

Synopsis of the Palaearctic genera of *Mirina* (Heteroptera: Miridae)

V.Ye. Rosenzweig

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A synopsis of the genera of Palaearctic impunctate *Mirini* is given. Complexes of genera are separated, their structure is analysed. A key to the genera is provided.

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The generic classification of the Palaearctic *Mirini* can be estimated as satisfactory. The genera are usually clear cut and rather easily distinguished. On the other hand, interrelations of the genera can be hardly understood without comparative analysis of the extensive and less known Oriental and Ethiopian faunas. A study of the genitalia of both sexes and search for other characters of sufficient taxonomic weight will promote the resolution of the issue. A major contribution to the problem was made by the works of Kelton (1955, 1959) and Slater (1950).

The present article is to some extent a continuation of our previous work, where the taxa isolated from the heterogeneous *Calocoris* appeared to belong to quite different generic complexes of *Mirini*. The aim of this investigation is a review of the subtribe on the generic level for the Palaearctic fauna with a key to the genera. Distribution and ecology of the genera are refined mostly according to the catalogue of Schuh (1995).

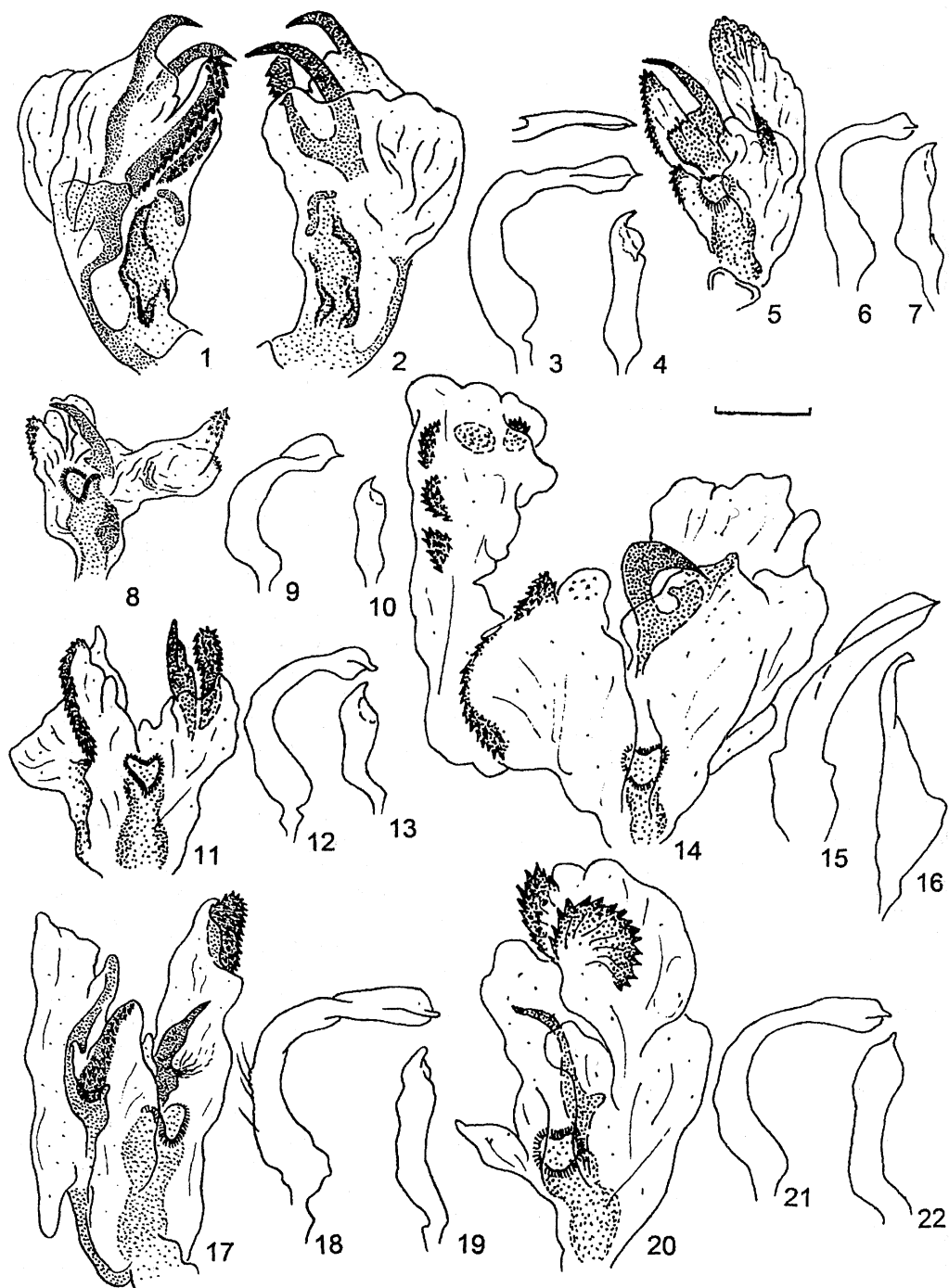
On taxonomic characters in *Mirina*

The division of the tribe *Mirini* into subtribes was proposed by Wagner (1974: 129) on the basis of the tegument punctation, but earlier had been accepted de facto in some keys to the genera (e. g. by Kerzhner, 1964: 701, 703). The punctate *Mirini* form the subtribe *Capsina* (*Capsaria* of Wagner), 2 other Wagner's subtribes (*Horistaria* and *Dionconotaria*) are synonyms of *Mirina* (*Miraria*). Most of the *Capsina* belong to the large and diverse *Lygus* complex thoroughly revised by Kelton (1955). Their genitalia are rather different, but the sensory

lobe of the left paramere is often well expressed, broad and flattened, sometimes (*Taylorilygus* and certain *Arbolygus*) bearing conspicuous processes (simple or forked); hypophysis often with downturned hook; lateral lobes of posterior wall of vagina are often present, not fused in *Lygocoris*, *Lygidea* and *Sabactus*, partly fused in *Taylorilygus*, fused in *Orthops* and *Pinalitus* (Slater, 1950; Kelton, 1955; Yasunaga, 1995b, 1996). Vertex usually with transverse keel (except *Capsus*, *Lygocorides*, *Liocoris*). Size mostly smaller than in *Mirina*.

In *Mirina*, the upper side of body lacks punctation (except *Taurocalocoris* and some *Capsodes*); size generally exceeds 6-7 mm. Sensory lobe of the left paramere well developed only in *Stenotus*, and provided with acute processes in *Rhabdomiris* and some *Phytocoris*. Posterior wall mostly (in Palaearctic fauna, always) with a single pair of lobes here identified as interramal lobes (further on, IRL) after Kelton (1955) and Yasunaga (1994a, 1994b); Slater (1950) named them lateral lobes ("structure H").

The function and morphology of the genitalia are studied in detail by Kullenberg (1947). According to this author, the anterior sack of vagina ("vorderer Sack") is present in all subfamilies and tribes of Miridae and in some other Cimicomorpha, but absent in the aquatic bugs and Pentatomomorpha. It is intended for insertion of the vesica during the copulation and for preserving of sperm, judging by the congestions of spermatophilous cells situated on its walls (Kullenberg, 1947: 395-401). Apparently, the sclerotized rings of the anterior sack margin these congestions, thus forming



Figs 1-22. Mirini, male genitalia. 1-4, *Closterotomus biclavatus* H.-S.; 5-7, *Phytocoridaea dispar* Reut.; 8-10, *Reuterista unicolor* Ros.; 11-13, *Alloeonotus fulvipes* Scop.; 14-16, *Aphanosoma italicum* Costa; 17-19, *Brachycoleus decolor* Reut.; 20-22, *Pantilius tunicatus* F. 1, 2, 5, 8, 11, 14, 17, 20, vesica; 3, 6, 9, 12, 15, 18, 21, left paramere; 4, 7, 10, 13, 16, 19, 22, right paramere. Scale: 0.25 mm.

some kind of glands additional to the vermiform gland having the same function (Rosenzweig, 1997: 140).

It is Kullenberg's opinion that the complexity of the vesical armament is in inverse proportion to the stability of the surface during the copulation, thus appearing stronger in dendrophilous taxa. However, this view seems to be not supported by our data (see the discussion of genera).

The most reliable taxonomic characters in the *Mirina* are:

- male genitalia: armament and symmetry of vesica, shape of the left paramere;
- female genitalia: location and shape of IRL, presence and symmetry of the median membranous process of vagina;
- the colour and type of pubescence that often confirm the conclusions based on the genitalia.

Some characters appear to be not available at suprageneric level because they are subjected to parallel changes. These are: brachyptery, sulcate vertex, clavate 2nd antennal segment, carinate pronotum, denticulate male genital segment. For example, carinate pronotum must have arisen at least 8 times independently (*Pantilius* + *Cheilocapsus*, *Miridius*, *Allorhinocoris* + *Apantilius*, *Gigantomiris*, *Capsodes*, *Paramiridius*, *Cheilocapsidea*, *Tolongia*); sulcate vertex, 5 times (*Miyamotoa*, *Pantilius* group, *Ischnosceliocris*, *Apantilius*, *Creontiades* complex); different degrees of brachyptery are very common, occurring in *Alloeonotus*, *Aphanosoma*, *Phytocoris* group, *Horwathia*, *Apantilius* and *Capsodes* groups. Within certain genera, parallel variation is frequently observed (Rosenzweig, 1997: 144, 149, 159) in the male and female genitalia, e. g. the length of dentate structure in the *Calocoris* complex, presence of uvulae in IRL and symmetry of membranous process of vagina in the *Closterotomus* complex.

