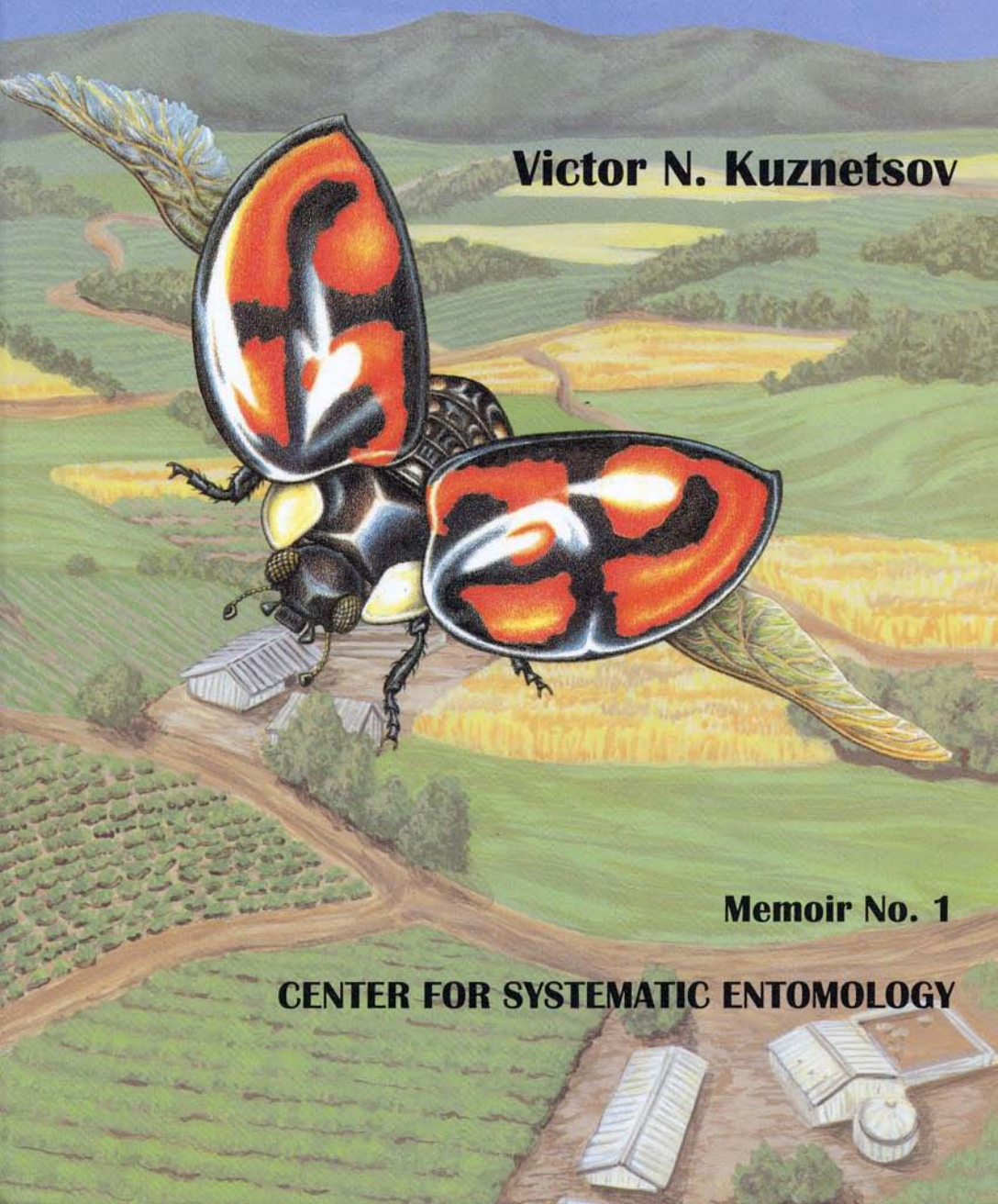


Lady Beetles of the Russian Far East

Victor N. Kuznetsov

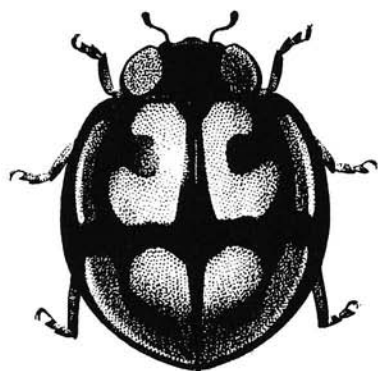
Memoir No. 1

CENTER FOR SYSTEMATIC ENTOMOLOGY



LADY BEETLES of the Russian Far East

Victor N. Kuznetsov



Memoir No. 1
Center for Systematic Entomology
1997

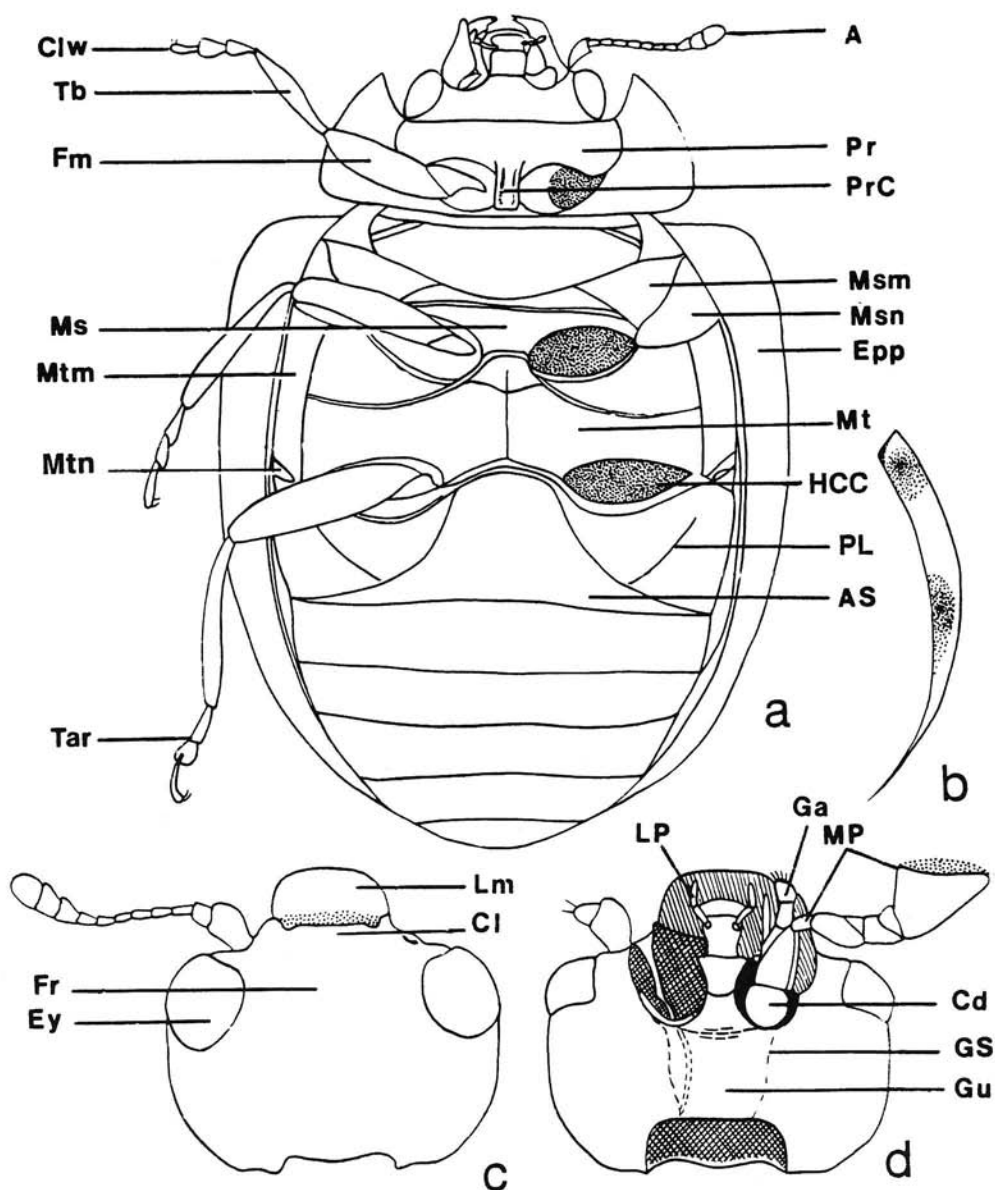


Fig.1. Morphology of the Coccinellidae: a, c, d, *Coccinella septempunctata* L.; b, *Hyperaspis leechi* Miyatake: a, adult, ventral view; b, elytral epipleuron; c, head, dorsal view; d, head, ventral view. A, antenna; AS, abdominal sternite; Cd, cardo; Cl, clypeus; Clw, tarsal claw; Epp, elytral epipleuron; Ey, eye; PL, postcoxal line; Fm, femur, Fr, frons; Ga, galea; GS, gular suture; Gu, gula; HCC, hind coxal cavity; Lm, labrum; LP, labial palpus; MP, maxillary palpus; Ms, mesosternum; Msm, mesepisternum; Msn, mesepimeron; Mt, metasternum; Mtm, metepisternum; Mtn, metepimeron; Pr, prosternum; PrC, prosternal carina; Tar, tarsus; Tb, tibia. (a – after Iablokoff-Khnzorian, 1982 (corrected); c-d – after Sasaji, 1971).

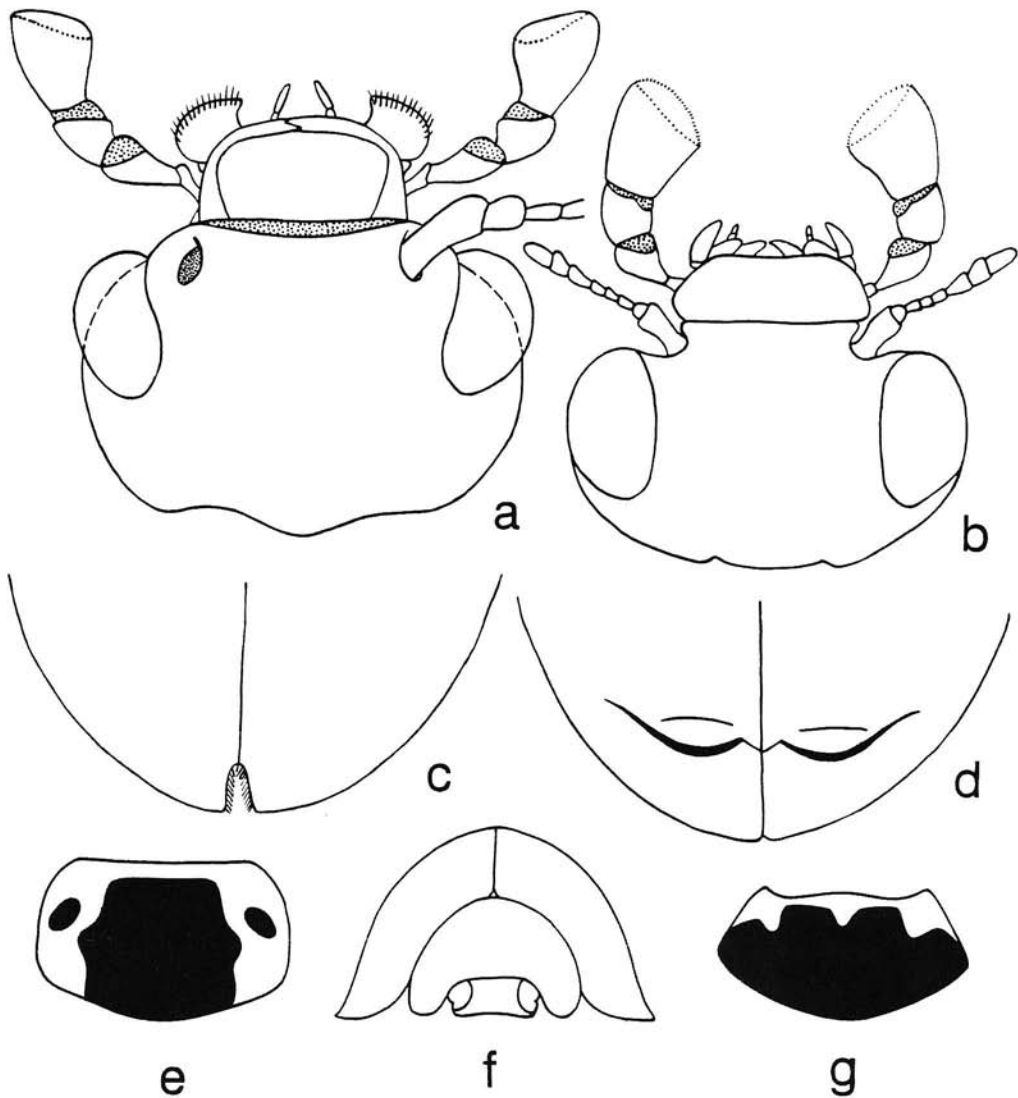


Fig. 2. Morphology of adults: a, *Henosepilachna vigintioctomaculata* (Motsch.); b, *Rodolia concolor* (Lew.); c, *Anatis ocellata* (L.); d, *Harmonia axyridis* (Pall.); e, *Hippodamia tredecimpunctata* (L.); f, *Chilocorus rubidus* Hope; g, *Coccinula quatuordecimpustulata* (L.): a, b, head, dorsal view; c, d, elytral apex; e-g, pronotum. (a, b - after Sasaji, 1968).

lacinae; the latter more or less rounded and bearing short hairs. Phytophagous Coccinellidae have larger galeae and laciniae than carnivorous species. Maxillary palpus consists of four segments; apical segment largest, of various shapes: securiform, oval, spindle-shaped, cylindrical (Figs. 4 a-h). Labium small (Figs. 3 f, h, i), consisting of submentum and mentum with suture between. Phytophagous Coccinellidae usually have the labium thin, narrowed anteriorly (Fig. 3 f), whereas carnivorous Coccinellidae (Fig. 3 h) have it broad. The shape of the mentum varies

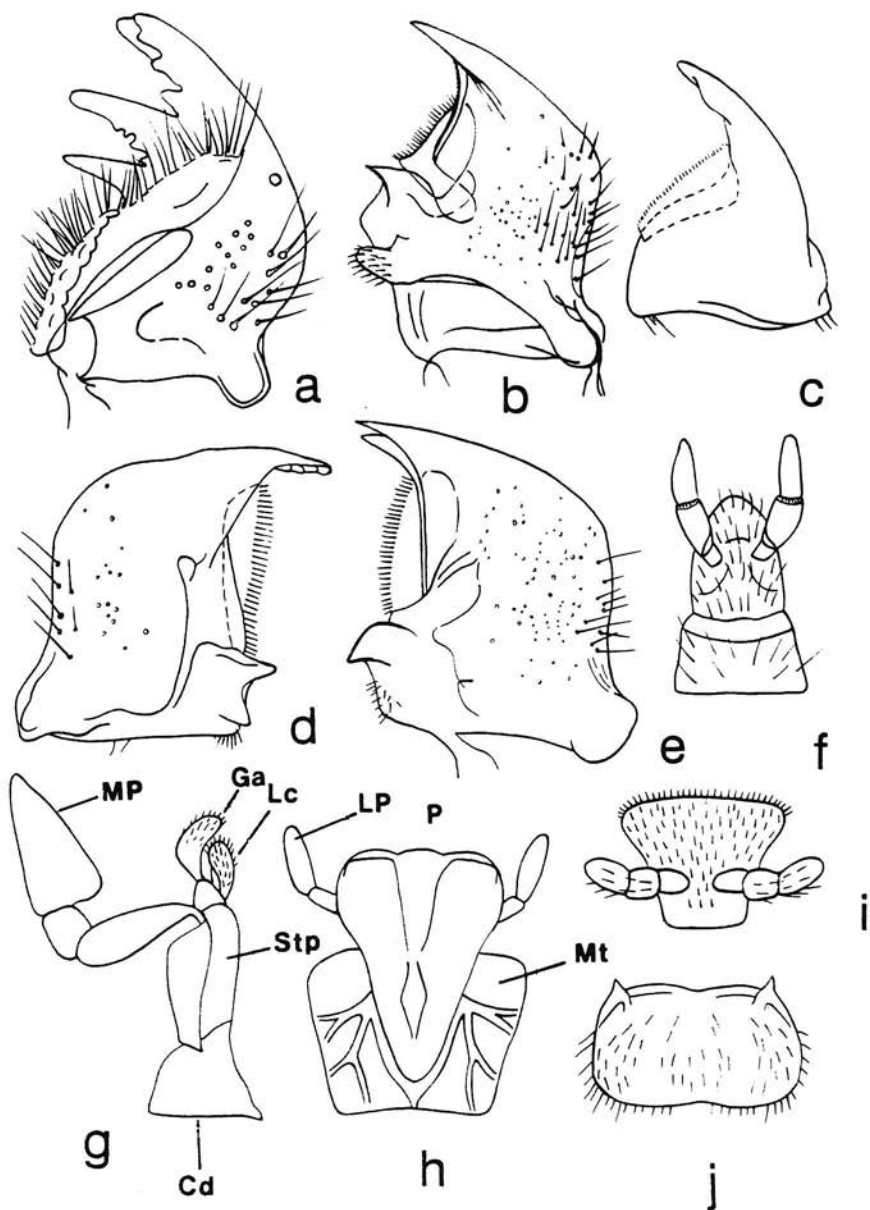


Fig. 3. Mouthparts: a, *Subcoccinella vigintiquatuorpunctata* (L.); b, *Chilocorus renipustulatus* (Scriba); c, *Serangium lygaeum* Khnz.; d, *Psyllobora vigintiduopunctata* (L.); e, *Adalia bipunctata* (L.); f, *Henosepilachna vigintioctopunctata* Fabr.; g, f, *Coccinella septempunctata* L.; i, j, *Vibidia duodecimguttata* (Poda): a-e, mandible; f, h, i, labium; g, maxillae; j, labrum. Cd, cardo; Ga, galea; Lc, lacinia; LP, labial palpus; MP, maxillary palpus; Mt, mentum; P, prementum; Stp, stipes. (a, b, d, e - after Hodek, 1973; c, f, i - after Sasaji, 1972; g, h - after Iablokoff-Khnzorian, 1982).

and is of taxonomic value (Figs. 1 d, 5 a-d). Submentum entirely fused with gula and sometimes very narrow. Gula broad; gular suture distinct. Labial palpi consist-

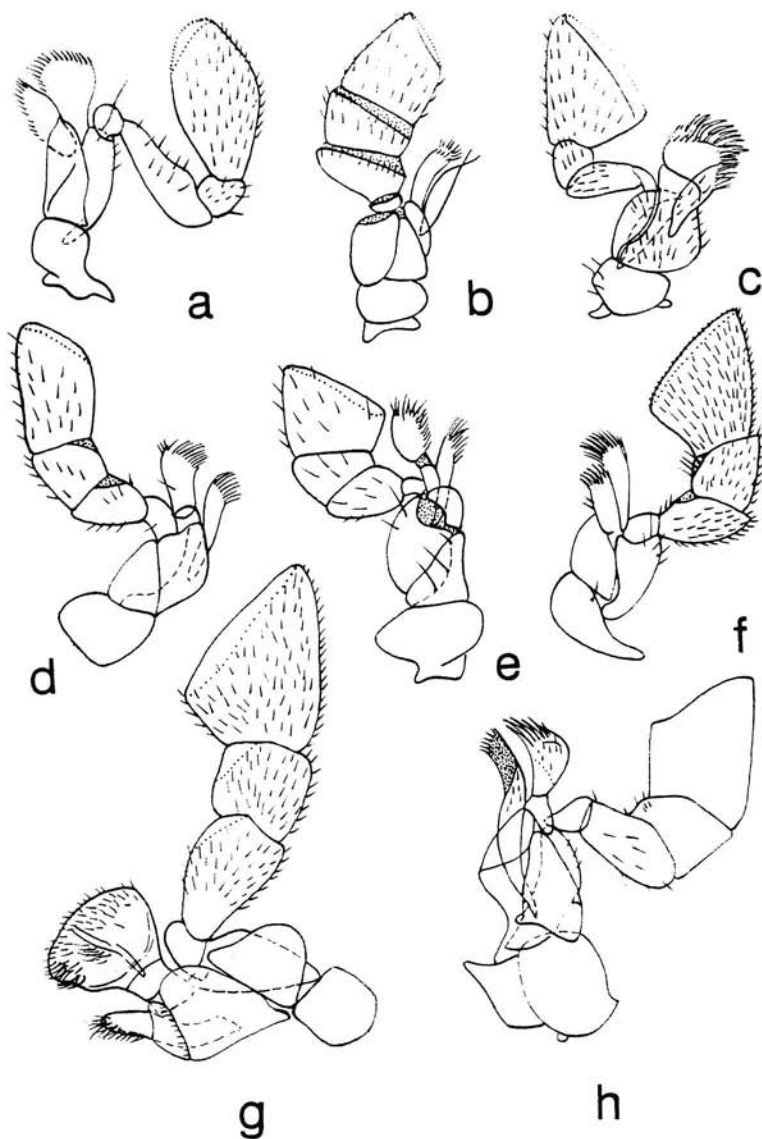


Fig. 4. Maxillae: a, *Serangium punctillum* Miyatake; b, *Pseudoscymnus hareja* (Weise); c, *Vibidia duodecimguttata* (Poda); d, *Scymnus* (*Scymnus*) *paganus* Lew.; e, *Hyperaspis japonica* Crotch.; f, *Rodolia concolor* (Lew.); g, *Henosepilachna vigintioctomaculata* (Motsch.); h, *Chilocorus kuwanae* Silv. (a-h – after Sasaji, 1968).

ing of 2 or 3 segments, narrow and short, covered with setae.

Antennae generally eleven-segmented; segments sometimes fused or otherwise reduced to 8 to 10 segments. Antennae attached either to frons, or to genae behind mandibular base. Apex often clavate. Antennal club variously formed, consisting of 1 - 6 segments. In some species the club is hardly developed (Noviini), in some it is distinctly separated from the rest of the segments (*Scymnini*). The antennal club

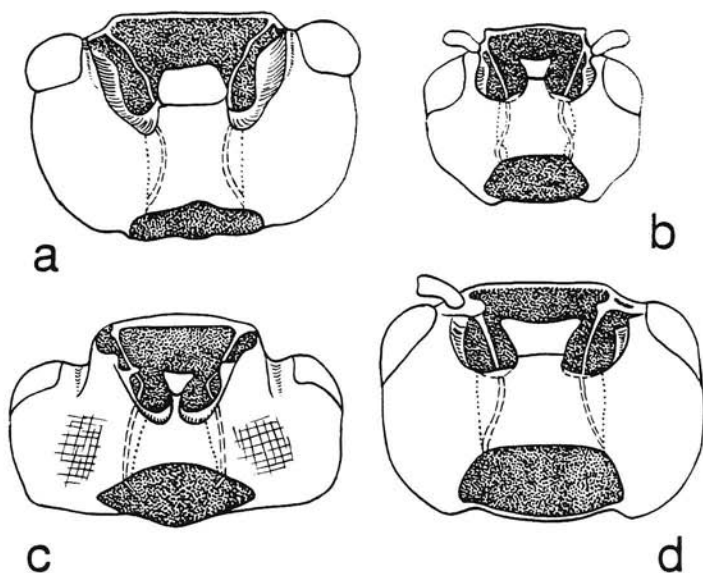


Fig. 5. Head capsules, ventral view: a, *Henosepilachna vigintioctomaculata* (Motsch.); b, *Harmonia axyridis* (Pall.); c, *Serangium punctum* Miyatake; d, *Scymnus (Pullus) hilaris* Motsch. (a-d – after Sasaji, 1968).

can be round (*Scymnini*) or narrowed and elongated (*Myzina*), its segments are closely adjoined to each other (*Coccinella*, *Adalia*) or more loose (*Propylea*, *Calvia*) (Fig. 6, a-o). The form of the last and penultimate segments vary in different genera.

Thorax. Prosternum strongly transverse, usually convex medially, with a well developed intercoxal process; anterior margin usually straight, or, as in *Stethorus*, with a protruding rounded lobe or rise at middle; intercoxal process often laterally bordered, this border often transformed into a pair of longitudinal carinae in anterior part of prosternum (Fig. 7, a-g); carinae present or absent, attaining anterior margin or not and with various relative orientations. Procoxal cavities complete. Trochantins lacking. Mesothorax strongly transverse, rather broad, short, with a projection between mesocoxal cavities, the latter more widely separated than procoxal cavities. Mesepimera reach the mesocoxal cavities. Anterior margin of mesosternum usually straight, some genera (*Harmonia*, *Synharmonia*) have it triangularly excavated. Metathorax large, transverse, much longer than mesothorax, broad, almost square, with an anterior projection between mesocoxae. Postcoxal lines originate at inner margin of metasternum, continue in an arch below mesocoxae and often reach inner margin of metepisterna (Fig. 1, a; 8, a-f). Postcoxal lines nearly always distinct, in the form of a groove. Metacoxal cavities broadly separated. Me-

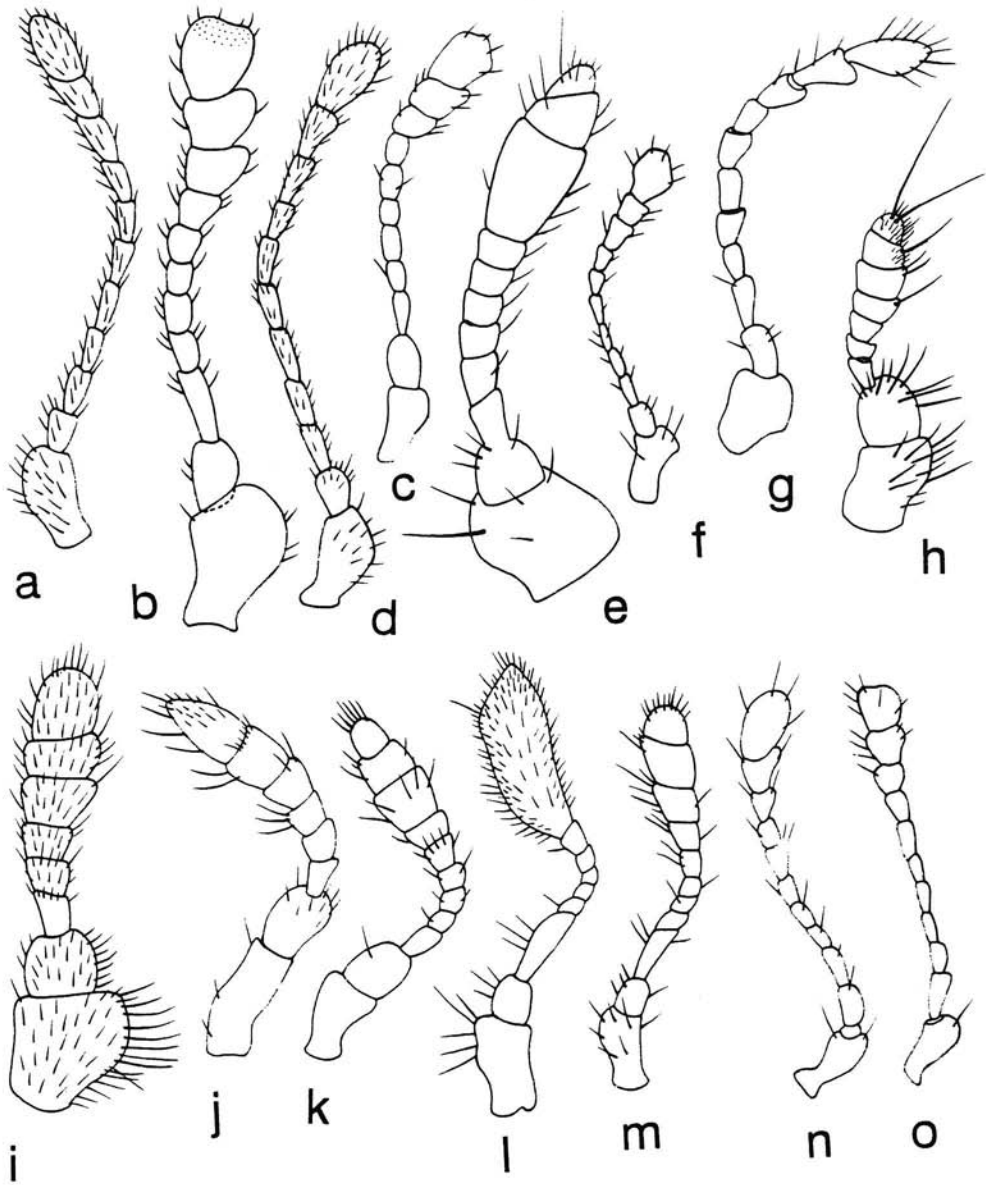


Fig. 6. Antennae: a, *Neomyzia oblongoguttata* L.; b, *Henosepilachna vigintioctomaculata* (Motsch.); c, *Vibidia duodecimguttata* (Poda); d, *Calvia quatuordecimguttata* (L.); e, *Hyperaspis asiatica* Lew.; f, *Propylea japonica* (Thunb.); g, *Halyzia sedecimguttata* (L.); h, *Pseudoscymnus hareja* (Ws.); i, *Rodolia limbata* (Motsch.); j, *Chilocorus kuwanae* Silv.; k, *Stethorus punctillum* Ws.; l, *Serangium lygaeum* Khnz.; m, *Scymnus (Pullus) hilaris* Motsch.; n, *Psyllobora vigintiduopunctata* (L.); o, *Harmonia axyridis* (Pall.). (a, d, e, h, i, l, m – after Sasaji, 1968; f, g, n – after Savoiskaya, 1983a).

tepiſterna oblong. A large thoracic sclerite, the metendosternite, attaches to the posterior margin of the metathorax; usually consisting of a basal part (trunk) and 2 long, widely divergent anterior processes. The metendosternite serves as an attach-

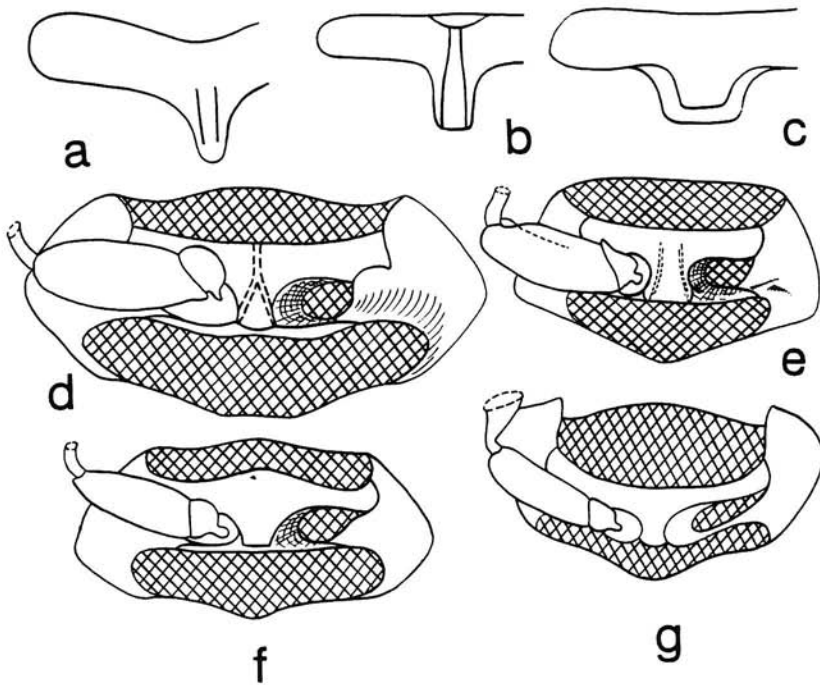


Fig. 7. Prothorax, ventral view: a, *Oenopia conglobata* (L.); b, *Scymnus* (*Scymnus*) *nigrinus* Kug.; c, *Nephus koltzei* (Ws.); d, *Hyperaspis japonica* (Crotch); e, *Scymnus* (*Scymnus*) *paganus* Lew.; f, *Stethorus japonicus* Kamiya; g, *Chilocorus kuwanae* Silv. (a-c - after Savoiskaya, 1983a; d-g - after Sasaji, 1971).

ment point for part of the musculature of the hind legs and wings.

