

Revised classification of the *Calocoris* complex and related genera (Heteroptera: Miridae)

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Rosenzweig, V.Ye. 1997. Revised classification of the *Calocoris* complex and related genera (Heteroptera: Miridae). *Zoosystematica Rossica*, 6(1/2): 139-169.

A revision of *Calocoris* Fieb. on the basis of genital and external characters showed the genus to be heterogeneous and falling into 5 unrelated complexes of genera: 1. *Closterotomus* Fieb., stat. rest. (= *Poecilnotus* Reut., syn. n.; including *norwegicus* Gmel.) – *Reuterista* Kirk., stat. rest. (including *instabilis* Fieb.) – *Brachycoleus* Fieb. (= *Trichocalocoris* Wgn., syn. n.); 2. *Polymerias* Yas. with the single species *C. opacipennis* Lindb. (= *lonicerae* Yas., syn. n.); 3. *Thiomiris* gen. n. erected for *C. sulphureus* Reut.; 4. *Calocoris* Fieb. (= *Charitides* Kerzh., *Macrocalocoris* Wgn., syn. n.) – *Grypocoris* Dgl. & Sc. (with *Lophyromiris* Wgn. as a subgenus) – *Rauniella* gen. n. erected for *C. ishtar* Lnv.; 5. *Rhabdomiris* Wgn., stat. n. Two new species and one new subspecies (*Closterotomus scorzonerae* sp. n., *Reuterista unicolor* sp. n., *Brachycoleus pilicornis orientalis* ssp. n.) are described. *Calocoris angularis* Fieb. is a subspecies of *C. roseomaculatus* De G. *C. schmidtii* Fieb. belongs to *Mermitelocerus* Reut., and *C. lineolatus* Costa to *Horwathia* Reut., both related to *Calocoris*. Groups of species are separated within the genera, their interrelations analysed.

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HISTORICAL REVIEW

Species of the genus *Calocoris* Fieb. (Miridae: Mirini) are well differentiated and, with rare exceptions, easily distinguished by external morphological characters. The history of the study of the genus is as follows. Fieber (1858) described the genera *Calocoris* with *affinis* H.-S. as type, and *Closterotomus* with *bifasciatus* sensu Fieb. as type. Reuter (1875) placed *Closterotomus* as a synonym of *Calocoris*. Subsequently additional species have been added and the genus now contains nearly 60 Palaearctic species (Muminov, 1986).

Wagner (1968, 1974) treated *Closterotomus* as a subgenus and erected 5 more subgenera based on body pubescence, tibial spines and other characters. Later, the subgenus *Calocorisellus* Wgn. was synonymized with *Reuterista* Kirk. originally described as a genus (Linnavuori, 1986). Kerzhner (1964: 726) transferred species of the *schmidtii* group from the subgenus *Trichocalocoris* Wgn. to *Calocoris* s. str. But the genitalia remained known unsatisfactorily because they almost were not used in diagnostics. Wagner (1968, 1974) however used the structure of vesica, and Kerzhner (1964) the shape of the

left paramere to delimit subgenera. In the keys to the genera of Mirini, *Calocoris* is defined by "negative" characters only, i.e. its representatives are united by symplesiomorphies. Kerzhner (1964, 1988) supposed the genus to be a mixture of unrelated species.

The present investigation was undertaken on I.M. Kerzhner's initiative and aims at the reclassification of the *Calocoris* complex, including related *Brachycoleus* Fieb., *Mermitelocerus* Reut., *Horwathia* Reut. and *Grypocoris* Dgl. & Sc., on the basis of comparative study of the male and female genitalia, body pubescence, tibial spines, length of rostrum, structure of hind tarsi and claws, ecology, etc.

Twelve species from tropical Asia, South Africa, New Caledonia and USA are included currently in *Calocoris*. Most of them are known from original descriptions only. These species are not considered in the present study.

PROPOSED CLASSIFICATION OF THE COMPLEX

According to the data received, the genus *Calocoris* appeared to be actually heteroge-

neous and falling into 5 unrelated groups and a number of genera.

The *Closterotomus* complex including the genera *Closterotomus* Fieb., *Reuterista* Kirk. and *Brachycoleus* Fieb. is recognized by mixed pubescence consisting of black fine and pale flattened ("scales") hairs, only in *Brachycoleus* the pubescence is pale and unflattened; bilobate vesica with rich armament including dentate fields and plates, forked and usually also simple spiculi; hypophysis of left paramere flattened and bearing longitudinal carina; interramal lobes of posterior wall of vagina not reaching near median line, or reaching it with free uvulae.

The genus *Polymerias* Yas. is distinguished by pubescence consisting of only silvery flattened hairs; vesica 5-lobate, without spiculi, with dentate plate on right dorsal lobe; left paramere as in *Closterotomus*; interramal lobes attached along whole width of posterior wall.

The genus *Thiomiris* gen. n. is characterized by golden fine pubescence, very long 3rd antennal segment and angular large cell of wing membrane; vesica with broad and flat spiculum.

Species of the *Calocoris* complex (genera *Calocoris* Fieb., *Mermitelocerus* Reut., *Horwathia* Reut., *Grypocoris* Dgl. & Sc. and *Rauniella* gen. n.) are covered with black or pale fine hairs, only in the aberrant genus *Rauniella* the pubescence is mixed; vesica typically 6-lobate, lacking spiculi, with poorly developed dentate structures on right lobe; hypophysis of left paramere unflattened, its apex hooked; interramal lobes attached along whole width.

The genus *Rhabdomiris* Wgn. differs in the black borderings of hemelytral veins and pale fine pubescence; presence of only the simple spiculum in vesica; sensory lobe of left paramere transformed into long process, hypophysis ending with hook; interramal lobes bearing free denticle.

In all groups examined, the vagina possesses a large membranous sac with two symmetrical, very fine, serrate, sclerotized rings (while parietal glands are situated on the vagina itself!). This sac seems to be characteristic to the whole tribe or maybe subfamily.

Note on terminology. Left and right sides (lobes) of vesica and parameres are designated in a morphological sense, i.e. according to their orientation in the insect body. Inasmuch as in the drawings vesica is depicted with its basal sclerite directed to the

observer, i.e. turned at 180°, so the right lobe appears on the left, and vice versa.

Except if otherwise noted, the abbreviation **comb. n.** is used for species currently placed in *Calocoris*, but in this paper combined with another generic name (including former subgeneric names upgraded in this paper). The abbreviation **stat. n.** is used for upgradings / downgradings of subgenera to genera and subspecies to species or vice versa.

The type specimens of new species and sub species are kept in the Zoological Institute, St. Petersburg.

I. GENERA OF THE *CLOSTEROTOMUS* COMPLEX

Large and middle-sized Mirini of oblong-oval shape. Both sexes macropterous. Upper side of body impunctate. Vertex without longitudinal furrow or transverse carina. Collar not shorter than thickness of 2nd antennal segment at base. Hind femora neither flattened nor lengthened. Tibiae with black pubescence, with or without black dots at seta bases. 1st segment of hind tarsus not longer than 2nd. Male genital segment usually without denticles.

Vesica bilobate. Right lobe always with 1-2 sclerotized dentate fields, folded 2 or 3 times. Left lobe membranous or (*Reuterista*, *Brachycoleus*, some *Closterotomus*) bearing sclerotized fields or combs. Simple and forked spiculi present on the right and left lobes respectively; shape of spiculi peculiar; simple spiculum often subject to reduction. Dorsal margins of both lobes with membranous folds covering secondary gonopore; ventral margin of right lobe with distinctive dilated sclerotized area.

Left paramere with poorly developed sensory lobe; hypophysis expanded and flattened, with longitudinal carina continuing on apex into denticle lying in the plane of hypophysis (except *Closterotomus annulus* Brulle, *C. migrans* Lindb., *C. putoni* Horv., *C. picturatus* Reut.). Obviously this carina functions as a strengthening rib, as does the longitudinal rib on spiculum in species having broad forked spiculum (Figs 8, 13, 68, 78). Right paramere with desclerotized bladder-like area at hypophysis base.

Parietal glands of vagina oval, separated by more than by their diameter. Vagina with ventral and sometimes also dorsal sclerotized stripes (G- and F-structures of Slater,

1950). Very characteristic membranous projection arising between parietal glands. Interramal lobes not reaching nearly to median line of posterior wall, or if reaching it then only with their free median uvulae.

Notes on interrelations. Within the complex, general directions of evolution are: reduction of simple spiculum and of the process of forked one; development of various sclerotized structures on left lobe of vesica; asymmetry of membranous projection of vagina; development of uvulae in interramal lobes. Parallel tendencies traced in related groups and combinative diversity at specific and generic levels do not allow us to apply strict cladistic conclusions.

Among the members of the complex, the most primitive is *Closterotomus* possessing no autapomorphies, thus being paraphyletic. *Reuterista* is a derived group in morphological features and ecological restriction. *Brachycoleus* is more isolated: being undoubtedly related to other genera in the male and female genitalia, it has markedly diverged in the type of pubescence.

Key to the genera of the *Closterotomus* complex

- 1(4). Pubescence mixed, consisting of black and golden hairs.
- 2(3). 2nd antennal segment normally blackened apically or completely black (*C. fulvomaculatus*, *C. cinctipes*, *C. longitarsis*, *C. nigronasutus*, some *C. ventralis*); if completely pale (*C. tunetanus*, *C. norwegicus*, *C. agranus*), then rostrum reaching at least mesocoxae ***Closterotomus* Fieb.**
- 3(2). 2nd antennal segment pale. Rostrum not reaching mesocoxae ***Reuterista* Kirk.**
- 4(1). Pubescence pale, erect and semierect ***Brachycoleus* Fieb.**

Genus ***Closterotomus*** Fieber, 1858, stat. rest.

Closterotomus Fieber, 1858: 306 (as genus); Reuter, 1875: 80 (as synonym of *Calocoris*); Wagner, 1971: 296 (as subgenus of *Calocoris*). Type species *Closterotomus bifasciatus* sensu Fieber, 1858, 1861, non Fabricius, 1775 (= *Capsus biclavatus* Herrich-Schäffer, 1835), by monotypy.

Poecilnotus Reuter, 1896: 167, **syn. n.** Type species *Poecilnotus picturatus* Reuter, 1896, by monotypy.

Diagnosis. Coloration diverse, from almost entirely black to pale. Pronotum in many species with characteristic dark pattern of longitudinal median stripe and 2 spots behind calli. Scutellum at least partly dark, if pale then with longitudinal median line which can be reddish or inconspicuous in pale females of *C. samojedorum*, *C. krue-*

peri, *C. kroesus*, *C. putoni*, *C. histrio histrio*. Pubescence mixed, black fine hairs coupled with golden or silvery flattened scales. Subocular part of head 0.38-0.91 times eye height. Rostrum reaching metacoxae, rarely mesocoxae (*C. samojedorum*, *C. scorzonerae* sp. n., *C. cinctipes*, *C. tunetanus*, *C. venustus*, *C. trivialis*) or even somewhat shorter (*C. ussuriensis*, *C. longitarsis*). Hind femora with numerous black spots at trichobothriae. 2nd metatarsal segment usually 1.0-1.7 times as long as 1st segment (in *norwegicus* species group 1.6-2.2). Male genital segment without denticle or (*C. krueperi*, *C. histrio*, *C. norwegicus*) with acute denticle on the left; in *C. costae* fore margin of genital opening with medial projection (Fig. 66). Genitalia in general typical of the complex.

Distribution. The genus includes 29 species most of which are concentrated in the Eastern Mediterranean and adjacent regions; only some species of the *C. biclavatus* group are widespread, *C. scorzonerae* sp. n. is endemic to S Kazakhstan, *C. ussuriensis* Kerzh. is known from the Far East, *C. marmoratus* Lindb. from N China and *C. forsythi* Dist. from N India.

Interrelations of species. Species of this genus fall into nearly 10 groups according to the high diversity of the male genitalia. The female genitalia being more stable provide two valuable characters uniting these groups into 3 supergroups: symmetry of membranous projection of vagina and presence of uvulae in interramal lobes.

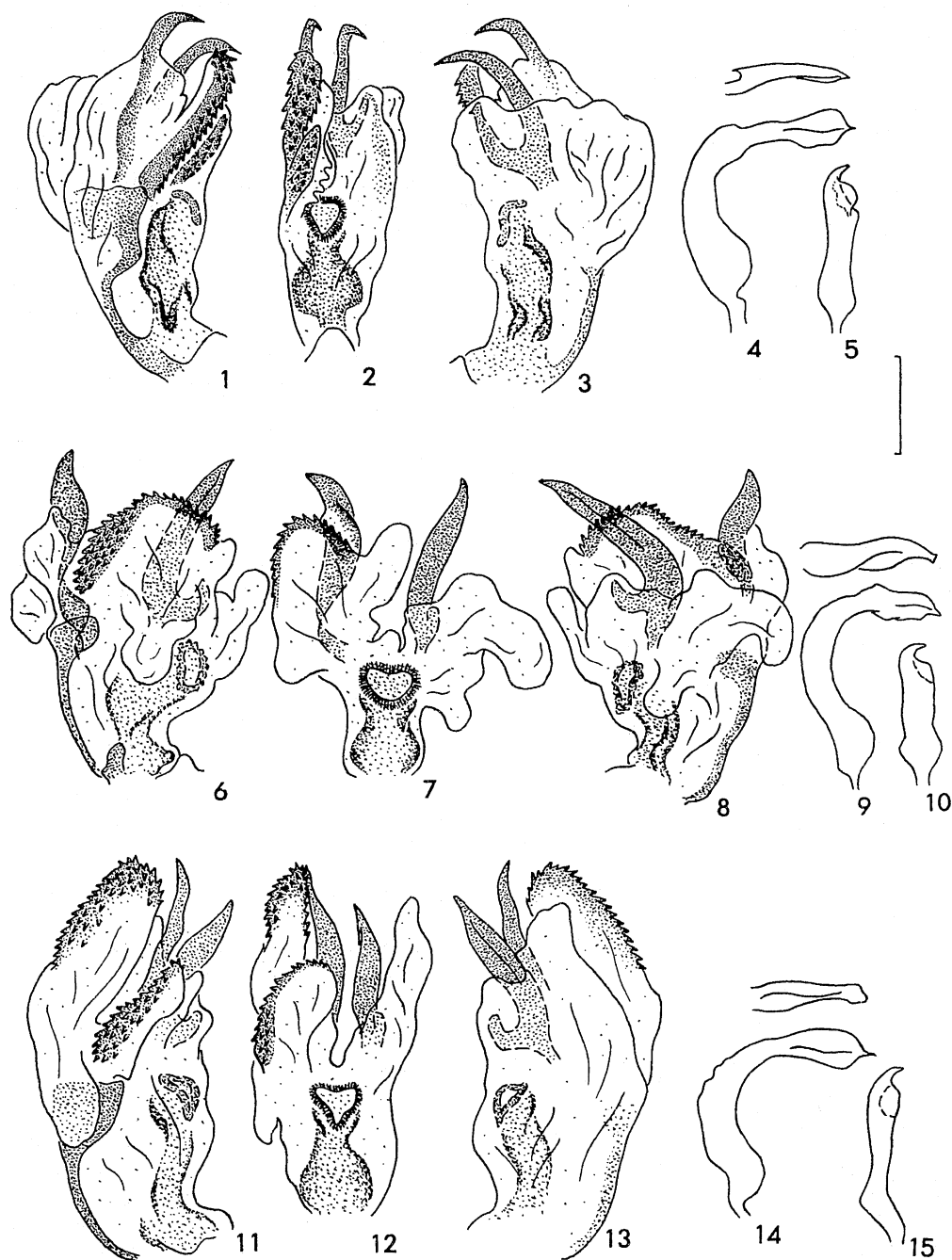
Supergroup A

Membranous projection of vagina symmetrical; interramal lobes without uvulae, widely separated (Figs 28, 29, 34, 35, 51-60); median process of posterior wall oval.

