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New Taxa of the Tribe Pentastirini (Homoptera, Cixiidae) from the Palearctic Region*

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Abstract. The transition of the taxonomy of Cixiidae to the new more precise level was begun more than 10 years ago by Wilhelm Wagner, who revised the European representatives of the genus *Cixius* Latr. However, this transition is not yet finished. Criteria of the genera, tribes, and to some extent of the subfamilies within the family are not sufficiently elaborated and applied to the material. That is caused partly by the scanty and unstable features of external morphology within the family and partly by the opposite tendency, the complicated and diverse structure of genitalia. This diversity impedes the detection of homologies of structural details of the penis even within groups of closely related species. This paper is a further attempt to improve the classification of the Palearctic species of a tribe. Taxonomic conclusions are drawn, in particular, based on revision of the taxonomic significance of features of the subapical setae on hindlegs.

Types of new species are preserved in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg.

Key words: Pentastirini; Cixiidae; Homoptera; taxonomy.

MORPHOGENETIC NATURE OF SUBAPICAL SETAE

In some Fulgoroidea (Cixiidae and Achilidae) simple teeth occur on the 1st and 2nd hindtarsal segments in some representatives, and in other representatives the teeth bear a specialized seta situated before the apex, and in still others setae are present on one tarsal segment and on other segments they are absent. At first glance, simple teeth should be considered as primitive, and the presence of a tooth with a seta as advanced, but the fact that in the distribution of groups (genera and tribes) with and without setae a phylogenetic disorder is observed, when even within many tribes both variants occur. This forces us to suppose that at least one variant of structure is a result of multiple parallel formation, and then it is even easier to assume a multiple parallel loss of subapical setae. Hypotheses concerning parallel multiple reduction do not fit as well as the opposite hypothesis of multiple convergent emergence of subapical setae, because observations on the genesis of some simple teeth on legs of Cixiidae and other Cicadina show that simple teeth are formed as a result of consolidation of the seta and its base into a whole tooth. Lateral teeth of hindtibia of Fulgoroidea have such a nature. All Fulgoroidea, except Cixiidae, are represented by simple teeth, including Delphacidae, which in the phylogenetic tree are placed below Cixiidae (Yemel'yanov, 1990). In Cixiidae teeth are formed of a truncate conical base terminated with a short and robust conical seta (Yemel'yanov, 1987, Fig. 26). Because the homology of lateral teeth in all Fulgoroidea does not raise any questions, it is possible to suppose that

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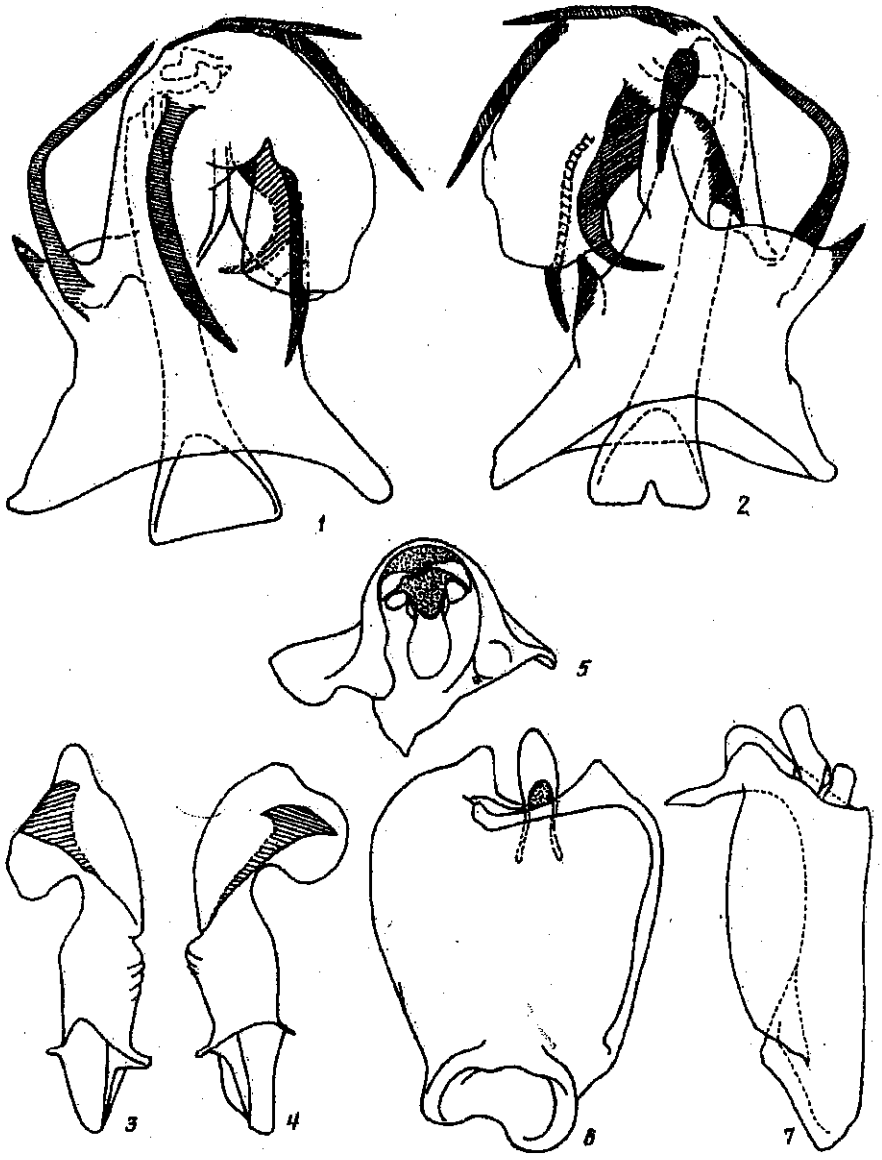

Fig. 1. Details of structure of *Pentastira praepamirica* sp. n.: *1, 2)* penis (1 - in dorsal view, 2) in ventral view); *3, 4*) stylus (*3* - left stylus, *4* - right stylus); *5-7*) anal tube (*5* - posterior view, *6* - ventral view, *7* - dextral view).

in Cixiidae, as a result of retardation, restoration of seta as an apex of a tooth takes place. In the example of *Oecleopsis artemisiae* Mats. (Cixiidae, Pentastirini) it is possible to see also the genetic association of simple teeth and setae on the pedestal with teeth of the apex of the 2nd hindtarsal segment. Here, in the middle part of simple teeth, as an individual variation, I recorded emergence of a seta on tall pedestal (Yemel'yanov, 1987, Fig. 27: 1). A simple tooth and a robust seta replace each other also in various representatives of the genus *Myndus* s. lato on apices of the foretibia: the tooth in *Myndus* s. str., the seta in *Myndodus* Em, and the absence of any structure at the same place in *Haplaxius* Fowl.

