

Comments on the Taxonomy and Nomenclature of Planthoppers (Hemiptera, Auchenorrhyncha)

A. F. Emeljanov^{a,*}

^a Zoological Institute, Russian Academy of Sciences, St. Petersburg, 199034 Russia

*e-mail: hemipt@zin.ru

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Abstract—The generic distinctness of *Mocuellus* and *Henschia* (Cicadellidae) is proven. The genus *Goniagnathus* is divided into four genera: *Goniagnathus* (with the subgenera *Goniagnathus* s. str. and *Goniozygotes*), *Epistagma* **stat. n.** (with the subgenera *Epistagma*, *Epitephra*, and *Episarca*), *Tropicognathus* **stat. n.**, and *Telogonus* **gen. n.** with the type species *Goniagnathus pectinatus* Fletcher, 2008. A new synonymy is established in the family Delphacidae: *Leimonodite* Kirkaldy, 1907 = *Ferganodelphax* Dubovsky, 1970, **syn. n.** The following replacement names are given for homonyms: in Delphacidae, *Migma* Emeljanov, **nom. n.** for *Polytropa* Emeljanov, 1982, nom. praeocc., non *Polytropa* Swainson, 1840 (Mollusca, Gastropoda: Muricidae); *Dicranotropis vilbastei* Emeljanov, **nom. n., sp. propria** for *Dicranotropis montana* Vilbaste, 1965, secondary homonym, non *Dicranotropis montana* (Horvath, 1897) = *Stiroma montana* Horvath, 1897; *Dicranotropis vilbastei* is restored as a distinct species; in Dictyopharidae, *Ostopicus* Emeljanov, **nom. n.** for *Opsigonus* Emeljanov, 2006, nom. praeocc., non *Opsigonus* Baudi de Selve, 1877 (Coleoptera, Melandryidae); *Rugorana* Emeljanov, **nom. n.** for *Cnodalum* Emeljanov, 1978, nom. praeocc., non *Cnodalum* Agassiz, 1846 (Coleoptera, Tenebrionidae); in Derbidae, *Synavella* Emeljanov, **nom. n.** for *Synavea* Emeljanov, 1995, nom. praeocc., non *Synavea* Lallmand, 1955 (Homoptera, Cercopidae). Several new combinations are formed in the family Cicadellidae.

Keywords: Cicadellidae, Delphacidae, Dictyopharidae, Derbidae, new status, new combinations, synonyms, homonyms, replacement names

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The European and, in a wider sense, West Palaearctic fauna of Auchenorrhyncha is one of the best studied, and the nomenclature of its representatives as a whole has been quite well established and generally accepted. However, there are certain controversial or insufficiently studied issues, some of which are addressed in this paper. First of all, the distinctness of the genus *Mocuellus* and the originality of the steppe monotypic genus *Henschia* are substantiated. Further, in view of description of numerous extra-Palaearctic species, I consider the subdivision of the genus *Goniagnathus*, distribute the species not previously studied at the modern level or only recently described into the existing subgenera of this genus, and describe one more subgenus. Finally, I discuss the distinctness of three closely related species: *D. montana* (Horvath, 1897), *D. gratiosa* Dlabola,

1999, and *D. vilbastei* Emeljanov, involving the characters that have not been previously used by taxonomists.

D.A. Dmitriev (Champaign, USA) drew my attention to the cases of homonymy created in my previous works. In this paper, I eliminate these homonymies by suggesting replacement names.

Family **CICADELLIDAE**

Subfamily **DELTOCEPHALINAE**

Tribe **Paralimnini**

Genus *Henschia* Lethierry, 1892

Type species *Henschia seticauda* Lethierry, 1892 (= *acuta* Löw, 1885).

