

# NEW LEAFHOPPER SPECIES (HOMOPTERA, AUCHENORRHYNCHA) FROM THE CAUCASUS

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The present article is based on an examination of the author's collections from Transcaucasia and the foothills of the Greater Caucasus.

The descriptions given below are of members of the families Cixiidae (2 species), Issidae (1 species) and Cicadellidae (6 species). The types of the new species are in the Auchenorrhyncha collection at the Institute of Zoology, Ukrainian Academy of Sciences (Kiev); some paratypes are in the Zoological Institute, USSR Academy of Sciences (Leningrad).

Fam. CIXIIDAE

Genus PENTASTIRIDIUS

Small and black, with brownish-yellow carinae and milky-fumose opaque elytra. Similar in appearance to Pentastiridius curvatus.

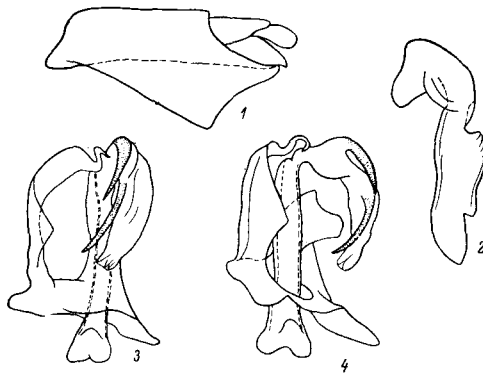
**Male.** Vertex concave, its length slightly less than its width between the posterior angles. Anterior margin of vertex projecting in a right angle, posterior margin parallel to it. Longitudinal carinae double on transition to face, the cells to the sides of it large. Frons weakly convex, its width in the middle twice the width of the anterior margin, lateral carinae elongated, light. Median ocellus distinct. Pronotum short, light, darkened only behind eyes. Scutellum weakly convex, shagreened, black, carinae brownish, apex orange. Tegulae dirty yellow. Fore wings practically opaque, milky fumose, veins of corium light brown in basal half, crossveins and veins in apical part brown, with distinct darker granules, elytra not darkened apically.

Anal tube broadening apically, its postero-lateral margins projecting in an angle. Style parallel sided basally, with a small subapical tooth on the inner margin, apex triangular, slightly transverse, with a small, oblique inner process. Aedeagus relatively slender, base giving way on the left to a slender, long arcuate process, the dorsal margin of which projects in a right angle, distal end of process pointed. The distal segment bears two identical processes, one at the base, the other on a level with the middle, but no apical process is developed on the distal segment. Body length 4.5-4.8 mm.

**Female** unknown.

**Material.** 3 ♂ (including holotype), Azerbaydzhan, Muganskaya steppe, around Sal'yany, 7 June, 1976.

The new species is most similar to P. curvatus, in contrast to which P. proximus has a shorter vertex, larger cells at the transition to the face, and milky-fumose uniformly colored elytra [the elytra of



Figs. 1-4. Pentastiridius proximus, ♂.

- 1) side view of anal tube; 2) style; 3) aedeagus from the right and above; 4) aedeagus from the right.

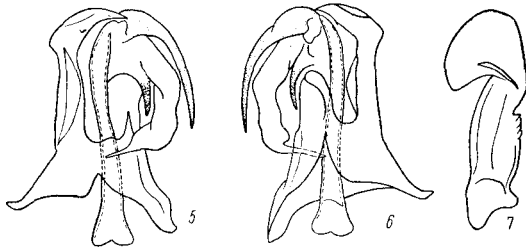
P. curvatus are transparent and darkened apically]. The main differences traceable in the male genitalia are structural characteristics of the style and the aedeagus. In particular, the new species has a rectangular lamellar projection on the dorsal surface of the basal process of the aedeagus (which P. curvatus lacks), but lacks the slender apical process of the distal segment.

Pentastiridius paulus (Figs. 5-7).

Small and black, with light carinae.