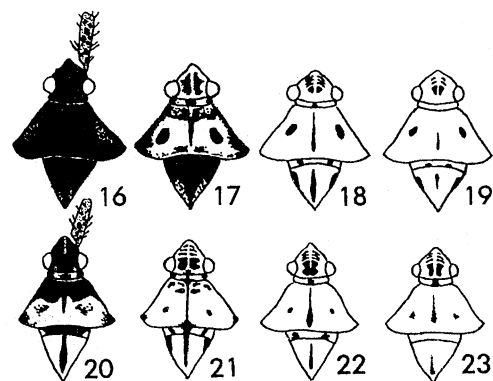
biclavatus species group

(Figs 1-19, 51-56)

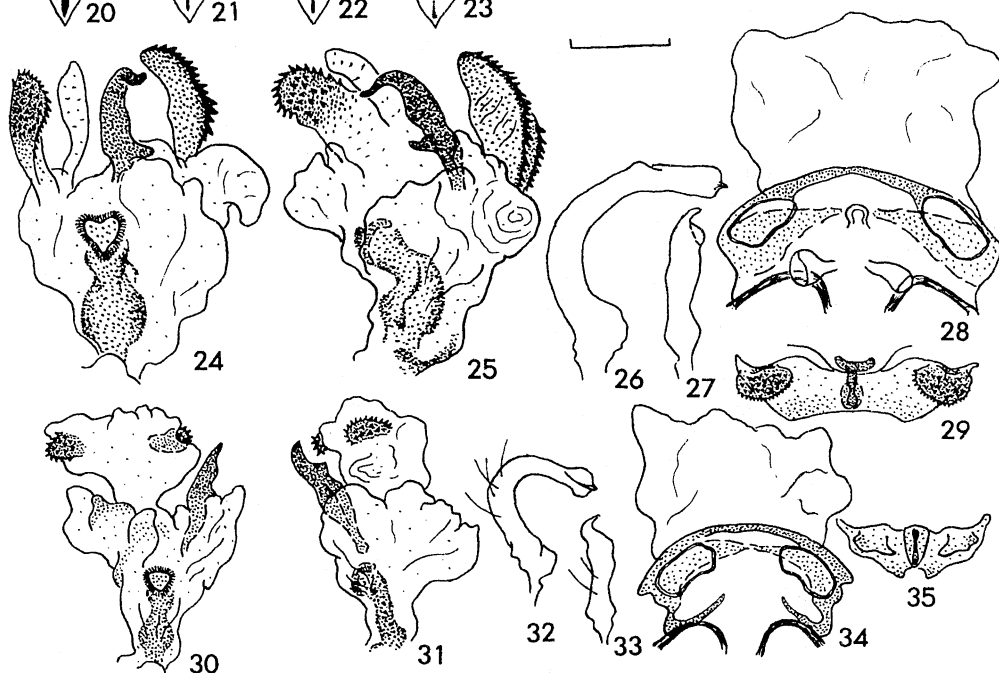
Diagnosis. Structure of vesica probably close to initial one for the genus and the complex: right lobe with 2 dentate fields, of which the closest to gonopore smaller; both spiculi present. Presence of 2 spiculi is considered to be a plesiomorphic character because as well as being distributed in more primitive *Closterotomus* it occurs in certain *Reuterista* and *Brachycoleus*. Shape of spiculi diverse: straight, curved at apex or spirally twisted at base. 2nd antennal segment clavate (except *C. fulvomaculatus*). In-



Figs 1-15. *Closterotomus*, male genitalia. 1-5, *C. biclavatus* H.-S. (Russia, Leningrad Prov.); 6-10, *C. fulvomaculatus* De G. (Russia, Primorsk Terr.); 11-15, *C. samojedorum* J. Sahlb. (Kirghizia). 1-3, 6-8, 11-13, vesica in different aspects; 4, 9, 14, left paramere in ventral aspect; 5, 10, 15, right paramere in dorsal aspect. Scale: 0.25 mm.



Figs 16-35. *Closterotomus* spp. 16-19, *C. samojedorum* J. Sahlb. (Kirghizia); 20-29, *C. scorzonerae* sp. n. (Kazakhstan, holotype and paratypes); 30-35, *C. ussuriensis* Kerzh. (Russia, Primorsk Terr.). 16-23, head and pronotum, 24, 25, 30, 31, vesica; 26, 32, left paramere; 27, 33, right paramere; 28, 34, vagina; 29, 35, posterior wall of vagina. Scale: 16-23, 2 mm; 24-27, 30-33, 0.25 mm; 28, 29, 34, 35, 0.5 mm.



terramal lobes serrate (Figs 54, 56), except *C. biclavatus* (Fig. 52).

Included species: *C. biclavatus* H.-S., comb. n.; *C. fulvomaculatus* De G., comb. n.; *C. samojedorum* J. Sahlb., comb. n.; *C. reuteri* Horv., comb. n.; *C. princeps* Reut., comb. n.

scorzonerae species group

This group includes one species.

Closterotomus scorzonerae sp. n. (Figs 20-29)

Holotype. ♂, **Kazakhstan**, *Chimkent Prov.*, Karatau Range, Kara-say, Dzhagan-Ata, 27-29.V.1936 (Luk'yanovich).

Paratypes (129 specimens). **Kazakhstan:** *Chimkent Prov.*: 16 spec., as holotype; 1 ♂, 4 ♀, as holotype,

but 14.V-26.VI.1932 (Pravdin); 2 ♀, locality Uzen', 30.V.1930 (Pogodin); 61 spec., Achi-say, 1.VI.1936 (Luk'yanovich); 1 ♂, 2 ♀, Kainar-Bastau, 29.V.1934 (Pravdin); 39 spec., 20 km N Kentau, 25-27.V.1966 (Kerzhner & Emeljanov); *Dzhambul Prov.*: 1 ♂, lake Ak-kul', 30 km W of Dzhambul, 7-8.V.1937 (Luk'yanovich); *Kzyl-Orda Prov.*: 1 ♀, Perovsk [Kzyl-Orda], 29.VI.1909 (collector not indicated).

Distribution. Karatau Range, S Kazakhstan, alt. 900-1900 m.

Description. Small species, length 7.2-7.5, width 2.0 mm.

Coloration (Figs 20-23) brownish grey, ventral side pale yellow; pattern variability similar to that of *C. samojedorum* J. Sahlb. Frons with 2 series of parallel black stripes, in dark specimens head almost completely black. Pattern of pronotum from almost completely pale with median stripe to well

developed. Scutellum always pale with more or less developed dark median stripe. Heme-lytra pale; sometimes internal part of exocorium slightly darkened; external margin narrowly black (viewed laterally); apex of cuneus always pale. 1st antennal segment and legs with numerous black spots.

1st antennal segment 0.90-1.05 times as long as head width, thick, with short black bristles. 2nd segment clavate, with dark apex. Antennal formula 2 : 5 : 2 : 1. Rostrum reaching mesocoxae.

Vesica (Figs 24, 25): simple spiculum absent; forked spiculum with reduced process; left lobe with double comb sclerite. Parameres as in Figs 26, 27. Vagina (Fig. 28) with symmetrical membranous projection; interramal lobes (Fig. 29) rounded, serrate.

Host plant: *Scorzonera tau-saghyz* Lipsch. & Bosse (Asteraceae).

Comparison. We consider the new species to form a separate group though it is obviously a derivate of *C. samojedorum*, being similar to it in coloration, structure of antennae, length of rostrum and trophic relations. *C. samojedorum* (Figs 11-19) differs in the larger size (7.7-8.5 mm); longer 1st antennal segment (1.15-1.22 times as long as head width); reddish tinge in coloration; in male scutellum black in most part, pattern of pronotum more intense; apex of cuneus black to dark red, even in pale females darker than remainder of cuneus; simple spiculum in vesica present, left lobe membranous.

The double comb of the left lobe closely resembles the similar structure in the *norwegicus* group (Supergroup C) but must have arisen independently because the external characters and symmetry of vaginal membranous projection indicate a relationship with the *biclavatus* group.

ussuriensis species group

The group includes one species, *C. ussuriensis* Kerzh., comb. n. (Figs 30-35). In this species, the vesica is strongly modified: right lobe of peculiar shape and with only 2 dentate plates, surrounded by several smaller lobes; spiculum of very modified irregular shape (Kerzhner, 1988b) and can be homologized as the forked one by its position only.

annulus species group (Figs 36-50, 57-60)

Diagnosis. Simple spiculum absent; large dentate field fragmented into 6-10 plates. In

C. krueperi and *C. kroesus*, small dentate field absent, and in *C. kroesus* dentate area appears at base of dorsal margin of left lobe (Figs 41, 42, also see Seidenstucker, 1977, Linnavuori, 1984). In *C. annulus* and *C. migrans*, hypophysis of left paramere not typical of the genus, narrowed, not flattened, with subapical tooth. Interramal lobes serrate (Figs 58, 60).

Included species: *C. krueperi* Reut., comb. n., *C. kroesus* Seid., comb. n., *C. annulus* Brullé, comb. n., *C. migrans* Lindb., comb. n.

Note. The synonymy of *C. annulus* Brullé and *C. nebulosus* Reut. (Horváth, 1911: 593; Schuh, 1995) is confirmed. Both external and genital characters listed by Wagner (1959) as distinguishing these "species" are subject to combinative variation depending neither on each other nor on geographical distribution. Moreover, the shape of spiculum depends on the extent of its twisting and the angle of view.

Supergroup B

Membranous projection of vagina asymmetrical, displaced leftward; interrampal lobes with free transparent uvulae reaching middle of posterior wall and adjoining each other.

Note. If at some time these supergroups are treated as subgenera then the valid name for "B" is *Poecilnotus* Reut.

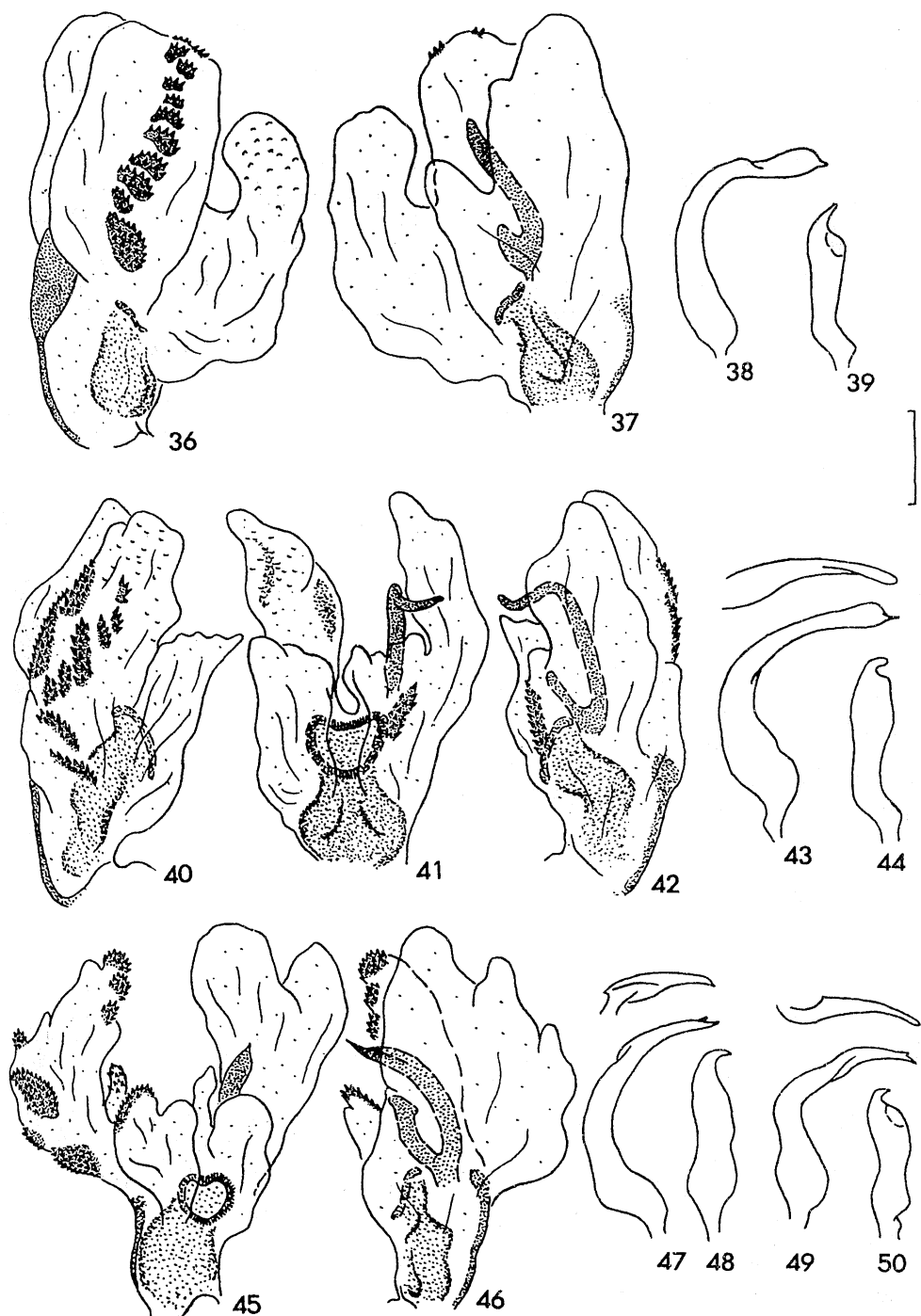
costae species group (Figs 61-75, 99, 100)

Diagnosis. Denticles of large field increased, flattened and oligomerized; simple spiculum desclerotized in *C. costae*, absent in others; forked spiculum with long process (except *C. agranus*, Fig. 73). In *C. putoni*, left paramere not typical of the genus (Fig. 71) but vesica much like that of *C. costae*.

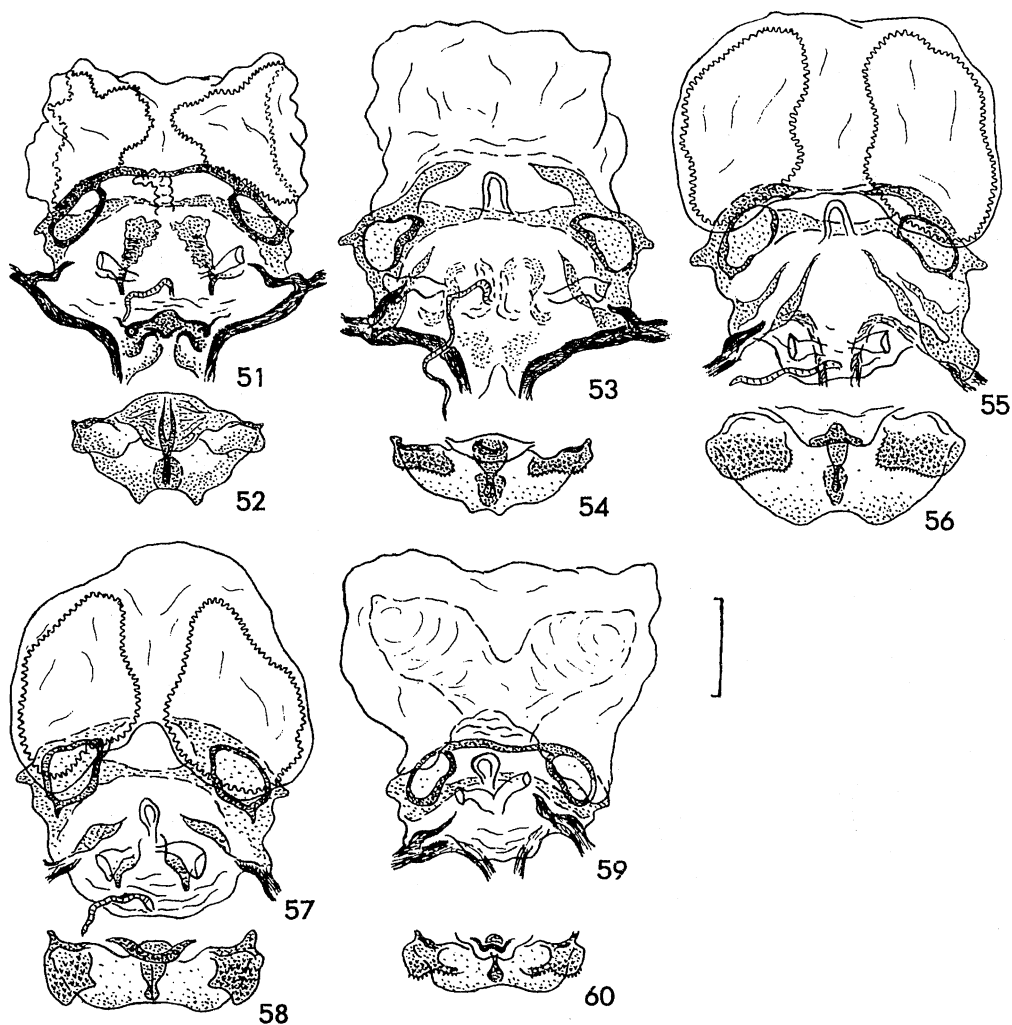
Included species: *C. costae* Reut., comb. n., *C. hedenborgi* Fieb., comb. n., *C. agranus* Lnv., comb. n., *C. putoni* Horv., comb. n.

picturatus species group

The group includes one species, *C. picturatus* Reut., comb. n. (*Poecilnotus*) (Figs 76-79, 101, 102). The parameres resemble those of *C. putoni* (Figs 71, 72); armament of vesica peculiar; process of forked spiculum short; simple spiculum absent. 2nd antennal segment clavate.