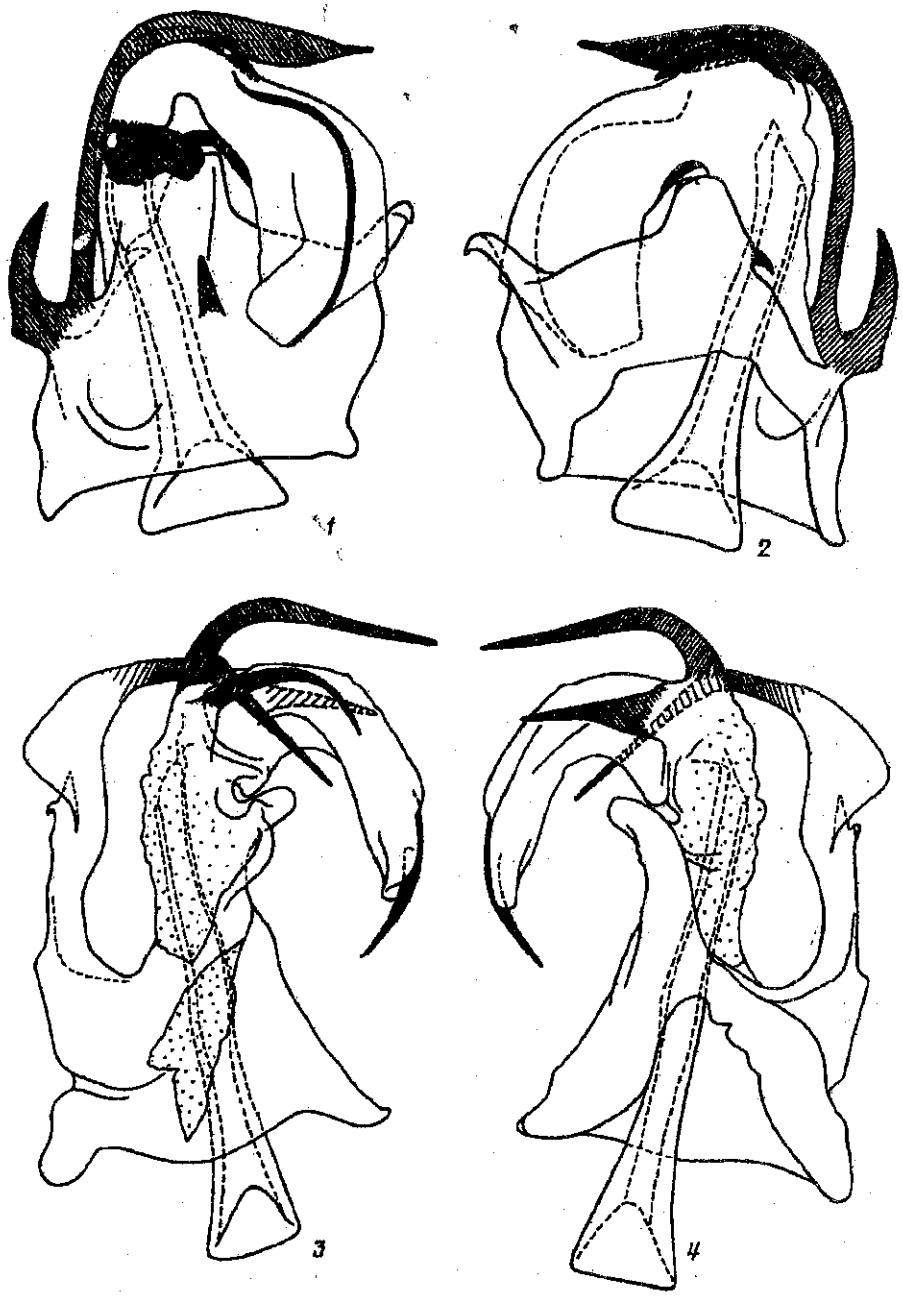

Fig. 2. Details of structure of *Reptalus noahi* sp. n. (*1, 2*) and *Pentastiridius* (*Podaplus*) *subterraneus* sp. n. (*3, 4*) - penis in dorsal view (*1, 3*) and in ventral view (*2, 4*).

Replacement of the seta by the tooth (or tooth by the seta) is also observed among Cicadelloidea, for example, in the close genera *Paralimnus* Mats. and *Metalimnus* Rib. On the lobe of parts of the pygophore in the former the seta is present, and in the latter the tooth is present; in the genus *Hardya* Edw. in some species the margin of lobes of the pygophore bears a comb of teeth, and in other species,

for example in *H. youngi* Beirne, instead of teeth robust setae are present (Anufriyev and Yemel'yanov, 1988, Fig. 138: 1.4). At last, one more case of the transformation of seta on a pedestal into a simple tooth is observed during ontogenesis of larvae of singing cicada. As is seen in drawings in works of Marlatt (1907) and Silvestri (1922), in larvae of cicadas of instars I and II on the femora of excavating midlegs, in the place of the middle tooth there is a short seta on a pedestal. Consolidation takes place during molting into instar III.

On the basis of the material discussed above I conclude that the state of the tooth with the subapical (or apical) seta and the simple tooth are microevolutionary, replacing each other in both directions and therefore cannot be estimated by themselves as an apomorphy or a plesiomorphy, and taxonomically a priori have very little weight in the evaluation of rank of taxa. It is possible to suppose that morphogenetic relationship of a simple tooth and seta on a pedestal had been formed at least in a common ancestor of Cicadina and most likely even at an earlier time.

Speaking about *Setapius*, *Reptalus*, and *Pentastiridius*, which are considered in this paper, it should be accepted that similarity in the distribution of subapical setae on tarsi in some species of *Reptalus* and *Pentastiridius* cannot be considered as a proof of their direct affinity and is not their true synapomorphy, but is a result of a display of modus of instauration (Yemel'yanov, 1987: 100-104). Combination or characters of similarity in the structure of styli and penis, taking into account also other characters, to me seems a more reliable index of direct affinity in the tribe Pentastirini than the presence or absence of subapical setae on the hindtarsi. However, in genera *Reptalus* and *Pentastiridius* chaetotaxy of tarsi combined with other characters permits one to distinguish groups of generic rank. In the genus *Hyalestes*, in which as a standard state there are subapical setae on the 2nd segment and no setae on the 1st segment, while a remarkable species, *H. yozgaticus* Hoch., has setae on both segments.

TRIBE **PENTASTIRINI** EMELJANOV

Genus ***Setapius*** Dlabola

Dlabola (1988) described a new genus *Setapius* and designated a new species, *S. brinki* Dlab. as a type. In this genus he included several species formerly included in the genus *Reptalus* Em. and partly in the genus *Pentastiridius* Kbm. In the genus *Reptalus*, according to Dlabola, the species without subapical setae on the 1st hindtarsal segment remain, and into the genus *Setapius* species with setae on the 2nd and 1st segments are transferred. Chaetotaxy of tarsi characteristic of representatives of the genus *Setapius* Dlabola is illustrated in the example with the type species, *S. brinki*, in which on the apex of the 1st segment there are several supporting structures consisting (starting from the outer margin) of 3 teeth without setae, 6 very large and robust, apically blunt setae-platellae and a tooth without seta closing the row on the inner margin. Judging by the species that Dlabola included in *Setapius* it is seen that he did not take into consideration differences between teeth with subapical setae, which are characteristic of many representatives of the family, and independent large platellae not situated on the toothlike pedastal. Among species he cited they are characteristic only of *S. apiculatus* Fieb., *S. venustus* Logv., and, possibly, of *S. niyazicus* Dlab. (non visum). Similar peculiar platellae without a pedestal are also found only in *S. curvatus* Longv., comb. n. (*Oliarus curvatus* Logv.). *S. venustus* probably is a senior synonym of *S. brinki*. Other species that Dlabola placed in the genus *Setapius* have regular subapical setae on the lateral wall of well developed teeth instead of setae without pedestal.

