

A CONTRIBUTION TO THE KNOWLEDGE OF THE LARVAE OF
NITIDULIDAE OCCURRING IN JAPAN
(COLEOPTERA: CUCUJOIDEA)

HAYASHI, N.: Contributions to the knowledge of the larvae of Cucujoidea X.

By NODOKA HAYASHI

Abstract

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The larvae of 50 species of the Nitidulidae occurring in Japan and belonging to 24 genera in 6 subfamilies are described and illustrated. A key to the species based on larval characters is given.

Author's address. Kikuna-machi 534, Kôhoku-ku, Yokohama, Kanagawa, 222 Japan.

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INTRODUCTION

The family Nitidulidae is a large group of the superfamily Cucujoidea or Clavicornia, comprising more than 2400 species from the world. Among them, about 170 species including some unrecorded ones occur in Japan.

The adults and larvae of the present family are found in various habitats. A large number feed on flowers, fruits, sap, fungi, decaying or fermenting plant tissue or dead animal tissue, while some others, limited in number, are leaf miners or predators. The majority of injurious species are found on cultivated plants and stored products including cereals, dried fruits, etc.; several are injurious to timber as vectors of oak wilt germs. The most important of these are the dried-fruit beetle *Carpophilus hemipterus*, the corn-sap beetle *C. dimidiatus* and some other species of *Carpophilus*, which cause considerable damage to stored products especially in tropical and temperate climates. On the other hand, all members of the genus *Cybocephalus* are known to feed on scale insects, and are very beneficial from the viewpoint of biological control.

Since the publication of Perris' paper on the larvae of Coleoptera including the Nitidulidae in 1876, the larvae of several injurious species have been described by many authors from the economic standpoint. However, general morphological studies are very unsatisfactory except for some important studies (e.g. Verhoeff 1923, Connell 1959, Böving & Rozen 1962, etc.).

In this paper are given descriptions of the mature larvae of 50 species belonging to 24 genera of the Nitidulidae occurring in Japan. Most of the materials examined were collected or reared by me, but some were received from institutes and individuals. Main part of them will be deposited in the collection of the Entomological Institute, Hokkaidô University, Sapporo.

In classifying the larvae the structures of the head-capsule, antennae, mouth-parts, thoracic legs, ninth abdominal segment, spiracles and various appendages of surrounding surface (sclerites, tubercles, granules, asperities, spines and setae) are good taxonomic features. The terminology used in this paper is explained by the diagrams in Plates 1 and 2.

DESCRIPTIONS OF LARVAE OF NITIDULIDAE OCCURRING IN JAPAN

In general appearance, the larvae of this family are more or less similar to those of many families of the Clavicornia, especially of Sphindidae, Helotidae, Phalacridae, etc. Furthermore, the larvae of the genus *Cybocephalus* (Nitidulidae or Cybocephalidae) are superficially allied to those of Coccinellidae. But main differences among them lie in the structures of the mouth-parts.

The larvae of Nitidulidae are generally characterized by the following characters:—

Frons fused with clypeus; clypeal region often depressed medially, forming paired protuberances (Pl. 1, E & G). Coronal suture (epicranial stem) usually absent. Frontal sutures as a rule sharply angulated midway (Pl. 1, E). Ocelli basically 4 in number on each side of head and arranged in 2 groups, i.e. 2 in anterior

and 2 in posterior group (Pl. 1, G), the posterior ocelli in many cases reduced to small spots, and sometimes indistinct or lost. Antennae 3-jointed, moderate in length.

Labroclypeal epipharynx usually furnished with a median longitudinal ridge and many oblique stripes (except in Cateretinae, Meligethinae and Cybocephalinae) (Pl. 2, A). Mandibles symmetrical or slightly asymmetrical (differing in number of teeth); dorsal or both dorsal and ventral cutting edges dentate (except in Cateretinae, Meligethinae and Cybocephalinae); prostheca present (except in Cateretinae and Cybocephalinae), consisting of numerous processes, but in Meligethinae represented by a simple lobe only (Pl. 13, B); mola usually well developed. Maxillae with palpus 3-jointed;¹⁾ palpiger well or ill defined from stipes; mala obtuse, never falciform as in case of many of Clavicornian larvae, armed with a prominent uncus and a number of conspicuous microtrichia (lacking uncus in Cateretinae and Cybocephalinae); cardo longitudinal, usually not bilobed. Maxillary articulating areas and submentum united into a single lobe. Labium with palpus 1-jointed; mentum tending to be combined with submentum, so that the suture between them is often obscure or absent. Gula indistinct owing to large submentum. Hypopharyngeal sclerome and bracons present (except in Cybocephalinae), the former usually bearing 2 anterior horns.

Legs with paired coxae usually placed widely apart; posterior seta of tarsungulus often ligulate or capitate and serves as adhesive seta in Meligethinae and probably many genera of Cateretinae and Cybocephalinae. Thoracic and abdominal spiracles in Carpophilinae, Nitidulinae and Cryptarhinae situated on slightly to strongly produced spiracular tubes, bearing a pair of air tubes (chambers) inside peritreme (Pl. 1, D), while those in Cateretinae and Cybocephalinae bearing air tubes outside peritreme (Pl. 21, K & M); abdominal spiracles usually situated dorsolaterally, but rarely under lateral extensions of each segment. Ninth abdominal segment with or without pregomphi; urogomphi variable, lacking in Cateretinae and Cybocephalinae. Tenth abdominal segment strongly projecting (pigopod well developed).

Subfamily Cateretinae

1. *Heterhelus japonicus* (Reitter, 1877)

Body (Pl. 3, A) creamy-white except head and sclerotized parts, slightly depressed; abdominal segments moderately lobed laterally; setae comparatively stout; mesothoracic to 8th abdominal terga bearing a pair of obscure sclerites (markings) near lateral sides; thoracic and abdominal spiracles not elevated above general surface of body; 9th abdominal segment without pregomphi and urogomphi. Body length about 3.5 mm.

Head-capsule (Pl. 6, A & B) about 0.39 mm. in breadth, about 1.5 times as wide as long, weakly widened posteriorly, deeply pigmented around antennal insertions; hypostomal rods present; dorsal hind margin of head-capsule slightly retracted medially; portion between clypeal and frontal regions transversely grooved; clypeal protuberances indistinct; frontal sutures rather short, turned outwards, but not forming a sharp angle; posterior ocelli reduced to 2 spots;

1) Hinton (1945) and other authors state that the maxillary palpus is 4-jointed, but it is obvious from my examination that they count the palpiger as a joint.

setal pattern of head-capsule as illustrated. Antennae (Pl. 10, A) with 1st joint transverse; 2nd joint almost as long as wide, subequal to or a little longer than 1st joint; 3rd joint extremely small, being much shorter than sensory appendix of 2nd joint. Labrum relatively large, with cephalic margin moderately produced forwards; labroclypeal epipharynx (Pl. 11, A) with anterolateral bristles well developed, without median longitudinal ridge and oblique stripes. Mandibles (Pl. 13, A) slender, unidentate apically, lacking teeth on dorsal and ventral cutting edges; protheca absent; mola weakly developed. Maxillae (Pl. 15, A) with 1st and 2nd joints of palpus subequal in length and about half as long as 3rd; mala exceedingly small, bearing only one bristle; stipes and cardo small, the latter far remote from ventral hind margin of head-capsule. Labium (Pl. 17, A) with palpi small and broadly separated from each other; ligula not produced; mentum longitudinal rectangular; suture between mentum and submentum visible; hypopharyngeal sclerome as illustrated (Pl. 17, M), without anterior horns.

Legs (Pl. 19, A) comparatively well developed, rather stout; setae as illustrated; femur and tibia about twice as long as wide; tarsungulus $2/3$ as long as tibia, more or less strongly curved near tip, lacking posterior seta. Presternum of prothoracic segment much shorter than eusternum. Thoracic and abdominal spiracles (Pl. 21, K) with air tubes (chambers) large and located outside peritreme. Abdominal tergum usually with 2 transverse rows of setae, each row consists of 6 setae. Ninth abdominal segment (Pl. 23, A & B) with 2 pairs of stout long setae on dorsocaudal margin.

Specimens examined: 50 exs., Yokohama, Kanagawa-ken, 16. V. 1977, in seeds of elder tree (*Sambucus sieboldiana*), N. Hayashi leg.

Subfamily Meligethinae

2. *Meligethes violaceus* Reitter, 1873

Body (Pl. 3, B) creamy-white except sclerotized parts, markedly widened medially, moderately depressed; mesothoracic to 8th abdominal segments more or less strongly lobed laterally, each with 3 obscure sclerites and several small stains on tergum; thoracic and abdominal spiracles not elevated above general surface of body; 9th abdominal segment without pregomphi; urogomphi rudimentary, reduced to 2 small caudal processes. Body length about 4.5 mm.

Head-capsule (Pl. 6, C & D) about 0.46 mm. in breadth, 1.7 times as wide as long (except labrum), considerably widened medially; dorsal hind margin of head-capsule slightly retracted; clypeal protuberances indistinct; frontal sutures widely apart and parallel, then turned outwards near tip; clypeal region pointed forwards at anterolateral angles; posterior group of ocelli reduced to a single spot; setae of head-capsule as illustrated. Antennae (Pl. 10, B) with 1st joint transverse, subequal to 3rd in length; 2nd joint a little longer than 1st, the sensory appendix nearly $2/3$ as long as 3rd joint. Labrum (Pl. 11, C) extremely small, fused with clypeal region; labroclypeal epipharynx (Pl. 11, B) as illustrated, lacking anterolateral bristles, median longitudinal ridge and oblique stripes. Mandibles (Pl. 13, B) unidentate apically; dorsal and ventral cutting edges without teeth; protheca forming a simple triangular lobe; mola moderately developed, the grinding surface with a pointed process at anterior angle, bearing 2 longitudinal rows of serrations. Maxillae (Pl. 15, B) with 3 joints of palpus subequal in length; mala elongate, cylin-

dricul, rounded apically, bearing a long, slender uncus and 2 inner-lateral bristles, lacking microtrichia. Labium (Pl. 17, B) with palpi nearly twice as long as wide, broadly separated from each other; ligula weakly produced; mentum large, bearing 3 pairs of setae; hypopharyngeal sclerome as illustrated (Pl. 17, N).

Legs (Pl. 19, B) moderate in length; setae as illustrated; femur and tibia each about 1.5 times as long as wide; tarsungulus about half as long as tibia, strongly curved near tip, lacking ventral seta, the posterior seta ligulate. Presternum of prothoracic segment more or less large. Thoracic and abdominal spiracles (Pl. 21, L) elongate elliptical; air tubes located inside peritreme. Stains of abdominal terga slightly impressed. Ninth abdominal segment (Pl. 23, C & D) extremely small, furnished with 2 pairs of stiff setae on dorsoposterior margin. Tenth abdominal segment strikingly produced.

Specimens examined: 7 exs., Minoge, Kanagawa-ken, 3. VI. 1968, in flowers of wild rose (*Rosa multiflora*), N. Hayashi leg. 30 exs., Minoge, Kanagawa-ken, 24. V. 1970, N. Hayashi leg.

Subfamily Carpophilinae

3. *Carpophilus delkeskampi* Hisamatsu, 1963

Body (Pl. 3, C) subdepressed; meso- and metathoracic terga without paired sclerites; abdominal segments weakly lobed laterally; abdominal spiracles slightly elevated; 9th abdominal segment bearing dorsal sclerite, lateral accessory spines, pregomphi and urogomphi. Body length about 6 mm.

Head-capsule (Pl. 6, E & F) about 0.62 mm. in breadth, 1.6 times as wide as long (except labrum), more or less evenly rounded laterally; dorsal hind margin of head-capsule moderately retracted; clypeal protuberances feebly raised; frontal sutures lightly impressed; posterior ocelli reduced to 2 small spots; setae as illustrated. Antennae (Pl. 10, C) with 2nd joint nearly as long as or slightly longer than 1st or 3rd, the sensory appendix a little shorter than half of 3rd joint; 3rd joint usually not longer than 1st. Labrum with cephalic margin almost straight; labroclypeal epipharynx (Pl. 11, D) as illustrated. Mandibles (Pl. 13, C) bidentate apically; dorsal cutting edge with a single tooth in right mandible, and with 2 in the left; ventral cutting edge without teeth; prostheca wholly fringed; mola transversely asperated. Maxillae (Pl. 15, C & D) with 2nd joint of palpus a little longer than 1st or 3rd; palpiger well delimited from stipes by a suture; mala broadly membranous along distal margin, with microtrichia tufted as illustrated, proximally with uncus dentate apically. Labium (Pl. 17, C) with palpi well separated from each other, about twice as long as wide; ligula rather strongly produced; suture between mentum and submentum absent; hypopharyngeal sclerome as illustrated (Pl. 17, O).

Prothoracic to metathoracic segments each without sclerites on presternum and eusternum (not sclerotized between paired coxae); presternum of prothoracic segment subequal to eusternum in length (Pl. 22, M). Legs (Pl. 19, C) medium-sized, slender; setae as illustrated; femur about 2.5 times as long as wide; tibia almost 3 times as long as wide; tarsungulus about 2/3 as long as tibia, slender, moderately curved, with ventral seta subequal to or longer than posterior seta. Abdominal segments basically (Pl. 22, A) with setae distributed as illustrated. Ninth abdominal segment (Pl. 24, A & B) with pregomphi acutely bent backwards;

urogomphi moderately separated from each other, the excision between them being rather broad, but slightly variable in individuals as illustrated, each urogomphus composed of a basal hamp and an apical spine, the apical spines being parallel or slightly slanted outwardly or inwardly in dorsal view.

Specimens examined: 7 exs., Kunigamai, Is. Okinawa, 22. V. 1977, in decaying pineapple-fruit, N. Hayashi leg. 14 exs., Naha, Is. Okinawa, 23. V. 1977, in mouldy grains, N. Hayashi leg.

4. *Carpophilus hemipterus* (Linnaeus, 1758)

References: Perris, 1876, Larves de Coleoptères, Ann. Linn. Soc. Lyon. 22: 303, figs. 33 & 34. Hinton, 1945, Beetless associated with stored products 1, London: 78-111 (Nitidulidae), fig. 93-99. Peterson, 1951, Larvae of Insect II, Columbus, Ohio: 188, figs. A & B. Connell, 1956, Univ. Delaware Agric. Exp. Stat. Bull. 318: 1-67, fig. 5.

Body with meso- and metathoracic terga without paired sclerites. Body length about 6 mm. Very similar to *C. delkeskampii*. Head-capsule about 0.56 mm. in breadth.

Specimens examined: 26 exs., Newark, Delaware, IX. 1955, reared on decaying peach-fruit by Dr. W. Connell (det. W. Connell).

Notes: The larva of this cosmopolitan species has been described by many authors. So far as based on the present specimens examined I have not been able to find distinct differences between this species and *C. delkeskampii*.

5. *Carpophilus marginellus* Motschulsky, 1858

Body length about 6 mm. Similar to *C. delkeskampii*, but differing as follows.

Head-capsule about 0.65 mm. in breadth, broadening posteriorly, then constricted basally (not evenly rounded laterally). Anterior and posterior ocelli indistinct or lost. Ventral cutting edge of mandible with a small additional tooth. Meso- and metathoracic terga with paired sclerites. Sclerotized between paired coxae. Legs with coxa, femur and tibia asperated ventrally; femur about twice as long as wide; tibia nearly 2.5 times as long as wide. Microscopic asperities of abdominal terga well developed, forming a pair of transverse oval patches in each tergum. Urogomphi (Pl. 24, C & D) slightly larger and the excision between them narrower, the latter slightly variable in individuals as illustrated. Cuticle about anus rather prominently asperated.

Specimens examined: 8 exs., Minoge, Kanagawa-ken, 14. VII. 1970, in oozing sap on oak, N. Hayashi leg. 14 exs., Yokohama, Kanagawa-ken, 15. VIII. 1977, in decaying orange-fruit, N. Hayashi leg. 18 exs., Naha, Is. Okinawa, 13-19. VII. 1977, reared on fermenting apple-fruit, N. Hayashi leg.

6. *Carpophilus freemani* Dobson, 1956

Reference: Connell, 1956, Univ. Delaware Agric. Exp. Stat. Bull. 318: 1-67, fig. 9.

Body length about 4.5 mm. Similar to *C. delkeskampii*, but differing as follows.

Head-capsule about 0.49 mm. in breadth. Posterior ocelli indistinct. Antennae with 1st joint not longer than 3rd joint. Ventral cutting edge of mandible (Pl. 13, D) with a small additional tooth. Protheca (Pl. 13, E) less fringed. Maxillary mala (Pl. 15, E) with some of apical microtrichia obovate or ligulate. Legs with femur about twice as long as wide; tibia about 2.5 times as long as

wide. Meso- and metathoracic terga with paired sclerites. Ninth abdominal segment (Pl. 24, E & F) more constricted at base of urogomphi; pregomphi situated near bases of urogomphi; urogomphi almost contiguous at base, the basal hump being more or less bulging, about as long as wide, with excision between them narrow, slightly variable in individuals as illustrated.

Specimens examined: 14 exs., Newark, Delaware, IX. 1955, reared on decaying peach-fruit by Dr. W. Connell (det. W. Connell).

7. *Carpophilus pilosellus* Motschulsky, 1858

Body length about 4 mm. Very similar to *C. freemani*. Head-capsule about 0.46 mm. in breadth.

Specimens examined: 5 exs., Peru, South America, 9. IV. 1962, in garlic bulbs, E. Yamaki leg. (det. W. Connell). 10 exs., Kurosaki, Fukuoka-ken, XI. 1964, mouldy grains, A. Haga leg.

8. *Carpophilus dimidiatus* (Fabricius, 1792)

Reference: Hinton, 1945, Beetles associated with stored products 1, London: 78-111 (Nitidulidae), figs. 101-105.

Body length about 5.5 mm. Very similar to *C. freemani*. Head-capsule about 0.54 mm. in breadth.

Specimens examined: 3 exs., Savannah, Georgia, IX. 1974, reared on peanuts (*Arachis hypogea*) by Dr. W. Connell (det. W. Connell).

Notes: The three species of the genus *Carpophilus*, *freemani*, *pilosellus* and *dimidiatus*, are common pests of stored products. I have examined the larvae of them on the basis of the above-mentioned specimens, and found no good differences among them.

9. *Carpophilus mutilatus* Erichson, 1843

Reference: Connell, 1956, Univ. Delaware Agric. Exp. Stat. Bull. 318: 1-67. fig. 10.

Body length about 6 mm. Similar to *C. freemani*, but differs as follows.

Head-capsule about 0.56 mm. in breadth, broadening posteriorly, then constricted basally (not evenly rounded laterally). Ninth abdominal segment (Pl. 24, G & H) with lateral accessory spines more developed; pregomphi obtuse apically, each located on a raised base; urogomphi prominent, the basal hump gradually tapering to apex, bearing transverse rugosities on surrounding surface, the apical spine peg-shaped, obtuse apically. Asperities about anus distinct.

Specimens examined: 12 exs., Faison, North Carolina, 11. XII. 1955, reared on decaying peach-fruit by Dr. W. Connell (det. W. Connell).

Notes: This species is a common pest of stored products.

10. *Carpophilus titanus* Reitter, 1884

Body length about 6.8 mm. Similar to *C. delkeskampii*, but differs as follows.

Head-capsule about 0.85 mm. in breadth, notably depressed, broadening posteriorly, then constricted basally (not evenly rounded laterally). Antennae (Pl. 10, D) elongate; 2nd joint about 1.6 times as long as 1st or 3rd, the sensory appendix extremely small. Ventral cutting edge of mandible with a small additional

tooth. Maxillary mala wider. Ligula (Pl. 17, D) pointed at middle of cephalic margin. Meso- and metathoracic terga with paired sclerites. Portion between paired coxae sclerotized. Presternum of prothoracic segment slightly larger. Legs (Pl. 19, D) with femur markedly thickened in apical third, obscurely rugose; tibia a little less than 3 times as long as wide. Abdominal segment generally (Pl. 22, B) with setae much shorter, with microscopic asperities well developed. Urogomphi widely separated from each other, the basal hump robust basally (Pl. 24, I & J). Cuticule about anus markedly granulated (Pl. 24, M).

Specimens examined: 2 exs., near Shirane-onsen, Gumma-ken, 10. VIII. 1977, under bark of oak, N. Hayashi leg. 1 ex., Tanzawa, Kanagawa-ken, 15. VI. 1971, reared on fermenting apple-fruit, N. Hayashi leg.

11: *Carpophilus sibiricus* Reitter, 1879

Body length about 4.3 mm. Similar to *C. delkeskampii*, but differing as follows.

Head-capsule about 0.52 mm. in breadth, strongly depressed. Antennae with 1st joint not longer than 3rd joint. Ventral cutting edge of mandible with a small additional tooth. Protheca less fringed. Maxillary mala wider. Ligula pointed at middle of cephalic margin. Meso- and metathoracic terga with paired sclerites. Portion between paired coxae sclerotized. Presternum of prothoracic segment larger. First to 7th abdominal terga with many transverse linear series of pigmented asperities medially and several recumbent spines (granules) paramedially (Pl. 22, C). Legs rather similar to those of *C. titanus*. Ninth abdominal segment (Pl. 24, K & L) with lateral sides more or less straight, converging posteriorly; lateral accessory spines smaller; urogomphi slender, well separated from each other. Cuticule about anus granulated.

Specimens examined: 2 exs. near Takaragawa-onsen, Gumma-ken, 13. VIII. 1977, under bark of oak, N. Hayashi leg. 10 exs., near Shirane-onsen, Gumma-ken, 10. VIII. 1977, under bark of oak, N. Hayashi leg.

12. *Carpophilus humeralis* (Fabricius, 1798)

Reference: Connell, 1956, Univ. Delaware Agric. Exp. Stat. Bull. 318: 1-67, fig. 4.

Body length about 7 mm. Similar to *C. delkeskampii*, but differing as follows.

Head-capsule (Pl. 6, G & H) about 0.85 mm. in breadth, broadening posteriorly, then constricted basally (not evenly rounded laterally). Antennae (Pl. 10, E) with 3rd joint about 2/3 as long as 2nd. Right mandible with 2 teeth, and the left with 2 or 3, on dorsal cutting edge (Pl. 13, F). Mesothoracic to 8th abdominal terga with paired sclerites (dorso-paramedian sclerites present); 1st to 8th abdominal terga with an assemblage of several recumbent spines (granules) on each sclerite (Pl. 3, D & Pl. 22, D). Legs (Pl. 19, E) with coxa and femur slightly asperated ventrally; femur nearly twice as long as wide; tibia about 2.5 times as long as wide. Ninth abdominal segment (Pl. 23, E & F) with urogomphi located more laterally, with lateral accessory spines located more posteriorly; urogomphi extremely enlarged, the excision between them being V-shaped.

Specimens examined: 10 exs., Yokohama, Kanagawa-ken, 10. VIII. 1976, in decaying persimmon-fruit, N. Hayashi leg. 20 exs., Kunigami, Is. Okinawa, 22. V. 1977, decaying pineapple-fruit, N. Hayashi leg. 15 exs., Naha, Is. Okinawa, 21. V. 1977, in mouldy cereals, N. Hayashi leg.

Subfamily Nitidulinae

13. *Ipidia variolosa* Reitter, 1879

Body (Pl. 3, E) subdepressed, abdominal segments moderately lobed laterally; mesothoracic to 7th abdominal terga without sclerites and tubercles; 8th abdominal tergum with a pair of obscure sclerites; abdominal spiracular tubes moderately produced; 9th abdominal segment bearing pregomphi and urogomphi. Body length about 5.2 mm.

Head-capsule (Pl. 6, I & J) about 0.75 mm. in breadth, 1.9 times as wide as long (except labrum), considerably widened posteriorly; dorsal hind margin of head-capsule obviously retracted; clypeal protuberances indistinct; frontal sutures moderately impressed; posterior ocelli reduced to 2 small spots; setae of head-capsule as illustrated. Antennae (Pl. 10, F) with 3 joints subequal in length; 1st joint as long as wide; sensory appendix of 2nd joint about half as long as 3rd joint. Labrum relatively large, the cephalic margin being straight or slightly produced forwards; labroclypeal epipharynx (Pl. 11, E) suffused with stout microtrichia, lacking median longitudinal ridge and oblique stripes. Mandibles (Pl. 13, G) bidentate apically; dorsal and ventral cutting edges respectively furnished with 4 and 2 teeth; protheca and grinding surface of mola strongly asperated, the former bearing a conspicuous projection. Maxillae (Pl. 15, F) with apical joint of palpus a little longer than either of basal joints; mala with microtrichia stout, sparsely scattered on distal and buccal surfaces, with uncus notched apically and notably thickened basally. Labium (Pl. 17, E) with palpi moderately separated from each other, about 1.5 times as long as wide; ligula strongly produced; suture between mentum and submentum obscure; hypopharyngeal sclerome as illustrated (Pl. 17, P).

Legs (Pl. 19, F) small; setae as illustrated; coxa, trochanter and femur each with microtrichia on ventral surface; femur and tibia each about twice as long as wide; tarsungulus nearly half as long as tibia, moderately curved, the posterior seta being more or less similar to ventral seta in shape. Presternum of prothoracic segment much shorter than eusternum. Setae of thoracic and abdominal segments conspicuous, those of general abdominal segment distributed as illustrated (Pl. 22, E). Spiracular tubes of 7th and 8th abdominal segments slightly larger, those on the 8th largest, about as long as basal diameter, and located near posterolateral angles of the segment. Ninth abdominal segment (Pl. 23, G & H) with tergum lightly sclerotized; pregomphi well developed, rounded apically; urogomphi moderately diverging, in lateral view projecting directly backwards, then upcurved apically, the distance between their apices longer than a half cephalic width of the tergum; margin between urogomphi (caudal margin of the segment) broadly concave.

Specimens examined: 2 exs., Yûshin, Tanzawa, Kanagawa-ken, 13. VIII. 1963, under bark of decaying tree, N. Hayashi leg.

14. *Ipidia sibirica* (Reitter, 1879)

Reference: Fukuda, 1959, Illustrated Insect Larvae of Japan, Tôkyô: 436, fig. 814.

Body without sclerites and tubercles on terga except on prothoracic and 9th abdominal segments; 9th abdominal segment bearing pregomphi and urogomphi. Body length about 4.3 mm. Similar to *I. variolosa*, but differs as follows.

Body more widened medianly. Head-capsule about 0.65 mm. in breadth. Buccal bristles of maxillary mala stouter. Eighth abdominal tergum with paired sclerites indistinct or absent. Ninth abdominal tergum not sclerotized. Urogomphi stouter basally, less divergent, evenly upcurved in basal part, the margin between them narrowly concave.

Specimens examined: 18 exs., Sekiro-san, Kanagawa-ken, 20. VII. 1968, in fruit bodies of tree-fungus (*Schizophyllum commune*), N. Hayashi leg. 2 exs., Tanzawa, Kanagawa-ken, 31. V. 1971, N. Hayashi leg.

15. *Omosita colon* (Linnaeus, 1758)

References: Eichelbaum, 1903, Allg. Z. Ent. 8(5): 81-87, 6 figs. Verhoeff, 1923, Arch. Natg. Berlin Abt. 89(1): 1-109, figs. 1-3. Hinton, 1945, Beetles associated with stored products 1, London: 107-108, figs. 108-113. Böving & Rozen, 1962, Ent. Medd., Copenhagen 31: 265-299, figs. 46-49.

Body (Pl. 3, F) subdepressed, abdominal segments moderately lobed laterally; mesothoracic to 8th abdominal terga each with a pair of obscure dorso-paramedian sclerites, which are transversely rectangular, weakly rugose, slightly raised above ground integument, and set fairly close together; abdominal spiracular tubes moderately produced; 9th abdominal segment bearing pregomphi and urogomphi. Body length about 5 mm.