Yet, characters treated as diagnostic for certain groups of genera do not embrace the whole group. For example, the pubescence is mixed in the *Closterotomus* complex (but excluding *Brachycoleus*, *Miridius*, *Loristes*) and homogeneous in the *Calocoris* complex (but excluding *Pachypterna*, some *Odontoplatus*, *Rauniella*); the vesica lacks spiculi in the *Calocoris* complex, but bears these in *Odontoplatus* and *Dionconotus*; IRL are closely drawn in the *Calocoris* complex, but extended in most representatives of the *Apantilius* group.

Thus, numerous parallelisms impart a "congregational" (term of Lubischev) structure to the classification, when a given taxon can

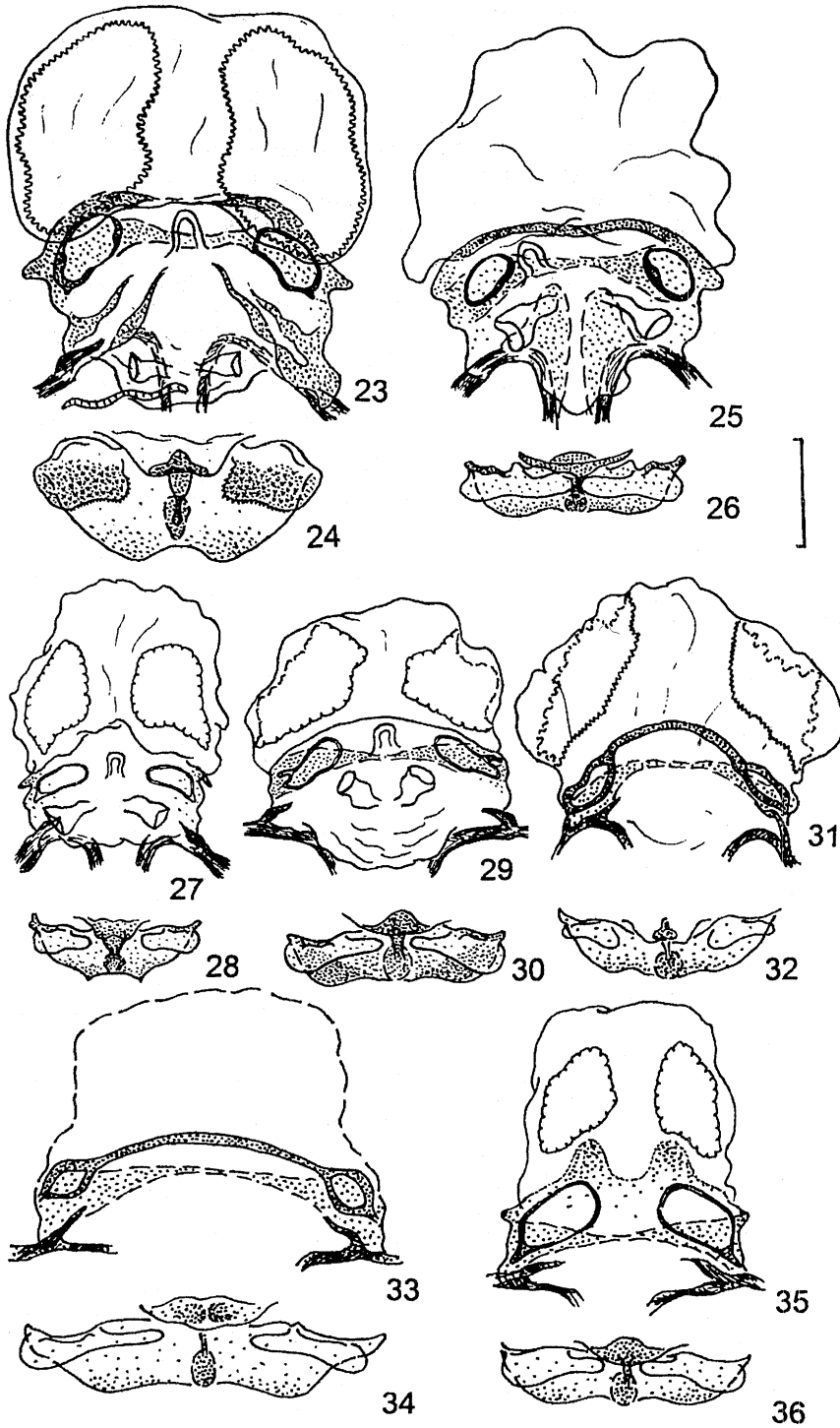
hardly be defined monothetically but rather as a multitude of subtaxa concentrated within some circle of dispersion.

In some groups, wide diversity does not allow recognition of autapomorphies. Analysing the complex *Closterotomus* - *Reuterista* - *Brachycoleus*, I have failed to find out any autapomorphy for *Closterotomus*, which is the most plesiomorphic. The two latter genera form a sister group to certain species groups of *Closterotomus*, and thus, being paraphyletic it should be split into about 10 genera. If we now imagine that the "derivative" groups do not exist, then the autapomorphies of the whole stem are the autapomorphies of *Closterotomus*, and in this case its integrity is beyond the doubt.

The present work allowed delimitation of main complexes of genera within the subtribe. Nearly 60 Palaeartic genera of *Mirina* can be united in 2 large complexes (containing over 15 genera each) and several smaller ones. Certain genera seem to occupy an isolated position, and their relationships cannot be traced at present stage.

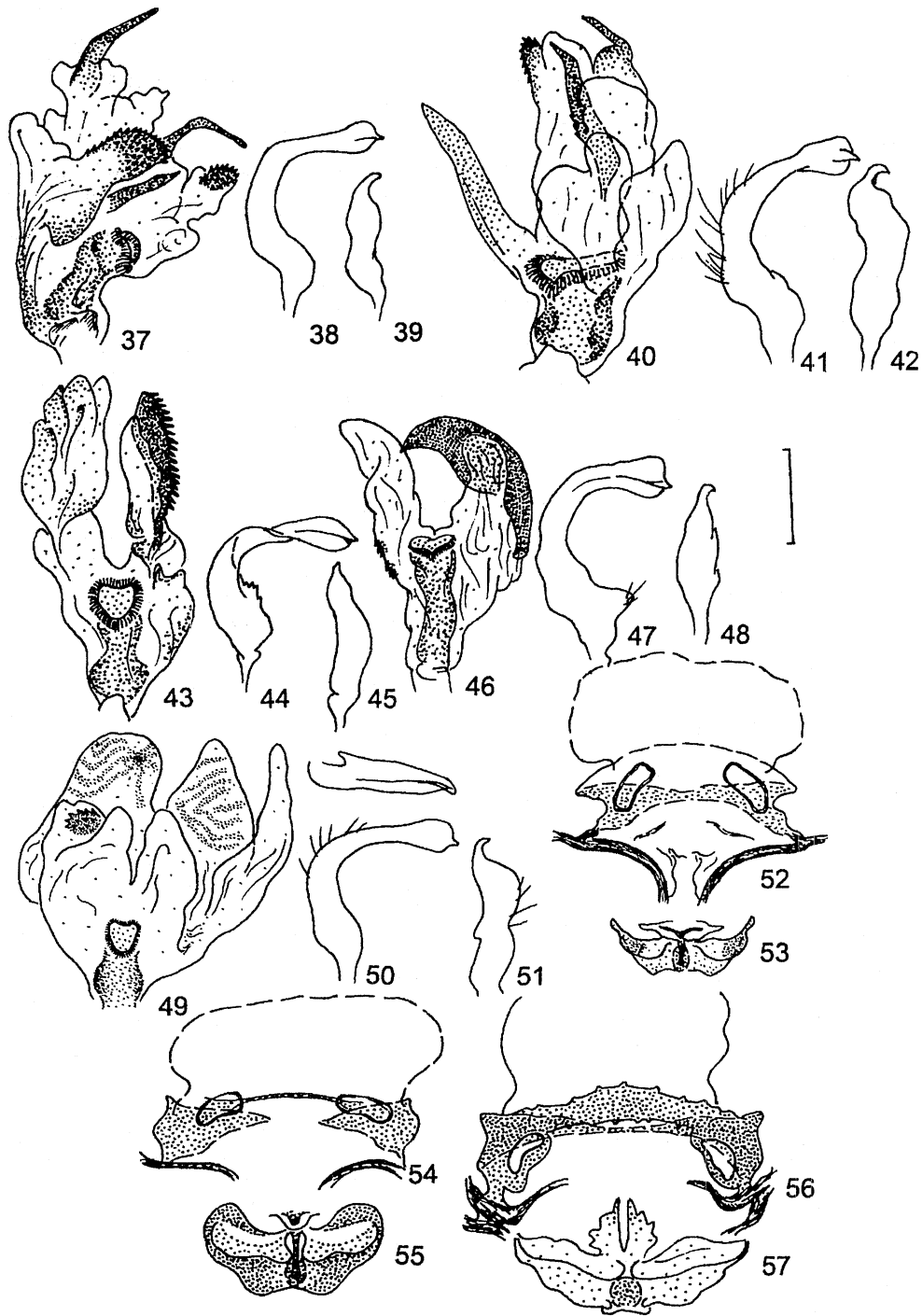
Key to the Palaeartic genera of *Mirina*