**Male.** Vertex slightly shorter than its width between the posterior angles, moderately concave, anterior margin projecting forward in a slight angle. Frons uniformly convex, with distinct middle ocellus, width of frons in the middle more than twice its apical width. Pronotum black, with light, arcuately diverging carinae and light posterior margin. Scutellar carinae brown. Fore wings transparent, sometimes slightly whitish. Veins light, brownish, crossveins darkened only on apical half, granules scarcely apparent on veins.

Anal tube ovoid, its posterior margin practically straight. Style with tooth on inner margin, rounded apically and bent outward. Inner process very small, lamellar. Aedeagus resembling that of P. pallens. Basal process broad, with lamellar swelling and pointed apex. At the base of the distal segment there are two teeth, a long outer tooth and an inner tooth that is half the length of the outer one. Slender long apical spine developed on distal segment. Body length 3.5-3.8 mm.



Figs. 5-7. *Pentastiridius paulus*, ♂.

5) Aedeagus from the right; 6) aedeagus from the left; 7) style.

Female externally indistinguishable from male. Body length 4.3 mm.

Material. 3 ♂♂ (including holotype), Azerbaydzhan, Mil'skaya steppe, 40 km N. of Zhdanovsk, 15 June, 1967; 1 ♂, Mil'skaya steppe, 24 km W of Birmay, 27 May, 1976; 4 ♂♂ and 2 ♀♀, Muganskaya steppe, near Sal'yany, 7 June, 1976.

Similar to *P. pallens*, but well distinguished by the small size of body and the shorter vertex, and in genital structure by the very long apical tooth at the base of the distal segment.

Fam. ISSIDAE

Genus BUBASTIA

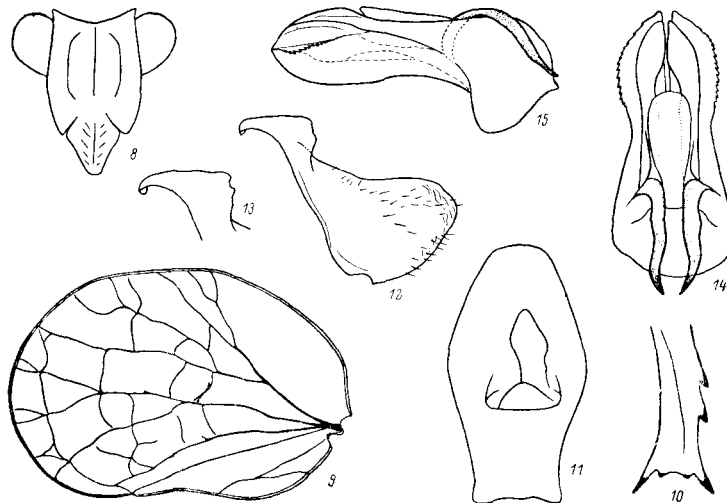
Bubastia carinata (Figs. 8-15).

Male brownish, with dense dark brown mottling, anterior part of body often reddish brown.

Width of vertex about 3.5-4 times its length in the middle. Anterior margin projecting in an obtuse angle, posterior margin gently concave, lateral margins parallel, identical in width in the middle and around the eyes. Posterior margin and lateral margins raised like a carina, median carina smoothed. Frons sheer, convex in the middle, its length appreciably greater than its width, its anterior margin concave, upper lateral angles moderately elongated.