The genus *Setapius* should be restricted to species having unique platellae without pedestal; species of *Setapius* s. str. differ in relatively small size and strong pigmentation of wings and also in

Fig. 3. Details of structure of *Pentastiridius* (*Polania*) *nanus* Iv. (*1-3*) and *P.* (*Oicopolia*) *breviceps* Kusn. (*4-6*) - penis in dorsal view (*1, 4*), ventral view (*2, 5*), and dextral view (*3, 6*).

asymmetric left and right styli. In the structure of the penis they differ strongly, but no one representative shows a clear similarity to any species of *Reptalus* and *Pentastiridius*.

Genus ***Pentastira*** Kirschbaum

Pentastira praepamirica Emeljanov, sp. n.
(Fig. 1, *1-7*)

Material. Tajikistan, Gorno-Badakhshan Autotonomous Prov., Dekh na Pyandzhe R., 19.VI.1986, 8 ♂'s, including holotype, 1 ♀ (Yemel'yanov).

Description. Macrocorypha approximately 1.5 times as long as wide, lateral margins in posterior 2/3, in area of the corypha, slightly converging anteriorly and in anterior 1/3, in area of the acrometopa,

slightly diverging. Anterior margin of corypha clearly carinate, rectangularly rounded, in middle connected with anterior carina of acrometopa by 2 indistinct, converging, short carinae. Eumetopa with postclyepus form hexagonal figure with rounded lateral corners, fork of middle carina small, its branches acutely angled or even rectangularly diverging. Postclypeus slightly entering into metopa to projection of middle parts of antennae. Pronotum and mesonotum with sharply developed carinae. Forewings with bristle-bearing granules on longitudinal veins, including costal vein; venation typical, posterior radius with 2 apices and medial vein with 5. On 1st hindtarsal segment 8 teeth without setae and on 2nd segment teeth with setae, except marginal teeth.

Integuments dark brown to black, with pale brownish carinae, ♀s colored more weakly than ♂s. In ♀s carinae hardly differing in color from background of brownish head and especially on reddish brown face. Pronotum in dorsal view entirely pale, without darkened areas between carinae. Mesonotum with brownish or pale brown carinae conspicuous on darker background. Forewings whitish, semitransparent, with dull white veins and brown granules on them, transverse veins also brown. Venter of body varying to dark brown, legs paler than body and margins of sclerites of abdomen fringed with white.

♂ **genitalia.** Anal tube broad, slightly asymmetric, on apex with processes divided by narrow emargination, under which asymmetric angulate lobe directed downward. Styli asymmetric, apex of left stylus weakly extending posteriorly, and apex of right stylus rather long, slightly distant; lobe on dorsal surface of styli acutely angled and protruding, on left stylus narrower and longer than on right stylus. Pygophore with long lateral processes, among which right process longer and more acute, medioventral process well developed, oval, with extended apex and small constriction at base. Theca of penis with tooth and process on right side and tooth on left side. Distal segment of penis with 1 process in middle and with 5 basal processes; 1 basal process occupying dorsal position and directed forward, 2 central processes, among which larger one curved hook-wise, and 2 posterior lateral processes and on left side of segment. Length of ♂ 4.7-5.2 mm, length of ♀ 7.4 mm.

Differential diagnosis. This species differs from *P. major* Kbm. and other species of the genus in absence of dorsal tooth of theca and in presence of left basal tooth of theca.

Genus ***Reptalus*** Emeljanov

In the genus 2 subgenera are distinct.

1 (2). 1st hindtarsal segment besides marginal setae teeth, with subapical setae. Anal tube without sharp processes near apex, but with asymmetry weakly developed. .... subgenus *Trepalus* Emeljanov, subgen. n. (type species *Oliarus rufocarinatus* Kusnetzov).

2 (1). On 1st hindtarsal segment all teeth without subapical setae. Anal tube usually with sharp asymmetric apical processes. ..... subgenus *Reptalus* s. str.

The subgenus *Trepalus* subgen. n. includes the following species: *R. cuspidatus* Fieb., *R. rufocarinatus* Kusn., *R. vilbastei* Logv., *R. suleiman* Dlab., *R. ziaron* Dlab., and *R. noahi* sp. n. Species of this group of Dlabola belong to the genus *Setapius*.

Reptalus noahi Emeljanov, sp. n
(Fig. 2, *1, 2*)

Material. Georgia, vicinity of Aspindza, 2.VIII.1984, 2 ♂s, including holotype, 5 ♀s

