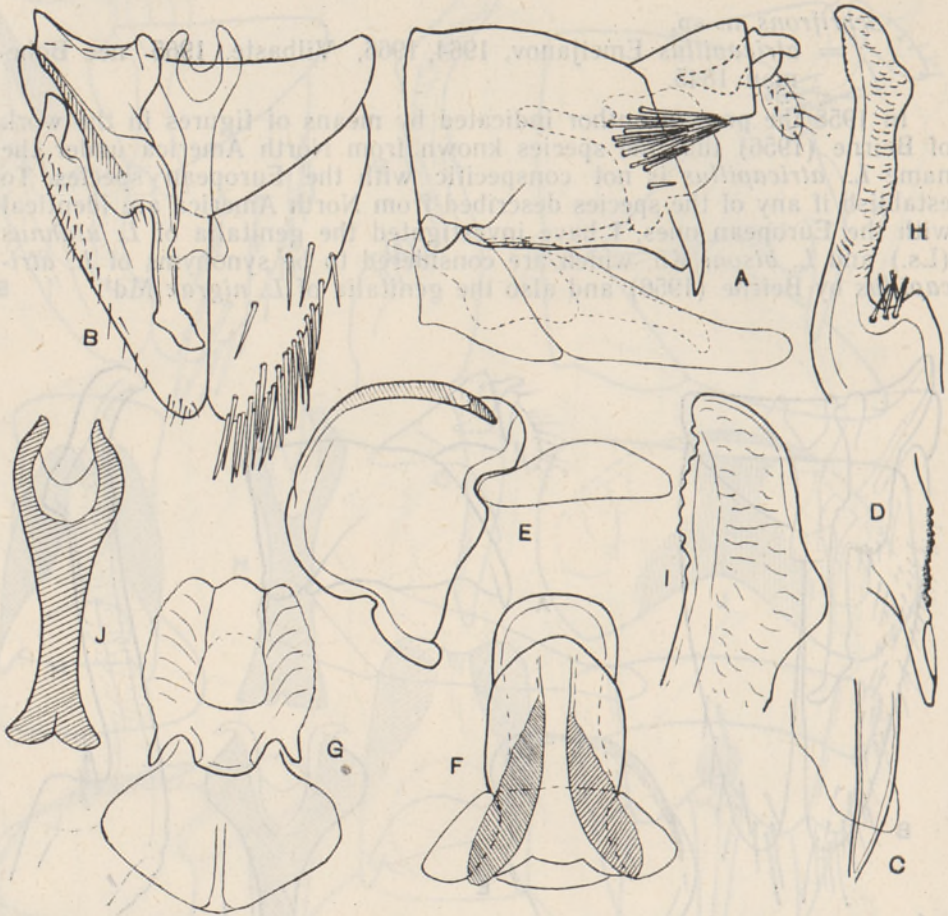


Fig. 8. *Limotettix bisoni* Kn. Male. A — genital segment, lateral view (52 \times); B — genital valve and plates (52 \times); C — tip of pygofer lobe, lateral view (150 \times); D — same, caudal view (82 \times); E — aedeagus, lateral view (150 \times); F — same, caudal view (150 \times); G — same, dorsal view (150 \times); H — style, dorsal view (150 \times); I — tip of style (375 \times); J — connective (112 \times).

Kontkanen (1952) was apparently the first, who referred European *L. atricapillus* from North-America. Later Beirne (1956) synonymized the North-American *L. utahnus* with *L. atricapillus*. Apparently those authors have based their conclusions mainly on the quite slight similarity of the style. Actually the genitalia of these species (cf. Figs. 7 and 5) are rather dissimilar (especially the length of the genital plates, the form of aedeagus and also the style, etc.). *L. bisoni* Kn., which was also synonymized (with a question mark) with *L. atricapillus* by Beirne. (l. c.) is a distinct species, differing from *L. utahnus* in its smaller size, somewhat different colouration and especially its male genitalia (Fig. 8A, J). Quite different in colouration as well as in the male genitalia (Fig. 9A—H) is *Limotettix nigrax* (Mdl.).

All the remaining North-American *Limotettix* belong to the subgenus *Neodrylix* Emeljanov, 1966, which, however, ought to be more correctly raised into a generic rank.