Head-capsule (Pl. 6, K & L) about 0.5 mm. in breadth, 1.4 times as wide as long (except labrum), weakly widened posteriorly; dorsal hind margin of head-capsule slightly, while ventral hind margin strongly, retracted; frontal sutures impressed, reaching near antennal insertions; frontal region longitudinal; clypeal protuberances rather weak; posterior ocelli reduced to 2 small spots; setae of head-capsule as illustrated. Antennae (Pl. 10, G) with 1st joint almost as long as wide, subequal to 3rd in length; 2nd joint as long as or slightly longer than 1st, the sensory appendix about half of 3rd joint in length. Labrum with cephalic margin nearly straight; labroclypeal epipharynx (Pl. 11, F) as illustrated. Mandibles (Pl. 13, H) bidentate apically; dorsal cutting edge with 3 teeth; ventral cutting edge without teeth; prostheca consists of several large lobes, bearing a lightly sclerotized projection at base; mola transversely ridged and asperated. Maxillae (Pl. 15, G) with 3rd joint of palpus longer than 1st or 2nd joint; mala enlarged inner-distally, bearing rather sparsely scattered microtrichia and a notched uncus. Labium (Pl. 17, F) with palpi set close at base, about 1.5 times as long as wide; ligula strongly produced; suture between mentum and submentum obscure; hypopharyngeal sclerome as illustrated (Pl. 17, Q).

Legs (Pl. 19, G) medium-sized; setae as illustrated; femur 1.5 to 2 times as long as wide; tibia 2 to 2.5 times as long as wide; tarsungulus slightly longer than half of tibia, moderately curved, the posterior seta being more or less similar to ventral seta in shape. Presternum of prothoracic segment much shorter than eusternum. Spiracular tubes of 7th and 8th abdominal segments slightly longer, those on the 8th longest, but shorter than its own basal diameter, and situated in posterolateral angles of the segment (Pl. 23, K). Setae and sclerites of abdominal tergum generally distributed as illustrated (Pl. 22, F). Ninth abdominal segment (Pl. 23, K & L) with pregomphi situated near meson of tergum; urogomphi comparatively small, much shorter than tergum, and gradually recurved.

Specimens examined: 11 exs., Kojôhama, near Noboribetsu, Hokkaidô, 25.

VI. 1964, in dead animal matter, N. Hayashi leg.

16. *Epuraea harmandi* Grouvelle, 1902

Body (Pl. 3, G) granulated above, bearing short to long frayed setae (Pl. 25, F), subdepressed; thoracic and abdominal terga extensively sclerotized, testaceous brown; abdominal segments moderately lobed laterally; granules of mesothoracic to 8th abdominal terga arranged in 8 longitudinal rows; spiracular tubes moderately produced; 9th abdominal segment bearing pregomphi and urogomphi; 10th abdominal segment bearing a transverse series of hook-like setae near anus (anal hooks). Body length about 5 mm.

Head-capsule (Pl. 7, A & B) about 0.59 mm. in breadth, 1.4 times as wide as long (except labrum), evenly rounded laterally; dorsal hind margin of head-capsule moderately retracted; clypeal protuberances weak; frontal sutures impressed medially; front median setae (Pl. 11, L) absent; posterior ocelli reduced to 2 small spots; setae of head-capsule distributed as illustrated. Antennae (Pl. 10, H) with 2nd joint twice as long as 1st or 3rd; 1st joint slightly transverse; sensory appendix about half as long as 3rd joint. Labrum with cephalic margin nearly straight; labroclypeal epipharynx as illustrated (Pl. 11, G). Mandibles (Pl. 13, I) bidentate apically; dorsal cutting edge with 3 teeth in right mandible, and with 4 teeth in the left; ventral cutting edge without teeth; prostheca fringed and pigmented anteriorly; mola moderately developed, dully dentate anteriorly, transversely asperated. Maxillae (Pl. 15, H) with 2nd joint of palpus a little longer than 1st or 3rd joint; mala with uncus notched apically and extremely thickened basally. Labium (Pl. 17, G) with palpi set close at base; ligula moderately produced; suture between mentum and submentum scarcely visible; hypopharyngeal sclerome as illustrated (Pl. 17, R).

Legs (Pl. 19, H) slightly short; paired coxae slightly approaching each other; setae as illustrated; femur and tibia each almost 1.5 times as long as wide; tarsungulus about 2/3 as long as tibia, rather strongly curved, the ventral seta much stouter than posterior seta. Presternum of prothoracic segment much shorter than eusternum. Thoracic and abdominal terga each with posterior granules moderately elongate. Ninth abdominal segment (Pl. 25, F) with ratio of width to median length 9:5, strongly constricted basally; subpregomphi absent; pregomphi moderate in length; about 5 granules before each pregomphus; cephalic portion of tergum with asperities irregularly strewn as illustrated; urogomphi (Pl. 25, M) comparatively short, the excision between them being broad, the surface with asperities dull apically.

Specimens examined: 4 exs., Nenoue-kôgen, Gifu-ken, 16. V. 1971, reared on decaying flowers of azalea (*Rhododendron* sp.), N. Hayashi leg.

17. *Epuraea argus* Reitter, 1894

Reference: Hayashi, 1960, Kenkyû to Hyôron 4: 1-4, 1 pl.

Body granulated above, bearing short to long frayed setae (Pl. 25, A). Body length about 4.8 mm. Similar to *E. harmandi*, but differing as follows.

Head-capsule about 0.52 mm. in breadth; frontal median setae present. Relative length of 1st to 3rd antennal joints as follows: 7: 11: 10. Right mandible with 2 teeth, and the left with 3, on dorsal cutting edge. Granules of thoracic and

abdominal terga stronger; posterior granules of each tergum elongate. Femur and tibia each about twice as long as wide. Tarsungulus moderately curved. Ninth abdominal segment (Pl. 25, A) with ratio of width to median length 3:2, weakly constricted basally; subpregomphi present; pregomphi extremely elongate, strongly erected, the apical seta subequal to the pregomphus in length. Urogomphi (Pl. 25, H) longer, the excision between them being narrower; apical spine of urogomphus usually shorter than that of *E. pallax*; surface with acutely pointed asperities.

Specimens examined: 20 exs., Sampei-tôge, Gumma-ken, 8. VI. 1959, in fruit bodies of tree-fungus (*Lenzites betulina* ?), N. Hayashi leg. 27 exs., Kirizumi, Gumma-ken, 26. V. 1962, in fruit bodies of tree-fungus (*Inonotus* sp.), N. Hayashi leg. 1 ex., Okunikkô, Gumma-ken, 8. VI. 1971, N. Hayashi leg.

18. *Epuraea pallax* Reitter, 1873

Body granulated above, bearing short to long frayed setae (Pl. 25, B). Body length about 4 mm. Similar to *E. harmandi*, but differing as follows.

Head-capsule about 0.47 mm. in breadth; frontal median setae present. Relative length of 1st to 3rd antennal joints as follows: 3:6:4. Right mandible with 2 teeth, and the left with 3, on the dorsal cutting edge. Granules of thoracic and abdominal terga stronger; posterior granules of each tergum larger than in *E. harmandi*, but smaller than in *E. argus*. Femur and tibia each about twice as long as wide. Tarsungulus moderately curved. Ninth abdominal segment (Pl. 25, B) with ratio of width to median length 4:3, weakly constricted basally; subpregomphi present; pregomphi exceedingly elongate, strongly erected, the apical seta shorter than the pregomphus. Urogomphi (Pl. 25, I) longer, the excision between them being narrower; apical spine of urogomphus usually longer; surface with sharply pointed asperities.

Specimens examined: 8 exs., Kanayama, Yamanashi-ken, 18. V. 1971, reared on fermenting apple-fruit, N. Hayashi leg. 3 exs., Tanzawa, Kanagawa-ken, 30. V. 1971, under bark of decaying oak, N. Hayashi leg.

Notes: The larva of this species is very similar to that of the preceding species, *E. argus*, but it is distinguished from the latter by the size of the head-capsule, by the posterior tubercles of each tergum, by the seta of the pregomphus, and by the apical spine of the urogomphus.

19. *Epuraea funeraria* Reitter, 1884

Body granulated above, bearing notably short, obovate or ligulate setae (Pl. 25, C). Body length about 5.5 mm. Similar to *E. harmandi*, but differing as follows.

Head-capsule about 0.61 mm. in breadth; frontal median setae present. Relative length of 1st to 3rd antennal joints as follows: 9:11:9. Right mandible with 4 teeth, and the left with 5, on dorsal cutting edge. Mesothoracic to 8th abdominal terga with a distinct mediadorsal suture. Granules of thoracic and abdominal terga much smaller. Femur and tibia each about twice as long as wide. Tarsungulus moderately curved. Ninth abdominal segment (Pl. 25, C) with ratio of width to median length 11:6; subpregomphi present, but very small; pregomphi shorter. Urogomphi (Pl. 25, J) shorter and stouter.

Specimens examined: 21 exs., Yabitsu-tôge, Kanagawa-ken, 16. V. 1977, reared on fermenting sap, N. Hayashi leg.

20. *Epuraea foveicollis* Reitter, 1873

Body granulated above; setae extremely short, obovate or ligulate. Body length about 5 mm. Similar to *E. harmandi*, but differing as follows.

Head-capsule about 0.54 mm. in breadth; frontal median setae present. Relative length of 1st to 3rd antennal joints: 7:12:9. Right mandible with 6 or 7 teeth, and the left with 7 or 8, on dorsal cutting edge (Pl. 13, J). Granules of thoracic and abdominal terga much smaller. Femur and tibia each about twice as long as wide. Tarsungulus not strongly curved. Ninth abdominal segment (Pl. 25, D) with ratio of width to median length 8:5; subpregomphi present, but very small; pregomphi shorter. Urogomphi (Pl. 25, K) shorter and stouter, notably upcurved.

Specimens examined: 10 exs., Karuizawa, Nagano-ken, 17. V. 1971, in fruit bodies of tree-fungus (*Daedaleopsis* sp. ?), N. Hayashi leg.

21. *Epuraea bergeri* Sjöberg, 1939

Body granulated above, bearing short to long spiniform setae (Pl. 25, E). Body length about 5 mm. Similar to *E. harmandi*, but differing as follows.

Head-capsule about 0.62 mm. in breadth; front median setae present. Relative length of 1st to 3rd antennal joints as follows: 4:8:5. Posterior granules of thoracic and abdominal terga more elongate, and bearing setae longer. Setae not enlarged apically. Femur and tibia each about twice as long as wide. Tarsungulus moderately curved. Ninth abdominal segment (Pl. 25, E) with ratio of wide to median length 7:5, less constricted basally; pregomphi more elongate; about 3 granules before each pregomphus. Urogomphi (Pl. 25, L) slightly longer, more slender and parallel; surface not asperated.

Specimens examined: 15 exs., Amagi-san, Shizuoka-ken, 5. VI. 1970, reared on decaying flowers of Japanese pieris (*Pieris japonica*), N. Hayashi leg. 3 exs., Karuizawa, Nagano-ken, 5. VII. 1971, in oozing sap on oak, N. Hayashi leg. 20 exs., Kawanori, Okutama, Tôkyô-toka, 25. V. 1977, reared on fermenting apple-fruit, N. Hayashi leg.

22. *Epuraea paulula* Reitter, 1873

Body granulated above, bearing short to long frayed setae. Body length about 3 mm. Similar to *E. harmandi*, but differing as follows.

Head-capsule about 0.35 mm. in breadth; front median setae present. Relative length of 1st to 3rd antennal joints: 3:6:5. Femur and tibia each nearly twice as long as wide. Tarsungulus moderately curved. Ninth abdominal segment (Pl. 25, G) with ratio of width to median length 11:8, less constricted basally; about 3 granules before each pregomphus; asperities of cephalic portion of tergum connected to each other as illustrated. Urogomphi (Pl. 25, N) slightly more slender, the excision between them being narrower; surface without asperities.

Specimens examined: 4 exs., Jimmuji, Kanagawa-ken, 9. VI. 1970, reared on decaying flowers of cutleaf stephanandra (*Stephanandra incisa*), N. Hayashi leg. 10 exs., Naha, Is. Okinawa, 23. V. 1977, N. Hayashi leg. 17 exs., Chino, Nagano-ken, 27. VI. 1977, reared on decaying flowers of wild rose (*Rosa multiflora*), N. Hayashi leg.

23. *Haptoncus ocularis* (Fairmaire, 1849)

Body granulated above, bearing spiniform or lanceolate or spatulate setae (Pl. 26, A). Body length about 4 mm. Similar to *Epuraea harmandi*, but differing as follows.

Head-capsule about 0.49 mm. in breadth; frontal median setae present or absent. Relative length of 1st to 3rd antennal joints as follows: 7:14:11. Right mandible with 2 teeth, and the left with 3, on dorsal cutting edge. Femur and tibia each nearly twice as long as wide. Tarsungulus moderately curved. Ninth abdominal segment (Pl. 26, A) with ratio of width to median length 7:4; lateral granules larger; about 3 granules before each pregomphus; asperities of cephalic portion of tergum connected to each other as illustrated. Urogomphi (Pl. 26, C) with asperities pointed.

Specimens examined: 24 exs., Sagamiko, Kanagawa-ken, 20. VII. 1970, in decaying peach-fruit, N. Hayashi leg. 14 exs., Karuizawa, Nagano-ken, 5. VII, 1971, in fruit bodies of tree-fungus, N. Hayashi leg. 20 exs., Nebukawa, Kanagawa-ken, in decaying orange-fruit, 30. V. 1977, N. Hayashi leg.

24. *Haptoncus luteolus* (Erichson, 1843)

Reference: Böving & Rozen, 1962, Ent. Medd., Copenhagen 31: 265-299, fig. 34.

Body granulated above, bearing lanceolate or spatulate short setae (Pl. 26, B). Body length about 4 mm. Similar to *H. ocularis*, but differing as follows.

Head-capsule about 0.46 mm. in breadth; frontal median setae present (Pl. 11, L). Relative length of 1st to 3rd antennal joints as follows: 6:11:9. Setae of thoracic and abdominal terga shorter. Ninth abdominal segment (Pl. 26, B) with about 2 granules before each pregomphus, which, when viewed from above, are arranged in an arcuate row with pregomphus; asperities of cephalic portion of tergum irregularly strewn or connected to each other as illustrated. Urogomphi (Pl. 26, D) more slender, parallel, the excision between them being nearly U-shaped; surface without asperities.

Specimens examined: 18 exs., Kunigami, Is. Okinawa, 6-12. VI. 1977, reared on fermenting apple-fruit, N. Hayashi leg.

25. *Aphenolia pseudosoronia* Reitter, 1884

Body (Pl. 3, H) granulated dorsally and laterally, depressed; thoracic and abdominal terga well sclerotized, testaceous brown in color; mesothoracic to 8th abdominal terga with a mediodorsal suture; lateral sides of tergum strongly produced outwards, so that the abdominal spiracular tubes are completely concealed under the terga when viewed from above; 9th abdominal segment terminating in long urogomphi, with pregomphi; 10th abdominal segment bearing anal hooks. Body length about 9 mm.

Head-capsule (Pl. 7, C & D) about 1.0 mm. in breadth, 1.5 times as wide as long (except labrum), depressed, moderately widened basally; dorsal hind margin of head-capsule slightly incurved; clypeal protuberances indistinct; frontal sutures more or less parallel and strongly impressed medially; posterior group of ocelli represented by 2 small stains remote from the anterior group; setae and granules of head-capsule as illustrated. Antennae (Pl. 10, I) slender; 1st joint longitudinal; 2nd joint about 1.5 times as long as 1st, the sensory appendix nearly

half of 3rd joint in length; 3rd joint about $\frac{2}{5}$ as long as 2nd. Labrum with cephalic margin almost straight; labroclypeal epipharynx as illustrated (Pl. 11, H). Mandibles (Pl. 13, K) bidentate apically; right mandible with 4 or 5 teeth, and the left with 6 or 7, on the dorsal cutting edge; ventral cutting edge without teeth; prostheca fringed in anterior half; mola moderately developed, asperated, lacking transverse ridges; external surface of mandible moderately convex medially. Maxillae (Pl. 15, I) with 1st and 3rd joints of palpus subequal in length, and about $\frac{2}{3}$ as long as 2nd joint; mala broadly rounded apically, bearing capitate microtrichia, with uncus elongate, trifid, projecting towards meson. Labium (Pl. 17, H) with palpi elongate, moderately separated from each other; ligula strongly produced, reaching to apex of palpus; suture between mentum and submentum indistinct; hypopharyngeal sclerome as illustrated (Pl. 17, S).

Legs (Pl. 19, I) elongate, slender; setae as illustrated; coxae long; femur notably thickened in apical half, about 2.5 times as long as wide; tibia about 3.5 times as long as wide; tarsungulus small, $\frac{1}{4}$ as long as tibia, strongly curved near tip, the posterior seta being extremely small. Presternum of prothoracic segment much shorter than eusternum. Thoracic and abdominal terga with marginal granules much larger, each granule bearing a long, stout seta. Ninth abdominal segment (Pl. 26, E & F) with urogomphi directed posteriorly on same plane as tergum, then weakly upcurved. Tenth abdominal segment with ventral marginal setae of anus hook-like (anal hooks).

Specimens examined: 100 exs., Takao, Tôkyô-toka, 6. V. 1968, in fruit bodies of tree-fungus (*Cryptoporus volvatus*), N. Hayashi leg. 3 exs., Narashino, Chiba-ken, 1. IV. 1964, T. Fukui leg.

26. *Amphicrossus japonicus* Reitter, 1873

Body (Pl. 4, A) granulated above, depressed, covered with inconspicuous pubescence; thoracic and abdominal terga well sclerotized, testaceous brown; mesothoracic to 8th abdominal terga divided into halves by a broad mediodorsal suture, with granules arranged in 3 or 4 longitudinal rows in lateral half of each tergum; abdominal spiracular tubes elongate and projecting outwards, so that the lateral lobes are completely concealed under the tubes when viewed from above, the tubes of 8th abdominal segment much longer and stouter, reaching near tips of urogomphi; 9th abdominal segment including pregomphi adorned with granules, ending in long urogomphi. Body length about 7 mm.

Head-capsule (Pl. 7, E & F) about 1.0 mm. in breadth, 1.9 times as wide as long (except labrum), more or less strongly widened basally, dorsal hind margin conspicuously retracted; clypeal protuberances weak; posterodorsal ocellus lens-shaped as anterior ocelli, while posteroventral ocellus absent; setae and granules of head-capsule as illustrated, with epicranial and frontal setae occasionally branched apically. Antennae (Pl. 10, J) with 1st joint as long as wide; 2nd joint elongate, almost twice as long as 1st, the sensory appendix small, about half as long as 3rd joint; 3rd joint less than $\frac{1}{3}$ as long as 2nd. Labrum exceedingly narrow, the cephalic margin straight; labroclypeal epipharynx (Pl. 11, I) with anterolateral bristles extremely small and set close together in anterolateral portions. Mandibles (Pl. 13, L) bidentate apically; dorsal cutting edge with 4 teeth in right mandible, and with 5 teeth in the left; ventral cutting edge without teeth; prostheca strongly fringed in anterior half; mola moderately developed, asperated; external surface

of mandible furnished with an angulated process. Maxillae (Pl. 15, J) with 1st and 2nd joints of palpus subequal in length and a little longer than 3rd; mala transverse, slanted apically, with apical microtrichia progressively longer from inner to outer side, with uncus elongate, bifurcate, projecting towards meson. Labium (Pl. 17, I) with palpi moderately separated from each other; ligula moderately produced; suture between mentum and submentum indistinct; submentum and maxillary cardo covered with microtrichia; hypopharyngeal sclerome as illustrated (Pl. 17, T).

Legs (Pl. 19, J) moderate in length; setae distributed as illustrated; femur and tibia each a little less than twice as long as wide; tarsungulus slightly shorter than tibia, moderately curved, the posterior seta being much smaller. Presternum of prothoracic segment much shorter than eusternum. Abdominal spiracular tubes elongate conical, those in first 6 abdominal segments 2.5 to 3 times as long as basal diameter, each with a prominent tubercle on anterior base. Ninth abdominal segment (Pl. 26, G & H) with urogomphi directed posteriorly on same plane as tergum and assuming an arborescent form owing to some well-developed tubercles. Tenth abdominal segment without anal hooks.

Specimens examined: 30 exs., Shiroyama, Kagoshima-ken, 17. V. 1960, in fermenting sap on bamboo (*Phyllostachys pubescens*), N. Hayashi leg.

27. *Soronia lewisi* Reitter, 1884

Body (Pl. 4, B) subdepressed; mesothoracic to 8th abdominal terga each with some unisetiferous tubercles and 3 pigmented sclerites (median sclerite consists of 2 contiguous dorso-paramedian sclerites); abdominal spiracular tubes moderately produced; lateral lobes of meso- and metathorax and abdomen papilli-form; 9th abdominal segment extensively pigmented above, bearing pregomphi and urogomphi. Body length about 6 mm.

Head-capsule (Pl. 7, G & H) about 0.9 mm. in breadth, 1.8 times as wide as long (except labrum), moderately widened basally; dorsal hind margin of head-capsule more or less strongly retracted; clypeal protuberances weak; frontal sutures strongly impressed; ocelli-bearing regions well pigmented; posterodorsal ocellus distinct, but the posteroventral obsolete; setae of head-capsule as illustrated. Antennae (Pl. 10, K) with 1st joint nearly as long as wide, subequal to 3rd in length; 2nd joint about 1.6 times as long as 1st, the sensory appendix slightly shorter than half of 3rd joint. Labrum comparatively large, lightly sinuated laterally, the cephalic margin being weakly notched medially; labroclypeal epipharynx as illustrated (Pl. 11, J). Mandibles (Pl. 13, M) apically dully pointed and lacking teeth; prostheca fringed; mola moderately developed, asperated; external setae absent, but their sockets visible. Maxillae (Pl. 15, K) with 1st and 2nd joints of palpus about equal in length; mala elongate, with microtricha often branched apically, with uncus stout, notched apically. Labium (Pl. 17, J) with palpi more or less set close at bases; ligula moderately produced; suture between mentum and submentum indistinct; hypopharyngeal sclerome as illustrated (Pl. 17, U).

Legs (Pl. 20, A) moderate in length, slender; setae as illustrated; femur about 2 times as long as wide; tibia about 3 times as long as wide; tarsungulus about 1/3 times as long as tibia, slightly curved, the posterior seta being extremely small. Prothorax with presternum much shorter than eusternum. Abdominal tergum with setae, tubercles and sclerites generally distributed as illustrated (Pl. 22, I); dorso-paramedian tubercle (assemblage of 3 dorso-paramedian setae) feebly raised, the

setae being slender (Pl. 26, K). Eighth abdominal segment (Pl. 26, I) with lateral swellings strikingly produced. Ninth abdominal segment (Pl. 26, I & J) with some dark stains on tergum; pregomphi elongate; urogomphi shorter than tergum, moderately upcurved.

Specimens examined: 4 exs., Sagamihara, Kanagawa-ken, 6. IV. 1970, in oozing sap on oak, N. Hayashi leg.

28. *Soronia japonica* Reitter, 1873

Body with some unisetiferous tubercles and 3 pigmented sclerites on each of mesothoracic to 8th abdominal terga. Body length about 6 mm. Very similar to *S. lewisi*, the difference between the two being found only in the dorso-paramedian tubercle.

Abdominal tergum generally with dorso-paramedian tubercle strongly raised, the setae of tubercle being blunt (Pl. 26, L).

Specimens examined: 6 exs., Jimmuji, Kanagawa-ken, 24. V. 1970, in oozing sap on oak, N. Hayashi leg.

29. *Lasiodactylus pictus* (MacLeay, 1825)

Body (Pl. 1, A & B) subdepressed; mesothoracic to 8th abdominal terga each with a pair of assemblages of unisetiferous tubercles (dorso-paramedian tubercles) and 1 or 2 pairs of corneous sclerites (dorso-paramedian sclerites); sclerites and abdominal spiracular tubes umber brown; abdominal segments moderately lobed laterally; spiracular tubes moderately produced; 9th abdominal segment bearing pregomphi and urogomphi. Body length about 10 mm.

Head-capsule (Pl. 1, E & G) about 1.3 mm. in breadth, 1.8 times as wide as long (except labrum), moderately widened basally; dorsal hind margin strongly incurved; clypeal protuberances feebly raised; frontal sutures strongly impressed; ocelli-bearing regions darker; posterior ocelli lens-shaped as anterior ocelli. Antennae (Pl. 1, H) with 1st joint slightly longer than wide; 2nd joint about 1.3 times as long as 1st, the sensory appendix being a little shorter than 3rd joint; 3rd joint nearly $\frac{2}{5}$ as long as 2nd. Labrum relatively large, the cephalic margin evenly rounded; labroclypeal epipharynx as illustrated (Pl. 2, A). Mandibles (Pl. 2, B & C) bidentate apically; dorsal cutting edge with 4 teeth in right mandible and with 5 in the left; ventral cutting edge without teeth; protheca fringed, furnished with a prominent projection; mola moderately developed, adorned with fine transverse ridges and asperities; external surface of mandible strongly produced medially. Maxillae (Pl. 2, D) with 3rd joint of palpus as long as or slightly longer than each of 1st and 2nd; mala more or less elongate, with uncus notched apically. Labium (Pl. 2, E) with palpi set moderately apart from each other, about twice as long as wide; ligula slightly produced; suture between mentum and submentum absent; hypopharyngeal sclerome as illustrated (Pl. 2, E)

Legs (Pl. 2, F) moderate in length, slender; setae distributed as illustrated; femur and tibia each nearly twice as long as wide; tarsungulus about half as long as tibia, slightly curved, the posterior seta much smaller than ventral seta. Prothoracic segment with presternum much shorter than eusternum. Meso- and metathoracic terga each with a small sclerite between dorso-paramedian sclerite and lateral side. Abdominal segment generally with setae, tubercles and sclerites

distributed as illustrated (Pl. 1, C). Eighth abdominal segment (Pl. 2, G & H) with lateral swellings projecting backwards, but not exceeding posterior margin of the segment. Ninth abdominal segment (Pl. 2, G & H) with pregomphi elongate; urogomphi slender, about as long as median length of tergum, with tip-end curved upwardly and inwardly.

Specimens examined: 5 exs., Wakayama-ken, 18. XI. 1976, in plum-fruit, I. Chikaoka leg. 2 exs., Nebukawa, Kanagawa-ken, 5. VI. 1977, in decaying orange-fruit, N. Hayashi leg. 16 exs., Yokohama, Kanagawa-ken, 24. VI. 1977, in decaying orange-fruit, N. Hayashi leg. 5 exs., Kunigami, Is. Okinawa, VIII. 1977, reared on fermenting apple-fruit, T. Kitano leg.

30. *Atarphia quadripunctata* Reitter, 1884

Body (Pl. 4, C) subdepressed; mesothoracic to 8th abdominal terga each with some unisetiferous tubercles, without paired dorso-paramedian tubercles and paired dorso-paramedian sclerites, with corresponding paramedian parts lightly elevated instead; abdominal segments moderately lobed laterally; abdominal spiracular tubes moderately developed; 9th abdominal segment bearing pregomphi and urogomphi. Body length about 8 mm.

Head-capsule (Pl. 7, I & J) about 0.9 mm. in breadth, 1.9 times as wide as long (except labrum), strongly widened basally; dorsal hind margin of head-capsule considerably retracted; clypeal protuberances moderately raised; frontal sutures more or less strongly impressed anteriorly; frontal region distinctly elevated medially; posterior ocelli reduced to 2 small spots; setae of head-capsule as illustrated. Antennae (Pl. 10, L) with 1st joint nearly as long as wide; 2nd joint about 1.3 times as long as 1st, the sensory appendix being longer than half of 3rd joint; 3rd joint about half as long as 2nd. Labrum with cephalic margin weakly produced forwards; labroclypeal epipharynx (Pl. 11, K) as illustrated. Mandibles (Pl. 13, N) bidentate apically; dorsal cutting edge with 6 teeth in right mandible, and with 7 teeth in the left; ventral cutting edge with 3 teeth; prostheca coarsely fringed; mola transversely ridged and asperated; external surface of mandible obviously produced medially. Maxillae (Pl. 15, L) with 2nd joint about as long as 1st, and slightly shorter than 3rd; mala with uncus comparatively stout, notched apically. Labium (Pl. 17, K) with palpi moderately separated from each other, about twice as long as wide; ligula conspicuously produced; suture between mentum and submentum absent; hypopharyngeal sclerome as illustrated (Pl. 17, V).