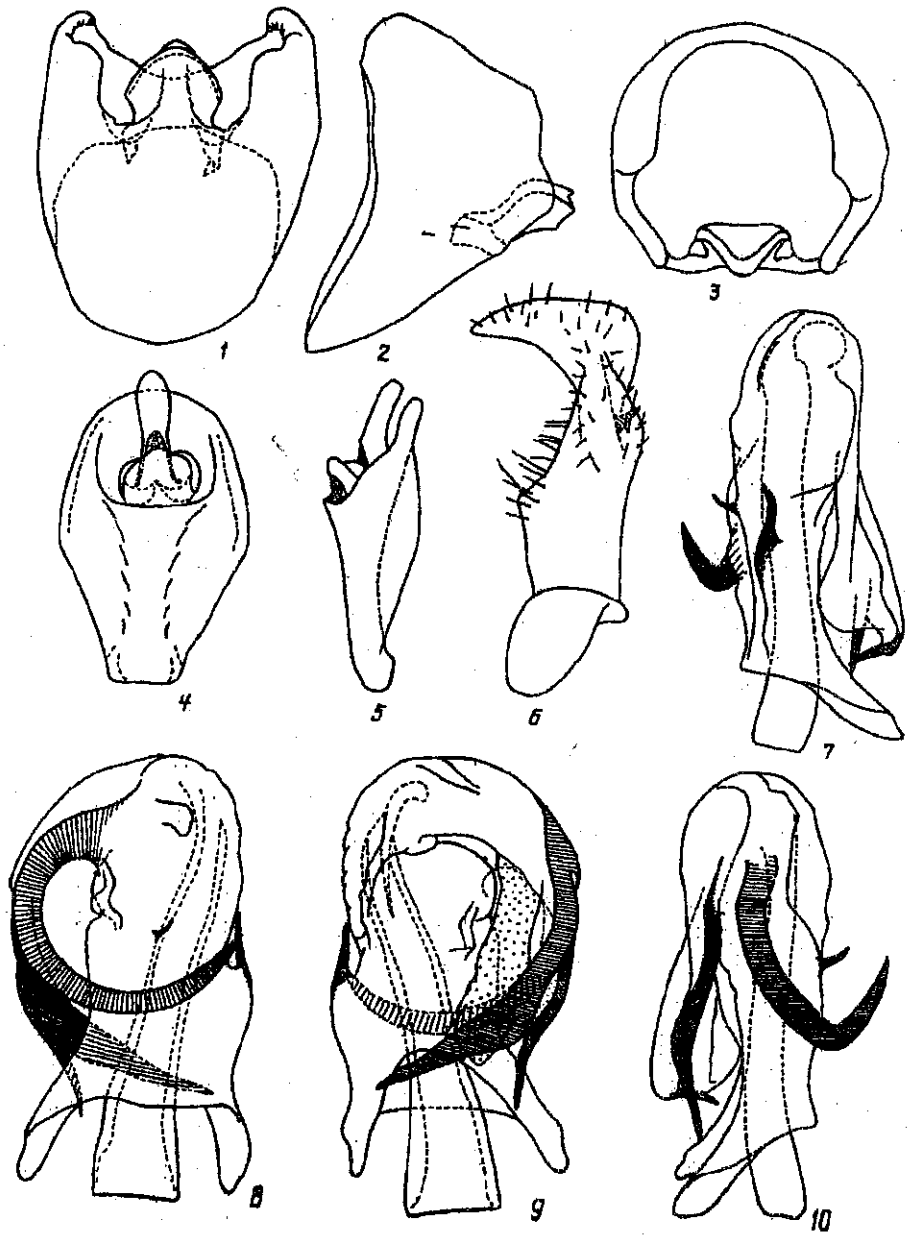

Fig. 4. Details of structure of *Hyalesthes ammon* sp. n.: *1-3* - pygophore of ♂ (*1* - in ventral view, *2* - in lateral sinistral view, *3* - in posterior view); *4, 5*) anal tube (*4* - dorsal view, *5* - lateral sinistral view); *6*) stylus; *7-10*) penis (*7* - lateral dextral view, *8* - ventral view, *9* - dorsal view *10* - lateral sinistral view).

(Yemel'yanov); Armenia, Berdadzor R. near Yerevan, 8.VII.1969, 1 ♂ (V. Rikhter); Azerbaijan, Caspian Sea coast near Zarat Sta., 4.VI.1980, 1 ♂ (Volkovich).

Description. This is a typical representative of the subgenus *Trepalus* subgen. n. and is especially close to *R. vilbastei* Logv. and not distinguishable from it by appearance.

Macrocorypha along medial line approximately 1.5 times as long as wide anteriorly, from posterior margin to middle slightly narrowed and then parallel-sided. Corypha posteriorly obtusely angled and emarginate, anteriorly obtusely angled, rounded, and convex, lateral margin of acrometopa approximately twice length of lateral margin of corypha, carina or carinae connecting apex with anterior margin of acrometopa not distinct or absent and not paler colored. Head dark brown to black, with pale carinae, carinae of branches of fork slightly paler as well as lateral and middle carinae of postclypeus. Pronotum pale in dorsal view or weakly darkened laterally between carinae, paranota darkened, but margins and carinae remaining pale. Mesonotum entirely darkened, tegulae widely fringed with pale color. Forewings hyaline, with brownish veins. Venter of body and legs somewhat blackened; on tibia carinae remain pale; hindtarsi pale, except 3rd segment.

Differential diagnosis. In structure of ♂ genitalia this species differs in presence of process instead of a tooth in the base of right paramere, absence of dorsal tooth at base of distal segment, presence of dorsal tooth of theca and distal segment process at base and bent under.

Length of ♂ 4.7-5.3 mm, length of ♀ 5.6-6.0 mm.

Genus ***Pentastiridius*** Kirschbaum

The genus may be divided into 6 subgenera.

1 (10). Border of acrometopa and eumetopa in form of distinct carina, fork of last carina of eumetopa also distinct. Medioventral process of pygophore of ♂ in dorsal view, apically with 1 carina.

2 (9). Lateral teeth on hindtibia present, teeth on apices of hindtibia in single row without interruption.

3 (6). Abdominal sternite VII of ♂ narrowed in middle, but sclerotized as whole unit.

4 (5). 1st hindtarsal segment with subapical setae. ..... subgenus *Pentastiridius* s. str.

5 (4). 1st hindtarsal segment lacking subapical setae. .....
subgenus *Haliarus* Emeljanov, subgen. n. (type species *Oliarus dagestanicus* Kusnezov).

6 (3). Abdominal sternite VII of ♂ divided into 3 parts.

7 (8). Subapical setae present on 1st and 2nd hindtarsal segments subgenus .....
..... *Polania* Emeljanov, subgen. n. (type species *Oliarus nanus* Ivanoff, Fig. 3, *1-3*).

8 (7). Subapical setae present only on 2nd hindtarsal segment. .....
.... subgenus *Dicopolia* Emeljanov, subgen. n. (type species *Livarus breviceps* Kusnezov, Fig. 3, *4-6*).

9 (2). Lateral teeth on hindtibia not developed, teeth on apices of hindtibia mainly with distinct