- 1(2). Upper side or at least pronotum (*Argenis*, *Tingitotum*) punctate. Size usually not more than 7 mm subtribe **Capsina** Burmeister, 1835
- 2(1). Upper side lacking punctation (in *Tolongia*, with 1 row of punctures on clavus); if pronotum (some *Capsodes*) or entire dorsum (*Taurocalocoris*) punctate, margins of pronotum carinate and size exceeding 9 mm (Subtribe **Mirina** Hahn, 1833)
- 3(40). Pubescence mixed, consisting of black hairs and golden scales; if black or pale, hind femora flattened (*Ischnosceliocris*, *Miridius*).
- 4(39). 1st metatarsal segment not longer than 2nd and not incrassate.
- 5(38). Vesica with 1-2 spiculi. Coloration diverse.
- 6(37). Collar much shorter than calli. Body more or less oblong.
- 7(28). Hind femora neither flattened nor, except *Phytocoridae*, lengthened.
- 8(23). Tibial spines black.
- 9(18). Vertex without longitudinal sulcus.
- 10(15). Pubescence adpressed. Usually macropterous.
- 11(14). Both sexes macropterous.
- 12(13). 2nd antennal segment at least apically black; if entirely pale, rostrum reaching or surpassing mesocoxae **Closterotomus** Fieb.
- 13(12). 2nd antennal segment pale. Rostrum not reaching mesocoxae. 2nd metatarsal segment 2.0-2.2 times as long as 1st **Reuterista** Kirk.
- 14(11). ♀ subbrachypterous (membrane rudimentary), ♂ macropterous. Hind femora lengthened **Phytocoridae** Reut.
- 15(10). Black hairs erect. ♀ brachypterous (membrane absent). Scutellum black.
- 16(17). ♂ macropterous **Alloeonotus** Fieb.



Figs 23-36. Mirini, female genitalia. 23, 24, *Closterotomus samojedorum* J.Sahlb.; 25, 26, *C. costae* Reut.; 27, 28, *Reuterista unicolor* Ros.; 29, 30, *Brachycoleus decolor* Reut.; 31, 32, *Alloeonotus fulvipes* Scop.; 33, 34, *Aphanosoma italicum* Costa; 35, 36, *Pantilius tunicatus* F. 23, 25, 27, 29, 31, 33, 35, vagina; 24, 26, 28, 30, 32, 34, 36, posterior wall. Scale: 0.5 mm.

- 17(16). ♂ brachypterous. 2nd antennal segment clavate **Aphanosoma** Costa
 18(9). Vertex sulcate. Antennae somewhat incrassate.
 19(22). Margins of pronotum carinate. Frons projecting forward.
 20(21). Head vertical. Posterolateral corners of pronotum projecting and reflexed **Pantilius** Curt.
 21(20). Head oblique. Posterolateral corners of pronotum less projecting and not reflexed
 **Cheilocapsus** Kirk.
 22(19). Pronotum not carinate. Rostrum not reaching mesocoxae **Heteropantilius** Zheng & Liu
 23(8). Tibial spines pale.
 24(25). Vertex sulcate. Rostrum not reaching mesocoxae **Miyamotoa** Yas.
 25(24). Vertex not sulcate.
 26(27). 2nd antennal segment about 3 times as long as 3rd **Eocalocoris** Miy. & Yas.
 27(26). 2nd antennal segment short, 1.12 times as long as 3rd **Adelphocorisella** Miy. & Yas.
 28(7). Hind femora flattened and lengthened, extending beyond apex of abdomen.
 29(36). Pronotum not carinate. Head short, oblique or vertical.
 30(35). Vertex not sulcate. ♀ macropterous or subbrachypterous.
 31(34). Vertex without keel.
 32(33). Hind margin of pronotum smoothly rounded **Phytocoris** Fall.
 33(32). Hind margin of pronotum undulating, with 4 or 6 projections **Eremobiellus** Reut.
 34(31). Vertex with T-shaped keel. Hind margin of pronotum with median notch **Neosapinnius** Wgn.
 35(30). Vertex sulcate. ♀ brachypterous
 **Ischnosceliocoris** Reut.
 36(29). Pronotum carinate. Head long, weakly sloping **Miridius** Fieb.
 37(6). Collar about as long as calli. Body convex, robust; legs and antennae thick. Cell of wing membrane broadly rounded **Eurystylus** Stål
 38(5). Vesica lacking spiculi. Uniformly yellow **Rauniella** Ros.
 39(4). 1st metatarsal segment longer than 2nd and incrassate. Vesica lacking spiculi
 **Pachypterna** Fieb.
 40(3). Pubescence homogeneous, black or pale; if mixed, overall colour green and procoxae visible from above (some *Odontoplatys*), or collar shorter than thickness of 2nd antennal segment at base (some *Adelphocoris*), or vertex carinate and hind femora not flattened (some *Volummus*).
 41(66). Pubescence black, sometimes with admixture of dispersed pale hairs (*Calocoris affinis* H.-S., some *Capsodes*); mixed in *Odontoplatys suturalis* Jak. (see couplet 40).
 42(65). Vertex without transverse keel. 1st antennal segment usually reaching beyond apex of clypeus.
 43(60). Corium with 2 veins.
 44(57). Pronotum not carinate; otherwise (*Allorhinocoris*, *Apantilius*) coloration green.
 45(52). Clypeus not obviously separated from frons by a suture.
 46(51). Procoxae not visible from above. Vesica lacking spiculi. Tibial spines black.
 47(48). Pubescence, at least on hemelytra, adpressed. Rostrum reaching or surpassing metacoxae
 **Calocoris** Fieb.
 48(47). Pubescence semierect or erect. Rostrum reaching mesocoxae.
 49(50). Green. Scutellum pale. Both sexes macropterous **Mermitelocerus** Reut.
 50(49). Brownish. Scutellum completely or mostly black. ♀ subbrachypterous **Horwathia** Reut.
 51(46). Procoxae visible from above. Vesica with spiculum. Tibial spines pale **Odontoplatys** Fieb.
 52(45). Clypeus obviously separated from frons. ♀ with some degree of brachyptery.
 53(56). Pronotum carinate.
 54(55). ♀ subbrachypterous **Allorhinocoris** Fieb.
 55(54). ♀ brachypterous. Vertex sulcate. Frons projecting forward over clypeus **Apantilius** Kir.
 56(53). Pronotum not carinate. ♀ brachypterous. 3rd antennal segment very long, almost as long as body
 **Hissaritus** Kir.
 57(44). Pronotum carinate. Coloration red and black. Male genital segment with 1-2 denticles.
 58(59). Pubescence adpressed. Upper side punctate. Anterior angles of pronotum protruding forward. Collar distinctly shorter than calli. Rostrum not reaching mesocoxae **Taurocalocoris** Carap.
 59(58). Pubescence erect. Collar about as long as calli. Rostrum reaching metacoxae
 **Capsodes** Dahlb. (part)
 60(43). Corium with additional (third) vein. Pubescence very short.
 61(64). Pronotum not carinate. Additional vein almost reaching base of cuneus.
 62(63). Base of scutellum not covered by pronotum. Eyes not touching collar **Miris** F.
 63(62). Base of scutellum covered by pronotum. Eyes touching collar **Actinonotus** Reut.
 64(61). Pronotum carinate. Additional vein incomplete, terminating in posterior part of corium
 **Gigantomiris** Miy. & Yas.
 65(42). Vertex with transverse keel at eyes. 1st antennal segment short, not reaching beyond apex of head
 **Dichrooscytus** Fieb.
 66(41). Pubescence pale, consisting of fine hairs or flattened shiny scales; mixed in certain *Adelphocoris* and *Volummus* (see couplet 40); if black (♂ of *Horistus turcomanus* Horv.), lateral margin of left paramere cristate (as in Fig. 82).
 67(112). Clavus impunctate.
 68(111). Vertex without transverse keel.
 69(108). 1st metatarsal segment not longer than 2nd.
 70(107). Veins of hemelytra not margined with black. Left paramere without long processes.
 71(96). Vertex not sulcate.
 72(93). Pronotum not carinate.
 73(90). 2nd antennal segment at least 1.4-1.7 times as long as 3rd. Collar not shorter than thickness of 2nd antennal segment at base.
 74(89). Coloration with pale pattern.
 75(88). Scutellum flat. Tibial spines black; otherwise (*Grypocoris* sg. *Lophyromiris*) pubescence fine, silky.
 76(83). Pubescence adpressed.
 77(82). 3rd metatarsal segment not more than 1.2 times as long as 2nd and shorter than 1st and 2nd combined.



Figs 37-57. Mirini, male and female genitalia. 37-39, *Loristes decoratus* Reut.; 40-42, 56, 57, *Eurystylus coelestialium* Kirk.; 43-45, *Phytocoris nowickyi* Fieb.; 46-48, *Ischnosceliocoris rubrinervis* Reut.; 49-53, *Polymerias opacipennis* Lindb.; 54, 55, *Phytocoris longipennis* Fl. 37, 40, 43, 46, 49, vesica; 38, 41, 44, 47, 50, left paramere; 39, 42, 45, 48, 51, right paramere; 52, 54, 56, vagina; 53, 55, 57, posterior wall. Scales: 37-51, 0.25 mm; 52-57, 0.5 mm.