Figs 36-50. *Closterotomus*, male genitalia. 36-39, *C. krueperi* Reut. (Cyprus); 40-44 *C. kroesus* Seid. (Turkey); 45-48, *C. annulus* Brullé (Turkey); 49, 50, *C. migrans* Lindb. (Cyprus). 36, 37, 40-42, 45, 46, vesica; 38, 43, 47, 49, left paramere; 39, 44, 48, 50, right paramere. Scale: 0.25 mm.



Figs 51-60. *Closterotomus*, female genitalia. 51, 52, *C. bicalvatus* H.-S. (Belarus); 53, 54, *C. fulvomaculatus* Deg. (Belarus); 55, 56, *C. samojedorum* J. Sahlb. (Uzbekistan); 57, 58, *C. annulus* Brullé (Turkey); 59, 60, *C. migrans* Lindb. (Cyprus). 51, 53, 55, 57, 59, vagina; 52, 54, 56, 58, 60, posterior wall of vagina. Scale: 0.5 mm.

histrion species group

The group includes one species, *C. histrion* Reut., comb. n. (Figs 80-83, 103). Large dentate field of vesica absent; simple spiculum very short and broad, distinct in apical part only; forked spiculum with long process. Interramal lobes serrate. 2nd antennal segment clavate.

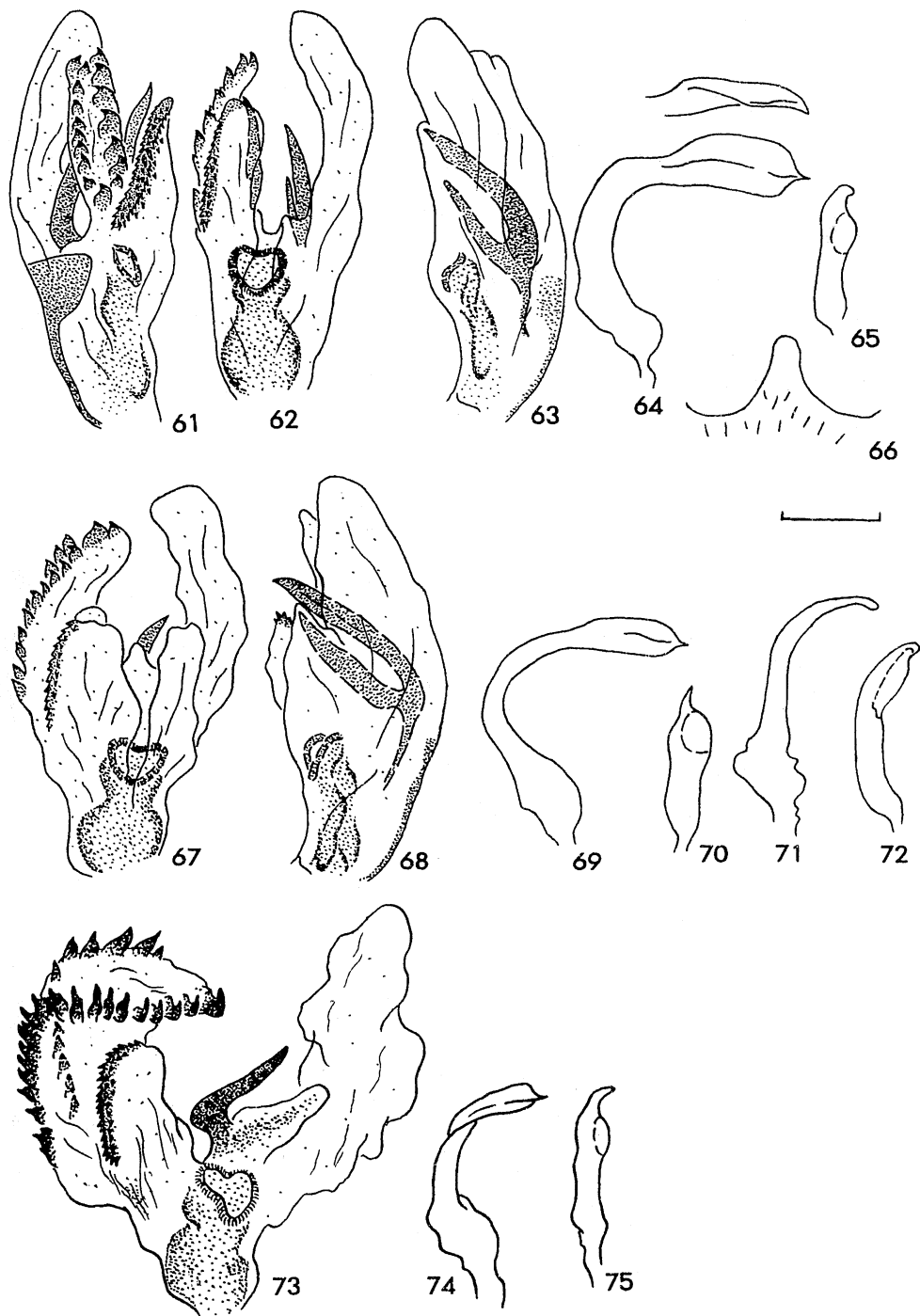
cinctipes species group

The group includes *C. cinctipes* Costa (Figs 84-88, 104, 105). Simple spiculum ab-

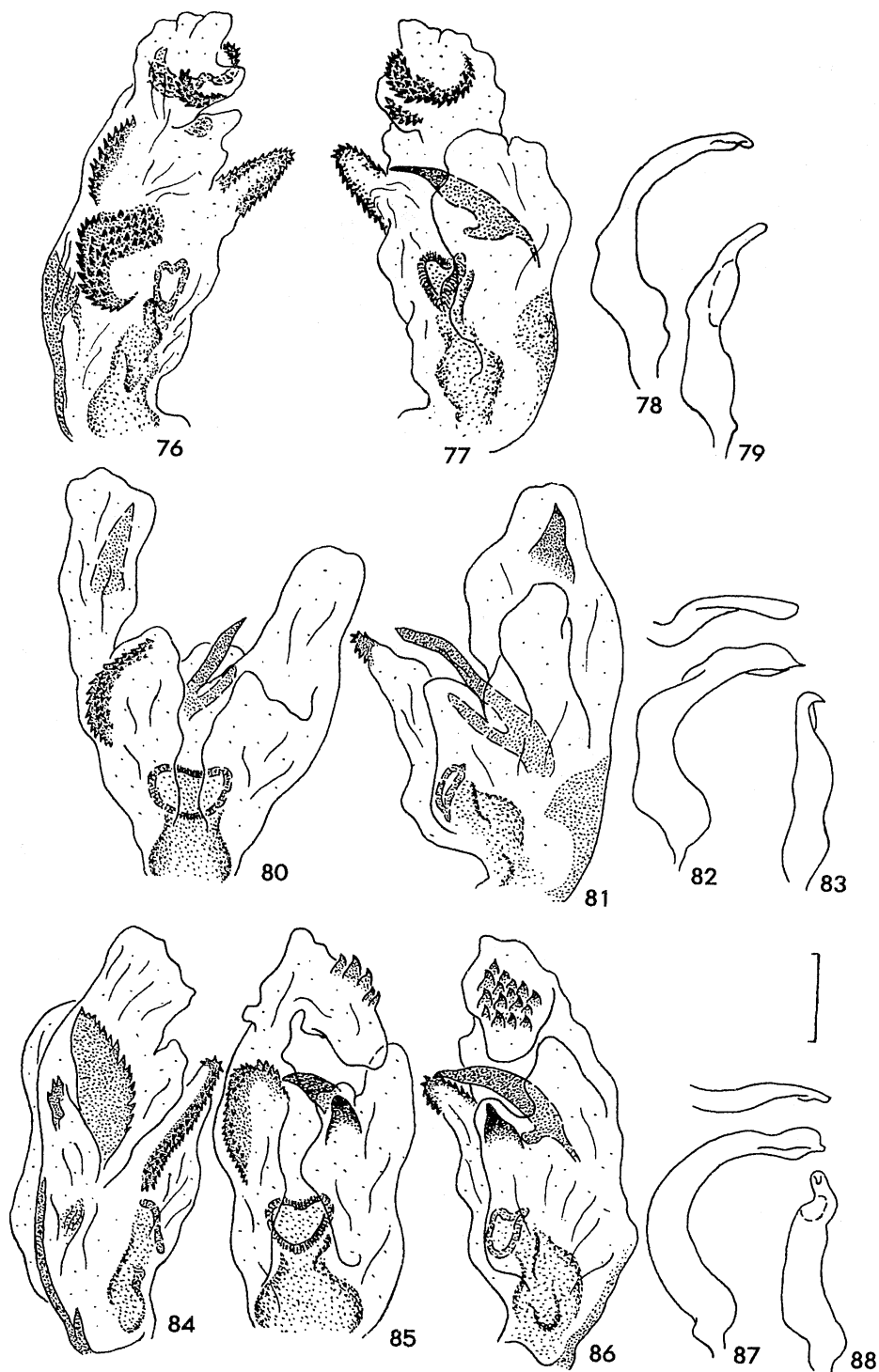
sent, forked one with very reduced process; left lobe with triangular sclerite near gonopore. Armament and shape of the right lobe do not allow us to place this species in any of the groups separated.

ventralis species group (Figs 89-98, 106, 107)

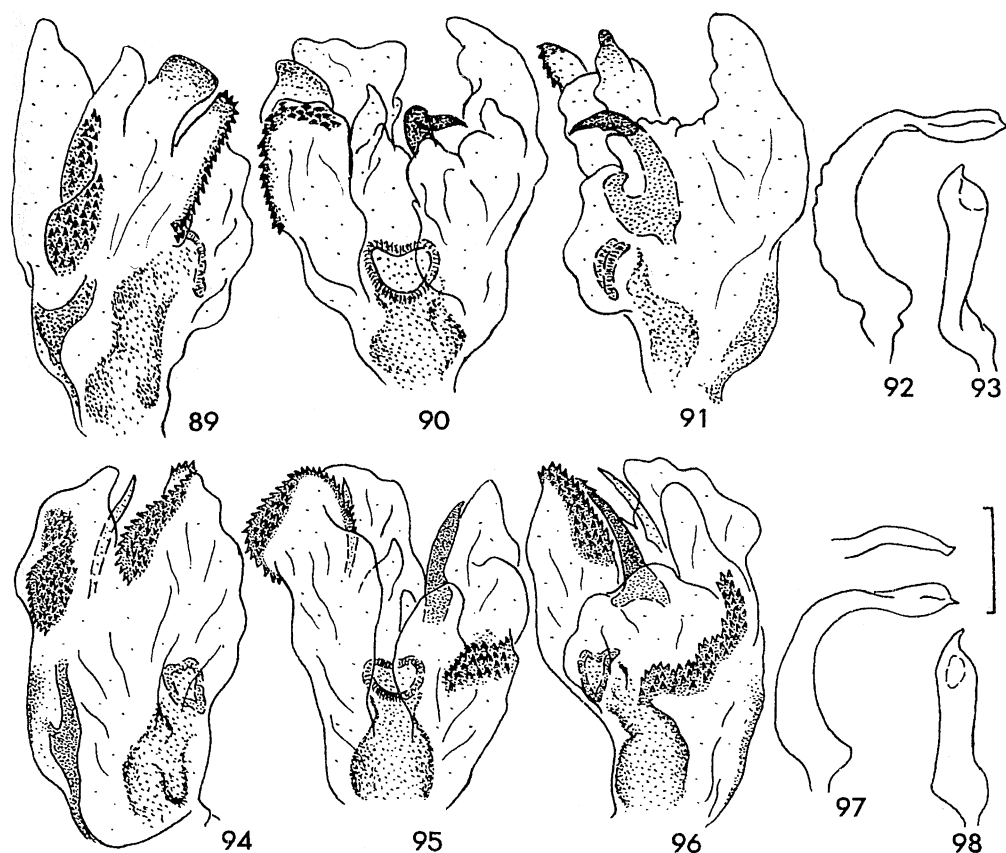
Diagnosis. Large dentate field consisting of two areas of distinctive shape; simple spiculum very weakly sclerotized; process of forked spiculum rudimentary; left lobe in *C.*



Figs 61-75. *Closterotomus*, male genitalia. 61-66, *C. costae* Reut. (Azerbaijan); 67-70, *C. hedenborgi* Fieb. (Syria); 71, 72, *C. putoni* Horv. (Lebanon); 73, 75, *C. aqranus* Lnv. (Iraq, paratype). 61-63, 67, 68, 73, vesica; 64, 69, 71, 74, left paramere; 65, 70, 72, 75, right paramere; 66, fore margin of genital opening. Scale: 0.25 mm.



Figs 76-88. *Closterotomus*, male genitalia. 76-79, *C. picturatus* Reut. (Turkey); 80-83, *C. histrio* Reut. (Greece); 84-88, *C. cinctipes* Costa (Italy). 76, 77, 80, 81, 84-86, vesica; 78, 82, 87, left paramere; 79, 83, 88, right paramere. Scale: 0.25 mm.



Figs 89-98. *Closterotomus*, male genitalia. 89-93, *C. vicinus* Horv. (Romania); 94-98, *C. ventralis* Reut. (France). 89-91, 94-96, vesica; 92, 97, left paramere; 93, 98, right paramere. Scale: 0.25 mm.

ventralis and *C. sedilloti* with well developed dentate field in middle part.

Included species: *C. vicinus* Horv., comb. n., *C. ventralis* Reut., comb. n., *C. sedilloti* Put., comb. n.

Supergroup C

2nd metatarsal segment lengthened, 1.6-2.2 times as long as 1st segment. Membranous projection of vagina asymmetrical, displaced leftward; interramal lobes without median uvulae, broadly separated; median process of posterior wall narrow.

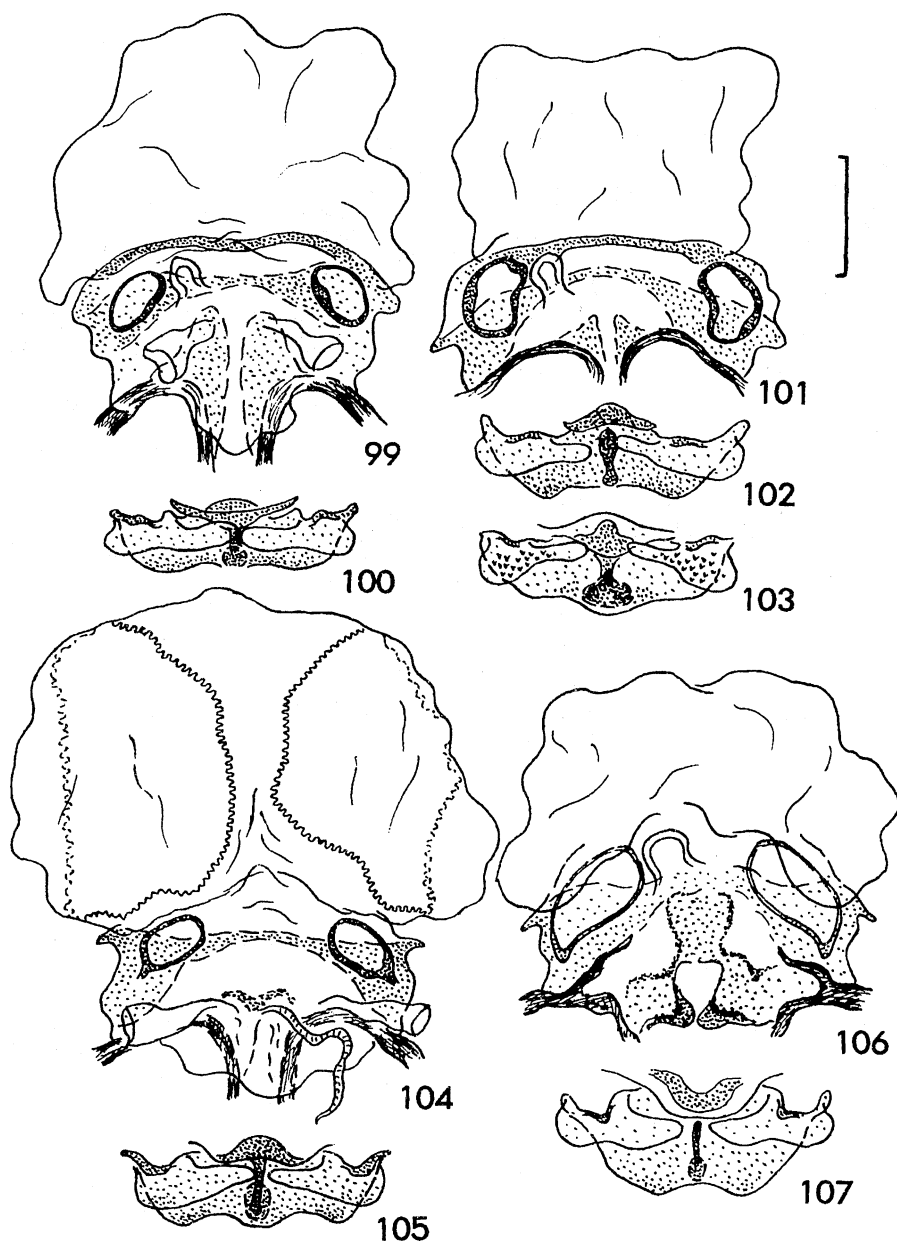
The representatives of this group show certain similarity to *Reuterista* in longer 2nd metatarsal segment, somewhat enlarged eyes, relatively short rostrum, scutellum pale in most species (except *C. trivialis* and *C. venustus*). Nevertheless, the double comb of

vesica left lobe and the characters of the female genitalia display no affinity to *Reuterista* and confirm once again the commonality of parallel transformations within the whole complex of genera.