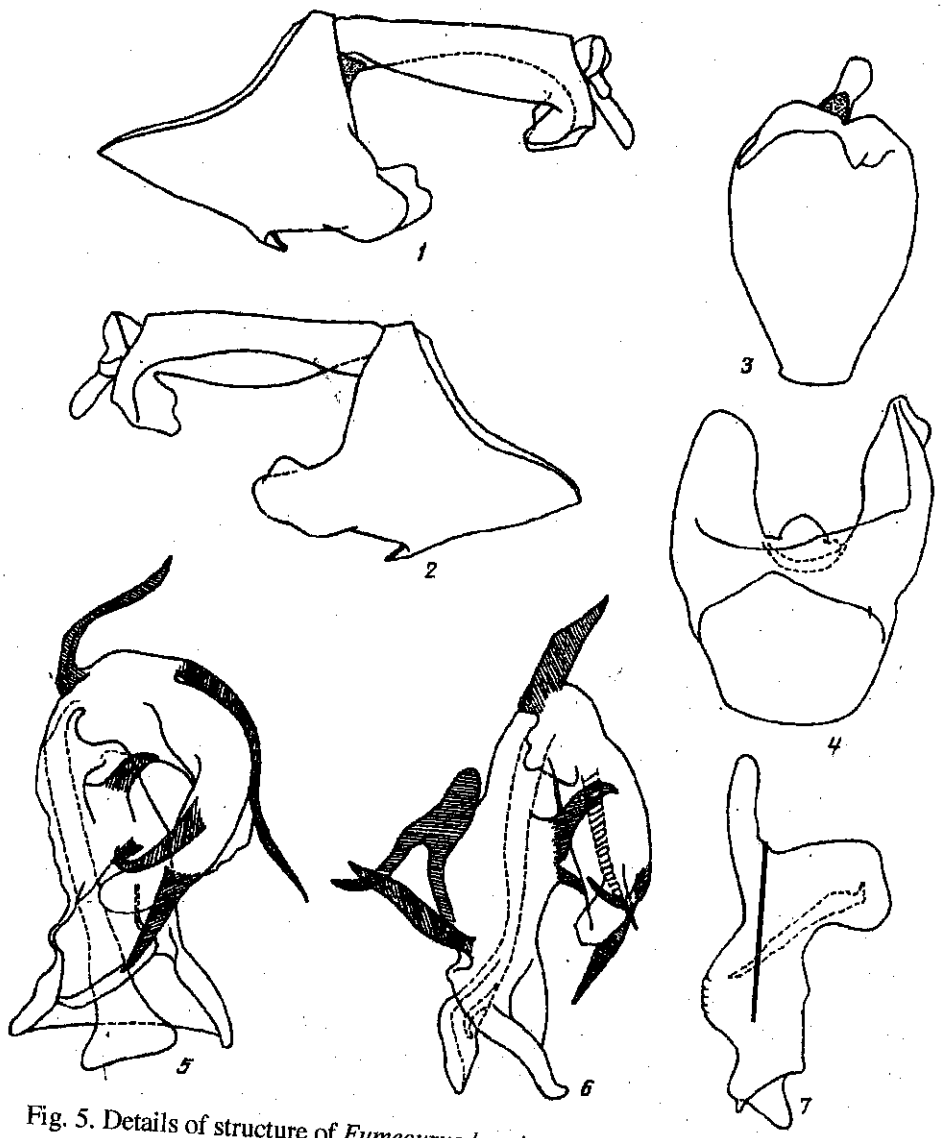

Fig. 5. Details of structure of *Eumecurus longivertex* Kusn.: *1, 2*) pygophore and anal tube (*1* - in lateral sinistral view, 2 - in lateral dextral view); *3*) anal tube in ventral view; 4) pygophore in dorsal view; *5, 6*) penis (*5* - in dorsal view, *6* - in lateral dextral view); *7*) stylus.

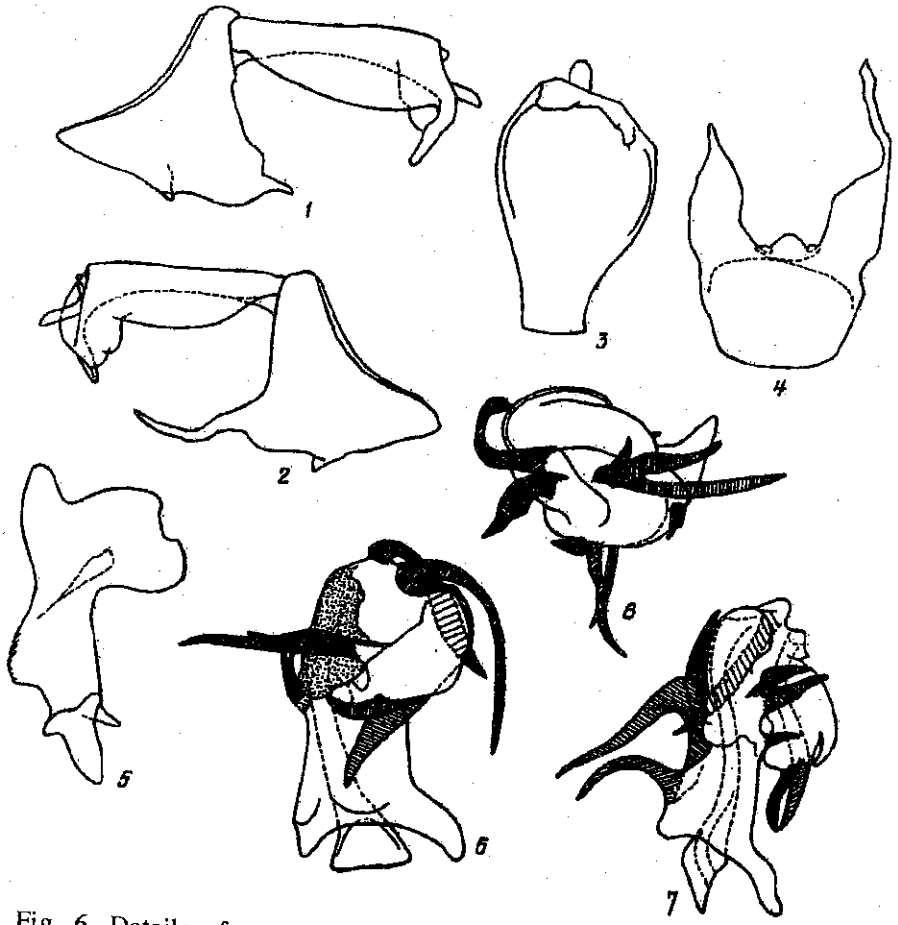

Fig. 6. Details of structure of *Eumecurus subrobustus* sp. n.: *1, 2*) pygophore and anal tube (*1* - in lateral sinistral view, *2* - same in dextral view;) *3*) anal tube in ventral view; *4*) pygophore in ventral view; *5*) stylus; *6-8*) penis (*6* - in dorsal view, *7* - in lateral dextral view, 7 - same in sinistral view, *8* - in posterior view).

diastema. .....

..... subgenus *Podaplus* Emeljanov, subgen. n. (type species *Oliarus holoxyli* Mitjaev).

10 (1). Border of acrometopa and eumetopa strongly effaced, often border carina not distinct. Medioventral process of pygophore of ♂ apically with 2 carinae. .....

.... subgenus *Stiraphana* Emeljanov, subgen. n. (type species *Oliarus liocara* Emeljanov)

All newly described subgenera are monotypic, except *Podaplus* subgen. n., which includes the type species and the new species.

Pentastiridius subterraneus Emeljanov, sp. n.
(Fig. 2, *3, 4*)

Material. Uzbekistan, Kyzylkum Desert, 60 km NW of Dzhingil'dy, 14.IV.1965, 3 ♂s, including holotype, and 3 ♀s (G. Medvedev).

Description. This species is close to *P. haloxyli* Mit. and is similar to it in external characters. Robust. Head robust, swollen, with indistinct splayed carinae and small eyes characteristic of species of Cixiidae and other Fulgoroidea living in caves or underground with ants. Macrocorypha transverse, approximately twice as wide as long, before it, in dorsal view, upper part of eumetopa apparent; carina of anterior margin of corypha most distinct, curved at obtuse angle, surface of corypha depressed, posterior margin slightly concave, almost straight; acrometopa and eumetopa contiguous and forming whole convex surface; lateral margins of macrocorypha slightly arcuate obtusely angulate-concave, converging anteriorly on sides of corypha and diverging on sides of acrometopa. Acrometopa divided longitudinally by broad, flattened cuneate carina narrowed anteriorly and touching carina of acrometopa at one point. Eumetopa strongly convex, width approximately equalling length in middle, lateral margins obtusely angulately extending to sides, bend approximately at projection of lower margin of eye or slightly higher, middle carina transient into fork approximately at mid-length, in dorsal view fork amorphously effaced, occupying at least half total width of margin of acrometopa. Middle ocellus present. Postclypeus broad, entering into metopa as far as 1/5 its own length approximately to projection of upper margins of antennae, middle carina usually absent, but sometimes quite distinct. Proboscis extending beyond apices of hindcoxae. Pronotum rather large, with well-developed carinae. Scutellum with 5 less distinct carinae developed along entire length, outer carinae usually less developed. Forewings relatively broad and short, but with complete set of veins; venation variable, median veins with 6 endings each. Hindlegs of new species (as in *P. haloxyli* Mit.) not at all typical of Pentastirini structure, clearly correlated with open way of life. Hindtibia without lateral teeth, on apex of tibia 6 teeth, often in two groups, 3 teeth in each, separated by diastema as in Oecelini. On 1st hindtarsal segment 5-7 (8) teeth without subapical setae, on 2nd segment same number of teeth with subapical setae.