Legs of moderate size, well developed, with dense short pubescence. Coxae transversely elongated, or sometimes nearly round. Trochantins small, transverse, subtrapezoidal, sometimes with apical corner sharply denticulate. Femora sometimes broad and flat; shallowly grooved for reception of tibiae. Tibiae elongate, dorsoventrally flattened; sometimes with spurs, but spurs usually lacking on protibiae. Tarsi usually cryptotetramerous, the third segment very small and hidden within the lobes of the second one. Only Lithophilini has an elongated third segment and has distinctly four-segmented tarsi. (Figs. 9 b, c). *Pseudoscymnus* and *Nephus* have 3-segmented tarsi. Apical segment of tarsus usually split or armed with a tooth at base or middle (Figs. 9 a, e-j).

Pronotum broader than head, convex, transverse, trapezoidal or arched (lateral sides more or less anteriorly curved). The pronotum has various forms (Fig. 2 e-g). In Chilacorini it is horseshoe-shaped. Pronotum widest at middle or in basal half, more rarely at anterior margin (Coccidulini). Anterior margin of pronotum more or less broadly excavated, sometimes covering the eyes (Pysilloborini), rarely truncate. Anterior angles rounded or protruding, sometimes in the form of lobes (Chilacorini). Lateral margins often rounded, sometimes with a lateral border or somewhat reflexed. The lateral margins of *Chilocorus* project anteriorly (Fig. 2 f). Base of

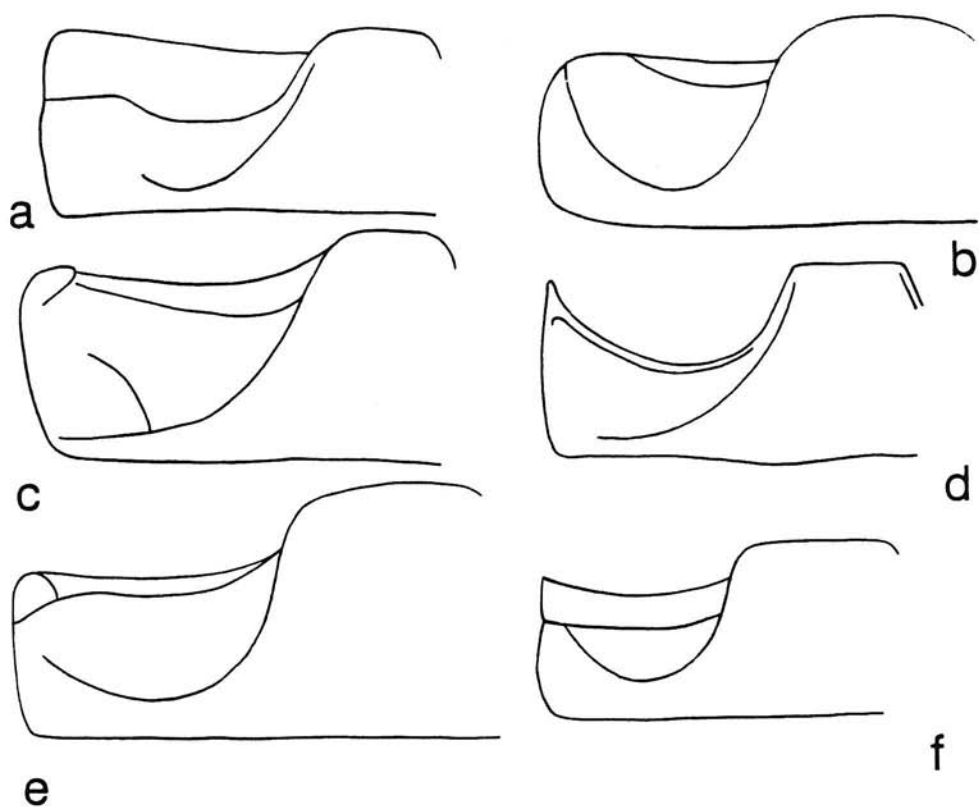


Fig. 8. First abdominal segment with postcoxal line: a, *Scymnus (Scymnus) nigrinus* Kug.; b, *Sidis biguttatus* Muls.; c, *Coccinella undecimpunctata* L.; d, *Nephus koltzei* (Ws.); e, *Adalia bipunctata* (L.); f, *Scymnus (Pullus) suturalis* (Thunb.). (b, c, e, f—after Savoiskaya, 1983a).

pronotum usually broadened, rounded, sometimes with raised border. Hind margin strongly arched-convex, more rarely straight (*Lithophilus*). Posterior angles usually blunt and broadly rounded, sometimes apically acute, or of some other form. Surface of pronotum more or less arched-convex, without any carinae or sulci, usually punctate, shiny or mat. Pronotum closely adjoining elytral base. Scutellum well developed, roughly triangular, but rarely rounded, sometimes equilateral (Coccidulini).

The form and color pattern of the elytra is important for the diagnosis of some species. Elytra glabrous or pubescent, shiny or mat, smooth, slightly or strongly convex, broad or less often elongate; base nearly truncate, rounded laterally. Only *Coccidula* has parallel-sided elytra. Apically the elytra are usually jointly rounded, but sometimes dehiscent and pointed. Humeral calli generally developed. The elytra of *Halyzia sedecimguttata* have a well flattened lateral margin; those of *Harmonia axyridis* each have a transverse folding at apex (Fig. 2 d). Some *Anatis* species have a small sutural excavation before the apex (Fig. 2 c). Elytral surface without carinae,

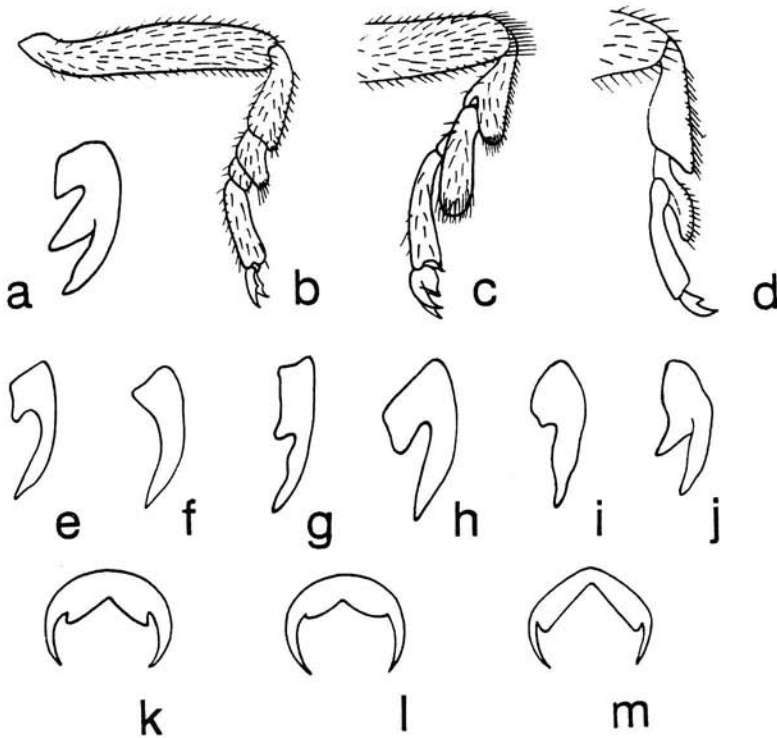


Fig. 9. Tarsal claw, tarsus: a, *Henosepilachna vigintioctomaculata* (Motsch.); b, *Tetrabrachus* sp.; c, *Adalia bipunctata* (L.); d, *Pseudoscymnus hareja* (Ws.); e, *Exochomus* (*Anexochomus*) *mongol* Bar.; f, *Bulaea lichatschovi* Hum.; g, *Adonia variegata* (Goeze); h, *Coccinella magnifica* Redt.; i, *Cynegetis impunctata* (L.); j, *Subcoccinella vigintiquatuorpunctata*; k, *Exochomus* (*Exochomus*) *quadripustulatus* (L.); l, *Exochomus* (*Parexochomus*) *nigromaculatus* (Goeze). b, c – after Hodek, 1973; d – after Sasaji, 1971; e, g, h, j – after Savoiskaya, 1983a; k-m – after Barovsky, 1922).

reliefs, or sulci; usually irregularly punctate; large and small punctures intermixed; sometimes forming longitudinal rows (*Coccidulini*). Ventrally the elytra continue as more or less developed epipleura. Epipleura usually broad, reaching elytral apex; very often strongly inclined towards interior surface of elytra. *Hyperaspis* and *Cynegetis* have deep cavities to receive femoral apices of the middle and hind legs. Wings usually well developed but in a few genera entirely lacking. Venation of cantharoid type. The structure of the wing is not very characteristic for the family and rather homogeneous.

Elytral and pronotal coloration rather variable, but generally of the following character: a dark background (black, or less commonly brown) with light spots (white, yellow, red, orange) or, just the opposite, a light background (whitish, yellow, red) with black or brown spots or stippling. The spots often coalesce into longitudinal or transverse bands or disappear altogether. Color varies greatly within the different species. Males usually have a more brightly colored head and pronotum.

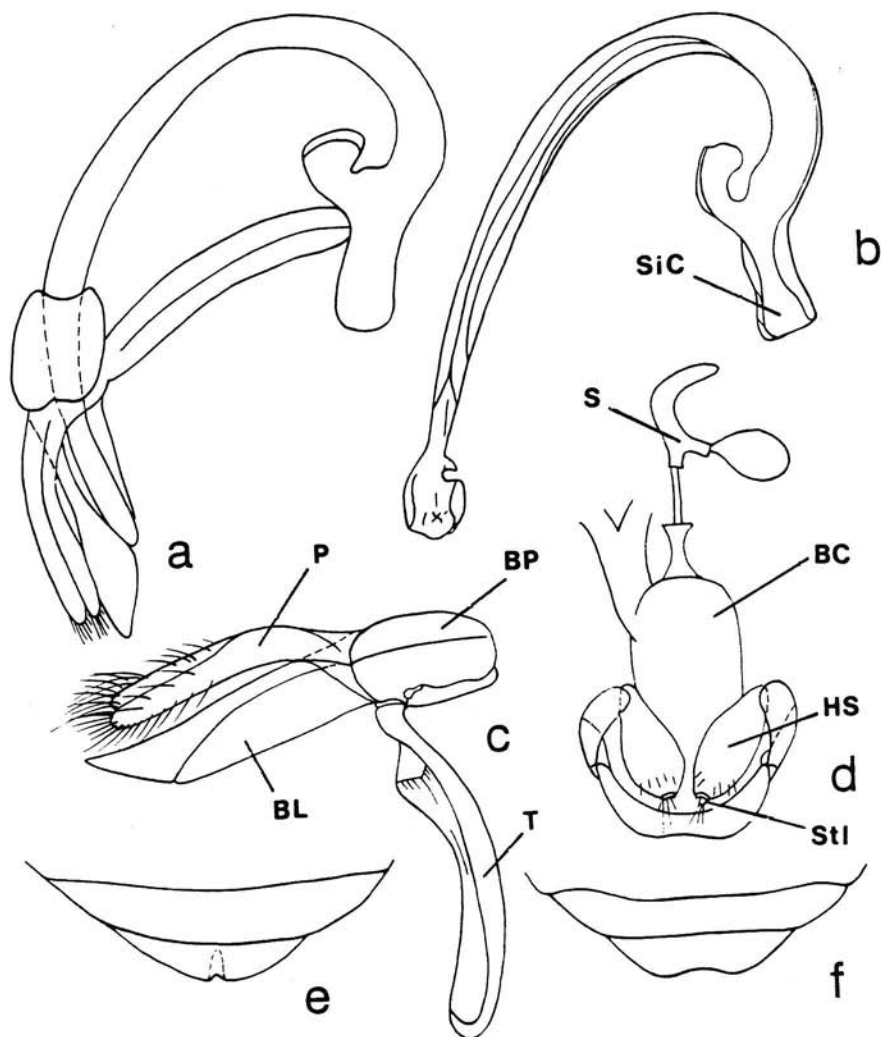


Fig. 10. Genitalia and last visible sternites of male and female: a-c, *Adalia* sp.; d, *Coccinella septempunctata* L.; e, f, *Anisosticta novemdecimpunctata* L.: a, tegmen of the male genitalia; b, siphon; c, male genitalia, lateral view; d, female genitalia; e, last sternites of female; f, last sternites of male. BC, bursa copulatrix; BL, basal lobe of tegmen; BP, basal piece of tegmen; HS, hemisternite; P, parameres; S, spermatheca; SiC, siphonal capsule; Stl, stylus; T, trabes. (a, c, e, f – after Hodek, 1973; d – after Sasaji, 1971).

Abdomen. Dorsally, the abdomen is much flatter than the elytra which encase it. It consists of five or six visible sternites. The first sternite is broad and extends anteriorly between the metacoxae. It bears postcoxal lines which, like those of the metathorax, more or less curve around the coxal cavities. Their form and degree of development are important for taxonomy (Figs. 8 a-f). The postcoxal lines are either complete or incomplete. When normally developed, they have the form of a half circle, when not, they are no more than a quarter circle or short arch. Sometimes they are confined to the anterior part of a sternite, or they may reach as far as

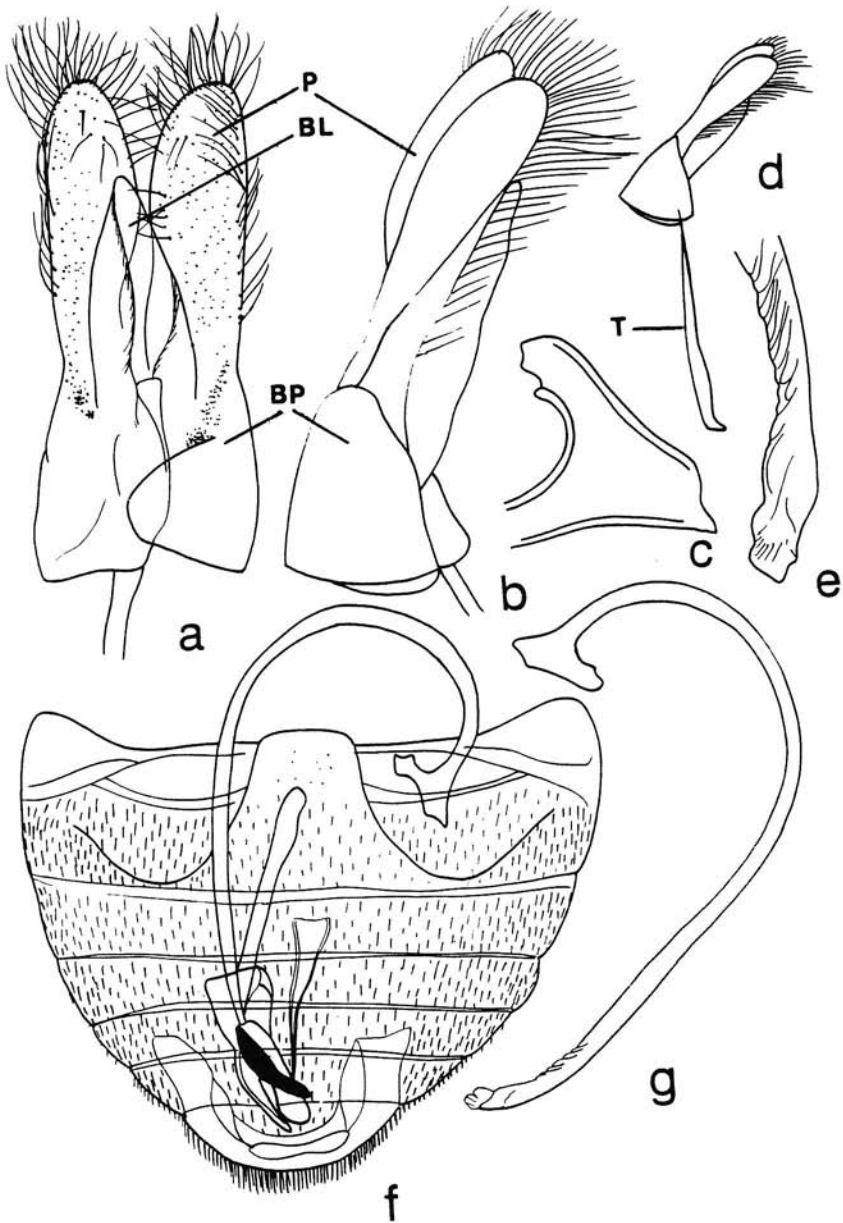


Fig. 11. Male genitalia of *Exochomus concavus* Fursch (after Fursch, 1973): a, b, d, tegmen; c, siphonal capsule; e, siphonal apex; f, abdomen with genitalia; g, siphon. BL, basal lobe of tegmen; BP, basal piece; P, parameres; T, trabes (after Fursch, 1973).

the middle part or hind margin. Sometimes the lines are distally divided into two branches: the lower one usually goes along the apical margin of the sternite, the upper one is bent or recurved toward the metepimerons. In some genera the post-coxal lines are "V" - shaped. In most species the males have an apical excavation on the fifth or sixth sternite, also provided with scarce setae (Fig. 10f); whereas the

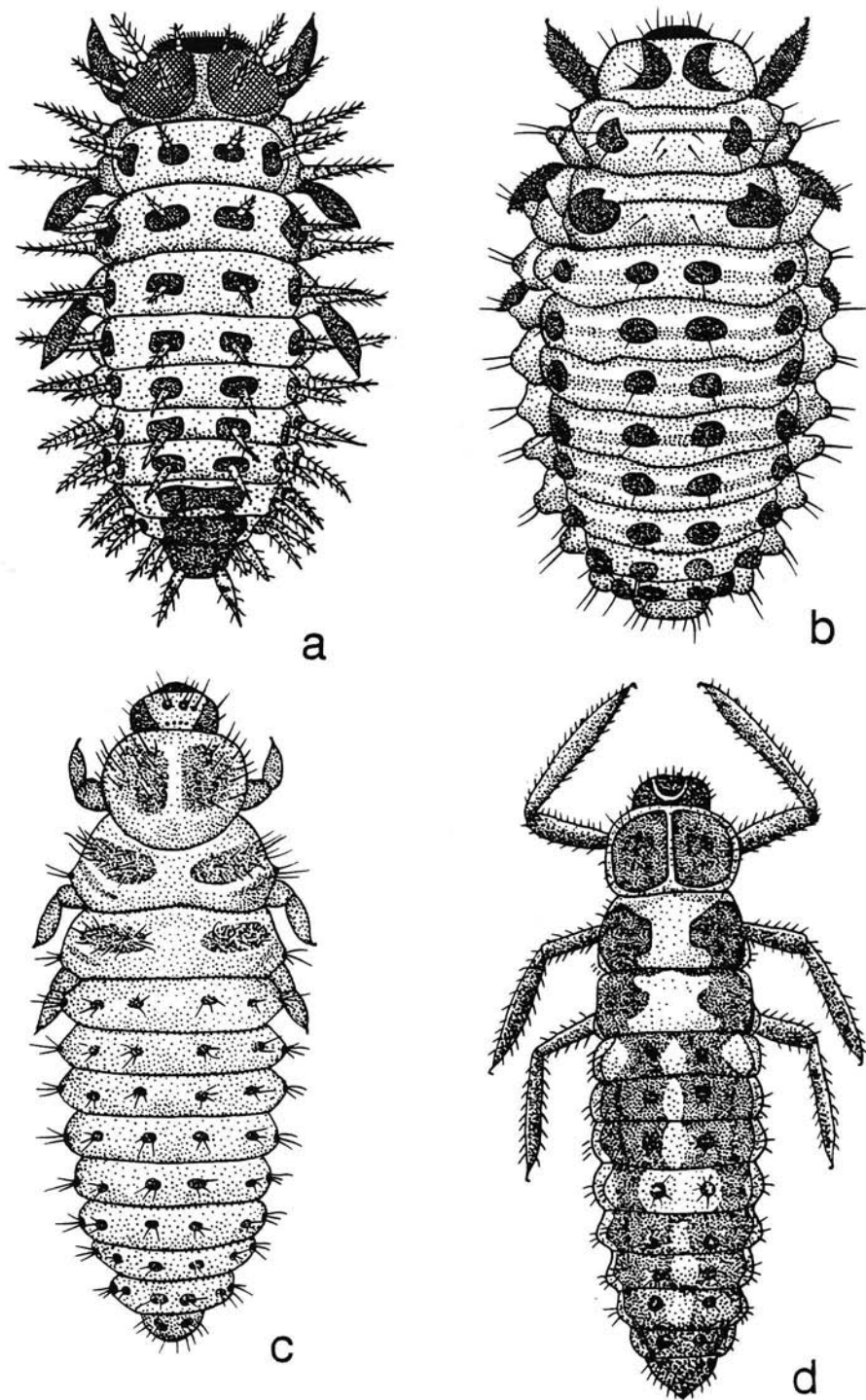


Fig. 12. Larvae of the Coccinellidae (after Sasaji, 1971): a, *Chilocorus kuwanae* Silv.; b, *Rodolia cardinalis* Muls.; c, *Stethorus japonicus* Kamiya; d, *Propylea japonica* (Thunbr.).

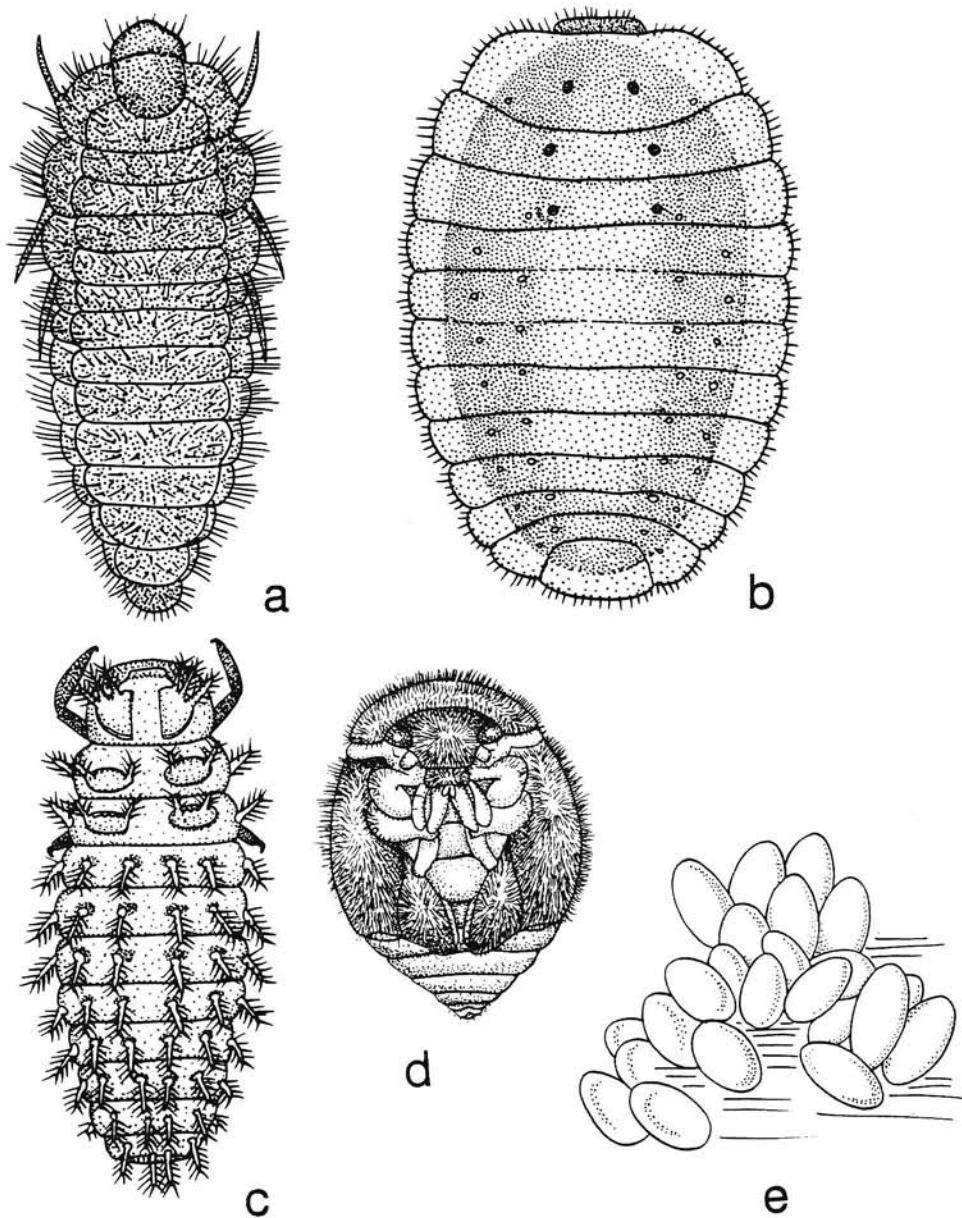


Fig. 13. Larvae, pupae, eggs: a, *Serangium japonicum* Chapin; b, *Cryptogonus horishanus* Ohta; c, *Henosepilachna vigintioctomaculata* (Motsch.); d, *Serangium parcesetosum* Sicard; e, *Aiolocaria hexaspilota* (Hope). a-c, larvae; d, pupae; e, eggs. (a,b – after Sasaji, 1971; d – after Timofeeva, Hoang, 1978).

