

## LARVAL KEY TO GENERA AND SELECTED SPECIES OF NORTH AMERICAN COCCINELLIDAE (COLEOPTERA)

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AND ROBERT D. GORDON<sup>2</sup>

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*Abstract.*—An illustrated key to the larvae of 46 of the 60 genera of North American Coccinellidae is presented. The 14 genera not included are *Blaisdelliana* Gordon, *Bru-moides* Chapin, *Ceratomegilla* Crotch, *Decadiomus* Chapin, *Didion* Casey, *Exoplectra* Mulsant, *Gnathowisea* Gordon, *Helesius* Casey, *Hyperaspidius* Crotch, *Macronaemia* Casey, *Nipus* Casey, *Pseudoazyza* Gordon, *Selvadius* Casey, and *Zilus* Mulsant.

*Key Words:* Coccinellidae, North America, larvae, taxonomy, key

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Progress in larval taxonomy has customarily lagged behind that of the adult stage throughout the holometabolous insects and the Coccinellidae are no exception. A means of identifying the prevalent larval stage is especially important because ladybeetles of several genera have become important to biological control programs. Previous keys by Böving (1917), Gage (1920), Storch (1970), and LeSage (1991) are not comprehensive enough to meet current needs for identification, even to genus, of North American ladybeetle larvae.

Larvae of Palaearctic ladybeetles have been much more extensively studied and can be identified to genus more readily than

their Nearctic counterparts. Principal publications on the Palaearctic fauna are those of van Emden (1949), Savoiskaya (1960, 1962, 1964a, 1964b, 1983), Kamiya (1965, 1966), Sasaji (1968a, 1968b), Klausnitzer (1970), Tao and Chiu (1971), Savoiskaya and Klausnitzer (1973), Sasaji and Tjubokawa (1983), and Majerus and Kearns (1989).

During his tenure (1940-1947) as a USDA curator, Bryant Rees prepared an illustrated manuscript key to larval genera and species of Coccinellidae deposited in the U.S. National Museum of Natural History collection. Years later, David Bouk incorporated additional North American genera and illustrations, and deleted some genera not represented in North America. Finally, Anderson and Gordon expanded the work to include all North American genera for which

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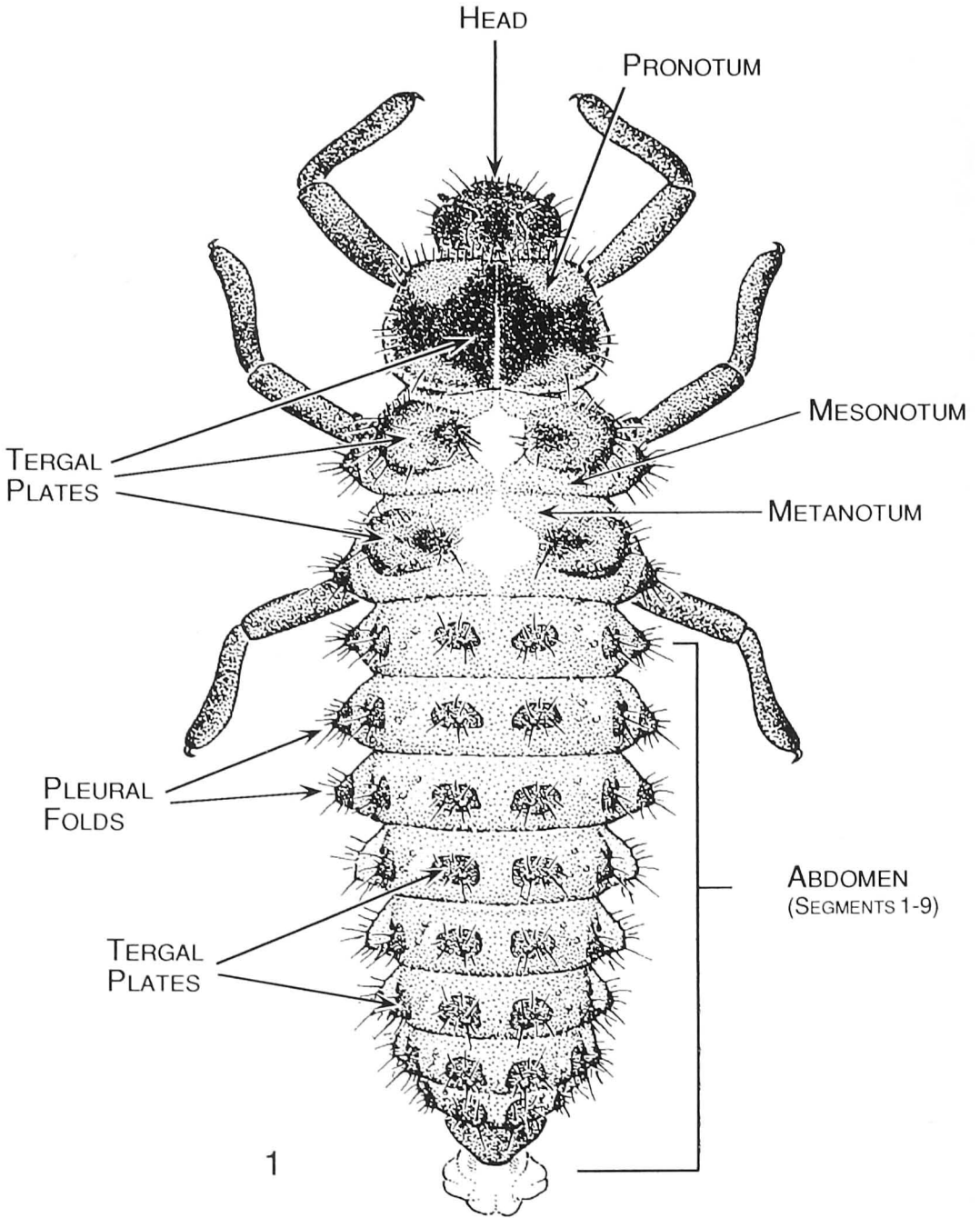
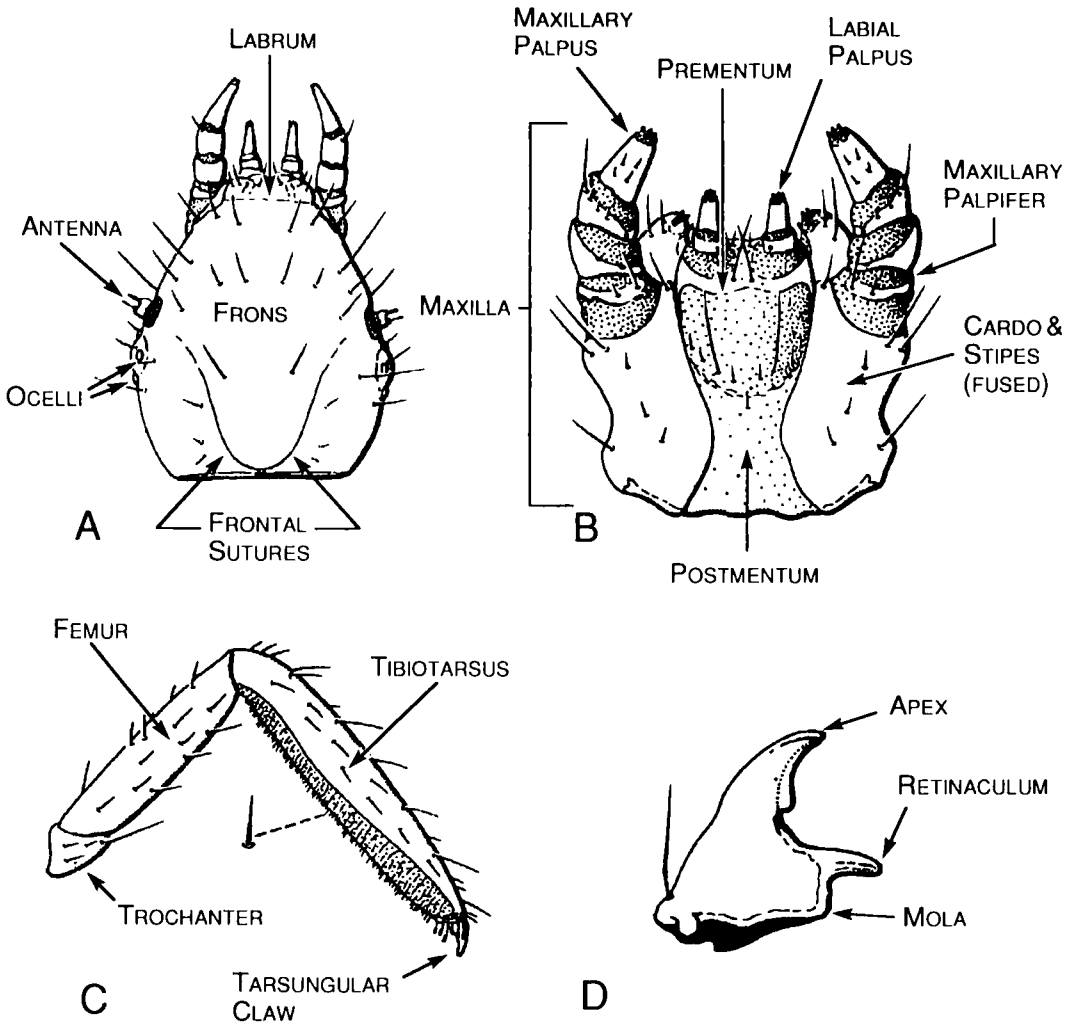


Fig. 1. Basic structures of larval Coccinellidae. *Neoharmonia venusta*, entire larva, dorsal view.



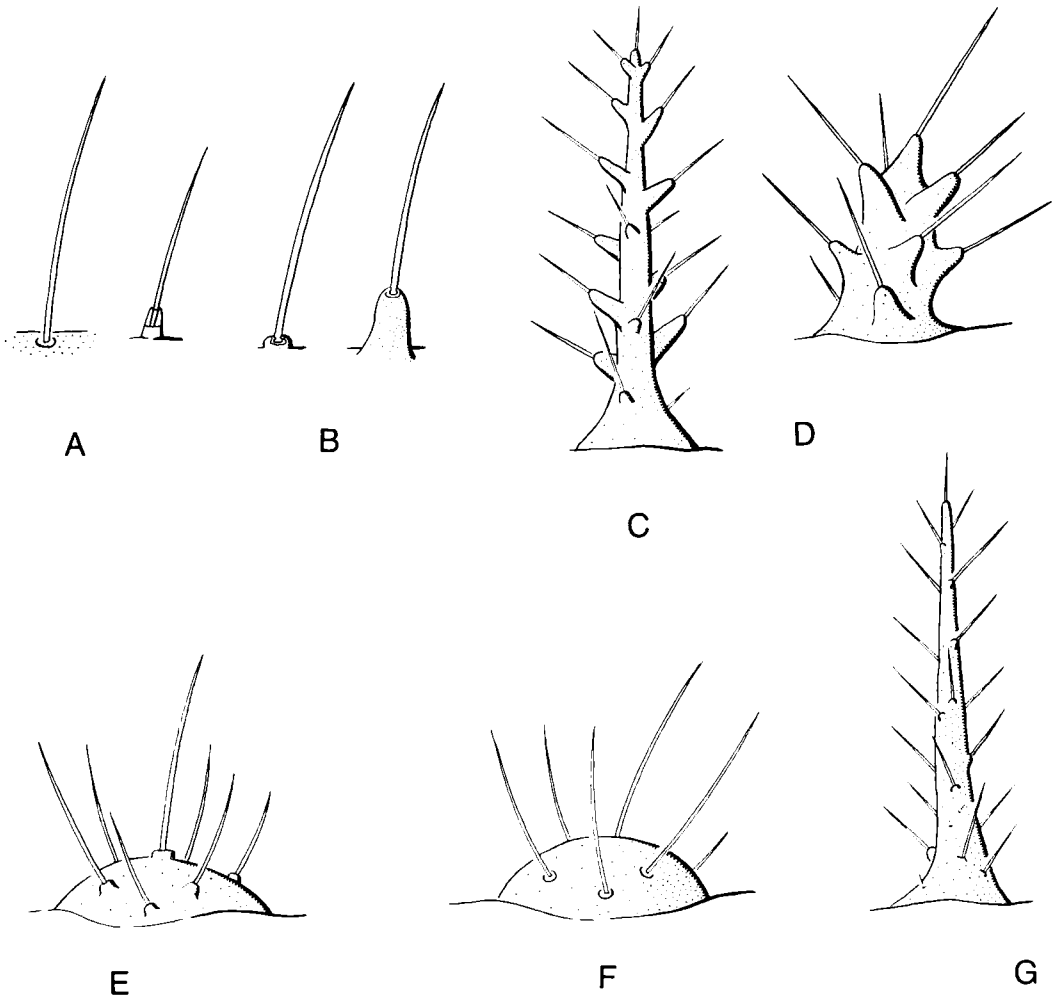
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Fig. 2. Basic structures of larval Coccinellidae. A. *Catana clauseni*, head, dorsal view. B-D. *Hippodamia convergens*: B. Labium and maxillae, ventral view. C. Leg, except for coxa, lateral view. D. Left mandible, dorsal view.

larval specimens were accessible, thus producing a publication that would complement the keys to genera of adults by Gordon (1985), Gordon and Vandenberg (1991), and pupae by Phuoc and Stehr (1974).