Integuments varying from brown to black, depending on widely variable degree of pigmentation, carinae of head and pronotum always paler than background, from pale brown to whitish, carina of mesonotum often not differing from background in color. Forewings whitish, with milky cells, on fork of anterior cubitus, clavus and in nodal area sometimes brown spots distinct.

Length of ♂ 4.8-5.0 mm, length of ♀ 6.2-6.6 mm.

Differential diagnosis. In the genitalic structure and external characters the new species is close to *P. haloxyli*, but it differs in presence of three processes at base of distal segment of penis, whereas in *P. haloxyli* only 2 processes are present (dorsal one absent) and presence of tooth before apical part of right paramere.

Genus ***Hyalesthes*** Signoret

Hyalestes ammon Emeljanov, sp. n.
(Fig. 4, *1-10*)

Material. Turkmenia, Malyy Balkhan, 25 km E of Kumdag, 15.V.1987, 7 ♂s, including holotype, 3 ♀s (Yemel'yanov); Igdedzhik, near Karakala, 31.V.1980, 1 ♂ (Sugonyayev); Kelyatinskoye Gorge, Bakharden Distr., 16.VI.1979, 1 ♂, 1 ♀ (Volkovich). Uzbekistan, Kuhitang Mts., 25 km SW of Sayrob, 9, 10.VI.1984, 1 ♂ (Volkovich). Tajikistan, Vakhsh Mts., 20 km upstream of Nurek, 900 m elevation, 5.VI.1983, 7 ♂s, 4 ♀s (Korotyayev).

Description. Integuments glossy, almost all carinae on head and mesonotum absent or strongly effaced, appearance similar to that of *H. obsoletus* Sign. On head middle carina absent, only small occipital segment on corypha present, anterior carina of macrocorypha not developed, only anterior

Fig. 7. Details of structure of *Eumecurus muslim* sp. n.: *1*, *2*) pygophore and anal tube (*1* - in lateral dextral view, *2* - same in sinistral view; *3*) stylus; *4*, *5*) penis (*4* - in dorsal view, 5 - in the dextral view).

carina of corypha well developed. Vertex approximately twice as long as wide, parallel-sided or barely narrowed in middle, anterior carina of corypha protruding parabolically or at right angle with rounded apex, posterior margin obtusely angulate-concave. On face clypeus and metopa evenly convex, border not distinguishable, except areas near apices of epiclypeal lobes, middle ocellus absent, lateral margins of metopa in area of epiclypeal lobes and higher from margin bent out anteriorly along sharp line of bend separating it from major convex part of face; bend separating it from basal convex part of face; bent part extend higher than antennae as far as epiclypeal lobes descending below them. Lateral carinae of postclypeus sharp, arcuately curved outwardly. Pronotum with well developed carinae, mesonotum convex, void of carinae or with barely marked carinae.

Head glossy, totally saturated black, only bent out lateral parts of head white or brownish white, and lateral carinae of metopa and its posterior margin edged with pale marginal line. Eyes dark brown,

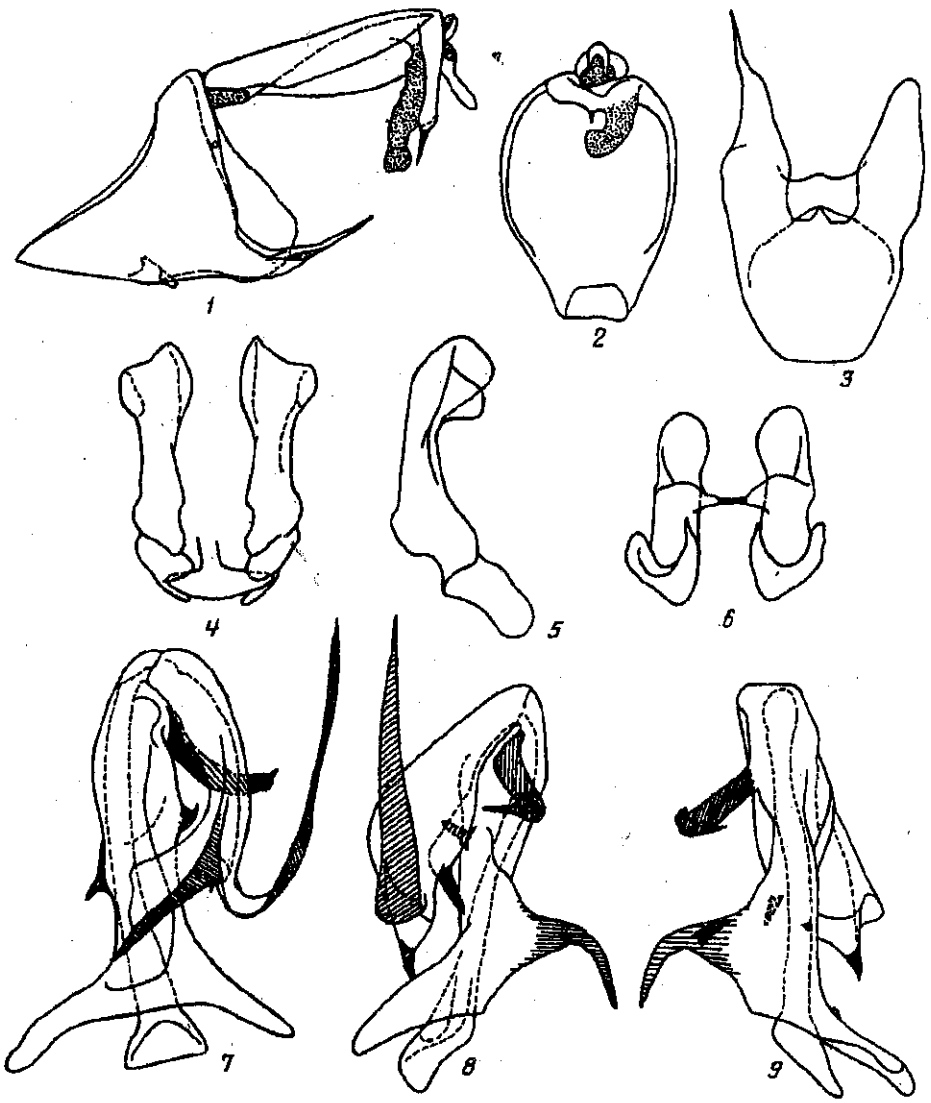

Fig. 8. Details of structure of *Eumecurus orthodoxa* sp. n.: *1*) pygophore and anal tube of ♂, *2*) anal tube in ventral view, *3*) pygophore in ventral view, *4-6*) styli (*4* - in ventral view, *5* - right stylus in lateral view, *6* - same in dorsoposterior view), *7-9* - penis (*7* - in dorsal view, *8* - in sinistral view, 9 - in dextral view).