Legs (Pl. 20, B) rather small; setae as illustrated; coxa, trochanter and femur each with a number of microtrichia on ventral surface; femur a little less than twice as long as wide; tibia almost as long as wide; tarsungulus $\frac{2}{3}$ as long as tibia, rather strongly curved inwards, the ventral seta being similar to posterior seta in shape. Prothorax with presternum much shorter than eusternum. Abdominal tergum generally with 2 dorso-paramedian setae (2 unisetiferous tubercles) set quite close to each other (Pl. 22, G). Spiracular tubes of 7th and 8th abdominal segments longer, those of the 8th longest, 2 to 3 times as long as its own apical diameter. Ninth abdominal segment (Pl. 27, A & B) with pregomphi located submedially, projecting upwards; urogomphi more or less strongly upcurved.

Specimens examined: 7 exs., Amagisan, Shizuoka-ken, 20. VII. 1963, in fruit

bodies of tree-fungus, N. Hayashi leg. 12 exs., Tanigawa-dake, Gumma-ken, 29. VII. 1967, N. Hayashi leg. 7 exs., Tanigawa-onsen, Gumma-ken, 11. VIII. 1977, N. Hayashi leg.

31. *Aethina maculicollis* Reitter, 1884

Body (Pl. 4, D) subdepressed; mesothoracic to 8th abdominal terga feebly elevated above paramedially, with some unisetiferous tubercles, without paired dorso-paramedian tubercles and paired dorso-paramedian sclerites; abdominal segments moderately lobed laterally; abdominal spiracular tubes and lateral swellings moderately produced; 9th abdominal segment bearing pregomphi and urogomphi. Body length about 6 mm.

Head-capsule (Pl. 7, K & L) about 0.8 mm. in breadth, 2.3 times as wide as long (except labrum), strongly widened basally; dorsal hind margin of head-capsule markedly retracted; clypeal protuberances weak; frontal sutures slightly impressed anteriorly; frontal region feebly elevated medially; posterodorsal ocellus obscure; setae of head-capsule as illustrated. Antennae (Pl. 10, M) with 1st joint transverse; 2nd joint a little longer than 1st, the sensory appendix longer than half of 3rd joint; 3rd joint about $\frac{3}{5}$ as long as 2nd. Labrum with cephalic margin nearly straight; labroclypeal epipharynx (Pl. 12, A) as illustrated. Mandibles (Pl. 13, O) bidentate apically; dorsal cutting edge with 3 teeth; ventral cutting edge without teeth; prosthema coarsely fringed; mola well developed, transversely ridged and asperated; external surface of mandible weakly produced medially. Maxillae (Pl. 15, M) with 2nd joint of palpus subequal to 1st joint in length, and a little shorter than 3rd; mala with uncus relatively stout, notched apically. Labium (Pl. 17, L) with palpi moderately separated from each other; ligula moderately produced; suture between mentum and submentum seemingly indistinct; hypopharyngeal sclerome as illustrated (Pl. 17, W).

Legs (Pl. 20, C) rather small; setae as illustrated; femur and tibia each about 1.5 times as long as wide; tarsungulus nearly $\frac{2}{3}$ as long as tibia, moderately curved, the ventral seta similar to posterior seta in shape. Prothorax with presternum much shorter than eusternum. Abdominal tergum (Pl. 22, H) generally with 3 dorso-paramedian setae separated from each other, each on an inconspicuous tubercle. Spiracular tubes of 8th abdominal segment slightly longer. Ninth abdominal segment (Pl. 27, C & D) with pregomphi located near urogomphi, projecting caudodorsally; urogomphi directly projecting, abruptly flexed upwardly near tip, and about as long as median length of tergum, with bases more or less contiguous.

Specimens examined: 1 ex., Yabitsu-tôge, Kanagawa-ken, 17. VI. 1970, reared on fermenting apple-fruit, N. Hayashi leg.

32. *Physoronia explanata* Reitter, 1884

Body (Pl. 4, E) subdepressed; mesothoracic to 8th abdominal terga each with paired dorso-paramedian tubercles; abdominal segments strongly lobed laterally; abdominal spiracular tubes strongly projecting; 9th abdominal segment bearing pregomphi and urogomphi, which are comparatively well developed. Body length about 6 mm.

Head-capsule (Pl. 8, A & B) about 0.8 mm. in breadth, 1.7 times as wide as

long (except labrum), moderately widened basally; dorsal hind margin of head-capsule weakly retracted; clypeal protuberances moderately elevated; frontal sutures strongly impressed anteriorly; frontal region distinctly swollen medially; posterior ocelli reduced to 2 spots; setae of head-capsule as illustrated. Antennae (Pl. 10, N) with 1st joint transverse, subequal to 3rd in length; 2nd joint nearly 1.5 times as long as 1st, the sensory appendix about half of 3rd joint in length. Labrum with cephalic margin slightly concave; labroclypeal epipharynx (Pl. 12, B) as illustrated. Mandibles (Pl. 14, A) bidentate apically; cutting part extremely slender; dorsal cutting edge with 3 teeth in right mandible, and with 4 teeth in the left; ventral cutting edge with 2 teeth; prostheca fringed; mola transversely ridged and asperated; external surface markedly swollen medially. Maxillae (Pl. 16, A) with palpiger well defined from stipes; palpus with basal 2 joints subequal in length, and with 3rd joint moderately longer than 2nd; mala transverse, with uncus stout, notched apically. Labium (Pl. 18, A) with palpi moderately separated from each other, about 1.5 times as long as wide; ligula not produced; suture between mentum and submentum indistinct; hypopharyngeal sclerome as illustrated (Pl. 18, L).

Legs (Pl. 20, D) rather small; setae as illustrated; femur and tibia each about 1.5 times as long as wide; tarsungulus almost $\frac{2}{3}$ as long as tibia, strongly curved, considerably produced at base of ventral edge, the posterior seta exceedingly small. Prothorax with presternum much shorter than eusternum. Abdominal tergum (Pl. 22, J) generally with 3 dorso-paramedian setae set quite close, forming together a dorso-paramedian tubercle. Spiracular tubes of 8th abdominal segment longest, projecting posterolaterally beyond lateral lobes of the segment. Ninth abdominal segment (Pl. 27, E & F) with pregomphi erecting; urogomphi slender, gradually upcurved, slightly longer than median length of tergum.

Specimens examined: 9 exs., Yabitsu-tôge, Kanagawa-ken, 20. V. 1968, in fruit bodies of tree-fungus (*Inonotus mikadoi*), N. Hayashi leg. 5 exs., Kirizumi, Gumma-ken, 26. V. 1962, N. Hayashi leg. 40 exs., Amagi-san, Shizuoka-ken, 24. V. 1970, N. Hayashi leg. 25 exs., Tanigawa-dake, Gumma-ken, 27. VI. 1977, N. Hayashi leg.

33. *Cychramus dorsalis* Reitter, 1884

Body (Pl. 4, F) subdepressed; mesothoracic to 8th abdominal terga each with paired dorso-paramedian tubercles; abdominal spiracular tubes moderately produced; abdominal segments prominently lobed laterally; 9th abdominal segment with pregomphi and urogomphi relatively well developed. Body length about 7 mm.

Head-capsule (Pl. 8, C & D) about 0.9 mm. in breadth, 1.6 times as wide as long (except labrum), moderately widened posteriorly; dorsal hind margin of head-capsule strongly retracted; clypeal protuberances moderately swollen; frontal sutures strongly impressed; frontal region distinctly swollen medially; posterior ocelli not reduced, lens-shaped as anterior ocelli; setae of head-capsule as illustrated. Antennae (Pl. 10, O) with 1st joint almost as long as wide; 2nd joint nearly 1.5 times as long as 1st, the sensory appendix about half of 3rd joint in length; 3rd joint half as long as 2nd. Labrum with cephalic margin slightly concave; labroclypeal epipharynx (Pl. 12, C) as illustrated. Mandibles (Pl. 14, B) bidentate apically; cutting part exceedingly slender; dorsal cutting edge with 3 teeth in right

mandible, and with 4 in the left; ventral cutting edge with 3 teeth; prostheca coarsely fringed; mola notably developed, transversely ridged and asperated; external surface of mandible prominently swollen. Maxillae (Pl. 16, B) with basal 2 joints of palpus subequal in length, and 3rd joint about 1.3 times as long as 2nd; mala transverse, with uncus stout, notched apically. Labium (Pl. 18, B) with palpi broadly separated from each other, nearly 1.5 times as long as wide; ligula not produced; suture between mentum and submentum indistinct; hypopharyngeal sclerome as illustrated (Pl. 18, M).

Legs (Pl. 20, E) moderate in length; setae as illustrated; femur and tibia each about twice as long as wide; tarsungulus nearly 2/3 as long as tibia, slightly curved, rather strongly produced at base of ventral edge, with posterior seta extremely small. Prothorax with presternum much shorter than eusternum. Abdominal tergum (Pl. 22, K) generally with 3 dorso-paramedian setae set quite close, forming together a dorso-paramedian tubercle, which is not sclerotized and moderately produced. Abdominal spiracular tubes as long as basal diameter, those of 8th segment equal to or slightly longer than those of the 7th. Ninth abdominal segment (Pl. 27, G & H) markedly attenuate, with pregomphi projecting caudodorsally, with urogomphi slender, projecting straight, abruptly flexed at tip, and slightly longer than median length of tergum.

Specimens examined: 45 exs., Hikosan, Fukuoka-ken, 23-24. X. 1961, in fruit bodies of tree-fungus (*Lampteromyces japonicus*). N. Hayashi leg. 50 exs., Ishizuchi-san, Ehime-ken, 23. X. 1972, N. Hayashi leg. 7 exs., Hanamaki-onsen, Iwate-ken, 13. X. 1965, N. Hayashi leg.

34. *Cychramus variegatus* (Herbst, 1792)

References: Hofeneder, 1935, Zool. Anz., Leipzig 111: 331-332. Böving & Rozen, 1962, Ent. Medd., Copenhagen 31: 256-299, figs. 43-45.

Body bearing dorso-paramedian tubercles; abdominal segments well lobed laterally; abdominal spiracular tubes and lateral swellings well developed. Body length about 7 mm. Similar to *C. dorsalis*, but differs as follows.

Dorso-paramedian tubercles much larger, elongate and sclerotized. Abdominal spiracular tubes much longer, elongate, projecting outwards.

Notes: This species is widely distributed in Japan and Europe. The above-mentioned characters are based upon the descriptions and illustrations by Hofeneder and Böving and Rozen.

35. *Pocadius nobilis* Reitter, 1873

Body (Pl. 4, G) subdepressed; on thoracic and abdominal segments each seta is borne on a small tubercle; mesothoracic to 8th abdominal terga each with a pair of dorso-paramedian tubercles; abdominal segments moderately lobed laterally; abdominal spiracular tubes moderately produced; 9th segment without pregomphi, ending in spiniform urogomphi. Body length about 6.5 mm.

Head-capsule (Pl. 8, E & F) about 0.9 mm. in breadth, 1.3 times as wide as long (except labrum), strongly thickened posteriorly; dorsal hind margin of head-capsule nearly straight, so that the vertex is unusually extensive; clypeal protuberances weak; frontal sutures V-shaped, strongly impressed anteriorly, their bases confluent in a short stem (coronal suture); posterior ocelli reduced to 2

spots; setae of head-capsule as illustrated. Antennae (Pl. 10, P) with 1st joint transverse; 2nd joint about 1.5 times as long as 1st, the sensory appendix nearly half of 3rd joint in length; 3rd joint about half as long as 2nd. Labrum with cephalic margin straight or slightly concave; labroclypeal epipharynx (Pl. 12, D) as illustrated. Mandibles (Pl. 14, C & D) truncate apically into a large, broad tooth on dorsal cutting edge; ventral cutting edge of right mandible without teeth, but that of the left armed with a blunt tooth (Pl. 14, D); prostheca consists of a large brush-like pad and a prominent projection; mola with fine transverse ridges; external surface of mandible weakly produced medially. Maxillae (Pl. 16, C) with 2nd joint of palpus about as long as 3rd, and a little shorter than 1st; mala truncated, distinctly transverse, with uncus notched apically, projecting towards meson; stipes with a large, corneous spine on buccal surface near palpiger, with a transverse groove near base. Labium (Pl. 18, C) with palpi far remote from each other, small, projecting downwards; ligula transverse, highly produced beyond level of palpi; suture between mentum and submentum visible; submentum extremely broad; hypopharyngeal sclerome as illustrated (Pl. 18, N), with anterior horns absent.

Legs (Pl. 20, F) moderate in length; setae as illustrated; femur slightly less than twice as long as wide; tibia about twice as long as wide; tarsungulus about $2/3$ as long as tibia, slender, moderately curved, lacking posterior seta. Prothorax with presternum much shorter than eusternum. Abdominal tergum (Pl. 22, L) generally with 3 dorso-paramedian setae set quite close, forming together a dorso-paramedian tubercle. Abdominal spiracular tubes as long as basal diameter. Ninth abdominal segment (Pl. 27, I & J) with 2 small, unisetiferous tubercles before each urogomphus; urogomphi spiniform in apical half, parallel, straight and projecting caudodorsally.

Specimens examined: 15 exs., Tanzawa, Kanagawa-ken, 15. VII. 1967, in puffballs (*Calvatia craniformis*), N. Hayashi leg. 17 exs., Rôkoku-tôge, Kanagawa-ken, X. 1972, in puffballs (*Lycoperdon* sp.), N. Hayashi leg.

36. *Pocadius* sp.

References: Hayashi & Nakamura, 1958, New Ent. 3(1): 26-34 [*Lycoperdina mandarinea*]. Hayashi, 1959, Illustrated Insect Larvae of Japan, Tôkyô: 448, No. 837 [*Lycoperdina mandarinea*].

Body with setae on thoracic and abdominal segments each borne on a small tubercle, with dorso-paramedian tubercles present. Body length about 7.5 mm. Similar to *P. nobilis*, but differs as follows.

Head-capsule about 1.1 mm. in breadth. Ninth abdominal segment (Pl. 27, K & L) with pregomphi represented by well-developed unisetiferous tubercles (corresponding to inner pair of tubercles at bases of urogomphi in *P. nobilis*). Urogomphi more widened basally, with excision between them wider.

Specimens examined: 8 exs., Tanzawa, Kanagawa-ken, X. 1949, in puffballs (*Lycoperdon* sp.), N. Hayashi leg.

Notes: The larva described and illustrated in the above-mentioned references as belonging to *Lycoperdina mandarinea* Gerstaecker of the family Endomychidae should, in reality, be referred to the present species, *Pocadius* sp.

37. *Pocadites corpulentus* Reitter, 1884

Body (Pl. 4, H) subdepressed, gradually thicker posteriorly; mesothoracic to 8th abdominal terga without tubercles and sclerites, with setae short; abdominal segments moderately lobed laterally; abdominal spiracular tubes moderately produced; 9th abdominal segment bearing small plegomphi and short urogomphi. Body length about 7.5 mm.

Head-capsule (Pl. 8, G & H) about 1 mm. in breadth, 1.8 times as wide as long (except labrum), strongly widened basally; dorsal hind margin of head-capsule weakly retracted; clypeal region relatively small, with protuberances indistinct; frontal sutures moderately impressed; posterodorsal ocellus reduced to a spot, while posteroventral ocellus indistinct or lost; setae of head-capsule as illustrated. Antennae (Pl. 10, Q) with 1st joint almost as long as wide; 2nd joint subequal to 1st in length, the sensory appendix longer than half of 3rd joint; 3rd joint about half as long as 2nd. Labrum comparatively large, with cephalic margin a little produced; labroclypeal epipharynx (Pl. 12, E) as illustrated, lacking median longitudinal ridge and oblique stripes. Mandibles (Pl. 14, E & F) bidentate apically; dorsal cutting edge with 6 teeth in right mandible, and with 7 or 8 in the left; ventral cutting edge with 2 teeth; prostheca swollen, digitated as illustrated (Pl. 14, F); mola covered with microtrichia and asperities, lacking transverse ridges; external surface of mandible markedly produced basally. Maxillae (Pl. 16, D) with 3 joints of palpus subequal in length; mala with inner-lateral bristles well developed, with uncus extremely small, not notched apically. Labium (Pl. 18, D) with palpi well separated from each other, about twice as long as wide; ligula large, projecting beyond apices of palpi, slightly notched apically; suture between mentum and submentum indistinct or lost; hypopharyngeal sclerome as illustrated (Pl. 18, O).

Legs (Pl. 20, G) small; setae as illustrated; femur and tibia each about 1.5 times as long as wide; tarsungulus $\frac{2}{3}$ as long as tibia, moderately curved, lacking posterior seta. Prothorax with presternum much shorter than eusternum. Spiracular tubes of 7th and 8th abdominal segments larger, those of the 8th longest, about twice as long as basal diameter. Ninth abdominal segment (Pl. 28, A & B) strongly tapering towards caudal end; plegomphi blunt apically; urogomphi shorter than median length of tergum, more or less acutely upcurved apically, with distance between their apices less than half of basal breadth of tergum.

Specimens examined: 3 exs., Minamitama, Tōkyō-tōka, 25. VI. 1950, in fruit bodies of tree-fungus, N. Hayashi leg.

38. *Cyllodes ater* (Herbst, 1892)

Body (Pl. 5, A) slightly broadening posteriorly, somewhat depressed; mesothoracic to 8th abdominal terga without tubercles and sclerites, with setae extremely short, each tergum obscurely impressed anteromedially; abdominal segments moderately lobed laterally; abdominal spiracular tubes slightly produced; 9th abdominal segment without plegomphi, terminating in small urogomphi. Body length about 7.5 mm.

Head-capsule (Pl. 8, I & J) about 0.9 mm. in breadth, notably transverse, 2 times as wide as long (except labrum), strikingly widened basally; dorsum with hind margin moderately retracted, with a transverse groove behind each antennal insertion; clypeal region conspicuously narrow, transversely impressed apically

and basally, the clypeal protuberances indistinct; frontal sutures moderately impressed; frontal region with a pair of longitudinal shallow impressions; posterior ocelli normal or slightly reduced; setae of head-capsule as illustrated. Antennae (Pl. 10, R) with 1st joint transverse; 2nd joint about 1.5 times as long as 1st, the sensory appendix nearly half of 3rd joint in length; 3rd joint about half as long as 2nd. Labrum extremely small, the cephalic margin weakly concave; labroclypeal epipharynx (Pl. 12, F) without median longitudinal ridge and oblique stripes. Mandibles (Pl. 14, G) strongly twisted apically, so that the dorsal cutting edge is turned to the outer margin of the apex, with 14 teeth; opposite margin (original ventral cutting edge) with 4 teeth in right mandible, and with 5 in the left; prostheca and mola strongly asperated; external surface of mandible distinctly swollen medially. Maxillae (Pl. 16, E) with 3rd joint of palpus as long as or slightly longer than 1st or 2nd; mala with inner-distal angle strikingly produced, dully pointed, bearing a small bristle, with uncus scarcely notched apically. Labium (Pl. 18, E) with palpi widely separated from each other, 1.5 times as long as wide; ligula large, projecting beyond apices of palpi, with spine-like minute processes on anterior margin; suture between mentum and submentum absent; submentum notably small in comparison with other genera; hypopharyngeal sclerome as illustrated (Pl. 18, P).

Legs (Pl. 20, H) apparently small; setae as illustrated; femur about 1.5 times as long as wide; tibia slightly less than twice as long as wide; tarsungulus (Pl. 20, J) nearly 2/3 as long as tibia, moderately curved, with ventral edge strongly produced at base, with posterior seta similar to ventral seta in shape. Prothorax with presternum much shorter than eusternum. Abdominal spiracular tubes shorter than their own basal diameters. Ninth abdominal segment (Pl. 28, C & D) comparatively very small, with a weak median protuberance on tergum; urogomphi upcurved, shorter than median length of tergum.

Specimens examined: 8 exs., Tanigawa-dake, Gumma-ken, 29. VII. 1967, in fruit bodies of tree-fungus (*Pleurotus ostreatus*), N. Hayashi leg. 15 exs., Tanigawa-dake, Gumma-ken, 13. VII. 1977, N. Hayashi leg.

39. *Cyllodes literatus* (Reitter, 1878)

Body with mesothoracic to 8th abdominal terga without tubercles and sclerites; 9th abdominal segment without pregomphi. Body length about 7.5 mm. Similar to *C. ater*, but differs as follows.

Uncus of maxillary mala without an apical notch. Tarsungulus (Pl. 20, K) with base of ventral edge more strongly produced. Ninth abdominal tergum (Pl. 28, E) without a median protuberance, extensively covered with a slightly pigmented sclerite.

Specimens examined: 5 exs., Sata-misaki, Kagoshima-ken, 6. V. 1964, in fruit bodies of tree-fungus (*Pleurotus* sp.), N. Hayashi leg.

40. *Cyllodes nakanei* Hisamatsu, 1961

Body (Pl. 5, B) rather fusiform, somewhat depressed; mesothoracic to 8th abdominal terga without tubercles and sclerites, abdominal spiracular tubes stout, considerably produced laterally or posteriorly, but the apex not reaching to posterior margin of each segment; 9th abdominal segment without pregomphi,

ending in small, closely set urogomphi. Body length about 7 mm. Similar to *C. ater*, but differs as follows.

Head-capsule (Pl. 8, K) about 0.7 mm. in breadth, 1.9 times as wide as long (except labrum), weakly widened basally; dorsal hind margin of head-capsule strongly retracted; clypeal protuberances feebly swollen. Inner margin of cutting part with 6 and 7 teeth in right and left mandibles respectively (Pl. 14, H); mola more developed; external surface broadly convex. Maxillae with 3rd joint of palpus much longer than 2nd; mala (Pl. 16, F) truncate apically, with inner-distal angle not strongly produced. Legs. (Pl. 20, I) shorter and stouter; femur less than 1.5 times as long as wide; tarsungulus (Pl. 20, L) strongly curved, with ventral edge more strongly produced basally. Ninth abdominal segment (Pl. 28, F & G) without a median protuberance on tergum; urogomphi smaller, parallel, set close and more fleshy. Posterior abdominal segments with minute pubescence of surface more or less distinct. Abdominal spiracular tubes much longer.

Specimens examined: 34 exs., Tanzawa, Kanagawa-ken, 27. VIII. 1977, in fruit bodies of tree-fungus (*Pholiota nameko* ?), N. Hayashi leg.

41. *Oxycnemus lewisi* (Reitter, 1884)

Body (Pl. 5, C) slightly depressed; mesothoracic to 8th abdominal terga without tubercles and sclerites, with setae indistinct, with a pair of transverse swellings on each tergum; thoracic and abdominal spiracular tubes prominently projecting; lateral lobes of abdominal segments moderate; 9th abdominal segment without pregomphi, ending in slender, long urogomphi. Body length about 11 mm.

Head-capsule (Pl. 8, L & M) about 1.5 mm. in breadth, 1.6 times as wide as long (except labrum), more or less parallel-sided; hind margin of head-capsule strongly retracted; clypeal protuberances weak; frontal sutures slightly impressed; ocelli-bearing region feebly raised; posterior ocelli close to anterior ocelli, not reduced; setae as illustrated, several of them are branched apically. Antennae (Pl. 10, S) with 1st joint about as long as wide, or slightly longitudinal; 2nd joint a little longer than 1st, the sensory appendix about half of 3rd joint in length; 3rd joint almost 1/3 as long as 2nd. Labroclypeal epipharynx (Pl. 12, G) as illustrated. Mandibles (Pl. 14, I) with cutting part exceedingly slender; dorsal cutting edge with 5 teeth in right mandible, and with 6 in the left; ventral cutting edge with 3 teeth; protheca fringed; mola notably produced, minutely and transversely ridged; external surface of mandible strikingly swollen, bearing a tuft of microtrichia at base of anterior external seta. Maxillae (Pl. 16, G) with 3 joints of palpus subequal in length; mala enlarged towards apex, rather truncate apically, armed with a small bristle inner-distally, with uncus notched apically. Labrum (Pl. 18, F) with palpi widely separated from each other, about 1.5 times as long as wide; ligula not produced; suture between mentum and submentum absent; hypopharyngeal sclerome as illustrated (Pl. 18, Q).

Legs (Pl. 21, A) elongate; setae as illustrated; femur about 1.5 times as long as wide; tibia twice as long as wide; tarsungulus slender, 2/3 as long as tibia, moderately curved, lacking setae. Prothorax with presternum much shorter than eusternum. Abdominal spiracular tubes about 2.5 times as long as basal diameter. Eighth abdominal segment (Pl. 29, A & B) with hind margin strikingly convex. Ninth abdominal segment (Pl. 29, A & B) exceedingly small; urogomphi fleshy, straight and projecting caudodorsally.

Specimens examined: 30 exs., Kanayama, Yamanashi-ken, 9. VI. 1968, in fruit bodies of fungus (*Phallus impudicus*), N. Hayashi leg.

42. *Pallodes umbratilis* Reitter, 1873

Body (Pl. 5, D) subdepressed; mesothoracic to 8th abdominal terga without tubercles, sclerites and conspicuous setae, with surface of each tergum swollen, obscurely impressed anteromedially; abdominal segments moderately lobed laterally; abdominal spiracular tubes strongly produced beyond lateral lobes of the segments; 9th abdominal segment without pregomphi, terminating in slender urogomphi. Body length about 5.5 mm.

Head-capsule (Pl. 9, A & B) about 0.8 mm. in breadth, 1.9 times as wide as long (except labrum), very weakly widened basally; hind margin of head-capsule strongly retracted; clypeal protuberances strikingly elevated; frontal sutures distinctly impressed anteriorly; posterior group of ocelli absent or represented by 1 or 2 spots; setae of head-capsule as illustrated. Antennae (Pl. 10, T) with 1st joint transverse, and subequal to 3rd in length; 2nd joint about 1.5 times as long as 1st, the sensory appendix half of 3rd joint in length. Labrum with cephalic margin nearly straight; labroclypeal epipharynx (Pl. 12, H) as illustrated, with 2 bristles in each anterolateral part spatulate. Mandibles (Pl. 14, J) with cutting part extremely slender; dorsal cutting edge with 7 teeth; ventral cutting edge with 5 and 6 teeth in right and left mandibles respectively; protheca coarsely fringed; mola well developed, transversely ridged and asperated; external surface of mandible strongly swollen. Maxillae (Pl. 16, H) with 1st and 2nd joints of palpus about equal in length, and nearly $\frac{2}{3}$ as long as 3rd joint; mala more or less truncate and slightly sinuate apically, furnished with a bristle inner-distally, with uncus notched apically, projecting beyond apex of mala. Labium (Pl. 18, G) with palpi well separated from each other; ligula scarcely produced; suture between mentum and submentum absent; hypopharyngeal sclerome as illustrated (Pl. 18, R).

Legs (Pl. 21, B) small; setae as illustrated; femur and tibia each about as long as wide; tarsungulus (Pl. 21, H) a little shorter than tibia, moderately curved, lacking posterior seta, with ventral edge markedly produced basally. Prothorax with presternum much shorter than eusternum. Eighth abdominal tergum with minute pubescence distinct. Ninth abdominal segment (Pl. 28, H & I) with urogomphi weakly upcurved, moderately divergent, and slender in apical half.

Specimens examined: 35 exs., Tanigawa-onsen, Gumma-ken, 13 & 19. VII. 1977, in fruit bodies of some fungi (Agaricales), N. Hayashi leg.

43. *Neopallodes harmandi* Grouvelle, 1902

Body rather fusiform, subdepressed; meothoracic to 8th abdominal terga without tubercles, sclerites and conspicuous setae, with surface of each tergum swollen, obscurely impressed anteromedially; abdominal segments moderately lobed laterally; abdominal spiracular tubes moderately produced, not projecting beyond lateral lobes of the segments; 9th abdominal segment without pregomphi, terminating in small urogomphi. Body length about 5 mm.