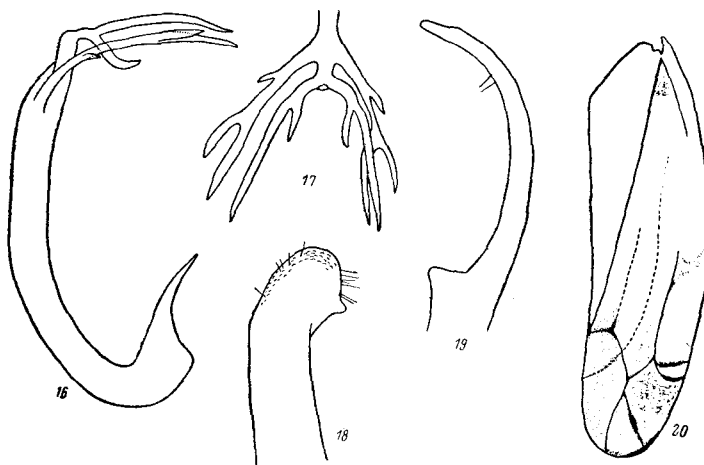
Median carina prominent, extending to anterior margin of frons, lateral carinae distinct, bracket-shaped, not linking up with median carina and fronto-clypeal suture. Clypeus elongated, upraised in region of median suture, with oblique bands along the sides. Length of scutellum in the middle twice length of vertex, its anterior margin strongly projecting, carinately upraised, posterior margin level, median carina prominent. Scutellum slightly longer than pronotum, with a pair of clearly apparent dents in front, its apical half transversely rugose. Length of fore wings slightly exceeding their width, fore wings very broadly rounded apically, projecting slightly beyond apex of clavus. Surface of fore wings dull, with prominent veins. Fore wings brownish, with small dark brown mottlings and even smaller red dots that are denser along the edges of the veins and along the posterior margin of the wing. Geniculate swelling not very prominent. Hind wings not developed. Hind tibiae bearing two teeth on outer margin.

Anal tube rhomboid in the middle, its apex broadly rounded. Style transverse, dorsal margin weakly and uniformly concave, apex elongated. Aedeagus comparatively short and straight, only its basal part recurved. Lobes of shaft dilated apically, lateral lobes of theca with finely toothed crest in



Figs. 8-15. *Bubastia carinata*, ♂.

8) Head from below; 9) fore wing; 10) distal part of hind tibia; 11) anal tube; 12) style; 13) apex of style; 14) dorsal aspect of aedeagus; 15) side view of aedeagus.



Figs. 16-20. *Eurhadina donata*, ♂.

16) Side view of aedeagus; 17) tip of aedeagus, dorsal aspect; 18) apex of genital plate; 19) style; 20) fore wing.

apical third. Dorsal processes weakly undulating, located beyond the middle of the shaft on its basal half.

Body length 3-3.2 mm.

**Female** considerably lighter, brownish yellow, with dark markings on fore wings appearing as a zigzag band on the dorsal part or an arcuate band to the rear of the apex of the clavus. Anal cells darkened on outer margin.

Body length 4-4.1 mm.

**Material.** 5 ♂♂ (including holotype), 15 ♀♀, Nakichevan ASSR, 14 km N of Dzhul'fa, xerophytic slopes with *Astragalus* and saltworts, 14 June, 1977.

The new species is similar to *B. parva* in genital structure, but is well distinguishable from it by larger size, as well as by the rhomboid anal tube, the concave dorsal margin of the style and other lesser structural details.

#### Fam. CICADELLIDAE

*Eurhadina donata* (Figs. 16-20).

Externally reminiscent of *Eu. loewi*. **Male.** Color very pale, whitish yellowish. Markings poorly developed on fore wings. Waxed area bordered in brown at the rear, crossveins at the apex of the clavus and at the costal margin of the wing on the same level. Wing tip just perceptibly yellow pigmented, slight darkened at the base of the wing. Venter, legs and abdomen yellowish.

Aedeagus with two apical pairs of branched processes. Apical pair recurved at a right angle to the shaft, branching in the proximal part, outer branch more than three times length of inner branch. Lower pair of processes of the same length as the apical pair, located parallel to it, branching twice at a distance of approximately one third of the length.

Both processes located on outer margin, lower process half length of upper one. Body length 4.2 mm.

**Female** paler than male, markings taking the form of darkenings along the veins barely apparent. Body length 4, 2-4.3 mm.

**Material.** 1 ♂ and 2 ♀♀ (holotype ♂), Karachai-Cherkess autonomous region, upper reaches of Bol'shaya Laba River, on *Acer trautvetteri*, 21 July, 1969 (V. Puchkov).

In genital structure the species is most similar to *Eu. loewi*, from which it is distinguished mainly by the presence of an additional process of the lower branch, located along the outer margin.

#### Genus EUPTERYX

*Eupteryx certa* (Figs. 21-27).