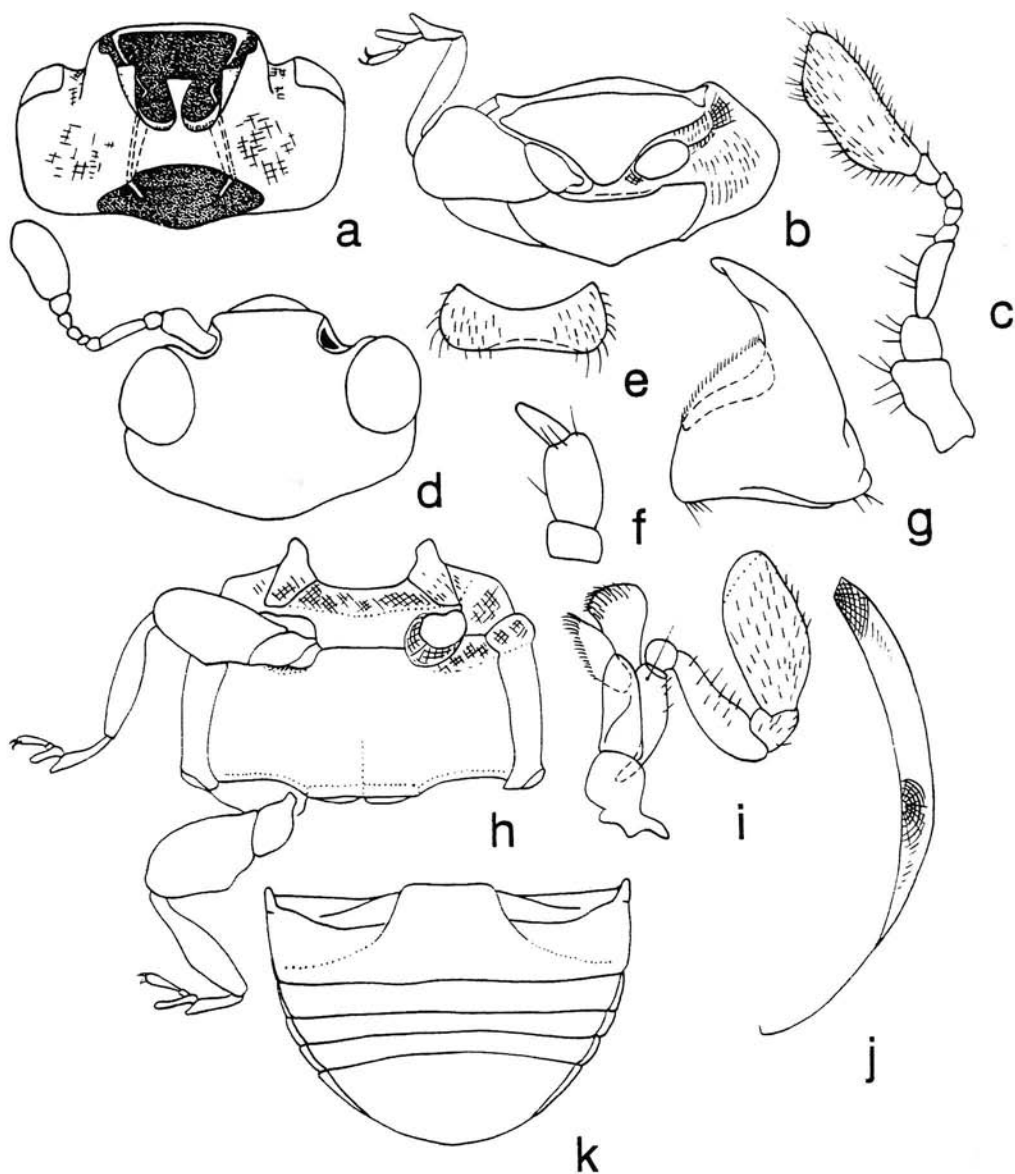


Fig. 14. Morphological details of *Serangium* spp. : a, b, d, f, h-k, *S.punctum* Miyatake; c, *S.rufficola* Kamiya; e, g, *S.japonicum* Chapin. a, head capsule, ventral view; b, prothorax, ventral view; c, antenna; d, head capsule, dorsal view; e, labrum; f, labial palpus; g, mandible; h, pterothorax; i, maxilla; j, elytral epipleuron; k, abdomen (after Sasaji, 1971).

USSR, one of them, *S.persocetosum*, is established in Adjara and successfully depresses the numbers of *Dialeurodes citri*. The other is recorded from the south of Primorsky krai. Japanese species of the genus feed on coccids of the genus *Ceroplastes* and some whiteflies (Aleyrodidae) (Kamiya, 1966).

of sternite, which ends in wide flat median lobe. Legs with very wide and flat femora; tibiae without teeth. Tarsi four-segmented, with very short third segment; claws with sharp tooth.

Genitalia. Siphon an evenly curved tube, straightening at apical third, with small emargination at apex; capsule lobe-like. Tegmen with very long narrow stick-like trabes, its basal part short; basal lobe flattened to very flat plate, asymmetrically rounded at apex, laterally excavated at base, reaching to its middle. Parameres fuse into common plate, canted toward tegmen with emarginate anterior margin, broadened by 2 teeth, bearing cluster of long setae each, laterally with small projection bearing pair of long setae; ninth sternite very large.

Body length 1.9-2.1 mm, width 1.7-1.9 mm.

Distribution. South and central regions of Primorsky krai.

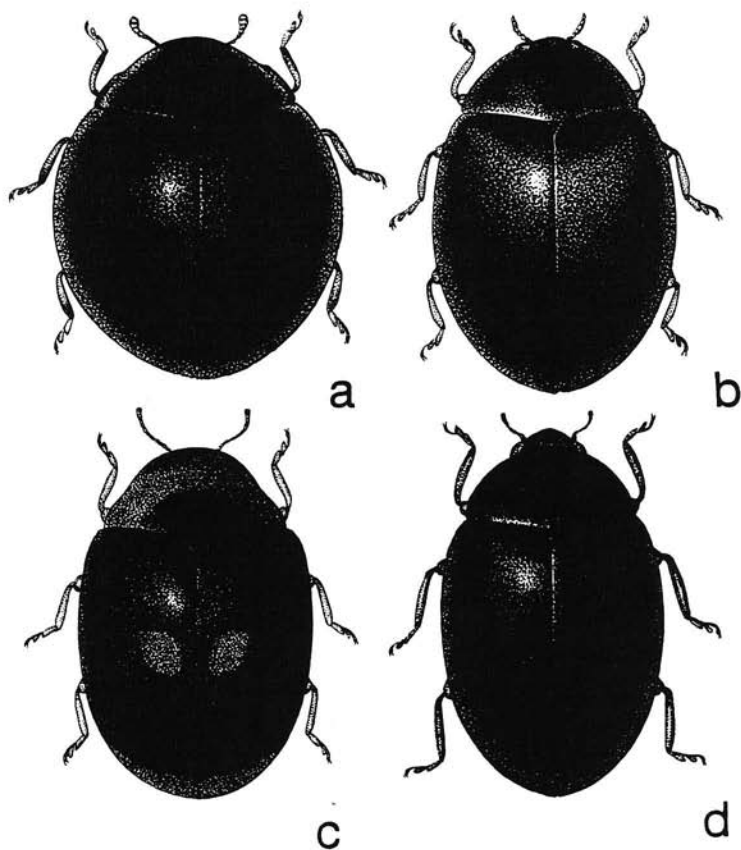


Fig. 15. Habitus views: a, *Serangium lygaeum* Khnz.; b, *Stethorus (Stethorus) punctillum* Ws.; c, *Pseudoscymnus hareja* Ws.; d, *Scymnus (Scymnus) nigrinus* Kug.

Beetles very small, size less than 1.6 mm, heavily pubescent. Eyes exposed apically, densely and finely pubescent. Antennae 11-segmented, distinctly clubbed, not very short, approximately $1/3$ of head width. Terminal segment of maxillary palpi apically narrowed, with truncate apex. Prosternum at middle of anterior margin roundly expanded, projecting in form of small rounded lobe, without lateral carinae. Mesosternum nearly flat, shorter than prosternum. Elytral epipleura without distinct depressions. Postcoxal lines complete, reaching anterior margin of

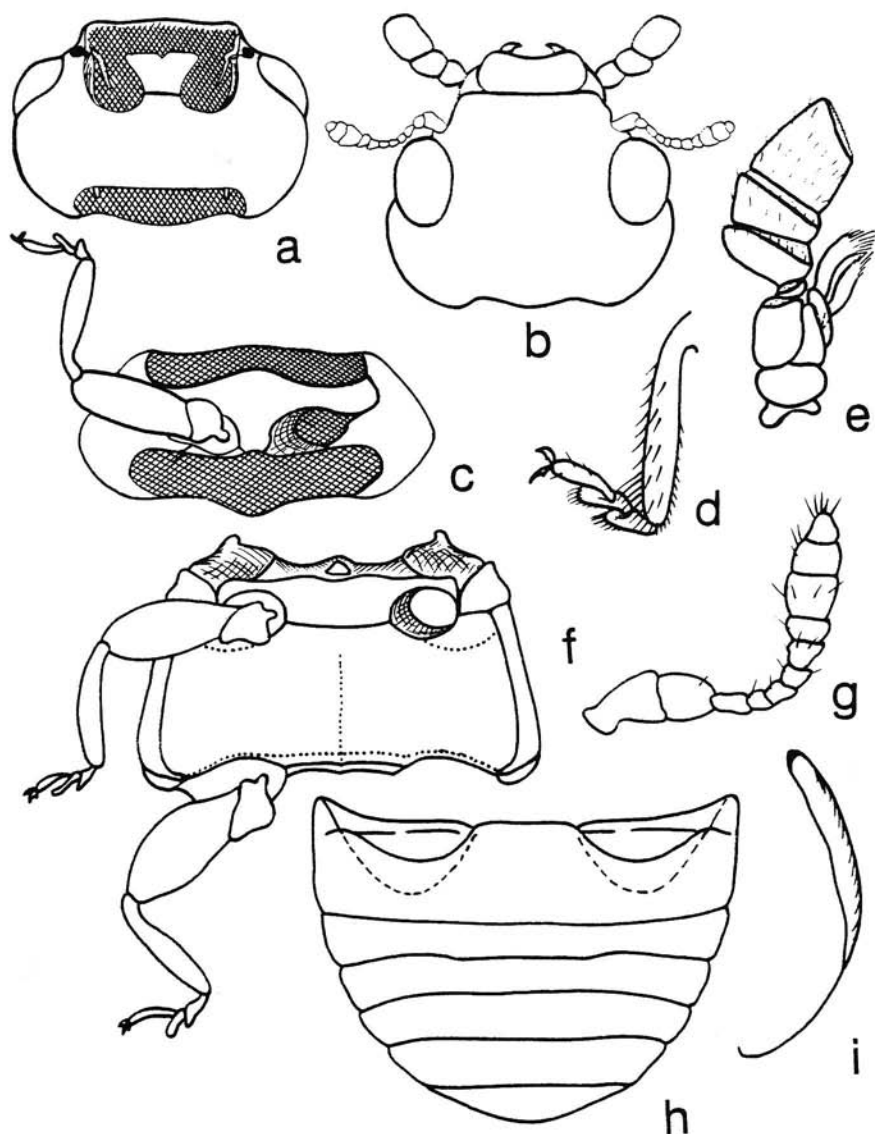


Fig.16. Morphological details of *Stethorus japonicus* Kamiya: a, head capsule, ventral view; b, head, dorsal view; c, prothorax; d, hind tibia and tarsus; e, maxilla; f, pterothorax, ventral view; g, antenna; h, abdomen; i, elytral epipleuron (after Sasaji, 1971).

1. *Stethorus (Stethorus) punctillum* (Weise, 1891)

Fig. 15b

Weise, 1891:781 (*Scymnus (Stethorus)*; type locality Italy); Casey, 1899:136; Korschefsky, 1931:112; Kapur, 1948:302; Djadchko, 1954:69; Kuznetsov, 1975b:6; 1979:74; Pang, 1979:33; Kuznetsov, 1981a:61; 1981b:46; 1983:64; Kuznetsov, Semjanov, 1983:4; Savoiskaja, 1983a:121; Iablokoff-Khnozorian, 1983:142; Kuznetsov, 1984b:27; Bielawski, 1984:329; Kuznetsov, 1992:344; Minima Rossi, 1794:89; (*Coccinella*; type locality - Italy, nom. preocc. Muller, 1776.

Larva. Savoiskaja, 1960:140; 1973:102; 1983b:190.

Body oblong-oval, convex, black, coarsely punctate, covered with rather long white hairs. Head transverse, with yellow, slightly curved anterior margin. Eyes large, finely faceted. Width of frons almost equal to twice diameter of eye. Mouth parts yellow. Antennae short, with distinct club.

Pronotum with ornamental excavation at anterior margin and with almost straight posterior margin. Pronotum widest at base. Scutellum small, equilateral. Elytra black, irregularly and roughly punctate, with strongly projecting humeral calli. Epipleura narrow, without depressions. Prosternum rather expanded, projecting at middle of anterior margin in form of rounded lobe, without longitudinal carinae. Mesoster-

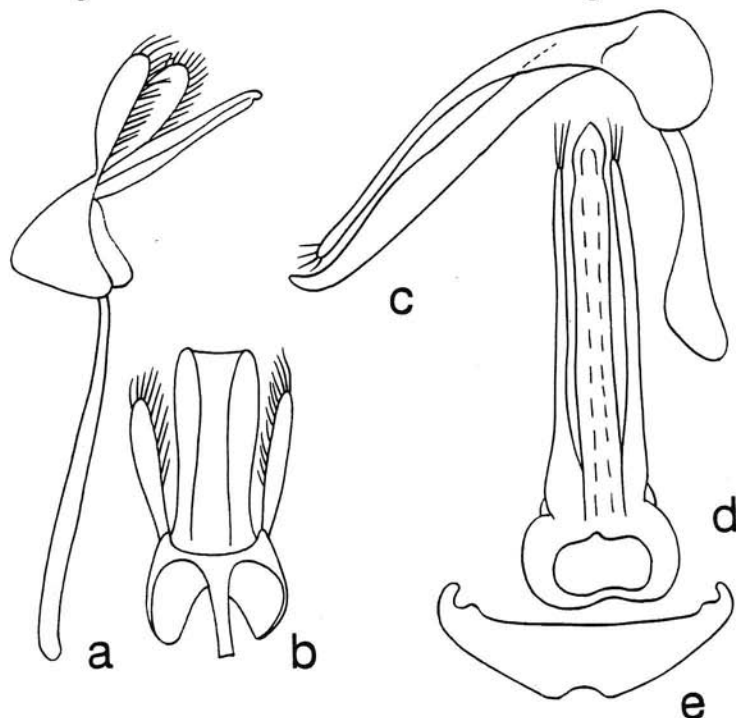


Fig. 17. Genitalia and abdominal segment of *Stethorus* spp.: a, b, *Stethorus (Allostethorus) amurensis* Khnz.; c, e, *S. (Stethorus) punctillum* Ws.; a, d, tegmen, lateral view; b, c, tegmen, ventral view; e, sixth abdominal segment of female. (a, b - after Jablokoff-Khnozorian, 1972; c-e - after Bielawski, 1984).

known. There are 11 genera in the Palearctic; in Russia the following genera are represented: *Cryptolaemus* Muls., *Clitostethus* Ws., *Scymnus*, *Nephus*, *Pseudoscymnus*; in the Far East only the last three genera are represented.

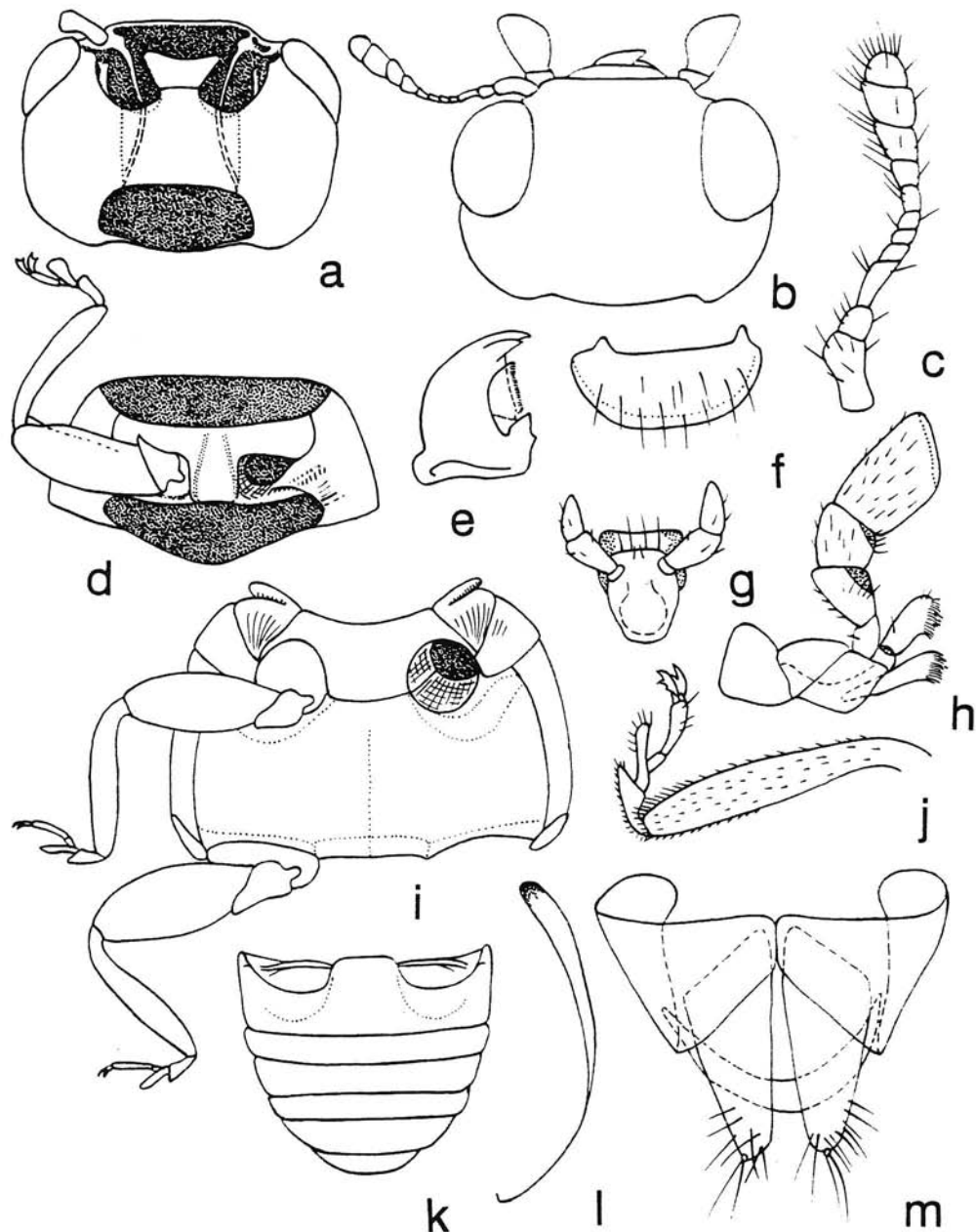


Fig. 18. Morphological details of *Scymnus* spp. : a-e, i-k, *S. (Scymnus) paganus* Lew and f, m, *S. (Pullus) hilaris* Motsch.; a, head capsule, ventral view; b, head dorsal view; c, antenna; d, prothorax; e, mandible; f, labrum; g, labium; h, maxilla; i, pterothorax, ventral view; j, hind tibia and tarsus; k, abdomen; l, elytral epipleuron; m, female genital segments (after Sasaji, 1968).

3. Genus *Pseudoscymnus* Chapin, 1962

Fig 19, a-i.

Chapin, 1962:50; Kamiya, 1961:291 (*Scymnus*); Sasaji, 1971:98; Hoang, 1982:124; Kuznetsov, 1992:349. Type species *Scymnus hareja* Weise, 1879 by primary designation.

Antennae very short, 9-segmented, with 2 large segments at base; remaining segments relatively small; apex of terminal segment with 2 long setae. Postcoxal line

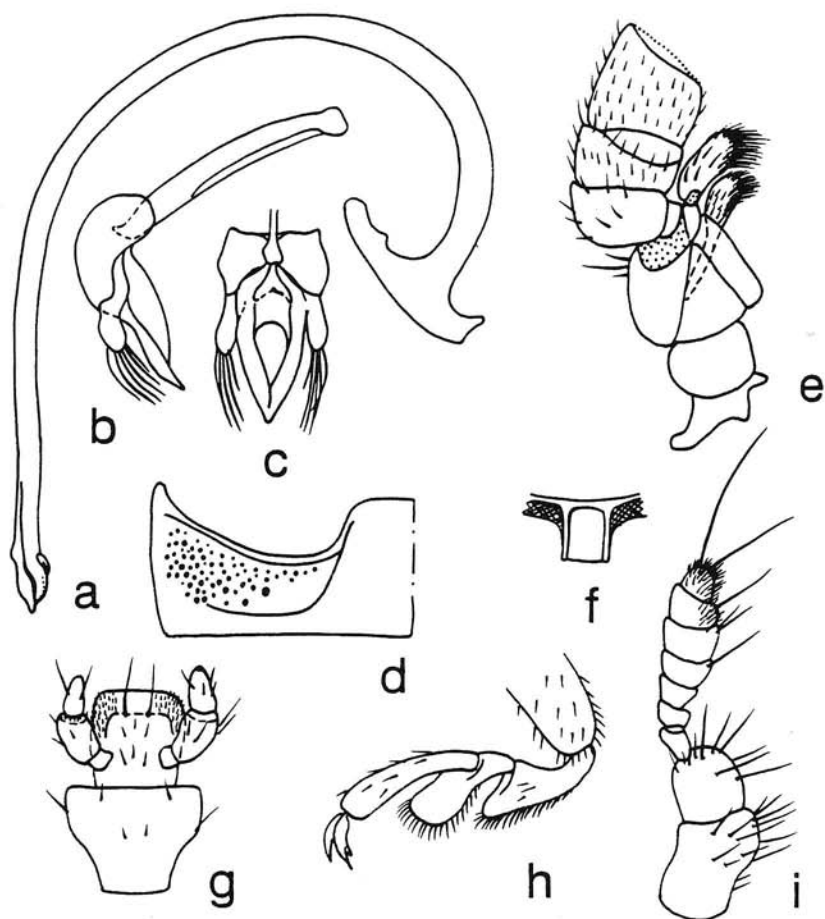


Fig. 19. Morphological details of *Pseudoscymnus hareja* (Weise): a, siphus; b, tegmen, lateral view; c, tegmen, ventral view; d, first visible abdominal segment; e, maxilla; f, median part of prosternum; g, labium; h, hind tarsus; i, antenna (after Sasaji, 1971).

Bielawski, 1984:339; Kuznetsov, 1992:345.

Body oval, moderately convex, slightly compressed laterally, black, slightly shiny, roughly punctate, covered with dense short pubescence. Head slightly transverse, with elongated almost cone-like anterior margin, covered with long, anteriorly directed yellowish hairs. Eyes large, convex, finely faceted. Antennae brown. Terminal segment of maxillary palpi almost spindle shaped. Pronotum transverse, with weakly emarginate anterior margin and almost right anterior angles, with distinct border at base. Scutellum large, almost equilateral. Elytra slightly laterally compressed, coarsely punctate, not joined apically.

Venter black. Prothorax slightly shiny, with distinct anteriorly convergent carinae, reaching as far as anterior margin. Tarsi dark brown. Postcoxal lines of first abdominal segment large, incomplete. Abdomen covered with posteriorly directed dense yellow pubescence. Process of terminal sternite apically disc-like, basal abdominal process spear-like. Aedeagus as in figure 22 e, f.

Body size 2.0-2.8 mm.

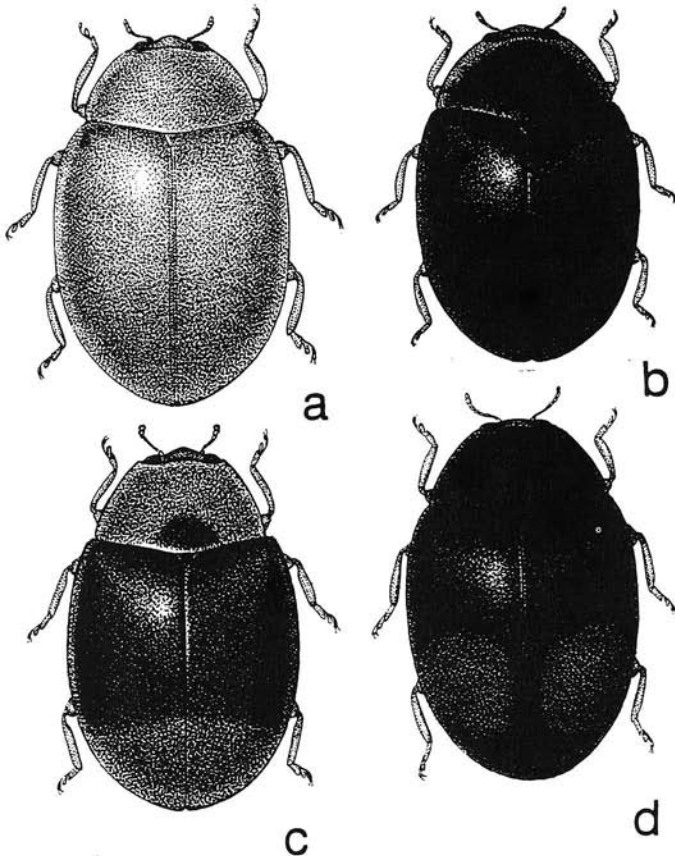


Fig. 20. Habitus views of *Scymnus* spp. : a, *S. (Scymnus) abietis* Payk.; b, *S. (Scymnus) crinitus* Fursch; c, *S. (Scymnus) rubromaculatus* (Goeze); d, *S. (Scymnus) jakowlevi* Ws.

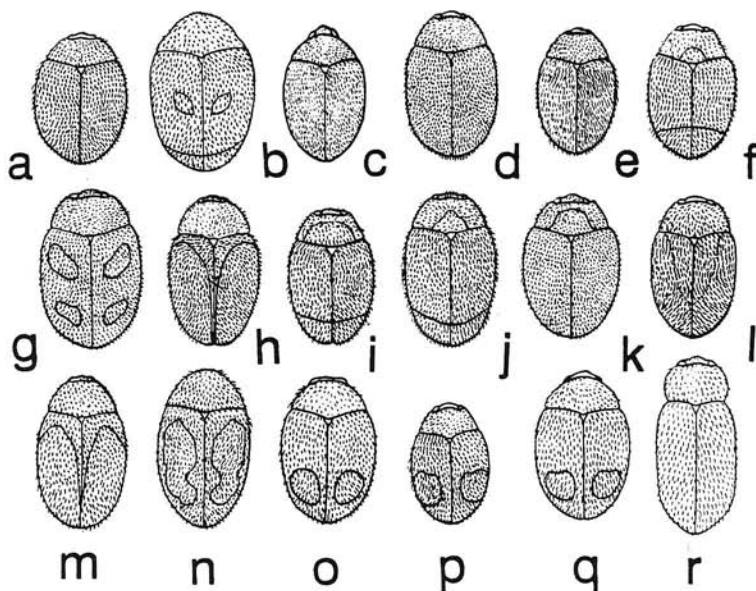


Fig. 21. Pattern of dorsal pubescence of diverse Coccinellidae: a, *Stethorus (Stethorus) punctillum* Ws.; b, *Pseudoscymnus hareja* Ws.; c, *Scymnus (Scymnus) nigrinus* Kug.; d, *S. (Scymnus) abietis* Payk.; e, *S. (Scymnus) crinitus* Fursch; f, *S. (Scymnus) rubromaculatus* (Goeze); g, *S. (Scymnus) frontalis* (Fabr.); h, *S. (Neopullus) fuscatus* Boheman; i, *S. (Pullus) haemorrhoidalis* Herbst; j, *S. (Pullus) ferrugatus* (Moll); k, *S. (Pullus) auritus* Thunb.; l, *S. (Pullus) limbatus* Steph.; m, *S. (Pullus) suturalis* Thunb.; n, *Nephus redtenbacheri* (Muls.); o, *N. koltzei* (Ws.); p, *N. bipunctatus* Kug.; q, *N. koreanus* Fursch; r, *Coccidula rufa* (Herbst).

Specimens examined. 293 specimens from the Far East, Siberia and Caucasus.

Distribution. Magadan region, Khabarovskiy krai, Amur region, Primorsky krai, Sakhalin; Siberia, European part of Russia, Europe.

Life history. Occurs in the crowns of conifers, in cedar-broad-leaved and pine forests; common on pine-trees. Feeds on aphids living on conifers.

2. *Scymnus (Scymnus) abietis* Paykull, 1798

Fig. 20a, 21d

Paykull, 1798:15 (type locality - Sweden); Mulsant, 1850:975; Mader, 1924:13; Korschefsky, 1931:117; Djadechko, 1954:83; Kuznetsov, 1975c:6; 1983:64; Kuznetsov, Semjanov, 1983:5; Iablokoff-Khinzorian, 1983:151; Kuznetsov, 1984b:27; Bielawski, 1984:340; Kuznetsov, 1992:346.

Body oval, strongly convex, slightly shiny, punctate, covered with white pubescence. Head transverse, rufous. Eyes large, finely faceted. Antennae ten segmented, yellow, short, clavate. Pronotum with weakly emarginate anterior margin, its anterior angles almost right angled, hardly projecting. Pronotum broadest anteriorly, its base narrower than base of elytra. Pronotum laterally raised. Scutellum small, hardly visible. Elytra rufous with distinct, large humeral calli.