C. norwegicus was included in *Calocoris* s. str. despite its mixed pubescence and genitalia (Figs 120-124, 149, 150) typical of *Closterotomus*.

norwegicus species group (Figs 108-128, 149, 152)

Diagnosis. Apex of left lobe with double comb formed by two close together rows of denticles; forked spiculum massive, with obvious blunt process. *C. tunetanus* retains a simple spiculum (Fig. 108) and *C. norwegicus* its membranous rudiment only (Figs 120, 121).

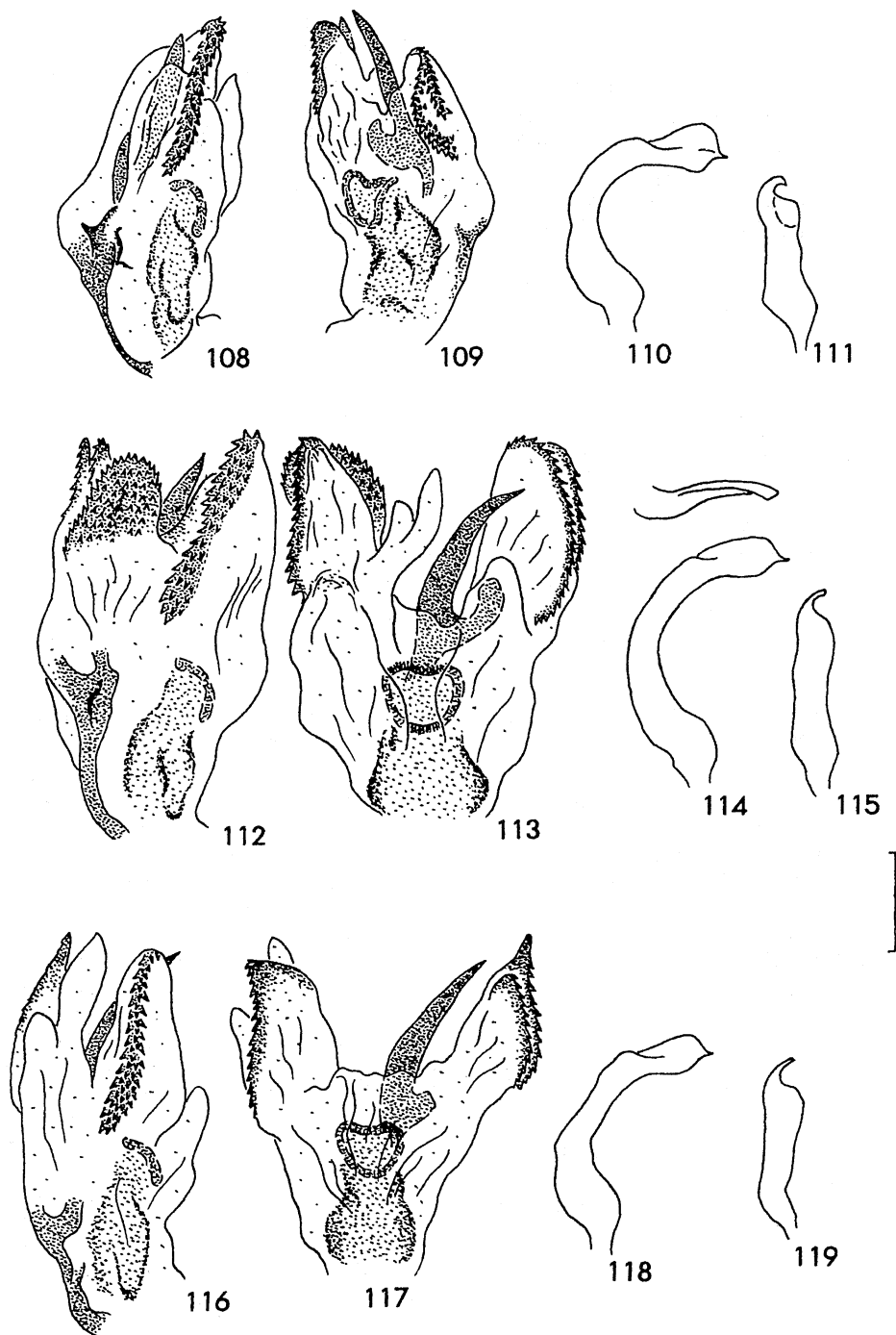


Figs 99-107. *Closterotomus*, female genitalia. 99, 100, *C. costae* Reut. (Georgia); 101, 102, *C. picturatus* Reut. (Turkey); 103, *C. histrio* Reut. (Greece); 104, 105, *C. cinctipes* Costa (Italy); 106, 107, *C. sedilloti* Put. (Algeria). 99, 101, 104, 106, vagina; 100, 102, 103, 105, 107, posterior wall of vagina. Scale: 0.5 mm.

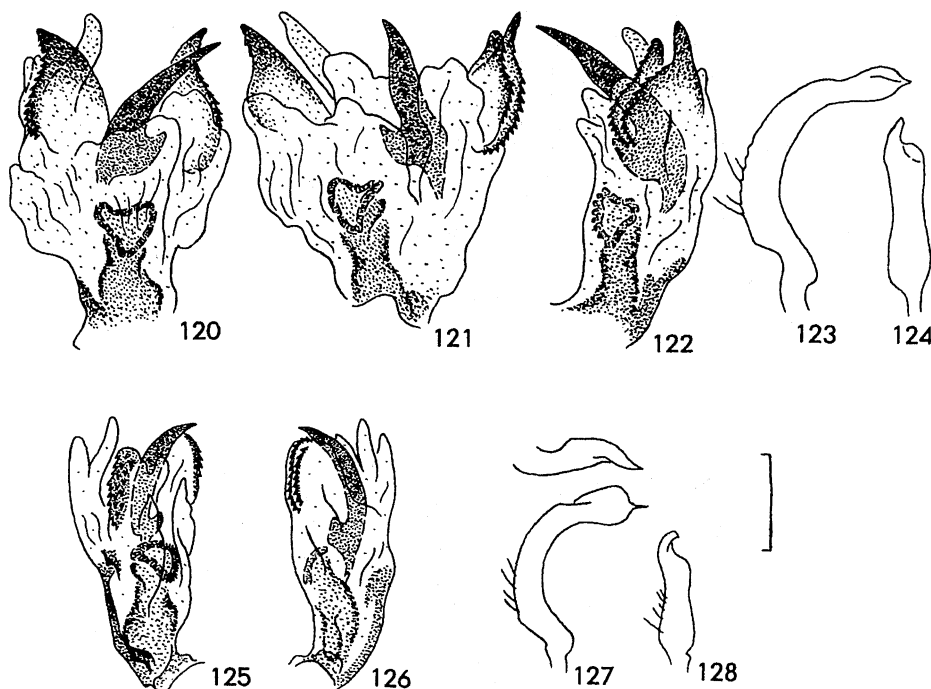
Included species: *C. tunetanus* Wgn., comb. n., *C. trivialis* Costa, comb. n., *C. venustus* Fieb., comb. n., *C. norwegicus* Gmel., comb. n., *C. longitarsis* Reut., comb. n., *C. nigro-nasutus* Reut., comb. n.

Species incertae sedis

The male genitalia and external characters of *C. marmoratus* Lindb., comb. n., according to I.M. Kerzhner (personal communica-



Figs 108-119. *Closterotomus*, male genitalia. 108-111, *C. tunetanus* Wgn. (Algeria); 112-115, *C. trivialis* Costa (Italy); 116-119, *C. venustus* Fieb. (France). 108, 109, 112, 113, 116, 117, vesica; 110, 114, 118, left paramere; 111, 115, 119, right paramere. Scale: 0.25 mm.



Figs 120-128. *Closterotomus*, male genitalia. 120-124, *C. norwegicus* Gmel. (Italy); 125-128, *C. longitarsis* Reut. (Algeria). 120-122, 125, 126, vesica; 123, 127, left paramere; 124, 128, right paramere. Scale: 0.25 mm.

tion), fit in the generic limits of variation but the forked spiculum is without a process and an additional acute sclerite is present ventrally, thus resembling *Loristes* Jos. & Kerzh.

Genus **REUTERISTA** Kirkaldy, 1904, stat. rest.

Brachybasis Reuter, 1900: 253 (as genus), nom. praeocc., non *Brachybasis* Selys, 1868 (Odonata). Type species *Brachybasis desertorum* Reuter, 1900, by monotypy.

Reuterista Kirkaldy, 1904: 280, nom. n. for *Brachybasis* Reut. (as genus); Linnavuori, 1986: 138 (as subgenus of *Calocoris*).

Calocorisellus Wagner, 1968: 162 (as subgenus of *Calocoris*); Linnavuori, 1986: 138 (as synonym of subg. *Reuterista*). Type species *Calocoris tegularis* Puton, 1888, by original designation.

Diagnosis. Pubescence mixed, consisting of black hairs and pale scales. Coloration pale yellow (greyish in males of *R. instabilis*), sometimes with pink pattern (*R. sangvineovittata*) or tinge. Base of hemelytron (tegula) with black dot (viewed lateroventrally), except *R. unicolor* sp. n. and *R. insta-*

bilis. 2nd antennal segment and scutellum always pale. Eyes large, subocular part of head only 0.30-0.42 times eye height. Rostrum short, reaching middle of mesosternum. 2nd metatarsal segment 2.0-2.2 times longer than 1st.

Left lobe of vesica long, divided into two, with 2 groups of denticles at apex. Right lobe with dentate field homologous to the small field of *Closterotomus* and 2 ventral areas membranous. Simple spiculum absent. Forked spiculum small; process reduced to basal tooth, sometimes inconspicuous. Hypophysis of left paramere short and strongly expanded. Membranous projection of vagina symmetrical. Interramal lobes with median uvulae. Median process of posterior wall circular.

Included species and distribution. The genus includes 9 species: *R. tegularis* Put., comb. n., *R. irana* Wgn., comb. n., *R. villiersi* Wgn., comb. n., *R. caucasica* Popp., comb. n., *R. unicolor* sp. n., *R. desertorum* Reut., comb. rest., *R. demeter* Lnv., comb. n., *R. sangvineovittata* Reut., comb. n., *R. instabilis* Fieb., comb. n. They inhabit deserts and semideserts of the Palearctic Region from Mo-

rocco to NW China and feed on ephemeral plants.

Notes on certain species

Reuterista caucasica (Poppius, 1912), nom. resurrect.

(Figs 134-137)

= *Calocoris poppiusi* Kerzhner & Schuh, 1995.

Linnavuori (1974) transferred *Creontiades causicus* Poppius, 1912 to the genus *Calocoris* (subgenus *Calocorisellus*) where it became a secondary homonym of *Calocoris causicus* Poppius, 1912 (subgenus *Trichocalocoris*). To resolve the homonymy, Kerzhner & Schuh (1995) proposed *Calocoris poppiusi* as a new replacement name for the first species. In this paper, the first species is placed in *Reuterista* and the second in *Brachycoleus*, the original name of the first species should be restored (Intern. Code Zool. Nomencl., Art. 59d).

Reuterista sangvineovittata Reut.

(Figs 138, 139)

Distribution. Known from Syria, Israel and Saudi Arabia (Schuh, 1995), was found also in Algeria: Abadla, 15-18.IV.1966 (Eckertlein), in the collection of the Zoological Institute, St. Petersburg.

Reuterista instabilis Fieb.

(Figs 145-148, 155, 156)

This species was included in *Calocoris* s. str. All the external characters (mixed pubescence, though pale hairs often inconspicuous; long 2nd metatarsal segment; large eyes; short rostrum) as well as genital structures (forked spiculum in vesica; shape of left paramere; features of vagina) clearly witness its belonging to *Reuterista*.

This species is somewhat isolated in the genus having the forked spiculum unusually slender and gently curved, and apices of both lobes more heavily sclerotized.

Reuterista unicolor sp. n.

(Figs 129-133, 153, 154)

Calocoris tegularis (non Puton, 1888): Carvalho, 1959 (part.); Wagner, 1971 (part.), Muminov, 1986 (misidentifications).

Calocoris villiersi (non Wagner, 1968): Linnavuori, 1974 (misidentification).

Holotype. ♂, **Uzbekistan**, Bukhara Prov., 65 km SE Uch-kuduk, 7.V.1966 (Medvedev).

Paratypes (96 specimens). **Uzbekistan:** Bukhara Prov.: 7 ♂, 2 ♀, as holotype; 32 spec., as holotype (Kerzhner); 3 ♂, 4 ♀, Kyzyl-kuduk, 8.V.1966 (Kerzhner); 1 ♀, 44 km of well Chinghildy, 3.IV.1948 (Kiritschenko); 1 ♂, Tasty-kuduk, 15.V.1912 (Zarudny). **Turkmenia:** Krasnovodsk Prov.: 4 ♂, 4 ♀, Pereval railway station, 26.IV.1889 (Semenov-Tian-Shanski); 1 ♂, Kirpili, 100 km NE Kyzyl-Arvat, 7.V.1953 (E. Arens); 1 ♂, 1 ♀, Uzboy river bed, 30 km E Yashkan, 7.V.1952 (Kryzhanovskij); 8 spec., Uzboy river bed, 25 km W Yashkan, 2.V.1952 (Slepian); *Ashkhabad* Prov.: 1 spec., Orta-Kuyu, 23.V.1953 (E. Arens); *Mary* Prov.: 1 ♂, Uch-Adzhi, 14.IV.1900 (Germs); *Chardzhou* Prov.: 17 spec., Repetek, 28.IV.1913 (A. Hohlbeck); 1 ♀, same locality, 23.IV.1914 (Plavilshchikov); 2 ♀, same locality, 17-29.IV.1947 (L. Arnoldi); 5 spec., same locality, 30.IV-4.V.1993 (A. Tishechkin). **China:** 1 ♀, [Xinjiang, env. of Cheren], V.1895 (Przewalski).

Description. Entirely pale yellowish, including tegula and veins of wing membrane; only apices of tarsi and of rostrum black. Eyes grey or rarely black. Wing membrane greyish, transparent.