**Male.** Coloration pale, yellowish greenish, markings pale brown. Of the two pairs of dark brown spots on the vertex, those in the posterior pair are more converged and are right on the posterior margin. Frons with 4 black spots between eyes, antennal sockets darkened, lateral margins of frons and anteclypeus finely bordered in black. Pronotum light yellow, especially its anterior half, 4 black spots along anterior margin, lateral spots longitudinally extended, median spots rounded or slightly transverse. Posterior part of pronotum fumose, anterior angles of darkened area joining the spots. Lateral angles of scutellum slightly darkened, with a pair of black dots between them. Fore wings semi-transparent, with delicate brownish-fumose markings consisting of individual spots and darkened areas on a yellowish-greenish ground. Veins light, yellowish, crossveins more darkly bordered in apical part. Abdomen black with fine light edging to sternites. Legs yellow, tarsi brown.

Genital plates yellow, elongated, apically pointed and with a shallow notch on the outer margin

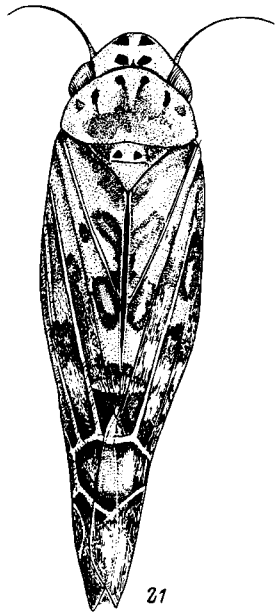
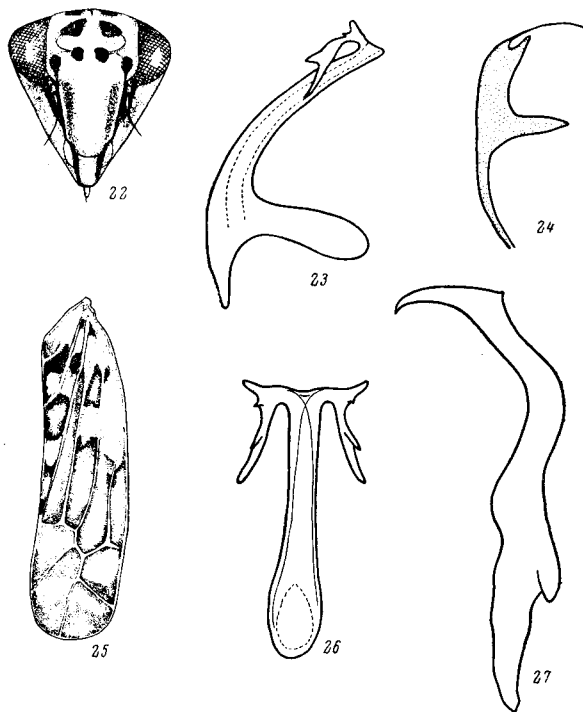


Fig. 21. *Eupteryx certa*, ♂, general appearance.

in the supapical part. Apex of style recurved outward. Inner process of lobe of pygophore 2-peaked - lower peak twice the length of the upper one and directed forward, upper peak directed upward. Aedeagus basally slightly recurved to the ventral side, apical processes in a T-shaped arrangement. Apical branch lying in the horizontal plane, with a small denticle at its base, lower branch longer, lying along the shaft perpendicular to the apical branch and with an offshoot on the dorsal surface on the outer margin. Gonopore apical. Body length 2.8-2.9 mm.

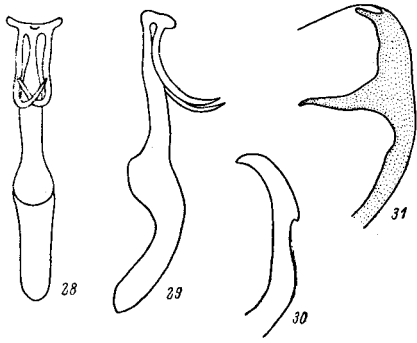
**Female.** The proportions of the body and the coloration are the same as in the male. Posterior margin of pregenital segment slightly convex, with the middle part more drawn out rearward. Body length 3.0-3.1 mm.