- 78(81). 2nd antennal segment linear.
 79(80). 1st metatarsal segment not thicker than 2nd . . .
 **Grypocoris** Dgl. & Sc.
 80(79). 1st metatarsal segment 1.5 times as thick as
 2nd **Hadrodemus** Fieb.
 81(78). 2nd antennal segment clavate
 **Epimecellus** Reut.
 82(77). 3rd metatarsal segment 1.5 times as long as
 2nd and equal in length to 1st and 2nd combined . . .
 **Rhabdoscytus** Horv.
 83(76). Pubescence erect.
 84(87). Frons not projecting forward.
 85(86). Head vertical, short. Ostiolar peritreme dark . .
 **Dionconotus** Reut.
 86(85). Head protruding anteriorly. Ostiolar peritreme
 white **Ulmiris** Seid.
 87(84). Frons projecting over clypeus. Rostrum reach-
 ing middle of mesosternum or, rarely, mesocoxae . .
 **Brachycoleus** Fieb.
 88(75). Scutellum distinctly convex. Tibial spines pale.
 Pubescence golden, flattened
 **Loristes** Jos. & Kerzh.
 89(74). Coloration entirely black including ostiolar
 peritreme. Pubescence silvery, flattened
 **Polymerias** Yas.
 90(73). 2nd antennal segment 1.1-1.3 times as long as
 3rd.
 91(92). Collar not shorter than thickness of 2nd anten-
 nal segment at base. Unicolorously yellow
 **Thiomiris** Ros.
 92(91). Collar narrow, shorter than thickness of 2nd
 antennal segment at base. Male genital segment with
 denticle on left **Adelphocoris** Reut.
 93(72). Pronotum carinate.
 94(95). 3rd antennal segment shorter than 4th. Poste-
 rior margin of pronotum more or less straight. Pu-
 bescence erect or adpressed
 **Capsodes** Dahlb. (part)
 95(94). 3rd antennal segment longer than 4th. Posterior
 margin of pronotum incurved. Pubescence long and
 erect **Horistus** Fieb.
 96(71). Vertex with longitudinal sulcus. Antennae usu-
 ally longer than body.
 97(98). Collar narrow, shorter than thickness of 2nd
 antennal segment at base. Male genital segment with
 denticle on the left. Tibial spines black or pale
 **Megacoelum** Fieb.
 98(97). Collar not shorter than thickness of 2nd anten-
 nal segment at base. Male genital segment usually
 lacking denticle (except some *Orientalis* and
Creontiades).
 99(102). Tibial spines black.
 100(101). Hemelytra not transparent
 **Orientalis** Yas.
 101(100). Hemelytra hyaline, corium transparent
 **Neomegacoelum** Yas.
 102(99). Tibial spines brown or pale.
 103(106). Pronotum not carinate.
 104(105). Rostrum reaching beyond metacoxae. Vesica
 symmetrical, 4- or 6-lobate **Creontiades** Dist.
 105(104). Rostrum not reaching beyond metacoxae.
 Vesica asymmetrical, gonopore surrounded with
 membranous hair-like processes
 **Poppiocapsidea** Yas.

- 106(103). Pronotum carinate. Frons projecting forward
 over clypeus **Cheilocapsidea** Popp.
 107(70). Veins of hemelytra margined with black. Sen-
 sory lobe of left paramere with acute process
 **Rhabdomiris** Wgn.
 108(69). 1st metatarsal segment 1.5-2.0 times as long
 as 2nd.
 109(110). Body 4 times as long as wide. Head nearly
 as wide as eye **Stenotus** Jak.
 110(109). Body 3 times as long as wide. Head 1.15-
 1.20 times as wide as high **Charitocoris** Reut.
 111(68). Vertex with transverse keel. Tibial spines pale
 or brown **Volumnus** Stål
 112(67). Clavus with 1 row of punctures. Pronotum
 carinate **Tolongia** Popp.

The relationships of genera

I. Closterotomus complex

(Figs 1-48, 54-57)

Characterized by (1) mixed pubescence consist-
 ing of black fine hairs and golden flattened
 scales; (2) abundant vesical armament; (3) hy-
 pophysis of left paramere expanded and flat-
 tened, with longitudinal carina, sensory lobe
 not prominent; (4) vagina with sclerotized pat-
 tern ventrally and finger-like membranous pro-
 jection between parietal glands; (5) IRL ex-
 tended (except *Phytocoris* and *Eurystylus*
 groups), often with uvulae projecting medially.

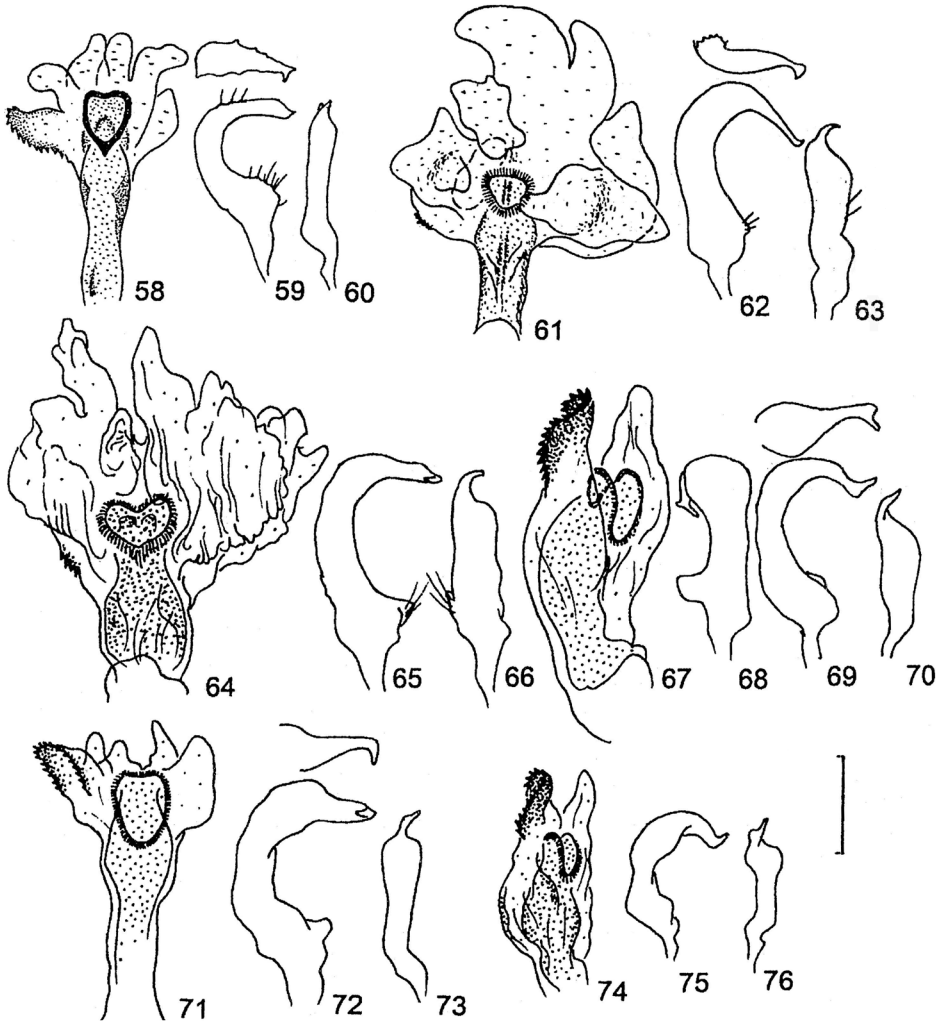
Within the complex, the following characters
 are shared by representatives of several genera
 (or of one large genus):

- different degrees of brachyptery (*Phyto-
 coridea*, *Alloeonotus*, *Aphanosoma*, *Phytocoris*,
Ischnosceliicoris);
- presence of dentate structures on left lobe
 of vesica (*Closterotomus*, *Eocalocoris*, *Reuter-
 ista*, *Alloeonotus*, *Brachycoleus*, *Pantilius*, *Lo-
 ristes*);
- absence of simple spiculum (*Closteroto-
 mus*, *Reuterista*, *Aphanosoma*, *Pantilius*, *Phy-
 tocoris*);
- reduction of the process of forked spicu-
 lum (*Closterotomus*, *Reuterista*, *Alloeonotus*,
Pantilius group);
- asymmetry of membranous projection of
 vagina (*Closterotomus*);
- presence of median uvulae on IRL (*Clos-
 terotomus*, *Eocalocoris*, *Reuterista*, *Aphanoso-
 ma*, *Brachycoleus*, *Pantilius* group).

A. Closterotomus group

(Figs 1-16, 23-28, 31-34)

Numerous (about 30) species of *Clostero-
 tomus* Fieber, 1858 are diverse in external ap-
 pearance and genital structures and fall into
 about 10 groups treated by Rosenzweig (1997).



Figs 58-76. Mirini, male genitalia. 58-60, *Calocoris affinis* H.-S.; 61-63, *Mermelocerus schmidtii* Fieb.; 64-66, *Pachypterna fieberi* Fieb.; 67-70, *Allorhinocoris flavus* J.Sahlb.; 71-73, *Hissaritus dimorphus* Kir.; 74-76, *Apantilius prasimus* Fieb. 58, 61, 64, 67, 71, 74, vesica; 59, 62, 65, 68, 69, 72, 75, left paramere; 73, 76, right paramere. Scale: 0.25 mm.

Distributed in Palaeartic, trophically associated with Asteraceae and other grasses.