Head-capsule (Pl. 9, C & D) about 0.7 mm. in breadth, 1.9 times as wide as long (except labrum), moderately widened basally; hind margin of head-capsule weakly retracted; clypeal protuberances prominently swollen; frontal sutures shallowly impressed; posterior group of ocelli absent or represented by 1 or 2

spots; setae of head-capsule as illustrated. Antennae (Pl. 10, U) with 1st joint transverse; 2nd joint a little longer than 1st, the sensory appendix about half of 3rd joint in length; 3rd joint nearly $2/3$ as long as 2nd. Labrum with cephalic margin straight or slightly concave; labroclypeal epipharynx (Pl. 12, I) as illustrated. Mandibles (Pl. 14, K) with cutting part exceedingly slender; dorsal cutting edge with 7 or 8 teeth; ventral cutting edge with 4 or 5 teeth; prostheca coarsely fringed; mola strikingly produced, transversely ridged and asperated; external surface of mandible conspicuously swollen. Maxillae (Pl. 16, I) with 3 joints of palpus subequal in length, or 3rd joint slightly longer; mala moderately tapered apically, armed with a stout bristle inner-distally, with uncus notched apically, lying more proximally than in *Pallodes umvratilis*. Labium (Pl. 18, H) with palpi short, remote from each other; ligula scarcely produced; suture between mentum and submentum absent; hypophryngeal sclerome as illustrated (Pl. 18, S).

Legs (Pl. 21, C) apparently small; setae distributed as illustrated; femur and tibia each about as long as wide; tarsungulus (Pl. 21, I) subequal to tibia in length, rather strongly curved, with ventral edge strongly produced basally, with posterior seta present, much smaller than ventral seta. Prothorax with presternum much shorter than eusternum. Abdominal spiracular tubes about as long as basal diameter. Ninth abdominal segment (Pl. 28, J & K) with margin between urogomphi narrowly concave; urogomphi more or less acutely erected from tergal plane, parallel or scarcely divergent, and much shorter than median length of tergum.

Specimens examined: 10 exs., Tanigawa-onsen, Gumma-ken, 19. VII. 1977, in fruit bodies of some fungi (Agaricales), N. Hayashi leg.

44. *Neopallodes omogonis* Hisamatsu, 1953

Body with mesothoracic to 8th abdominal terga without tubercles, sclerites and conspicuous setae; 9th abdominal segment with small pregomphi and short urogomphi. Body length about 5 mm. Similar to *N. harmandi*, but differs in the following points.

Clypeal protuberances weakly swollen; Frontal sutures obscurely impressed. Mandibles (Pl. 14, L) with 5 teeth on dorsal cutting edge, with 5 teeth on ventral cutting edge; Maxillary mala (Pl. 16, J) more transverse, more or less truncate apically. Tarsungulus (Pl. 21, J) weakly curved. Thoracic and abdominal terga each with anteromedian impression indistinct. Abdominal spiracular tubes about 1.5 times as long as basal diameter. Pregomphi present (Pl. 28, L & M). Urogomphi well separated from each other, the excision between them being broad; each urogomphus weakly erected from tergal plane.

Specimens examined: 4 exs., Tanigawa-onsen, Gumma-ken, 25. VII. 1977, reared on fruit bodies of some fungi (Agaricales), N. Hayashi leg. 3 exs., Tanigawa-onsen, Gumma-ken, 15. VIII. 1977, reared on some fungi (Agaricales), N. Hayashi leg.

Subfamily Cryptarchinae

45. *Cryptarcha strigata* (Fabricius, 1787)

Body (Pl. 5, E) subdepressed; dorsum adorned with irregularly shaped markings light purple in color; mesothoracic to 8th abdominal terga with 1 to 3

pairs of unisetiferous small tubercles; abdominal spiracular tubes of posterior segments conspicuously elongate; lateral lobes of meso- and metathorax and abdominal segments strongly produced; 9th abdominal segment bearing lateral accessory spines, pregomphi and branched urogomphi. Body length about 6 mm.

Head-capsule (Pl. 9, E & F) about 0.7 mm. in breadth, 1.9 times as wide as long (except labrum); lateral sides moderately widened posteriorly; dorsal hind margin of head-capsule moderately retracted; clypeal protuberances moderately swollen; frontal sutures lightly impressed; frontal region about 2.5 times as long as clypeal region; posterior ocelli reduced to 2 spots; setae of head-capsule as illustrated. Antennae (Pl. 10, V) with 1st joint longitudinal; 2nd joint as long as or slightly longer than 1st, the sensory appendix less than half of 3rd joint in length; 3rd joint about $\frac{2}{3}$ as long as 2nd. Labrum semicircular; labroclypeal epipharynx (Pl. 12, J) as illustrated. Mandibles (Pl. 14, M) bidentate apically; dorsal cutting edge with 3 teeth; ventral cutting edge without teeth; prostheca well fringed; mola transversely ridged, asperated more coarsely on anterior part; external surface of mandible not conspicuously produced, with posterior seta extremely short. Maxillae (Pl. 16, K) with 3rd joint of palpus about 1.5 times as long as 2nd, and a little longer than 1st; mala longitudinal, with uncus more or less slender, slightly notched apically, lying on proximal portion, and with microtrichia on ventrodorsal portion often branched. Labium (Pl. 18, I) with palpi moderately separated from each other, twice as long as wide; ligula prominent; suture between mentum and submentum indistinct; hypopharyngeal sclerome as illustrated (Pl. 18, T).

Legs (Pl. 21, D) moderate in length; setae as illustrated; femur and tibia each about 1.5 times as long as wide; tarsungulus a little shorter than tibia, moderately curved, with setae slender. Prothorax with presternum much shorter than eusternum. Abdominal tergum generally with a transverse row of 6 unisetiferous tubercles, of which the median pair are stronger. Spiracular tubes of 8th abdominal segment (Pl. 29, C & D) longest, projecting beyond lateral lobes of the segment. Ninth abdominal segment (Pl. 29, C & D) consisting chiefly of sclerotized urogomphi; lateral accessory spines and pregomphi well developed and situated on bases of urogomphi; urogomphus trifold apically, the median and outer branches being subequal in length, and the inner branch longest, slightly curved inwards and downwards.

Specimens examined: 27 exs., Minoge, Kanagawa-ken, 4. VI. 1970, reared on fermenting apple-fruit, N. Hayashi leg. 4 exs., Karuizawa, Nagano-ken, 5. VII. 1971, in oozing sap on oak, N. Hayashi leg. 1 ex., Hodakamachi, Nagano-ken, VIII. 1974, in sap on oak, N. Hayashi leg.

46. *Cryptarcha* sp.

Body with irregularly shaped maculations above, light purple in color; abdominal spiracular tubes of posterior segments extremely elongate; 9th abdominal segment bearing lateral accessory spines, pregomphi and branched urogomphi. Body length about 6 mm. Similar to *C. strigata*, but differs in the following points.

Head-capsule (Pl. 9, G) about 0.8 mm. in breadth, more strongly widened posteriorly. Frontal region about 3 times as long as clypeal region. Mandibles with 4 teeth on dorsal cutting edge.

Specimens examined: 5 exs., Kunigami, Is. Okinawa, 2. VI. 1977, reared

on fermenting apple-fruit, N. Hayashi leg.

47. *Glischrochilus japonicus* (Motschulsky, 1857)

References: Fukuda, 1959, Illustrated Insect Larvae of Japan, Tôkyô: 437, fig. 815.
Böving & Rozen, 1962, Ent. Medd., Copenhagen 31: 265-299, fig. 75.

Body (Pl. 5, F) subdepressed, adorned dorsally with irregularly shaped markings light purple in color; terga of all segments except for the 9th without tubercles; each abdominal tergum with a transverse groove; abdominal spiracular tubes moderately produced; lateral lobes of abdominal segments prominent; 9th abdominal segment extensively covered with a corneous sclerite dorsally, bearing pregomphi and branched urogomphi. Body length about 11 mm.

Head-capsule (Pl. 9, H & I) about 1.7 mm. in breadth, twice as wide as long (except labrum), strongly widened posteriorly; dorsal hind margin of head-capsule considerably retracted; clypeal protuberances weakly or moderately swollen; frontal sutures strongly impressed; frontal region with a V-shaped weak impression; posterior ocelli reduced to 2 small spots; setae of head-capsule as illustrated. Antennae (Pl. 10, W) with 1st joint longitudinal; 2nd joint about equal to 1st in length, the sensory appendix extremely small; 3rd joint nearly $\frac{2}{3}$ as long as 2nd. Labrum with cephalic margin slightly retracted medially; labro-clypeal epipharynx (Pl. 12, K) as illustrated. Mandibles (Pl. 14, N) bidentate apically; dorsal cutting edge with a single tooth in right mandible, and with 3 in the left; ventral cutting edge without teeth; prostheca finely fringed; mola with transverse minute stripes, and asperated more coarsely on anterior part; external surface of mandible not distinctly swollen; external setae short, the posterior one being indistinct. Maxillae (Pl. 16, L) with 3rd joint of palpus about as long as or longer than 1st, and the 2nd a little shorter than 1st; mala elongate, with uncus bifurcate, lying on base. Labium (Pl. 18, J) with palpi moderately separated from each other, 2.5 to 3 times as long as wide; ligula markedly produced, but not reaching to apices of palpi; suture between mentum and submentum absent; hypopharyngeal sclerome as illustrated (Pl. 18, U).

Legs (Pl. 21, E) small; setae as illustrated; femur and tibia each about 2.5 times as long as wide; tarsungulus almost $\frac{2}{3}$ as long as tibia, moderately curved, with setae slender. Prothoracic segment with presternum rather large. Spiracular tubes and lateral lobes of posterior segments more developed; the spiracular tubes of the 8th longest, about as long as basal diameter. Abdominal tergum generally with 2 transverse rows of setae, the anterior row consisting of 4 setae and posterior row of 8 setae. Ninth abdominal segment (Pl. 29, E & F) with lateral accessory spines dull, and with pregomphi strongly projecting, not pointed apically; urogomphi stout, bifid apically, the inner branch as long as or slightly longer than outer branch, both not pointed apically.

Specimens examined: 9 exs., Hachiôji, Tôkyô-toka, 12. VII. 1971, in oozing sap on oak, N. Hayashi leg. 4 exs., Minoge, Kanagawa-ken, 21. VI. 1970, in sap on oak, N. Hayashi leg. 2 exs., Jimmuji, Kanagawa-ken, 15. VI. 1969, reared on syrup, N. Hayashi leg. 3 exs., same, 5. VI. 1969, reared on syrup, N. Hayashi leg.

48. *Glischrochilus rufiventris* (Reitter, 1879)

Body with mesothoracic to 8th abdominal terga without tubercles and sclerites; 9th abdominal segment bearing pregomphi and branched urogomphi. Body length

about 6.5 mm. Similar to *G. japonicus*, but differs as follows.

Body more depressed. Head-capsule about 1 mm. in breadth. Antennae with 3 joints subequal in length, the 1st being nearly as long as wide. Dorsal cutting edge of mandible (Pl. 14, O) with 2 to 4 teeth, of which the posteriormost is much larger and bifurcate. Labial palpi about twice as long as wide. Legs (Pl. 21, F) smaller; femur about 1.5 times as long as wide; tibia about twice as long as wide. Mesothoracic to 8th abdominal terga pale, lacking maculations and transverse grooves; setae indistinct. Lateral lobes of abdominal segments not prominent. Spiracular tubes of 8th abdominal segment much longer, nearly 1.5 times as long as basal diameter. Ninth abdominal segment (Pl. 29, G & H) without lateral accessory spines; pregomphi smaller; urogomphi shorter, widened basally, the margin between them narrowly concave; inner branch of each urogomphus about as long as or shorter than outer branch, directed backwards.

Specimens examined: 4 exs., Minoge, Kanagawa-ken, 9. VI. 1970, reared on syrup, N. Hayashi leg. 2 exs., Tanzawa, Kanagawa-ken, 30. V. 1971, in oozing sap on oak, N. Hayashi leg. 2 exs., Tanigawa-onsen, Gumma-ken, 14. VII. 1977, reared on fermenting apple-fruit, N. Hayashi leg. 2 exs., Iyo-gun, Ehime-ken, 15. V. 1964, in galleries of scolytids, S. Hisamatsu leg.

49. *Glischrochilus christophi* (Reitter, 1879)

Body (Pl. 5, G) without tubercles and sclerites on mesothoracic to 8th abdominal terga; 9th abdominal segment bearing pregomphi and branched urogomphi. Body length about 5.5 mm. Similar to *G. japonicus*, but differs as follows.

Body more depressed. Head-capsule (Pl. 9, J) about 0.9 mm. in breadth, more transverse; hind margin moderately retracted; clypeal protuberances scarcely elevated; frontal sutures lightly impressed. Antennal joints decreasing towards apex in length, the 3rd about 2/3 as long as the 1st. Cephalic margin of labrum (Pl. 12, L) strikingly retracted. Mandibles similar to those of *G. rufiventris*, especially in dorsal cutting edge, but external surface of mandible conspicuously produced. Labial palpi about twice as long as wide. Legs similar to those of *G. rufiventris*. Mesothoracic to 8th abdominal terga pale, lacking markings and transverse grooves; setae indistinct. Lateral lobes of abdominal segments not prominent. Ninth abdominal segment (Pl. 29, I & J) without accessory spines; pregomphi smaller; dorsal sclerite less sclerotized; urogomphi smaller, the margin between them being broadly concave; inner branch of each urogomphus much smaller than outer branch, directed inwards.

Specimens examined: 26 exs., Daibosatsu-tôge, Yamanashi-ken, 21. VI. 1961, in sap on oak, N. Hayashi leg.

Notes: The larva of this species is more similar to that of *G. rufiventris* than to that of *G. japonicus* in view of the characters described above, but the differences between them lie in the shapes of the head-capsule, 8th abdominal spiracular tubes, urogomphi, etc.

Subfamily Cybocephalinae

50. *Cybocephalus nipponicus* Endrödy-Younga, 1971

Body (Pl. 5, H) creamy-white, longitudinally elliptical, depressed, adorned dorsally with short capitate setae; thoracic and abdominal spiracles not produced as tubes; meso- and metathoracic and abdominal segments well lobed laterally, bearing long setae; 8th and 9th abdominal segments each with a spiniform tubercle on each side; 9th segment semicircular, lacking pregomphi and urogomphi. Body length about 2 mm.

Head-capsule (Pl. 9, K & L) strongly depressed, about 0.35 mm. in breadth, 2.3 times as wide as long, strongly widened posteriorly; dorsal hind margin of head-capsule strongly retracted; cephalic margin of clypeal region notched; clypeal protuberances absent; frontal sutures rudimentary, nearly V-shaped and colorless; frontoclypeal suture absent, but suggested by a slight groove; venter of head-capsule with sides of mouth-cavity pigmented, with hypostomal rods present; setae of head-capsule as illustrated, with dorsal and lateral setae extremely long, not capitate; anterior and posterior ocelli small. Antennae (Pl. 10, X) with 1st and 2nd joints about as long as wide; 2nd joint nearly 2/3 as long as 1st, the sensory appendix longer than half of 3rd joint; 3rd joint 2 to 3 times as long as 2nd. Labrum indistinct; labroclypeal epipharynx simple, lacking conspicuous projections. Mandibles (Pl. 14, P) simple, lacking teeth and protheca; mola weakly developed. Maxillae (Pl. 16, M) with 3rd joint of palpus longest, almost twice as long as 2nd; mala small, membranous, pointed inwards, bearing 3 setae; palpiger large; stipes small; cardo divided into 2 parts by a groove, of which the posterior one (pseudocardo) is colorless and extremely large. Labium (Pl. 18, K) with palpi set rather close, about twice as long as wide; ligula absent; mentum longitudinal; hypopharyngeal sclerome indistinct.

Legs (Pl. 21, G) medium-sized; setae as illustrated, bearing exceedingly long setae; femur about 1.5 times as long as wide; tibia nearly twice as long as wide, tapering towards tip; tarsungulus half as long as tibia, the posterior seta long and capitate. Presternum of prothoracic segment small. Thoracic and abdominal terga transversely grooved; abdominal terga except the 9th each with 7 pairs of capitate setae. Thoracic and abdominal spiracles (Pl. 21, M) with air tubes (chambers) large, situated on outer side of peritreme. Ninth abdominal segment (Pl. 29, K & L) with 2 pairs of capitate setae on tergum. Tenth abdominal segment slightly produced backwards.

Specimens examined: 11 exs., Kurume, Fukuoka-ken, 11. V. 1970. reared on scale insect (*Chrysomphalus bifasciculatus*) by Dr. M. Tanaka.

KEY TO THE SPECIES BASED ON THE LARVAE

In the preceding pages are given descriptions of the larvae of 50 species belonging to 24 genera. Making use of larval characters the key to the species is intended as follows: -

- | | | |
|---|---|---|
| 1 | Urogomphi absent or reduced to a pair of small tubercles (Pl. 23, A & C; Pl. 29, K) | 2 |
| | | |
| - | Urogomphi present | 4 |
| 2 | Abdominal dorsal setae capitate (Pl. 5, H). Eighth and 9th abdominal segments | |

- each with a spiniform tubercle on lateral side (Pl. 29, K & L). Larvae feeding on scale insects50. *Cybocephalus nipponicus*
- Abdominal dorsal setae not capitate. Eighth and 9th abdominal segments without spiniform tubercles. Larvae feeding on plants 3
- 3 Urogomphi absent (Pl. 23, A & B). Mandibles without prostheca (Pl. 13, A). Body about 3.5 mm in length (Pl. 3, A)1. *Heterhelus japonicus*
- Urogomphi present, but reduced to paired tubercles (Pl. 23, C & D). Mandibles with prostheca (Pl. 13, B). Body about 4.5 mm. in length (Pl. 3, B) 2. *Meligethes violaceus*
- 4 Thoracic and abdominal terga each extensively covered with paired granulated sclerites (Pl. 3, G & H; Pl. 4, A). Anal hooks present or absent (Pl. 26, F) 5
- Thoracic and abdominal terga each not covered with paired granulated sclerites. Anal hooks absent 15
- 5 Abdominal spiracular tubes elongate and projecting outwards (Pl. 4, A). Anal hooks absent26. *Amphicrossus japonicus*
- Abdominal spiracular tubes not elongate to project outwards. Anal hooks present 6
- 6 Mesothoracic to 8th abdominal terga strongly produced laterally so that each abdominal spiracle is completely concealed under the tergum as seen from above (Pl. 3, H). Body about 9 mm. in length25. *Aphenolia pseudosoronia*
- Mesothoracic to 8th abdominal terga not strongly produced laterally, each abdominal spiracle not concealed under tergum (Pl. 3, G). Body less than 8 mm. in length (*Epuraea* & *Haptoncus*) 7
- 7 Ninth abdominal tergum with subpregomphi (Pl. 25, A to D) 8
- Ninth abdominal tergum without subpregomphi (Pl. 25, E to G; Pl. 26, A & B).... 11
- 8 Granules of abdominal terga larger, with lanceolate or bifurcate, short to long setae (Pl. 25, A & B). Urogomphi longer, covered with sharply pointed asperities (Pl. 25, H & I) 9
- Granules of abdominal terga smaller, with ligulate or obovate short setae (Pl. 25, C & D). Urogomphi shorter, covered with bluntly pointed asperities (Pl. 25, J & K) 10
- 9 Apical seta of pregomphus medium-sized, subequal to pregomphus in length (Pl. 25, A). Head-capsule more than 0.5 mm. in breadth17. *Epuraea argus*
- Apical seta of pregomphus shorter than pregomphus (Pl. 25, B). Head-capsule less than 0.5 mm. in breadth 18. *Epuraea pellax*
- 10 Dorsal cutting edge of mandible with 4 or 5 teeth. Body about 5.5 mm. in length19. *Epuraea funeraria*
- Dorsal cutting edge of mandible with 6 to 8 teeth (Pl. 13, J). Body about 5 mm. in length20. *Epuraea foveicollis*
- 11 Anterior asperities of 9th abdominal tergum strewn (Pl. 25, F). Body more than 4.5 mm. in length 12
- Anterior asperities of 9th abdominal tergum often transversely connected to each other (Pl. 25, G; Pl. 26, A & B). Body less than 4.5 mm. in length 13
- 12 Setae of abdominal terga not frayed apically (Pl. 25, E). Urogomphus slender, lacking asperities on surface (Pl. 25, L)21. *Epuraea bergeri*
- Setae of abdominal terga frayed apically, forming a lanceolate or bifurcate apex (Pl. 25, F). Urogomphus not slender, asperated (Pl. 25, M)16. *Epuraea harmandi*
- 13 Dorsal cutting edge with 3 teeth in right mandible and with 4 in the left. Lateral granules of 9th abdominal tergum not extremely strong (Pl. 25, G)..... 22. *Epuraea paulula*
- Dorsal cutting edge with 2 teeth in right mandible and with 3 in the left. Lateral granules of 9th abdominal tergum extremely strong 14
- 14 Setae of abdominal terga not short. Ninth abdominal tergum with 3 granules cephalad of each pregomphus (Pl. 26, A). Urogomphus not slender, asperated (Pl. 26, C)23. *Haptoncus ocularis*
- Setae of abdominal terga short. Ninth abdominal tergum with 2 granules

	cephalad of each pregomphus (Pl. 26, B). Urogomphus slender, not asperated (Pl. 26, D)	24. <i>Haptoncus luteolus</i>	16
15	Urogomphus unbranched apically		16
	- Urogomphus branched apically		43
16	Presternum of prothoracic segment large, subequal to eusternum in length (Pl. 22, M). Ninth abdominal segment extensively covered with a dorsal sclerite; with lateral accessory spine on each side (Pl. 23, E; Pl. 24, A) (<i>Carpophilus</i>)		17
	- Presternum of prothoracic segment small, much shorter than eusternum. Ninth abdominal segment usually without a dorsal sclerite; without lateral accessory spine on each side		23
17	First 7 or 8 abdominal terga each with an assemblage of spines or granules paramedially (Pl. 3, D; Pl. 22, C & D)		18
	- First 7 or 8 abdominal terga each without an assemblage of spines or granules paramedially		19
18	First to 7th abdominal terga each with paired dorso-paramedian sclerites (Pl. 22, D). Urogomphi notably enlarged basally; inner margins converging to base (Pl. 23, E). Body about 7 mm. in length	12. <i>Carpophilus humeralis</i>	
	- First to 7th abdominal terga each without paired dorso-paramedian sclerites (Pl. 22, C). Urogomphi slender; inner margins not converging to base (Pl. 24, K). Body about 4 mm. in length	11. <i>Carpophilus sibiricus</i>	
19	Meso- and metathoracic terga each without paired sclerites (Pl. 3, C)	3. <i>Carpophilus delkeshampi</i> or 4. <i>C. hemipterus</i>	
	- Meso- and metathoracic terga each with paired sclerites		20
20	Anterior and posterior ocelli indistinct or lost. Abdominal terga each with a pair of transverse oval patches of microscopic asperities	5. <i>Carpophilus marginellus</i>	
	- Anterior ocelli distinct, but posterior ocelli frequently indistinct. Abdominal terga each without a pair of transverse oval patches of microscopic asperities		21
21	Excision between urogomphi broad (Pl. 24, I). Body about 6.5 mm. in length	10. <i>Carpophilus titanus</i>	
	- Excision between urogomphi narrow (Pl. 24, E & G). Body less than 6 mm. in length		22
22	Pregomphi and urogomphi pointed apically; basal part (hump) of urogomphus about as long as wide, bulge-shaped (Pl. 24, E & F). Body less than 6 mm. in length	6. <i>Carpophilus freemani</i> , 7. <i>C. pilosellus</i> or 8. <i>C. dimidiatus</i>	
	- Pregomphi and urogomphi not pointed apically; basal part (hump) of urogomphus longitudinal, gradually tapered towards apex (Pl. 24, G & H). Body about 6 mm. in length	9. <i>Carpophilus mutilatus</i>	
23.	Labroclypeal epipharynx with median longitudinal ridge and oblique stripes (Pl. 2, A)		24
	- Labroclypeal epipharynx without median longitudinal ridge and oblique stripes (Pl. 11, E; Pl. 12, E & F)		38
24	Abdominal terga each with unisetiferous tubercles (Pl. 22, G & H) or paired dorso-paramedian tubercles (Pl. 22, I to L)		25
	- Abdominal terga except the 9th without tubercles		34
25	Mesothoracic to 8th abdominal terga without paired dorso-paramedian tubercles (Pl. 22, G & H)		26
	- Mesothoracic to 8th abdominal terga with paired dorso-paramedian tubercles (Pl. 22, I to L).....		27
26	Abdominal tergum generally with 2 of dorso-paramedian setae set well close together (Pl. 22, G). Ventral cutting edge of mandible with 3 teeth (Pl. 13, N). Body about 8 mm. in length (Pl. 4, C).....	30. <i>Atarphia quadripunctata</i>	
	- Abdominal tergum generally with dorso-paramedian setae set well separated from each other (Pl. 22, H). Ventral cutting edge of mandible without teeth (Pl. 13, O). Body about 6 mm. in length (Pl. 4, D)	31. <i>Aethina maculicollis</i>	
27	Mesothoracic to 8th abdominal terga with paired dorso-paramedian sclerites (Pl. 1, A; Pl. 4, B)		28

- Mesothoracic to 8th abdominal terga without paired dorso-paramedian sclerites... 30
- 28 Dorso-paramedian tubercles, and also dorso-paramedian sclerites, moderately separated from each other on each tergum (Pl. 1, A). Body about 11 mm. in length29. *Lasiodactylus pictus*
- Dorso-paramedian tubercles, and also dorso-paramedian sclerites, set close together on each tergum (Pl. 4, B). Body about 6 mm. (*Soronia*) 29
- 29 Dorso-paramedian tubercle of abdominal tergum feebly raised; setae not blunt (Pl. 26, K)27. *Soronia lewisi*
- Dorso-paramedian tubercle of abdominal tergum strongly raised; setae blunt (Pl. 26, L)28. *Soronia japonica*
- 30 Abdominal tergum generally with some unisetiferous tubercles besides dorso-paramedian tubercles (Pl. 22, L). Abdominal segments not strongly lobed laterally (Pl. 4, G). Frontal sutures V-shaped (Pl. 8, E). Urogomphi comparatively short, parallel (Pl. 27, I to L) (*Pocadius*) 31
- Abdominal tergum without unisetiferous tubercles in addition to dorso-paramedian tubercles (Pl. 22, J & K). Abdominal segments strongly lobed laterally (Pl. 4, E & F). Frontal sutures not V-shaped. Urogomphi comparatively long, moderately diverging (Pl. 27, E to H) 32
- 31 Pregomphi absent (Pl. 27, I & J)35. *Pocadius nobilis*
- Pregomphi present (Pl. 27, K & L)36. *Pocadius* sp.
- 32 Ocelli not extremely developed; posterior ocelli reduced to 2 spots (Pl. 8, A)....
.....32. *Physoronia explanata*
- Ocelli extremely developed; posterior ocelli normal, or only ventral one reduced to a spot (Pl. 8, C) (*Cychramus*) 33
- 33 Dorso-paramedian tubercles of thoracic and abdominal terga moderately produced, not forming elongate, sclerotized projections (Pl. 4, F). Abdominal spiracular tubes moderately produced (Pl. 4, F).33. *Cychramus dorsalis*
- Dorso-paramedian tubercles of thoracic and abdominal terga strikingly produced, forming elongate, sclerotized projections. Abdominal spiracular tubes extremely produced34. *Cychramus variegatus*
- 34 Mesothoracic to 8th abdominal terga with paired dorso-paramedian sclerites (Pl. 3, F; Pl. 22, F). Cutting part of mandible not slender; ventral cutting edge without teeth (Pl. 13, H). Larva feeding on various substances15. *Omosita colon*
- Mesothoracic to 8th abdominal terga without paired dorso-paramedian sclerites. Cutting part of mandible slender; ventral cutting edge with teeth (Pl. 14, I to L). Larvae feeding on fruit bodies of fungi 35
- 35 Thoracic and abdominal spiracular tubes strongly projecting, about 2.5 times as long as basal diameter in abdominal ones (Pl. 5, C). Urogomphi elongate (Pl. 29, A & B). Body about 11 mm. in length41. *Oxycnemus lewisi*
- Thoracic and abdominal spiracular tubes slightly to moderately projecting, less than 2.5 times as long as basal diameter in abdominal ones. Urogomphi not elongate. Body less than 7 mm. in length 36
- 36 Abdominal spiracular tubes 1.5 to 2 times as long as basal diameter (Pl. 5, D; Pl. 28, H). Urogomphi not small, slender in apical half (Pl. 28, H & I). Pregomphi absent. Tarsungulus without posterior seta (Pl. 21, B)42. *Pallodes umbratilis*
- Abdominal spiracular tubes 1 to 1.5 times as long as basal diameter. Urogomphi small, gradually tapered towards tips. Pregomphi present or absent. Tarsungulus with posterior seta (*Neopallodes*) 37
- 37 Pregomphi absent (Pl. 28, J & K). Urogomphi more or less contiguous at base. Abdominal spiracular tubes about as long as basal diameter (Pl. 28, J)
.....43. *Neopallodes harmandi*
- Pregomphi present (Pl. 28, L & M). Urogomphi more or less widely separated at base. Abdominal spiracular tubes about 1.5 times as long as basal diameter (Pl. 28, L)44. *Neopallodes omogonis*
- 38 Mandibular apex strongly twisted, so that the dorsal and ventral cutting edges are respectively turned to the outer and inner margins of the apex (Pl. 14, G & H)