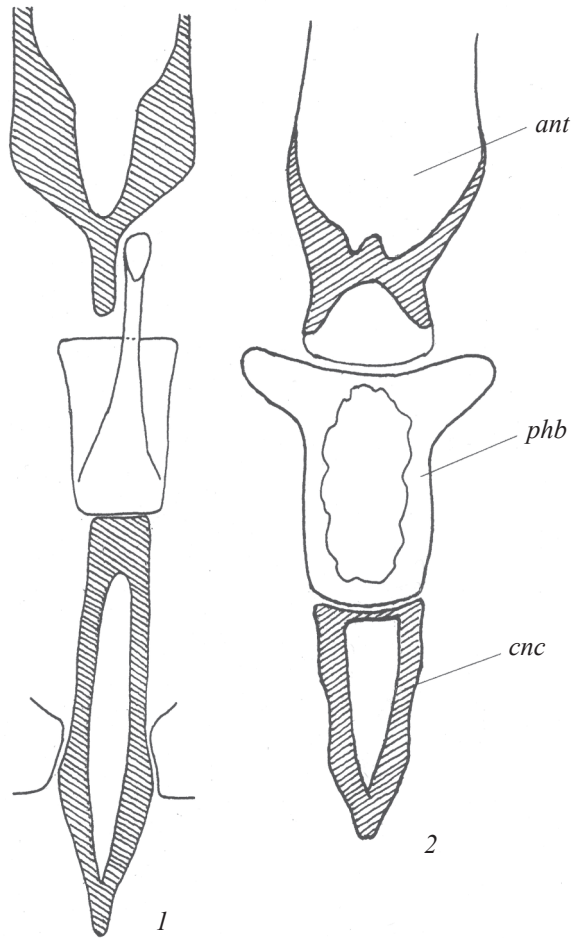


Fig. 1. Cicadellidae: Paralimnini, articulation of the penis base with the anal tube and the connective in ventral view: (1) *Henschia acuta* Löw; (2) *Mocuellus collinus* Boh.; *ant*, anal tube; *cnc*, connective; *phb*, phallobase. Only the penis base (~ phallobase) is shown; the aedeagus is not shown.

The genus was originally established as monotypic, but *H. vittata* Matsumura, 1914 from Taiwan and Singapore and *H. oculata* Lindberg, 1948 from Cyprus were subsequently described in it. *Henschia oculata* turned out to be a typical representative of the genus *Aconura* Lethierry from the tribe Doraturini. The taxonomic position of *H. vittata* is still unclear, but its placement in the genus *Henschia* and even in the tribe Paralimnini is highly questionable.

Wagner (1961) considered *Henschia* a senior synonym of *Mocuellus* Ribaut, 1946. His opinion was not supported by anyone until the publication of Holzinger and Kunz (2006), after which a number of authors

shared this view (Kunz et al., 2011; Müllethaler et al., 2019).

However, *Henschia* differs considerably from the genus *Mocuellus* in a combination of characters. One important character was mentioned in my earlier publication (Emeljanov, 1999). Two incomplete images of the genitalia of *Henschia acuta* (Löw, 1885) have been published: Dlabola (1956) illustrated the penis and stylus, and Logvinenko (1962) also illustrated the genital plates with the stylus in situ and the connective. The articulations of the penis base with the anal tube and the connective in *Henschia* and *Mocuellus* are shown in Fig. 1. Other differences between these genera are considered below.

1. The anal tube in males of *Henschia* has an arcuate, strongly sclerotized ventrobasal bridge bearing a short, digitiform median projection that rests freely on the straight transverse edge of the penis base (Emeljanov, 1999). In contrast, the penis base in *Mocuellus* has a wide and concave dorsal edge; the anal tube is attached to the penis base via paired lateral protrusions close to its lateral edges (Fig. 1, 2). In the morphology of the anal tube, *Henschia* appears more similar to the genus *Falcitettix* Linnavuori, 1953, but in the latter the bridge has no digitiform projection, its margin is arcuately convex along the entire width of the tube and has a narrow medial incision (see Anufriev and Emeljanov, 1988, fig. 179, 4).

2. The connective of *Henschia* is elongated, with a relatively narrow and long base (Logvinenko, 1962), whereas that of *Mocuellus* is not elongated and not basally narrowed, while the basal bridge is narrow (see Fig. 1, 2).