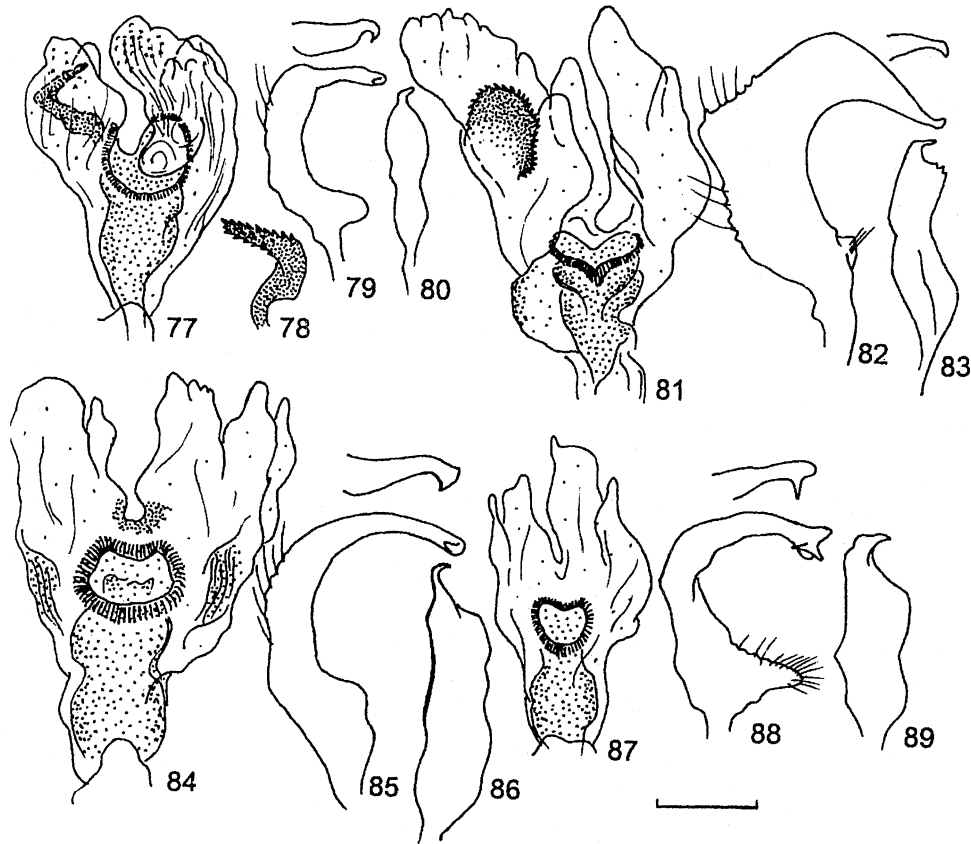
Phytoridea Reuter, 1906 resembles the previous genus differing in subbrachypterous ♀, smaller size (7 mm), long (though unflattened) hind femora, rostrum reaching mesocoxae. Distributed in China.

Japanese genera *Eocalocoris* Miyamoto & Yasunaga, 1990 and *Miyamotoa* Yasunaga, 1990 possess pale tibial spines; in *Miyamotoa*, vertex sulcate, 1st and 2nd antennal segments incrassate, rostrum not reaching mesocoxae. Male and female genitalia rather similar to

those of *Closterotomus*, especially in the latter genus (see also Yasunaga & Takai, 1994).

Reuterista Kirkaldy, 1904 is ecologically specialized, inhabiting the desert zone of the Palaeartic Region and associated with ephemeral plants. Accordingly, the genus is characterized by pale yellow coloration, enlarged eyes (possibly, because of nocturnal activity), short rostrum and long 2nd metatarsal segment.

Females of *Alloeonotus* Fieber, 1858 and both sexes of *Aphanosoma* Costa, 1842 are brachypterous. Black hairs forming the pubescence are erect in both genera. In *Aphanosoma*, 2nd antennal segment clavate, rostrum not sur-



Figs 77-89. *Mirini*, male genitalia. 77-80, *Odontoplatus suturalis* Jak.; 81, *Capsodes gothicus* L.; 82, 83, *Horistus orientalis* Gmel.; 84-86, *Actinonotus pulcher* H.-S.; 87-89, *Miris striatus* L. 77, 81, 84, 87, vesica; 78, spiculum; 79, 82, 85, 88, left paramere; 80, 83, 86, 89, right paramere. Scale: 0.25 mm.

passing mesocoxae, left paramere wedge-shaped. The range of *Alloeonotus* is N Mediterranean, *Aphanosoma* is Euro-Caucasic; both genera feed on grasses.

B. *Brachycoleus* group

(Figs 17-19, 29, 30)

Brachycoleus Fieber, 1858 is readily distinguished by pale erect pubescence, frons projecting anteriorly, and short rostrum. Length of rostrum and structure of vagina and posterior wall display similarity to *Reuterista*. Distributed in Europe, Mediterranean and the steppe zone; on grasses.

C. *Pantilius* group

(Figs 20-22, 35, 36)

Pantilius Curtis, 1833 and *Cheilocapsus* Kirkaldy, 1902 (= *Parapantilius* Reuter, 1903) form a morphologically specialized group hav-

ing sulcate vertex, projecting frons, carinate pronotum (except the latter genus), incrassate 2nd antennal segment (Yasunaga, 1994b). *Pantilius* is Palaeartic, *Cheilocapsus* is E Palaeartic and Oriental.

D. *Loristes* group

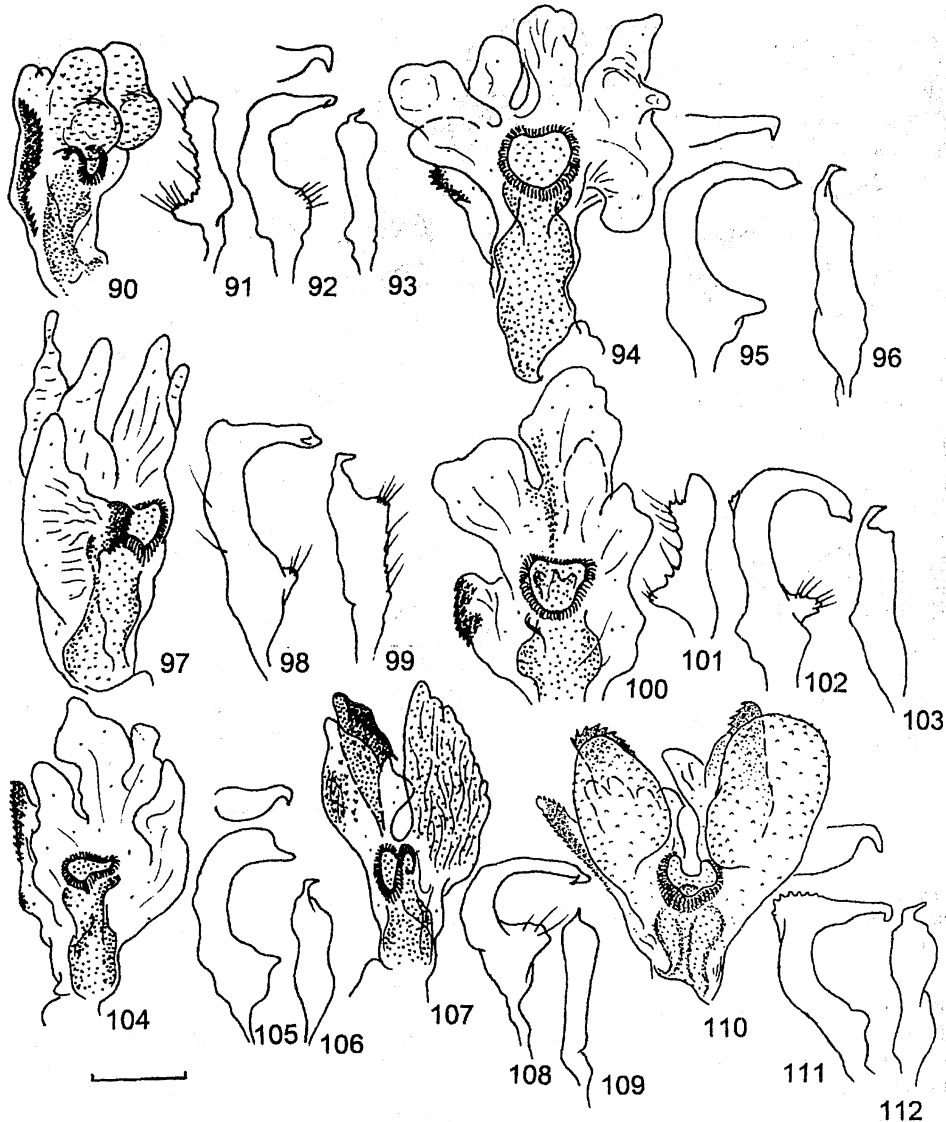
(Figs 37-39)

Loristes Josifov & Kerzhner, 1972 lacks black hairs in pubescence, maxillary plates partly screen mandibular plates, pronotum and scutellum markedly convex, tibial spines pale, vesica bearing 3 spiculi and dentate areas on both lobes. The genus is E Palaeartic, its host plant is *Lonicera*.