	(<i>Cyllodes</i>)	39
-	Mandibular apex not twisted	41
39	Abdominal spiracular tubes long (Pl. 5, B). Urogomphi extremely small, contiguous to each other, parallel or slightly incurved (Pl. 28, F & G)	40. <i>Cyllodes nakanei</i>
-	Abdominal spiracular tubes short (Pl. 5, A). Urogomphi not extremely small, not contiguous to each other, slightly diverging, and upcurved (Pl. 28, C to E) ..	40
40	Ninth abdominal tergum with a small protuberance medially; dorsal sclerite absent (Pl. 28, C & D). Tarsungulus of each leg moderately produced basally (Pl. 20, J) ..	38. <i>Cyllodes ater</i>
-	Ninth abdominal tergum without a small protuberance medially; dorsal sclerite present (Pl. 28, E). Tarsungulus of each leg strikingly produced basally (Pl. 20, K)	39. <i>Cyllodes literatus</i>
41	Thoracic and abdominal terga without long setae (Pl. 4, H). Mandible with 6 to 8 teeth on dorsal cutting edge; prostheca well elevated, without a prominent projection (Pl. 14, E & F). Spiracular tubes of 8th abdominal segment twice as long as basal diameter (Pl. 28, A). Urogomphi short; distance between tips less than half of anterior width of tergum (Pl. 28, A & B). Body about 7.5 mm. in length	37. <i>Pocadites corpulentus</i>
-	Thoracic and abdominal terga with long setae (Pl. 3, E; Pl. 22, E). Mandible with 4 teeth on dorsal cutting edge; prostheca not elevated, with a prominent projection (Pl. 13, G). Spiracular tubes of 8th abdominal segment about as long as basal diameter (Pl. 23, G). Urogomphi moderate in length; distance between tips more than half of anterior width of tergum (Pl. 23, G to J). Body less than 5.5 mm. in length (<i>Ipidia</i>)	42
42	Urogomphi acutely upcurved apically, weakly widened basally; margin between them broadly concave (Pl. 23, G & H). Body more than 4.5 mm. in length	13. <i>Ipidia variolosa</i>
-	Urogomphi more or less evenly upcurved, strongly widened basally; margin between them narrowly concave (Pl. 23, I & J). Body less than 4.5 mm. in length	14. <i>Ipidia sibirica</i>
43	Thoracic and abdominal terga with markings (Pl. 5, E). Lateral accessory spines present, strongly raised (Pl. 29, C & D). Urogomphi trifid apically (Pl. 29, C & D) (<i>Cryptarcha</i>)	44
-	Thoracic and abdominal terga with or without markings (Pl. 5, F & G). Lateral accessory spines present or absent, when present weakly raised (Pl. 29, E & F). Urogomphi bifid apically (Pl. 29, E & F) (<i>Glischrochilus</i>)	45
44	Frontal region about 2.5 times as long as clypeal region (Pl. 9, E). Mandibles with 3 teeth on dorsal cutting edge (Pl. 14, M)	45. <i>Cryptarcha strigata</i>
-	Frontal region about 3 times as long as clypeal region (Pl. 9, G). Mandibles with 4 teeth on dorsal cutting edge	46. <i>Cryptarcha</i> sp.
45	Thoracic and abdominal terga with markings (Pl. 5, F). Mandibles with posteriormost tooth of dorsal cutting edge not much larger than the rest and not bifurcate apically (Pl. 14, N). Lateral accessory spines present (Pl. 29, E & F). Urogomphi larger; inner branch equal to or slightly longer than outer branch (Pl. 29, E & F). Body more than 8 mm. in length	47. <i>Glischrochilus japonicus</i>
-	Thoracic and abdominal terga without markings (Pl. 5, G). Mandibles with posteriormost tooth of dorsal cutting edge much larger than the rest and bifurcate apically (Pl. 14, O). Lateral accessory spines absent (Pl. 29, G to J). Urogomphi shorter; inner branch as long as or shorter than outer branch (Pl. 29, G to J). Body less than 8 mm. in length	46
46	Spiracular tubes of 8th abdominal segment 1.5 times as long as basal diameter (Pl. 29, G & H). Urogomphi strongly widened basally; excision between them narrow; inner branch equal to or shorter than outer branch, directed backwards (Pl. 29, G & H). Body about 7 mm. in length	48. <i>Glischrochilus rufiventris</i>
-	Spiracular tubes of 8th abdominal segment about as long as basal diameter (Pl. 29, I & J). Urogomphi moderately widened basally; excision between them broad;	

inner branch shorter than outer branch, directed inwards (Pl. 29, I & J). Body about 5.5 mm. in length49. *Glischrochilus christophi*

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PLATES

Plate I

Larva of *Lasiodactylus pictus*.

A: Larva (dorsal view) (as: abdominal spiracle. lb: lateral lobe. ts: metathoracic spiracle). B: ditto (ventral view) (ps: presternum of prothoracic segment). C: Third abdominal segment (right half) (as: abdominal spiracle. dps: dorso-paramedian setae. dpt: dorso-paramedian tubercle. dsc: dorso-paramedian sclerite. lb: lateral lobe). D: Third abdominal spiracle (right; anterior view) (at: air tubes. pe: peritreme. su: spiracular tube. tr: trachea). E: Head (dorsal view) (cl: clypeal region. fr: frontal region. fs: frontal suture. la: labrum). F: ditto (ventral view) (aa: maxillary articulating area. ca: cardo. ma: mala. mt: mentum. pm: prementum. sm: submentum. st: stipes). G: ditto (lateral view) (ao: anterior ocelli. cp: clypeal protuberances. la: labrum. po: posterior ocelli). H: Antenna (right; ventral view) (a1, a2, a3: 1st, 2nd and 3rd joints of antenna. sa: sensory appendix).

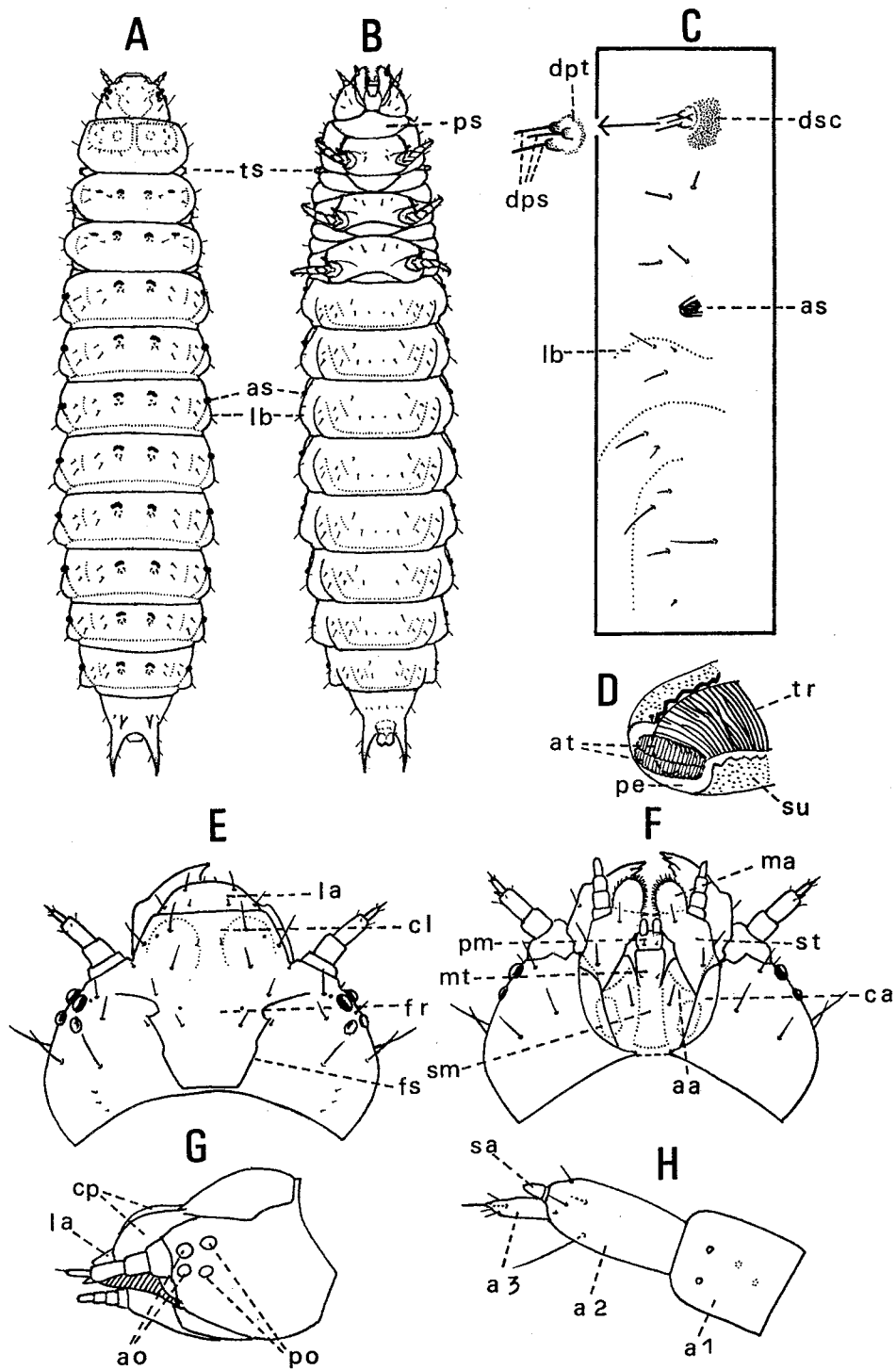


Plate II

Larva of *Lasiodactylus pictus*.

A: Labroclypeal epipharynx (ab: anterolateral bristles. mr: median longitudinal ridge. os: oblique stripes). B: Mandible (left; ventral view) (es: external setae. mo: mola. pr: prosthema). C: ditto (right; inner surface of apex) (dc: dorsal cutting edge. vc: ventral cutting edge). D: Maxilla (left; anterior part, buccal view) (ib: inner-lateral bristles. m1, m2, m3: 1st, 2nd and 3rd joints of maxillary palpus. ma: mala. mi: microtrichia. pa: palpiger. un: uncus). E: Labium and hypopharynx (left half: labium, right half: hypopharynx) (ah: anterior horns. br: bracon. hs: hypopharyngeal sclerome. li: ligula. lp: labial palpi. mt: mentum. pm: prementum. sl: superligula). F: Metathoracic leg (right; posterior view) (co: coxa. fe: femur. pst: posterior seta of tarsungulus. ta: tarsungulus. tc: trochanter. ti: tibia. vst: ventral seta of tarsungulus). G: Eighth and 9th abdominal segments (lb: lateral lobe. pg: pregomphi. su: spiracular tube. ug: urogomphi). H: Eighth to 10th abdominal segments (lateral view) (s10: 10th abdominal segment. sn: sternum. tg: tergum).

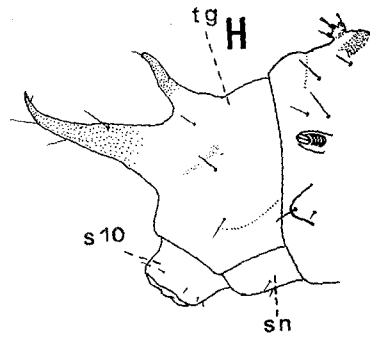
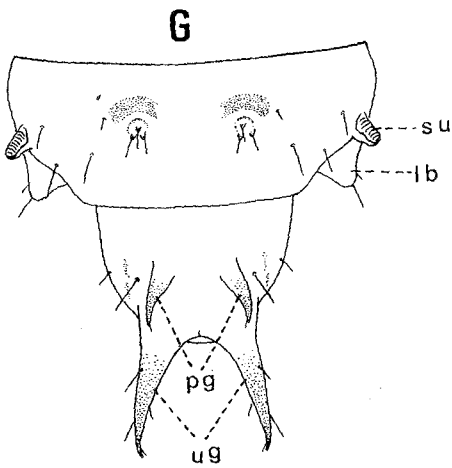
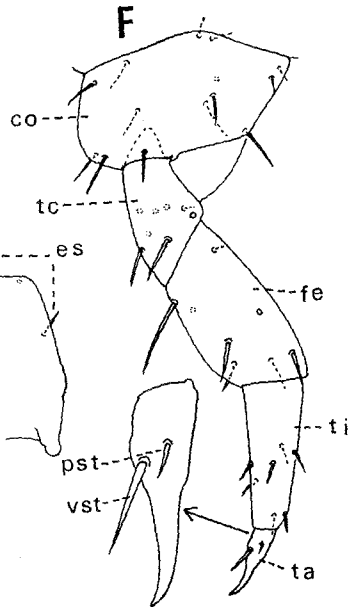
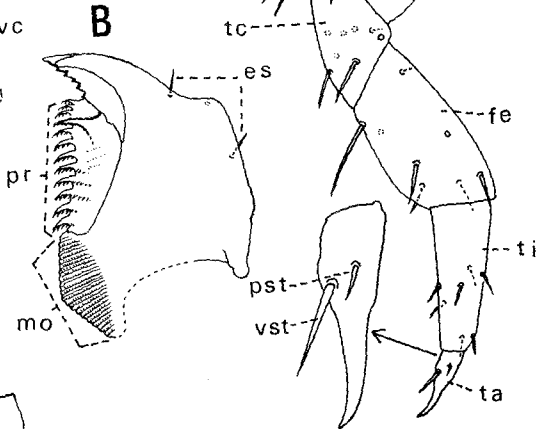
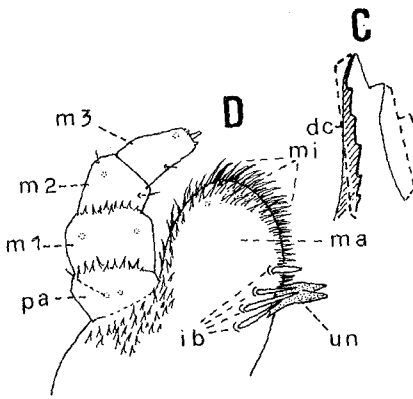
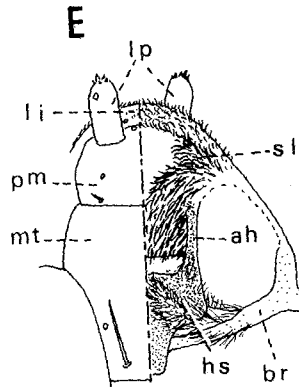
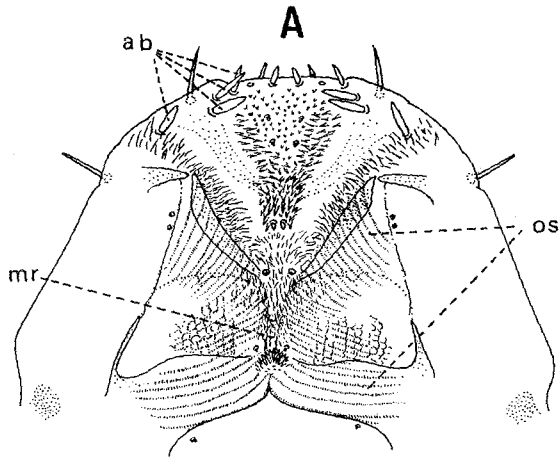


Plate III

Larvae (dorsal view).

A: *Heterhelus japonicus*. B: *Meligethes violaceus*. C: *Carpophilus delkeskampi*. D: *Carpophilus humeralis*. E: *Ipidia variolosa*. F: *Omosita colon*. G: *Epuraea harmandi*. H: *Aphenolia pseudosoronia*.

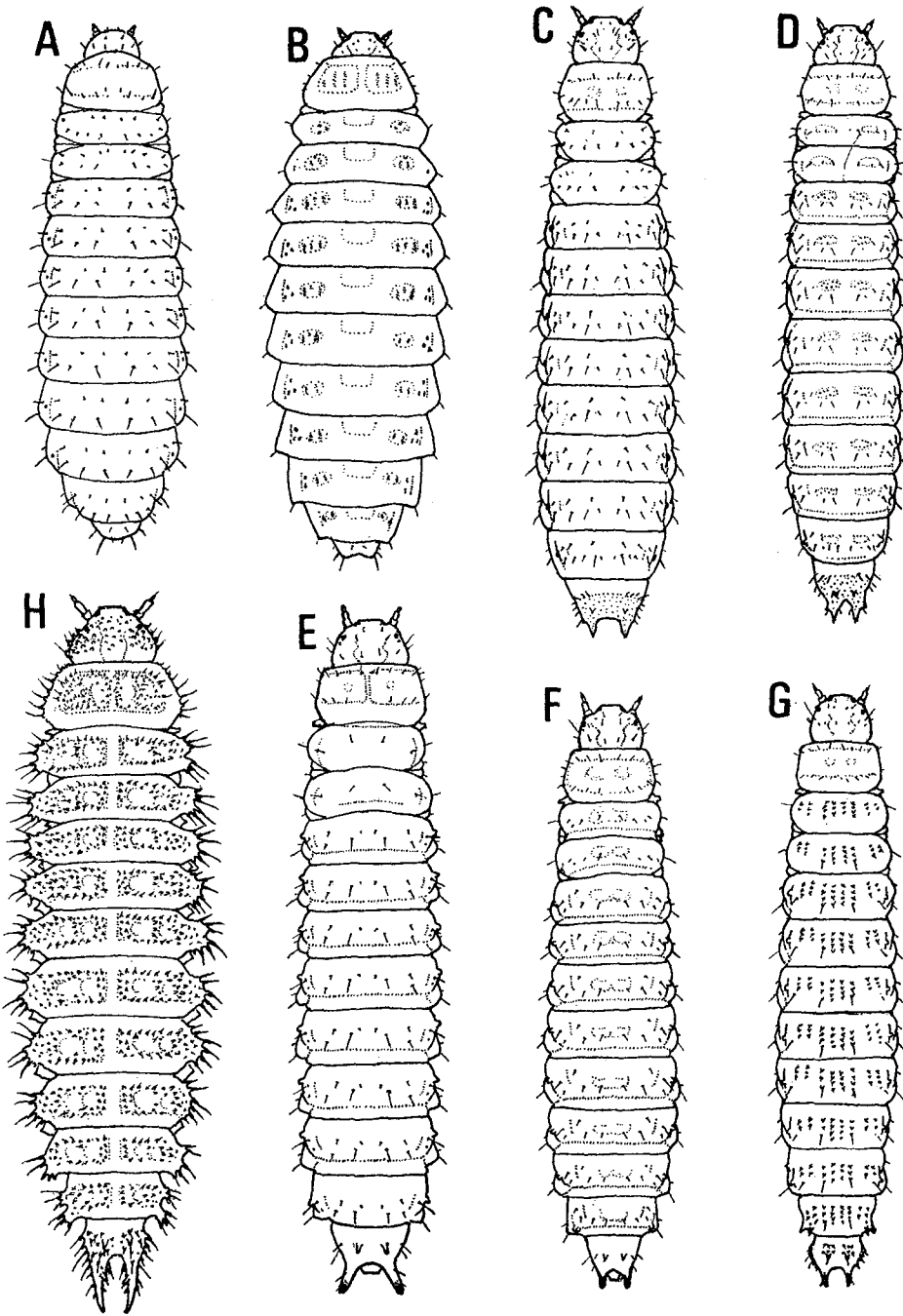


Plate IV

Larvae (dorsal view).

A: *Amphicrossus japonicus*. B: *Soronia lewisi*. C: *Atarphia quadripunctata*. D: *Aethina maculicollis*. E: *Physoronia explanata*. F: *Cychramus dorsalis*. G: *Pocadius nobilis*. H: *Pocadites corpulentus*.

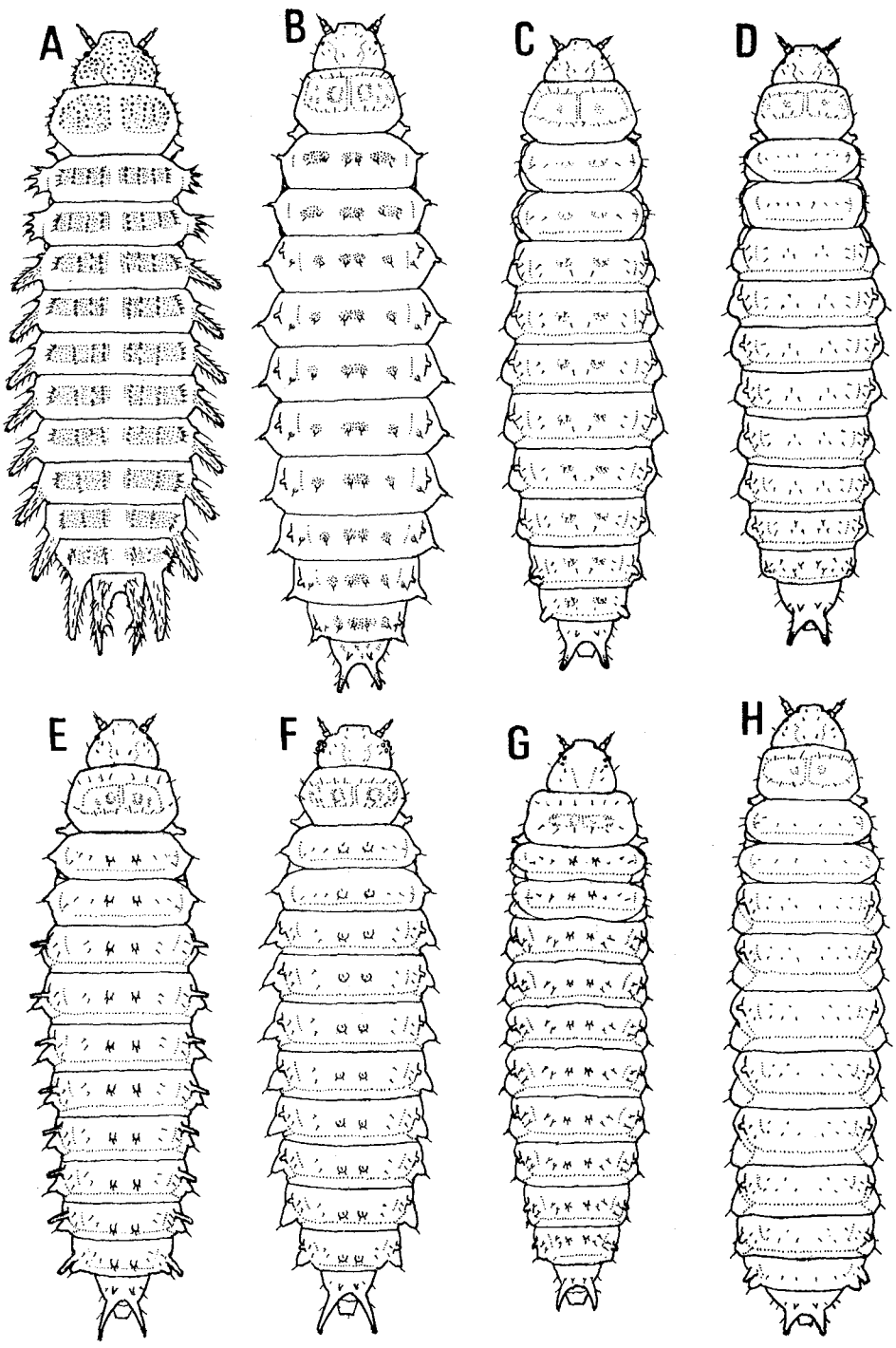


Plate V

Larvae (dorsal view).

A: *Cyllodes ater*. B: *Cyllodes nakanei*. C: *Oxycnemus lewisi*. D: *Pallodes umbratilis*.
E: *Cryptarcha strigata*. F: *Glischrochilus japonicus*. G: *Glischrochilus christophi*.
H: *Cybocephalus nipponicus*.

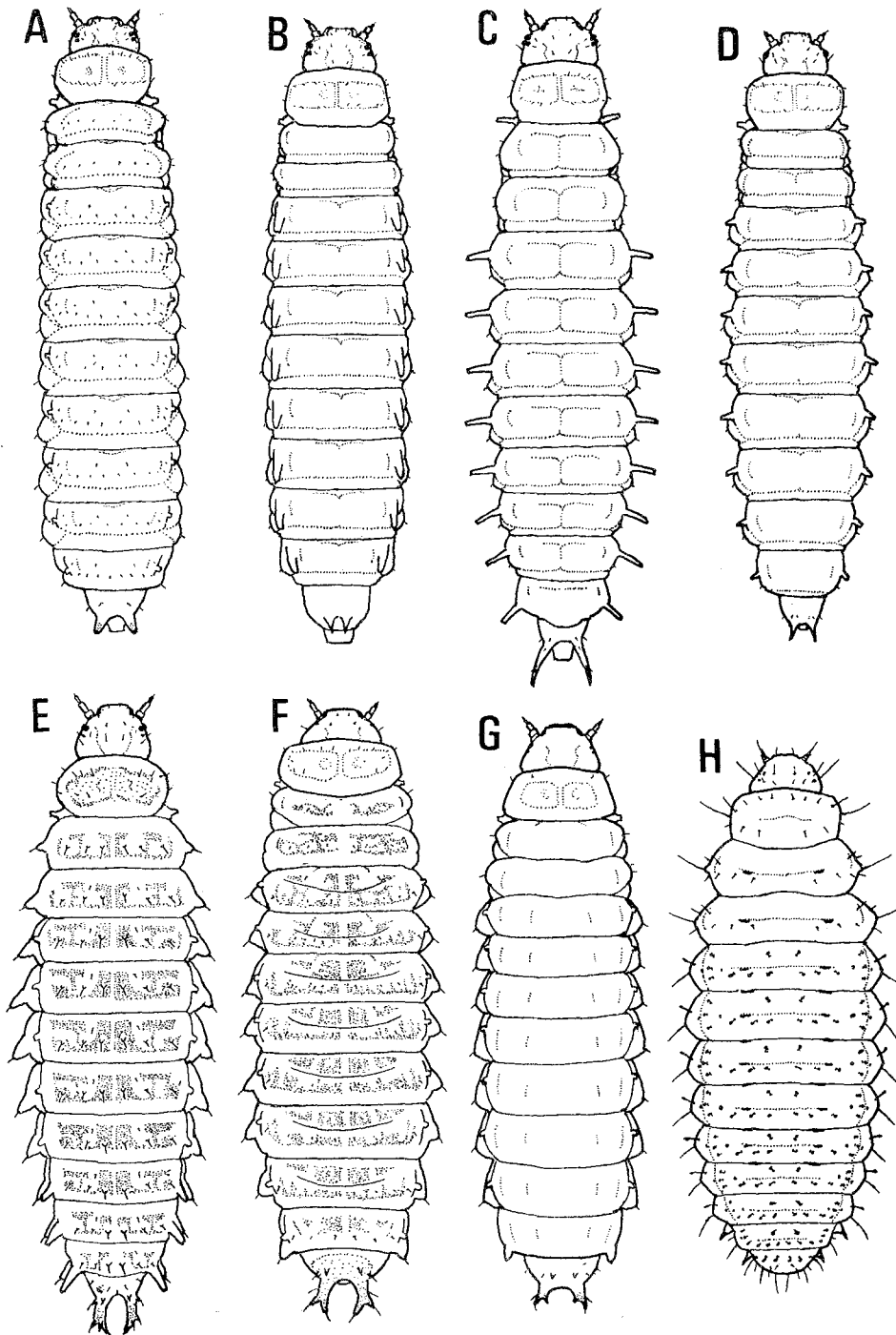


Plate VI

Heads.