Forty-six of the 60 North American genera are included in this key. The 13 genera not included, because larval specimens are

not available, are: *Blaisdelliana* Gordon, *Brumoides* Chapin, *Ceratomegilla* Crotch, *Decadiomus* Chapin, *Didion* Casey, *Exoplectra* Mulsant, *Gnathowisea* Gordon, *Helesius* Casey, *Hyperaspidius* Crotch, *Macronaemia* Casey, *Nipus* Casey, *Pseudoazya* Gordon, *Selvadius* Casey, and *Zilus* Mulsant.



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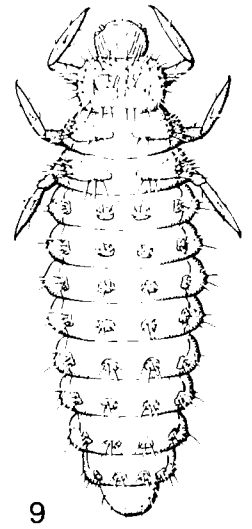
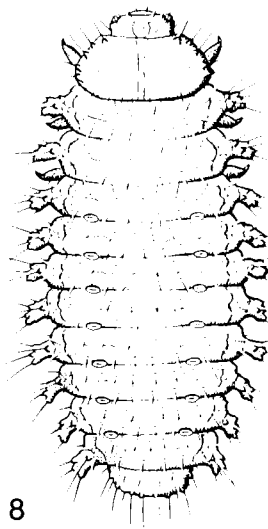
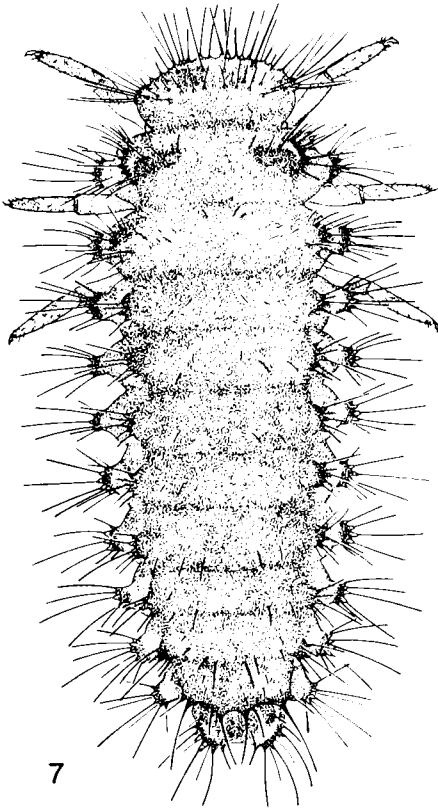
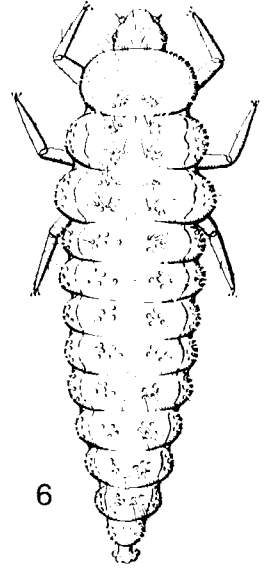
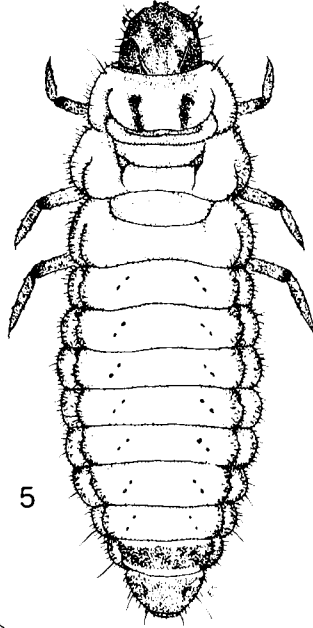
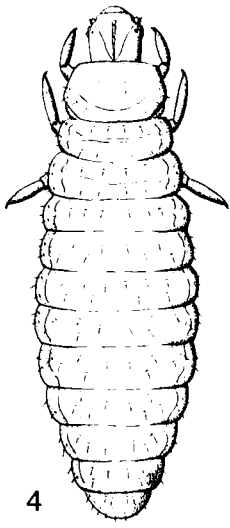
Fig. 3. Terminology of armature of larval Coccinellidae. A. Seta (left) and a collar seta (right). B. Chalazae. C. Scolus. D. Parascolus. E. Struma. F. Verruca. G. Sentus.

The illustrations contained herein were done by several different illustrators over a period of years, hence they are not uniform but rather reflect the style of each artist. In several instances structures shown were drawn from taxa not represented in North America. Because cost is a major factor in producing a publication needing many illustrations, available illustrations were utilized wherever possible as long as they accurately reflected the character(s) in question. Genera mentioned in the key but

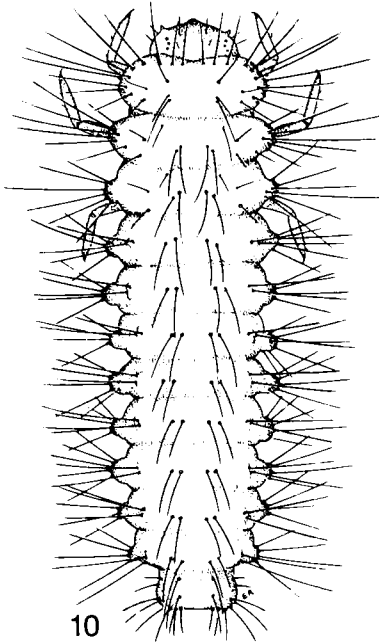
not occurring in North America are *Catana*, *Halysia*, *Ortalistes*, *Synonycha*, and *Tytthaspis*. In many cases figures of taxa appearing previously in the key are repeated because they best illustrate a pertinent character.

#### TERMINOLOGY

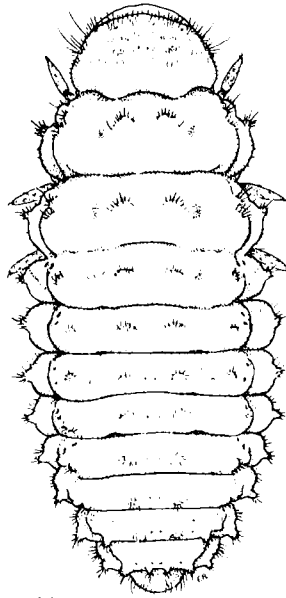
Ladybeetle larvae possess armature of the body wall in the form of variously shaped setose projections. Each type of projection has a name, therefore this terminology must



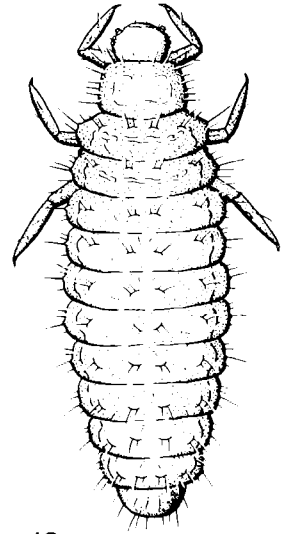
Figs. 4–9. Habitus views. Fig. 4, *Microweisea misella*; 5, *Coccidophilus* sp.; 6, *Delphastus pusillus*; 7, *Zagloba* sp.; 8, *Cephaloscymnus* sp.; 9, *Stethorus* sp.



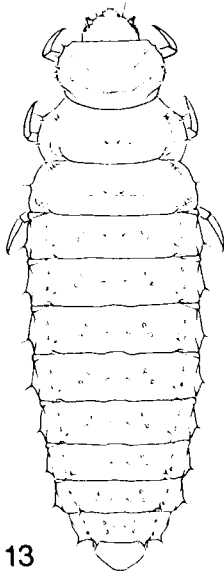
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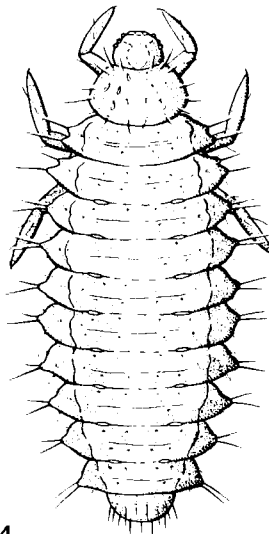
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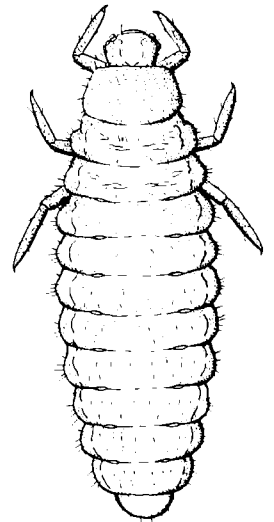
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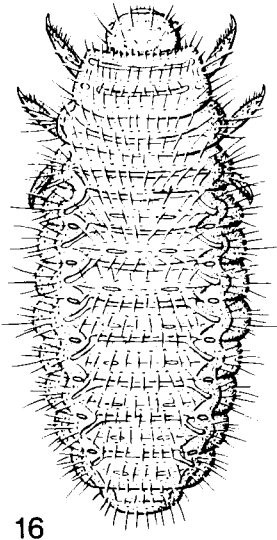


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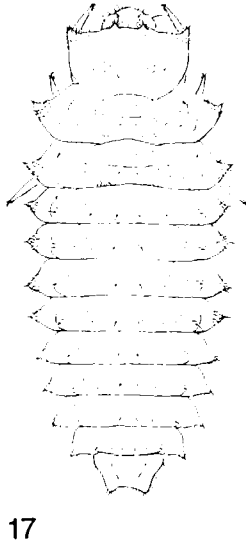


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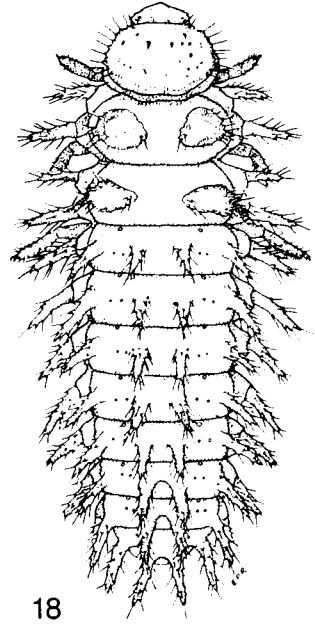
Figs. 10-15. Habitus views. Fig. 10, *Nephaspis oculata*; 11, *Cryptolaemus montrouzieri*; 12, *Scymnus (Pullus)* sp.; 13, *Nephus* sp.; 14, *Diomus roseicollis*; 15, *Decadiomus pictus*.