**Material.** 2 ♂♂ and 3 ♀♀ (holotype ♂), Azerbaydzhan, Nagorno-Karabakh Autonomous Region, Lachin, on mint, 18 May, 1966; 3 ♂♂ and 2 ♀♀, Nakhichevan ASSR, Abrakunis, mint along an irrigation ditch, 19 May, 1976; 2 ♂♂, same locality, Khok, solonchakous meadow, 25 May, 1966; 1 ♂, Talysh, Gosmol'yan, meadow vegetation, 16 July, 1970; 1 ♂ and 1 ♀, Diabara basin, Amburdara, meadow, 1 June, 1976; 2 ♂♂, Georgian SSR, near Tbilisi, on mint along a water course, 25 May, 1967.



Figs. 22-27. *Eupteryx certa*, ♂.

22) Face; 23) side view of aedeagus; 24) inner process of pygophore lobe; 25) fore wing; 26) dorsal aspect of aedeagus; 27) style.



Figs. 28-31. *Eupteryx fastuosa*, ♂.

28) Dorsal aspect of aedeagus; 29) side view of aedeagus; 30) tip of style; 31) inner process of pygophore lobe.

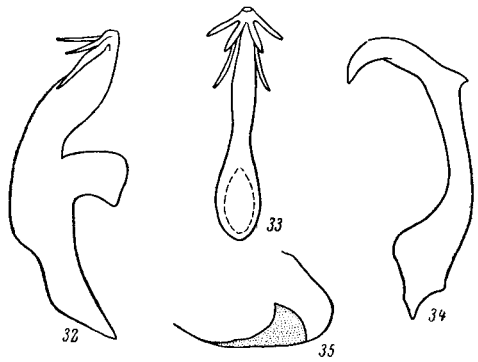
*Eu. certa*, is most similar to *E. iranica*, described from the vicinity of Teheran. In as far as may be assessed from the brief description given by Linnavuori, these species are converged both by external similarity (in particular the markings of the head), and by the general structural plan of the male genitalia. The new species is distinguished by the squatter shaft of the aedeagus, the more strongly developed branches of the aedeagus and the presence of a denticle at their base, as well as by a broader and longer lower branch (relative to the shaft) and the slightly different configuration of its apex.

*Eupteryx fastuosa* (Figs. 28-31).

Externally similar to the previous species, *Eu. certa*.

**Male.** Anterior part of body yellow, with black markings, elytra yellowish green, with pale brownish markings. The vertex has a pair of angular spots on the anterior margin, and a smaller pair of converged spots, frequently merging to form one, on the posterior margin. As in *Eu. certa* (Fig. 23), the frons bears 4 spots between the eyes, of which the middle spots are larger and rounder than the lateral ones. The lateral parts of the frons are more darkened, transversely striated. Antennal sockets black, frontoclypeal suture and sides of clypeus darkened. The pronotum has 4 small spots near the anterior margin, beyond which, is strongly colored individuals, there is a grayish darkened area occupying the entire posterior half. Scutellum yellow, lateral angles not darkened, pair of black dots on disc. Elytra yellowish greenish, with delicate brownish spots on clavus and a similar edging to the veins of the corium and darkening of the apex. Veins yellow. Abdomen black, sternites finely edged in yellow along the posterior margin.

Genital plates light yellow, with strongly elongated distal ends. Inner process of pygophore lobes 2-peaked - lower peak more than twice the length of the upper one and directed forward, upper peak directed forward and upward. Aedeagus with straight shaft, slightly narrowed before the T-shaped apex. Transverse branch of apical process short, arcuate. The lower branch, which is long and slender, extends perpendicular from it. Lower branches arcuate, their distal ends crossing over on the dorsal surface. Base of aedeagus elongated. Gonopore apical. Body length 2.5-2.7 mm.



Figs. 32-35. *Eupteryx miranda*.

32) Side view of aedeagus; 33) dorsal aspect of aedeagus; 34) style; 35) inner process of pygophore lobe.

**Female.** The proportions of the body and the coloration are the same as in the male. Posterior margin of pregenital segment projecting practically in a right angle, the vertex of which is narrowly rounded. Both length 2.6-2.9 mm.