E. *Phytocoris* group

(Figs 43-45, 54, 55)

The group includes *Phytocoris* Fallén, 1814, *Eremobiellus* Reuter, 1895, *Neosapinnius* Wag-



Figs 90-112. Mirini, male genitalia. 90-93, *Grypocoris ajderensis* V.Putshk.; 94-96, *Hadrodemus m-flavum* Gz.; 97-99, *Rhabdoscytus costae* Reut.; 100-103, *Epimecellus cylocoroides* Reut.; 104-106, *Ulmiris olympicus* Seid.; 107-109, *Dionconotus neglectus* F.; 110-112, *Rauniella ishtar* Lnv. 90, 94, 97, 100, 104, 107, 110, vesica; 91, 92, 95, 98, 101, 102, 105, 108, 111, left paramere; 93, 96, 99, 103, 106, 109, 112, right paramere. Scale: 0.25 mm.

ner, 1960, *Ischnosceliocris* Reuter, 1886, and *Miridius* Fieber, 1858. Their notable features are long antennae and legs, flattened hind femora. Brachyptery of females is common in *Phytocoris* and *Ischnosceliocris*. The latter lacks golden scales in pubescence and possesses sulcate vertex. In *Miridius*, pubescence is pale, anterior margins of pronotum carinate. In the whole group, vesica with a characteristic comb on the left (Wagner, 1974; Carapezza,

1997) that can hardly be homologized on the Palaearctic material, but in numerous Nearctic *Phytocoris* and in *Ischnosceliocris* the comb is substituted by a broad, spade-like, or even forked, spiculum (Stonedahl, 1988) comparable with that of *Closterotomus*. Ranges and host plants: *Phytocoris* – cosmopolitan, on various trees and herbs; *Eremobiellus* – N Africa and Arabia, on Brassicaceae; *Neosapin-nius* – Arabia, on grasses; *Ischnosceliocris* –

N Africa, E Mediterranean, on Poaceae; *Miridius* – Euro-Mediterranean, on grasses.

F. *Eurystylus* group

(Figs 40-42, 56, 57)

The genus *Eurystylus* Stål, 1871 widely distributed in the Old World is recognized by rounded, convex body; thick 1st and 2nd and very short 3rd and 4th antennal segments; rostrum reaching mesocoxae; tibiae with black spines and pale setae. Vesica with 2 spiculi and several lobes, certain areas weakly sclerotized and dentate.

II. *Polymerias* complex

(Figs 49-53)

The only genus of the complex is *Polymerias* Yasunaga, 1997 inhabiting E Palaeartic and feeding on *Lonicera* and *Staphylea*. It is characterized by silvery flattened pubescence, almost entirely black coloration and corrugate scutellum and hemelytra. Vesica poorly armed, with 5 lobes and small dentate plate; left paramere similar to that of *Closterotomus*. IRL attached along whole width, not extended.

III. *Calocoris* complex

(Figs 58-131)

This large complex consists of nearly 20 genera and is recognized by the following characters. (1) Vesica more or less symmetrical, lacking spiculi (with 2 exceptions), with weakly developed dentate structure on right lobe. In different groups, this type undergoes various changes sometimes rather sufficient: the armament can be completely absent (*Miris*, *Capsodes*) or, on the contrary, strongly developed (some *Grypocoris*, *Rauniella*), even with a spiculum (*Odontoplatys*, *Dionconotus*). Homologous series in the length of the dentate structure are common within the complex (Rosenzweig, 1997). (2) Hypophysis of the left paramere cylindrical and always ending with downturned hook; sensory lobe more expressed than in the complexes I and II. (3) Parietal glands usually large, closely placed, sometimes connected; IRL narrow, attached along their whole width.

A. *Calocoris* group

(Figs 58-66, 77-80, 113-118)

Distinguished by usually greenish coloration and black pubescence, in *Calocoris* Fieber, 1858 (= *Charitides* Kerzhner, 1962), adpressed;

in *Mermitelocerus* Reuter, 1908 and *Horwathia* Reuter, 1881, semiect. Two latter genera are very similar also in short rostrum reaching mesocoxae, asymmetrical vesica and arched left paramere (Rosenzweig, 1997). *Calocoris* is Euro-Mediterranean, but 1 species is endemic to E Kazakhstan; the genus is associated with herbs; *Mermitelocerus* is distributed in Europe, Caucasus, Turkmenia and Far East; *Horwathia* is alpine European, feeding on Poaceae.

In *Pachypterna* Fieber, 1858, pubescence is mixed, unusual for the complex; 1st metatarsal segment lengthened and incrassate. Restricted to Europe, living on conifers.

In *Odontoplatys* Fieber, 1858, procoxae are visible from above; eyes not touching collar; vesica armed with a dentate twisted spiculum on the right. In *O. suturalis* Jak., pale hairs present in pubescence. The genus is Euro-Caucasian, the host plants are Lamiaceae.

B. *Apantilius* group

(Figs 67-76, 119-123)

Allorhinocoris Reuter, 1876, *Hissaritus* Kiritshenko, 1952, *Apantilius* Kiritshenko, 1951 are characterized by subbrachypterous or brachypterous females; frons separated from clypeus by a suture (in *Apantilius*, even projecting forward); carinate pronotum (except *Hissaritus*); green coloration; black adpressed pubescence. In *Apantilius*, the vertex is sulcate; in *Hissaritus*, the 3rd antennal segment is remarkably long, almost equal in length to body. Ranges: *Allorhinocoris* – Holarctic, on Fabaceae; *Hissaritus* – Tajikistan; *Apantilius* – steppes of Kazakhstan.

C. *Miris* group

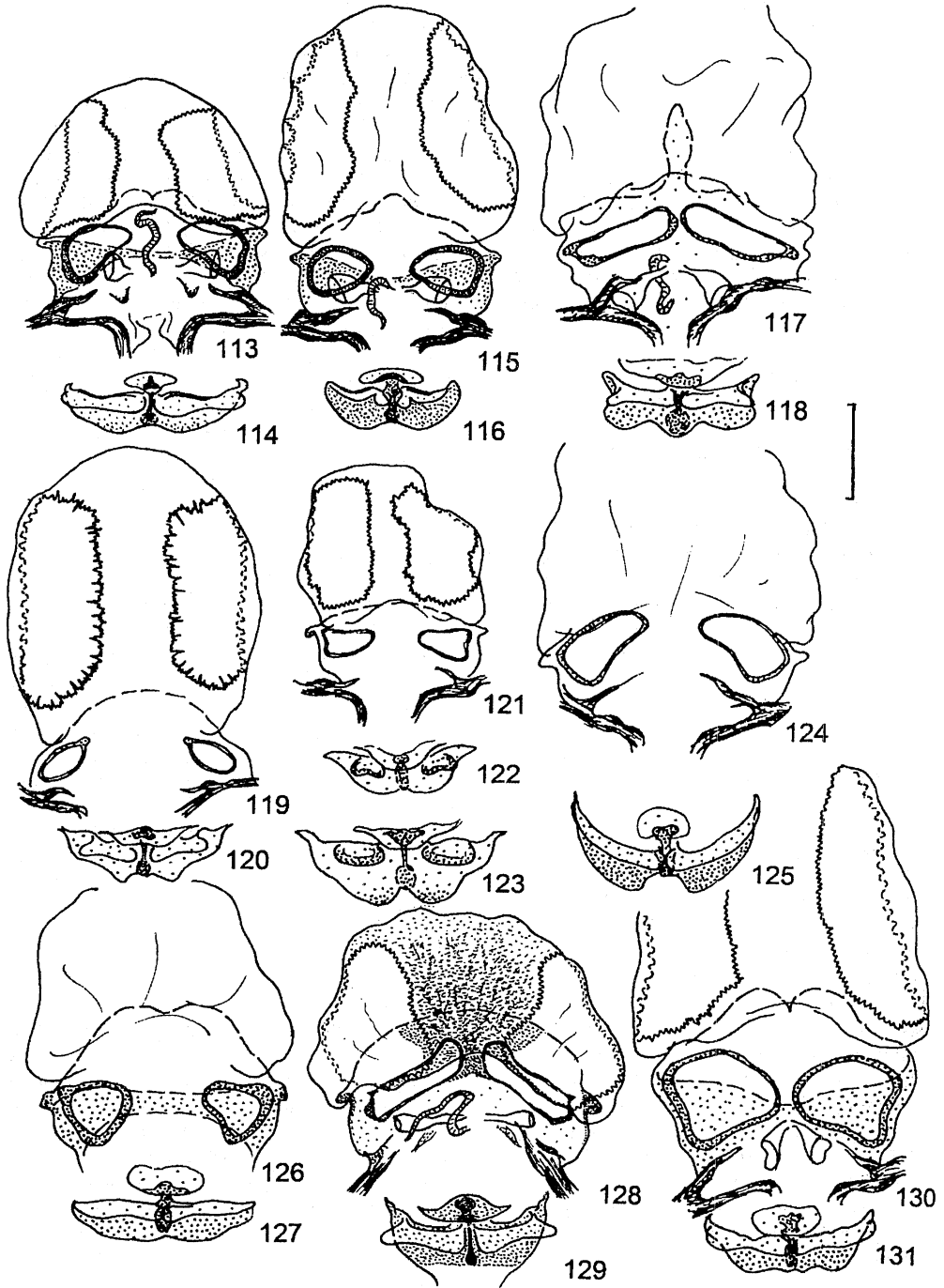
(Figs 84-89, 124, 125)

Represented by *Miris* Fabricius, 1794, *Actinonotus* Reuter, 1896, *Gigantomiris* Miyamoto & Yasunaga, 1988. Pubescence black, very short; a unique feature is the additional vein on corium homologized as *M* (or its branch) by Kerzhner (1981); vesicae completely lacking sclerotization. In *Gigantomiris*, pronotum carinate. Ranges: *Miris* – Euro-Mediterranean, *Actinonotus* – European, *Gigantomiris* – E Palaeartic; all living on trees, *Actinonotus* – on *Quercus* (Fagaceae).