3. The penis shaft of *Henschia* is simple, tubular, without any processes or teeth, with an apical gonopore slightly slanted ventrally. In contrast, *Mocuellus* and *Falcitettix* are characterized by the presence of the processes, teeth, and carinae in the apical part of the penis (e.g., see Vilbaste, 1980, figs. 28–33; Anufriev and Emeljanov, 1988, fig. 179).

4. The pygofer lobes of *Henschia* lack marginal protrusions and denticles that are present in both *Mocuellus* and *Falcitettix*.

Of course, lack of armament of the penis shaft can be regarded as a reduction trend that is sometimes observed

in the penis structures even within a genus or closely related genera, in particular, in the lineages *Pithyotettix*–*Perotettix*–*Colobotettix* or *Grypotes*–*Grypotellus* within Deltocephalinae. The same interpretation can be offered for the absence of protrusions on the edge of the pygofer lobes. However, in my opinion, the peculiar structure of the anal tube combined with characters 2, 3, and 4 supports the distinctness of the genera *Mocuellus* and *Henschia*.

5. *Henschia acuta* is the only genuine xerophilous species among *Mocuellus* and *Henschia*. It inhabits the entire steppe zone of the Palaearctic, i.e., the Scythian Region, and has not yet been recorded only in the extreme east of the zone, in China, where its finding can be expected in northeastern Inner Mongolia and in Heilongjiang Province. This species is an oligophage of feather grasses of the genus *Stipa*, the dominants and main edificators in the steppe vegetation, and it is very common in the areas where unplowed steppes are preserved. The genus *Stipa* belongs to the tribe Agrostideae. In contrast, all *Mocuellus* species whose trophic preferences are known are associated with grasses of the tribe Hordeae; they are predominantly mesoxerophilous and do not inhabit upland zonal steppes.

Thus, there is every reason to consider *Mocuellus* a distinct genus.

Tribe **Goniagnathini**

The small and well-defined tribe Goniagnathini comprises seven genera, together with the one described here: *Megalopsius* Em., 1961, *Tamaricades* Em., 1962, *Goniagnathus* Fieb., 1866, *Epistagma* Em., 1999, *Raunothus* Dlab., 1987, *Tropicognathus* Virak. et Gnan., 2009, stat. n., and *Telogonus* gen. n. These genera form a morphological series according to the structure of their stylus. The genus *Megalopsius* shows the most plesiomorphic features and has a stylus with a falcate pointed apex, while the other genera have a stylus with a truncated, mostly dilated apex. The stylus of *Tamaricades* retains the original slender shape. The stylus apex in *Goniagnathus* and *Epistagma* is strongly thickened; that in *Goniagnathus* remains axe-shaped, and that in *Epistagma* is considerably elongated and straightened.

Species of the two least advanced genera, *Megalopsius* and *Tamaricades*, are trophically associated with shrubs of the genus *Tamarix* (Tamaricaceae), while the

others inhabit low-growing, mostly herbaceous plants: composites, chenopods, and grasses. The genus *Raunothus* was recorded on a shrub *Prosopis* of the family Mimosaceae (Dlabola, 1987).

Genus **Goniagnathus** Fieber, 1866

Type species *Jassus brevis* Herrich-Schäffer, 1835.

Earlier (Emeljanov, 1999), I divided the Palaearctic representatives of the genus *Goniagnathus* Fieber, 1866 into five subgenera: *Goniagnathus* s. str., *Goniozygotes* Emeljanov, 1999, *Epistagma* Emeljanov, 1999, *Epitaphra* Emeljanov, 1999, and *Episarca* Emeljanov, 1999. These subgenera are clearly united into two groups that differ primarily in the stylus shape and are considered here as the genera *Goniagnathus* and *Epistagma*.

The genus *Goniagnathus* includes the nominotypical subgenus and the subgenus *Goniozygotes* and is characterized by a relatively short stylus with a large axe-shaped apex and a well-developed preapical projection.