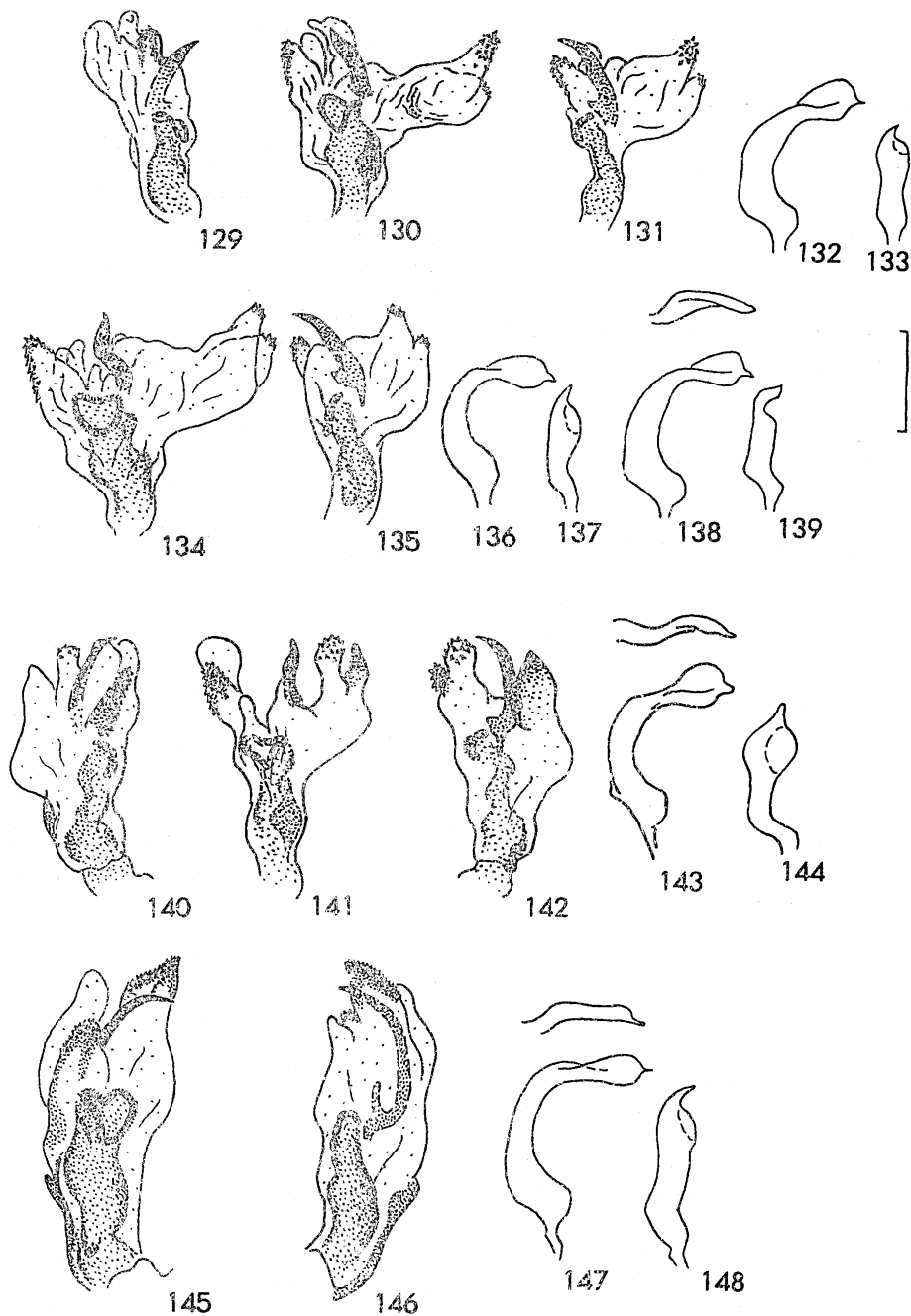
Length 6.5-7.7, width 2.0-2.5, head width 1.0-1.2 mm. Vertex in ♂ 0.86-1.00, in ♀ 1.0-1.5 times as wide as eye. 1st antennal segment 3.1-3.3 times shorter than width of pronotum and 1.50-1.67 times shorter than width of head. 2nd antennal segment 1.10-1.25 longer than width of pronotum. Antennal formula 2.4-3 : 10 : 5-6 : 2.6-3. Rostrum reaching middle of mesosternum. Metatarsal formula 1 2.0-2.2 : 2.5-3.0.

Distribution. Kyzylkum, Karakum, Iran (prov. Khorasan; personal communication of R. Linnavuori) and N Chinese deserts.

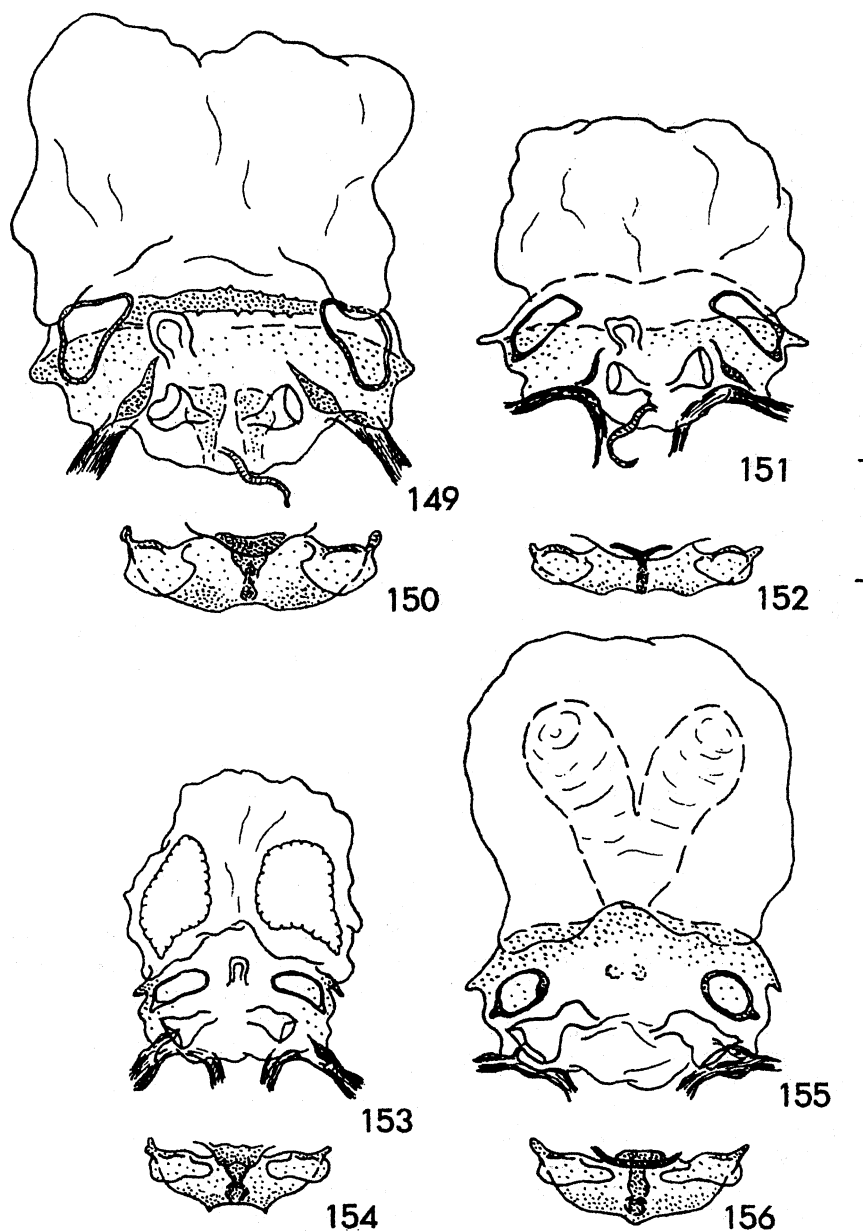
Comparison. The new species differs from all related species in the absence of black dot on tegula, thus being completely unicolorous.

In *R. tegularis* Put. distributed in N Africa, Sudan, Israel, and Saudi Arabia, the vertex is narrower (in ♂ 0.70-0.87, in ♀ 0.87-1.22 times as wide as eye); 1st antennal segment 3.0-3.3 times shorter than width of pronotum and 1.67-2.00 times shorter than width of head. This species might be conspecific with *R. irana* Wgn. judging by measurements and genital structures.

In *R. caucasica* Popp. (Figs 134-137) from Georgia and Armenia, the antennae are longer and pronotum narrower: 1st antennal segment only 2.5 times shorter than width of pronotum and 1.5 times shorter than width of head; 2nd segment 1.25-1.50 times longer than width of pronotum; vertex in ♂ also narrower, 0.70-0.85 times as wide as eye.



Figs 129-148. *Reuterista*, male genitalia. 129-133, *R. unicolor* sp. n. (Uzbekistan, paratype); 134-137, *R. caucasica* Popp. (Armenia); 138, 139, *R. sanguineovittata* Reut. (Saudi Arabia); 140-144, *R. demeter* Lnv. (Algeria); 145-148, *R. instabilis* Fieb. (Cyprus). 129-131, 134, 135, 140-142, 145, 146, vesica; 132, 136, 138, 143, 147, left paramere; 133, 137, 139, 144, 148, right paramere. Scale: 0.25 mm.

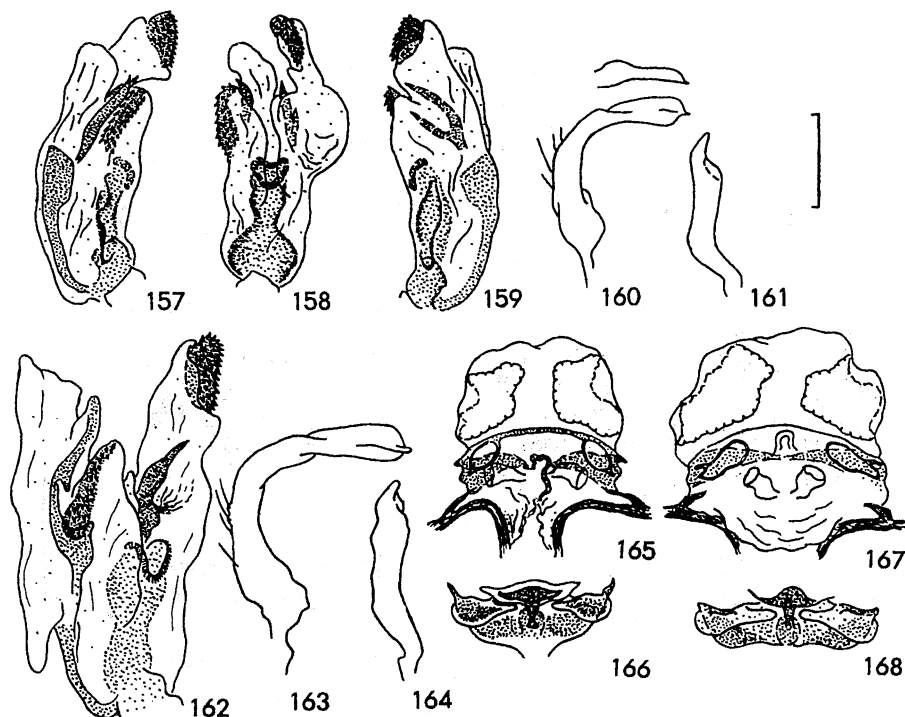


Figs 149-156. *Closterotomus* and *Reuterista*, female genitalia. 149, 150, *C. norvegicus* Gmel. (Poland); 151, 152, *C. longitarsis* Reut. (Algeria); 153, 154, *R. unicolor* sp. n. (Turkmenia, paratype); 155, 156, *R. instabilis* Fieb. (Algeria). 149, 151, 153, 155, vagina; 150, 152, 154, 156, posterior wall of vagina. Scale: 0.5 mm.

In *R. demeter* Lnv. (Figs 140-144) from N Africa, Saudi Arabia and Iraq, the veins of wing membrane and hind margins of corium and cuneus are pink; 1st antennal segment 3.3 times shorter than width of pronotum and 1.67-2.00 times shorter than width of

head; also certain differences in the shape of left lobe of vesica and right paramere present.

R. sanguineovittata Reut. (Figs 138, 139) possesses well developed pink pattern and transverse furrow on pronotum behind calli.



Figs 157-168. *Brachycoleus* spp. 157-161, 165, 166, *B. pilicornis* Pz. (Ukraine); 162-164, 167, 168, *B. decolor* Reut. (Kazakhstan). 157-159, 162, vesica; 160, 163, left paramere; 161, 164, right paramere; 165, 167, vagina; 166, 168, posterior wall of vagina. Scale: 157-164, 0.25 mm; 165-168, 0.5 mm.

Genus **BRACHYCOLEUS** Fieber, 1858
(Figs 157-168)

Brachycoleus Fieber, 1858. Type species *Lygaeus scriptus* Fabricius, 1803 (= *Brachycoleus scriptus* var. *decolor* Reuter, 1887), by monotypy.

Trichocalocoris Wagner, 1952:96 (as subgenus of *Calocoris*), **syn. n.** Type species *Capsus pilicornis* Panzer, 1805, by original designation.

Diagnosis. Body covered with erect and semierect yellowish fine hairs, longer than thickness of tibia; isolated dark hairs sporadically occur near lateral margins of hemelytra. Coloration with prevailing red, orange and yellow tinges, black pattern more or less developed. Frons markedly projecting over clypeus. Subocular part of head 0.7 eye height. Rostrum reaching middle of mesosternum or (in *B. pilicornis* and *B. caucasicus*) mesocoxae.

Male genitalia (Figs 157-164). Apex of left lobe of vesica with well developed dentate plate. Simple spiculum present. Forked spiculum with long or reduced process. Right lobe divided into two, dorsal part

marginated with dentate field, ventral part membranous.

Female genitalia (Figs 165-168). Membranous projection of vagina symmetrical. Interramal lobes with median uvulae. Median process of posterior wall circular.

Interrelations. The length of rostrum and structure of the female genitalia indicate the affinity with *Reuterista*.

Included species. Wagner (1952, 1971) included in the subgenus *Trichocalocoris* the following species: *Calocoris pilicornis* Pz., *C. caucasicus* Popp., *C. schmidtii* Fieb. and *C. lineolatus* Costa. The two latter species belong to *Mermitelocerus* and *Horwathia* respectively (see proper sections); the two former display obvious generic identity with *Brachycoleus* and are transferred to this genus (*B. pilicornis* Pz., comb. n., *B. caucasicus* Popp., comb. n.) in addition to the seven species placed in this genus currently.

Notes on taxonomy. *B. caucasicus* Popp. differs from *B. pilicornis* Pz. in the thicker 2nd antennal segment (Poppius, 1912), pale vertex and tarsi, black collar in male and ab-

sence of black spot in apical third of femora. However, in Algerian specimens of *B. pilicornis* the tarsi are pale and femora lacking black spot, but they have a black stripe on vertex (often interrupted or absent in females) and pale collar, like European populations. All the foregoing might suggest a subspecific rank for these 3 groups of populations.

***Brachycoleus pilicornis orientalis* ssp. n.**

Holotype. ♂, **Kazakhstan, Alma-Ata Prov.**: Lepsinsk (collection of Kiritschenko).

Paratypes (11 specimens). **Kazakhstan, Alma-Ata Prov.**: 1 ♂, 3 ♀, as holotype; 4 ♂, 3 ♀, 8-11 km SE of Sarkand, on *Euphorbia*, 7.VI.1957 (Kerzhner).

Description. Overall colour yellow. Vertex always with black stripe; collar pale; tarsi black. Femora with 2 brown rings: in apical third and on very top. Length 6.5-7.5 mm.

Comparison. Distinguished from the nominotypical subspecies by the yellow coloration and additional dark ring on the top of femora. The population from the SE Kazakhstan (foothills of Dzhungar Alatau) is the easternmost and seems to be isolated from the nearest populations (Central Kazakhstan).

II. Genus *POLYMERIAS* Yasunaga, 1997 (Figs 169-174)

Type species *Polymerias lonicerae* Yasunaga, 1997 (= *Calocoris opacipennis* Lindberg, 1934).

Description. Medium-sized, oval. Coloration almost entirely black, including ostiolar peritreme. Both sexes macropterous. Upper side of body not punctured, scutellum and hemelytra corrugate. Pubescence silvery, flattened, on exocorium and lateral parts of cuneus yellowish, fine. Vertex without longitudinal furrow or transverse carina. Rostrum reaching hind third of mesosternum. Collar not shorter than thickness of 2nd antennal segment at base. Hind femora neither flattened nor lengthened. Tibiae with black pubescence. 1st metatarsal segment 1.7 times shorter than 2nd. Pygophore without denticles.

Vesica (Figs 169, 170) asymmetrical, with 5 membranous lobes; right dorsal lobe with rounded dentate plate near apex. 3 lobes of ventral group large, with pattern of feebly sclerotized stripes; 2 dorsal lobes smaller. Left paramere (Fig. 171) with poorly developed sensory lobe; hypophysis expanded, with longitudinal carina and acute projec-

tion near base dorsally (compare *Closterotomus biclavatus* H.-S., Fig. 4). Internal margin of right paramere (Fig. 172) convex.

Vagina (Fig. 173) with sclerotized stripe ventrally. Parietal glands oblong, rather extended. Interramal lobes (Fig. 174) attached along their whole width, reaching median line of posterior wall.

Comparison. The structure of genitalia, type of pubescence and other characters differentiate this genus from other genera of the tribe. Its phylogenetic connections are not traced. In the shape of the left paramere and externally, *Polymerias* resembles *Closterotomus* Fieb. (where it was included); the latter differs in the presence of black hairs, ostiolar peritreme always pale even in darkest species, bilobate vesica bearing 1-2 spiculi and interramal lobes widely extended.

The Far Eastern *Loristes* Jos. & Kerzh., also pubescent with only golden flattened hairs and living on honeysuckle, differs in the vesica bearing 3 spiculi and 2 dentate fields; maxillary plates (lorae) partly screening mandibular plates (bucculae); pronotum and scutellum distinctly convex; ostiolar peritreme and tibial spines pale.

Certain similarities of vesicae of *Polymerias* and *Calocoris* are obviously convergent.

Included species. The genus includes one species.

***Polymerias opacipennis* (Lindberg, 1934), comb. n.**

Calocoris opacipennis Lindberg, 1934: 17; Kerzhner, 1988a: 816.