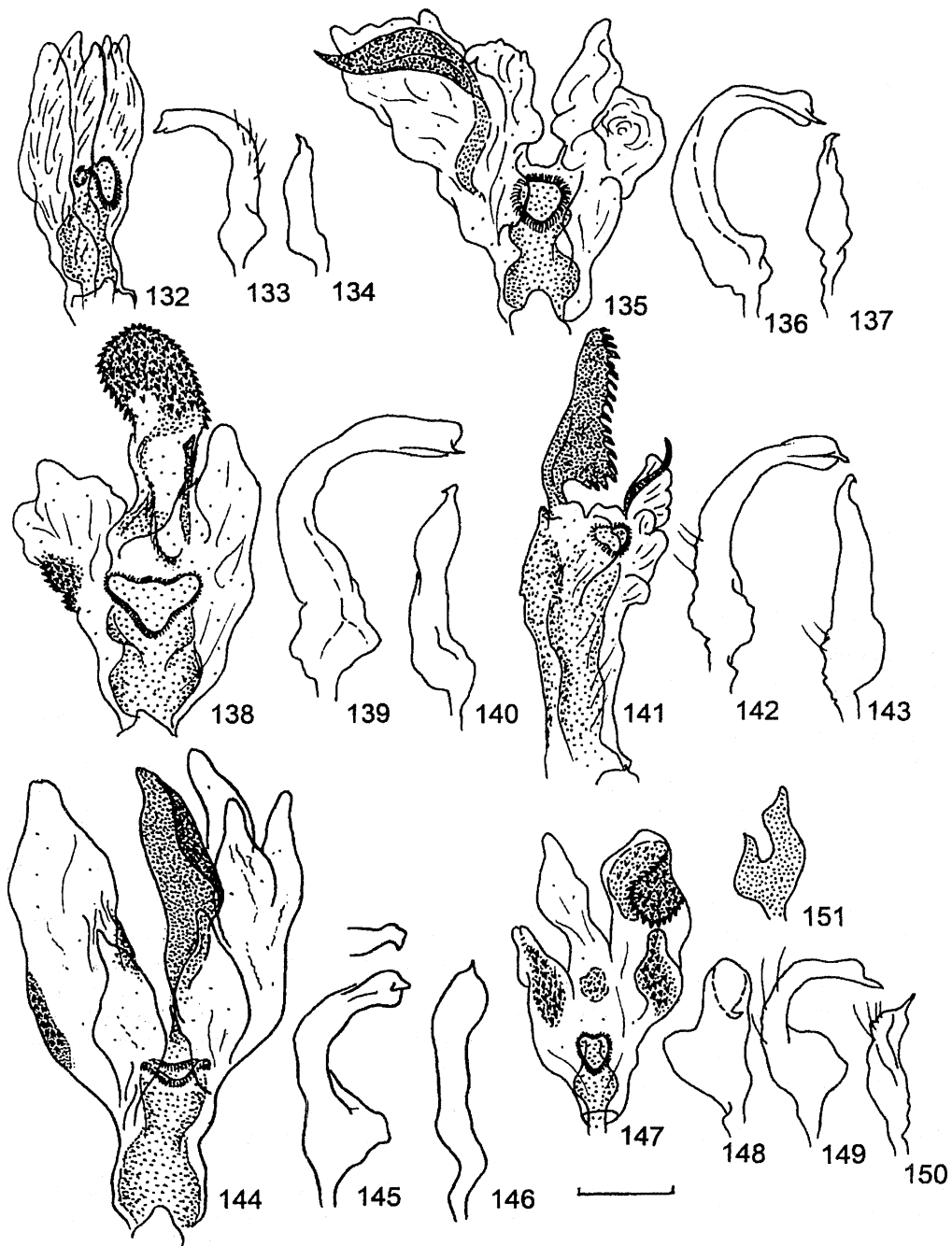
D. *Capsodes* group

(Figs 81-83, 126, 127)

Includes *Taurocalocoris* Carapezza, 1998, *Capsodes* Dahlbom, 1851 and *Horistus* Fieber,



Figs 113-131. *Mirini*, female genitalia. 113, 114, *Calocoris r. roseomaculatus* DeG.; 115, 116, *Horwathia hieroglyphica* Mls. & R.; 117, 118, *Odontoplatys suturalis* Jak.; 119, 120, *Hissaritus dimorphus* Kir.; 121, 122, *Apantilius prasinus* Fieb.; 123, *Allorhinocoris flavus* J.Sahlb.; 124, 125, *Miris striatus* L.; 126, 127, *Capsodes gothicus* L.; 128, 129, *Grypocoris sexguttatus* F.; 130, 131, *Epimecellus cyllacoroides* Reut. 113, 115, 117, 119, 121, 124, 126, 128, 130, vagina; 114, 116, 118, 120, 122, 123, 125, 127, 129, 131, posterior wall. Scale: 0.5 mm.



Figs 132-151. *Mirini*, male genitalia. 132, *Creontiades coloratus* Popp.; 133, 134, *C. brevis* Yas. (after Yasunaga); 135-137, *Megacoelum beckeri* Fieb.; 138-140, *Orientalis tricolor* Scott; 141-143, *Adelphocoris triannulatus* Stål; 144-146, *Thiomiris sulphureus* Reut.; 147-150, *Stenotus binotatus* F.; 151, *S. tesquorum* Akram. & Kerzh. 132, 135, 138, 141, 144, 147, vesica; 133, 136, 139, 142, 145, 148, 149, left paramere; 134, 137, 140, 143, 146, 150, right paramere; 151, spiculum. Scale: 0.25 mm.

1861 possessing carinate pronotum and coloured with predominance of red and black tones; 2nd antennal segment gradually thickening towards apex; male genital segment with denticles on the left (*Taurocalocoris*) or on both sides.

Taurocalocoris described from Turkey is unique among *Mirina* in punctate dorsal side, also recognized by protruding forward anterior angles of pronotum and rostrum not reaching mesocoxae. Lateral margin of left paramere cristate.

Euro-Mediterranean *Capsodes* (1 species is transpalearctic) and *Horistus* live on herbs and usually possess a long, erect pubescence. In the majority of species, the hairs are pale, but in *C. gothicus* L., *C. pauperatus* Reut., and males of *H. turcomanus* Horv. predominantly black. Collar is usually as long as calli. In species of the *C. mat* Rossi group, pubescence is adpressed, length of collar does not exceeds 1st antennal segment width. Vesica in some species lacking sclerotization. Lateral margin of left paramere cristate in most of *Horistus* (Fig. 82; Chérot, 1997). *H. elongatus* Wgn. is dimorphic having subbrachypterous females.

E. *Grypocoris* group

(Figs 90-103, 110-112, 128-131)

The genera of this group: *Grypocoris* Douglas & Scott, 1868, *Hadrodemus* Fieber, 1858, *Epimecellus* Reuter, 1894, *Rhabdoscytus* Horváth, 1923, *Rauniella* Rosenzweig, 1997. They possess pale, fine, adpressed pubescence (in *Rauniella*, mixed). Coloration bright, black with yellow or orange markings (in the deserticolous *Rauniella*, pale yellowish). Vesicae with different extent of armament; hypophysis of right paramere angularly curved. In *Grypocoris*, anterior sack of vagina gently sclerotized between serrate rings; in its subgenus *Lophyromiris* Wgn., tibial spines pale. In *Epimecellus*, 2nd antennal segment clavate; in *Hadrodemus*, 1st metatarsal segment incrassate; in *Rhabdoscytus*, 3rd metatarsal segment lengthened. Distribution and host plants: *Grypocoris* – Euro-Mediterranean, *Hadrodemus* – European, both on Poaceae; *Epimecellus* endemic to Crimea, on *Poa*; *Rauniella* – Iraq.

F. *Dionconotus* group

(Figs 104-109)

Ulmiris Seidenstücker, 1965 and *Dionconotus* Reuter, 1894 possess pale erect pubescence and fused in a bar calli; coloration as in the previous group; in *Dionconotus*, vesica with

spiculum. *Ulmiris* is distributed in Turkey, on *Poa*, *Dionconotus* in N and E Mediterranean.

IV. *Creontiades* complex

(Figs 132-140, 161-166)

This complex is characterized by (1) pale pubescence, which can be fine or flattened, adpressed or erect; (2) longitudinal furrow on vertex; (3) hypophysis of left paramere ending with an apical curved denticle.

Members of *Creontiades* Distant, 1883, which is spread worldwide, feed on herbs and possess silky pubescence, long antennae, pale tibial spines, symmetrical 4- or 6-lobate vesicae lacking sclerotization thus similar to these of *Calocoris* complex. Chinese-Oriental *Poppiocapsidea* Yasunaga, 1998 closely resembling *Creontiades* differs in the peculiar structure of vesica (Chérot et al., 1999).