A: *Heterhelus japonicus* (dorsal view). B: ditto (ventral view) (hr: hypostomal rod).
C: *Meligethes violaceus* (dorsal view). D: ditto (ventral view). E: *Carpophilus delkeskampii* (dorsal view). F: ditto (ventral view). G: *Carpophilus humeralis* (dorsal view). H: ditto (ventral view). I: *Ipidia variolosa* (dorsal view). J: ditto (ventral view).
K: *Omosita colon* (dorsal view). L: ditto (ventral view).

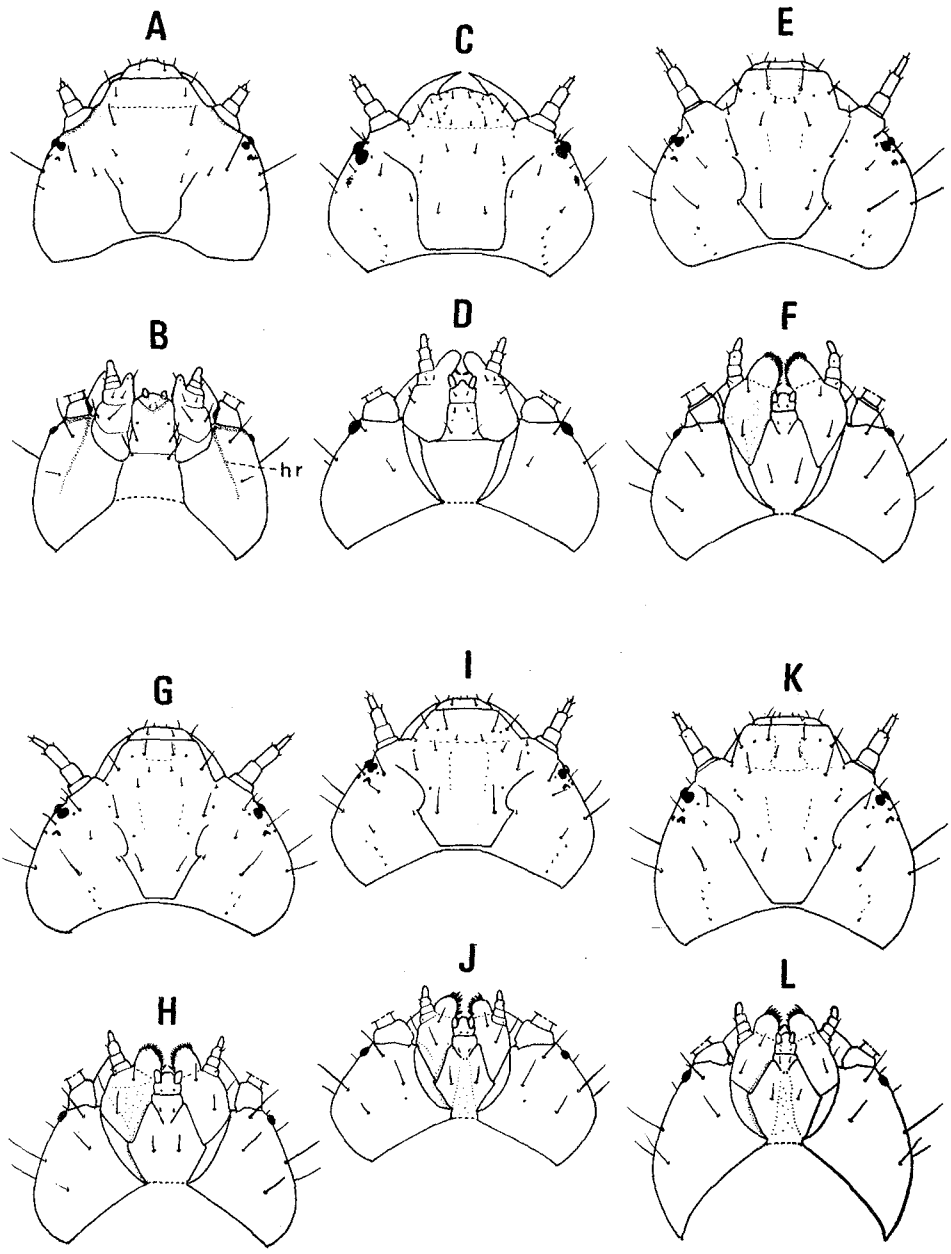


Plate VII

Heads.

A: *Epuraea harmandi* (dorsal view). B: ditto (ventral view). C: *Aphenolia pseudosoronia* (dorsal view). D: ditto (ventral view). E: *Amphicrossus japonicus* (dorsal view). F: ditto (ventral view). G: *Soronia lewisi* (dorsal view). H: ditto (ventral view). I: *Atarphia quadripunctata* (dorsal view). J: ditto (ventral view). K: *Aethina maculicollis* (dorsal view). L: ditto (ventral view).

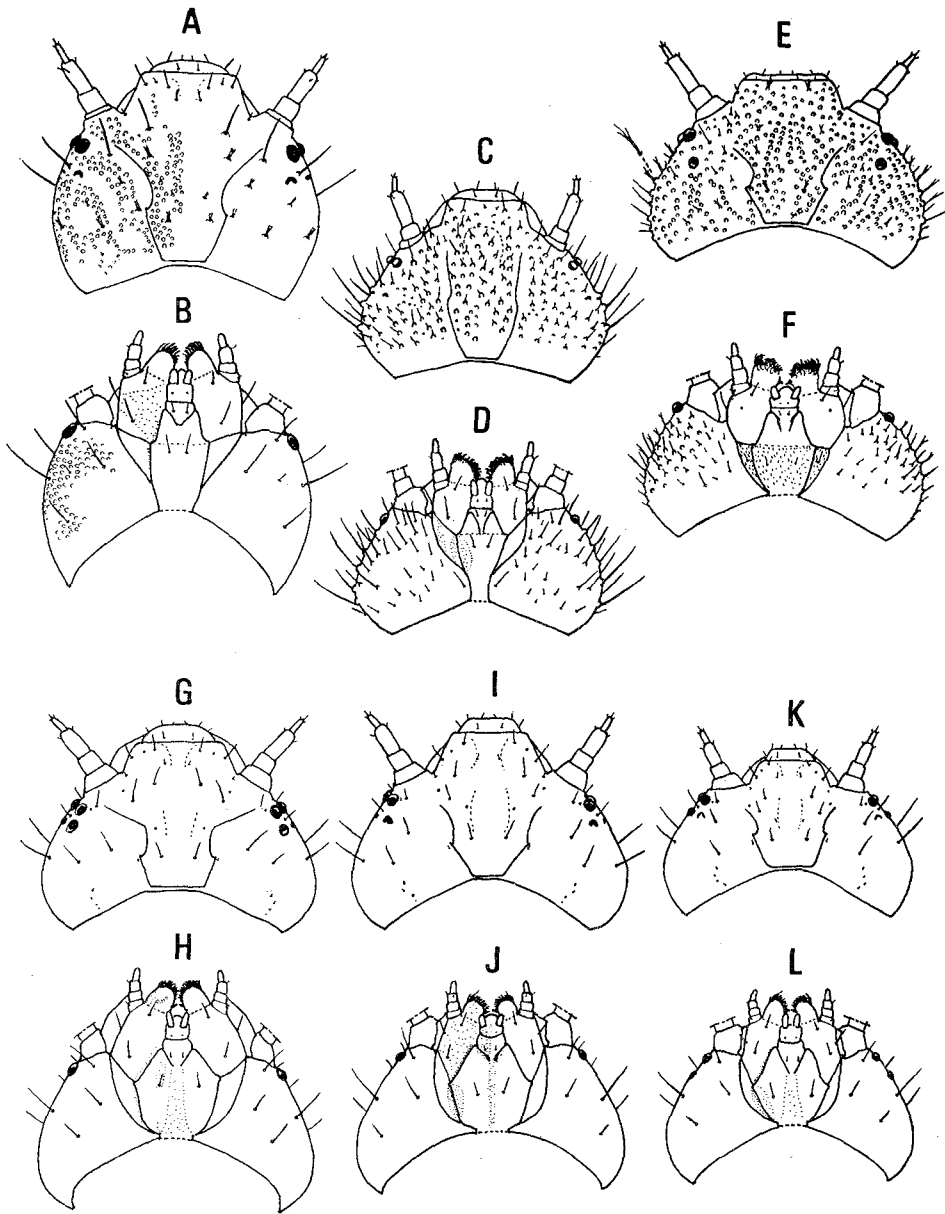


Plate VIII

Heads.

A: *Physoronia explanata* (dorsal view). B: ditto (ventral view). C: *Cyckramus dorsalis* (dorsal view). D: ditto (ventral view). E: *Pocadius nobilis* (dorsal view). F: ditto (ventral view). G: *Pocadites corpulentus* (dorsal view). H: ditto (ventral view). I: *Cyllodes ater* (dorsal view). J: ditto (ventral view). K: *Cyllodes nakanei* (dorsal view). L: *Oxycnemus lewisi* (dorsal view). M: ditto (ventral view).

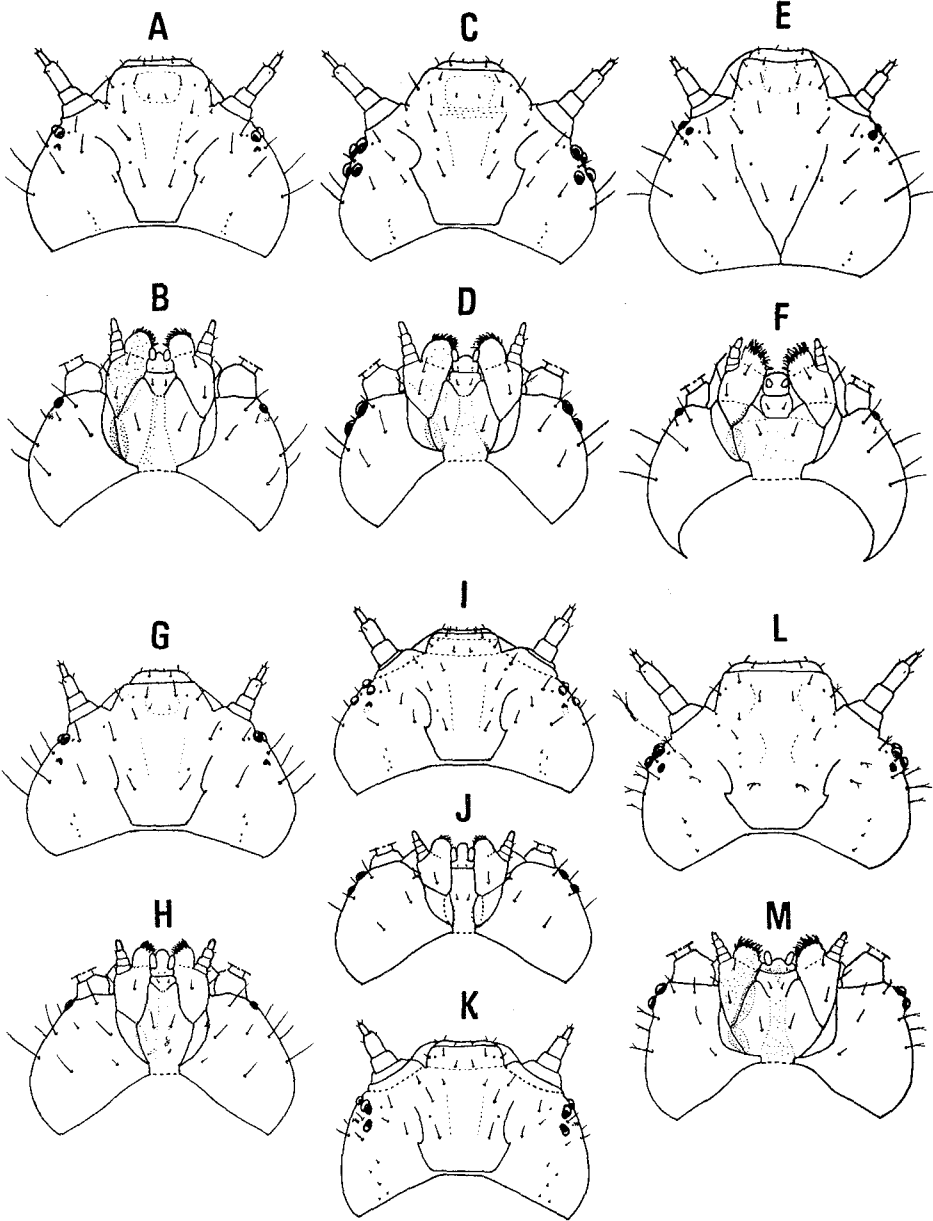


Plate IX

Heads.

A: *Pallodes umbratilis* (dorsal view). B: ditto (ventral view). C: *Neopallodes harmandi* (dorsal view). D: ditto (ventral view). E: *Cryptarcha strigata* (dorsal view). F: ditto (ventral view). G: *Cryptarcha* sp. (dorsal view). H: *Glischrochilus japonicus* (dorsal view). I: ditto (ventral view). J: *Glischrochilus christophi* (dorsal view). K: *Cybocephalus nipponicus* (dorsal view). L: ditto (ventral view). (hr: hypostomal rod).

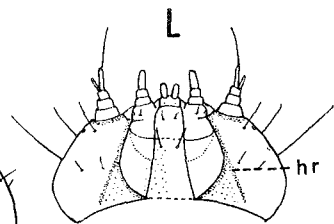
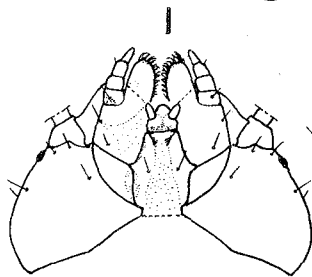
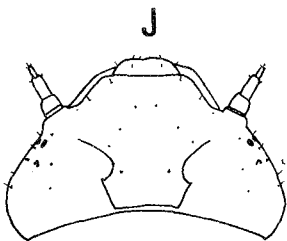
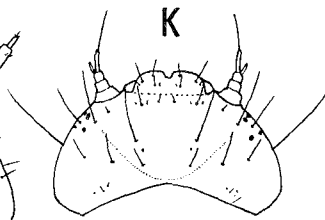
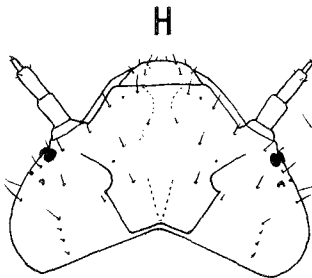
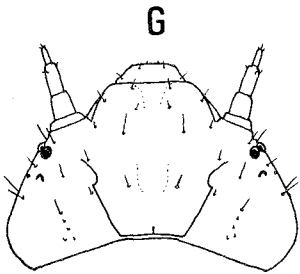
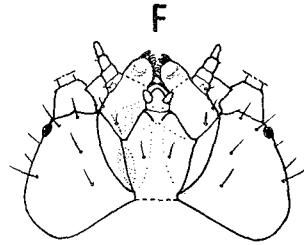
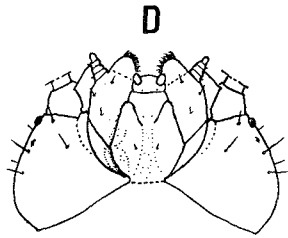
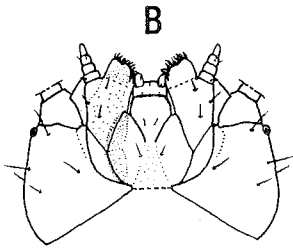
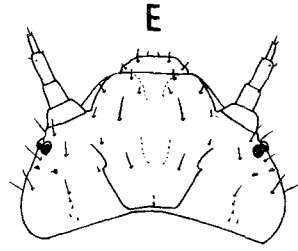
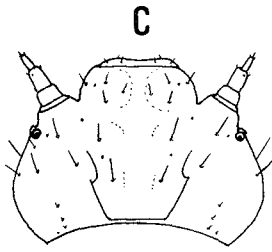
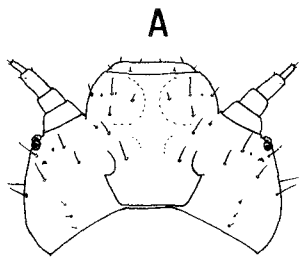


Plate X

Antennae (ventral view).

A: *Heterhelus japonicus* (right). B: *Meligethes violaceus* (left). C: *Carpophilus delkeshampi* (right). D: *Carpophilus titanus* (left). E: *Carpophilus humeralis* (left). F: *Ipidia variolosa* (left). G: *Omosita colon* (left). H: *Epuraea harmandi* (left). I: *Aphenolia pseudosoronia* (left). J: *Amphicrosus japonicus* (left). K: *Soronia lewisi* (right). L: *Atarphia quadripunctata* (left). M: *Aethina maculicollis* (left). N: *Physoronia explanata* (left). O: *Cychramus dorsalis* (left). P: *Pocadius nobilis* (right). Q: *Pocadites corpulentus* (left). R: *Cyllodes ater* (left). S: *Oxycnemus lewisi* (right). T: *Pallodes umbratilis* (left). U: *Neopallodes harmandi* (left). V: *Cryptarcha strigata* (right). W: *Glischrochilus japonicus* (left). X: *Cybocephalus nipponicus* (right).

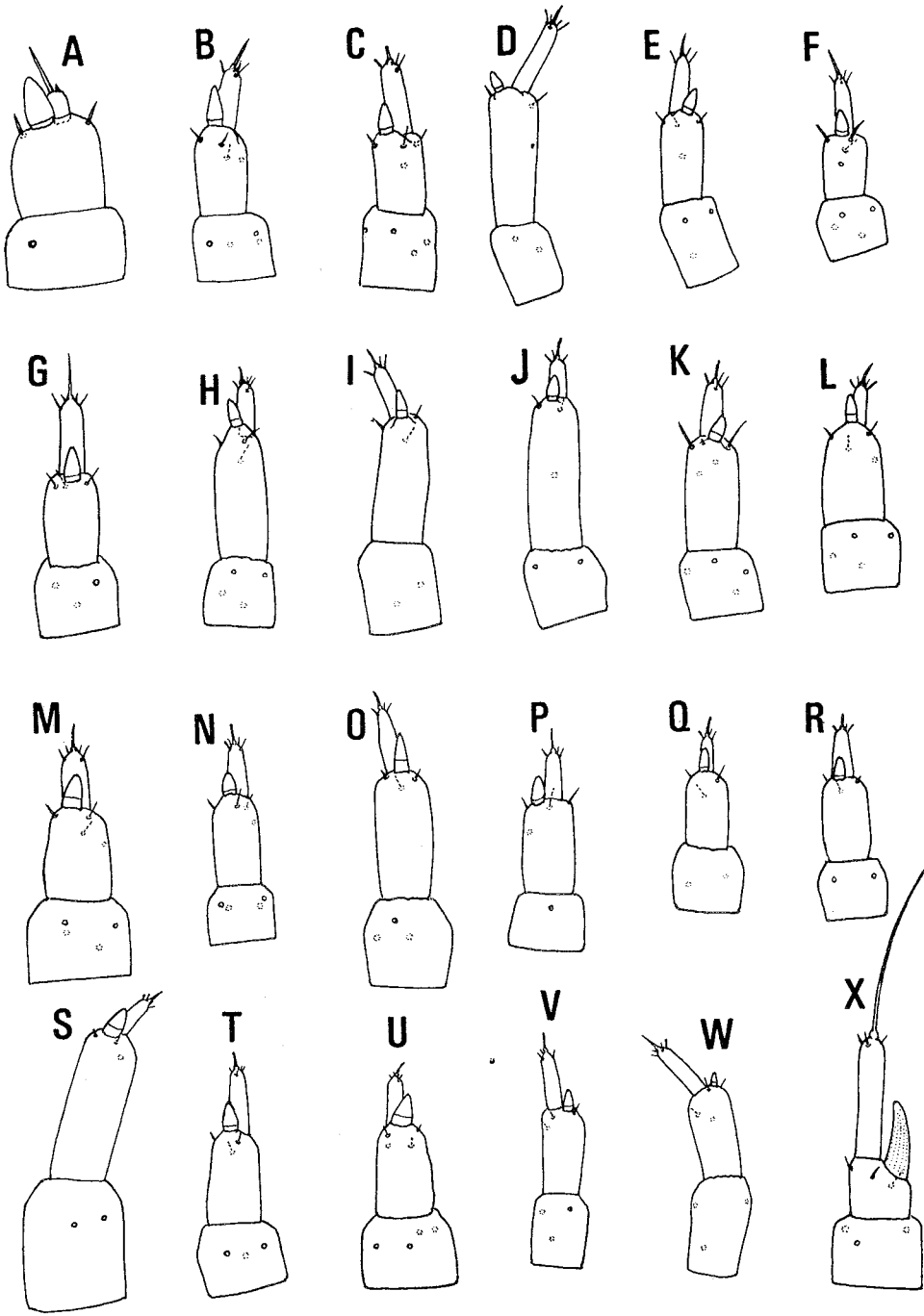


Plate XI

Labroclypeal epipharynges (except Fig. C).

A: *Heterhelus japonicus*. B: *Meligethes violaceus*. C: ditto (labrum and clypeus). D: *Carpophilus delkeskampi*. E: *Iphidia variolosa*. F: *Omosita colon*. G: *Epuraea harmandi*. H: *Aphenoria pseudosoronia*. I: *Amphicrossus japonicus*. J: *Soronia lewisi*. K: *Atarphia quadripunctata*.

Frontal region (right half) (fms: frontal median setae).

L: *Haptoncus luteolus*.

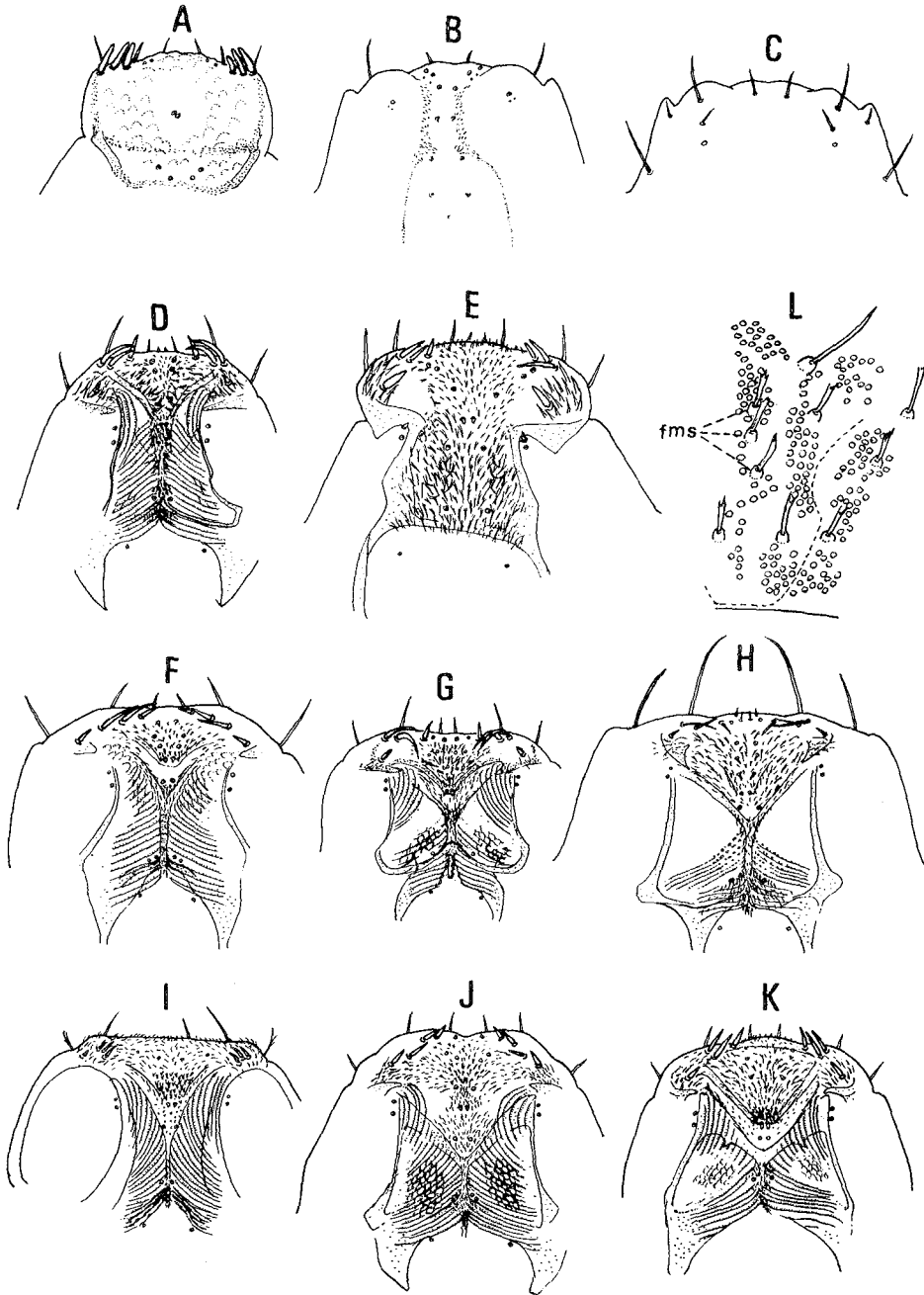


Plate XII

Labroclypeal epipharynges.

A: *Aethina maculicollis*. B: *Physoronia explanata*. C: *Cychramus dorsalis*. D: *Pocadius nobilis*. E: *Pocadites corpulentus*. F: *Cyllodes ater*. G: *Oxycnemus lewisi*. H: *Pallodes umbratilis*. I: *Neopallodes harmandi*. J: *Cryptarcha strigata*. K: *Glischrochilus japonicus*.

Cephalic margin of labrum.

L: *Glischrochilus christophi*.