Venter rufous, sometimes only thorax dark. Prosternum with distinct anteriorly

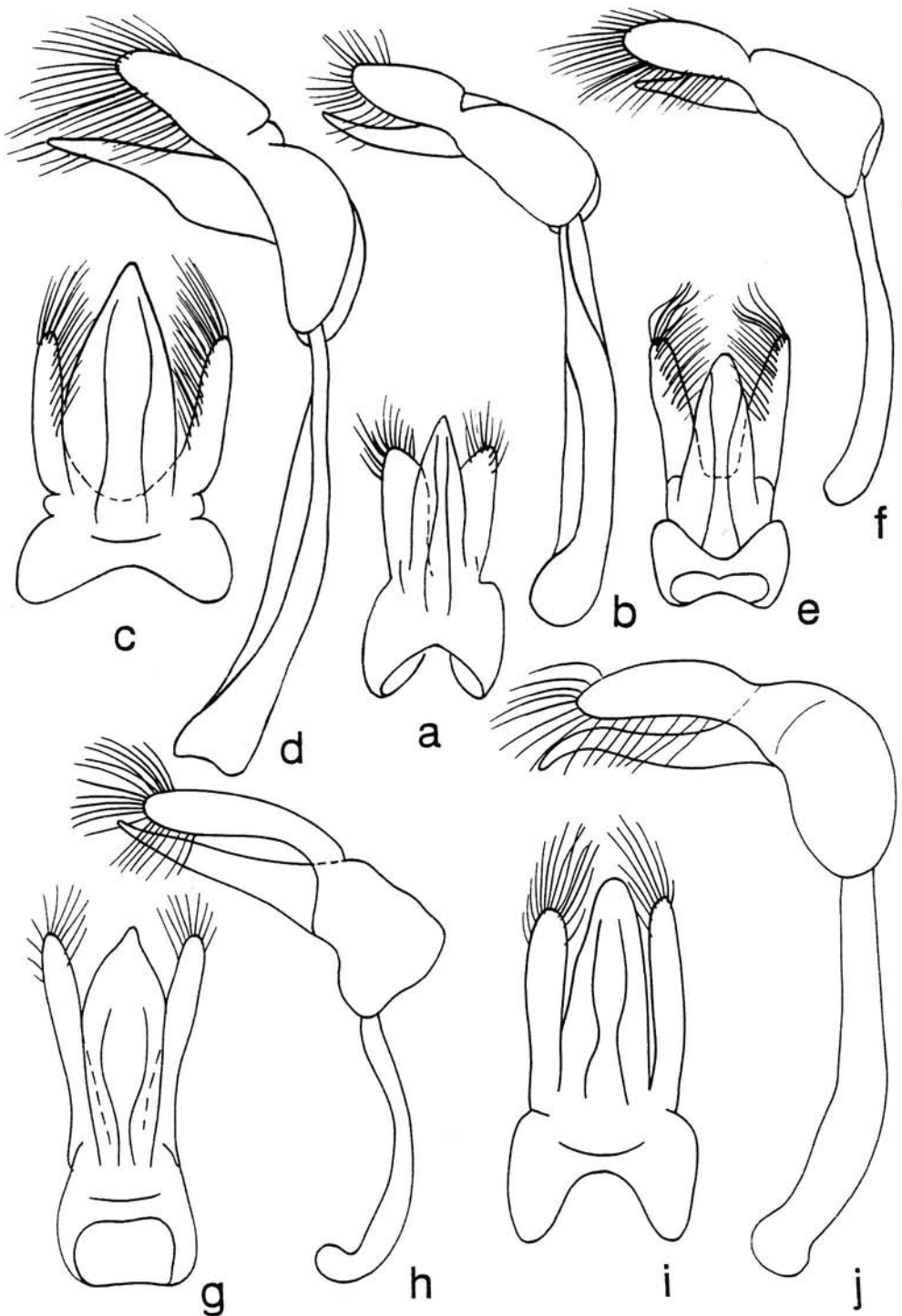


Fig. 22. Tegmen of *Scymnus* spp.: a, b, *S. (Scymnus) rubromaculatus* (Goeze); c, d, *S. (Scymnus) frontalis* (Fabr.); e, f, *S. (Scymnus) nigrinus*; g, h, *S. (Scymnus) abietis* Payk.; i, j, *S. (Scymnus) jakowlewi* Ws.; a, c, e, g, i, tegmen, ventral view; b, d, f, h, j, tegmen, lateral view (after Bielawski, 1959, 1964).

middle part of tibiae black. Hind coxae more widely separated than middle ones. Postcoxal lines large, incomplete, almost reaching base of first abdominal sternite.

Aedeagus - Figs. 22c, d. Siphon short, massive, broadened apically.

Body length 2.6-3.2 mm., width 1.9-2.1 mm.

Distribution. Magadan region, Khabarovskiy krai, Amur region, Primorsky krai, Siberia, Kazakhstan, Middle Asia, European Part of the Russia. Peninsula of Korea, China, Mongolia, Asia Minor, Western Europe, North Africa.

Specimens examined. 381 specimens from the Far East, Siberia, Mongolia.

Life history. Common on herbaceous vegetation of dry meadows, and forest clearings of broad-leaved and cedar-broad-leaved forests, occasionally occurs in agricultural fields (cereals, soybeans). Adult beetles are recorded from May to the second half of September.

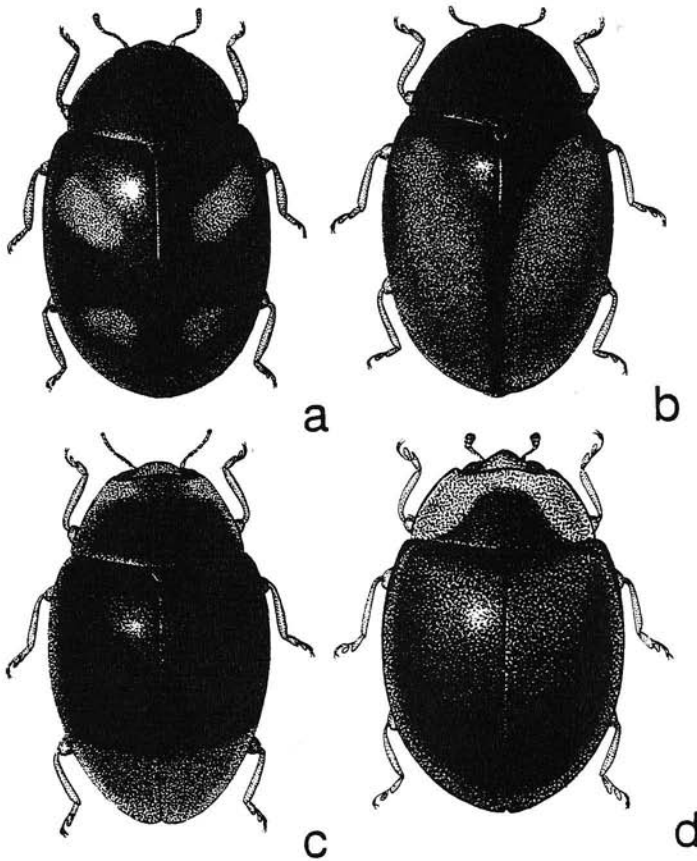


Fig. 23. Habitus views of *Scymnus* spp.: a, *Scymnus (Scymnus) frontalis* Fabr.; b, *S. (Neoscymnus) fuscatus* Boheman; c, *S. (Pullus) haemorrhoidalis* Herbst; d, *S. (Pullus) ferrugatus* Moll.

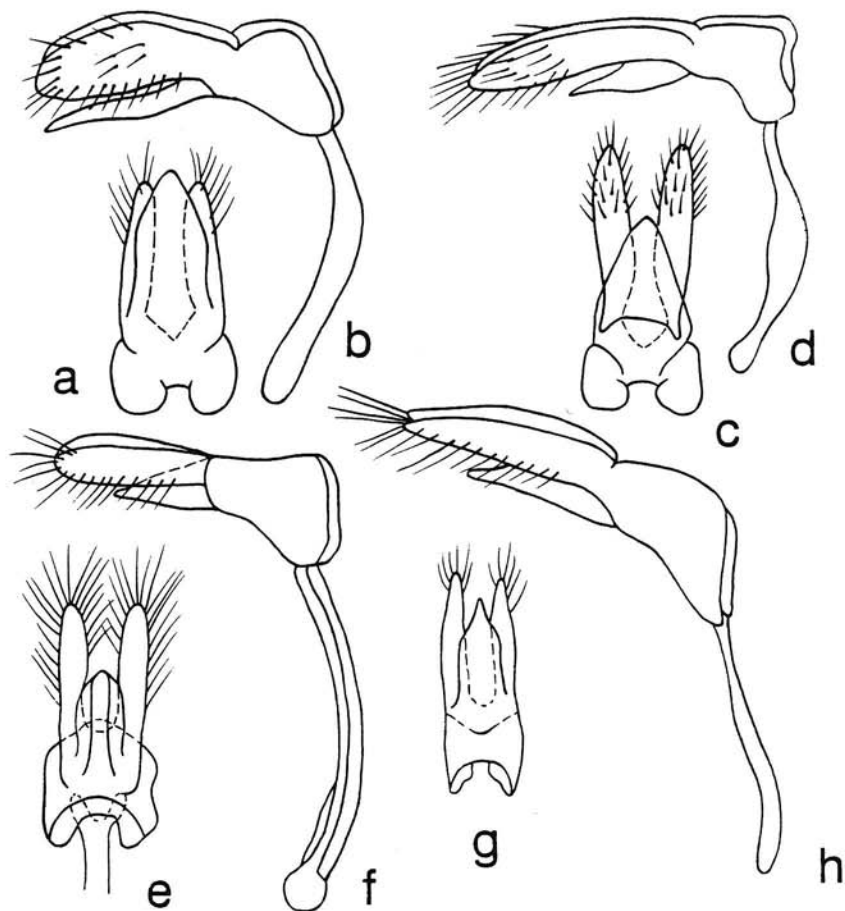


Fig. 24. Tegmen of *Scymnus* spp.: a, b, *S. (Pullus) ferrugatus* (Moll); c, d, *S. (Pullus) haemorrhoidalis* Herbst; e, f, *S. (Pullus) limbatus* Steph.; g, h, *S. (Neopullus) fuscatus* Boheman; a, c, e, g, ventral view; b, d, f, h, lateral view (a-f - after Bielawski, 1959).

2. Subgenus *Neopullus* Sasaji, 1971

Sasaji, 1971:177; Iablokoff-Khuzorian, 1976:377; Pang, Gordon, 1976:177; Hoang, 1982:156; Fürsch, 1987:72; Yu, 1990:83. - *Scymnus* (not Kugelann, 1794); Boheman, 1858:208 (part); Korschefsky, 1931:143 (part.). - *Pullus* (non Mulsant, 1846); Mader, 1955:908 (part.); Miatake, 1959:130; Kamiya, 1961:311 (part.).

Type species *Scymnus hoffmannii* Weise, 1879, by primary designation.

Body elongate oval, moderately convex, highly pubescent. Antennae ten segmented. Prosternum with distinct carinae. Anterior margin of mesosternum emarginate. Metasternum with distinct femoral cavities. Postcoxal lines of first abdominal sternite complete, coxal plates densely and uniformly punctate (Fig. 26e). Subgenus spread throughout South-eastern Asia. 15 species are recorded, in Japan - 7,

10. *Scymnus (Pullus) auritus* Thunberg, 1795

Figs. 21k, 25a

Thunberg, 1795:105 (type locality - Sweden, types in Berlin); Jakobson, 1916:974; Korschevsky, 1931:119; Djadechko, 1954:75; Mader, 1955:906; Bielawski, 1959:40; Kuznetsov, 1972b:178; Gourreau, 1974:58; Kuznetsov, 1979:75; Savoiskaja, 1983a:129; Iablokoff-Khznorian, 1983:149; Kuznetsov, 1984b:27; 1992:345. - *anatolicus* Weise, 1905:219 (type locality - Anatolia).

Body broadly oval, moderately convex, coloration predominantly black, punctate, covered with white pubescence. Head transverse, yellow, densely covered with long anteriorly directed pubescence. Anterior margin of labrum curved, brown-yellow. Eyes big, slightly reniform, with large facets. Antennae rufous, ten segmented, clavate. Mouth parts rufous. Pronotum finely punctate, black in females, with pale narrow border at anterior margin in males; base with distinct border. Scutellum black, cordate. Elytra black with narrow dark-red or brown-yellow strip at apex. Punctuation of elytra irregular, large punctures dominate.

Prothorax black-brown with two distinct carinae reaching anterior margin. Legs

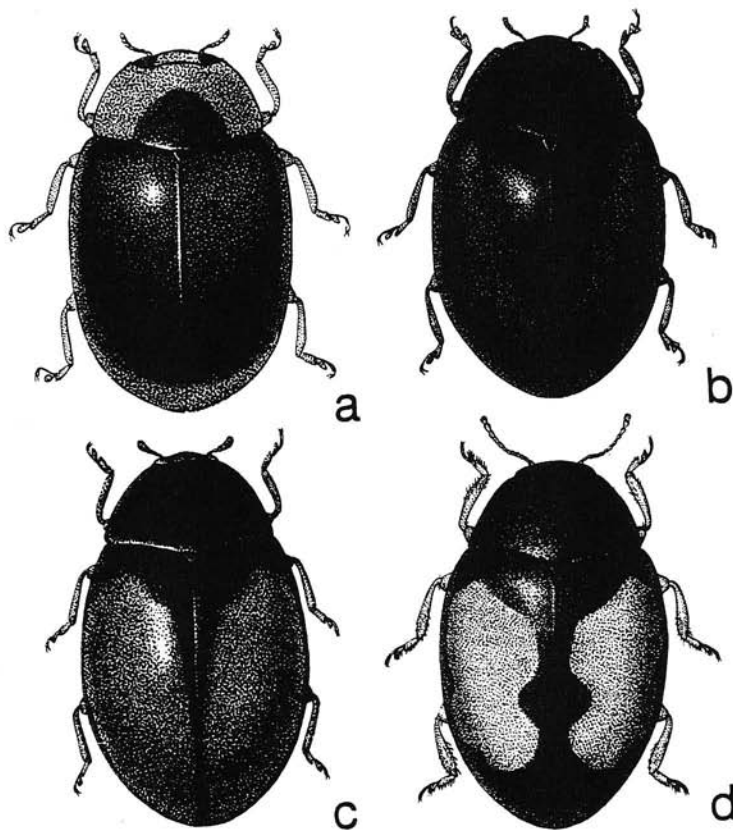


Fig. 25. Habitus views of *Scymnus* spp.: a, *Scymnus (Pullus) auritus* Thunb.; b, *S. (Pullus) limbatus*; c, *S. (Pullus) suturalis* Thunb.; d, *Nephus redtenbacheri* (Muls.).

Body oval, usually more elongate than *Scymnus*, weakly convex, dorsally covered with pubescence. Antennae short, ten segmented, less commonly pseudo 11-segmented with first and second segments fully or partly fused; flagellum generally 9 segmented. Apical segment of maxillary palpi generally not very short, elongate, sometimes parallel sided. Intercoxal process of prosternum relatively wide, almost flat. Prosternum convex, without carinae, with truncate anterior margin. Postcoxal lines of first abdominal sternite incomplete, slightly curved anteriorly, almost reaching lateral margin of sternite, not joined to either lateral or anterior margin of sternite (Figs. 8d). Tarsi trimerous. Claws with an acute basal tooth.

The genus is widely distributed throughout the world and not well studied. Divided into the following subgenera: *Nephus* Fürsch, *Depressoscymnus* Gordon, *Geminosopho* Fürsch, *Parascymnus* Chapin, *Scymnoibius* Casey, *Sidis* Mulsant, *Turboscymnus* Gordon. In the Palearctic 40 species of the genus are recorded, in Japan 9, in Russia 18, in the Far East 4.

Key to the species of *Nephus*

1. Each elytron with 1 large elongate orange or yellowish-red spot, occupying most of elytron and constricted near middle (Fig. 25d) 1. *N. redtenbacheri* Muls.
 -Each elytron with relatively small, more or less round spot located in the posterior part 2

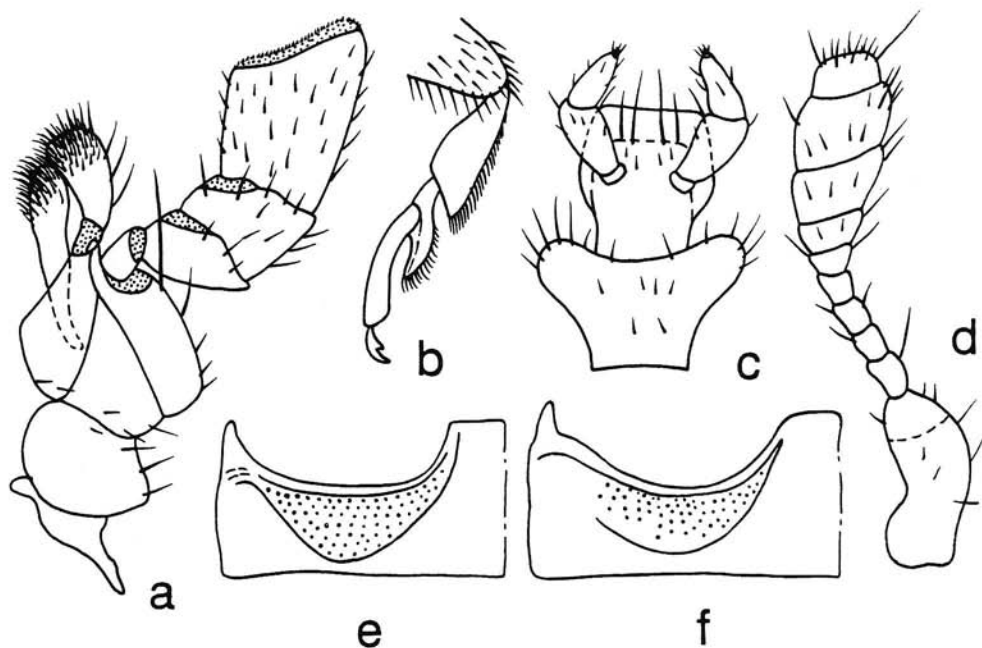


Fig. 26. Morphological details of *Nephus* and *Scymnus* spp.: a-d, *Nephus quadrimaculatus* Herbst; e, *Scymnus (Neopullus) fuscatus* Boheman; f, *Scymnus (Scymnus) paganus* Lew.; a, maxilla; b, tarsus; c, labium; d, antenna; e, f, first abdominal segment showing pattern of punctures (after Sasaji, 1971).

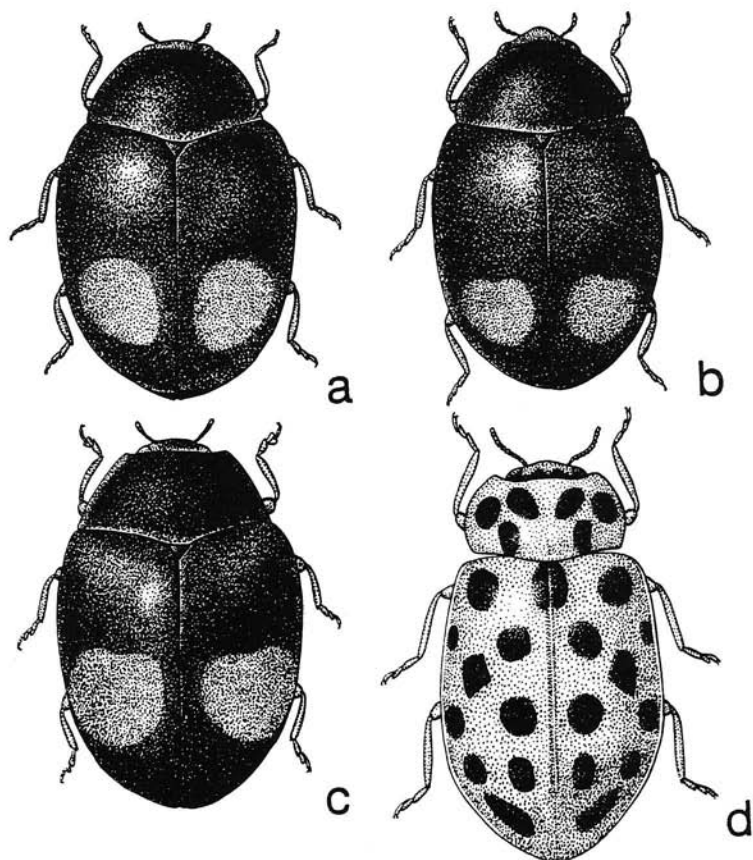


Fig. 27. Habitus views of *Nephus* spp. and *Anisosticta novemdecimpunctata*: a, *Nephus koltzei* (Ws.); b, *N. koreanus* Fursch; c, *N. bipunctatus* (Kug.); d, *Anisosticta novemdecimpunctata* L.

casus, European part of the Russia. Mongolia, Asia Minor, Afghanistan, Europe, Northern Africa.

Specimens examined. Occurs on herbaceous vegetation of steppes.

4. *Nephus koreanus* Fursch., 1965

Figs. 21g, 27b

Fursch, 1965:189 (type locality - Vladivostok, types in museum H. Frei, Tutzig, Germany); Bielawski, 1980:237; Kuznetsov, 1984b:27; 1992:349.

Body black, broadly oval, rounded, convex, densely pubescent. Hairs light, semierect, on posterior part of elytron distinctly directed laterally. Head brown, transverse with large finely faceted eyes. Frons narrower than twice diameter of eye. Mouth parts and antennae brown. Pronotum black, distinctly and densely punctate, space between punctures smooth, much less distinctly reticulate. Elytra black, hind margin with red border. Each elytron with one big reddish spot, that

1787, by subsequent designation (Korschevsky, 1931)): Mulsant, 1850:649; Crotch, 1874b:239; Chapuis, 1876:258; Weise, 1890:489; Jakobson, 1916:977; Korschevsky, 1931:200; Mader, 1955:850; Bielawski, 1959:54; Miyatake, 1961:147 (*Hyperaspis* subgs); Kamiya, 1963:79 (*Hyperaspis* subg.).

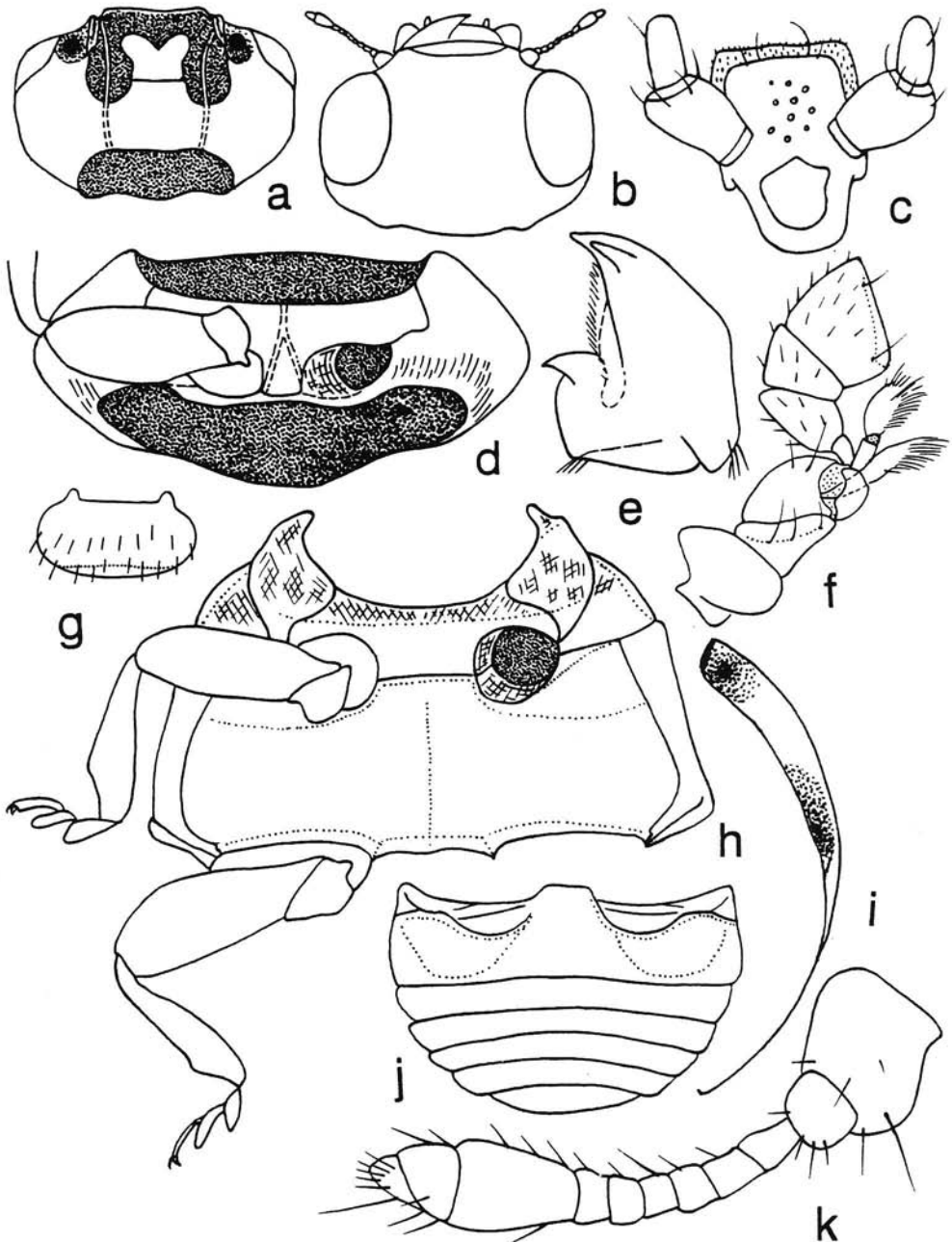


Fig. 28. Morphological details of *Hyperaspis japonicum* (Crotch) : a, head capsule, ventral view; b, head, dorsal view; c, labium; d, prothorax, ventral view; e, mandible; f, maxilla; g, labrum; h, pterothorax, ventral view; i, elytral epipleuron; j, abdomen; k, antenna (after Sasaji, 1971).

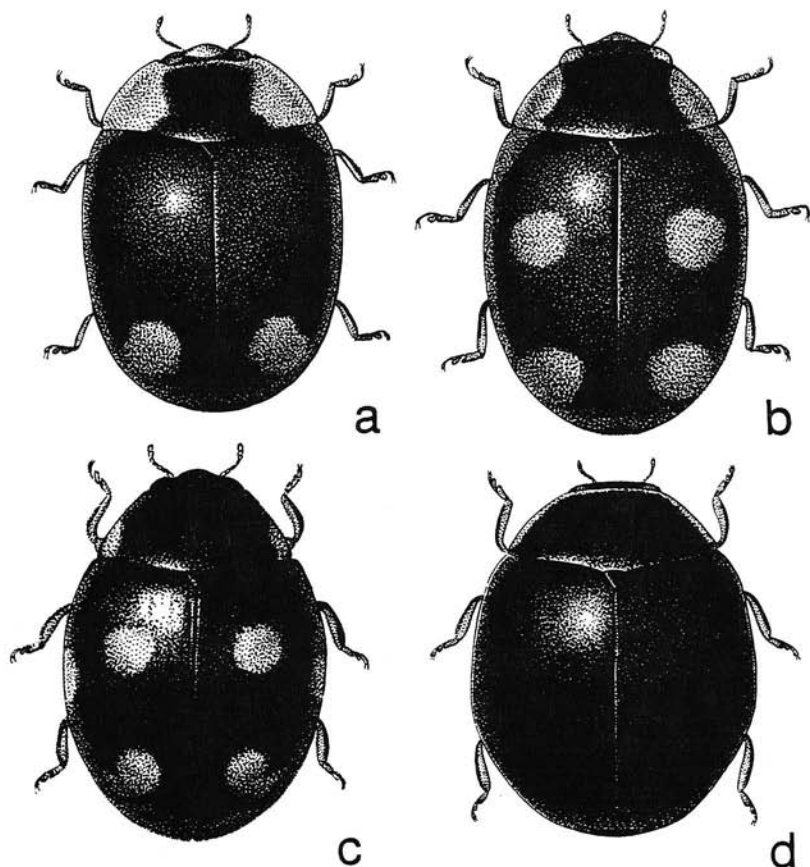


Fig. 29. Habitus views of *Hyperaspis* spp.: a, *H. asiatica* Lew.; b, *H. leechi* Miyatake; c, *H. erythrocephala gyotokui* Kamiya; d, *H. amurensis* Ws.

adjoining elytra. Elytra black, shiny, finely and densely punctate. Punctures slightly bigger than on pronotum, separated by 2-3 diameters. Epipleura very broad, slightly concave, with interior margin straight for most of length. Epipleural punctation fine, surface reticulate.

Venter black. Prothorax black, almost twice as long as mesosternum. Prosternal carinae small, parallel at base, converging to sharp angle near anterior margin. Metasternum and abdomen with fine, sparse irregular punctation. Punctures separated by 3-4 diameters. Surface reticulate. Postcoxal line of first abdominal sternite complete, reaching base of sternite.

Body of male black with frons, anterior margin and lateral margins of pronotum white; propleura black with whitish lateral stripe. Legs black with anterior pair slightly lighter. Tegmen with basal lobe in form of broad tube, slightly shorter than parameres. Paramere plate wide, excavated, strongly expanded toward apex and with lateral teeth of various shapes.