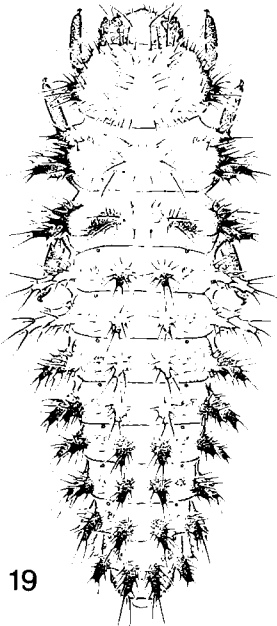
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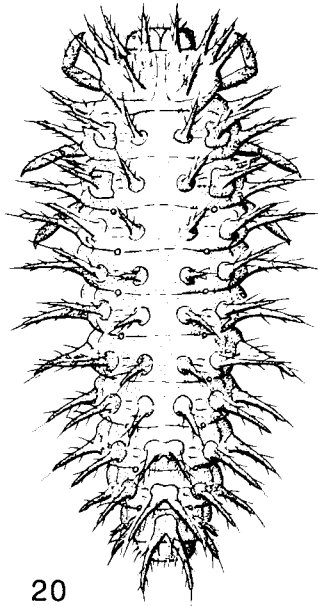
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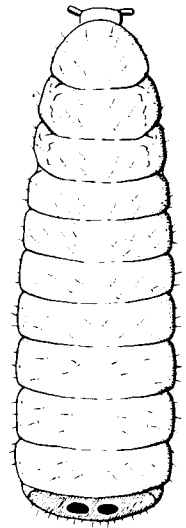
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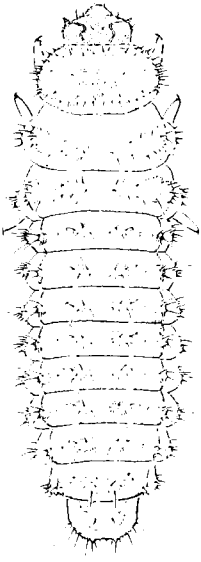


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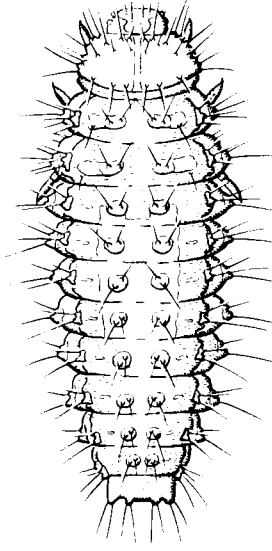


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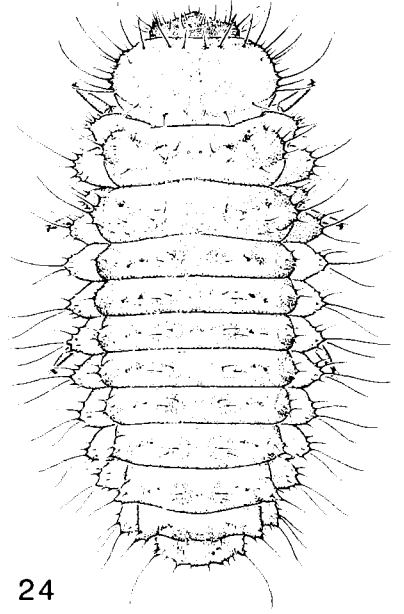
Figs. 16–21. Habitus views. Fig. 16, *Hyperaspis signata*; 17, *Cryptognatha nodiceps*; 18, *Arawana scapularis*; 19, *Exochomus marginipennis*; 20, *Chilocorus stigma*; 21, *Ortalistes rubidus*.



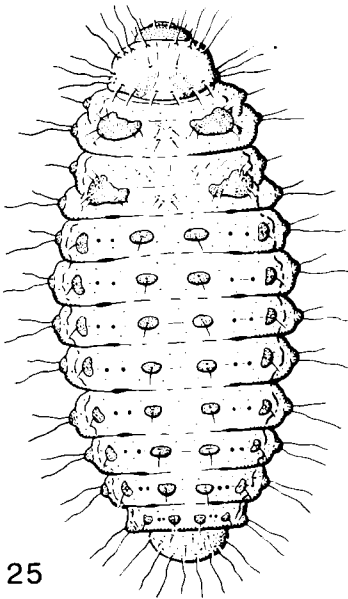
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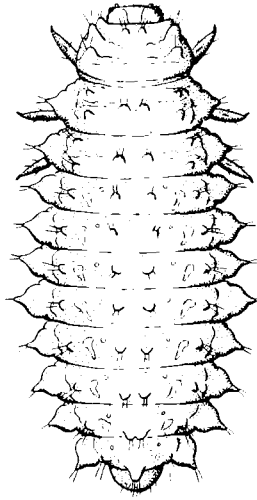
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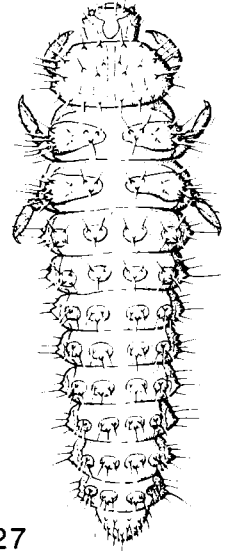
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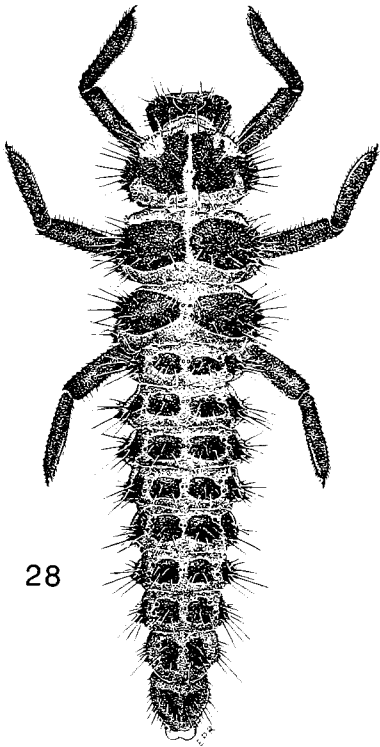
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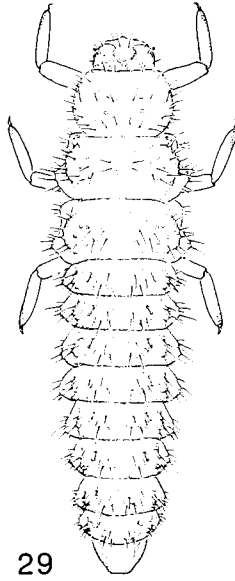
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Figs. 22-27. Habitus views. Fig. 22, *Coccidula rufa*; 23, *Rhyzobius lophanthae*; 24, *Rhyzobius forestieri*; 25, *Rodolia cardinalis*; 26, *Azya* sp.; 27, *Anisosticta* sp.

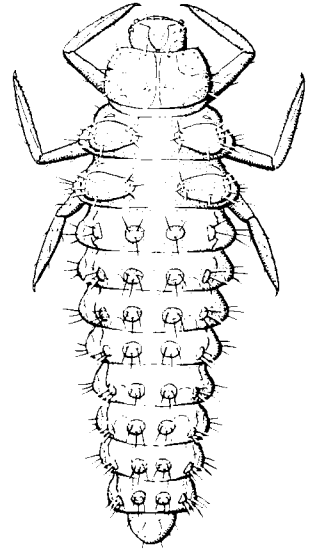




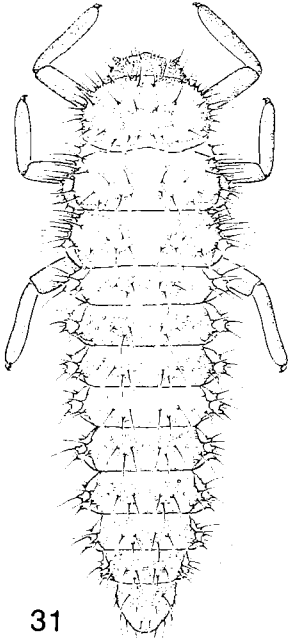
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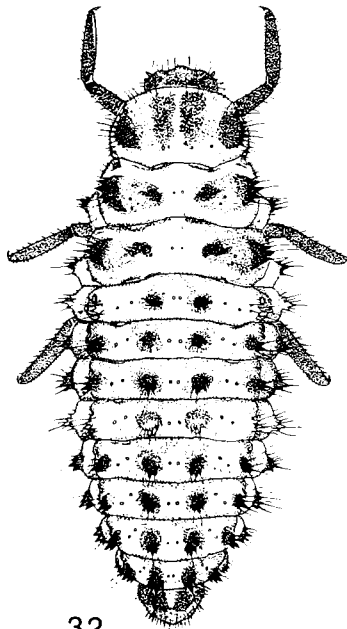
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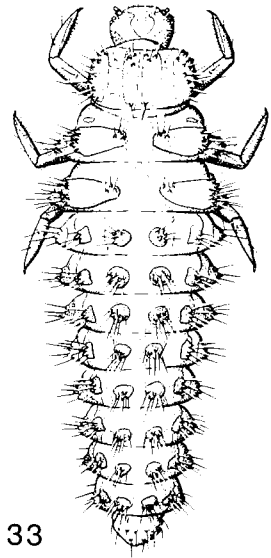
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Figs. 28–33. Habitus views. Fig. 28, *Paranaemia vittigera*; 29, *Naemia seriata*; 30, *Coleomegilla maculata*; 31, *Coleomegilla maculata fuscilabris*; 32, *Hippodamia undecimnotata*; 33, *Hippodamia convergens*.

be understood before keys or descriptions can be utilized. The following glossary of terms has been modified from Gage (1920).

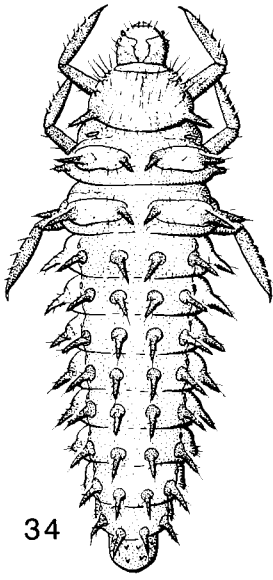
- collar seta    Seta, surrounded by a raised collar at the base (Fig. 3A, right).
- chalaza    Projection of the body wall bearing a seta (Fig. 3B).
- scolus     Branched projection usually more than 5 times as long as wide, each branch with a single terminal seta (Fig. 3C).
- parascolus   Shortened, modified scolus covered by chalazae (Fig. 3D).
- struma    Mound-like projection bearing chalazae (Fig. 3E).
- verruca   Low, rounded elevation (reduced struma) bearing setae instead of chalazae (Fig. 3F).
- sentus    Long, cone-like, unbranched projection with several setae (Fig. 3G).

Illustrations of various structures are labeled above to facilitate use of the key to larvae.