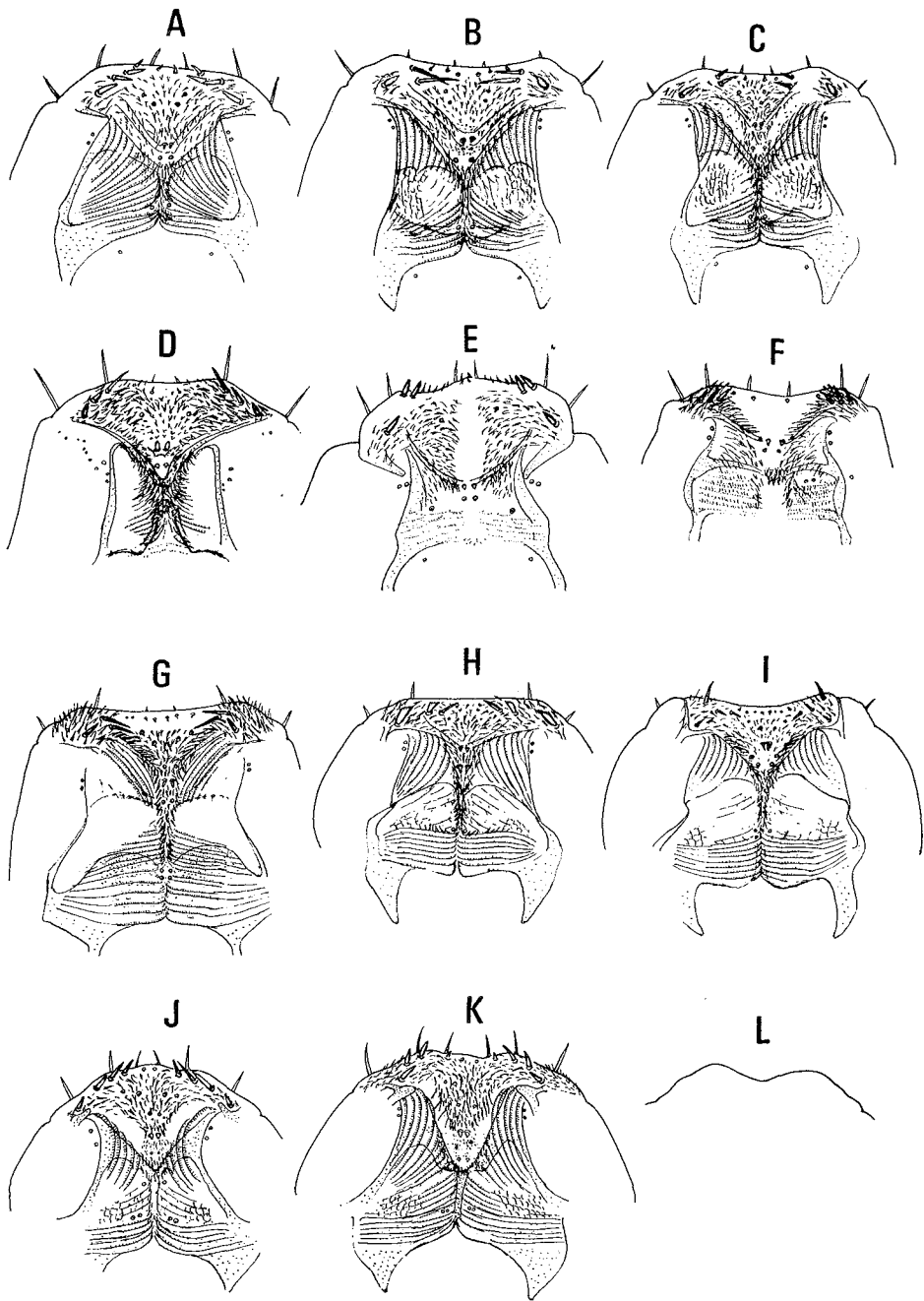


Plate XIII

Mandibles (ventral view except Figs. B & J).

A: *Heterhelus japonicus* (right). B: *Meligethes violaceus* (left; dorsal view). C: *Carpophilus delkeshampi* (right). D: *Carpophilus freemani* (apex in right) (ad: additional tooth). E: ditto (prosthema in right). F: *Carpophilus humeralis* (right). G: *Ipedia variolosa* (left). H: *Omosita colon* (right). I: *Epuraea harmandi* (right). J: *Epuraea foveicollis* (apex in left, inner-dorsal view). K: *Aphenoria pseudosoronia* (left). L: *Amphicrossus japonicus* (right). M: *Soronia lewisi* (right). N: *Atarphia quadripunctata* (right). O: *Aethina maculicollis* (right).

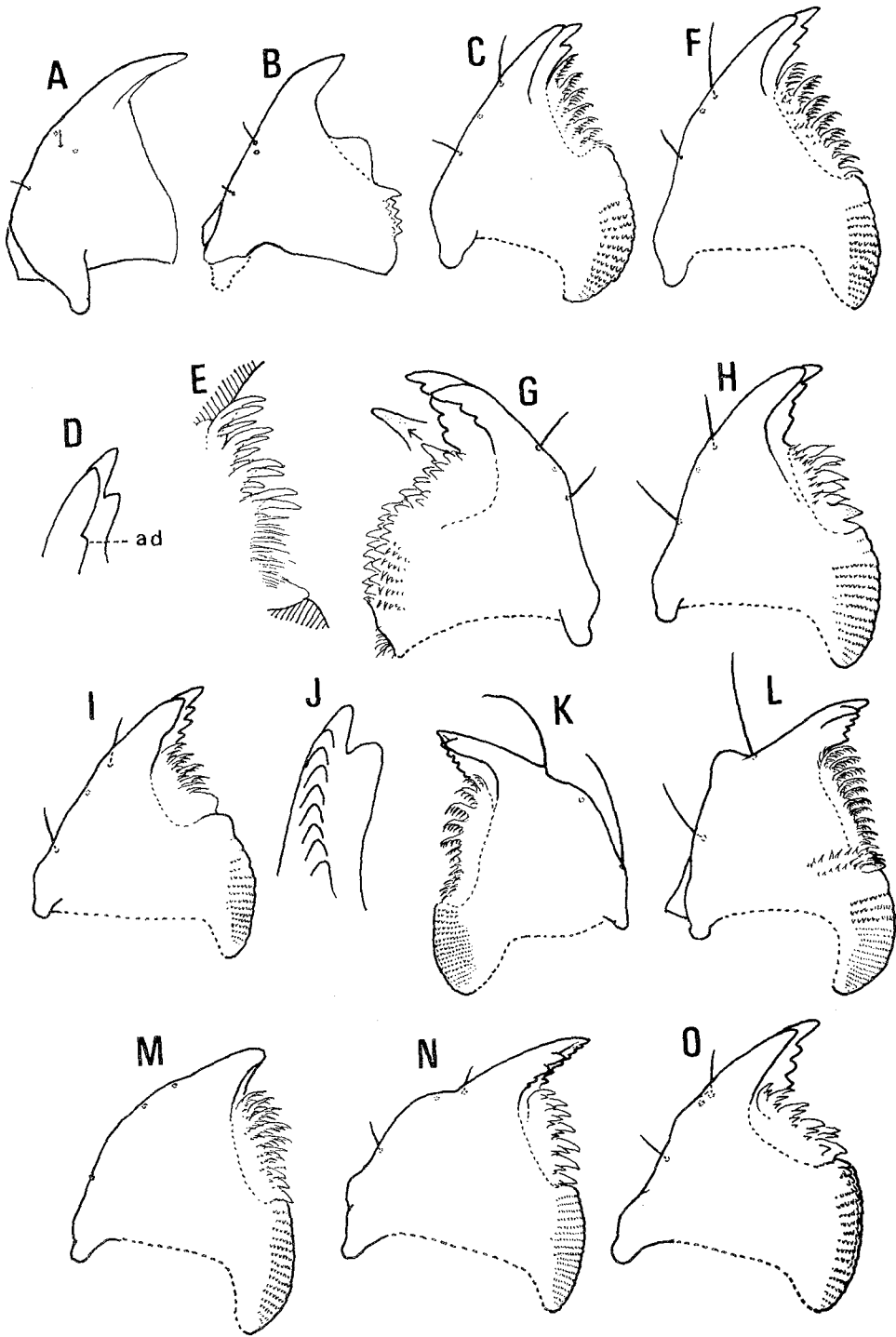


Plate XIV

Mandibles (ventral view except Fig. G).

A: *Physoronia explanata* (left). B: *Cychramus dorsalis* (left). C: *Pocadius nobilis* (right). D: ditto (apex in left). E: *Pocadites corpulentus* (right). F: ditto (prosthema in right). G: *Cyllodes ater* (right; dorsal view). H: *Cyllodes nakanei* (left). I: *Oxycnemus lewisi* (right). J: *Pallodes umbratilis* (right). K: *Neopallodes harmandi* (left). L: *Neopallodes omogonis* (left). M: *Cryptarcha strigata* (right). N: *Glischrochilus japonicus* (left). O: *Glischrochilus rufiventris* (apex in left). P: *Cybocephalus nipponicus* (right).

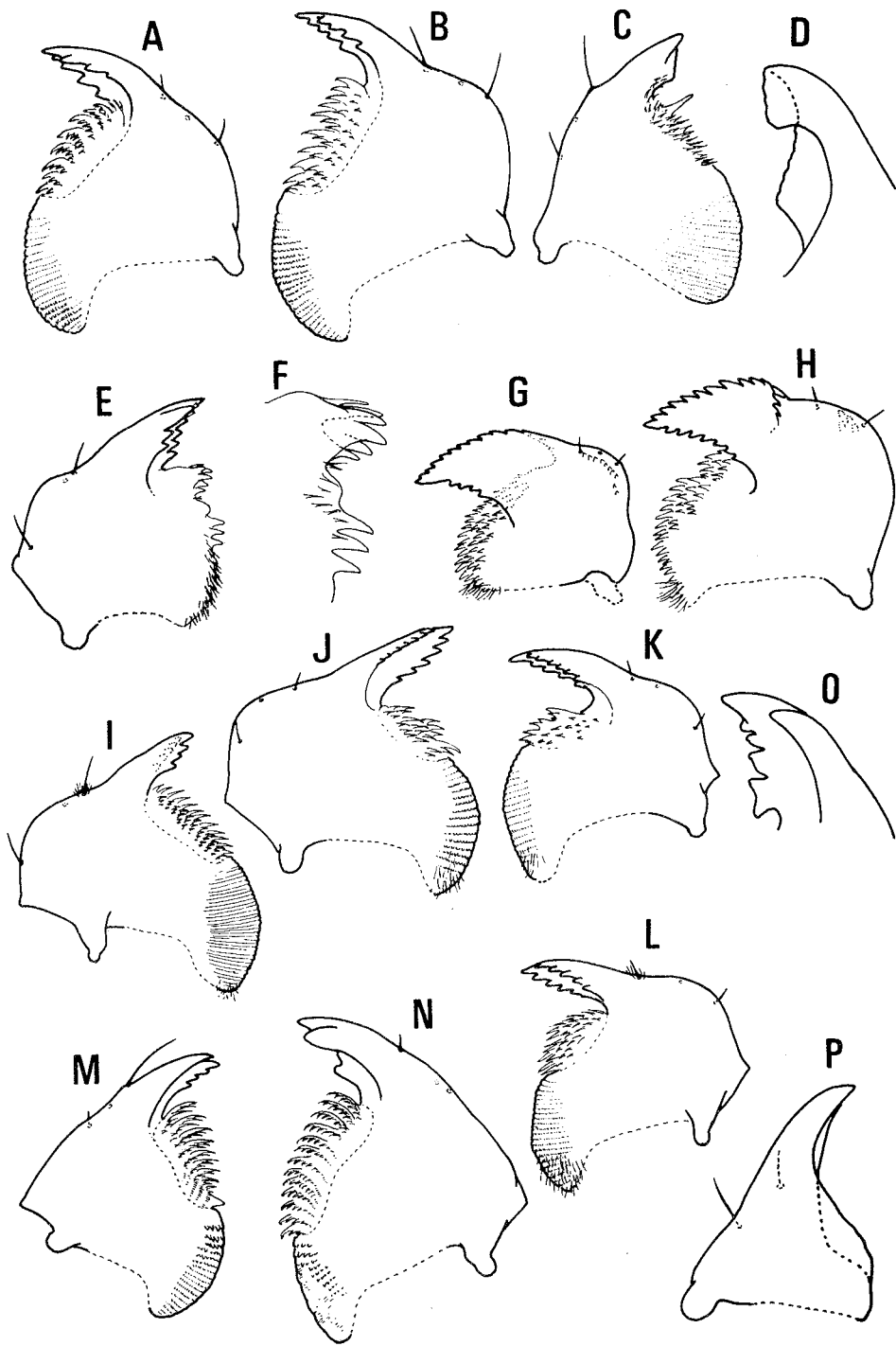


Plate XV

Maxillae, anterior parts (buccal view except Figs. D & E).

A: *Heterhelus japonicus* (left). B: *Meligethes violaceus* (left). C: *Carpophilus delkeshamphi* (left). D: ditto (left; ventral view). E: *Carpophilus freemani* (mala in right; ventral view). F: *Ipidia variolosa* (left). G: *Omosita colon* (left). H: *Epuraea harmandi* (left). I: *Aphenoria pseudosoronia* (left). J: *Amphicrossus japonicus* (left). K: *Soronia lewisi* (left). L: *Atarphia quadripunctata* (left). M: *Aethina maculicollis* (left).

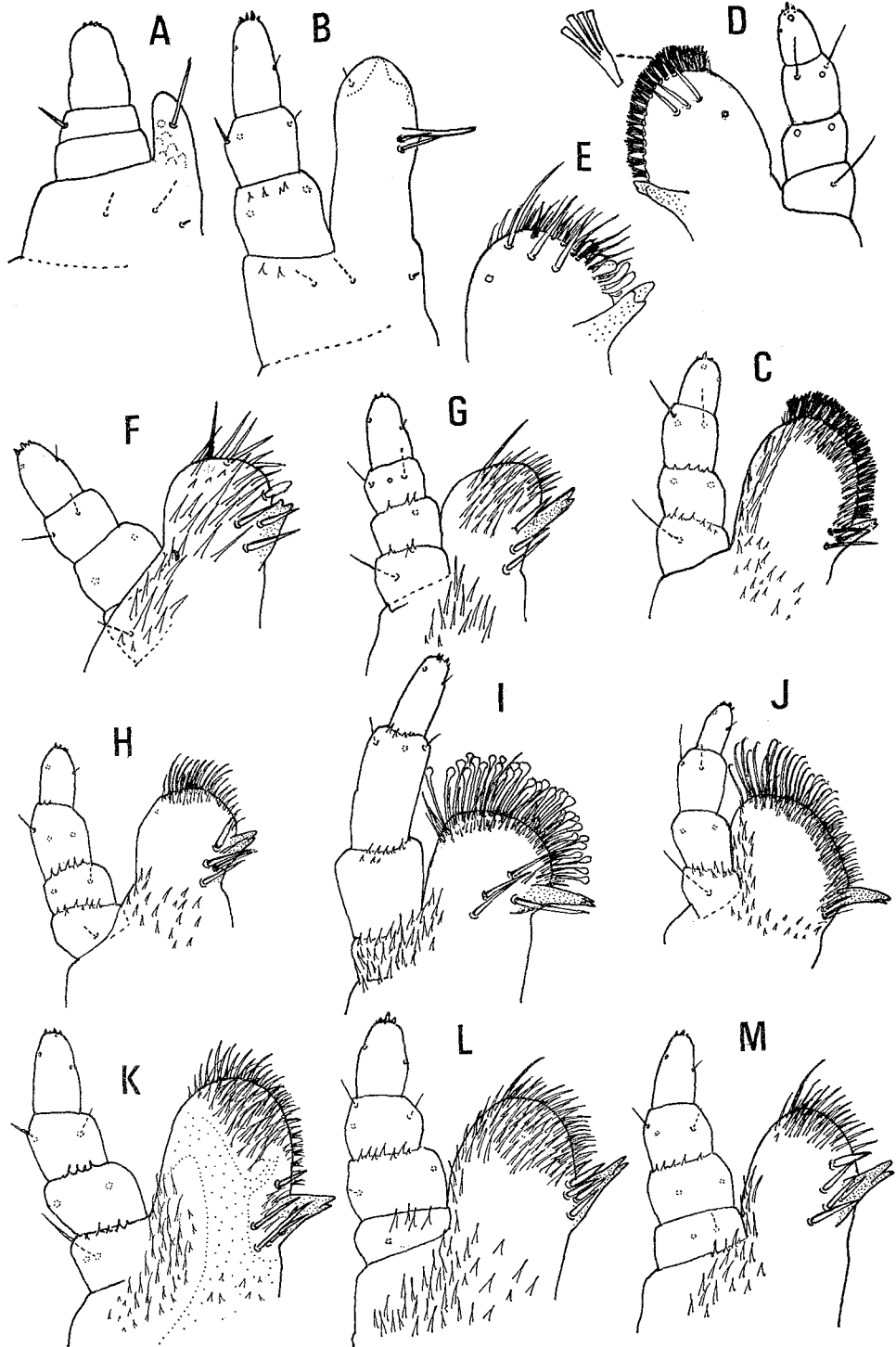


Plate XVI

Maxillae, anterior parts (buccal view).

A: *Physoronia explanata* (left). B: *Cythrampus dorsalis* (left). C: *Pocadius nobilis* (left).
D: *Pocadites corpulentus* (left). E: *Cyllodes ater* (left). F: *Cyllodes nakanei* (left). G:
Oxycnemus lewisi (left). H: *Pallodes umbratilis* (left). I: *Neopallodes harmandi* (left). J:
Neopallodes omogonis (right). K: *Cryptarcha strigata* (left). L: *Glischrochilus japonicus*
(right). M: *Cybocephalus nipponicus* (right).

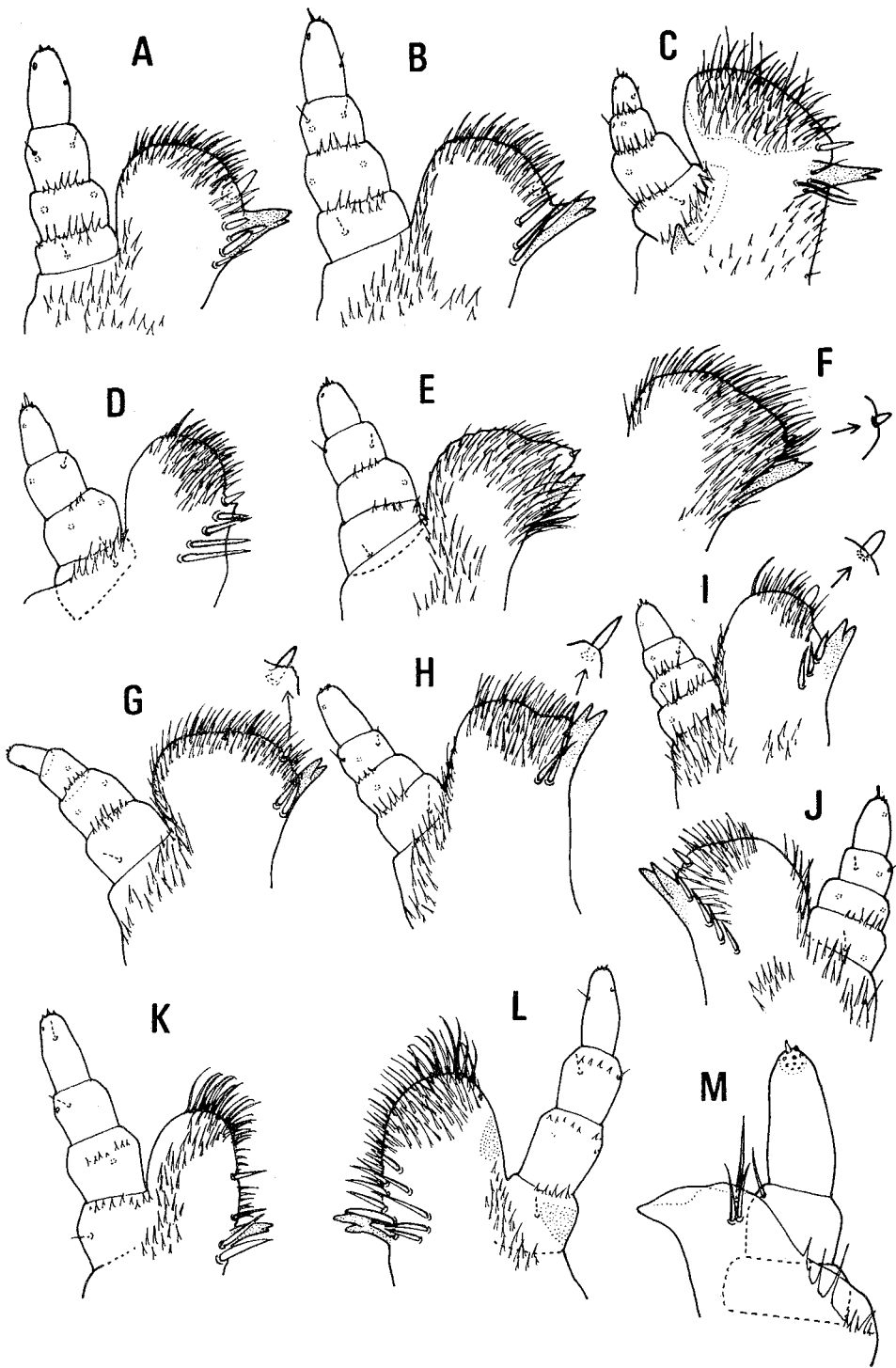


Plate XVII

Labia, anterior parts.

A: *Heterhelus japonicus*. B: *Meligethes violaceus*. C: *Carpophilus delkeskampi*. D: *Carpophilus titanus*. E: *Ipidia variolosa*. F: *Omosita colon*. G: *Epuraea harmandi*. H: *Aphenolia pseudosoronia*. I: *Amphicrossus japonicus*. J: *Soronia lewisi*. K: *Atarphia quadripunctata*. L: *Aethina maculicollis*.

Hypopharynges, posterior parts.

M: *Heterhelus japonicus*. N: *Meligethes violaceus*. O: *Carpophilus delkeskampi*. P: *Ipidia variolosa*. Q: *Omosita colon*. R: *Epuraea harmandi*. S: *Aphenolia pseudosoronia*. T: *Amphicrossus japonicus*. U: *Soronia lewisi*. V: *Atarphia quadripunctata*. W: *Aethina maculicollis*.

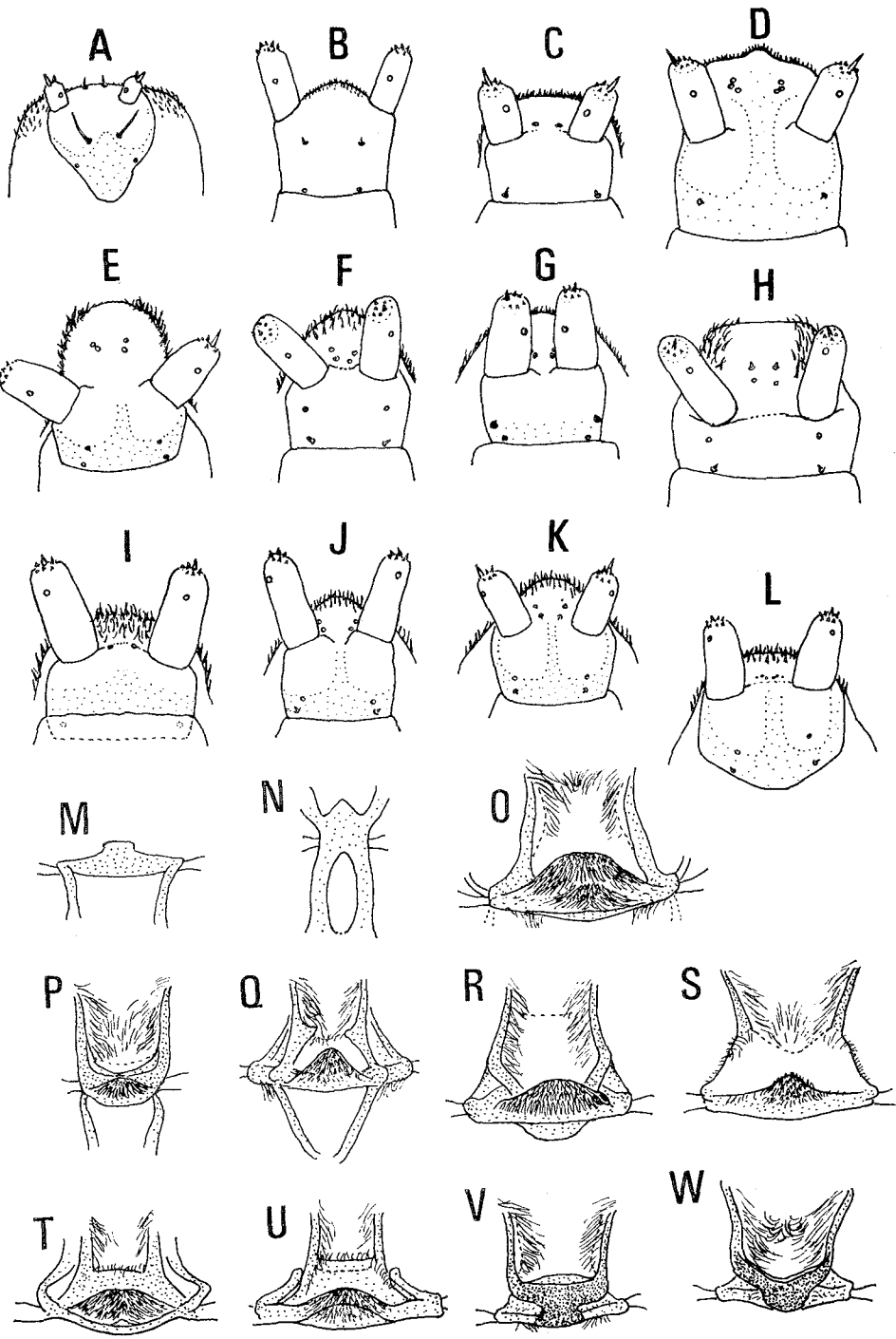


Plate XVIII

Labia, anterior parts.

A: *Physoronia explanata*. B: *Cychramus dorsalis*. C: *Pocadius nobilis*. D: *Pocadites corpulentus*. E: *Cyllodes ater*. F: *Oxycnemus lewisi*. G: *Pallodes umbratilis*. H: *Neopallodes harmandi*. I: *Cryptarcha strigata*. J: *Glischrochilus japonicus*. K: *Cybocephalus nipponicus*.

Hypopharynges, posterior parts.

L: *Physoronia explanata*. M: *Cychramus dorsalis*. N: *Pocadius nobilis*. O: *Pocadites corpulentus*. P: *Cyllodes ater*. Q: *Oxycnemus lewisi*. R: *Pallodes umbratilis*. S: *Neopallodes harmandi*. T: *Cryptarchia strigata*. U: *Glischrochilus japonicus*.

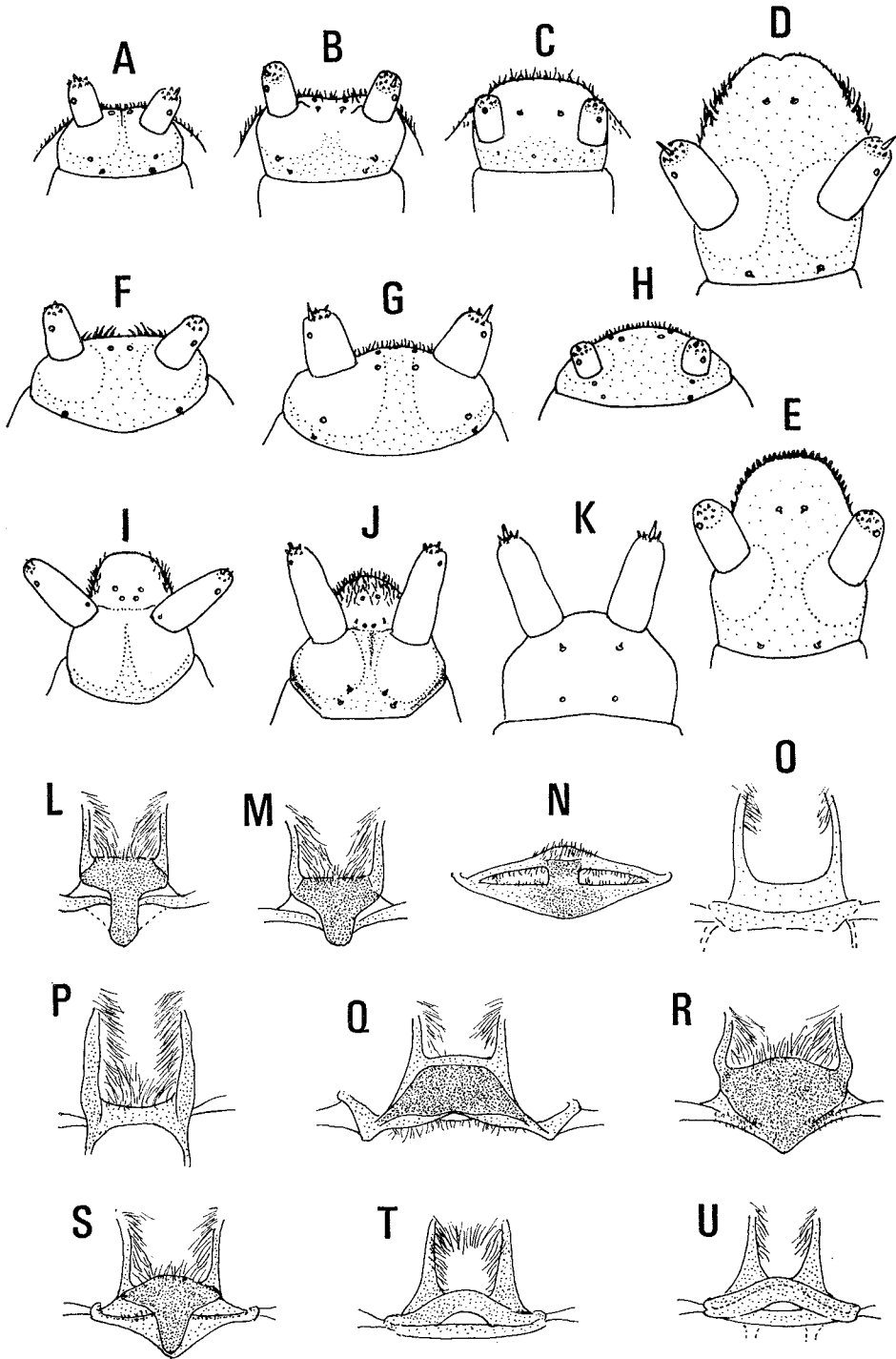


Plate XIX

Metathoracic legs (right; posterior view).