Body length 2.5-3.5 mm, width 1.7-2.1 mm.

orange spots. Dorsal surface glabrous, punctation fine. Head transverse, black with rounded base and trapezoidal anterior margin. Frons broad, slightly convex; punctation very fine and dense, interspaces shagreened. Preocular lobe slightly narrowed towards apex. Clypeus slightly emarginate and raised; lateral edges distinctly nar-

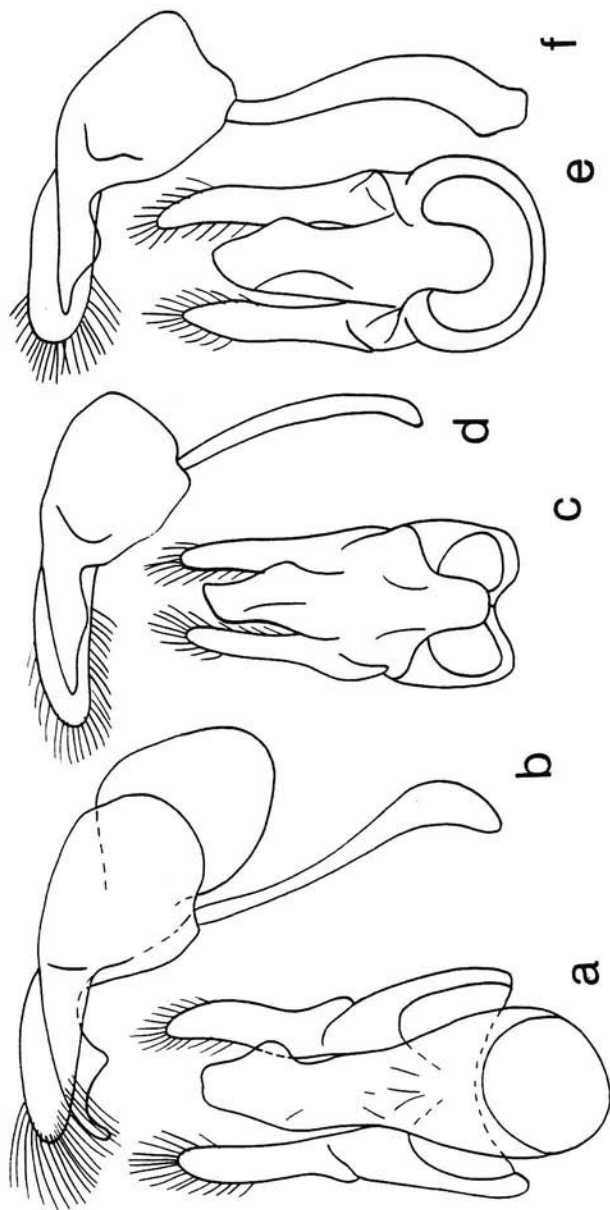


Fig. 30. Tegmen of *Hyperaspis* spp. : a,b, *H. leechi* Miyatake; c, d, *H. erythrocephala gyotokui* Kamiya; e, f, *H. asiatica* Lew.; a, c, e, ventral view; b, d, f, lateral view (a, b, e, f - after Bielawski, 1984).

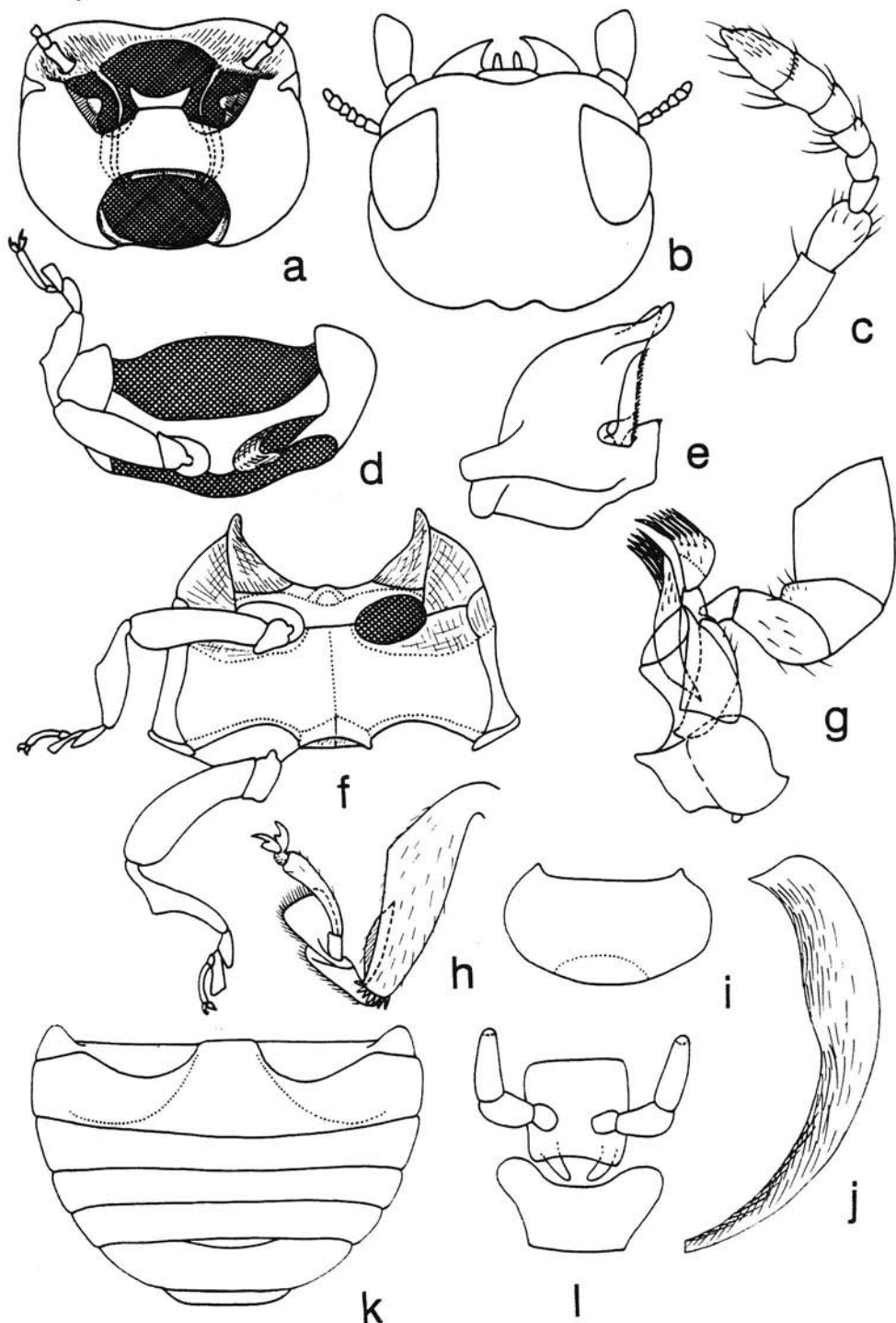


Fig. 31. Morphological details of *Chilocorus kuwanae* Silv. : a, head capsule, ventral view; b, head capsule, dorsal view; c, antenna; d, prothorax, ventral view; e, mandible; f, pterothorax, ventral view; g, maxilla; h, hind tarsus; i, labrum; j, elytral epipleuron; k, abdomen; l, labium (after Sasaji, 1971).

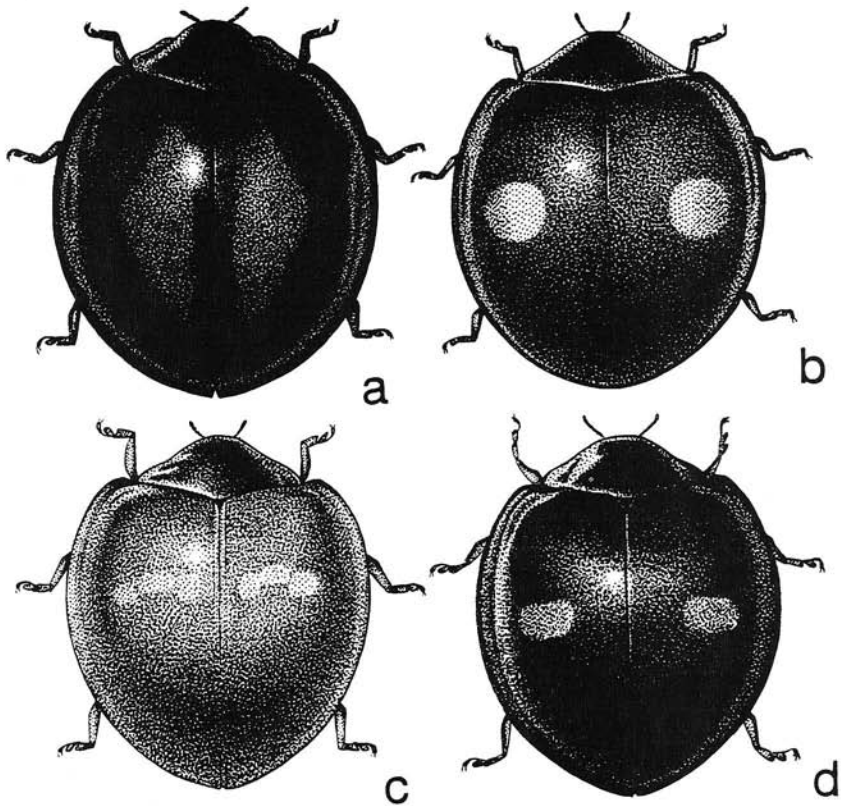


Fig.32. Habitus views of *Chilocorus* spp. : a, *Ch.rubidus* Hope; b, *Ch.renipustulatus* (Scriba); c, *Ch.bipustulatus* (L.); d, *Ch.kuwanae* Silv.

Larva. Kamiya, 1966:83; Savoiskaja, 1973:106; 1983b:157.

Ecology. Telenga, Bogunova, 1936:75; Pantjukhov, 1968a:376; Kuznetsov, 1972b:183; 1979:77; Kamiya, 1966:88; Kuznetsov, 1988:37.

Body rather large, shortened oval, strongly convex. Head, pronotum, scutellum black. Head rather small, less than 1/5 body width. Frons surface distinctly and finely depressed and very coarsely punctate. Anterior margin of clypeus with rather deep bow shaped emargination. Pronotum finely punctate, with rather dense white pubescence and round impression near each anterior angle. Lateral sides of pronotum rectilinear with rounded angles. Scutellum oblong-triangular, with sparse punctation. Elytra black; each elytron with large longitudinal oblong oval cherry-red spot; border between red spot and black elytral surface usually indistinct. Elytral punctation as fine as that of pronotum and denser towards lateral sides. Venter red-brown, sometimes prosternum and mesosternum dark. Intercoxal process of prosternum long (Fig. 31d). Epipleura of elytra very broad. Legs jet-black-brown or black.

Genitalia (Fig. 33a, b). Siphon rather long and slender, moderately curved. Siphonal capsule with distinct outer and inner process. Siphonal apex expanded and

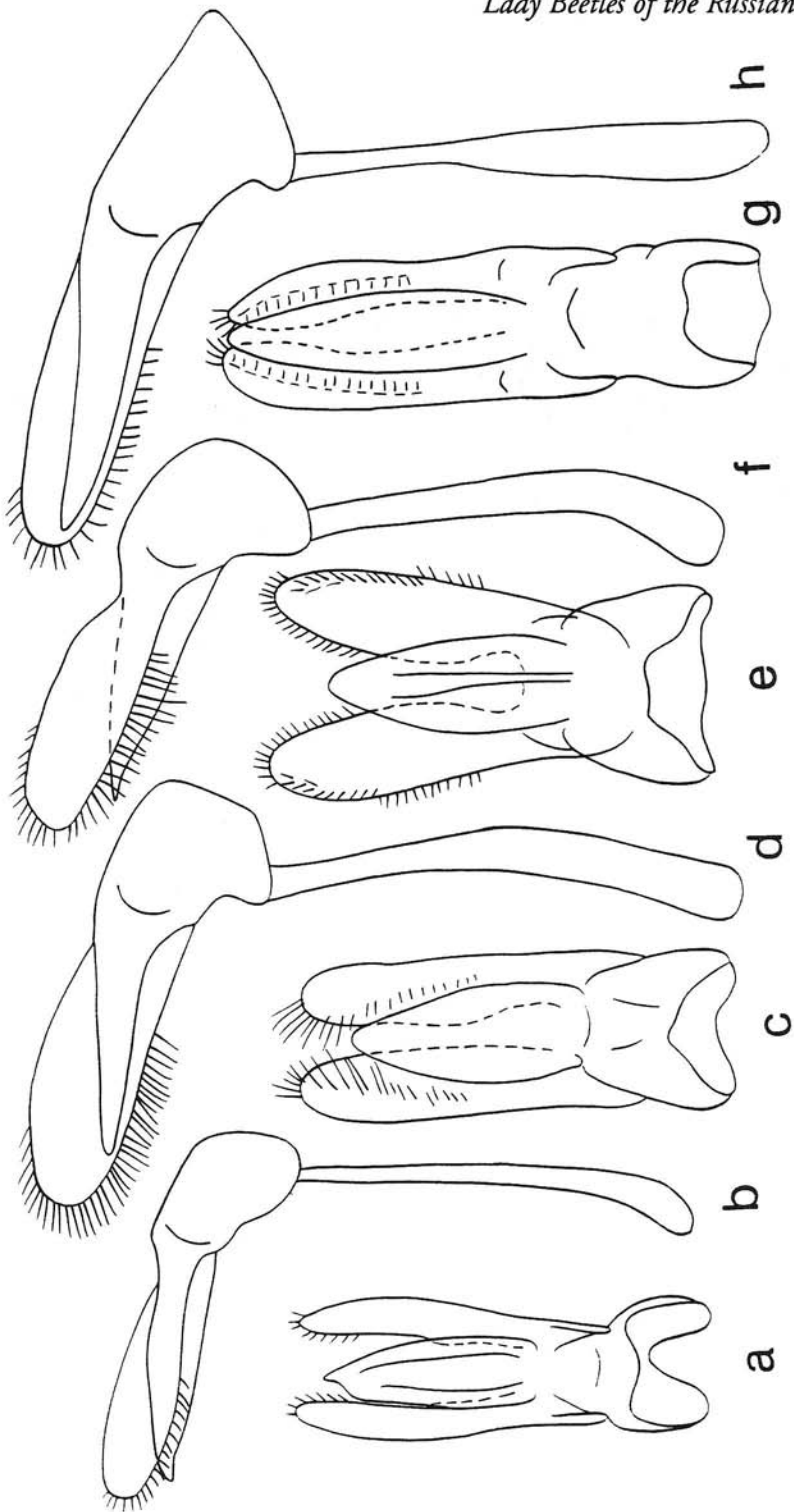


Fig. 33. Tegmen of *Chilocorus* spp. : a, b, *Chilocorus rubidus* Hope; c, d, *Ch. renipustulatus* (Scriba); e, f, *Ch. inornatus* Ws.; g, h, *Ch. bipustulatus* (L.); a, c, e, g, ventral view; b, d, f, h, lateral view (a-d, g, h - after Bielawski, 1984).

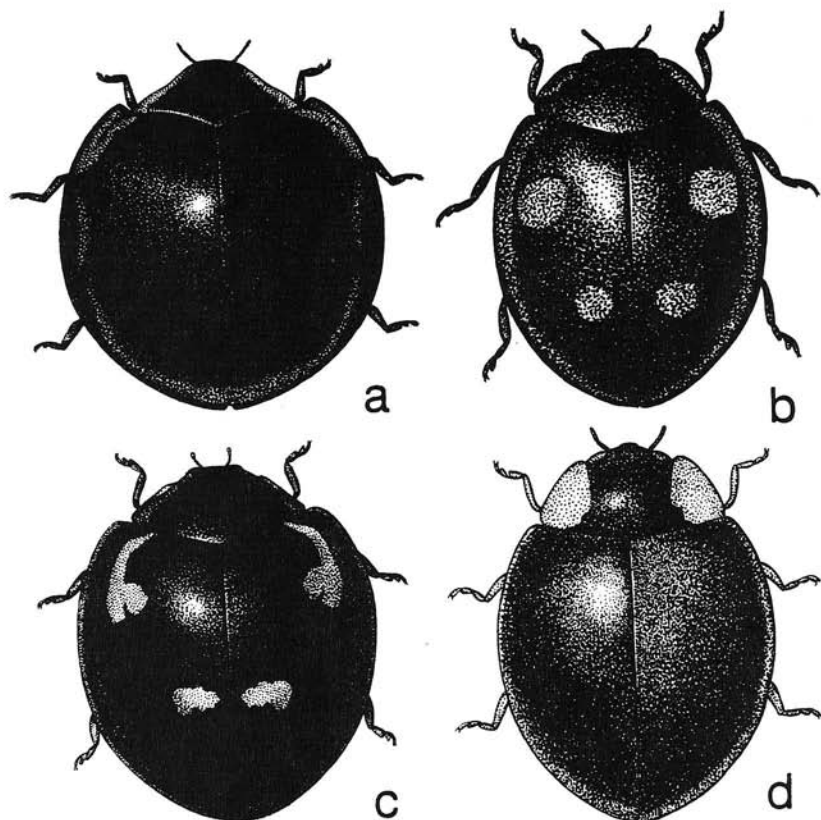


Fig. 34. Habitus views of *Chilocorus* and *Exochomus* spp. : a, *Chilocorus inornatus* Ws.; b, *Exochomus (Anexochoinus) mongol* Bar.; c, *E. (Exochomus) quadripustulatus* (L.); d, *E. (Parexochomus) nigromaculatus* (Goeze).

Ecology. Telenga, Bogunova, 1936:75; Kuznetsov, 1986a:40.

Body rounded, strongly convex, glabrous. Head, pronotum, elytra black. Head transverse, punctation fine and sparse. Anterior margin of clypeus deeply and arcuately emarginate. Pronotum with deep excavation at anterior margin, with posterior angles broadly rounded, not contiguous with elytra. Pronotal punctation fine. Scutellum small, triangular, black. Elytra finely punctate, shiny, with broad, strongly concave epipleura, without foveae for femoral apices.

Venter including legs black. Abdomen reddish-yellow, only first sternite black at middle. Metasternum broad, weakly convex with longitudinal shallow groove at middle. 5-th sternite in males nearly truncate posteriorly, broadly rounded in females; 6-th sternite in male feebly emarginate; rounded in female.

Body length 3.7-4.6 mm, width 3.1-4.2 mm.

Distribution. Khabarovsk and Primorye Territories. Korean Peninsula.

Material. 217 specimens examined from the Far East and Korean Peninsula.

Note. Described as an aberration of *Ch. renipustulatus* Scriba, however some

Ecology. Beetles play important role in reducing infestations of diaspine scale damaging trees and shrubs. In the Far East, occurs very rarely and only in the Amur Region.

8. Genus *Exochomus* Redtenbacher, 1843

Redtenbacher, 1843:11; Mulsant, 1846:122; 1850:476; Crotch, 1873:376; Barovsky, 1922:289; Koschefsky, 1932: 252; Djadechko, 1954:59; Chapin, 1965a:247; Miyatake, 1970:27; Belicek, 1976:319; Pang, Mao, 1979:74; Savoiskaja, 1983a:117; Iablokoff-Khnzorian, 1983:133; Bielawski, 1984:372; Gordon, 1985:621.

Type species *Coccinella quadripustulata* Linnaeus, 1758: 367, by subsequent designation (Koschefsky, 1932).

Body convex, rounded-oval, with shiny and finely punctate surface. Clypeus expanded laterally in front of eyes in the form of broad preocular lobes and covering antennal bases. Anterior margin of clypeus rounded, not bordered. Antennae 9-segmented. Pronotal base joins closely along entire width of elytral base, sides more or less reflexed. Elytra with broad, strongly concave epipleura, without foveae for femoral apices. Femora broad, large, elongate; tibiae simple. Postcoxal lines com-

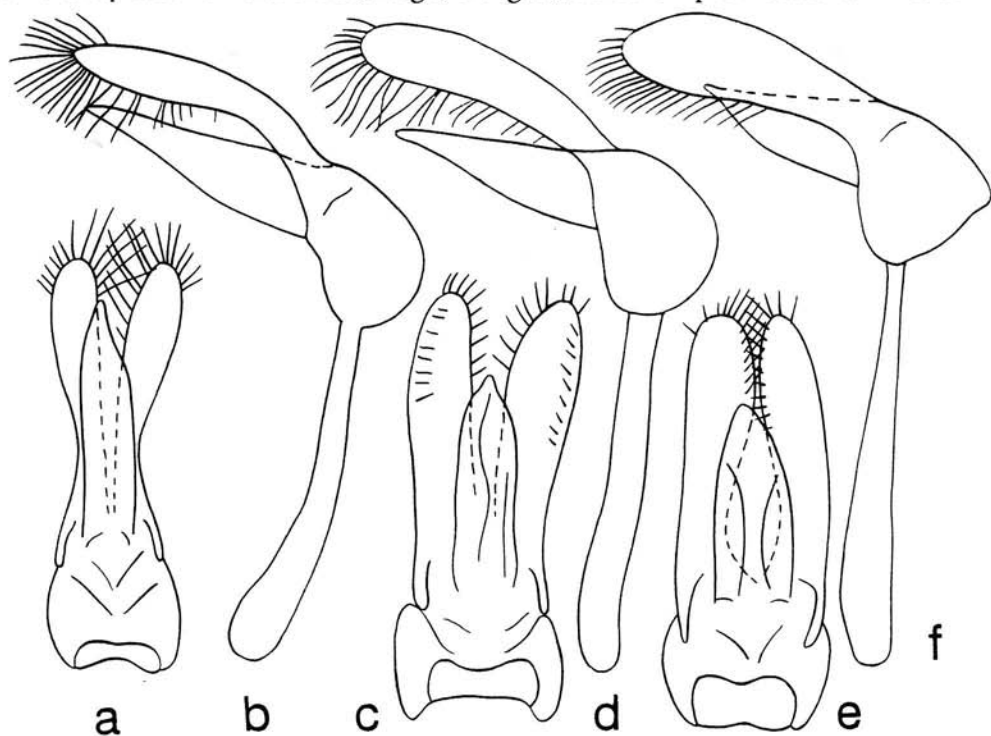


Fig. 35. Tegmen of *Exochomus* spp.: a, b, *E. (Exochomus) quadripustulatus* (L.); c, d, *E. (Anexochomus) mongol* Bar.; e, f, *E. (Parexochomus) nigromaculatus* (Goeze). a, c, e, ventral view; b, d, f, lateral view (after Bielawski, 1984).

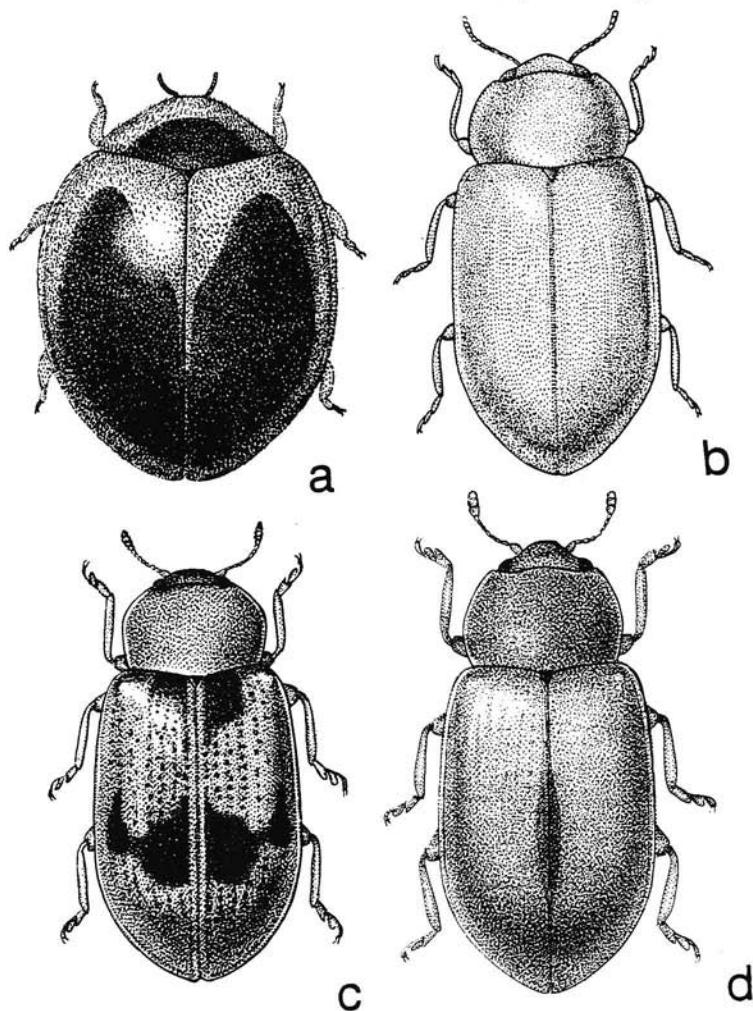


Fig. 36. Habitus views of Coccidulinae: a, *Rodolia limbata* (Motsch.); b, *Coccidula rufa* (Herbst); c, *C. scutellata* (Herbst); d, *C. reitteri* Dodge.

Material. 11 specimens examined from Irkutsk Region and Buryatja.

Life history. Inhabits grassy vegetation of bogs, bottomlands of rivers and lakes. Rare. Predacious on aphids on cereals and sedges.

2. *Coccidula rufa* (Herbst, 1783)

Fig. 36b

Herbst, 1782:22 (*Dermestes*; type locality - Berlin, lectotype and paratypes in Berlin); Jakobson, 1916:972; Djadechko, 1954:66; Sharova, 1962:1175; Kuznetsov, 1975c:6; 1979: 74; 1983:64; Savoiskaja, 1983a:115; Iablokoff-Khnzorian, 1983: 98; Kuznetsov, 1984b:28; 1992:354. - *inicolor* Reitter, 1890: 176 (*rufa* subsp., type locality - valley of the Araks river).

Larva. Savoiskaja, 1983b:150.

Body unicolorous, oblong with parallel sides, slightly convex, punctate, with

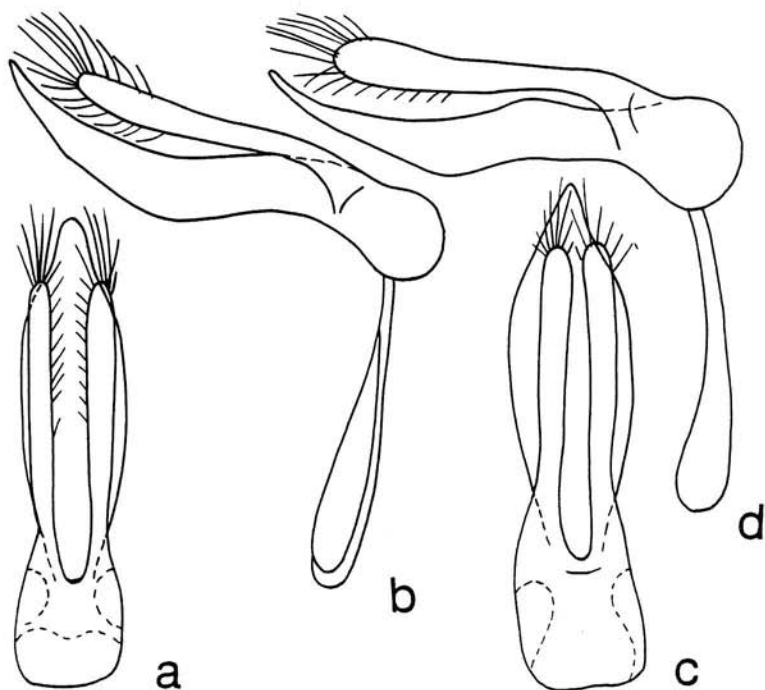


Fig. 37. Tegmen of *Coccidula* spp. : a, b, *C. rufa* (Herbst); c, d, *C. reitteri* Dodge. a, c, ventral view; b, d, lateral view (after Bielawski, 1984).

short, dense yellow pubescence. Head somewhat transverse, yellowish-red. Clypeus truncate anteriorly, bordered; sides with long, narrow anterior projections. Eyes small, prominent with large facets. Interocular distance more than twice transverse diameter of eye. Mouth parts yellowish-red. Labrum convex, covered by sparse long hair. Antennae yellowish-red, long, clavate, reaching the middle of lateral margin of pronotum.

Pronotum slightly narrower than elytra, yellowish-red; anterior margin with small excavation for eyes; base margined. Pronotum widest near anterior margin. Scutellum small, equilateral, dark. Elytra yellowish-red with fine, sparse punctures in rows.

Prosternum convex at middle, carinae short, faint, not reaching anterior margin of thorax by great distance. Mesosternum black at middle, rough, shorter than prosternum. Metasternum black, large, weakly convex, with transverse shading and faint longitudinal sulcus. Legs yellow-red, tibiae projecting beyond sides of elytra, tarsi cryptotetramerous. Apex and sides of abdomen dark red; base and middle black. Abdomen with 6 visible sternites, 3-rd and 4-th sternites shortest, subequal. Base of 5-th sternite in males with faint excavation.