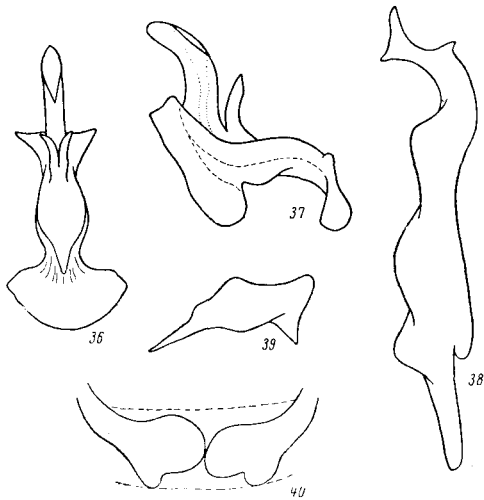
**Material.** Four ♂♂ and 2 ♀♀ (holotype ♂), Azerbaydzhan, Talysh, Diabara basin, river valley, on mint, 15 July, 1970; 2 ♂♂, same locality, Dzhoni, 1900 m above sea level, 19 May, 1975 and 2 ♂♂, 30 May, 1976; 12 ♂♂ and 8 ♀♀, Lerik, on mint along a watercourse, 12 May, 1966; 2 ♂♂ and 1 ♀, Nagorno-Karabakh Autonomous Region, near Lysogorskoye, 24 July, 1970.

The new species is well distinguishable from the similar *Eu. talassica* by the shorter and straight shaft of the aedeagus, as well as by the longer lower branches, which cross over.

*Eupteryx miranda* (Figs. 32-35).

Lightly colored, with delicate markings on the fore wings. Ground color pale yellow, markings brownish. The head has a pair of small rounded spots and a bifurcating spot at the base of the median line. The spots are larger in strongly colored specimens and tend to be connected by a cross piece. Frons and other parts of face yellowish, without spots, antennal sockets sometimes darkened. Pronotum dark brown, matte, with yellow spot in the middle on the anterior margin and a pair of rhomboid spots along the sides. Lateral parts light, with dark transverse spot on each side. Lateral angles of scutellum greatly darkened, disc orange-yellow. Elytra whitish, semi-transparent, with fumose-brownish markings: base and apex of clavus darkened, with a rounded spot between them. Medial and cubital cells most often darkened on corium, and also in part the apical cells of the wing; waxen area bordered with brown at the rear. Veins light, whitish or yellowish. Venter mainly pale yellow, basal parts of tergites and sternites dark brown. Legs yellow, devoid of dark pigment.

Genital plates yellow, elongate, their distal ends pointed and recurved upward. Pygophore almost completely brown, inner process of lobes



Figs. 36-40. *Arboridia irenae*, ♂.

36) Dorsal aspect of aedeagus; 37) side view of aedeagus; 38) style; 39) anal process of pygophore lobe; 40) apodemes.

simple, broad and short, with pointed apex directed forward and upward. Aedeagus relatively short and squat, slightly arcuate, with strongly developed base. Shaft laterally flattened, tip slightly recurved dorsally and bearing 3 pairs of slender processes, of which the dorsal processes are the longest. Gonopore apical. Body length 3.1-3.3 mm.

Female externally very similar to male. Posterior margin of pregenital segment slightly convex. Body length 3.4 mm.

Material. One ♂ (holotype), Azerbaydzhan, Talysh, Avrova, Girkanskiy reservation, 21 May, 1975; 1 ♂, same locality, in a lowland Girkanian forest, 26 May, 1975; 2 ♂♂, Mistan, 18 May, 1975; 2 ♂♂, Dzhoni, 1700 m above sea level, 19 May, 1975; 9 ♂♂ and 1 ♀, Lerik, 9 May, 1966, 15 May, 1966 and 3, 4 June, 1967.

The species is well distinguished from the known species of the genus by the structure of the ♂ genitalia, in particular the presence of 3 pairs of apical processes on the aedeagus.

#### Genus *ARBORIDIA*

*Arboridia irenae* (Figs. 36-40).