Outside the Palaearctic, the genus has been recorded from the Palaetropical Kingdom (India, Madagascar, tropical and southern Africa) and the Notogaean Kingdom (Australia). However, most of the species described in it do not belong to the genus *Goniagnathus* as interpreted here, with the only exception of *Goniagnathus emeljanovi* Zahniser et Dietrich, 2013 from Madagascar. The other species included in *Goniagnathus* s. lato, namely *G. alkhubricus* Dlabola, 1980 from Saudi Arabia, *G. dursoicus* Dlabola, 1994, and *G. bishapuricus* Dlabola, 1994 from southern Iran, are distributed within the Palaearctic or near its southern boundary, such as *G. othello* Distant, 1913 from the south of Algeria.

The Oriental representatives of *Goniagnathus* s. lato (Dash and Viraktamath, 2001; Viraktamath and Gnaneswaran, 2009) were previously singled out in the subgenus *Tropicognathus* Viraktamath et Gnaneswaran, which is promoted here to the rank of a genus.

Genus **Tropicognathus**

Viraktamath et Gnaneswaran, 2009, stat. n.

Type species *Goniagnathus fumosus* Distant, 1918.

The distinctive characters of the genus are well-developed dorsal or caudal processes of the male pygofer (Viraktamath and Gnaneswaran, 2009).