Aedeagus, Fig. 37a, b.

Body length 2.5-3.0 mm, body width 1.3-1.6 mm.

Distribution. Khabarovsk Territory, Amur Region, Primorye Territory, Yakut-

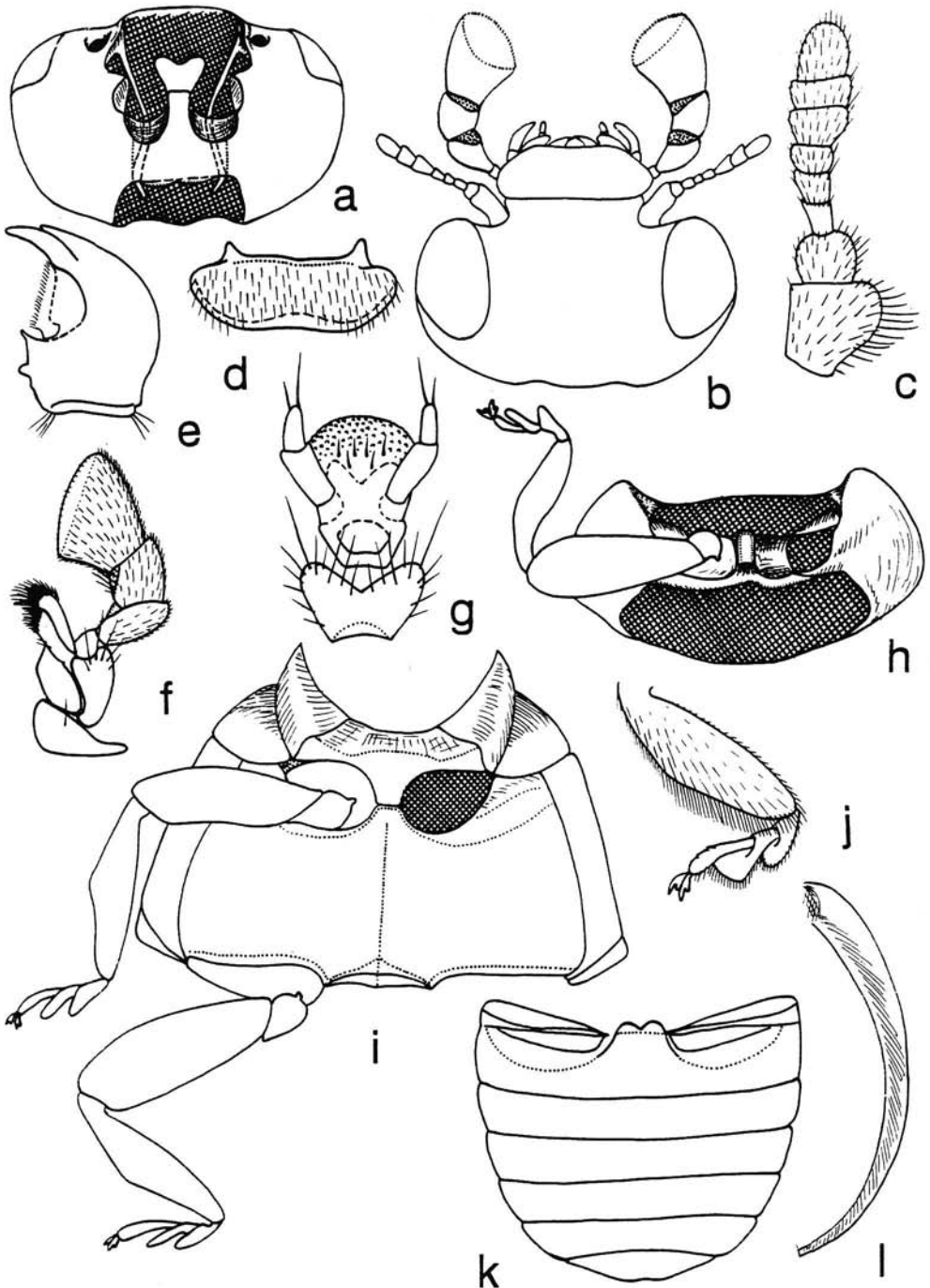


Fig. 38. Morphological details of *Rodolia concolor* Lewis: a, head capsule, ventral view; b, head, dorsal view; c, antenna; d, labrum; e, mandible; f, maxilla; g, labium; h, prothorax; i, pterothorax; j, hind leg; k, abdomen; l, elytral epipleuron (after Sasaji, 1971).

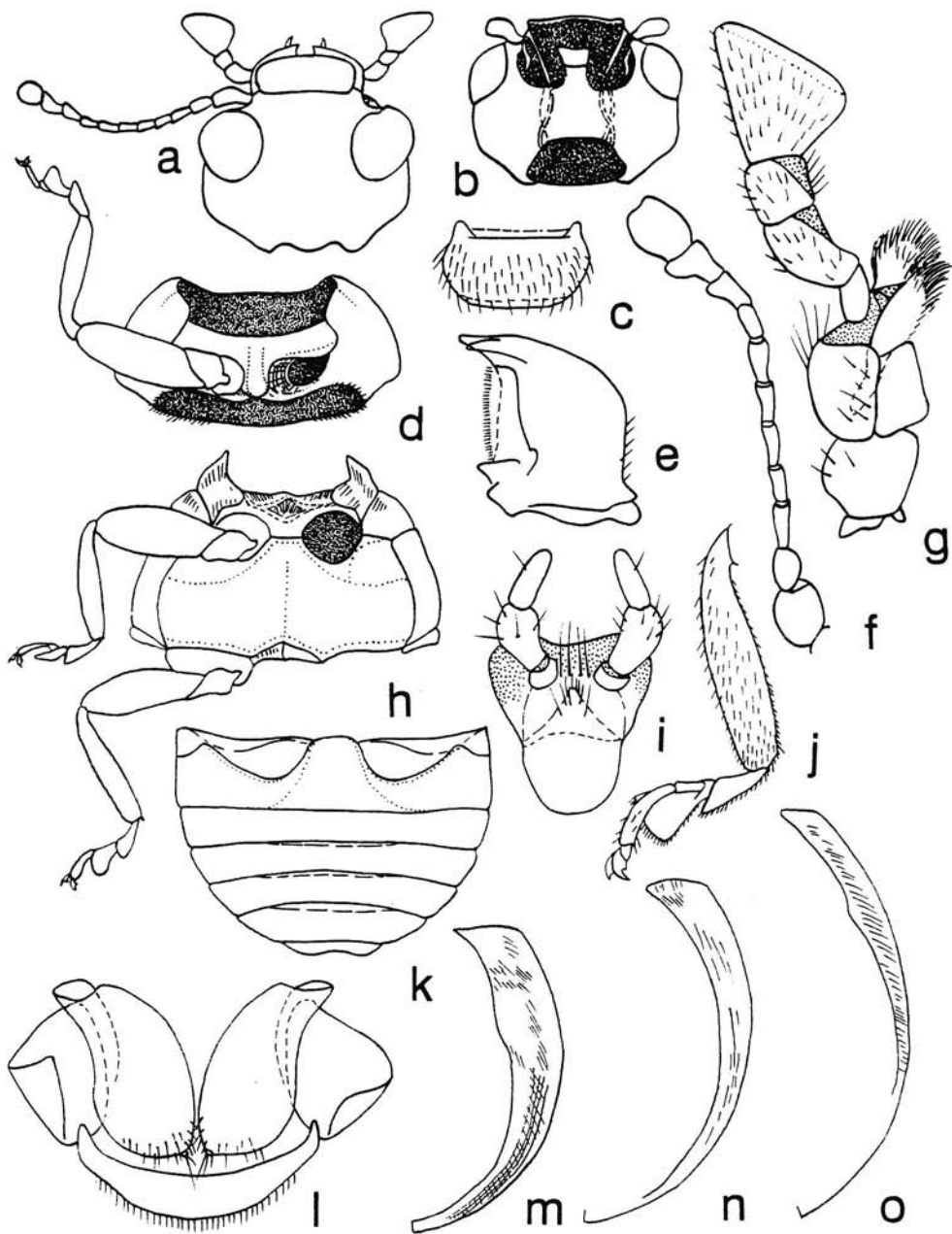


Fig. 39. Morphological details of Coccinellini spp.: a-l, *Eocaria muiri* Timber., m, *Aiolocaria hexaspilota* (Hope); n, *Coccinella septempunctata brucki* Muls., o, *Adalia bipunctata* (L.); a, head capsule, dorsal view; b, head capsule, ventral view; c, labrum; d, prothorax; e, mandible; f, antenna; g, maxilla; h, pterothorax; i, labium; j, hind leg; k, abdomen; l, female genital segments; m-o, elytral epipleuron (after Sasaji, 1971).

Savoiskaja, 1983a:112; 1985:683; Kuznetsov, 1992:358. - novemdecimpunctata irregularis Weise, 1879:94 (type locality - Oregon); Brown, Ruetten, 1962:645.

Body oblong-oval, weakly convex, coarsely punctate, glabrous. Head transverse, black with large yellow spots. Pronotum with 2 large compound spots; each spot consisting of 3 fused spots. Pronotal punctation distinct, with interspaces equal to diameter of punctures, distinctly sculptured. Scutellum black. Elytra yellow with 9 black spots on each elytron and 1 common spot near scutellum. Spots very large, sometimes confluent in longitudinal beadlike strands or bands. Far Eastern specimens with elytral spots consisting of single long mark along suture and bands by sides. Elytral punctation dense with large punctures. Interspaces narrower than diameter of punctures, not microsculptured.

Prosternum black, weakly convex anteriorly, without carinae. Anterior margin of prosternum with narrow white strip. Mesepisterna black. Metepisterna black

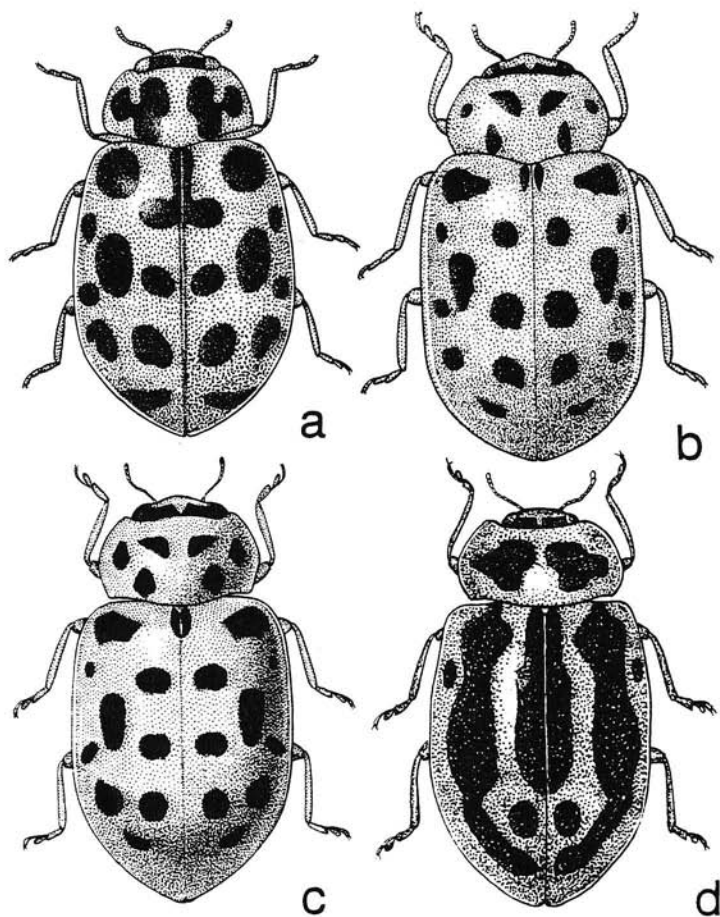


Fig. 40. Habitus views of *Anisosticta* spp.: a, *A. bitriangularis* (Say); b, *A. sibirica* Biel.; c, *A. kobensis* Lew.; d, *A. strigata* (Thunb.).

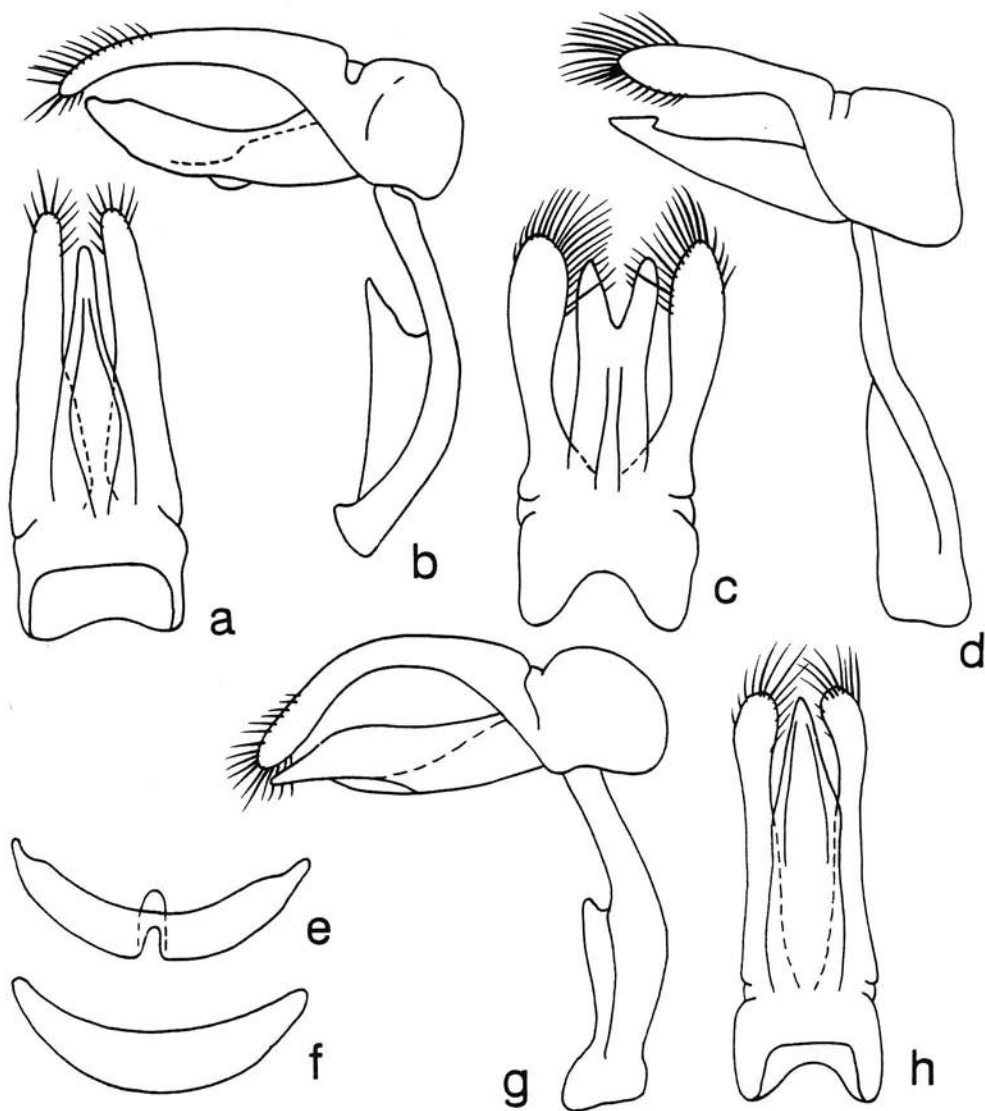


Fig. 41. Tegmen and sixth abdominal segment of *Anisosticta* spp.: a, b, e, *Anisosticta kobensis* Lew.; c, d, f, *A. sibirica* Biel.; g, h, *A. bitriangularis* (Say); a, c, h, tegmen, ventral view; b, d, g, tegmen, lateral view; e, f, sixth abdominal segment (after Bielawski, 1958).

with whitish posterior margin. Metepimera white. Mesosternum and metepisternum convex. Abdomen black; sides of I–V and VI sternites entirely yellowish-brown. This species is easily separated from related species by the male genitalic structure (Figs. 41g, h).

Body length 2.9–4.0 mm, width 1.8–2.4 mm.

Distribution. Magadan Region, Khabarovsk Territory, Amur Region, Primorye Territory, Siberia, European part of Russia. China, Mongolia, northern Europe, North America.

Material. 857 specimens examined from the Far East, Siberia, Mongolia.

Life history. Inhabits taiga and tundra zones. Common in wet meadows, bogs, river and lake banks. Predators of aphids on cereal, sedge and other bog vegetation.

2. *Anisosticta strigata* (Thunberg, 1795)

Fig. 40d

Thunberg, 1795:113 (*Coccinella*, type locality - Scandinavia, type in Uppsala); Mader, 1929:87; Korschefsky, 1932: 372; Bielawski, 1958:108; Iablokoff-Khnzorian, 1982:115; Kuznetsov, 1984b:28; Bielawski, 1984:397; - borealis Timberlake, 1943:45; Brown, Ruette, 1962:645; Belicek, 1976 :352; Gordon, 1985:684; Kuznetsov, 1992:358.

Body oblong-oval, distinctly convex. Head black with small yellow spot at middle. Pronotum with 2 large black spots. Anterior and posterior angles of pronotum rounded, anterior angles slightly projecting anteriorly, lateral margin arcuate. Pronotal sides narrowly and distinctly rounded. Punctures on head and pronotum of moderate size, sparse; interspaces with distinct reticulate microsculpturing. Scutellum black. Elytra yellow with 3 black longitudinal sinuous stripes: one along suture and 2 more laterally. Small black spot in anterior half of each elytron, situated between band and external margin; longitudinal band runs from base to near apex of elytron in a curve parallel to external margin. Humeral calli large, weakly developed. Explanate margin of elytron broad and nearly reaching apex. Elytra covered with coarse,

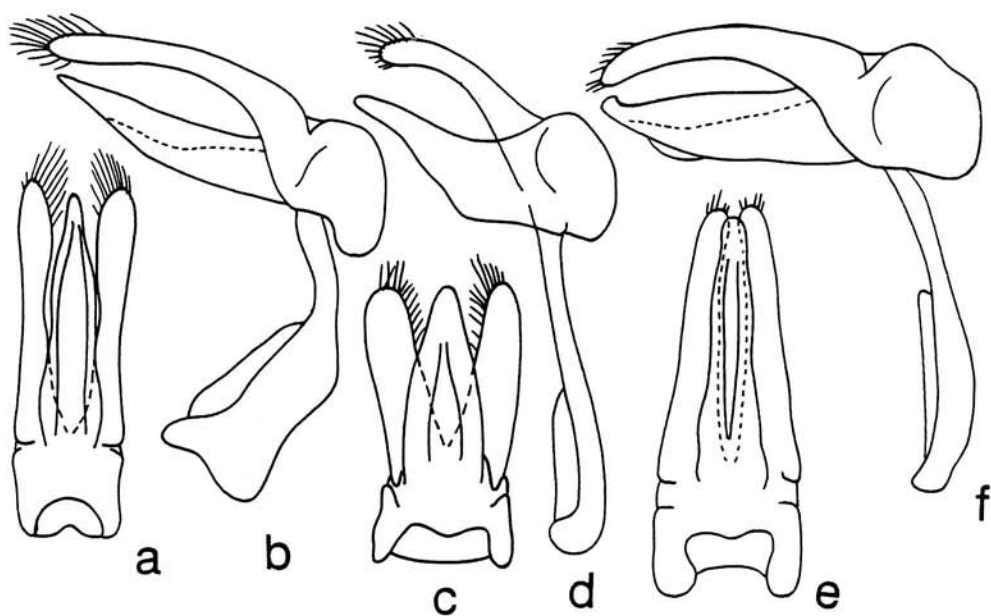


Fig. 42. Tegmen of *Anisosticta* spp. : a, b, *A. s strigata* (Thunb.); c, d, *A. terminassiani* Biel.; e, f, *A. novemdecimpunctata* L.; a, c, e, ventral view; b, d, e, lateral view (after Bielawski, 1958, 1959).

Body flattened, very elongate, lateral margins of elytra nearly parallel, broadly rounded at apex. Head brown-yellow with 2 black spots joined at base. Mouth parts brown. Head with fine punctation, similar to pronotal punctation; interspaces narrower than diameter of punctures. Interspaces with distinct reticular microsculpture. Pronotum yellow-brown with 6 black, nearly circular spots. Lateral margin of pronotum narrowly bordered. Punctures on pronotum smaller and considerably sparser than on elytra; interspaces as wide as diameter of punctures or slightly wider, shiny, with irregular microsculpturing. Scutellum small, triangular, black. Elytra long, narrow, brownish-yellow with 10 black spots on each elytron. Humeral calli nearly obsolete, represented by weakly developed bulges. Humeral angle and elytral

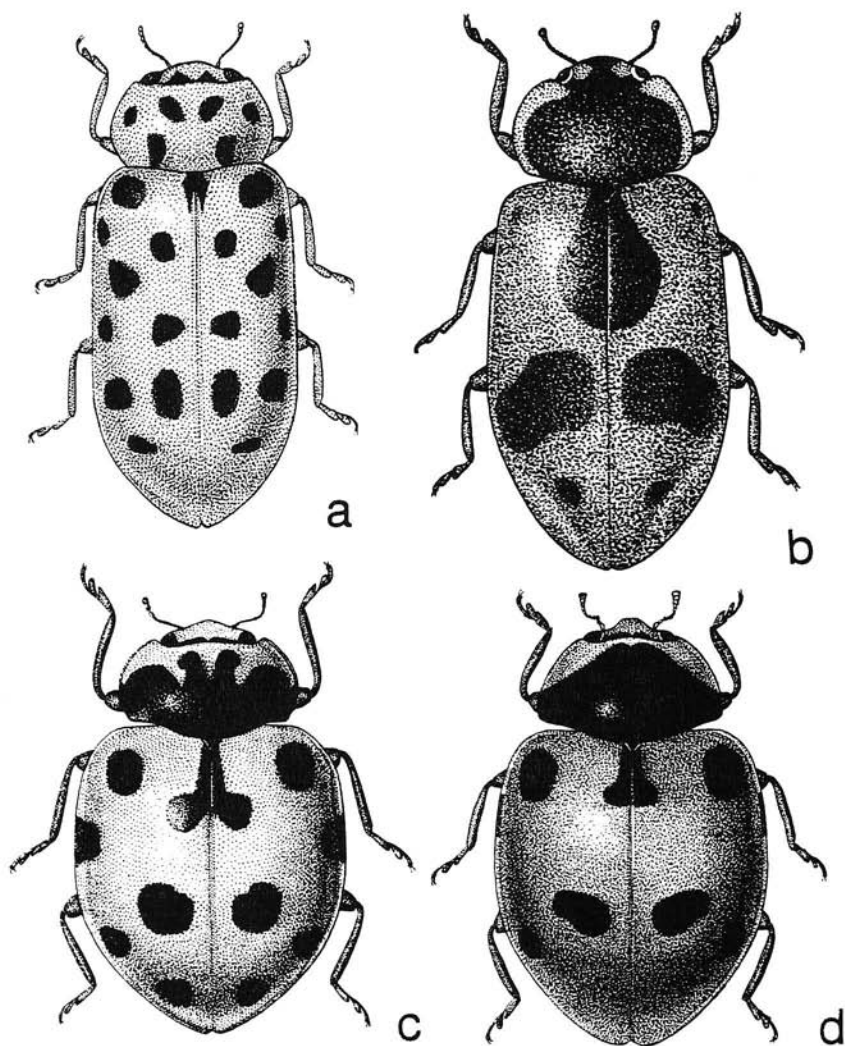


Fig. 43. Habitus views of diverse Coccinellinae: a, *Anisosticta terminassiani* Biel.; b, *Ceratomegilla ulkei* Crotch; c, *Semiadalia apicalis* (Ws.); d, *S. notata* (Leich.).

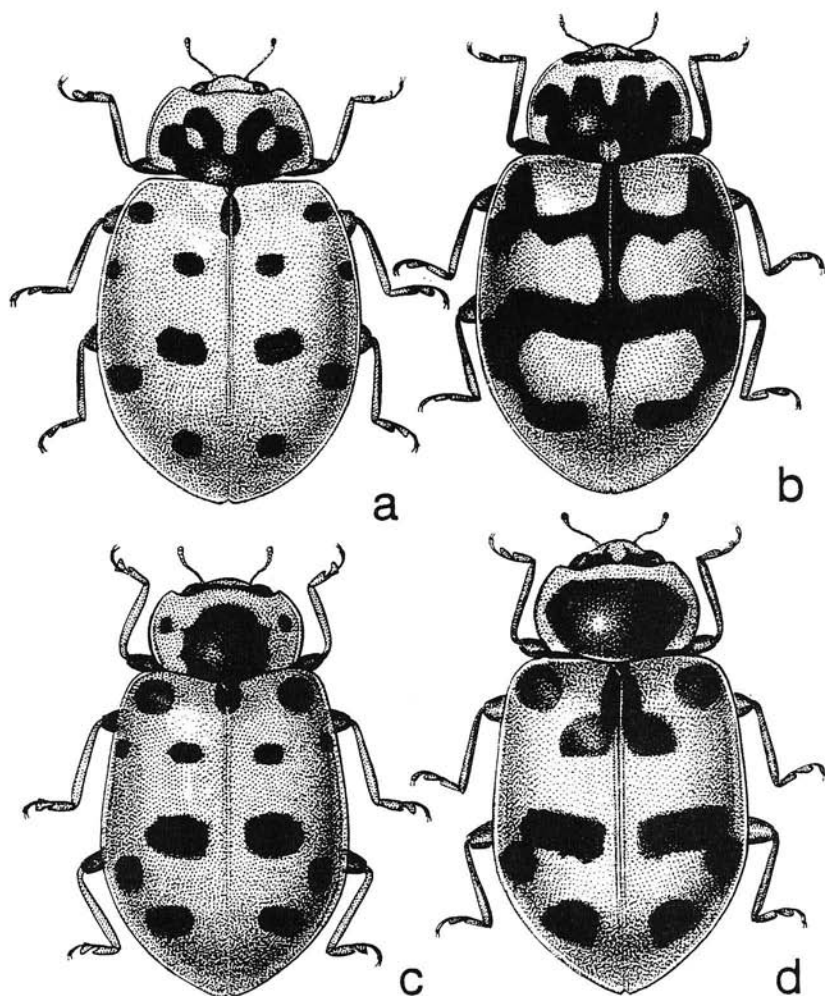


Fig. 44. Habitus views of diverse Coccinellinae: a, *Adonia variegata* Goeze, b, *A. amoena* Fald., c, *Hippodamia tredecimpunctata* (L.); d, *H. septemmaculata* (Degeer).

Larva. Savoiskaja, 1964:318; Hodek, 1973:41.

Body oblong, slightly oval, weakly convex, punctate, dorsal surface glabrous. Head black, with large yellow spot at anterior margin. Eyes with minute facets. Interocular distance twice diameter of eye. Mouth parts and antennae brown-yellow. Pronotum yellow with large black quadrangular spot at middle and two black dots laterally. Anterior margin of pronotum nearly straight. Scutellum small, black, equilateral. Elytra oblong, orange or yellow with small common postscutellar spot, and with 6 spots on each elytron.

Venter black. Prosternum black with yellow sides, without carinae. Mesosternum black, yellow laterally, transverse part convex at middle. Metasternum convex, very weakly punctate, with sparse yellow pubescence and longitudinal depression at

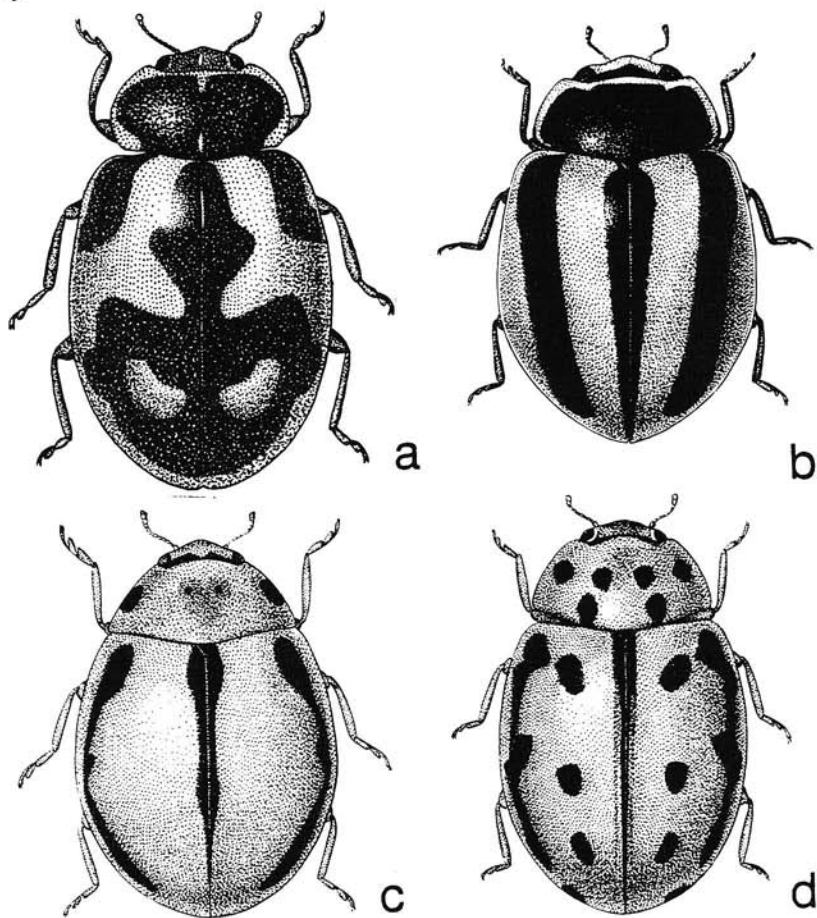


Fig. 45. Habitus views of diverse Coccinellinae: a, *Hippodamia arctica* (Schneid.); b, *Coccinella nigrovittata* Kapur; c, *Tytthaspis gebleri* Muls.; d, *T. sedecimpunctata* (L.).