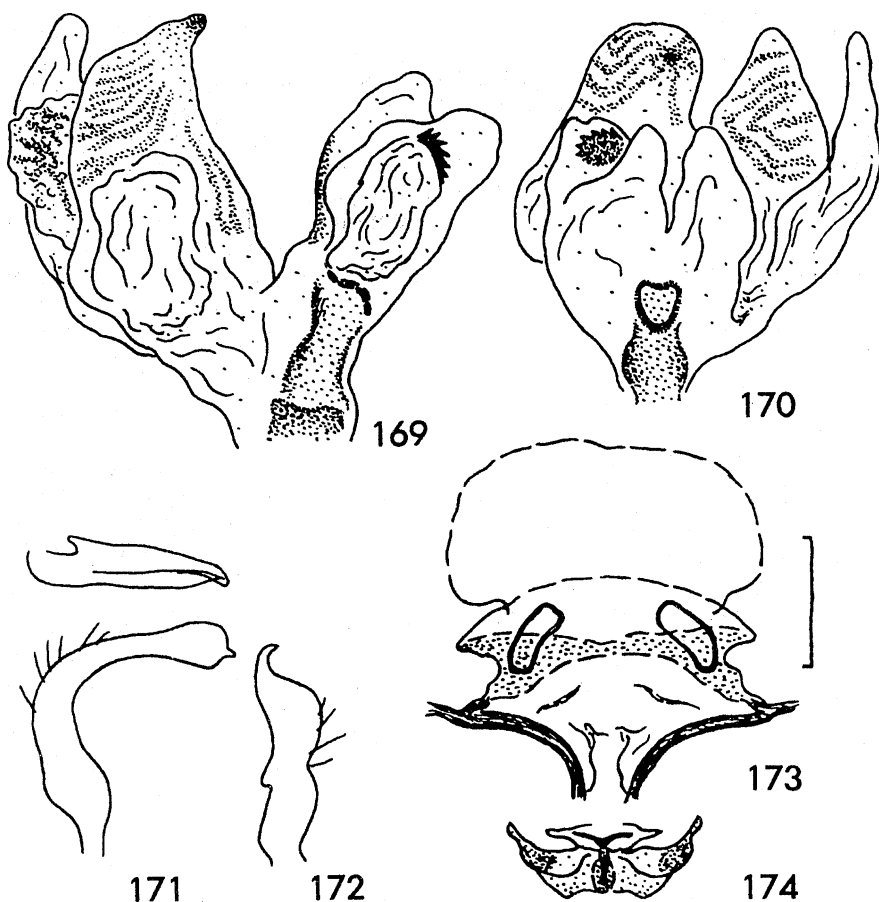
Polymerias lonicerae Yasunaga, 1997: 118, **syn. n.**

The species is distributed in the Far East of Russia (Primorsk Terr.), Korea and Japan. In Russia it feeds on honeysuckle (*Lonicera maackii*), but in Japan it was collected from *Staphylea bumalda*.

III. Genus *THIOMIRIS* gen. n. (Figs 175-179)

Type species *Calocoris sulphureus* Reuter, 1879.

Description. Large and oblong. Coloration entirely yellow, tarsi and apex of rostrum black. Both sexes macropterous. Upper side of body not punctured. Pubescence golden, fine. Vertex without longitudinal furrow or transverse carina. Antennae long, especially 3rd segment which is only 1.25 times shorter than 2nd; length of 2nd segment about 1.5 times greater than width of pronotum. Col-



Figs 169-174. *Polymerias opacipennis* Lindb. (Russia, Primorsk Terr). 169, 170, vesica; 171, left paramere; 172, right paramere; 173, vagina; 174, posterior wall of vagina. Scale: 169-172, 0.25 mm; 173, 174, 0.5 mm.

lar as long as thickness of 2nd antennal segment at base. Rostrum reaching metacoxae. Large cell of wing membrane angular (Fig. 179). Hind femora neither flattened nor lengthened.

Vesica (Figs 175, 176) with 4 large membranous lobes and 2 smaller lobes surrounding gonopore. Margin of right lobe with oblong dentate plate. Spiculum broad and flat, convex dorsally. Left paramere (Fig. 177) with well developed sensory lobe; hypophysis forming a hook. Right paramere (Fig. 178) expanded towards apex; hypophysis very small, pointed.

Comparison. The genus resembles externally *Adelphocoris* Reut. in the type of pubescence, long 3rd antennal segment (in *Adelphocoris*, 1.23-1.37 times shorter than 2nd) and angular cell of wing membrane.

The vesicae of *Adelphocoris* spp. possess comb-shaped spiculum on the right and slender twisted spiculum on the left, left paramere different, male genital segment with denticle on the left.

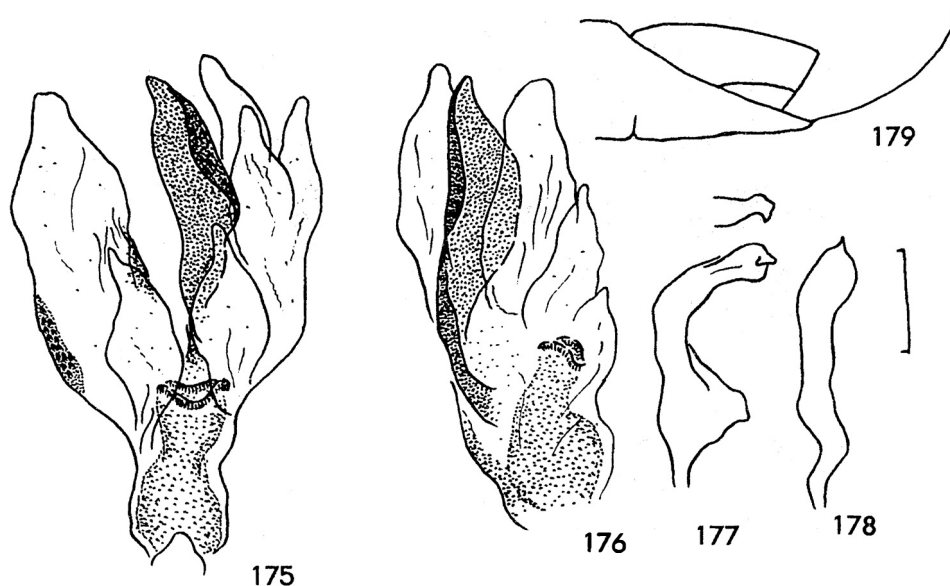
Included species. The single species, *Th. sulphureus* Reut., comb. n. is distributed in S Europe.

Etymology. The generic name is partly derived from the Greek "theiodes" (sulphur).

Gender: masculine.

IV. GENERA OF THE *CALOCORIS* COMPLEX

Large and medium-sized, oblong-oval. Both sexes macropterous (except *Horwathia*). Upper side of body not punctured. Vertex without longitudinal furrow or trans-



Figs 175-179. *Thiomiris sulphureus* Reut. (Spain). 175, 176, vesica; 177, left paramere; 178, right paramere; 179, cells of wing membrane. Scale: 175-178, 0.25 mm; 179, 1 mm.

verse carina. Collar not shorter than thickness of 2nd antennal segment at base. Hind femora neither flattened nor lengthened. Male genital segment usually without denticles.

Vesica subsymmetrical, typically 6-lobate, without spiculi, with more or less developed dentate structures on right lobe, in some *Grypocoris* and *Rauniella* gen. n. also on left lobes. Homologous series of variation in length of dentate structure often observed between related species and subspecies.

Left paramere with sensory lobe more prominent than in *Closterotomus*, dorsal margin with a row of setiferous tubercles (Figs 199, 206, 217, 237), hypophysis not flattened and always ending with downturned hook. However, such a structure is observed in many Mirini and cannot be treated as an autapomorphy. Possibly, this hook has the same function as the upturned plate of *Nabis* parameres (Kerzhner, 1981:37): to draw aside the 9th gonocoxite of the female during copulation.

Parietal glands of vagina subrectangular or triangular, placed rather close together, sometimes connected (Figs 222, 257). Inter-ramal lobes narrow, attached along their whole width and reaching median line of posterior wall.

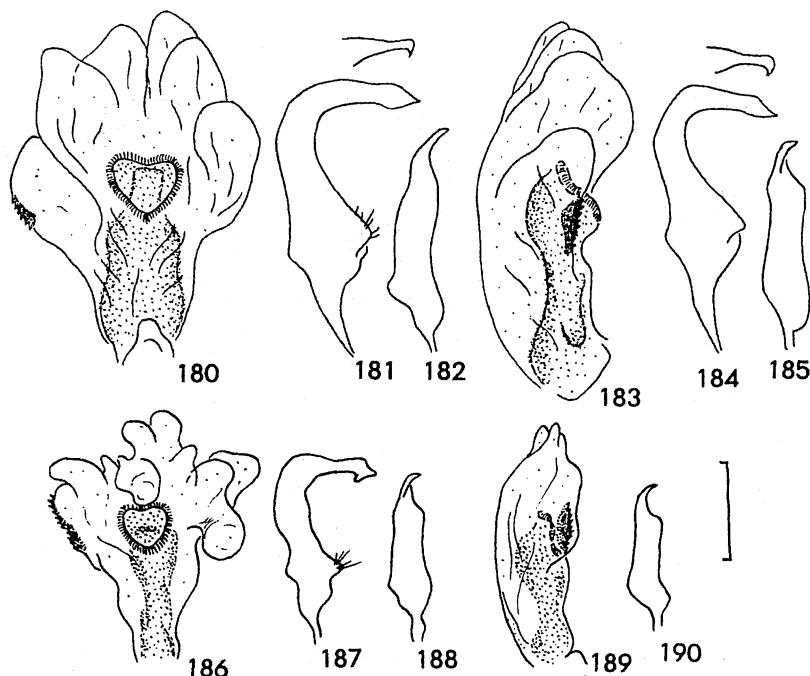
Key to the genera and subgenera of the *Calocoris* complex

- 1(6). Pubescence black.
- 2(3). Pubescence adpressed (in *C. alpestris* M.-D. semierect on pronotum and scutellum). Overall colour green (except *C. nemoralis* F. and *C. porphyropterus* Reut.). Rostrum reaching or surpassing metacoxae ***Calocoris*** Fieb.
- 3(2). Pubescence semierect or partly erect. Rostrum reaching mesocoxae.
- 4(5). Overall colour green; scutellum pale. Both sexes macropterous ***Mermilocerus*** Reut.
- 5(4). Overall colour brownish; scutellum black. Female subbrachypterous ***Horwathia*** Reut.
- 6(1). Pubescence pale or mixed.
- 7(12). Pubescence pale, fine. Coloration black and yellow ***Grypocoris*** Dgl. & Sc.
- 8(11). Tibial spines black. Eyes not touching collar.
- 9(10). Calli enlarged, almost fused. Rostrum reaching mesocoxae sg. ***Grypocoris*** Dgl. & Sc.
- 10(9). Calli small, almost separate. Rostrum reaching metacoxae sg. ***Turciocoris*** Wgn.
- 11(8). Tibial spines pale. Eyes touching collar sg. ***Lophyromiris*** Wgn.
- 12(7). Pubescence mixed. Coloration uniformly yellowish ***Rauniella*** gen. n.

Genus **CALOCORIS** Fieber, 1858

(Figs 180-204, 220-225)

Calocoris Fieber, 1858: 305; Oshanin, 1912: 62. Type species *Capsus affinis* Herrich-Schaeffer, 1835, by subsequent designation (Kirkaldy, 1906: 37).



Figs 180-190. *Calocoris*, male genitalia. 180-182, *C. r. roseomaculatus* De G. (Russia, Tver' Prov.); 183-185, *C. r. angularis* Fieb. (Georgia); 186-188, *C. r. saucius* Lnv. (Iran); 189, 190, *C. r. decolor* Reut. (Algeria). 180, 183, 186, 189, vesica; 181, 184, 187, left paramere; 182, 185, 188, 190, right paramere. Scale: 0.25 mm.

Charitides Kerzhner, 1962: 140, syn. n. Type species *Charitides smaragdinus* Kerzhner, 1962, by original designation.

Macrocalocoris Wagner, 1968: 160 (as subgenus of *Calocoris*), syn. n. Type species *Cimex nemoralis* Fabricius, 1787, by original designation.

Diagnosis. Coloration mostly green, sometimes with black, brownish or pink pattern (exceptions: the very polymorphic *C. nemoralis* F. and the reddish *C. porphyropterus* Reut.). Pubescence consisting of black fine adpressed hairs (in *C. alpinus* M.-D., semi-erect on pronotum and scutellum). Eyes touching collar. Rostrum reaching or surpassing metacoxae.

Vesica 6-lobate, almost symmetrical. Right lobe with small dentate plate or linear dentate structure. Secondary gonopore heart-shaped. Hypophysis of left paramere forming almost right angle with paramere stem. Hypophysis of right paramere gently curved, in *C. nemoralis* F. and *C. affinis* H.-S. bifurcate at apex (Figs 193, 201).

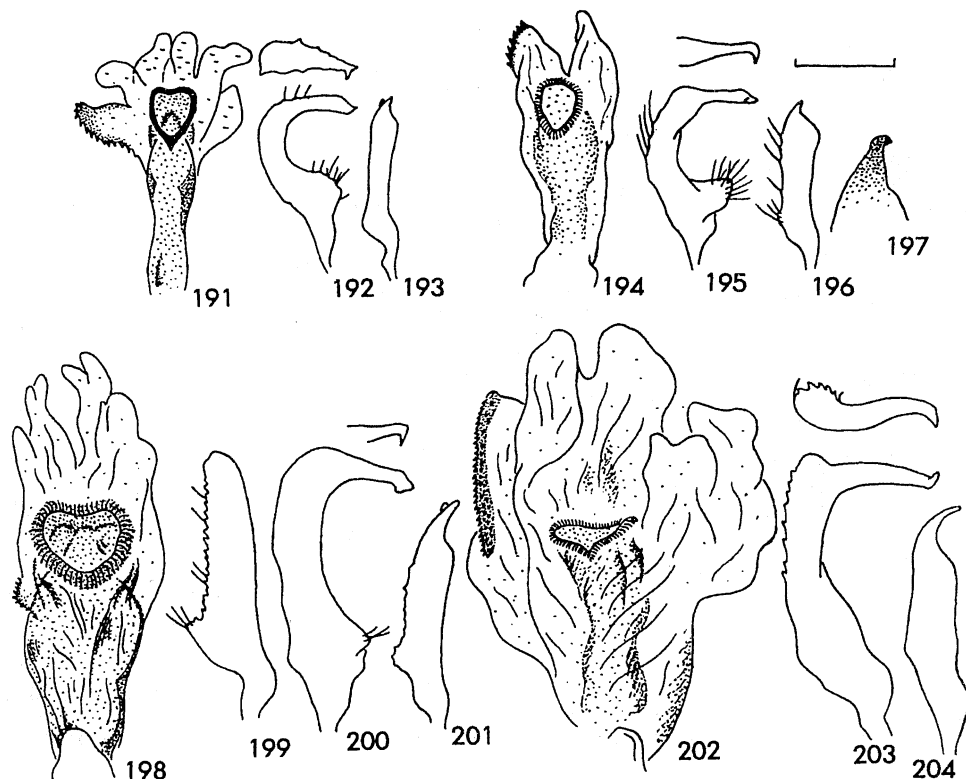
Included species. Our concept of *Calocoris* differs from the former concept of the subgenus *Calocoris* s. str.: *C. norwegicus* Gmel.

and *C. instabilis* Fieb. are transferred to *Closterotomus* and *Reuterista* and *C. smaragdinus* Kerzh., comb. n. (*Charitides*) and *C. nemoralis* F. (the only species of the subgenus *Macrocalocoris*) are included in *Calocoris* in the restricted sense.

The monotypic *Charitides* displays close relationship with *C. affinis* H.-S. in the body shape, structure of antennae and genitalia (Figs 194-197, compare 191-193) and might be its vicariant.

The diagnostic characters of the subgenus *Macrocalocoris* are the entirely black head and wing membrane, large size, and frons not projecting over clypeus. But the characters of greater taxonomic weight, genitalia (Figs 198-201, 224, 225) and pubescence, show complete similarity to the *affinis* species group.

The genus now includes 7 species: *C. roseomaculatus* De G., *C. nemoralis* F., *C. affinis* H.-S., *C. smaragdinus* Kerzh., *C. rubicundus* Reut., *C. porphyropterus* Reut. and *C. alpestris* M.-D. All of them are distributed in Europe and Mediterranean, except *C. smaragdinus* which is endemic to the Dzhungar Alatau Mts in E Kazakhstan.