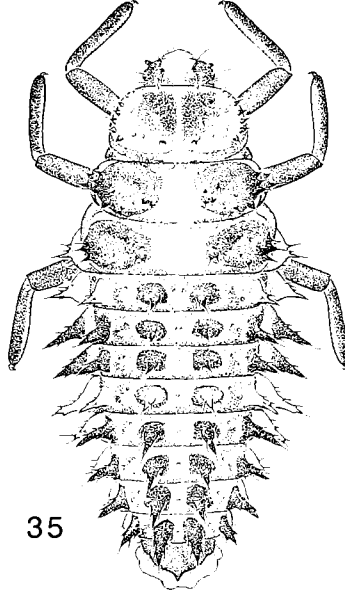
KEY TO LARVAE

- 1. Mandible with digitiform teeth, retinaculum absent (Fig. 76); terga with scoli (Figs. 3C, 48, 127, 128), sometimes with parascoli (Fig. 3D); frontoclypeal suture complete (Fig. 52); antenna long, 3 or more times as long as wide, of nearly uniform diameter (Fig. 88) ..... *Epilachninae* ... 2
- Mandible other than with digitiform teeth, apically simple (Figs. 65, 67, 68) or with 2 to 5 teeth (Figs. 73, 74, 77, 79), with retinaculum (Figs. 66, 68, 74, 79) or without retinaculum (Figs. 63, 67); terga with structures other than scoli, parascoli sometimes present; frontoclypeal suture incomplete or absent (Fig. 2A); antenna usually short (Figs. 83, 85, 90), less than 3 times as long as wide, if long (Fig. 91), segments distinctly of different diameters (Fig. 84) ..... 3
- 2(1). Setae of scoli nearly as short or shorter than bases supporting them (Fig. 127);

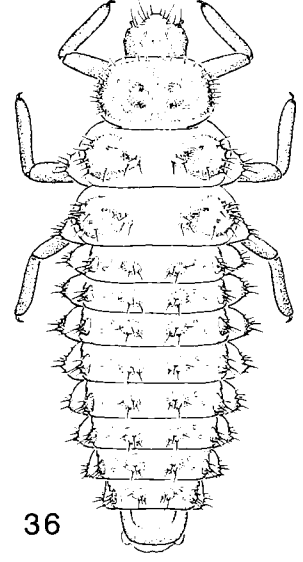
- habitus Fig. 48 ..... *Epilachna* Dejean
- Setae of scoli several times longer than bases supporting them (Fig. 128); habitus Fig. 49 ..... *Subcoccinella* Guerin
- 3(1). Abdominal terga 1-8 each distinctly divided transversely into 2 parts (Fig. 16) with setae or collar setae (Fig. 3A); head broader than long (Fig. 53); labial palpus 1-segmented, palpiger indistinct or absent (Fig. 58) mandible simple, with retinaculum (Fig. 68) ..... *Hyperaspini* ... 4
- Abdominal terga entire, not distinctly divided transversely (Fig. 15) or only weakly so (Fig. 14); head usually not broader than long; tergal structures variable; labial palpus 2-segmented, with or without palpiger (Figs. 60, 61, 62); mandible, head variable ..... 6
- 4(3). Terminal segment of maxillary palpus slender, 3 times or more as long as its basal width, as long as segments 1, 2 combined; maxillary, labial palpi elongate, with maxillary palpifer, labial palpiger weakly sclerotized; tergal segmental pores circular to oval, large (Fig. 100) ..... *Brachiacantha* Chevrolat
- Terminal segment of maxillary palpus not as long as segments 1-2 combined; labial palpus short, semiglobular, palpiger absent (Fig. 58); tergal segmental pores elliptical, slitlike, small (Fig. 16) ..... 5
- 5(4). Submentum sclerotized, pigmented, fused with cardines of maxillae to form sclerotized, transverse, pigmented U-shaped basal bridge (Fig. 59); pronotum without pigmented areas ..... *Thalassa montezumae* Mulsant
- Submental area usually weakly sclerotized or with faint sclerites, cardines of maxilla not fused with submental sclerite or transversely connected to each other; if submental area strongly sclerotized, then pronotum with pigmented areas as in Figs. 93, 94, sternum of 9th abdominal segment with pigmented sclerites; habitus Fig. 16 ..... *Hyperaspis* Dejean
- 6(3). Abdomen dorsolaterally with longitudinal series of 8 prominent, circular (occasionally slightly elongate) intersegmental pores, pores strongly sclerotized, usually darkly pigmented (Fig. 20); body with senti 6-8 times as long as wide at base (Fig. 3G), or with parascoli (Fig. 3D) ..... *Chilocorini* ... 7
- Abdomen without dorsolateral series of circular, strongly sclerotized pores; when intersegmental pores present, elliptical to subcircular, weakly sclerotized (Figs. 8,



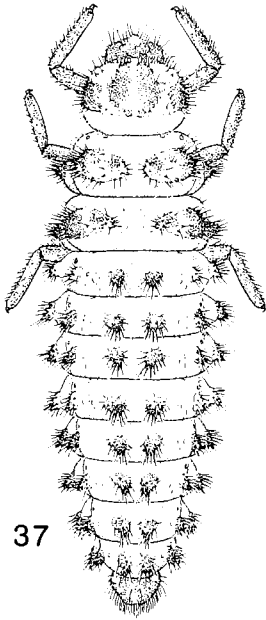
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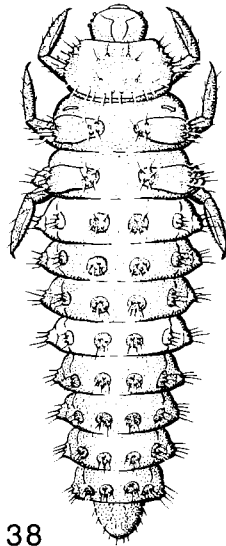
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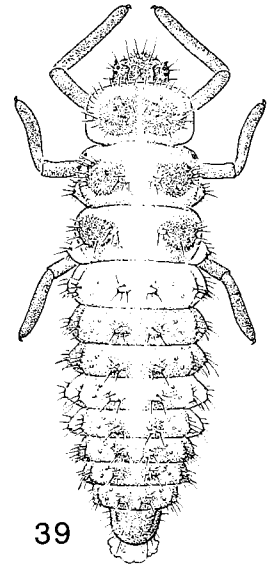
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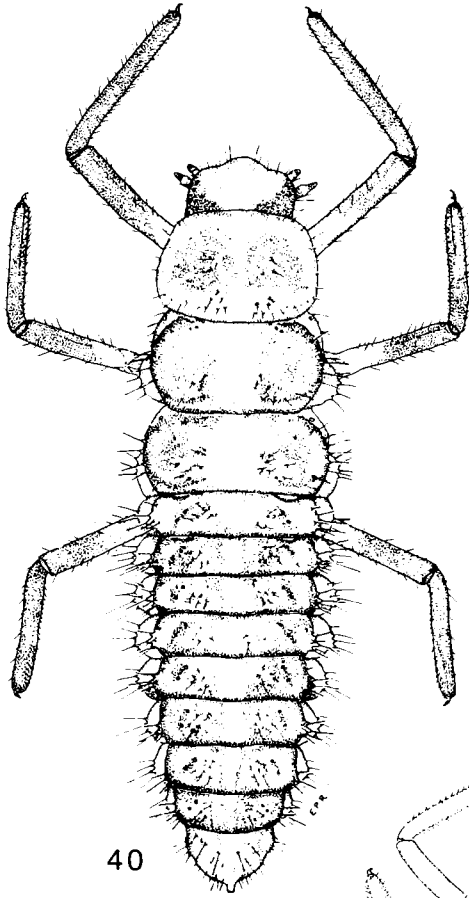
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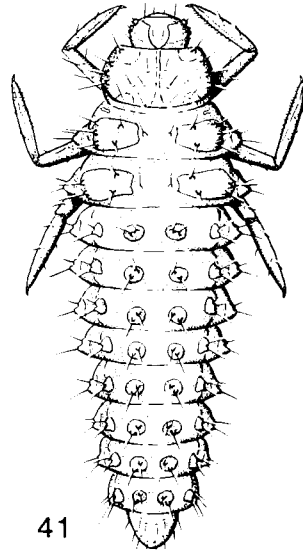
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Figs. 34–39. Habitus views. Fig. 34, *Anatis* sp.; 35, *Calvia quatuordecimguttata*; 36, *Adalia bipunctata*; 37, *Coccinella septempunctata*; 38, *Coccinella novemnotata*; 39, *Cycloneda* sp.

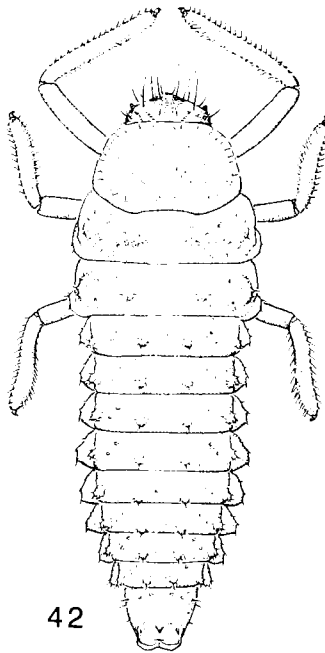
- 14, 16, 102, 103); senti and or parascoli variable ..... 14
- 7(6). Apex of mandible simple; coronal (epicranial) suture absent ..... 8
- Apex of mandible bidentate (Fig. 73); coronal (epicranial) suture present ..... 13
- 8(7). Pronotal and mesonotal tergites laterally with 3 senti, often with an additional short sentus at anterolateral angle (Fig. 96); metathoracic tergites each with 1 lateral sentus, if 2 present, then 2nd slender, short (Fig. 96) ..... *Axion* Mulsant
- Thoracic tergites not as described above ..... 9
- 9(8). Abdominal tergites 1–8 with senti or parascoli ..... 10
- Abdominal tergites 1–8 with senti only, at least dorsolaterally, laterally (Fig. 20) ..... 11
- 10(9). Abdominal tergites 1–8 with dorsal, dorsolateral parascoli basally, gradually lengthening into senti terminating in single chalaza posteriorly ..... *Exochomus quadripustulatus* (L.)
- Abdominal terga 1–8 dorsally, dorsolaterally with parascoli lengthening posteriorly and terminating in 2 or 3 unequal chalazae, as in Fig. 122 ..... *Brumoides suturalis* (F.)
- 11(9). Meso-, metathoracic tergites each with single long sentus on lateral margin (Fig. 95); habitus Fig. 18 ..... *Arawana* Leng
- Meso-, metathoracic tergites otherwise ..... 12
- 12(11). Mesothoracic tergites each with 3 short, unequal, lateral senti; metathoracic tergites each with 2 (sometimes 3) short, unequal, lateral senti; chalazae of both tergites with short, subconical bases (Fig. 19, habitus) ..... *Exochomus marginipennis* (LeConte) and *E. childremi childremi* Mulsant
- Meso-, metathoracic tergites each with a rudimentary posterolateral sentus and chalazae; bases of chalazae small, broadly rounded ..... *Exochomus californicus* Casey
- 13(7). Pronotum with 6 or more senti on each side (Fig. 97); meso-, metathoracic terga with 2 distinct, complete tergites, each bearing 2 senti ..... *Halmus chalybeus* Boisduval
- Pronotum with 5 or fewer senti (Fig. 3G); meso-, metathorax without complete tergites, tergites reduced to areas at base of senti; meso-, metathoracic terga each with 4 senti, 2 mesally, 1 on each lateral area; habitus Fig. 20 ..... *Chilocorus* Leach
- 14(6). Antenna salient. 2nd segment nearly as long or as long as 1st but of  $\frac{1}{2}$  or less diameter as in *Pentilia* (Fig. 84) ..... 15
- Antenna otherwise (Figs. 83, 85, 88) 16
- 15(14). Tergal strumae with apically shredded, truncated setae of various lengths, along with normally pointed setae; pleural folds with strumae bearing several prominent setae; asperities distinct, acute; mandible apically simple, with 2 longitudinal rows of small serrations on mesal surface; habitus Fig. 7 ..... Scymnillini ... *Zagloba* Casey
- Tergal strumae small, with normal, pointed setae; pleural folds pointed, each bearing single prominent seta, several short setae (Fig. 17); asperities absent on abdominal terga but present on pleural folds; mandible apically simple, with 2 rows of very small serrations on mesal surface; habitus Fig. 17 ..... Cryptognathini (only one species in North America—*C. nodiceps* Marshall) ..... *Cryptognatha*
- 16(14). Mandible with 5 distinct, serially arranged teeth, retinaculum dentate (Figs. 78, 79); abdominal terga 1–8 with strumae (Fig. 3E); habitus Fig. 47 ..... Psylloborini ... *Psyllobora* Dejean
- Mandible otherwise; tergal structures variable ..... 17
- 17(16). Mandible without retinaculum, apically simple (Figs. 63–65, 67) ..... Sticholotidinae ... 18
- Mandible with retinaculum, apically simple or otherwise (Figs. 68, 69, 73, 74) 21
- 18(17). Mandible elongate, slender, with medial, lateral serrations, molar area not developed (Fig. 67); body broadly elliptical; abdomen on each side with longitudinal row of elliptical intersegmental pores (Fig. 8), abdominal pleura with protuberant strumae (Figs. 8, 104); habitus Fig. 8 ..... *Cephaloscymnus* Crotch
- Mandible triangular, apically curved, with molar area developed (Figs. 63–65); abdomen without intersegmental pores ..... 19
- 19(18). Frontal sutures distinct, terga with short, inconspicuous setae (Figs. 4, 5) ..... 20
- Frontal sutures incomplete, indistinct to obsolete; principle body setae long, each seta rising from small, circular, pigmented spot; habitus Fig. 6 ..... *Delphastus* Casey
- 20(19). Head with dark, median, longitudinal line or elevation on frons (Fig. 50); pronotum with 2 faintly pigmented patches; habitus Fig. 4 ..... *Microweisea* Cockerell
- Entire cranium darkly pigmented; pronotum with 2 prominent, longitudinal pigmented patches; habitus Fig. 5 ..... *Coccidophilus* Brethes