Body oblong-oval, of moderate size. Pronotum black with yellow stripes along sides and anterior margin and short stripe at middle near base. Elytra yellow or red with large longitudinal black humeral spots, spot on suture in anterior half and very large common spot in posterior half enclosing 2 yellow spots. Sometimes elytra black with lyriform yellow spot in anterior half and yellow transverse stripe at apex of elytra. Venter black. Antennae, mouth parts, tibiae, tarsi, femora dark brown.

Body length 3.4-4.5 mm.

Distribution. Magadan Region, Siberia (except south), north of European part of Russia. Sweden, Norway, North America.

Material. 108 specimens examined from Magadan Region.

Life history. Inhabits cereal vegetation among bottomland larch, valley larch, elfin woods and tundra. Typical representative of northern taiga and tundra.

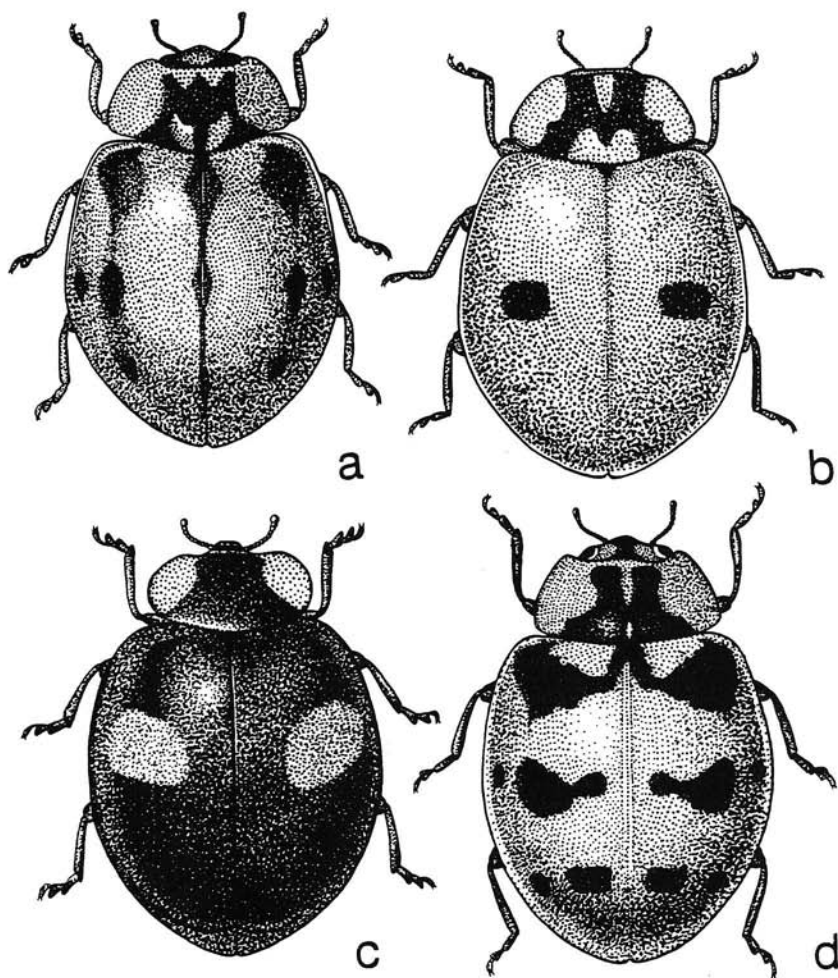


Fig. 46. Habitus views of diverse Coccinellinae: a, *Adalia conglomerata* (L.); b, *A. bipunctata bipunctata* L.; c, *Eoadalia koltzei* (Ws.); d, *Adalia bipunctata* var. *fasciatopunctata* Fald.

yellow-brown or yellow. Claws with weakly developed tooth at base. Abdomen dark brown, with lighter sides. Apex of abdominal sternite V in males with hardly visible excavation.

Body length 3.0-4.5 mm.

Distribution. Khabrovsk Territory, Amur Region, Primorye Territory, Sakhalin Island, Southern Kuril (Kunashir, Iturup islands), Siberia, European part of Russia. Japan (Hokkaido, mountains of Honshu), Mongolia, Europe.

Material. 643 specimens examined from the Far East, Siberia.

Life history. Common on conifers in cedar-broad-leaved, fir-spruce, larch, pine woods, elfin woods. Has been observed from tundra to forest-steppe zone. Feeds on aphids upon conifers.

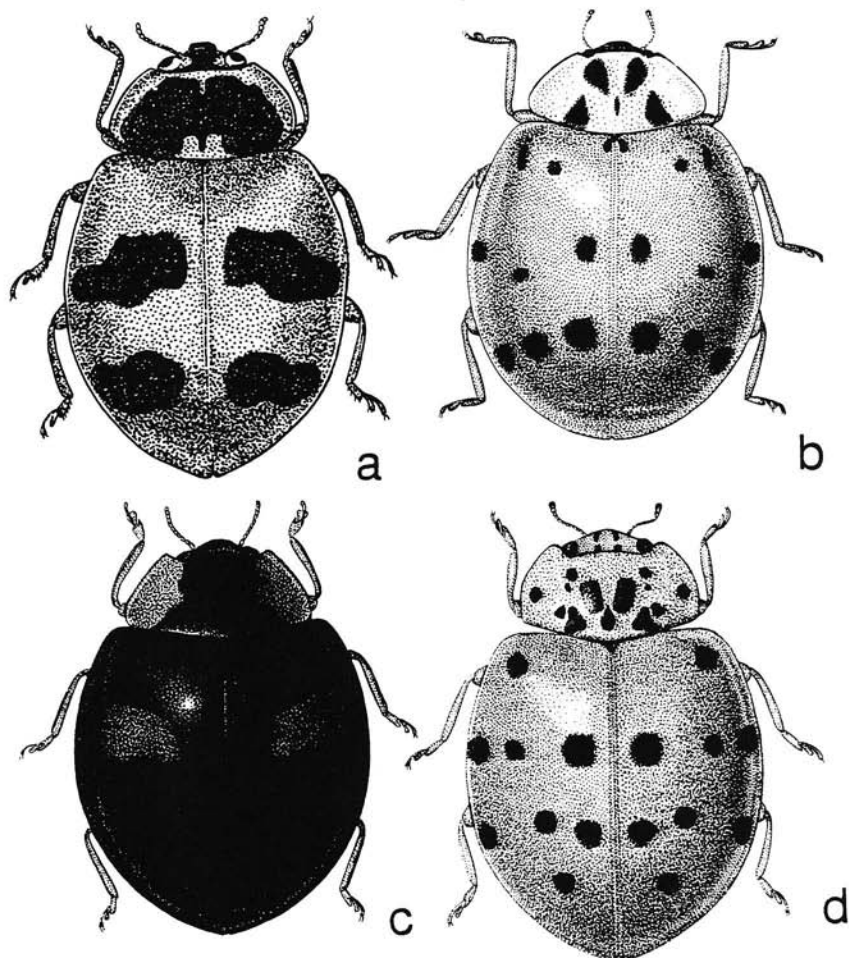


Fig. 47. Habitus views of diverse Coccinellinae: a, *Adalia bipunctata frigida* Scheid; b, c, *Harmonia axyridis* (Pall.); d, *Harmonia quadripunctata* (Pont.)

Body oval, moderately convex, shiny, punctate. Head black. Pronotum red with M-shaped black mark at middle and 1 black dot near each lateral margin; more rarely pronotum black with narrow white border along margins. Scutellum small, triangular, reddish or more often dark. Elytra red or red-yellow; each elytron with 2 transverse black bands: first band consists of 3 spots, second band of 2 spots. Spots usually fused with each other, more rarely separated. Sometimes bands with light borders. Antennae brown, with darkened apex, palpi black or blackish. Ventral body surface and legs black.

Body length 3.5-5.0 mm.

Distribution. Chukotka, Magadan Region, Koryak district, Kamchatka, North of Khabarovsk Territory, Sakhalin Island, Southern Kuril (Iturup, Kunashir islands), northern Siberia, European part of Russia. Mongolia, Norway, Sweden, North

3. Elytra red to red-yellow with 3 broad black transverse bands: first band entire, others broadly separated at suture (Fig. 48a). Usually bands with light border 3. *C. trifasciata* L.
 - Elytra red with black spots (dots) 4
4. Metepimera black. Elytra in anterior half with lateral margins strongly flattened. Elytra with 7 spots: 1 common postscutellar and 3 on each elytron 5
 - Metepimera light. Lateral margin of elytra narrow. Elytra coloration not as above 6
5. Spots on elytra small. Body moderately convex, of usual size. On continental regions of the Far East 4. *C. septempunctata septempunctata* L.
 - Spots on elytra large. Body strongly convex and larger. Only on islands (Sakhalin and Southern Kuril) 4a. *C. septempunctata brucki* Muls.
6. Elytra red with 5 large elongate spots: 1 common postscutellar and a pair of spots on each elytron; paired spots transverse-oval, anterior pair oblique. Pronotum black with 1 nearly triangular spot in each anterior angle 6. *C. nivicola* Muls.

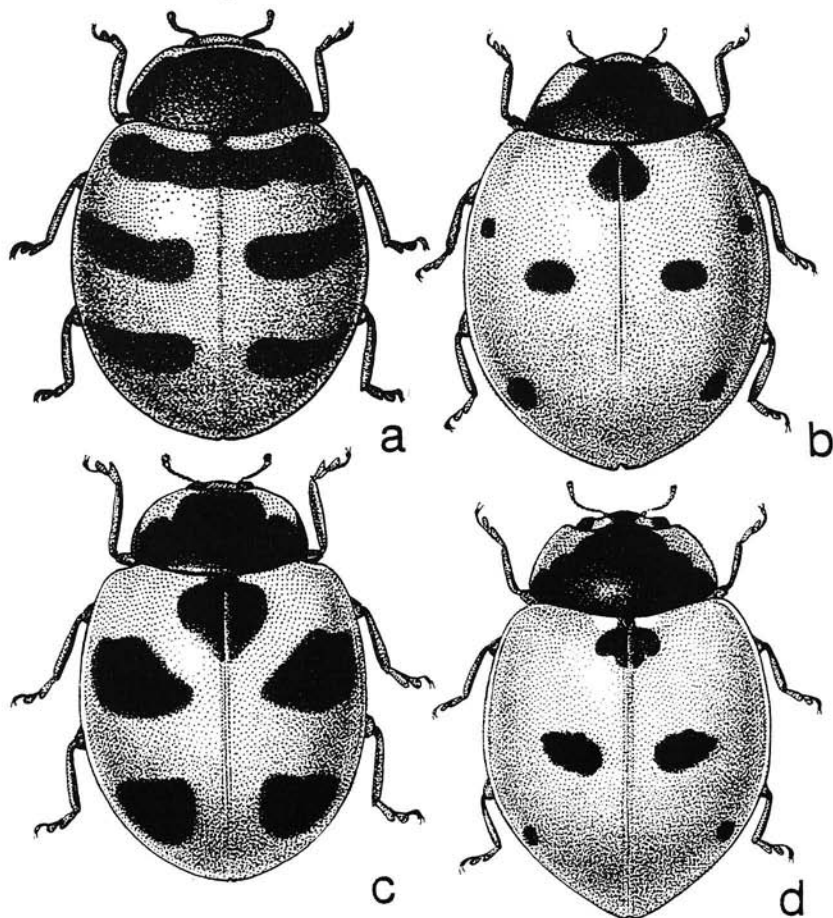


Fig. 48. Habitus views of *Coccinella* spp.: a, *Coccinella trifasciata* L.; b, *C. septempunctata* L.; c, *C. nivicola* Muls.; d, *C. quinquepunctata* L.

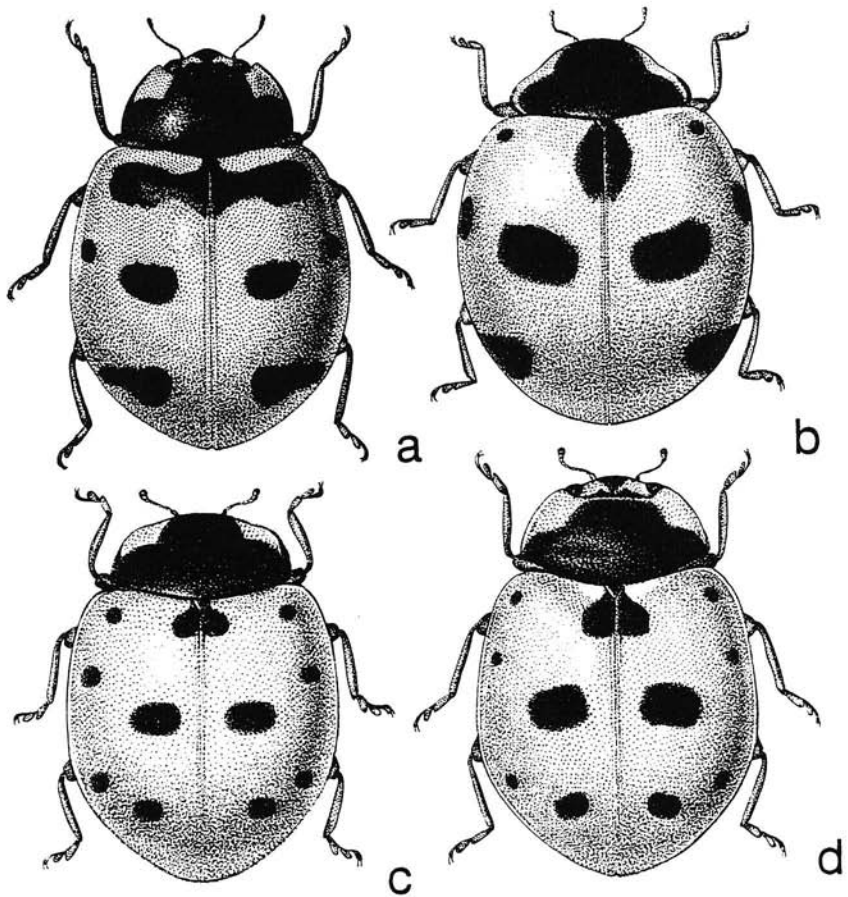


Fig. 49. Habitus views of *Coccinella* spp. : a, *Coccinella transversoguttata* Fald.; b, *C. magnifica* Redt.; c, *C. undecimpunctata* L.; d, *C. ainu* Lew.

nae. Antennae shorter than head, 11-segmented, brown or yellow-brown, with darker distinct club. Eyes large with minute facets. Mouth parts brown or black-brown, labrum large, convex, with lighter anterior margin. Pronotum black with yellow spot at each anterior angle; often spots elongate along lateral margin, sometimes also along posterior angle (Fig. 51b). Pronotum with greatest width at middle. Anterior margin of pronotum deeply excavated, lateral margins bordered. Elytra red with 11 subequal black spots.

Prosternum black, weakly convex, with distinct carinae not reaching anterior margin. Mesosternum short, black, with narrow border at anterior margin. Metasternum convex, black, with transverse wrinkles and faint longitudinal groove at middle. Mesepimera and metaepimera white. Legs black with apices of tibiae and tarsi paler. Apices of middle and hind tibiae with small spurs. Abdomen black, densely punctate, with short yellow pubescence. Postcoxal line of abdominal sternite I large,

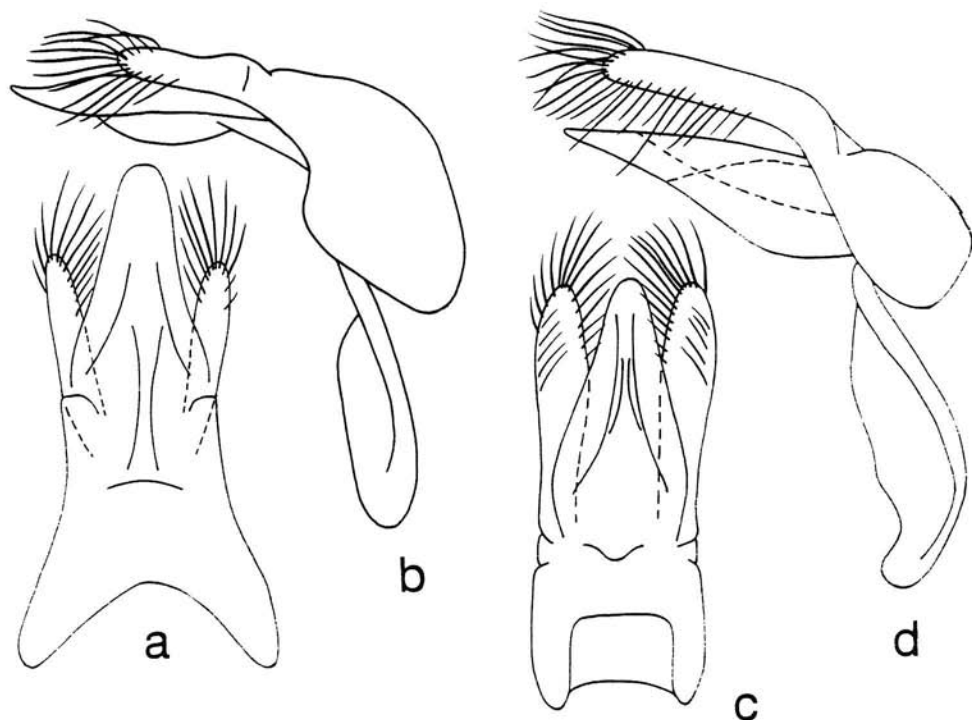


Fig. 50. Tegmen of *Coccinella* spp. : a, b, *C.undecimpunctata* L.; c, d, *C.ainu* Lew.; a, c, ventral view; b, d, lateral view.

in form of quarter circle, externally bifid. Easily distinguished from *C.aini* by genitalia. Aedeagus as in figure 50.a,b.

Body length 3.5-5.5 mm, body width 2.7-4.1 mm.

Distribution. Magadan Region, Amur Region, Siberia, Kazakhstan, Middle Asia, Caucasus, European part of Russia. China, Mongolia, Europe, North Africa, North America.

Material. 68 specimens examined from the Far East and Siberia.

Life history. Inhabits forest and forest-steppe zones. Occurs in northern part of the Far East on trees in bottomland chosenia-poplar woods, larch forests and urban plantings.

2. *Coccinella transversoguttata* Falderman, 1835

Fig. 49a

Falderman, 1835:177 (type locality - Altai and Mongolia); Jacobson, 1916:982; Dobrzhansky, 1926:21; Mader, 1930:150; Sharova, 1962:1177; Filatova, 1970:94; Kuznetsov, 1972b:181; 1975c:7; Ivliev, Kuznetsov, Matis, 1975:11; Iablokoff-Khinzorian, 1982:364; Kuznetsov, 1984b:29; Bielawski, 1984:416; Kuznetsov, 1992:365.

Body shortened oval, strongly or moderately convex. Head black with yellowish spot adjacent to each eye. Pronotum with quadrate spot in each anterior angle reaching middle of lateral margin. Very rarely pronotum with narrow whitish border at anterior margin. Elytra yellow-red or orange-yellow with 11 black spots, some of them fused; spots at elytral base fused in transverse band; 2 small dots located near outer margin at basal 1/3; 1 large transverse dot closer to suture at middle of length; 2 dots at elytral apex fused to form transverse mark. Design varies. Elytra densely and finely punctate. Ventral surface black. Mesepimera and metepimera whitish, sometimes latter darkened. Legs black.

Body length 5.5-8.0 mm.

Distribution. Magadan Region, Kamchatka, Khabarovsk Territory, Amur Region, Primorye Territory, Siberia, Middle Asia. China, Mongolia, North America.

Material. 163 specimens examined from the Far East and Mongolia.

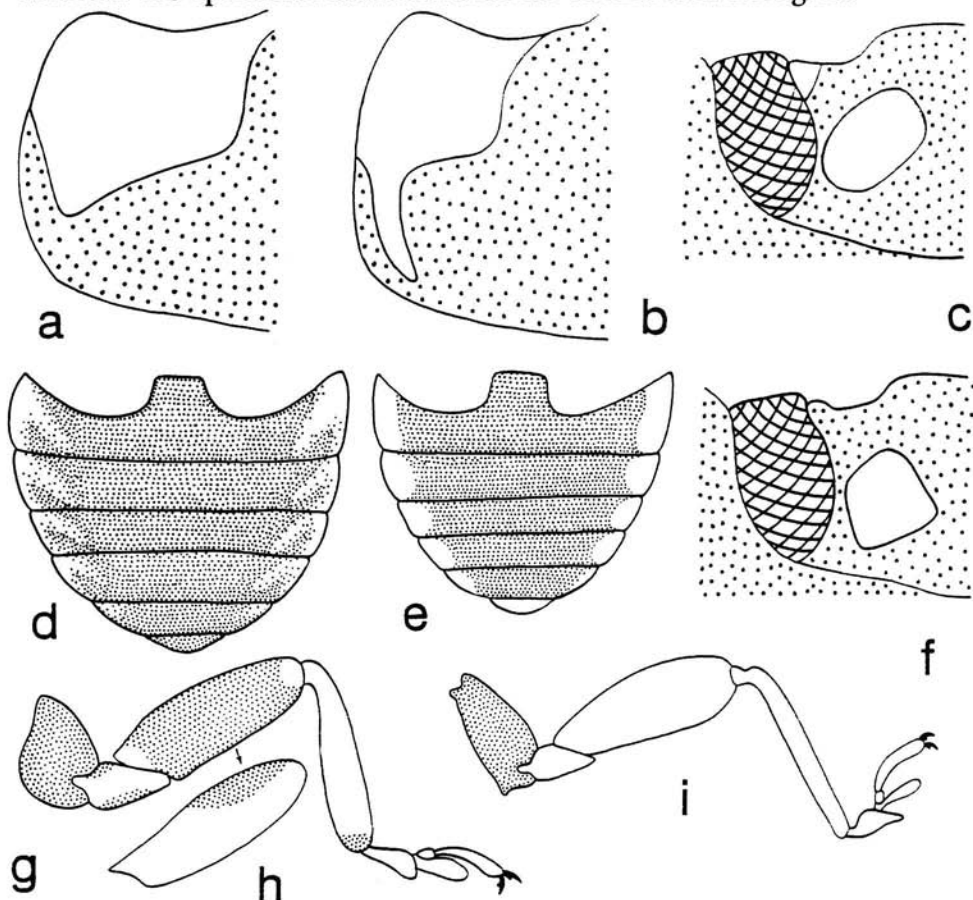


Fig. 51. Color pattern of head, pronotum, femur and abdomen: a, c *Coccinella ainu* Lew.; b, f, *C. undecimpunctata* L.; d, g, h, *Propylea quatuordecimpunctata* (L.); e, i, *P. japonica* (Thunb.); a, b, pronotum; c, f, head; d, e, abdomen; g, h, i, femur. (a-c, e - after Bielawski, 1957; g, h, i - after Sasaji, Yahara, Saito, 1975).

Life history. Inhabits broadleaved trees and shrubs in bottomland choseniapoplar, valley larch and mixed woods. Has been observed from tundra to forest-steppe.

3. *Coccinella trifasciata* Linnaeus, 1758

Fig. 48a

Linnaeus, 1758:365 (type locality - north of Scandinavian Peninsula, Lapponia); Jacobson, 1916:982; Mader, 1930:162; Sharova, 1962:1177; Kuznetsov, 1972b:180; 1975b:7; Ivliev, Kuznetsov, Matis, 1975:10; Iablokoff-Khnzorian, 1982:368; Kuznetsov, Semjanov, 1983:8; Bielawski, 1984:423; Gordon, 1985:787; Kuznetsov, 1992:363.

Body shortened oval, rather strongly convex. Head yellow with one black band on occiput in male or black with 2 yellow spots on frons at inner margin of eyes.

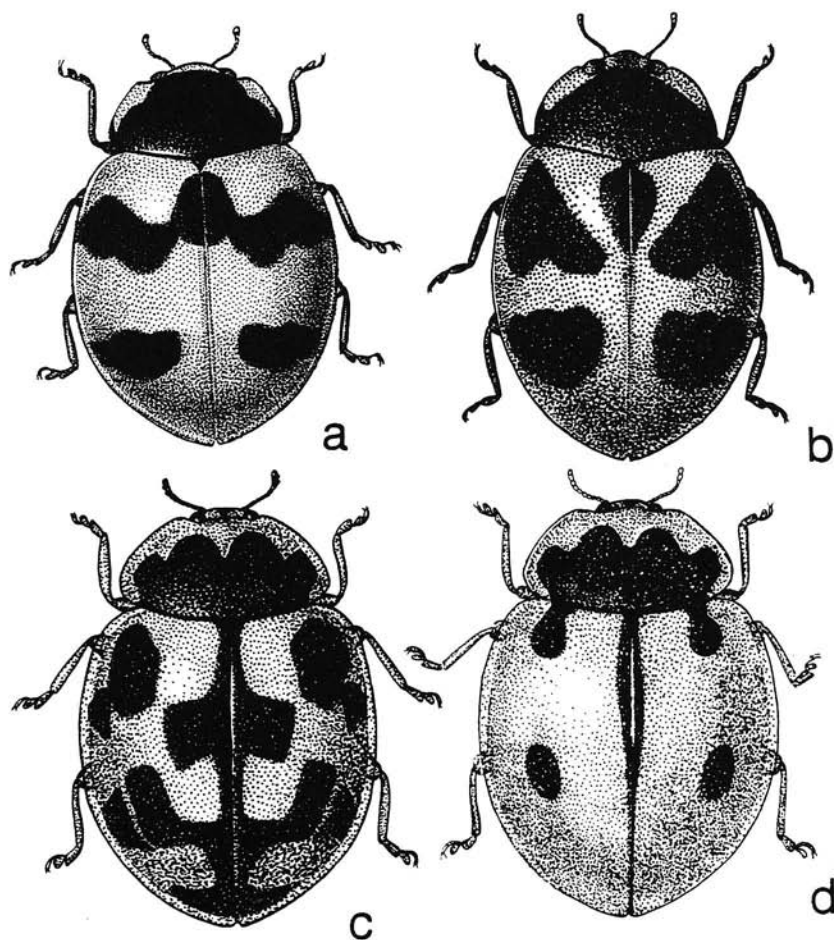


Fig. 52. Habitus views of *Coccinella* and *Propylea* spp.: a, *Coccinella hieroglyphica* Lew.; b, *C. sachalinensis* Ohta; c, *Propylea quatuordecimpunctata* (L.); d, *P. japonica* (Thunb.).

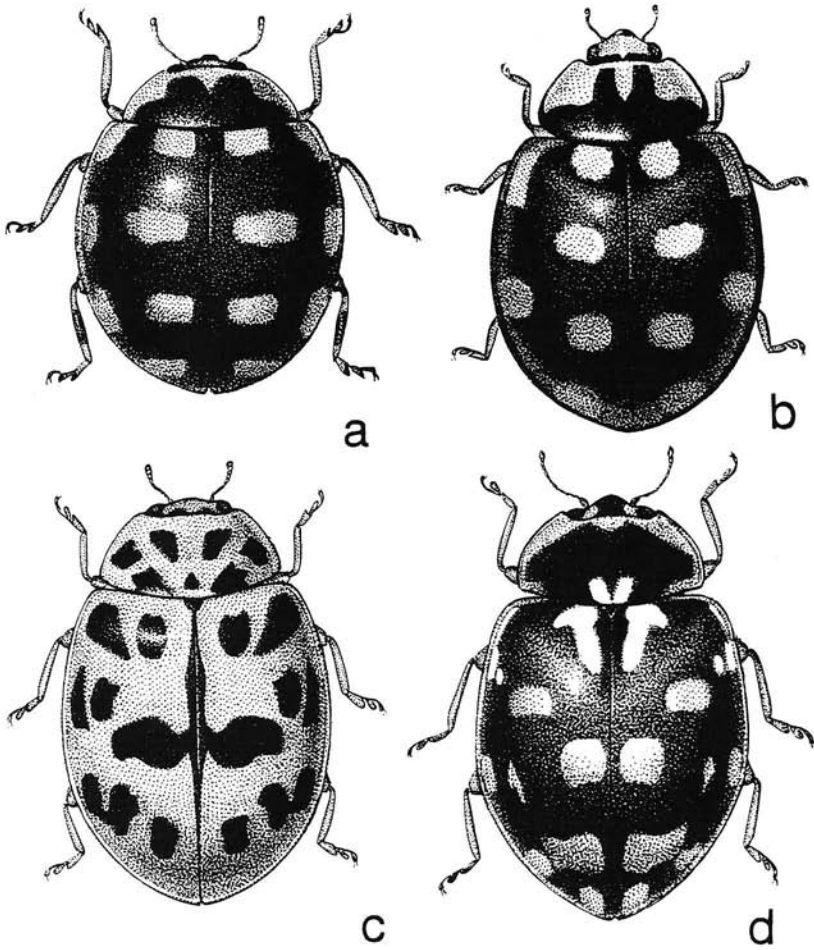


Fig. 53. Habitus views of diverse Coccinellini: a, *Coccinula quatuordecimpustulata sinensis* (Ws.); b, *O. bisexnotata* (Muls.); c, *Oenopia conglobata* (L.); d, *Myrrha octodecimguttata* (L.).

club. Labrum convex, black, rounded, with long hairs. Mouth parts black, only bases of maxillary palpi yellow. Pronotum black with large yellow spots at anterior angles, with narrow yellow border anteriorly in males; lateral margins bordered; base rounded; surface densely and finely punctate. Elytra red, usually with 7, more rarely with 9 black spots: 1 common large postscutellar and 3 spots on each elytron; inner spots large, sometimes additional dot on humeral calli. Elytral apices strongly curved.