So the synonymy of the North-American species is the following:

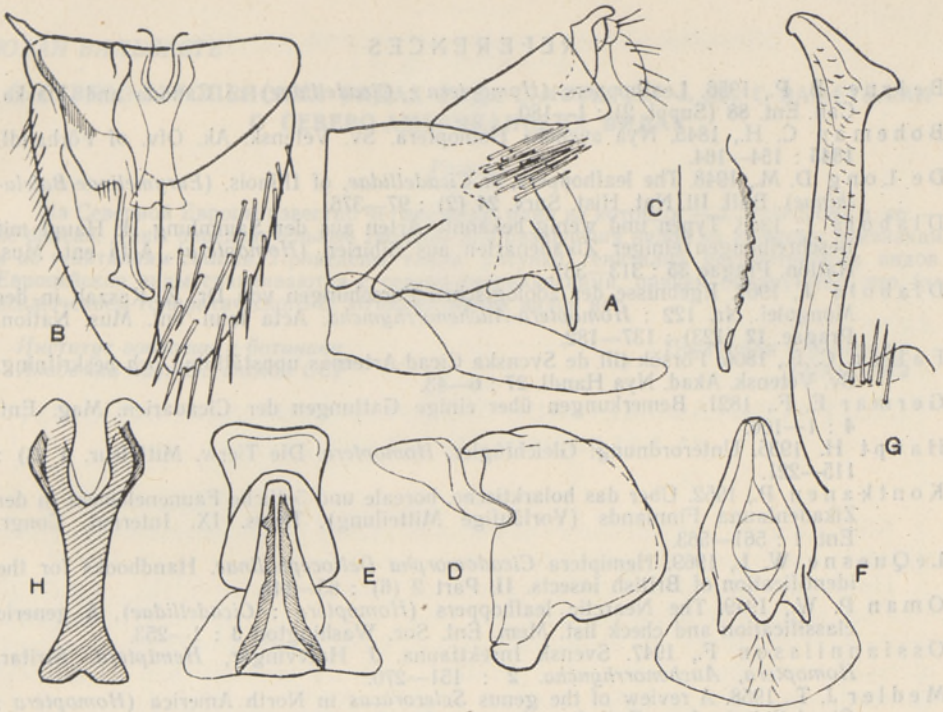


Fig. 9. *Limotettix nigrax* (Mdl.). Male. A — genital segment, lateral view (52×); B — genital valve and plates (52×); C — tip of pygofer lobe, caudal view (52×); D — aedeagus, lateral view (112×); E — same, dorsal view (112×); F — same, dorsal view (112×); G — style, dorsal view (150×); H — connective (82×).

Gen. *Limotettix* J. Sahlberg, 1971

Subgen. *Limotettix* s. str.

striolus (Fallen, 1806) [*Cicada*]

ulahnus (Lawson, 1931) [*Drylix*]

= *atricapillis* [sic!] Beirne 1956, nec Boheman 1845

bisoni Knull, 1952

nigrax Medler, 1943

Subgen. *Neodrylix* Emeljanov, 1966

T. sg. *Athysanus parallelus* V|D.

parallelus (Van Duzee, 1891) [*Athysanus*]

= *medianus* (Lawson, 1931) [*Drylix*]

divaricatus (Sanderson & DeLong, 1920) [*Euscelis*]

uneolus (Ball, 1929) [*Drylix*]

truncatus (Sleesman, 1929) [*Drylix*]

Euscelis cuneatus Sand & DeLong which is sometimes also referred to the genus *Limotettix* (cf. Oman, 1949; Metcalf, 1967), apparently belongs to the genus *Scleroracus* V.D. (cf. DeLong, 1948), although Prof. J. T. Medler (1958) does not mention it in his review of the North-American species of the genus.

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**LIMOTETTIX J. Sb. LIIKIDEST PÕHJA-EUROOPAS VIIDETEGA
TEMA LIIKIDELE PÕHJA-AMEERIKAS**

• Resümee

Põhja-Euroopast tuntakse nelja *Limotettix* J. Sb. liiki, milledest ühte (*L. ochrifrons* n. sp.) polnud veel kirjeldatud. Käesolevas esitatakse määramistabelid liikide eraldamiseks nii väliste tunnuste kui ka isaste genitaalide järgi, samuti kõigi liikide isaste ja emaste genitaalide joonised. Võrreldes Euroopas esinevaid liike Põhja-Ameerika omadega, leiti, et viimased (välja arvatud holarktiline *L. striolus*) pole identsed Euroopas olemasolevatega.

Eesti NSV Teaduste Akadeemia
Zooloogia ja Botaanika Instituut

Toimetusse saanud
13. XII 1972

ЮХАН ВИЛЬБАСТЕ

О СЕВЕРО-ЕВРОПЕЙСКИХ ВИДАХ РОДА *LIMOTETTIX* J. Sb. С ЗАМЕТКАМИ
О СЕВЕРО-АМЕРИКАНСКИХ ВИДАХ

Резюме

Из Северной Европы известно четыре вида, один из которых — *L. ochrifrons* n. sp. — не описан. Даны определительные таблицы для различения видов по внешним признакам и по гениталиям самцов. Приведены также рисунки гениталий рассмотренных видов. Европейские виды сравниваются с северо-американскими, причем обнаружено, что (за исключением голарктического *L. striolus*) общих видов нет.

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