almost black. Pronotum whitish ferrugineous and glossy. Mesonotum saturated black and tegulae whitish ferrugineous. Forewings hyaline, with whitish veins, margin of wing in distal half and pterostigma often brownish. Lower part of thorax in weakly pigmented individuals (some ♀s) dark brown, legs brown, abdomen ferrugineous, in strongly pigmented individuals (♂s and some ♀s) lower part of thorax and coxae black, femora dark brown, tibia and tarsi brown, abdomen dark brown and varying to black with pale lateral margins.

♂ **genitalia.** Anal tube from base to middle with straight diverging margins, after middle

converging to broadly rounded apex. Pygophore symmetric, without lateral processes and with large broad medioventral process with 2 carinae. Styli typical of genus, without conspicuous peculiarities. Theca of penis on right side with tooth directed posteriorly, with tooth ventrally, directed downward. At base of distal segment, ventrally very large, perfectly arcuately curved pores along 3/4 length of circle extended ventrally from theca, distal segment slanted arcuately, with 2 preapical processes parallel to it, among which dorsal one broadest and most robust.

Length of ♂ 4.4-4.9 mm, length of ♀ 5.1-5.2 mm.

Genus ***Pseudoliarus*** Haupt.

Among species of the genus *Pseudoliarus, P. jaxartus* Mt. is the most peculiar.

1 (2). Forewings with granules on veins. Anal tube with pair of recurrent teeth on apex. Pygophore without teeth on posterior margin. ..... subgenus *Pseudoliarus* s. str.

2 (1). Anterior margin without granules on veins. Anal tube without teeth, on apex with 2 rounded lobes separated by emargination. Pygophore with tooth on posterior margin on left side. ..... subgenus *Paroliarus* Emeljanov, subgen. n. (type species *Oliarus jaxaratus* Mitjaev)

Genus ***Eumecurus*** Emeljanov

The genus *Eumecurus* is widely distributed in the southern Palearctic Region and in the Ethiopian Province (Dlabola, 1985; Yemel'yanov, 1993). In mountains of Central Asia and Transcaucasia it is distributed to the farthest point in the north. There it forms several new species described below. Here I offer a drawing of genitalia of the type species of the genus, *E. longivertex* Kusn. (*E. caudatus* Em.).

KEY TO SPECIES OF CENTRAL ASIA AND TRANSCAUCASIA

1 (2). Powerful right basal process of theca present. Anal tube without separated lobes, posterior margin protruding as whole, not sharply outlined lob. ..... ***E. muslim*** Emeljanov, sp. n.

2 (1). Right basal process of theca not developed. Anal tube on apex with 2 asymmetric lobes or large teeth.

3 (6). Both lobes on apex of anal tube with obtuse apices and strongly sclerotized. Mediodistal angles of styli extended in form of obtuse process.

4 (5). Right lobe of pygophore extended in form of acute process. Mediodistal process of stylus small. Lower processes of theca not overlapping. ..... *E. subrobustus* Emeljanov, sp. n.

5 (4). Both lobes of pygophore not bent out and rounded on apex. Mediodistal process of stylus long, of comparable length to width of apex of stylus. Lower processes of theca in lateral view overlapping. ..... *E. orthodoxa* Emeljanov, sp. n.

Eumecurus subrobustus Emeljanov, sp. n.
(Fig. 6, *1-8*)

Material. Tajikistan, Vakhsh Mts., vicinity of Pervomay, 17.VI.1975, 4 ♂s, including holotype, 2 ♀s (Volkovich and Danilovich).

Description. The species is close to *E. longivertex* Kusn. and in appearance is indistinguishable from it. Macrocorypha narrow, weakly protruding from eyes forward, slightly narrowing anteriorly, on lateral margin almost 3 times as long as wide, posteriorly obtusely angulate, almost rectangularly concave, oblique carinae originating from middle of its lateral margins, slightly extended outward and therefore lateral cells separated by them rather narrow. Fork of middle carina occupying approximately 1/3 width apex of head, lateral carinae of eumetopa before apex of head usually slightly concave. On hindtarsi, on 1st segment, 7 apical teeth and on second segment 5 teeth. Longitudinal veins of forewings with dark granules bearing easily broken pale setae. Dark brown varying to black with brown carinae. On vertex at projection across middle of eyes, along lateral carinae extended whitish spots present. Apices of epiclypeal lobes metopa paler. Anteclypeus entirely darkened, including carinae. Supraocular and preocular areas, and also genal side of lateral carinae of metopa whitish. Eyes with 2 oblique longitudinal dark stripes. Pronotum in dorsal view rather pale because of broad paler-colored carinae and weakened pigmentation of intervals, paranotal lobes more darkened. Mesonotum in dorsal view darkened together with carinae. Forewings hyaline, with whitish longitudinal veins, on which dark granules conspicuous. Pterostigma darkened, on membrane transverse veins darkened and adjacent to them parts of longitudinal veins and ends of longitudinal veins also darkened. Sometimes darkened parts of veins of corium in subbasal part and posteriorly of its middle darkened and marking rudiments of bands. In strongly pigmented individuals parts of cells between darkened veins also slightly darkened, forming continuous bands. Venter of body rather strongly darkened, only carinae on tibia remain pale.

♂ **genitalia.** Anal tube rather broad, on apex bearing rather broad, downwardly bent, obliquely truncate process, left corner of which more protruding. Pygophore bearing large and long tooth on left lobe and long, irregularly curved process on right lobe; medioventral process blunt and short. Styli with broad and angulate apex, mediodistal corner short and digitately extended. Theca in ventral view with 2 processes on medial line, curved downwardly and anteriorly, and with 1 more curved tooth on apex ventrally and directed posteriorly, on upper left side with doubled robust segment, with tooth on upper middle part, directed upward, and with biapicate tooth on right middle side on desclerotized base. At base of distal segment of penis 2 large processes present, bent out along left convex wall of segment, near apex of segment robust arcuate tooth subapically on sclerotized stripe-nervure extended from base of segment to its apex on left convex side, second nervure extending parallel more dorsally and void of teeth.

Length of ♂ 4.4-4.9 mm, length of ♀ 5.1-5.2 mm.

Eumecurus muslim Emeljanov, sp. n.
(Fig. 7, *1-5*)

Material. Turkmenia, Bolshoy Balkhan, 30 km E-NE of Nebitdag, 11 and 12.V.1987, 3 ♂s and 1 ♀ (Yemel'yanov), 35 km E-NE of Nebitdag, 14.V.1981, 4 ♂s, including holotype, 2 ♀s (Yemel'yanov), Kyurendag, 4 km S of Danata, 30.IV.1974, 1 ♂ (Loginova).