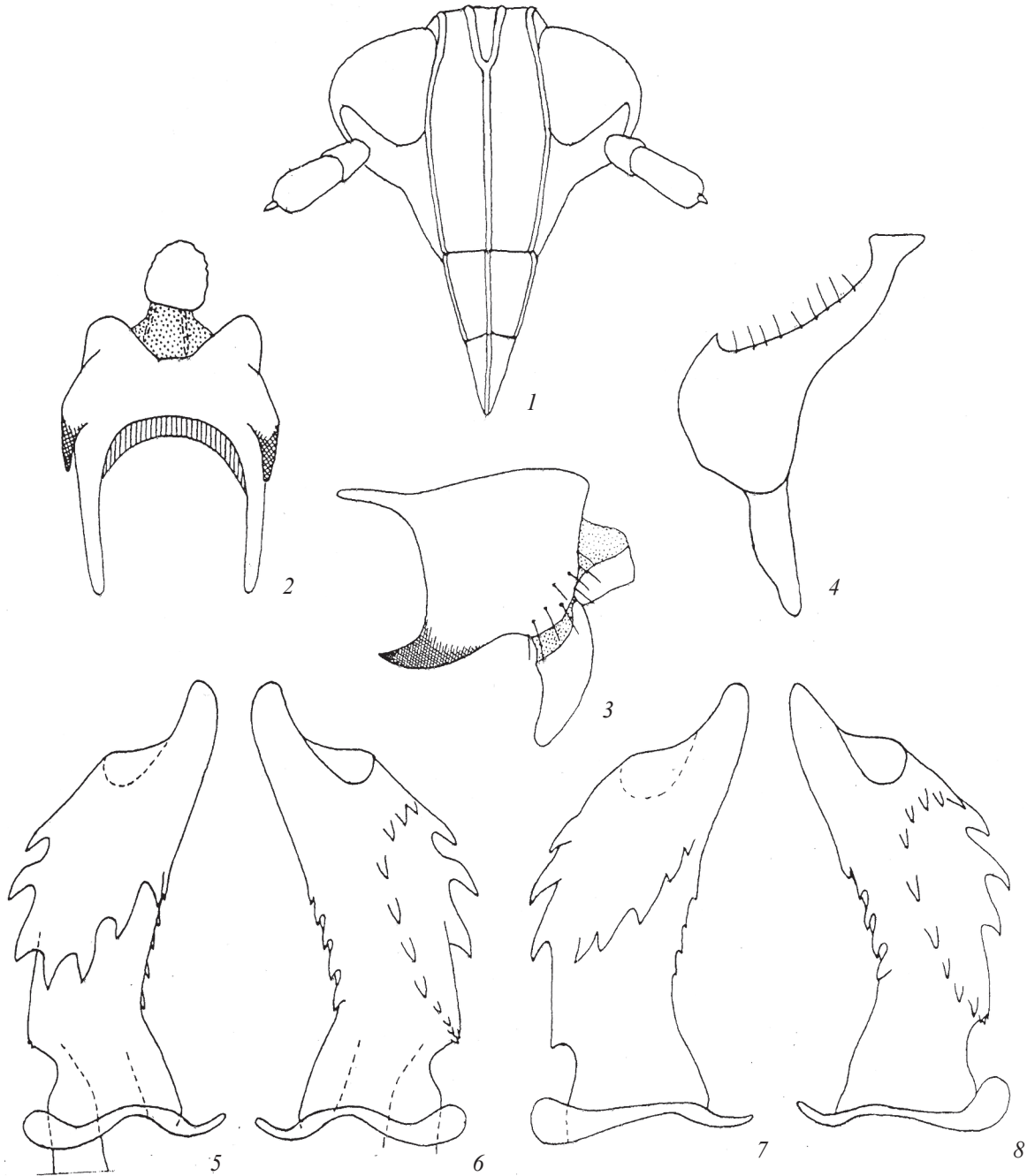


Fig. 2. *Dicanotropis crassiuscula* (Dub.): (1) head (face) in anterior-ventral view; (2) anal tube in ventral view; (3) anal tube in lateral (right) view; (4) stylus in approximately posterior-lateral view (unfolded in a plane); (5-8) penis of two specimens: (5, 7) left view, (6, 8) right view.

In addition to the Oriental species, *Goniagnathus appendiculatus* Linnavuori, 1978 from Sudan is also transferred to the genus *Tropicognathus*, and the new combination *Tropicognathus appendiculatus* (Lnv.), comb. n. is thus formed

Genus *Epistagma* Emeljanov, 1999, stat. n.

Type species *Jassus guttulinervis* Kirschbaum, 1868.

This genus includes the subgenera *Epistagma*, *Epi-tephra*, and *Episarca*, and is characterized by an elon-

gated, approximately parallel-sided stylus with a truncated apex and an almost completely reduced preapical projection. Some Ethiopian (= Afrotropical) species can be confidently placed in the nominotypical subgenus: *Epistagma* (*Epistagma*) *parvipicta* (Linnavuori, 1978), comb. n., *E. (E.) obfuscata* (Linnavuori, 1978), comb. n., *E. (E.) albomarginata* (Linnavuori, 1978), comb. n., and *E. (E.) hanifana* (Dlabola, 1979), comb. n.

The Australian species described by M.J. Fletcher in the genus *Goniagnathus* (Fletcher and Zahniser, 2008) undoubtedly belong to the distinct genus *Telogonus* gen. n. that is described below.

Genus *Telogonus* Emeljanov, gen. n.

Type species *Goniagnathus pectinatus* Fletcher, 2008.

Comparative diagnosis. The new genus is externally similar to *Goniagnathus* and *Epistagma*, but clearly differs in the structure of the male genitalia, in particular, in the short transverse genital plate and the stylus divided into two articulated parts and having a short, thick, angular apex.

Composition. The genus *Telogonus* gen. n. includes *Telogonus osmelaki* (Fletcher, 2008), comb. n. (*Goniagnathus osmelaki* Fletcher), *T. centralis* (Evans, 1966), comb. n. (*Deltocephalus centralis* Evans), *T. venenensis* (Fletcher, 2008), comb. n. (*Goniagnathus venenensis* Fletcher), *T. crocodontis* (Fletcher, 2008), comb. n. (*Goniagnathus crocodontis* Fletcher), and *T. pectinatus* (Fletcher, 2008), comb. n. (*Goniagnathus pectinatus* Fletcher).

Family **DICTYOPHARIDAE**

Genus *Ostopicus* Emeljanov, nom. n.

Opsigonus Emeljanov, 2006, nom. praeocc., non *Opsigonus* Baudi de Selve, 1877 (Coleoptera, Melandryidae).

Etymology. The name of the new genus is a masculine noun formed as an arbitrary combination of letters.

Genus *Rugorana* Emeljanov, nom. n.