Figs 191-204. *Calocoris*, male genitalia. 191-193, *C. affinis* H.-S. (Ukraine); 194-197, *C. smaragdinus* Kerzh. (Kazakhstan); 198-201, *C. nemoralis* F. (Syria); 202-204, *C. alpestris* M.-D. (Austria). 191, 194, 198, 202, vesica; 192, 195, 199, 200, 203, left paramere; 193, 196, 201, 204, right paramere; 197, apex of theca. Scale: 0.25 mm.

Calocoris roseomaculatus (De Geer, 1773)

The opinion on the subspecific rank of *C. angularis* Fieb. was expressed by Wagner & Weber (1964). The data kindly provided by A. Gogala and F. Faraci and the examination of extensive material in the collection of the Zoological Institute, St. Petersburg, allowed us to conclude that *C. roseomaculatus* De G. is a polytypic species including 4 subspecies.

Calocoris roseomaculatus roseomaculatus (De Geer, 1773) (Figs 180-182, 220, 221)

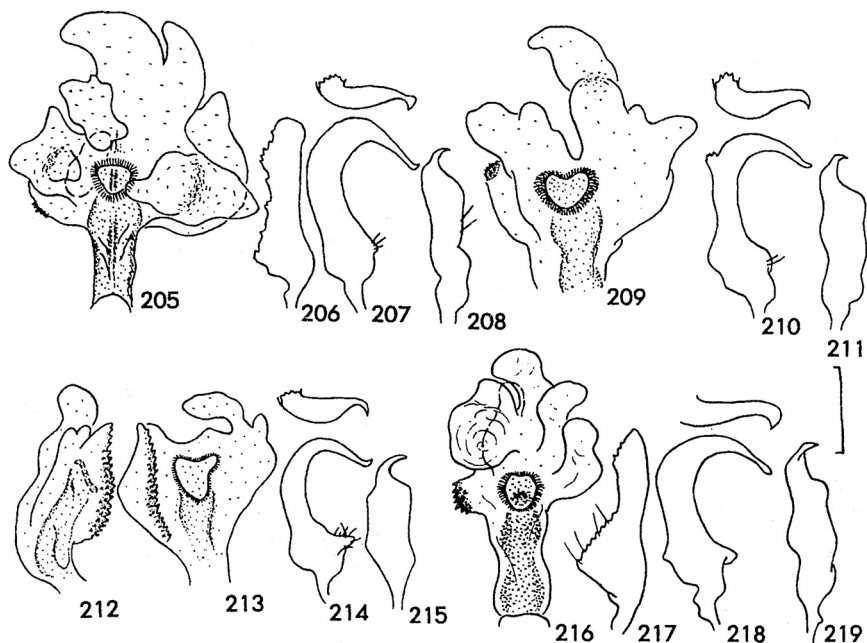
Both sexes with pink pattern, head with black Y-pattern; antennae and collar pale. Length 6.5-8.0 mm. Dentate plate of vesica 80-110 μ m long. Lateral margin of right paramere often (not always) with protruding tubercle at base, unlike *C. r. angularis*; hypo-

physis curved more strongly. Inhabits the forest zone of Europe.

Calocoris roseomaculatus angularis (Fieber, 1864), stat. n. (Figs 183-185)

Calocoris angularis (Fieber, 1864).

Males with brownish pattern, head with black Y-pattern; females pale (though a female from Belgrade possessed pink pattern); antennae and collar pale. Length 5.8-8.0 mm, females not smaller than in the nominotypical subspecies. Dentate plate 140-160 μ m long. Distributed in France (Corsica), Italy, the whole Balkan Peninsula, S Romania, S Ukraine, Georgia, Armenia, Azerbaijan and Turkey. *C. r. angularis* and *C. r. roseomaculatus* are allopatric in Eastern Europe where their ranges in Ukraine are separated by a wide area where the species does not occur, but the situation in the contact zone in N Italy remains unclear.



Figs 205-219. *Mermitelocerus* and *Horwathia*, male genitalia. 205-208, *M. schmidtii* Fieb. (Armenia); 209-211, *M. annulipes prasinus* Reut. (Russia, Primorsk Terr.); 212-215, *H. lineolata* Costa (Austria); 216-219, *H. hieroglyphica* Mls. & Rey (Ukraine). 205, 209, 212, 213, 216, vesica; 206, 207, 210, 214, 217, 218, left paramere; 208, 211, 215, 219, right paramere. Scale: 0.25 mm.

***Calocoris roseomaculatus saucius* Linnavuori, 1951**
(Figs 186-188)

Pattern pink, pronotum coloured more intensely; 2 black stripes on reddish background. Head black, except lorae, bucculae, two spots near eyes and sometimes indistinct stripe on vertex. 1st antennal segment black, other segments and collar pale. Smaller (6.0-6.3 mm), but females from Iran reaching 7.0 mm. Dentate structure linear, 190-240 μ m long. Right paramere rather as in *C. r. angularis* (see drawings in Linnavuori, 1951), without tubercle at base and with hypophysis more straight. Originally described from Israel and Algeria, but the Algerian specimens should be referred to the next subspecies. Later recorded from Iraq, and in the Zoological Institute, St. Petersburg there are also specimens collected in W Iran (Lurestan, Khuzestan) by N. Zarudny.

***Calocoris roseomaculatus decolor* Reuter, 1902, stat. n.**
(Figs 189, 190)

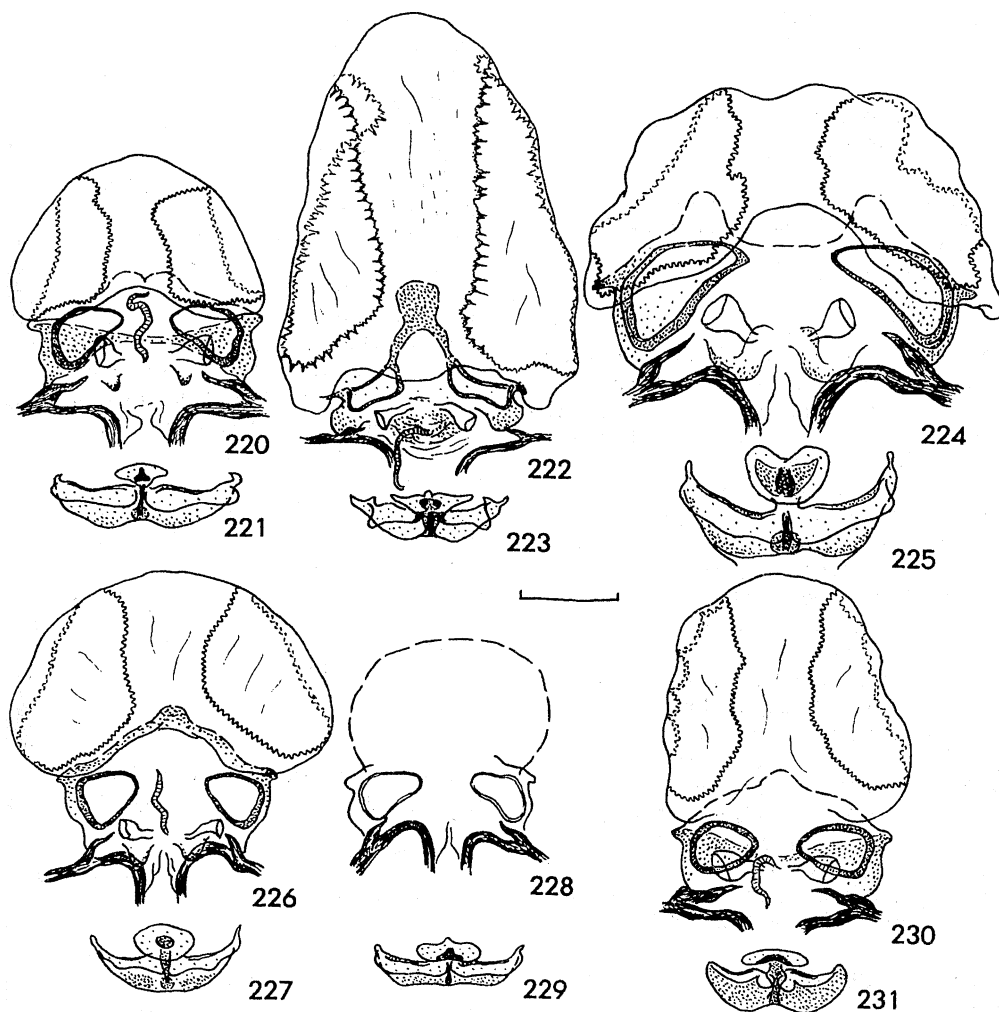
Calocoris roseomaculatus var. *decolor* Reuter, 1902.

Coloration as in *C. r. saucius* but in fully coloured specimens 2nd antennal segment blackened at base and at apex; collar in males often black. The smallest subspecies: σ 5.0-6.0, ϕ 6.0 mm. Dentate plate 130 μ m long. Right paramere more alike that of *C. r. roseomaculatus*. Distribution: Algeria (lectotype from Lambessa in Reuter's heterogeneous type series designated by Kerzhner, 1996). Probably all records of *C. roseomaculatus* from N Africa refer to this subspecies.

Genus *MERMITELOCERUS* Reuter, 1908
(Figs 205-211, 226, 227)

Mermitelocerus Reuter, 1908; Yasunaga & Miyamoto, 1991. Type species *Mermitelocerus annulipes* Reuter, 1908, by monotypy.

Diagnosis. Coloration green, with weakly developed black pattern. Pubescence black, fine, semierect. Eyes touching collar. Rostrum comparatively short, reaching mesocoxae. 2nd antennal segment clavate, except *M. schmidtii* Fieb. In *M. annulipes* Reut., male genital segment with rounded projection on the left.



Figs 220-231. *Calocoris*, *Mermelocerus* and *Horvathia*, female genitalia. 220, 221, *C. r. roseomaculatus* De G. (Russia, Tver' Prov.); 222, 223, *C. affinis* H.-S. (Belarus); 224, 225, *C. nemoralis* F. (Syria); 226, 227, *M. annulipes prasinus* (Russia, Sakhalin Prov.); 228, 229, *H. lineolata* Costa (Austria); 230, 231, *H. hieroglyphica* Mls. & Rey (Ukraine). 220, 222, 224, 226, 228, 230, vagina; 221, 223, 225, 227, 229, 231, posterior wall of vagina. Scale: 0.5 mm.

Vesica (Figs 205, 209) asymmetrical, left lobe larger; right lobe with small (60 μ m) dentate plate; in *M. viridis* Yas. & Miy. with linear dentate structure (350 μ m). Left paramere with arched hypophysis and a projection on dorsal margin; setiferous tubercles transformed into noticeable teeth (Figs 206, 207, 210).

Included species. Wagner (1974: 297) included *Calocoris schmidtii* Fieb. and *C. lineolatus* Costa in the subgenus *Trichocalocoris* Wgn. based on their semierect pubescence. But the black colour of the hairs, which is a

more reliable character, and the structure of the vesica and parameres clearly show that these species belong to the *Calocoris* complex, as was pointed out by Kerzhner (1964: 726). Judging also by the asymmetry of vesica and the shape of left paramere, they should be placed in *Mermelocerus* and *Horvathia* respectively.

The genus contains 3 species: *M. schmidtii* Fieb., comb. n., *M. annulipes* Reut. (with ssp. *prasinus* Reut.), and *M. viridis* Yas. & Miy. The range of the genus is disjunctive: *C. schmidtii* occurs in Europe, Caucasus and

Kopetdag, the two other species are distributed in the Far East.

Genus **HORWATHIA** Reuter, 1881
(Figs 212-219, 228-231)

Horwathia Reuter, 1881. Type species *Lopus vittatus* Horváth, 1876 (= *Capsus hieroglyphicus* Mulsant & Rey, 1852), by monotypy.

Horwathia: incorrect subsequent spelling.

Diagnosis. Coloration brownish, with more or less developed black pattern, at least scutellum black. Pubescence black, fine, semierect or partly erect. Female subbrachypterous. Eyes touching collar. Rostrum reaching mesocoxae.

Vesica asymmetrical, left lobe larger; right lobe with small or linear dentate structure (Figs 212, 213, 216). Left paramere curved archwise (Figs 214, 217, 218).

In *H. hieroglyphica* Muls. & Rey interramal lobes medially with peculiar circular uvulae (Fig. 231).

Relationships and included species. The type of pubescence, length of rostrum, asymmetry of vesica and arched left paramere indicate very close affinity to *Mermitelocerus*. *Horwathia* includes *H. lineolata* Costa, comb. n. and *H. hieroglyphica* Muls. & Rey. They are similar in the slightly subbrachypterous females and in the coloration; both species are alpine and feed on Poaceae (Seidenstücker, 1984; Schuh, 1995).

Genus **GRYPOCORIS** Douglas & Scott, 1868
(Figs 232-250, 255-258)

Grypocoris Douglas & Scott, 1868. Type species *Grypocoris fieberi* Douglas & Scott, 1868, by monotypy.

Diagnosis. Coloration contrasting, yellow with black pattern. Pubescent with pale, fine, adpressed hairs.

Vesica more markedly bilobate than in *Calocoris*; its surface sometimes covered with numerous microspinules (Figs 232, 233, 236); secondary gonopore shaped like an inverted saddle. Left paramere with thickened hypophysis; setiferous tubercles sometimes transformed into teeth (Figs 234, 237). Hypophysis of right paramere distinctly angular; stem often narrowed.

Parietal glands of vagina oblong, subrectangular, medially dilated, close together or even connected. Surface of membranous sac

between sclerotized rings with gently sclerotized film.

Distribution and composition. The genus includes 9 species; the subgenera *Grypocoris* and *Turciocoris* include endemic species from the East Mediterranean (Turkey, Syria, Lebanon, Israel, Armenia, Azerbaijan, Kopetdag); species of the subgenus *Lophyromiris* inhabit Europe (mostly the forest zone).

Wagner erected the subgenus *Turciocoris* based on the size of the calli and pronotal pattern. This action, however, seems not to be supported by the male genitalia displaying great diversity (Figs 232-246): from complete reduction of sclerotization in vesica of *G. melanopygus* to unusually rich armaments on both lobes in *G. heinzi*.

The subgenus *Lophyromiris* belongs to *Grypocoris* though formerly it was included in *Calocoris* because of such superficial character as eyes adjoining collar. It is noteworthy that Kolenati (1846) united the representatives of the current subgenera *Turciocoris* and *Lophyromiris* in his subgenus *Lophyrus*.

Subgenus **Turciocoris** Wagner, 1966
(Figs 232-235, 240-243, 255, 256)

Turciocoris Wagner, 1966 (as subgenus of *Grypocoris*).

Type species *Grypocoris syriacus* Reuter, 1896, by original designation.

Diagnosis. Eyes not adjoining collar. Rostrum reaching metacoxae. Calli small, smoothed. Pronotum with pattern of longitudinal stripes. Ostiolar peritreme black (except *G. heinzi*). Tibial spines black.

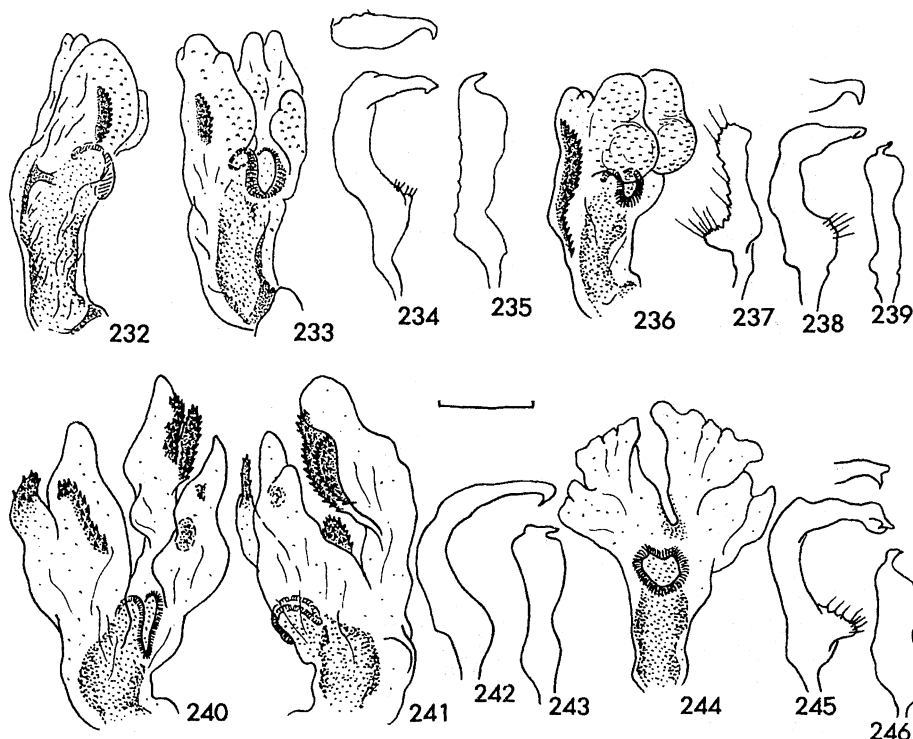
Included species: *G. syriacus* Reut., *G. meyeri* Kol., *G. amoenus* Dgl. & Sc., *G. heinzi* Wgn.