Male slender, brightly colored, externally extremely similar to males of other members of the genus. Vertex bright yellow, especially its posterior half, with the pair of rounded spots typical of species of the genus. Anterior half of pronotum pale yellow, posterior half reddish brown. Scutellar disc orange yellow, with whitish band along the middle, lateral angles black. Fore wings yellowish, costal area and cubital cell reddish brown, wing tips slightly fumose, veins light. On either side of the claval vein there is a row of strongly pigmented mottlings that gradually disappear toward the apex of the clavus.

In genital structure the species is most similar to *A. pusilla*, to which it is similar in the structure of the style and, in part, the aedeagus. The anal process of the pygophore lobes has a more dilated basal part with angular contours and a straight, greatly elongated apex. The shaft of the aedeagus is weakly flattened laterally and uniformly arcuate. The basal processes are practically pressed against the shaft, weakly arcuate and apically slightly deflected sideways. The processes, which are comparatively short, do not reach the lower margin of the gonopore. Apodemes large, rounded, with a small projection below, converged, contacting apically. Body length 3.9 mm.

Female unknown.

Material. One ♂ (holotype), Georgian SSR, Kobuleti district, Khino, among ferns, 1 June, 1966; Myusserskiy reservation on oak, 13 June and 2 July, 1978.

The new species is clearly distinguished from the similar *A. pusilla* by the shape of the process of the pygophore lobes and the structure of the aedeagus, in particular by the short, arcuate processes that are closely appressed to the shaft and have their tips recurved and not reaching the lower margin of the gonopore, as well as by the large rounded, apically contacting apodemes.

The species has been named after Irena Dvorakovskaya, to whom the author expresses heartfelt gratitude for valuable advice on aspects of the systematics of the subfamily Typhlocybinæ.

#### Genus *PSAMMOTETTIX*

*Psammotettix perpectus* (Figs. 46-50).

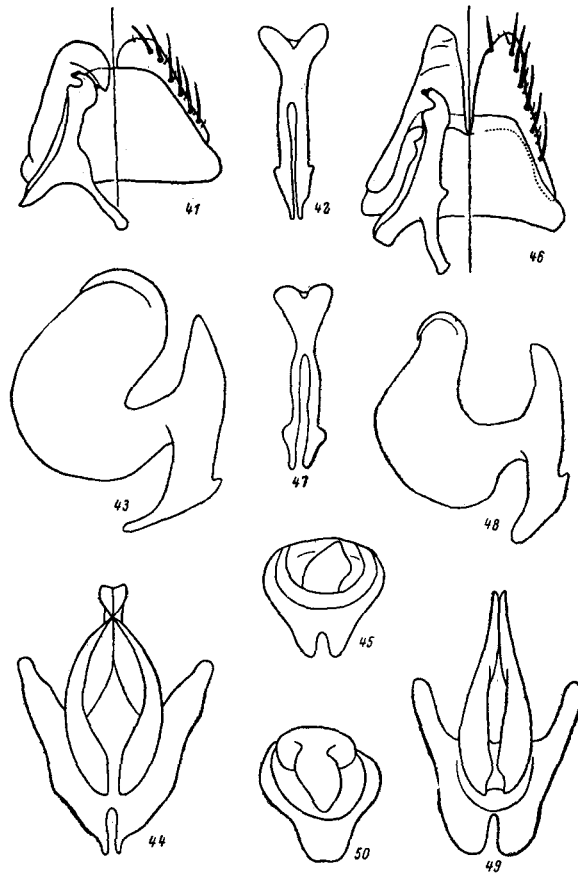
In appearance and coloration the species is practically indistinguishable from *P. pictipennis* (Figs. 41-45); it is only in the structure of the male genitalia that specific differences are traceable.

Genital plates elongate, approximately triangular, narrowly rounded apically. The even outer margin of the plate bears a regular row of macrochaetae. Style slender, its apex slightly dilated, hooklike, of the shape normally found in the genus, with a submedian triangular denticle on the outer margin. Apex of connective with broad converged lobes forming an acute angle. Anal tube with broadened, but entire lower margin. Tip of aedeagus with two large teeth recurved on to the dorsal side. "Spoon" comparatively broad, narrowing apically, its lateral margins not recurved. Processes of base of aedeagus very broad, each several times as wide as the area between them.