Cnodalum Emeljanov, 1978, nom. praeocc., non *Cnodalum* Agassiz, 1846 (Coleoptera, Tenebrionidae).

Etymology. The name of the new genus is a feminine noun derived from the Latin nouns *ruga* “wrinkle” and *rana* “frog,” by analogy with *Ranissus* (*rana* + *issus*).

Family **DERBIDAE**

Genus *Synavea* Emeljanov, nom. n.

Synavea Emeljanov, 1995, nom. praeocc., non *Synavea* Lallmand, 1955 (Homoptera, Cercopidae).

Etymology. The genus is named after Henri Synave (1921–1981), the eminent researcher of African Fulgoroidea. The name is a feminine noun.

Family **DELPHACIDAE**

Genus *Migma* Emeljanov, nom. n.

Polytropa Emeljanov, 1982, nom. praeocc., non *Polytropa* Swainson, 1840 (Mollusca, Gastropoda: Muricidae).

Etymology. The name of the new genus is a neuter noun derived from the Ancient Greek μίγμα (*migma*, gen. *migmatos*)—“mixture.”

Genus *Dicranotropis* Fieber, 1866

Type species *Delphax hamata* Boheman, 1847.

Subgenus *Leimonodite* Kirkaldy, 1907

Type species *Dicranotropis beckeri* Fieber, 1866.

= *Ferganodelphax* Dubovsky, 1970, type species *Ferganodelphax crassiuscula* Dubovsky, 1970, syn. n.

Ferganodelphax crassiuscula Dub. (Fig. 2) is a rather peculiar species of the genus *Dicranotropis*; it belongs to the subgenus *Leimonodite*, characterized by a laterally flattened penis shaft with an S-curved row of denticles. The anal tube has characteristic teeth, and in most species it also has a pair of lateral teeth on the pygofer directed at one another, though the latter character is absent in *D. crassiuscula*, *D. divergens* Kbm., 1868, and *D. beckeri*. The stylus morphology in *D. crassiuscula* is quite typical of the subgenus *Leimonodite*. The furca of the median metopal carina is relatively short, but its length falls within the range of variation observed in the genus *Dicranotropis* (Fig. 2, 1); its height is approximately the same as that in *D. hamata*. A highly variable