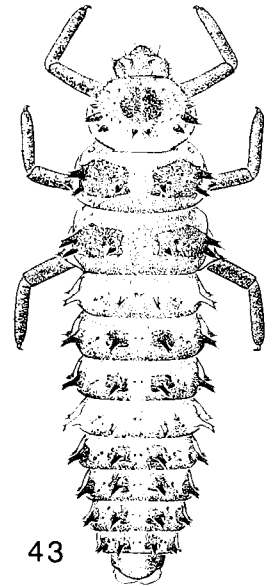
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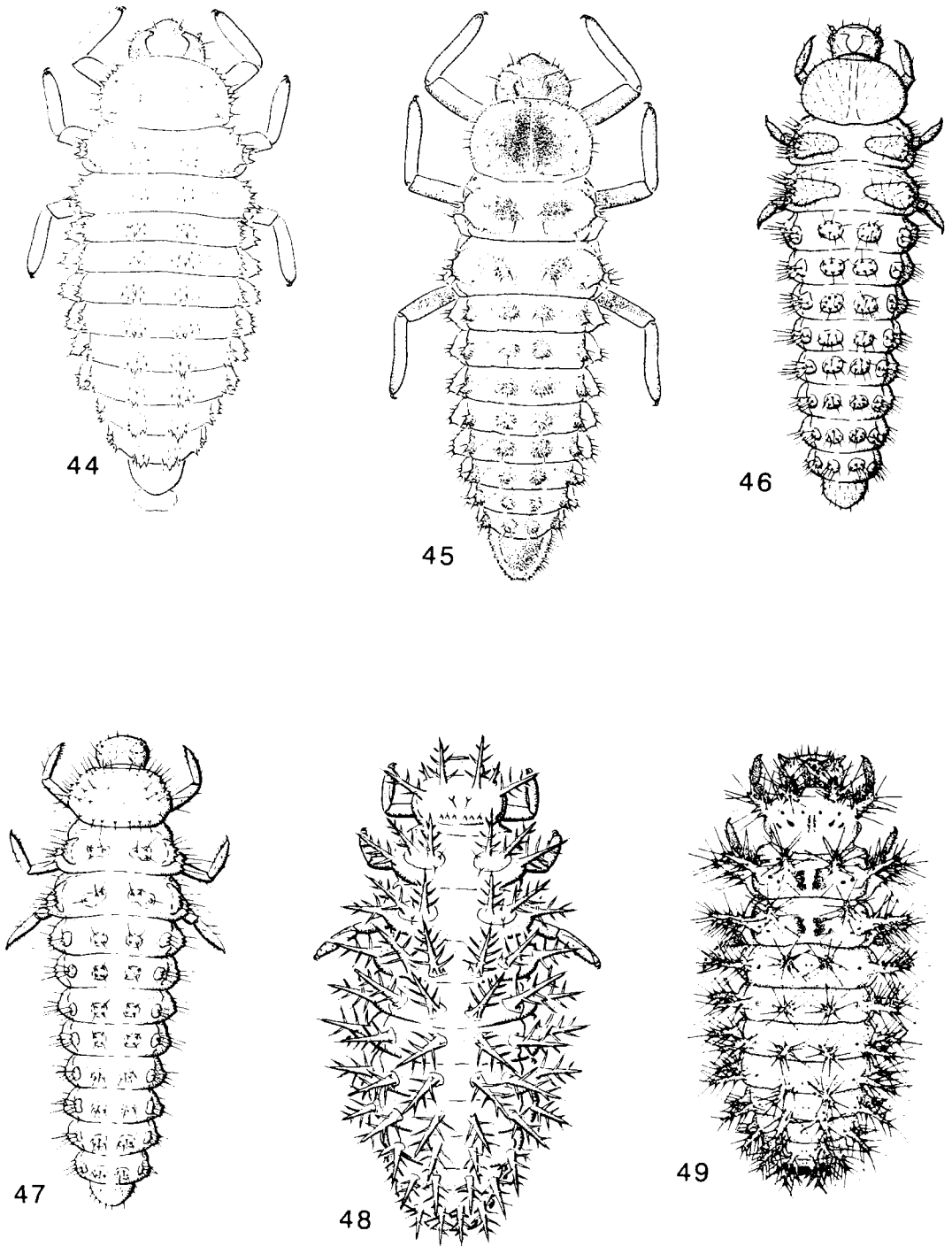


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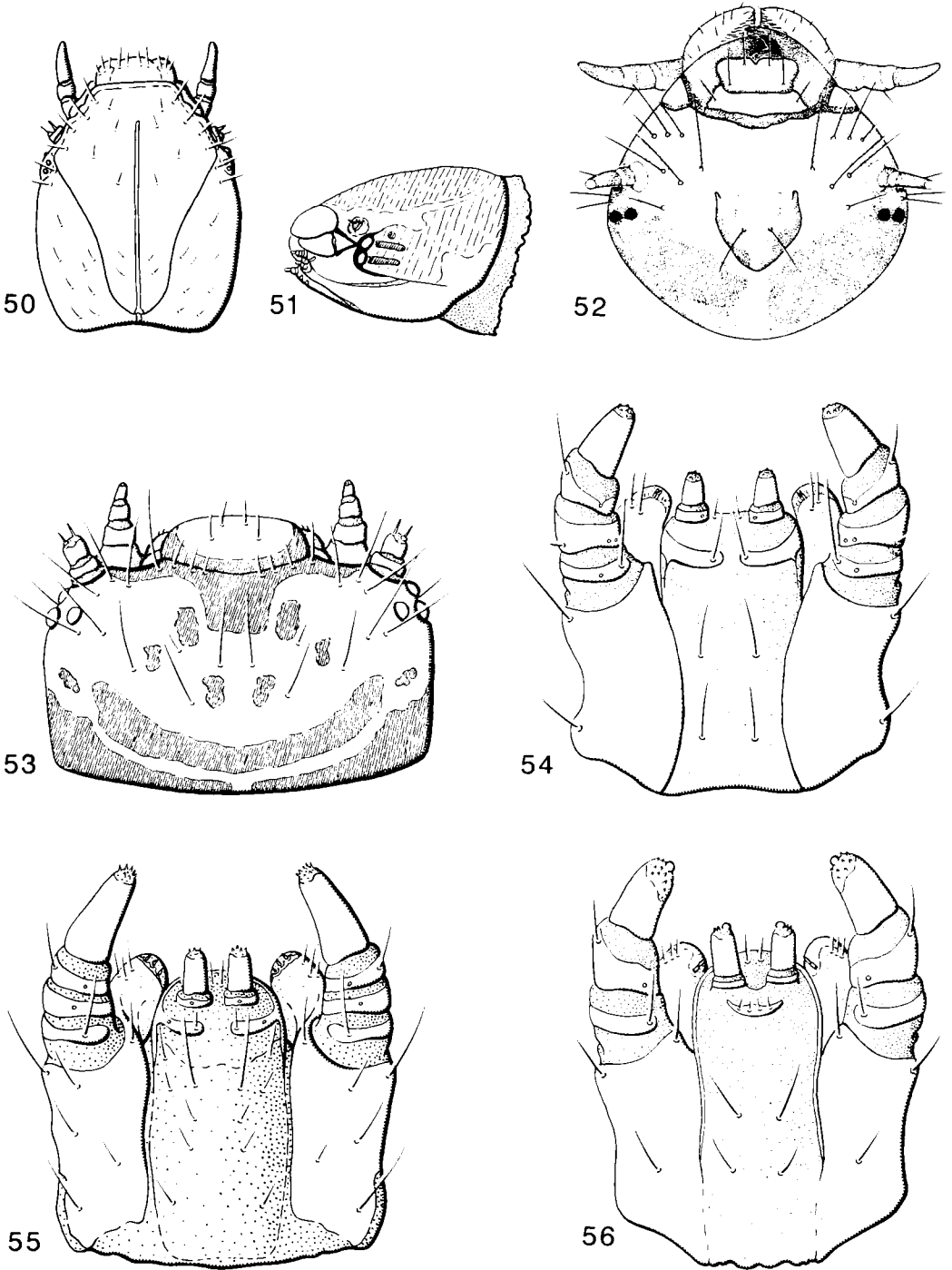


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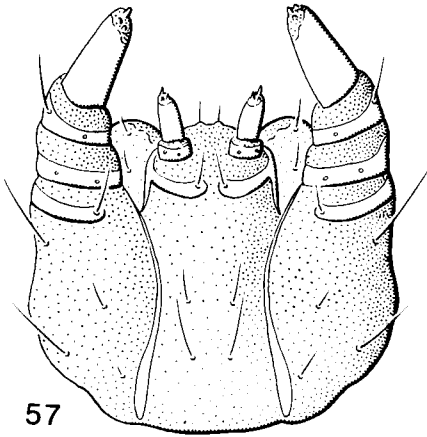
Figs. 40–43. Habitus views. Fig. 40, *Propylea quatuordecimpunctata*; 41, *Olla v-nigrum*; 42, *Coelophora inaequalis*; 43, *Harmonia conformis*.



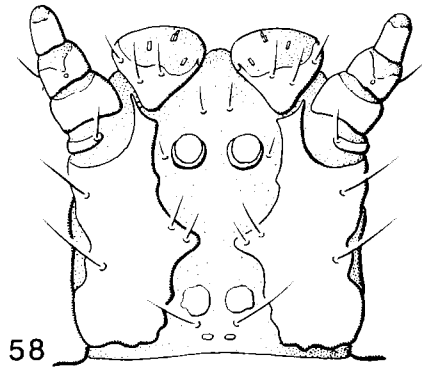
Figs. 44–49. Habitus views. Fig. 44, *Aphidecta obliterata*; 45, *Mulsantina* sp.; 46, *Tythaspis sedecimpunctatus*; 47, *Psyllobora vigintimaculata*; 48, *Epilachna varivestis*; 49, *Subcoccinella vigintiquatuorpunktata*.



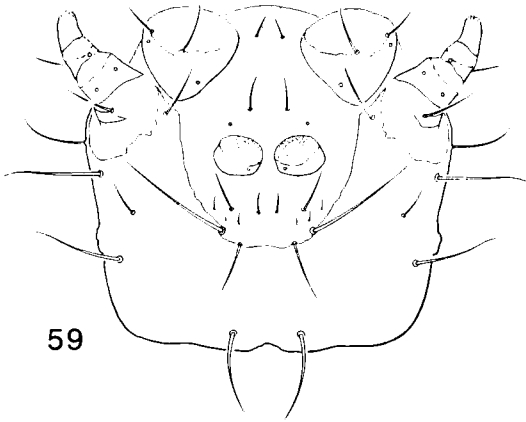
Figs. 50–56. Heads and ventral mouthparts. Fig. 50, *Microwiseia ovalis*, dorsal view; 51, *Stethorus punctum*, lateral view; 52, *Epilachna* sp., dorsal view; 53, *Hyperaspis signata*, dorsal view; 54, *Scymnus (Pullus)* sp., ventral mouthparts; 55, *Nephus (Scymnobius)* sp., ventral mouthparts; 56, *Diomus roseicollis*, ventral mouthparts.