Venter black. Prosternum black with 2 distinct carinae. Mesosternum short, epimera white. Metasternum convex with transverse wrinkles and faint longitudinal groove at middle; episterna black, rough; epimera white. Legs black, only fore tarsi with small white spot at base. Abdomen black, densely punctate, covered by short yellow pubescence. Postcoxal line large, in the form of quarter circle.

- spot at base. Rarely elytra and pronotum black with white spot
 3. *C. (A.) quatuordecimguttata* (L.)
- Elytra yellow-brown with 7, rarely with 6, white spots on each elytron (spot at humeral callus absent): 2 spots are located in second transverse row from elytral base, lateral spot prominent anteriorly (Fig. 54d). Pronotum brown-yellow, with 1 small oblong spot on each side at base
 4. *C. (A.) quindecimguttata* (F.)

1. *Calvia (Calvia) decemguttata* (Linnaeus, 1758)

Fig. 54a

Linnaeus, 1758:583 (*Coccinella*; type locality - Sweden); Jacobson, 1916:986; Mader, 1933:236; Djadechko, 1954:144; Filatova, 1965:138; Kuznetsov, 1972b:182; 1975c:7; Tomilova, Pleshanov, 1977:149; Iablokoff-Khnzorian, 1982:205; Kuznetsov, 1984b:29; 1992:372.

Larva. Emden, 1949:275; Savoiskaja, 1983b:99.

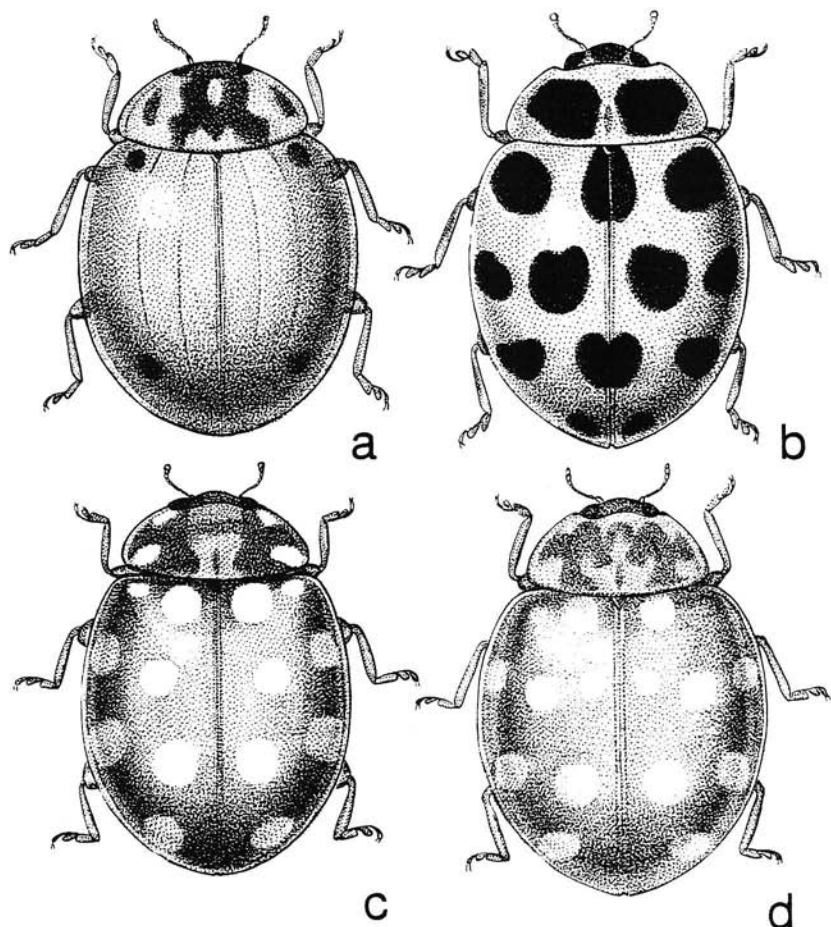


Fig. 54. Habitus views of *Calvia* spp. : a, *Calvia (Calvia) decemguttata* (L.); b, *C. (Anisocalvia) duodecimmaculata* (Gebli.); c, *C. (Anisocalvia) quatuordecimguttata* (L.); d, *C. (Anisocalvia) quindecimguttata* (Fabr.).

- *Paramysia* Reitter, 1911:136 (nom.n. *Mysia* Mulsant, 1846); Timberlake, 1943:21; 1954:137.

Type species *Coccinella oblongoguttata* Linnaeus, 1758, by monotypy.

Body oblong-oval, strongly convex, smooth, large. Clypeus with wedge-shaped projections before antennae, anterior margin weakly excavated. Eyes large with minute facets, strongly covered by anterior margin of pronotum which is rather weakly and arcuately emarginate. Postantennal lobe of frons short. Inner margins of eyes distinctly diverging toward mouth. Antennae rather long, nearly twice width of frons. Antennal club well marked, slender and loose; 1-st segment rather broad, large, nearly transverse; 9-th segment 2 times and 10-th segment 1.5 times longer than wide; terminal segment oblong-oval. Anterior margin of pronotum weakly and arcuately excavated, lateral sides rounded, bordered and reflexed; posterior an-

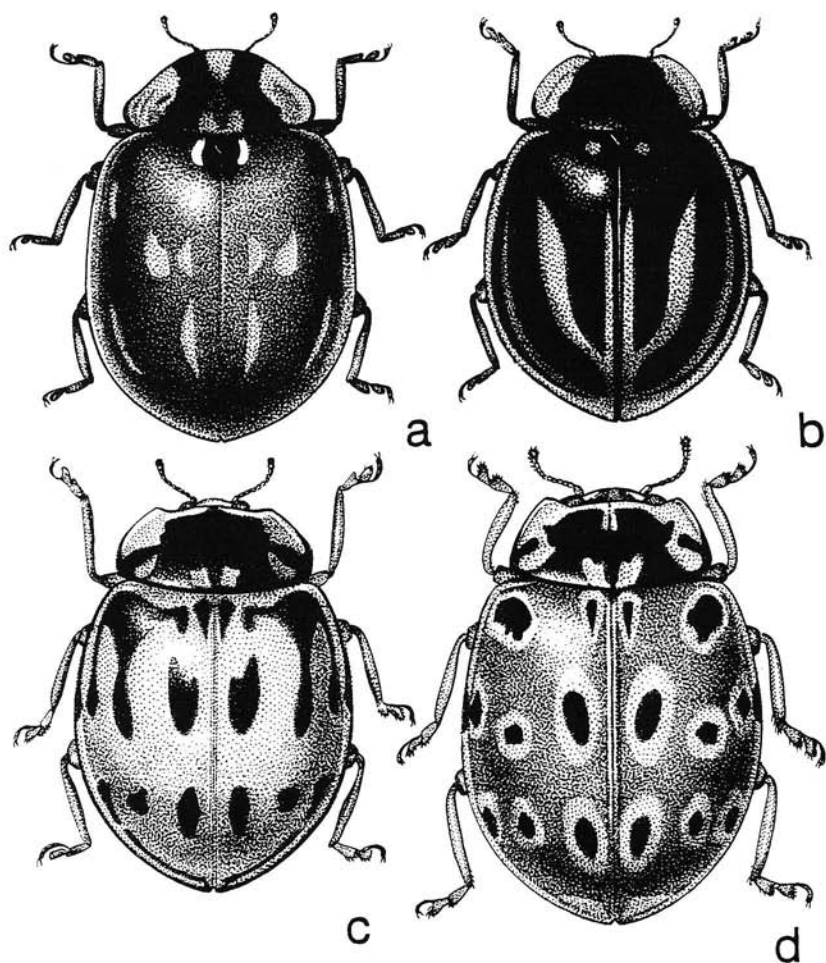


Fig. 55. Habitus views of *Myzia* and *Anatis* spp.: a, *Myzia oblongoguttata* L.; b, *M.gebleri* (Crotch); c, *Anatis ocellata* (L.); d, *A.halonis* Lewis.

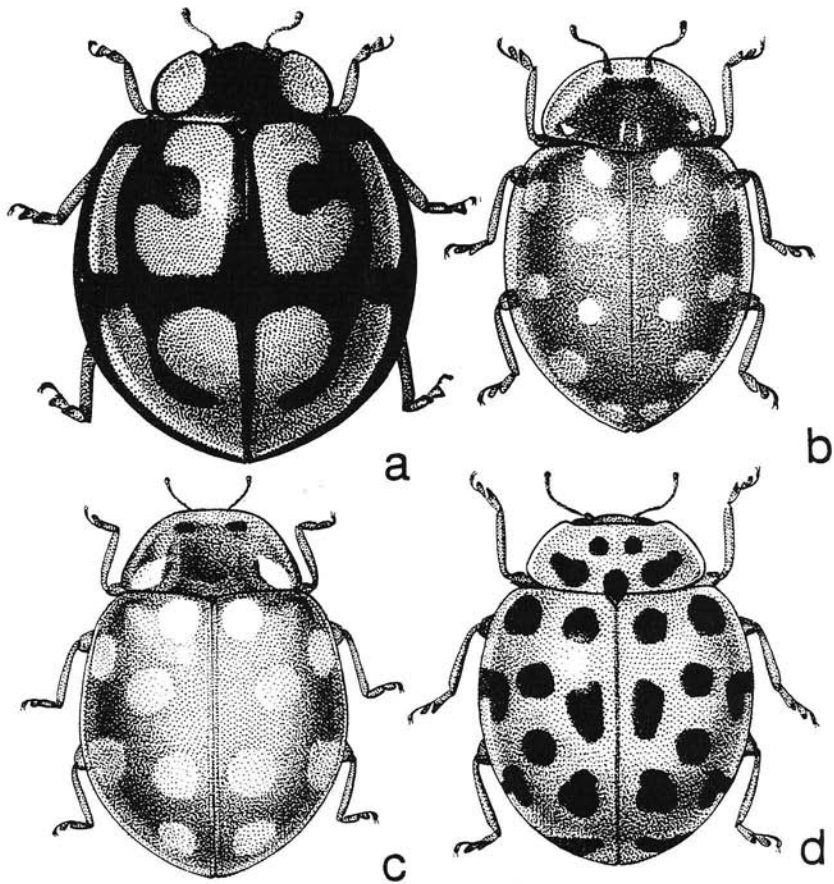


Fig. 56. Habitus views of diverse Coccinellinae: a, *Aiolocaria hexaspilota* (Hope); b, *Halysia sedecimguttata* (L.); c, *Vibidia duodecimguttata* (Poda); d, *Pyslobora vigintiduopunctata* (L.).

ed, nearly semicircular; base narrowly bordered. Posterior margin of pronotum rounded, lateral part of surface distinctly explanate along side with exception of basal part. Epipleura of pronotum depressed only anteriorly. Scutellum triangular, slightly broader than long, as wide as $1/8$ pronotal width. Lateral margins of elytra strongly rounded and broadly expanded externally, not bordered. Epipleura of elytra complete, broad, nearly as wide as half metasternum. Prosternum with carinae, epimera flattened only at apical part. Mesosternum anteriorly with small emargination at middle. Postcoxal lines of abdominal sternite I incomplete, bifid externally, not reaching posterior margin of sternite. Middle and hind tibiae with 2 spurs. Claw with large thick tooth at base.

Monotypical genus. Previously the following two names were also classified in this genus: *mirabilis* Motsh., *duodecaspilota* Hope. The first was reduced to a synonym of *A. hexaspilota* Hope, and the latter was separated into a new genus *Alloneda* Khnz., 1979.

and Novosibirsk Regions), Kazakhstan, Middle Asia, south of European part of Russia (steppe zone).

Specimens examined. 28 specimens collected by us in Irkutsk Region, Buryatja and Yakutja were examined.

Life history. Inhabits grasses of steppes and dry meadows. Occurs often on wormwood (*Artemisia* sp.).

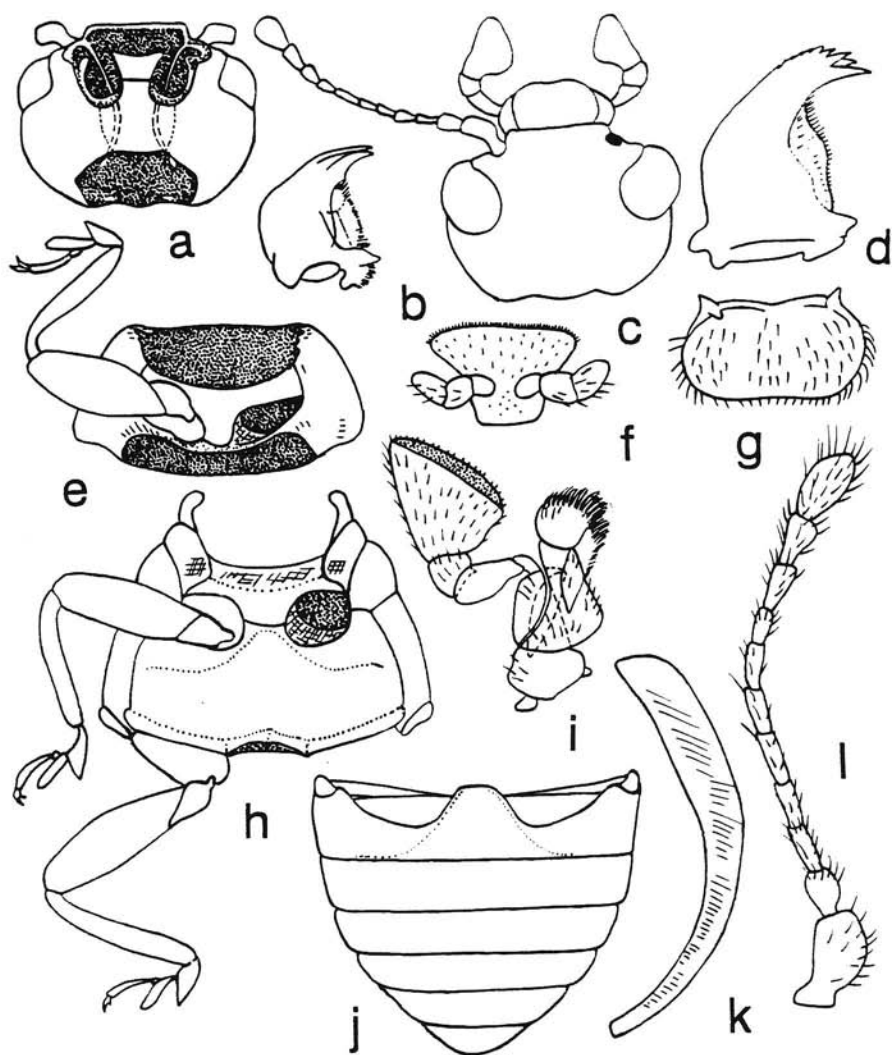


Fig. 57. Morphological details of Psylloborini spp. : e, *Illeis koebelei* Timber. and *Vibidia duodecimguttata* (Poda) (remainder); a, head capsule, ventral view; b, d, mandible; c, head, dorsal view; e, prothorax; f, labium; g, labrum; h, pterothorax, ventral view; i, maxilla; j, abdomen; k, elytral epipleuron; l, antenna (after Sasaji, 1971).

brum broad, with two processes at the back. Anterior margin of clypeus truncate. Pronotum strongly transversely oval; anterior margin deeply excavated; lateral margin with fine, slightly raised or flat border, base not bordered. Scutellum visible,

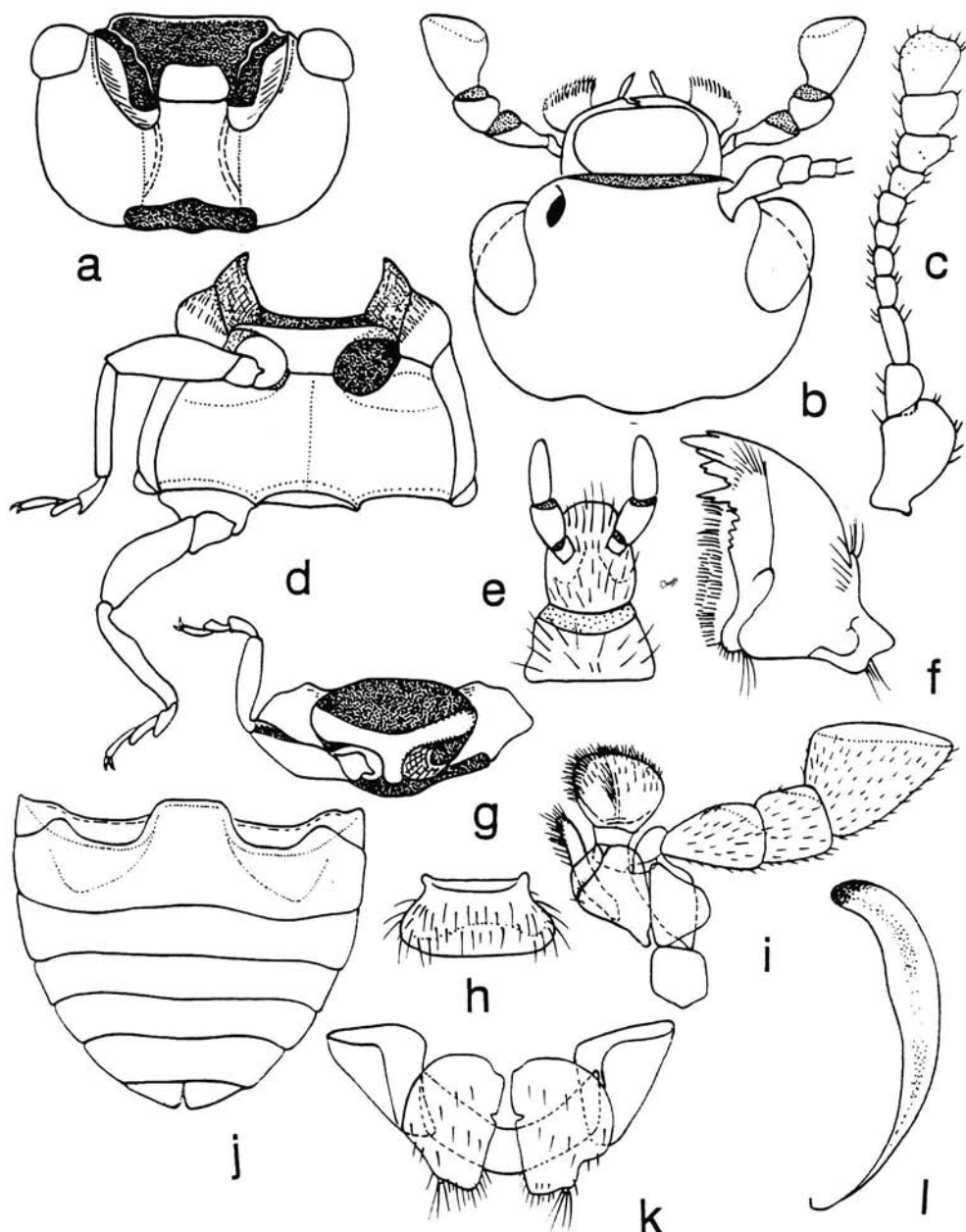


Fig. 58. Morphological details of Epilachnini spp.: a, b, c, i *Henosepilachna vigintioctomaculata* Motsch., and *H. vigintioctopunctata* Fabricius (remainder; a, head capsule, ventral view; b, head capsule, dorsal view; c, antenna; d, pterothorax; e, labium; f, mandible; g, prothorax, ventral view; h, labrum; i, maxilla; j, abdomen; k, female genital segment; l, elytral epipleuron (after Sasaji, 1971).

bifid with a basal tooth. Externally the representatives of this genus are almost impossible to distinguish from *Epilachna*. Many specialists consider these 2 genera as *Epilachna* in the broad sense.

Species of the genus are spread throughout the world, mainly in tropical regions. In North Vietnam 20 species are recorded, in China – 12, in Japan – 3 species. In Russia and in the Far East a single species is known.

1. *Henosepilachna vigintioctomaculata* (Motschulsky, 1857)

Fig. 59b

Motschulsky, 1857:40 (*Epilachna*, type locality - Japan, Honshu, Simoda); Li, Cook, 1961:48; Sasaji, 1971:311; Kuznetsov, 1972b:177 (*Epilachna*); 1975b:6 (*Epilachna*); Hoang, 1977:137; Pang, Mao, 1979:111;

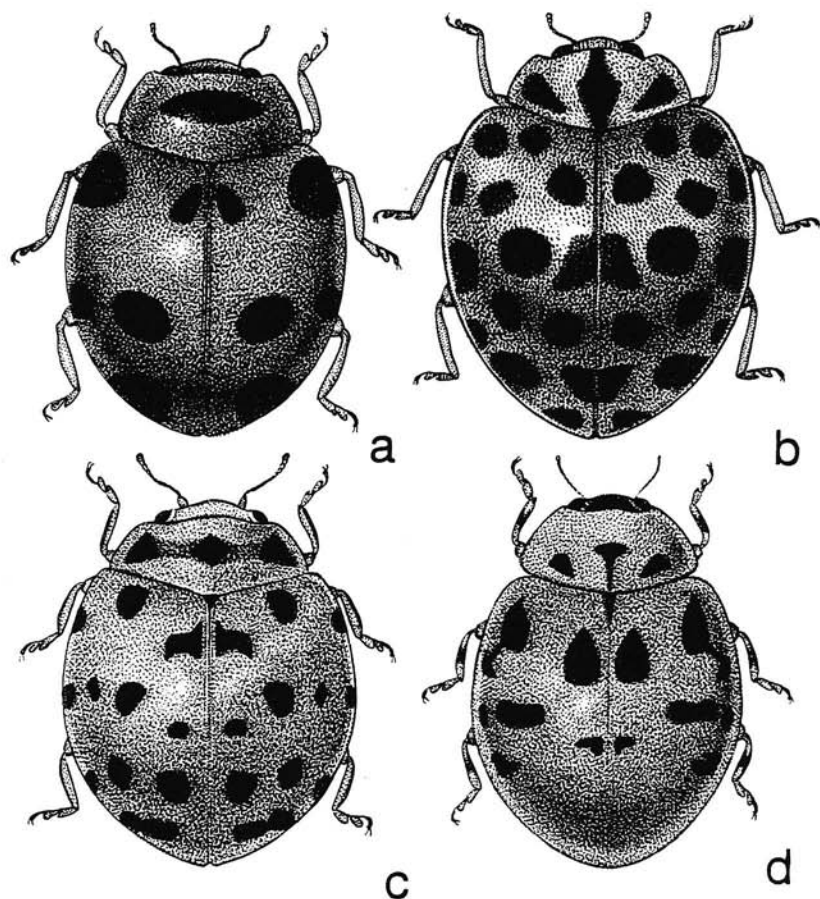
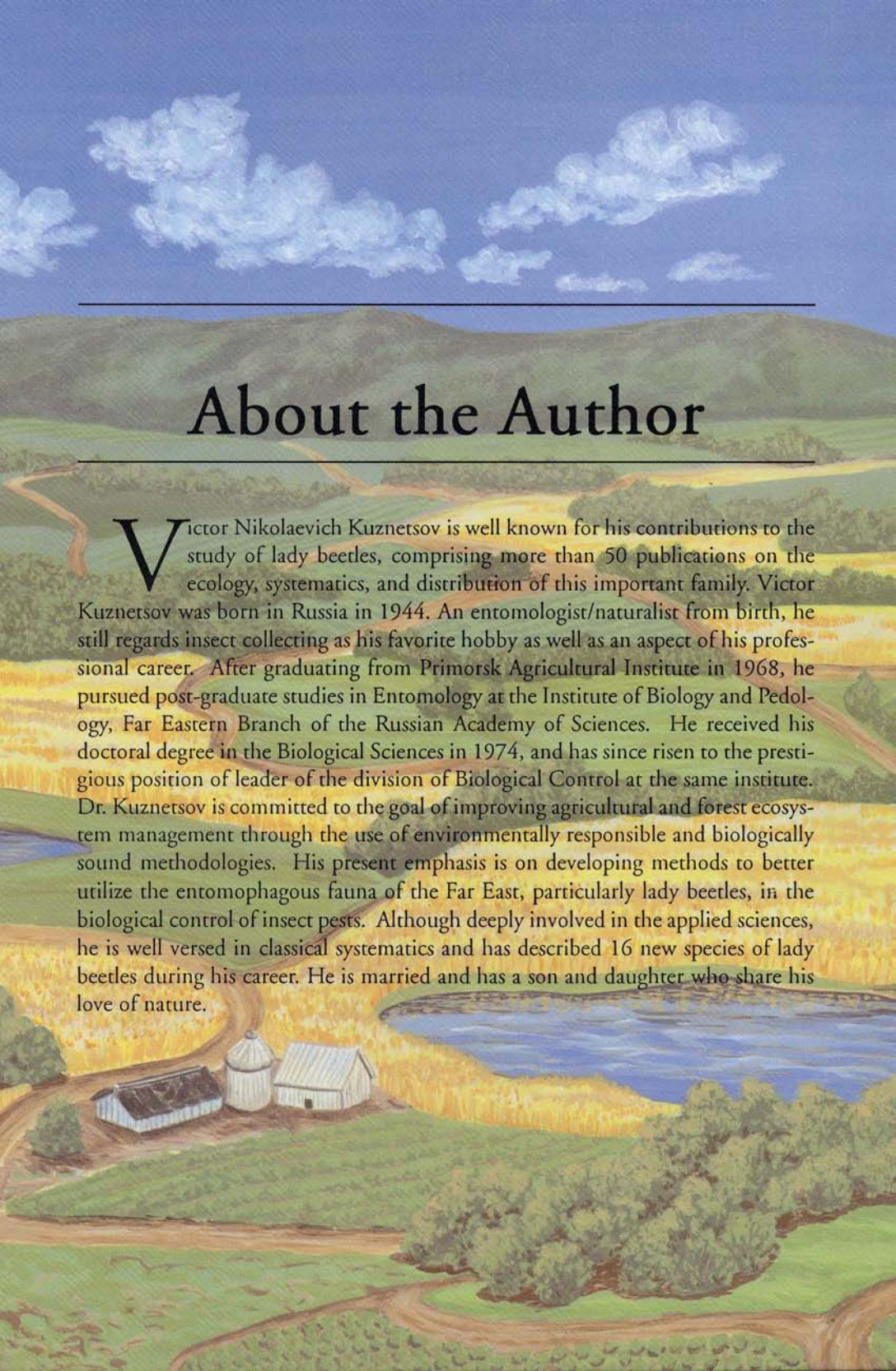


Fig. 59. Habitus views of Epilachnini spp.: a, *Epilachna chinensis* Ws.; b, *Henosepilachna vigintioctomaculata* (Motsch.); c, *Subcoecinella vigintiquatuorpunctata* (L.); d, *Cynegetis impunctata* (L.).



About the Author

Victor Nikolaevich Kuznetsov is well known for his contributions to the study of lady beetles, comprising more than 50 publications on the ecology, systematics, and distribution of this important family. Victor Kuznetsov was born in Russia in 1944. An entomologist/naturalist from birth, he still regards insect collecting as his favorite hobby as well as an aspect of his professional career. After graduating from Primorsk Agricultural Institute in 1968, he pursued post-graduate studies in Entomology at the Institute of Biology and Pedology, Far Eastern Branch of the Russian Academy of Sciences. He received his doctoral degree in the Biological Sciences in 1974, and has since risen to the prestigious position of leader of the division of Biological Control at the same institute. Dr. Kuznetsov is committed to the goal of improving agricultural and forest ecosystem management through the use of environmentally responsible and biologically sound methodologies. His present emphasis is on developing methods to better utilize the entomophagous fauna of the Far East, particularly lady beetles, in the biological control of insect pests. Although deeply involved in the applied sciences, he is well versed in classical systematics and has described 16 new species of lady beetles during his career. He is married and has a son and daughter who share his love of nature.