Material. Twenty-seven ♂♂ and 43 ♀♀ (holotype ♂), Krasnodar Territory, near Temryuk, Golubitskaya, coastal solonchak, on grasses, 8 June, 1963; Ukraine: 3 ♂♂ and 9 ♀♀, Kherson Province, near Skadovsk, coastal solonchak, on grasses, 31 May, 1964; 1 ♂, Kherson Province, Ingulets River flood plain, 2 June, 1966; Crimean Province, Perekop, wormwood steppe, 3 June, 1964; 3 ♂♂ and 1 ♀♀, Kerch Peninsula, Cape Kazantip, coastal solonchak, on grasses, 14 June, 1963; 5 ♂♂ and 5 ♀♀, Dagestaniy ASSR, Terekli-Mekteb, solonchakous steppe, grasses, 6 May, 1972; 11 ♂♂, Nakhichevan ASSR, near Bilav, 22 May, 1969; 1 ♂, Armenia, Yerevan, 25 May, 1966; 2 ♂♂, Kazakh SSR, Chu

Differences Between the Species *Psammotettix pictipennis* and *P. perpictus*

Names of species	Genital plates	Style	Lower margin of anal tube	Apex of connective	Aedeagus
<i>P. pictipennis</i>	Short, apices broadly rounded (Fig. 41)	Outer margin simple (Fig. 41)	cleft (Fig. 45)	Lobes broadly diverging, forming a right angle (Fig. 42)	"Spoon" broad, its apical part (from the side) practically as wide as the middle part (Fig. 43). Processes of base narrow, no broader than the area between them (Fig. 44)
<i>P. perpictus</i>	Long, elongated, apically narrowly rounded (Fig. 46)	Outer margin with submedian triangular denticle (Fig. 46)	Entire, broadened (Fig. 50)	Lobes more converged, forming an acute angle (Fig. 47)	"Spoon" more narrowed, its apical part (in side view) considerably narrower than the middle part (Fig. 49). Processes of base very broad, approximately 3 times as wide as the area between them (Fig. 49)



Figs. 41-50. *Psammotettix*.

41-45) *Psammotettix pictipennis*, ♂: 41) genital plates, valve and style; 42) connective; 43) side view of aedeagus; 44) ventral aspects of aedeagus; 45) anal tube from below; 46-50) *Psammotettix perpictus*, ♂: 46) genital plates, valve and style; 47) connective; 48) side view of aedeagus; 49) dorsal aspect of aedeagus; 50) anal tube from below.

Station, Dzhabul Province, 14 July, 1960 (A. Yemel'yanov and I. Kerzhner).

As is evident from the description, the new species belongs to a group having the processes of the tip of the aedeagus developed and recurved onto the dorsal side [P. pictipennis, P. salsuginosus, P. narsiculovij], but it is most similar to P. pictipennis. At the same time, the new species is distinguished from P. pictipennis by a number of distinct morphological characteristics in all the details of the "bloc genital" of the male, especially the shape of the genital plates, on which basis these species may be differentiated by external characters without preparation. In the interests of clarity and for ease of identification the main differences between these species have been summarized in the Table.

On examination of specimens in the collections of the Institute of Zoology, Ukrainian Academy of Sciences and the Zoological Institute, USSR Academy

of Sciences previously classified as P. pictipennis it was established that both the species here considered are to be found together under the same ecological conditions (coastal solonchaks and solonchakous steppes) in different ratios in collections from the Crimean and Kherson provinces, Krasnodar Territory, the Nakhichevan ASSR and Kazakhstan. According to the available data, the range of P. perpictus includes the Southern Ukraine, the Crimea, the North Caucasus, Dagestan, Transcaucasia and E. Kazakhstan. As regards the trophic links of the new species, it may be assumed that it, like similar species of this group, feeds on the grass Aeluropus litoralis.

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