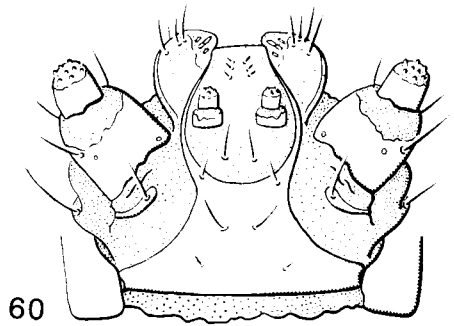
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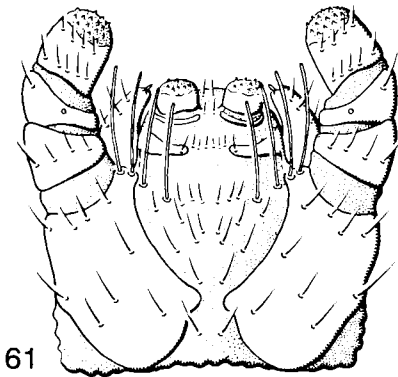
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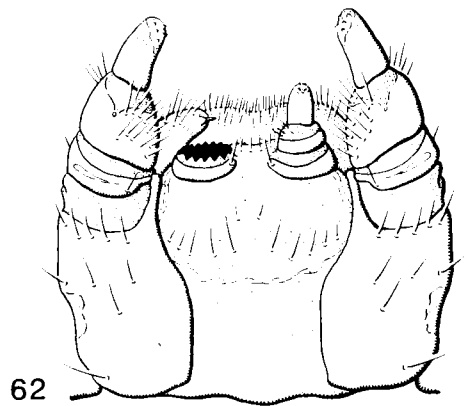
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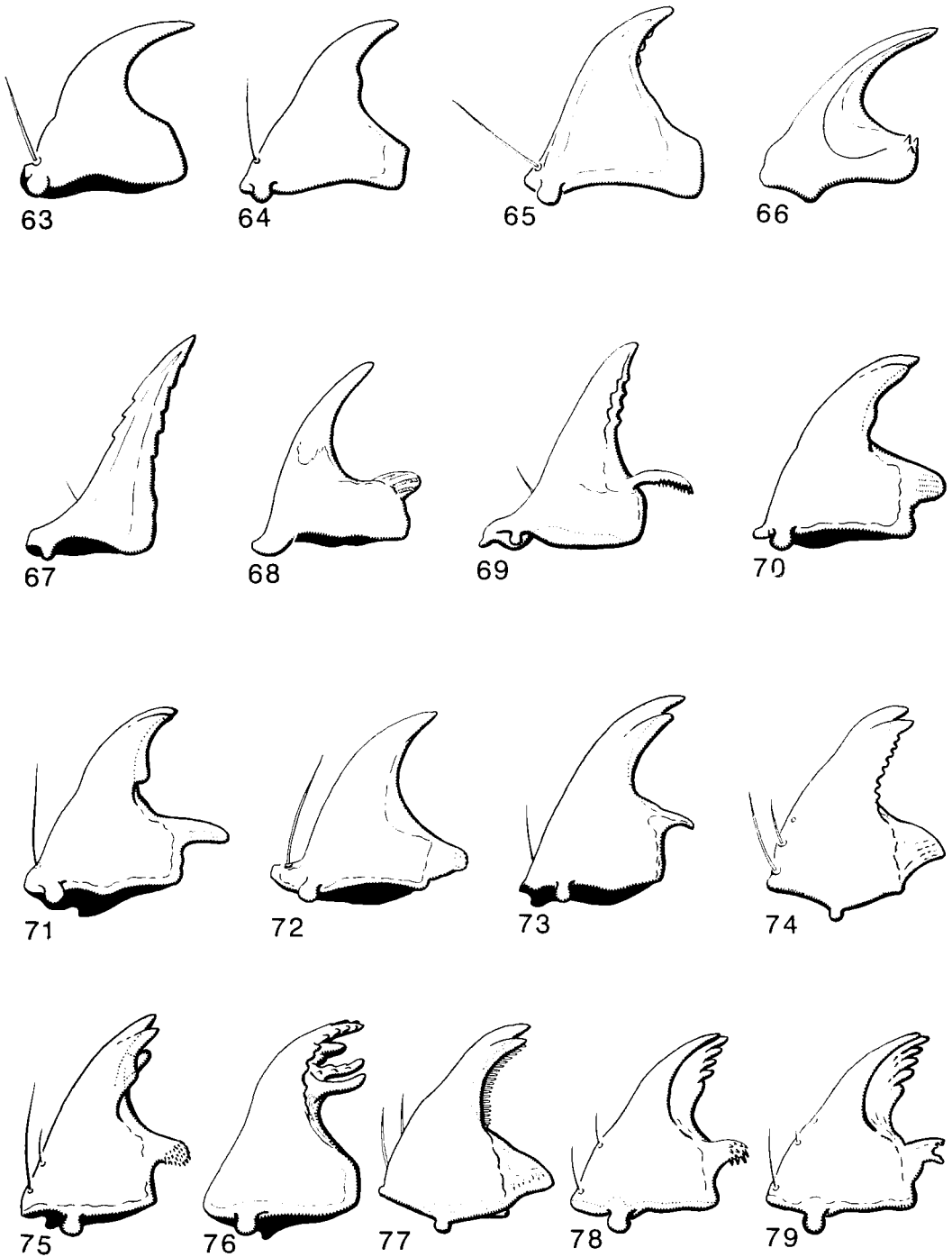
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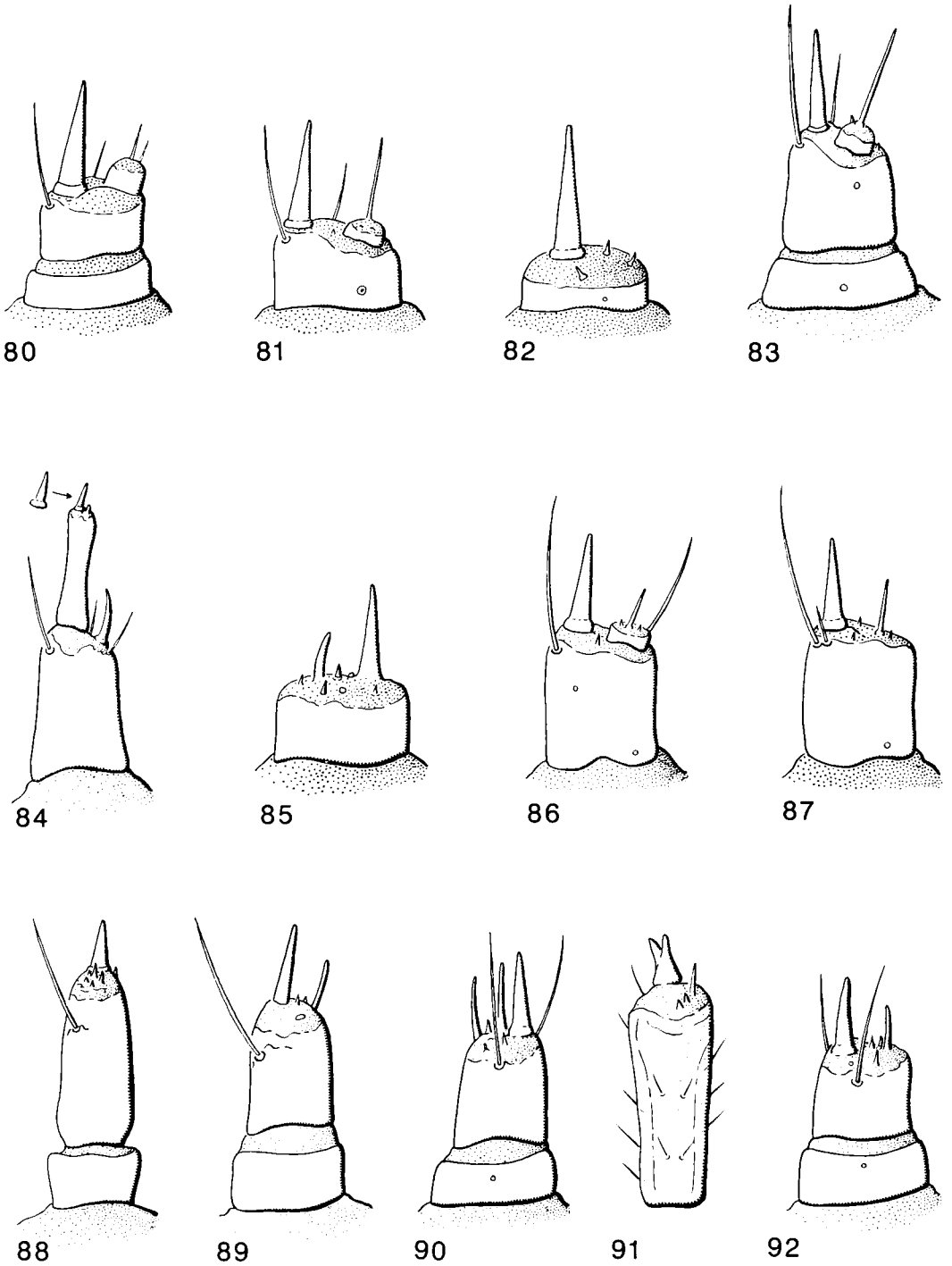
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Figs. 57-62. Ventral mouthparts. Fig. 57, *Stethorus punctum*; 58, *Hyperaspis signata*; 59, *Thalassa montezumae*; 60, *Rodolia cardinalis*; 61, *Psyllobora vigintimaculata*; 62, *Tythaspis sedecimpunctata*.



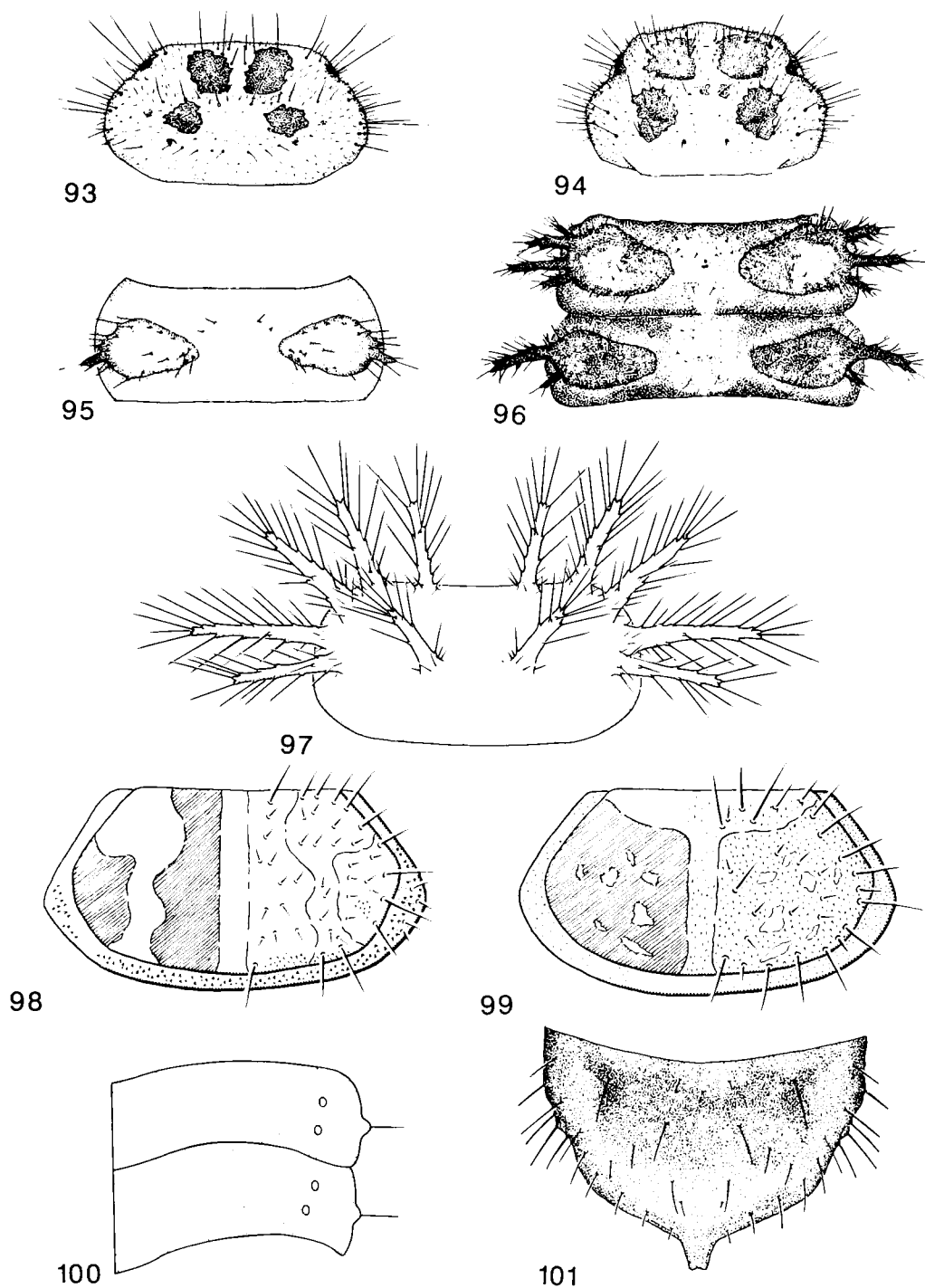


Figs. 63–79. Mandibles, ventral view, right mandible. Fig. 63, *Microwiseia ovalis*; 64, *Delphastus pusillus*; 65, *Catana clauseni*; 66, *Ortalistes rubidus*; 67, *Cephaloscymmus* sp.; 68, *Hyperaspis signata*; 69, *Pentilia castanea*; 70, *Cryptolaemus montrouzieri*; 71, *Rhizophobus lophanthae*; 72, *Azya* sp.; 73, *Chilocorus stigma*; 74, *Anisosticta bitriangularis*; 75, *Synonychia grandis*; 76, *Epilachna borealis*; 77, *Tythaspis sedecimpunctata*; 78, *Halyzia sedecimguttata*; 79, *Psyllobora vigintimaculata*.