Subgenus **Grypocoris** Douglas & Scott, 1868
(Figs 236-239, 244-246)

Grypocoris Douglas & Scott, 1868. Type species *Grypocoris fieberi* Douglas & Scott, 1868, by monotypy.

Diagnosis. Eyes not adjoining collar. Rostrum reaching mesocoxae. Calli large, almost fused. Pronotum with 2 spots behind calli. Ostiolar peritreme pale. Tibial spines black.

Included species: *G. fieberi* Dgl. & Sc., *G. melanopygus* Horv., *G. ajderensis* V. Putshk.



Figs 232-246. *Grypocoris*, male genitalia. 232-235, *G. meyeri* Kol. (Armenia); 236-239, *G. ajderensis* V. Putshk. (Turkmenia); 240-243, *G. heinzi* Wgn. (Turkey); 244-246, *G. melanopygus* Horv. (Turkey). 232, 233, 236, 240, 241, vesica; 234, 237, 238, 242, 245, left paramere; 235, 239, 243, 246, right paramere. Scale: 0.25 mm.

Subgenus **Lophyromiris** Wagner, 1958
(Figs 247-250, 257, 258)

Lophyrus Kolenati, 1845: 105 (as subgenus of *Polymerus*), nom. praeocc., non *Lophyrus* Poli, 1791 (Mollusca). Type species *Cimex sexguttatus* Fabricius, 1777, by subsequent designation (Kirkaldy, 1906: 137).

Lophyromiris Wagner, 1958 (as subgenus of *Calocoris*). Type species *Cimex sexguttatus* Fabricius, 1777, by original designation.

Diagnosis. Eyes adjoining collar. Rostrum reaching middle of metasternum. Calli small, smoothed. Pronotum with pattern of longitudinal stripes. Ostiolar peritreme pale. Tibial spines pale brown.

Included species: *G. sexguttatus* F., comb. n., *G. styasi* Wgn., comb. n.

Genus **RAUNIELLA** gen. n.

Type species *Calocoris* (s. str.) *ishtar* Linnavuori, 1984.

Description. Coloration uniformly yellowish. Pubescence consisting of black fine hairs coupled with golden flattened scales.

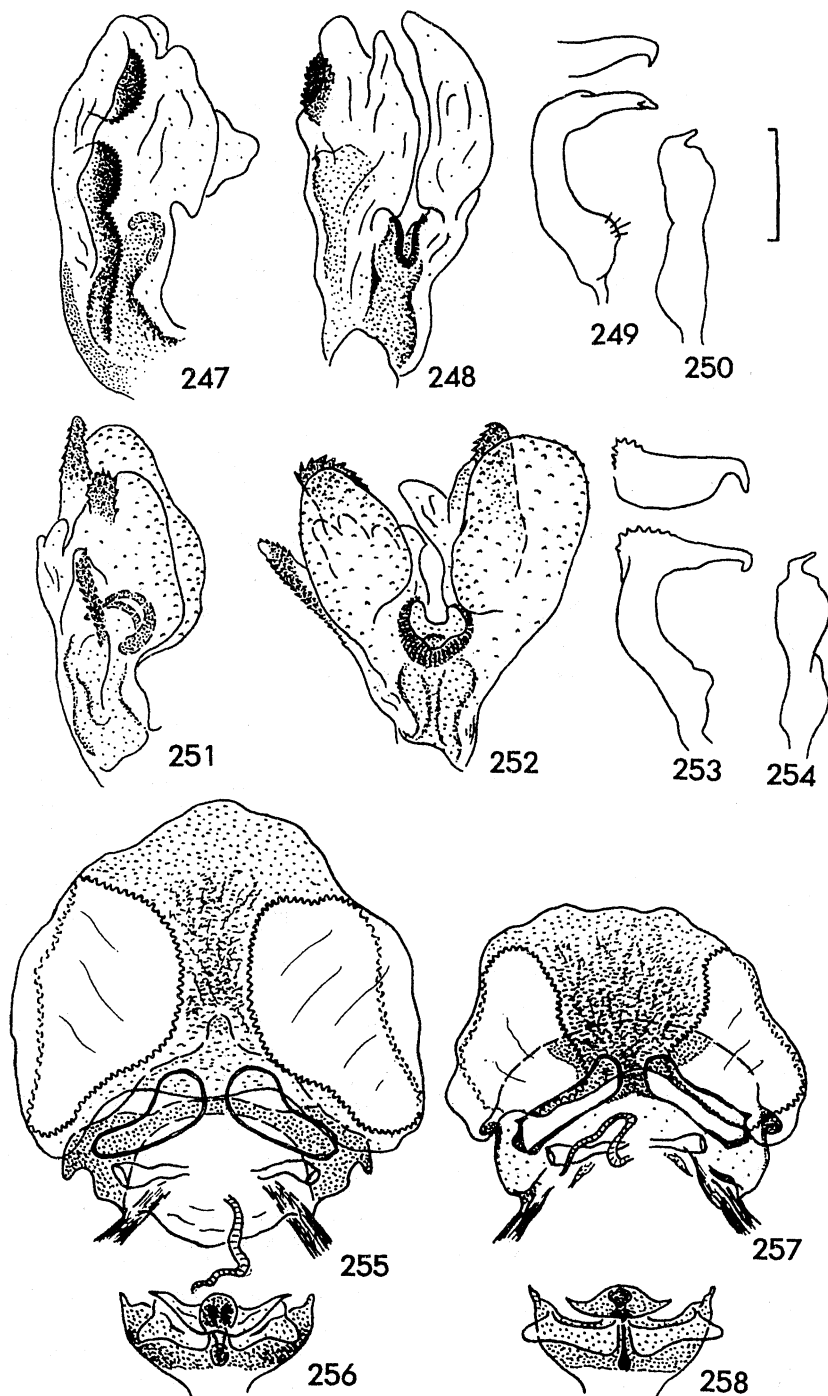
Eyes not adjoining collar. Rostrum reaching 2nd abdominal sternite.

Vesica (Figs 251, 252) distinctly bilobate, slightly asymmetrical, surface covered with evenly distributed microspinules. Lobes large, bulbous, with several membranous processes ventrally. Armaments rich: right lobe with dentate plate near apex and long narrow dentate field proximally; one of lobes of left group dentate, sclerotized. Secondary gonopore shaped like an inverted saddle.

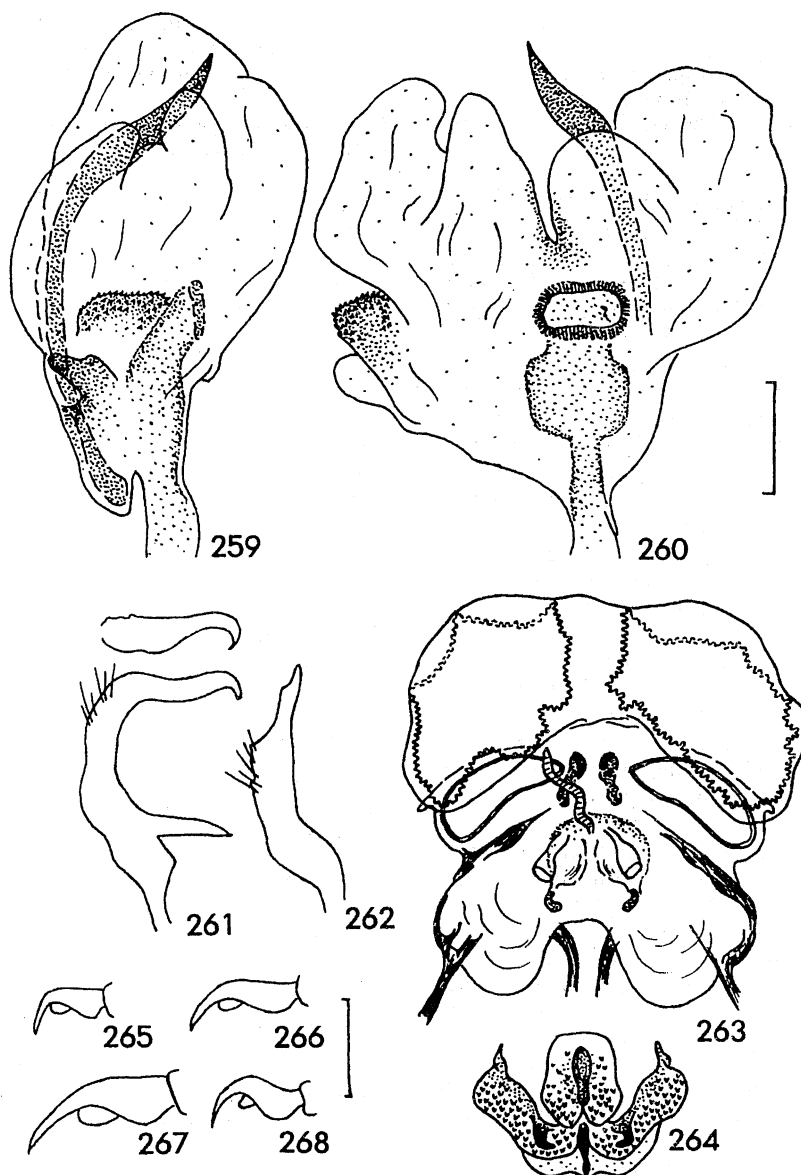
Left paramere (Fig. 253) with thickened hypophysis, setiferous tubercles transformed into distinct teeth. Right paramere (Fig. 254) with angular hypophysis, narrowed in middle part.

Comparison. Main diagnostic characters of the new genus are aberrant for the *Calocoris* complex: type of pubescence and vesica bearing dentate structures on both groups of lobes (but see *Grypocoris heinzi* Wgn., Figs 240, 241).

Judging by the general appearance (shape of pronotum, head, etc.), armament of ve-



Figs 247-258. *Grypocoris* and *Rauniella* spp. 247-250, 257, 258, *G. sexguttatus* F. (Belarus); 251-254, *R. ishtar* Lnv. (Iraq, paratype); 255, 256, *G. meyeri* Kol. (Armenia). 247, 248, 251, 252, vesica; 249, 253, left paramere; 250, 254, right paramere; 255, 257, vagina; 256, 258, posterior wall of vagina. Scale: 247-254, 0.25 mm; 255-258, 0.5 mm.



Figs 259-268. 259-264, *Rhodomiris striatellus* F. (Russia, Leningrad Prov.): 259, 260, vesica; 261, left paramere; 262, right paramere; 263, vagina; 264, posterior wall of vagina. 265-268, claws: 265, *Rhodomiris striatellus* F.; 266, *Closterotomus biclavatus* H.-S.; 267, *Calocoris r. roseomaculatus* De G.; 268, *Polymeris opacipennis* Lindb. Scale: 259-262, 0.25 mm; 263, 264, 0.5 mm; 265-268, 0.125 mm.

sica, presence of microspinules, shape of gonopore and both parameres, especially angular hypophysis of right one, *Rauniella* is closely related to *Grypocoris*. Apparently, adaptation to the life in the desert zone has caused common in such cases loss of the pattern of teguments.

Included species. The genus includes the only species, *R. ishtar* (Linnavuori, 1984), comb. n. from Iraq.

Etymology. Named for Rauno E. Linnavuori who made a valuable contribution to the studies of Middle East Miridae.

Gender: feminine.

V. Genus **RHABDOMIRIS** Wagner, stat. n.

Rhabdomiris Wagner, 1968 (as subgenus of *Calocoris*).
Type species *Cimex quadripunctatus* Villers, 1789 (= *Lygaeus striatellus* Fabricius, 1794), by original designation.

Diagnôsis. Large and oblong. Basic colour ochraceous yellow, veins of hemelytra margined with black. Both sexes macropterous. Upper side of body not punctured. Pubescence pale and fine, very short, adpressed. Vertex without longitudinal furrow or transverse carina. Rostrum reaching 2nd abdominal sternite. Collar not shorter than thickness of 2nd antennal segment at base. Hind femora neither flattened nor lengthened. Tibiae with black spines, without black dots. 1st metatarsal segment not longer than 2nd. Claws strongly, almost at right angle, curved beyond middle (Fig. 265, compare 266-268). Pygophore without denticles. Ovipositor very long, occupying more than 4/5 of abdomen length.

Vesica (Figs 259, 260) asymmetrical, with several large lobes and one spiculum. Right lobe with small dentate field near gonopore and irregular sclerotized area near spiculum base. Spiculum long and slender, undulating in apical part. Secondary gonopore subrectangular.

Sensory lobe of left paramere with long acute process; hypophysis not flattened and ending with turned down hook (Fig. 261). Right paramere narrowed towards apex, without distinct hypophysis (Fig. 262).

Vagina (Fig. 263) with large ovoid parietal glands, a pair of sclerotized areas between them and a pair of membranous lobes inside vaginal cavity below. Interramal lobes and large dorsal structure (Fig. 264) densely covered with microspinules, interrampal lobes bearing free sclerotized curved denticle.

Discussion of status and interrelations. *Rhabdomiris*, erected as a subgenus of *Calocoris*, does not display relationship either with taxa examined or with other genera of the tribe and certainly deserves to be considered as separate genus. Some features, such as the structure of the left paramere, interrampal lobes, claws and ovipositor, suggest peculiarity and relative isolation of this genus.

Included species and distribution. The genus includes 2 closely related species, *Rh. striatellus* F., comb. n. and *Rh. pulcherrimus* Lindb., comb. n., feeding on oaks (*Quercus* spp.). For this reason, the range of the genus is nemoral, disjunctive (*Rh. striatellus* in Europe, Transcaucasia and Turkey; *Rh. pul-*

cherrimus in the Far East). In both species the genitalia are very similar, according to Miyamoto & Yasunaga (1992).

Revised systematic position of species hitherto placed in *Calocoris* (* - species name changed)

affinis, *Calocoris*
alpestris, *Calocoris*
*angularis**, *Calocoris*
annulus, *Closterotomus*
agranus, *Closterotomus*
hclavatus, *Closterotomus*
caucasicus, *Brachycoleus*
cinctipes, *Closterotomus*
costae, *Closterotomus*
demeter, *Reuterista*
desertorum, *Reuterista*
fulvomaculatus, *Closterotomus*
hedenborgi, *Closterotomus*
histris, *Closterotomus*
instabilis, *Reuterista*
iramus, *Reuterista*
ishtar, *Rauniella*
kroesus, *Closterotomus*
krueperi, *Closterotomus*
lineolatus, *Horvathia*
longitarsis, *Closterotomus*
marmoratus, *Closterotomus*
migrans, *Closterotomus*
nemoralis, *Calocoris*
nigronasutus, *Closterotomus*
norvegicus, *Closterotomus*
opacipennis, *Polymerias*
pilicornis, *Brachycoleus*
*poppiusi**, *Reuterista*
porphyropterus, *Calocoris*
princeps, *Closterotomus*
pulcherrimus, *Rhabdomiris*
putoni, *Closterotomus*
reuteri, *Closterotomus*
roseomaculatus, *Calocoris*
rubicundus, *Calocoris*
samojedorum, *Closterotomus*
sangvineovittatus, *Reuterista*
schmidtii, *Mermitelocerus*
sedilloti, *Closterotomus*
sexguttatus, *Grypocoris*
striatellus, *Rhabdomiris*
stysi, *Grypocoris*
sulphureus, *Thiomiris*
tegularis, *Reuterista*
trivialis, *Closterotomus*
tunetanus, *Closterotomus*
ussuriensis, *Closterotomus*
ventralis, *Closterotomus*
venustus, *Closterotomus*
vicinus, *Closterotomus*
villiersi, *Reuterista*

Acknowledgements

I am sincerely grateful to Dr. I.M. Kerzhner (Zoological Institute, St.Petersburg) for the possibility to

work with collections and literature, general guidance and valuable consultation; Prof. Dr. I.K. Lopatin (Belarussian State University) for reviewing the manuscript and advices on nomenclatural issues; Dr. R.E. Linnavuori (Turku) and A.O. Lukashuk (Berezinsky Nature Reserve) for the loan of the material; Dr. A. Gogala (Slovene Museum of Natural History) and Dr. F. Faraci (Museum of Natural History of Verona) for the data on distribution; A.D. Pisanenko (Belarussian State University) for promoting this work. The work was fulfilled using scientific collections of the Zoological Institute, Russian Academy of Sciences, which obtain financial support from the Science and Technology State Committee of Russian Federation (Reg. No. 97-03-16).

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Received 25 January 1997