Diagnostic characters of *Megacoelum* Fieber, 1858 are the short collar and noticeable denticle on the left of male genital segment; tibial spines black or pale; eyes often enlarged; vesica bilobate, bearing massive spiculum on the right; IRL somewhat plicate, covered with microspinules. The genus is cosmopolitan, occurring on *Quercus*, *Pinus* and other trees and herbs.

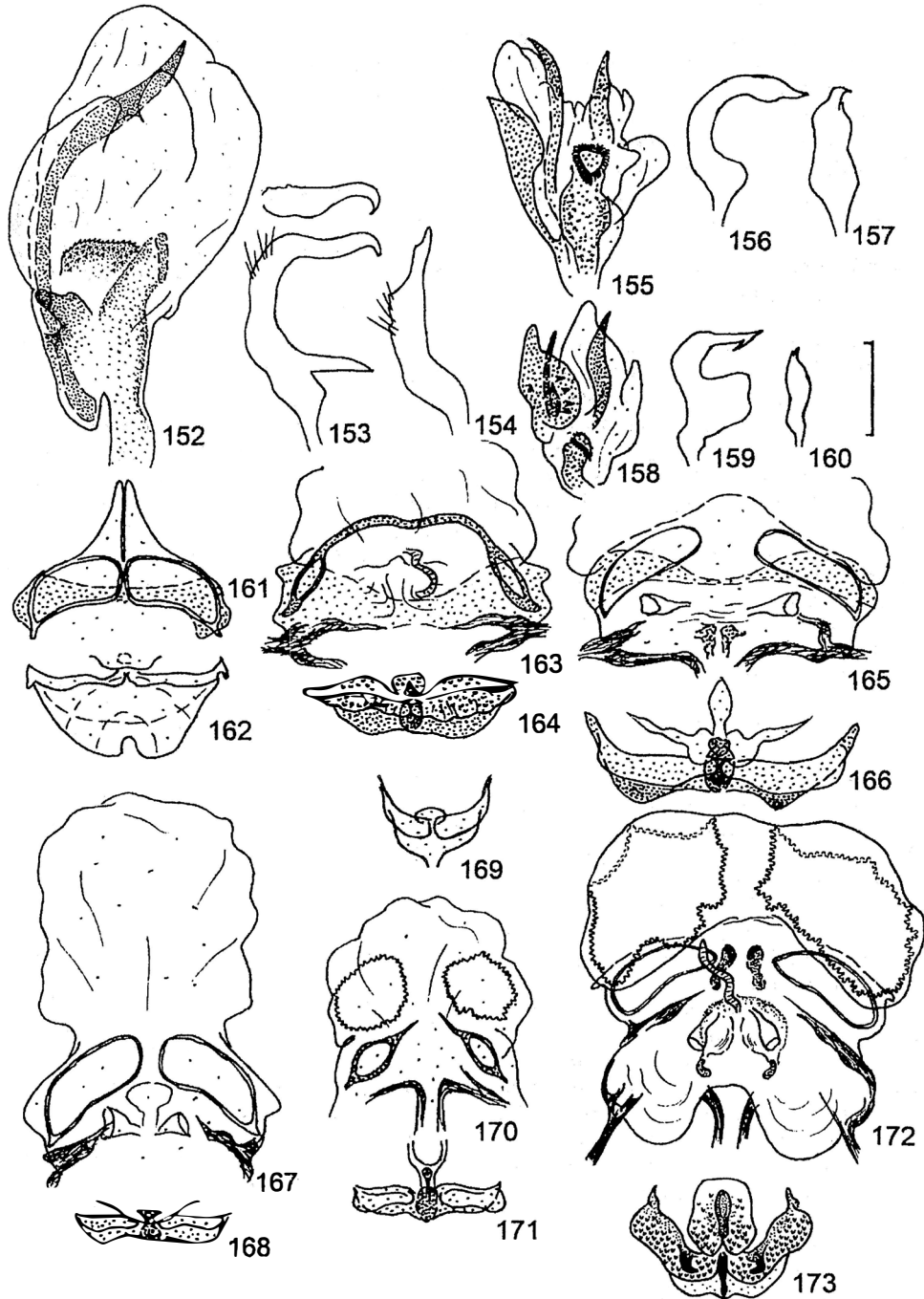
Cheilocapsidea Poppius, 1915 (= *Carvalho-pantilius* Yasunaga, 1995) restricted to E Palearctic and *Pleurochiloporos* Reut. inhabiting savannah regions of Africa possess carinate pronotum and projecting frons. In the former genus, the vesica is much similar to that of *Megacoelum*, in the latter one, lacking spiculum (Linnavuori, 1974).

In E Palearctic *Orientaliris* Yasunaga, 1997 and *Neomegacoelum* Yasunaga, 1998, tibial spines black. Vesica of *Orientaliris* possesses more developed armament; *Neomegacoelum* is recognized by the hemelytra transparent in most part. Both genera are dendrobionic, the latter feeds on *Quercus*.

V. *Adelphocoris* complex

(Figs 141-143, 167, 168)

Adelphocoris Reuter, 1876 is pubescent with fine golden hairs (except several species with mixed pubescence) and distinguished by the short collar, long 3rd antennal segment, angular big cell of hemelytral membrane, male genital segment dentate on the left. Vesica rather rigid, provided with comb on the right and spirally twisted spiculum on the left, uniform in numerous species and differing mostly in the shape of the comb. Parietal glands very



Figs 152-173. *Mirina*, male and female genitalia. 152-154, 172, 173, *Rhabdomiris striatellus* F.; 155-157, *Dichroscytus rufipennis* Fall.; 158-160, *Tingitotum pini* Kulik; 161, 162, *Creontiades coloripes* Hsiao (after Yasunaga); 163, 164, *Megacoelum beckeri* Fieb.; 165, 166, *Orientalis tricolor* Scott; 167, 168, *Adelphocoris lineolatus* Gz.; 169, *Argenis incisuratus* Walk.; 170, 171, *Stenotus binotatus* F. 152, 155, 158, vesica; 153, 156, 159, left paramere; 154, 157, 160, right paramere; 161, 163, 165, 167, 170, 172, vagina; 162, 164, 166, 168, 169, 171, 173, posterior wall. Scales: 152-160, 0.25 mm; 161-173, 0.5 mm.

large in *A. lineolatus* Gz. but small and extended in *A. suturalis* Jak.; IRL attached along their whole width. Range: Holarctic; host plants: mainly, Fabaceae.

The W Mediterranean *Thiomiris* Rosenzweig, 1997 (Figs 144-146) resembling *Adelphocoris* externally possesses however different male genitalia not allowing placement of both genera in one complex.

VI. *Rhabdomiris* complex

(Figs 152-154, 172, 173)

Rhabdomiris Wagner, 1968 is pubescent with whitish fine hairs. Vesica armed with long slender undulating spiculum; sensory lobe of left paramere bearing long acute process, hypophysis ending with a hook; right paramere tapering towards apex, hypophysis not expressed. Parietal glands large, ovoid; general structure of vagina complicated; IRL with free curved denticle, densely spinulate as well as dorsal structure. Range: amphipalaearctic nemoral, on *Quercus*.

VII. *Stenotus* complex

(Figs 147-151, 170, 171)

Stenotus Jakovlev, 1877 and *Charitocoris* Reuter, 1904 are recognized by the pale fine pubescence and long 1st metatarsal segment markedly exceeding the 2nd; rostrum in most species reaching far beyond metacoxae. Vesicae diverse, rather richly armed. Sensory lobe of left paramere expressed unusually well for *Mirina*; hypophysis hooked. Ranges: *Stenotus* is cosmopolitan, feeding on Poaceae, *Charitocoris* is spread in Ethiopian district, Arabia, India. Possibly, *Charitocoris* is synonymous to *Stenotus*, the key is given after Wagner (1974) for the Mediterranean fauna.

A number of genera distributed in China [*Paramiridius* Miyamoto & Yasunaga, 1992 (not included in the key), *Heteropantilius* Zheng & Liu, 1992] and in Japan (*Adelphocorisella* Miyamoto & Yasunaga, 1993, *Tolongia* Poppius, 1915) possess characteristic genitalia each that do not allow them to be included in any of the complexes studied. Probably, their relationships can be elucidated after examination of the Oriental fauna. *Heteropantilius* resembles *Pantilius* in the type of pubescence, sulcate vertex, incrassate antennae. In *Adelphocorisella*, pubescence is also mixed, 3rd antennal segment long, vesica with 1 spiculum. Other genera are with pale pubescence and carinate pronotum. In *Tolongia*, clavus with 1 row of punctures.

Presence of transverse keel between eyes, which is more common in Capsina, is characteristic for the Holarctic *Dichrooscytus* Fieber, 1858 (host plants – *Juniperus* and other conifers; Figs 155-157) and Ethiopian *Volumnus* Stål, 1866. Nevertheless, these genera have nothing in common either in general appearance or in genital structure: in *Dichrooscytus*, pubescence is black; in *Volumnus* pale but heterogeneous (scales and hairs), or with an admixture of black, pronotum corrugate, 2nd antennal segment often clavate (Linnavuori, 1997).

Argenis Distant, 1904 (Fig. 169) and *Tingnotum* Kirkaldy, 1902 (Figs 158-160) distributed in E Palaearctic and tropics of the Old World are characterized by smooth hemelytra but punctate pronotum. Both genera are very similar in the pale, long, erect pubescence, small size, vertical head and convex pronotum, depressed suture of exocorium. Genitalia, especially the shape of the left paramere show them to be representatives of the Capsina.

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