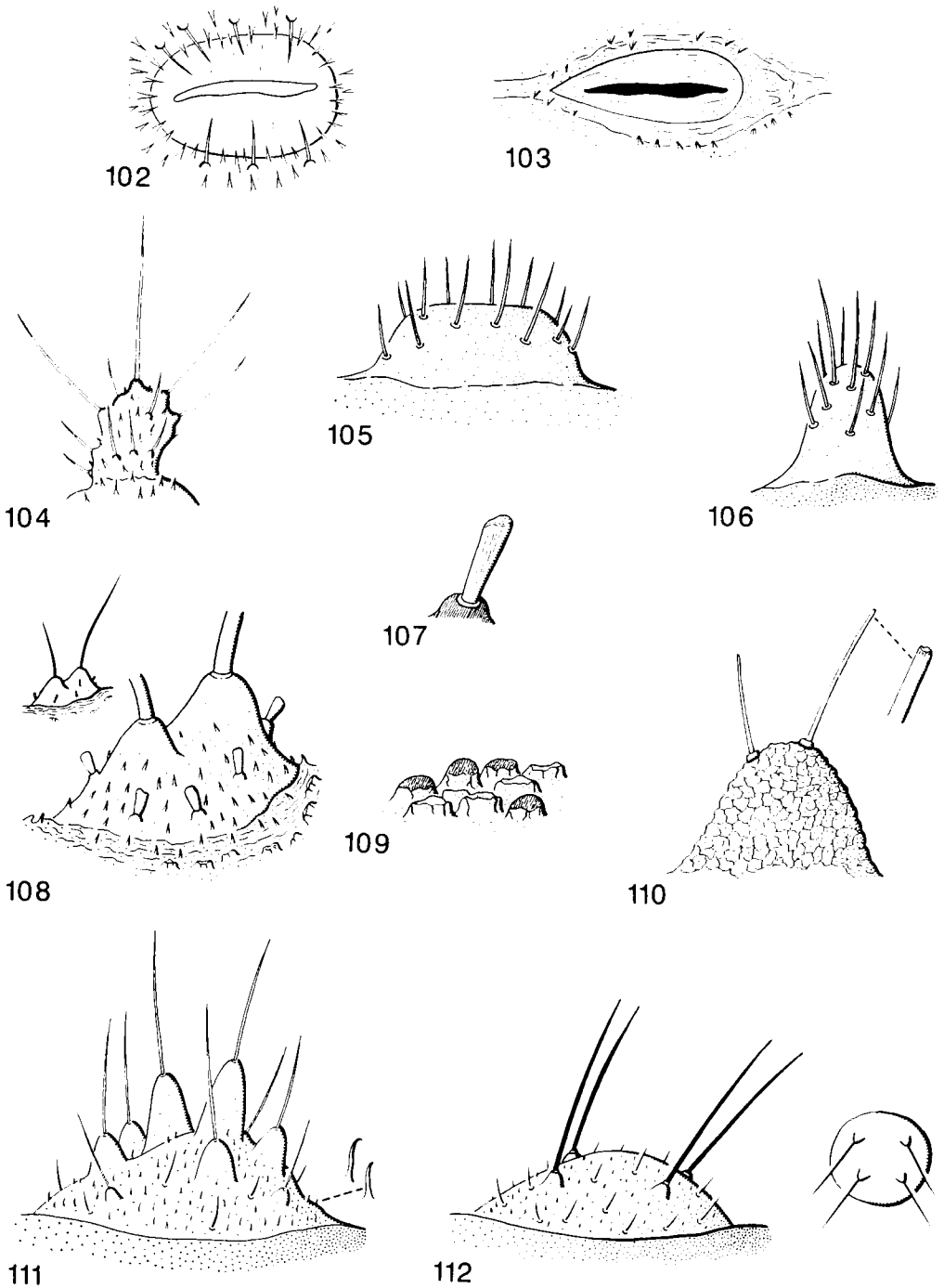


Figs. 80-92. Antennae. Fig. 80, *Scymnus (Pullus) sp.*; 81, *Nephus (Scymnobius) sp.*; 82, *Stethorus punctum picipes*; 83, *Hyperaspis signata*; 84, *Pentilia castanea*; 85, *Chilocorus stigma*; 86, *Rodolia cardinalis*; 87, *Anovia virginalis*; 88, *Epilachna varivestis*; 89, *Tytthaspis sedecimpunctata*; 90, *Psyllobora vigintimaculata*; 91, *Ortalistes rubidus*; 92, *Anisosticta bitriangularis*.

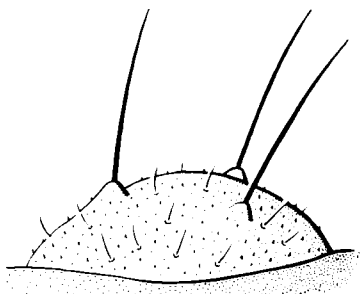
21(17).	Mandible apically bidentate (Figs. 70, 71, 73), or apically bidentate with subapical tooth (Fig. 75), serrations (Fig. 74), or structures resembling teeth of comb (Fig. 77) . . . . .	22	-	Dorsal senti of abdominal terga long on terga 4-8, progressively longer on terga 1-7 (Fig. 35) . . . . . <i>Calvia quatuordecimguttata</i> (L.)
-	Mandible apically simple (Figs. 66, 68), serrations present or absent . . . . .	43	28(26).	Abdominal terga bearing stout sentae (Fig. 3G); habitus Fig. 34 . . . . . <i>Anatis</i> Mulsant
22(21).	Frontal sutures distinct (Figs. 27, 34, 46); meso-, metathoracic tergites each with 2 sclerites (Figs. 30, 33, 34), sometimes weak (Fig. 23), or with structures other than setae . . . . .	23	-	Abdominal terga armed with apically bifurcate or trifurcate parascoli (Fig. 122); habitus Fig. 43 . . . . . <i>Harmonia conformis</i> Mulsant
-	Frontal sutures indistinct, evident posteriorly (Fig. 2A); meso-, metathoracic terga with prominent verrucae instead of sclerites (Figs. 11, 105, 106); abdominal terga 1-8 with similar verrucae; habitus Fig. 11 . . . . . Scymnini . . . <i>Cryptolaemus montrouzieri</i> Mulsant	23	29(25).	Mandible apically bidentate with additional subapical tooth, serrations (Fig. 74); body terga with strumae; antenna 2-segmented (Figs. 89, 92); habitus Fig. 27 . . . . . <i>Anisosticta bitriangularis</i> (Say)
23(22).	Tergal plates, strumae, with small chazae bearing peglike setae in addition to normal setae (Figs. 107, 108); body densely asperate (Figs. 23, 24), asperities on membrane irregularly truncate (Fig. 109), acute on strumae . . . . .	24	-	Mandible apically bidentate, with subapical tooth, without serrations or comblike structures . . . . .
-	Tergal plates, other structures without chazae, peglike setae; integument with or without asperities . . . Coccinellini . . .	25	30(29).	Abdominal terga with strumae, each struma with 2 prominent chazae, anterior chazae smaller than posterior, setae of chazae long (Figs. 41, 118) . . . . .
24(23).	Abdomen with sharply defined, dorsal light area extending from terga 1-4 through 4 (Fig. 23); strumae sparsely asperate, asperities of strumae short, acute (Fig. 108); habitus Fig. 23 . . . . . <i>Rhyzobius lophanthae</i> (Blaisdell)	24	-	Abdominal terga otherwise, with parascoli (Figs. 3D, 37, 38, 125), or strumae bearing several prominent chazae (Figs. 3E, 30), or with verrucae (Figs. 3F, 117) . . . . .
-	Dorsum of body uniformly pigmented; strumae densely asperate, asperities acute, long, slender; habitus Fig. 24 . . . . . <i>Rhyzobius forestieri</i> Mulsant	25	31(30).	Abdominal sterna 3-5 or 4-5 with short, stubby setae in addition to normal setae (Figs. 121, 126) . . . . .
25(23).	Abdominal terga 1-8 with senti (Figs. 3G, 34), or with tall bifurcate or trifurcate parascoli (Fig. 122) . . . . .	26	-	Abdominal sterna without short, stubby setae; habitus Fig. 1 . . . . . <i>Neoharmonia venusta</i> (Melsheimer)
-	Abdominal terga 1-8 otherwise, with various structures: parascoli (Figs. 3D, 115, 125), strumae (Figs. 3E, 32, 111), verrucae (Figs. 3F, 11, 117), setae (Figs. 3A, 21), or collar setae (Fig. 3A) . . . . .	29	32(31).	Short setae of abdominal sterna 4, 5 subapically bulbous (Fig. 121); habitus Fig. 41 . . . . . <i>Olla v-nigrum</i> (Say)
26(25).	Tergite of 9th abdominal segment with minute, posteriorly directed process on apical margin (Figs. 35, 42) . . . . .	27	-	Short setae of abdominal sterna 3-5 terminally truncate or slightly emarginate (Fig. 126); habitus Fig. 45 . . . . . <i>Mulsantina</i> Weise
-	Tergite of 9th abdominal segment entire, without posterior process . . . . .	28	33(30).	Tarsungulus simple, without basal tooth or rectangular base (Figs. 130, 131) . . . . .
27(26).	Dorsal senti of abdominal terga short throughout, progressively longer from terga 1-6, shorter on terga 7, 8; habitus Fig. 42 . . . . . <i>Coelophora inaequalis</i> (F.)	28	-	Tarsungulus with basal tooth or rectangular base (Fig. 132) . . . . .
			34(33).	Abdominal terga 1-8 with short, stout parascoli (Figs. 3D, 32, 33, 115); habitus Figs. 32, 33 . . . . . <i>Hippodamia</i> Chevrolat
			-	Abdominal terga 1-8 either with strumae (Figs. 3E, 30, 113) or verrucae (Figs. 3F, 11, 117) . . . . .
			35(34).	Abdominal terga 1-8 with strumae or 6-8 with parascoli (Figs. 3E, 113) . . . . .
			-	Abdominal terga 1-8 with verrucae, verrucae asperate, with 8 or more setae (Figs. 116, 117); or 6-8 with parascoli . . . . . <i>Myzia</i> Mulsant
			36(35).	Dorsal strumae of abdominal terga 1-8 each with 4 or less low-based chazae



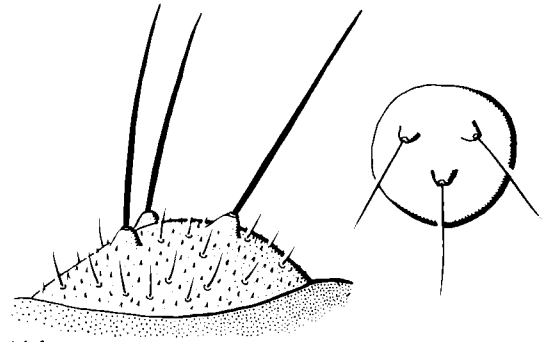
Figs. 93–101. Body structures. Fig. 93, *Hyperaspis psyche*, pronotum; 94, *Hyperaspis postica*, pronotum; 95, *Arawana scapularis*, metanotum; 96, *Axion tripustulatum*, mesonotum and metanotum; 97, *Halmus chalybeus*, pronotum; 98, *Adalia bipunctata*, pronotum; 99, *Cycloneda sanguinea*, pronotum; 100, *Brachiacantha* sp., abdominal terga, showing segmental pores; 101, *Propylea quatuordecimpunctata*, tergite IX.