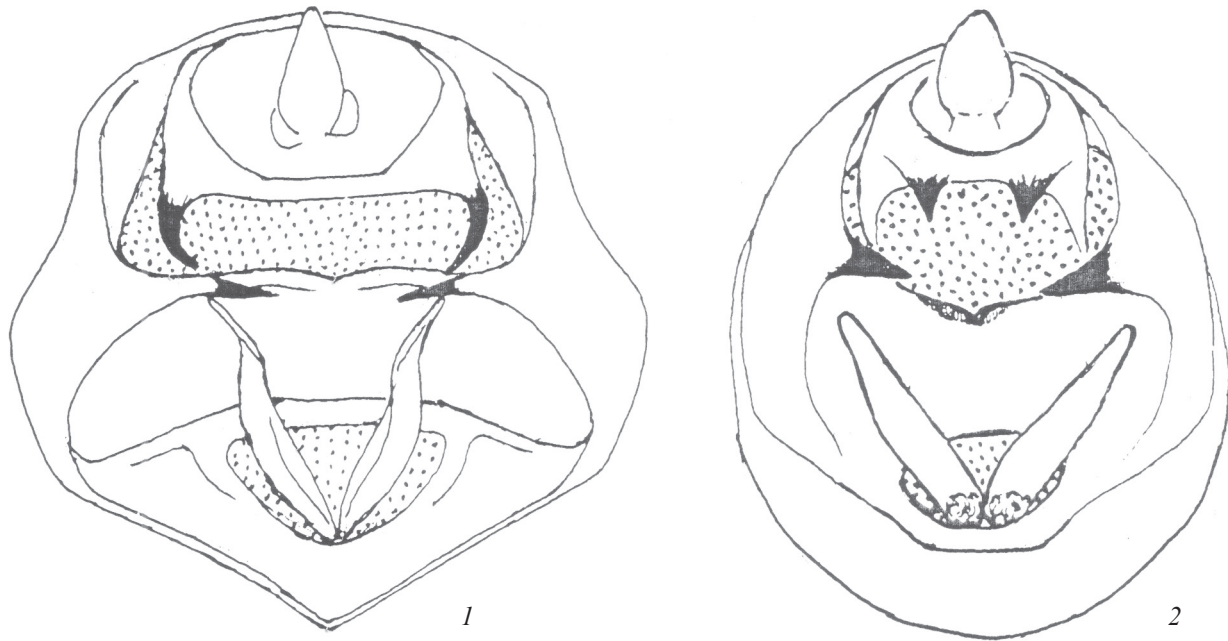


Fig. 3. *Dicranotropis* spp., male pygofer, semi-schematic posterior view: (1) *D. tenellula* Dlab., (2) *D. vilbastei* Em.

position of the furca of the median metopal carina in *D. beckeri* was demonstrated already by Haupt (1935), but the furca in *D. hamata* and *D. crassiuscula* is even shorter (compare fig. 153, C in Holzinger et al., 2003 and Fig. 2, 1 in this paper).

***Dicranotropis vilbastei* Emeljanov, nom. n.,
sp. propria**

Dicranotropis montana Vilbaste, 1965, nom. praeocc. (secondary homonym), non *Dicranotropis montana* (Horvath, 1897) = *Stiroma montana* Horvath, 1897.

Vilbaste (1965) described *Dicranotropis montana* from Altai. However, this name became a secondary junior homonym of *Stiroma montana* Horvath, 1897, described from the Carpathians, when Asche (1982) transferred the latter species to the genus *Dicranotropis*. The species described by J. Vilbaste has remained without a valid name until now, and here I propose a replacement name for this taxon.

Even before M. Asche's publication, J. Vilbaste (1980) erroneously synonymized his species with *Dicranotropis tenellula* Dlabola, 1965, described from Mongolia, even though the two species clearly differ in the position of the anal tube processes in males: these

processes lie close together in *D. vilbastei* and wide apart in *D. tenellula* (Fig. 3; see also Vilbaste, 1965; Dlabola, 1965; Anufriev and Emeljanov, 1988).

Strangely enough, *D. montana* (Horvath, 1897) and *D. montana* Vilbaste, 1965 are very similar in male genital morphology, but both differ from *D. tenellula*. In 1997, J. Dlabola described one more *Dicranotropis* species from the Austrian Alps (Tyrol): *D. gratiosa* Dlabola, 1997. This species was shortly after synonymized with *D. montana* (Horvath) by Holzinger (1999). The latter decision was in all likelihood erroneous, but the matter is not entirely clear, since there appear to be no published illustrations of the genitalia of the lectotype (male), and it is unknown whether W. Holzinger has examined the type material. The point is that the species described by Dlabola (1965) has a smooth claw-like basal tooth of the stylus in the illustrations published both by Dlabola (1965) and by Holzinger (1999), whereas in all the illustrations of *D. montana* (Horvath), this tooth is shown as a blunt tuberos projection (Holzinger et al., 2003; Della Giustina, 2019). If identification of *D. montana* (Horvath) was correct in Holzinger (1999), but incorrect in the later publications (Holzinger et al., 2003; Della Giustina, 2019), then we are dealing with three distinct species: *D. montana*

(Horvath, 1897), *D. gratiosa* Dlabola, 1999, and *D. vilbastei* Emeljanov, nom. n. *Dicranotropis montana* (Horvath) and *D. vilbastei* seem to differ only in the length of the processes of the pygofer and anal tube and in the distances between these processes; the differences between the two species still remain to be studied.

COMPLIANCE WITH ETHICAL STANDARDS

Statement on the welfare of animals. All the applicable international, national, and/or institutional guidelines for the care and use of animals were followed. All the procedures performed in studies involving animals were in accordance with the ethical standards of the institution or practice at which the studies were conducted.

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