Description. Macrocorypha narrow, weakly protruding from eyes, almost parallel-sided, on lateral margin approximately 2.5 times long as wide, posteriorly obtusely angulate concave, oblique carinae originating from middle of lateral margins, rather straight and therefore lateral cells separated by them rather broad. Fork of middle carina of eumetopa in most cases relatively narrow and occupying less than 1/3 width of head. Lateral carinae of eumetopa before apex usually somewhat straight and not concave. On hindtarsi, on 1st segment 7 apical teeth, and on 2nd segment 5 teeth. Longitudinal veins of forewings with dark granules bearing pale setae. Insect black, with pale margins, and sometimes with paler disk of mesonotum. On corypha across middle of eyes, along lateral carinae extended

pale spots may be present. Supraocular and preocular areas and also cheek sides of lateral carinae of metopa whitish. Eyes sometimes with 2 oblique longitudinal dark stripes. Area of pronotal disk of entirely pale. Mesonotum usually entirely black, outer and remaining carinae sometimes paler, in ♀s intercarinal spaces may be paler to red-brown, longitudinal veins brownish with dark granules, transverse veins widely brown darkened and pterostigma brown. Venter of body blackened; legs, except tarsi, also darkened, but on tibia pale carinae remain, foretarsi and midtarsi pale at base, darkening to apices, hindtarsi pale with darkened teeth.

♂ **genitalia.** Anal tube relatively short, broad, without sharp processes on apex, but with more protruding lobate left side. Pygophore with extended and apically rounded lateral lobes, among which right lobe extends more posteriorly and posteriorly in ventral view with pit; medioventral process blunt and short. Stylus with broad, angulate apex, middle of posterior margin of which protruding in form of obtuse angle. Theca of penis with robust basal tooth (paramere), apex of which bent out downward and serrate, ventrally with 2 robust processes, one laterally flattened and terminally 3 large teeth bent posteriorly, other tooth narrow, directed down ventrally, dorsally theca bearing a tooth bent downwardly. Distal segment of penis in middle sharply bent and apical half transverse, bearing large process at base directed anteriorly along left margin, large distal tooth-process, with 2 apices in middle, directed along stem to right.

Length of ♂ 4.3-4.7 mm, length of ♀ 5.0-5.3 mm.

Eumecurus orthodoxa Emeljanov, sp. n.
(Fig. 8, *1-9*)

Material. Armenia, Garni, 10.VII.1984, 1 ♂ (Yemel'yanov); Azerbaijan, Nakhichevan Republic, Bilav, 14.VII.1984, 3 ♂s, including holotype, 1 ♀ (Yemel'yanov).

Description. The species is close to *E. gyaurus* Dlab. and *E. bourouensis* Lnv. Macrocorypha moderately narrow, weakly protruding from eyes, slightly narrowed anteriorly, on lateral margin slightly more than twice as long as wide, posteriorly obtuse-concave, oblique carinae originating from middle of lateral margins, carinae rather strongly extended outwardly and therefore lateral cells separated by them narrow. Fork of middle carina of eumetopa occupying about 1/3 width of apex head. Lateral carinae of eumetopa before apex usually straight or slightly convex. Windows darkened. On 1st segment 7 apical teeth and on 2nd segment 5 teeth. Longitudinal veins of forewings with pale granules bearing setae, on costal vein only occasional granules near pterostigma present or absent here. General color reddish brown. Head reddish brown, color of carinae not differing, color of clypeus more saturated. On eyes 2 reddish, oblique longitudinal stripes. Pronotum paler dorsally, here carinae whitish. Mesonotum dark, reddish brown, on sides slightly darker than between carinae; carinae slightly paler than background. Forewings semihyaline, slightly milky, longitudinal veins brownish, more distinctly brownish to apices. Pterostigma and transverse veins brown. Venter of body reddish brown, legs becoming paler toward apex.

♂ **genitalia.** Anal tube large, on apex with 2 large processes directed downwardly and slightly anteriorly, left process sclerotized, with acute apex, right process fleshy, with obtuse-digitate apex. Pygophore extended in form of long acute process, left lobe and short and broadly rounded right lobe, medioventral process small and slightly acute. Styli almost identical, with bilobate apex, both lobes, medial and lateral, bent dorsally, medial lobe of right stylus slightly extending posteriorly. Phyllotheca narrow, with right and left lateral teeth, right tooth slightly closer to base, theca ventrally subbasally bearing process with cuneate, laterally compressed base and apex anteriorly downward, on left side in middle process bearing additional tooth, ventrally near apex theca bearing long process with doubled

apex directed first downward and then left and upward. Distal segment weakly arcuately curved and ending with pointed sclerotized plate beginning from the left wall. In upper part of this wall originating long, flattened process as continuation of same wall. Process sharply bending near base and almost entirely extended posteriorly; ventrally, parallel to preceding nervure-stripe another nervure-stripe present, at the same level terminates by short and conical process.

Length of ♂ 4.4-4.5 mm, length of ♀ 5.2 mm.

LITERATURE CITED

ANUFRIYEV, G. A., and A. F. YEMEL'YANOV. 1988. The suborder Cicadinea (Auchenorrhyncha). [In Russ.]. In: Opredelitel' Nasekomykh Dal'nego Vostoka SSSR. Leningr. Otd. Nauka, Leningrad: 12-495.

DLABOLA, J. 1985. Neue Cixiiden vom Iran, Nachbarländern und anderen Mediterrangebieten (Homoptera, Auchenorrhyncha). Acta Entomol. Bohemosl. 82: 95-128.

DLABOLA, J. 1988. Reklassification der Gattungen der Pentastirini und neue Taxone der Cixiidae (Homoptera, Auchenorrhyncha). Acta Entomol. Bohemosl. 85: 49-70.

EMELJANOV [YEMEL'YANOV], A. F. 1993. Planthoppers of family Cixiidae from vicinity of Ambo, Ethiopia (Homoptera, Cicadina). Zoosyst. Ross. 1(1): 20-36.

MARLATT, C. L. 1907. The periodical cicada. Bull. U.S.D.A. Bur. Entomol. 71: 1-181.

SILVESTRI, F. 1921. Notizie sulla *Cigala grigiastra* (*Tettigia roni* L.), sulla *Cigala maggiore* (*Cicada plebeja* Scop.) sui lore parassiti e descrizione della loro larva neonata e della ninfa. Boll. Lab. Zool. Sci. Agr., Portici 15: 191-202.

YEMEL'YANOV, A. F. 1987. Phylogeny of Cicadina (Homoptera) according to comparative morphological data. [In Russ.]. Tr. Vsesoyuz. Entomol. Obshch.: 19-109.

YEMEL'YANOV, A. F. 1990. An attempt at reconstruction of the phylogenetic tree of Fulgoroidea (Homoptera, Cicadina). [In Russ.]. Entomol. Obozr. 69(2): 353-356.