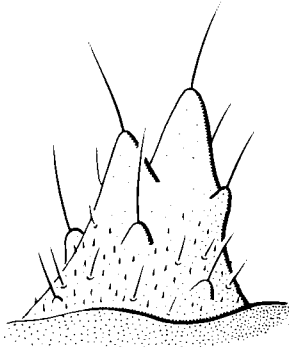
Figs. 102–112. Body structures. Fig. 102, *Cephaloscymnus* sp., intersegmental pore; 103, *Diomus roseicollis*, intersegmental pore; 104, *Cephaloscymnus* sp., lateral struma; 105, *Cryptolaemus montrouzieri*, dorsal verruca, posterior view; 106, *Cryptolaemus montrouzieri*, dorsal verruca, lateral view; 107–109, *Rhyzobius lophanthae*, 107, clublike seta; 108, struma; 109, asperities of membrane; 110, *Azya* sp., chalaza; 111, *Anisosticta* sp., dorsal struma; 112, *Naemia seriata*, struma.



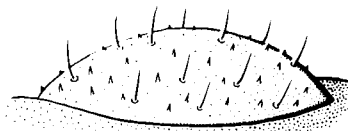
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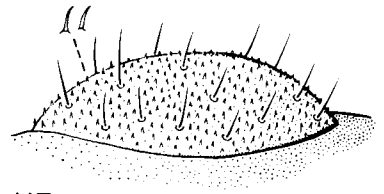
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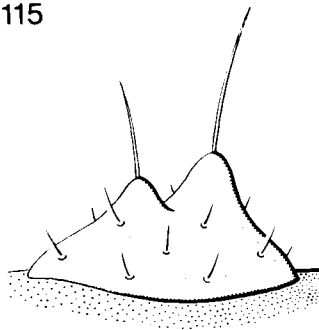
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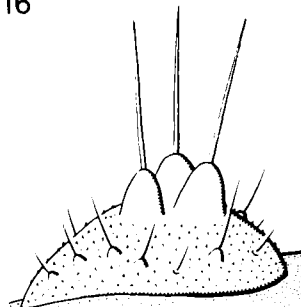
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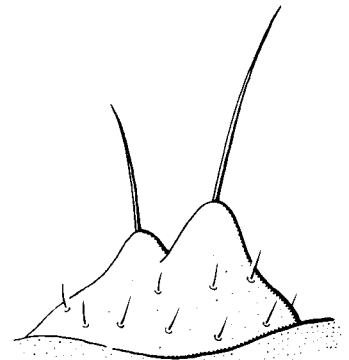
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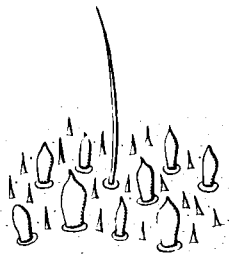
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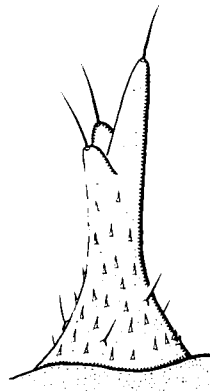
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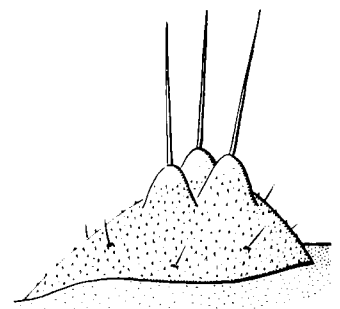
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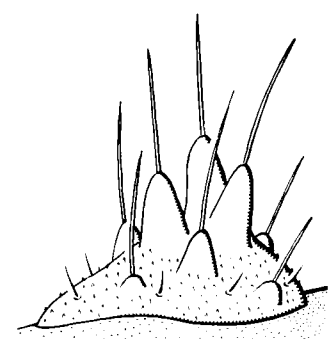


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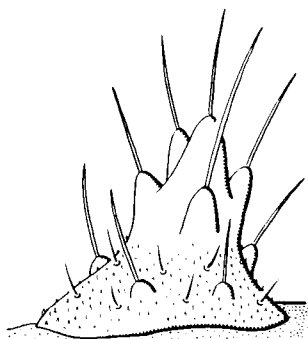


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Figs. 113–123. Body structures. Fig. 113, *Paranaemia vittigera*, dorsolateral struma; 114, *Coleomegilla maculata*, dorsal struma; 115, *Hippodamia convergens*, parascolus; 116, *Myzia pullata*, verruca; 117, *Myzia oblongoguttata*, verruca; 118, *Neoharmonia venusta*, struma; 119, *Adalia bipunctata*, struma; 120, *Olla v-nigrum*, dorsal struma; 121, *Olla v-nigrum*, setae, venter of 4th, 5th abdominal segments; 122, *Harmonia conformis*, trifurcate parascolus; 123, *Cycloneda sanguinea*, struma.



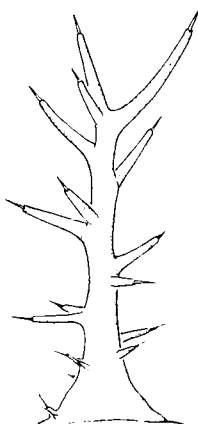
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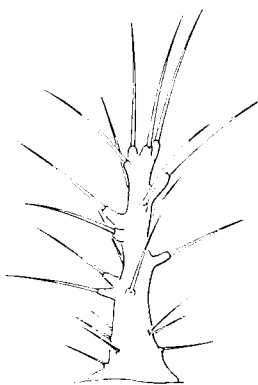
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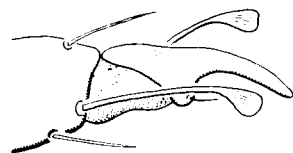
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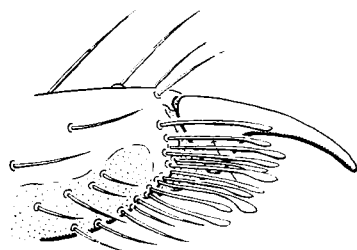
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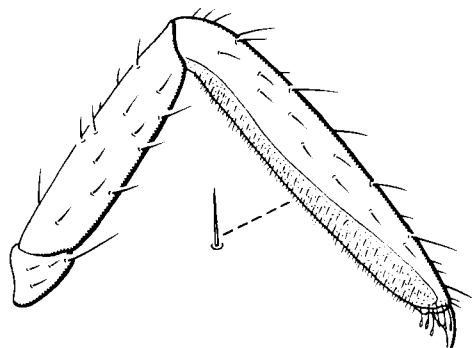
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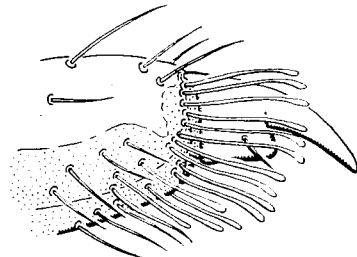
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Figs. 124–132. Body structures. Fig. 124, *Coccinella novemnotata*, struma; 125, *Coccinella septempunctata*, parascolus; 126, *Mulsantina picta*, setae, venter of 4th, 5th abdominal segments; 127, *Epilachna varivestis*, scolus; 128, *Subcoccinella vigintiquatuor punctata*, scolus; 129, *Hippodamia convergens*, leg; 130, *Delphastus pusillus*, tibiotarsal claw and terminal setae; 131, *Hippodamia convergens*, tibiotarsus; 132, *Coccinella septempunctata*, tibiotarsus.

- on which setae are usually long, black (Figs. 30, 112, 113) ..... 38
- Abdominal terga with more than 4 chalazae on dorsal strumae (Fig. 3E, 44) 37
- 37(36). Abdominal terga 6-8 bearing a dorsal pair of parascoli (Fig. 44); posterior margin of abdominal segment 9 broadly rounded; habitus Fig. 44 ..... *Aphidecta obliterata* (L.)
- Abdominal terga without parascoli; posterior margin of abdominal segment 9 emarginate medially; habitus Fig. 22 ..... Coccidulini ... *Coccidula* Kugelann
- 38(36). Dorsal strumae of abdominal terga 1-8 each bearing 4 chalazae, 2 anteriorly, 2 posteriorly (Fig. 112); dorsolateral strumae with 3 or 4 chalazae ..... 39
- Dorsal strumae of abdominal terga 1-8 each bearing 3 chalazae, 2 anteriorly, 1 posteriorly (Figs. 30, 114); habitus Figs. 30, 31 ..... *Coleomegilla* Timberlake
- 39(38). Dorsolateral strumae of abdominal terga 1-8 bearing 4 chalazae, 2 anteriorly, 2 posteriorly (Fig. 112); habitus Fig. 29 ..... *Naemia serjata* (Melsheimer)
- Dorsolateral strumae of abdominal terga 1-8 bearing 3 chalazae, 1 anteriorly, 2 posteriorly (Fig. 113); habitus Fig. 28 ..... *Paranaemia vittigera* (Mannerheim)
- 40(33). Posterior margin of 9th abdominal segment with short, distinct, apically truncate, median process (Fig. 101); abdominal terga 1-8 with strumae each bearing several chalazae of various sizes; habitus Fig. 40 ..... *Propylea quatuordecimpunctata* (L.)
- Posterior margin of 9th abdominal tergite entire, without median process; abdominal terga 1-8 with parascoli or strumae ..... 41
- 41(40). Abdominal terga 1-8 with strumae on which only 3 chalazae are prominent, these 3 usually grouped together (Figs. 119, 123) ..... 42
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- 42(41). Pronotum densely asperate (Figs. 39, 99); tibiotarsus ventrally with setiferous semimembranous surface extending about  $\frac{1}{2}$  length of segment; habitus Fig. 39 ..... *Cycloneda* Crotch
- Pronotum without asperities, or if present, asperities few, on posterior margin (Fig. 98); tibiotarsus ventrally with setiferous semimembranous surface extending length of segment, as in *Hippodamia* (Fig. 129); habitus Fig. 36 ..... *Adalia* Mulsant
- 43(21). Cardines, stipes, submental, mental areas fused into solid, sclerotized, pigmented structure possessing anterior extension on each side, composite structure or area assuming appearance of egg-cup encompassing labial palpi (Fig. 60); maxillary palpus 2-segmented, 1st segment large, 2nd segment small, palpifer distinct, small (Fig. 60) ..... Novini ... 44
- Cardines, stipes, submental, mental areas not fused as above into single composite structure, area membranous or nearly so (Figs. 54-57) maxillary palpus variable ..... 45
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- Antennae 1-segmented (Fig. 87) ..... *Anovia* Casey
- 45(43). Abdominal terga with membranous or non-sclerotized strumae each bearing 2 chalazae with bases extremely small, setae subequal, short, apically truncate (Fig. 110); anterior seta on dorsolateral strumae shorter than posterior seta (Fig. 110); lateral abdominal lobes prominent, acute, with at least 1 seta; habitus Fig. 26 ..... Azyini ... *Azya* Mulsant
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- Ocelli not so modified, normal; antennae 2- or 3-segmented (Figs. 80, 81) ..... Scymnini, in part ... 47
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- ally on each side (Figs. 14, 15, 103); habitus Fig. 14 ..... *Diomus* Mulsant
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