A: *Heterhelus japonicus*. B: *Meligethes violaceus*. C: *Carpophilus delkeskampi*. D: *Carpophilus titanus*. E: *Carpophilus humeralis*. F: *Ipidia variolosa*. G: *Omosita colon*. H: *Epuraea harmandi*. I: *Aphenolia pseudosoronia*. J: *Amphicrossus japonicus*.

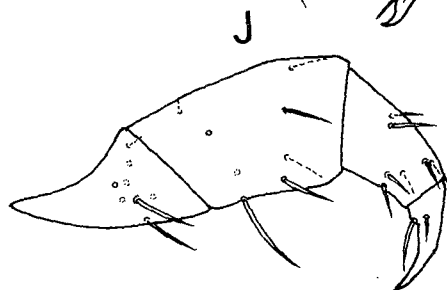
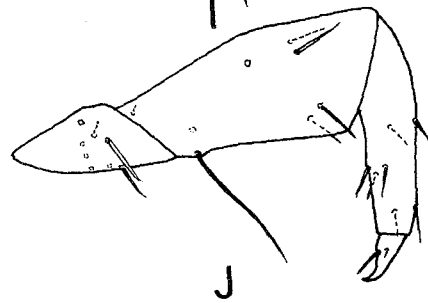
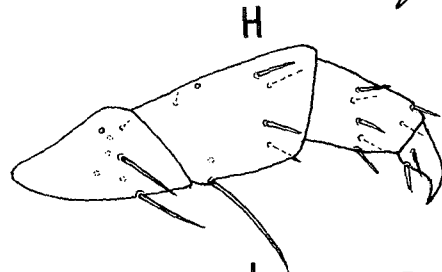
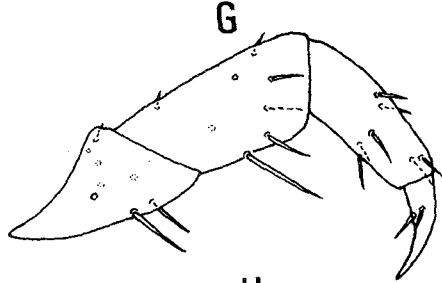
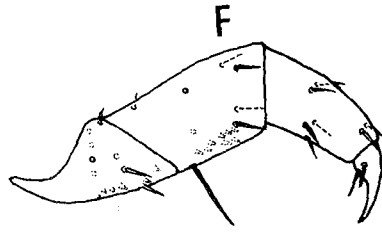
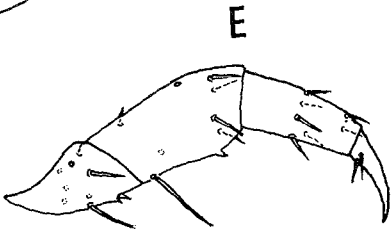
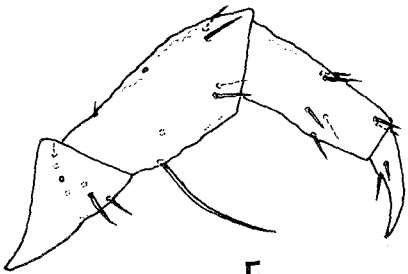
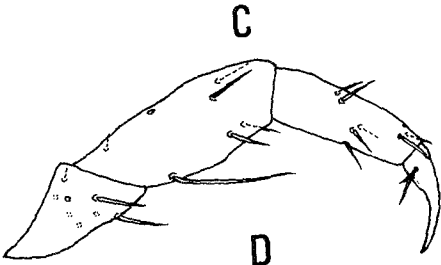
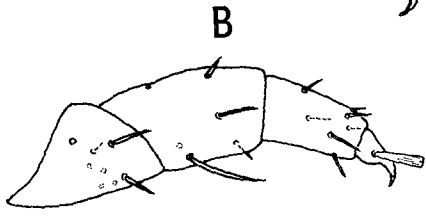
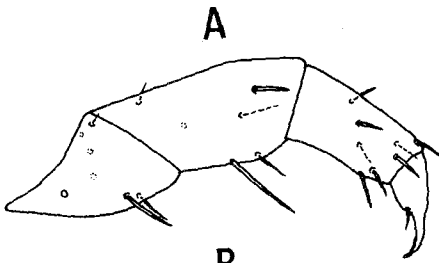


Plate XX

Metathoracic legs (right; posterior view).

A: *Soronia lewisi*. B: *Atarphia quadripunctata*. C: *Aethina maculicollis*. D: *Physoronia explanata*. E: *Cydramus dorsalis*. F: *Pocadius nobilis*. G: *Pocadius corpulentus*. H: *Cyllodes ater*. I: *Cyllodes nakanei*.

Tarsunguli of metathoracic leg (right; posterior view).

J: *Cyllodes ater*. K: *Cyllodes literatus*. L: *Cyllodes nakanei*.

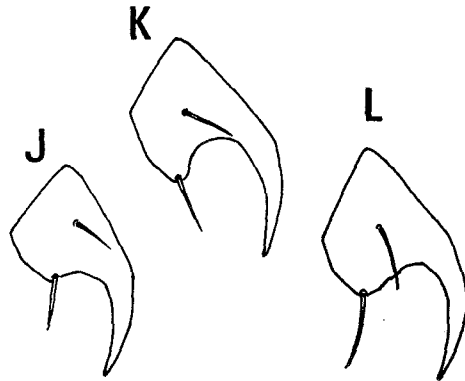
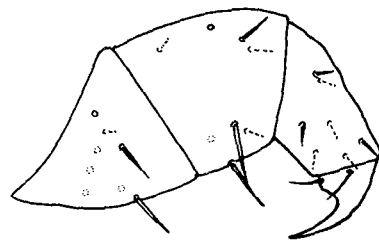
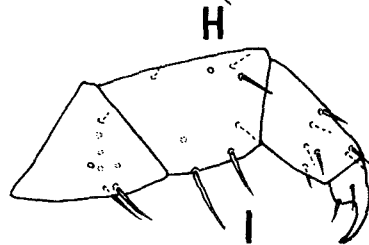
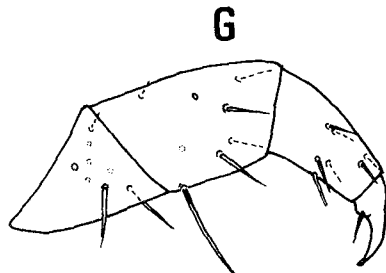
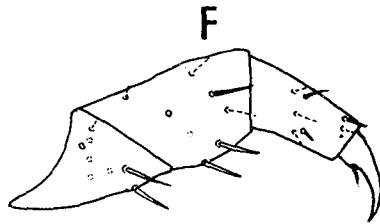
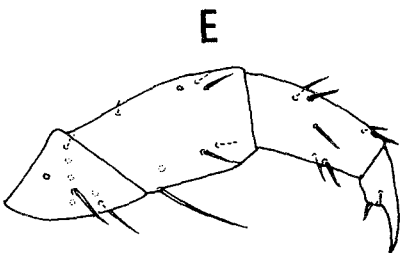
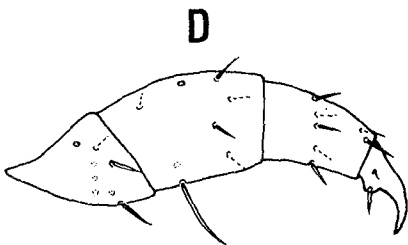
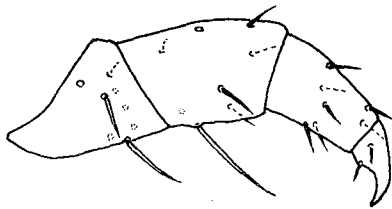
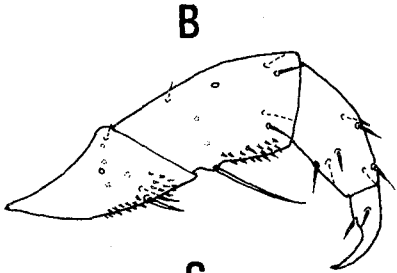
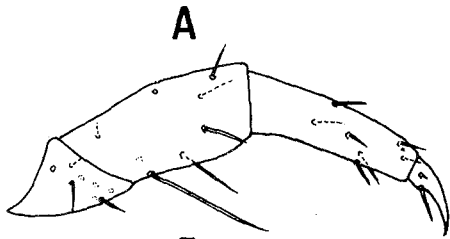


Plate XXI

Metathoracic legs (right; posterior view).

A: *Oxycnemus lewisi*. B: *Pallodes umbratilis*. C: *Neopallodes harmandi*. D: *Cryptarcha strigata*. E: *Glischrochilus japonicus*. F: *Glischrochilus rufiventris*.

Metathoracic leg (left; anterior view).

G: *Cybocephalus nipponicus*.

Tarsunguli of metathoracic leg (right; posterior view).

H. *Pallodes umbratilis*. I: *Neopallodes harmandi*. J: *Neopallodes omogonis*.

Spiracles of 3rd abdominal segment (right; d: dorsum).

K. *Heterhelus japonicus* (at: air tubes). L: *Meligethes violaceus*. M: *Cybocephalus nipponicus*.

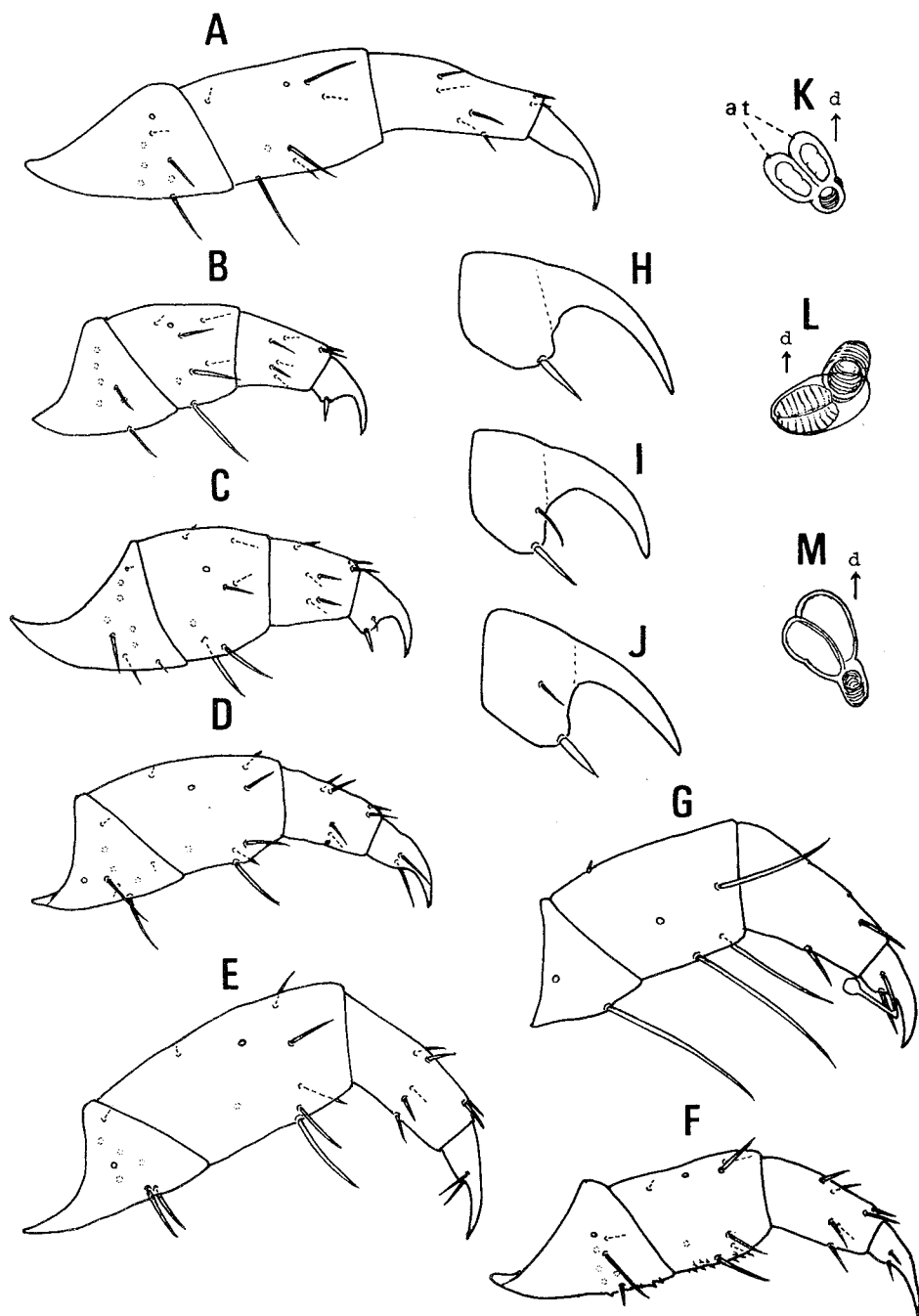


Plate XXII

Third abdominal segments, dorsal and ventral setal pattern (right half).

A: *Carpophilus delkeskampi*. B: *Carpophilus titanus*. C: *Carpophilus sibiricus*. D: *Carpophilus humeralis*.

Third abdominal segments, dorsal setal pattern (right half).

E: *Ipidia variolosa*. F: *Omosita colon*. G: *Atarphia quadripunctata* (dps: dorso-paramedian setae). H: *Aethina maculicollis*. I: *Soronia lewisi*. J: *Physoronia explanata* (dps: dorso-paramedian setae. dpt: dorso-paramedian tubercle). K: *Cychramus dorsalis*. L: *Pocadius nobilis*.

Venter of prothoracic segment.

M: *Carpophilus delkeskampi* (eu: eusternum. ps: presternum).

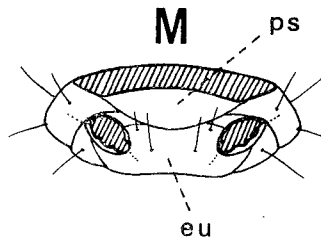
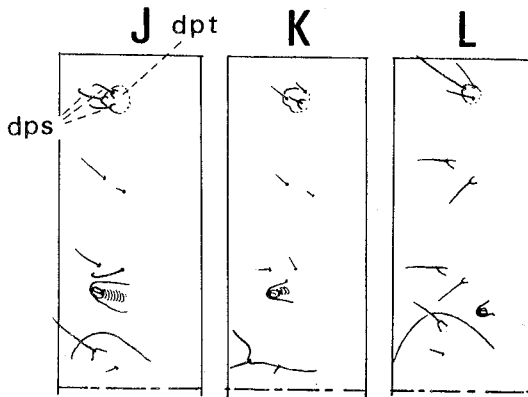
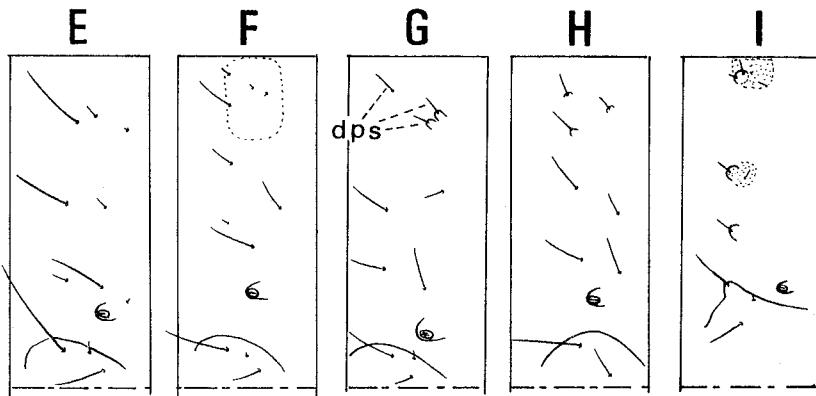
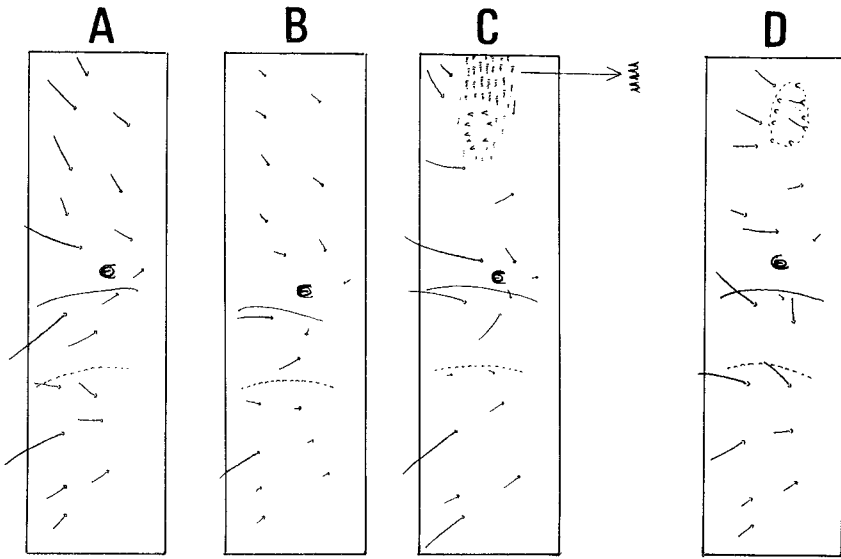


Plate XXIII

Eighth to 10th abdominal segments.

A: *Heterhelus japonicus* (dorsal view). B: ditto (lateral view). C: *Meligethes violaceus* (dorsal view). D: ditto (lateral view). E: *Carpophilus humeralis* (dorsal view) (las: lateral accessory spine. pg: pregomphus) F: ditto (lateral view). G: *Ipidia variolosa* (dorsal view). H: ditto (lateral view). I: *Ipidia sibirica* (dorsal view). J: ditto (lateral view). K: *Omosita colon* (dorsal view). L: ditto (lateral view).

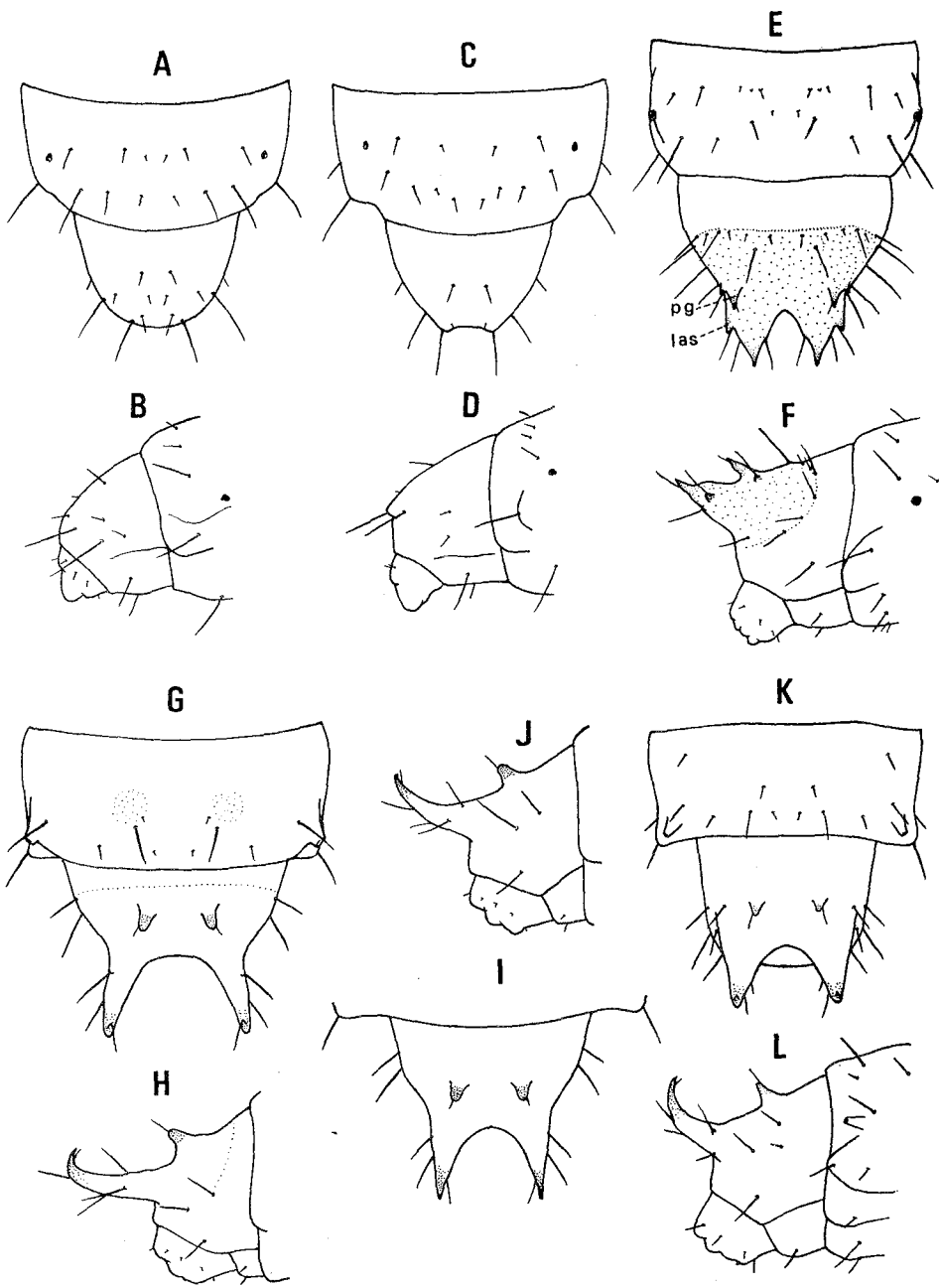


Plate XXIV

Eighth to 10th abdominal segments of *Carpophilus* spp.

A: *delheskampii* (dorsal view) (las: lateral accessory spine. pg: pregomphus). B: ditto (lateral view). C: *marginellus* (dorsal view). D: ditto (lateral view). E: *freemani* (dorsal view.) F: ditto (lateral view). G: *mutilatus* (dorsal view). H: ditto (lateral view). I: *titanus* (dorsal view). J: ditto (lateral view). K: *sibiricus* (dorsal view). L: ditto (lateral view). M: *titanus* (10th segment, ventral view).

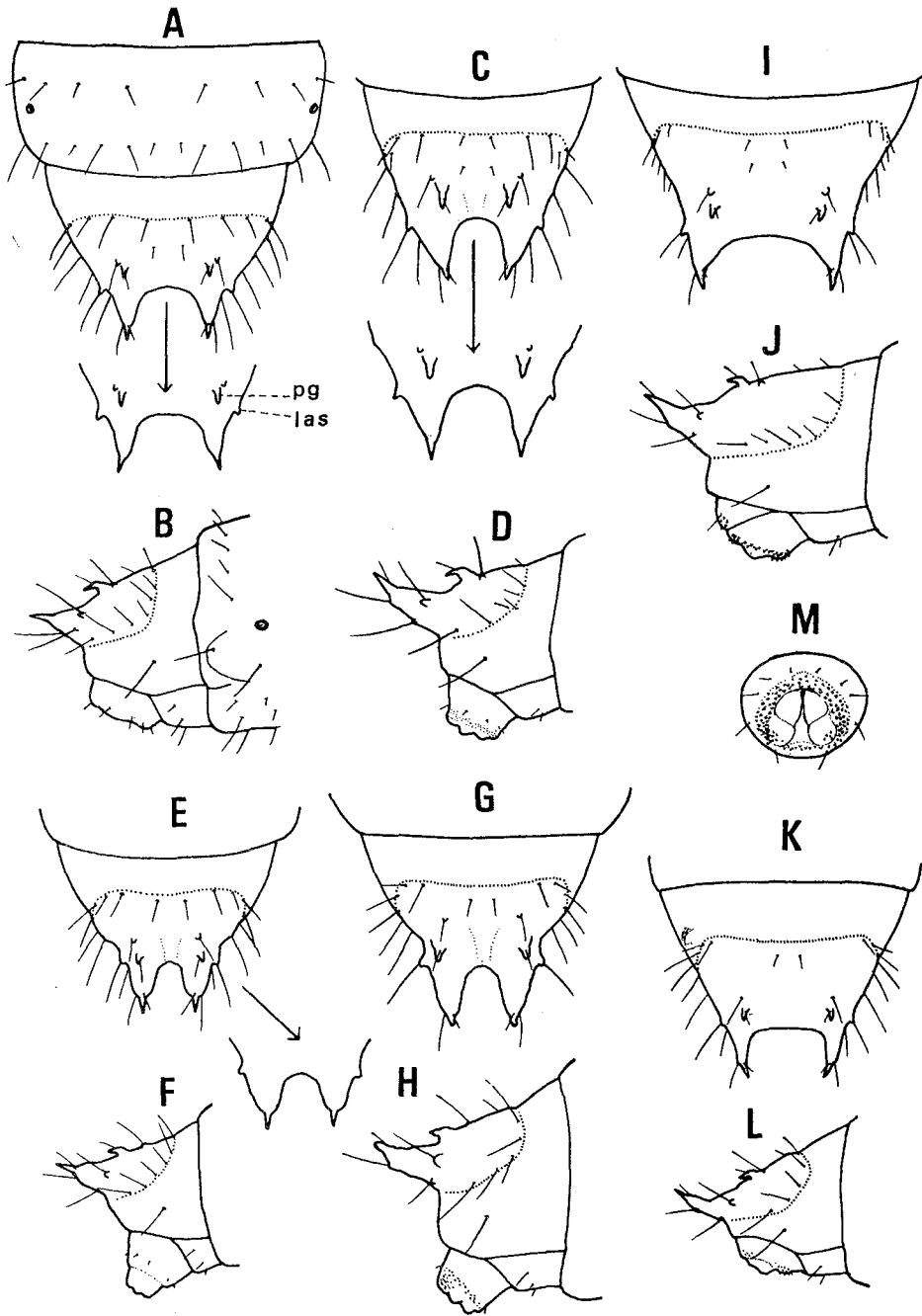


Plate XXV

Eighth and 9th abdominal segments of *Epuraea* spp. (dorsolateral aspect in slide-mounted specimen).

A: *argus* (pg: *pregomphi*. spg: *subpregomphi*). B: *pellax*. C: *funeraria*. D: *foveicollis*. E: *bergeri*. F: *harmandi*. G: *paulula*.

Urogomphi of *Epuraea* spp. (right; dorsal view).

H: *argus*. I: *pellax*. J: *funeraria*. K: *foveicollis*. L: *bergeri*. M: *harmandi*. N: *paulula*.

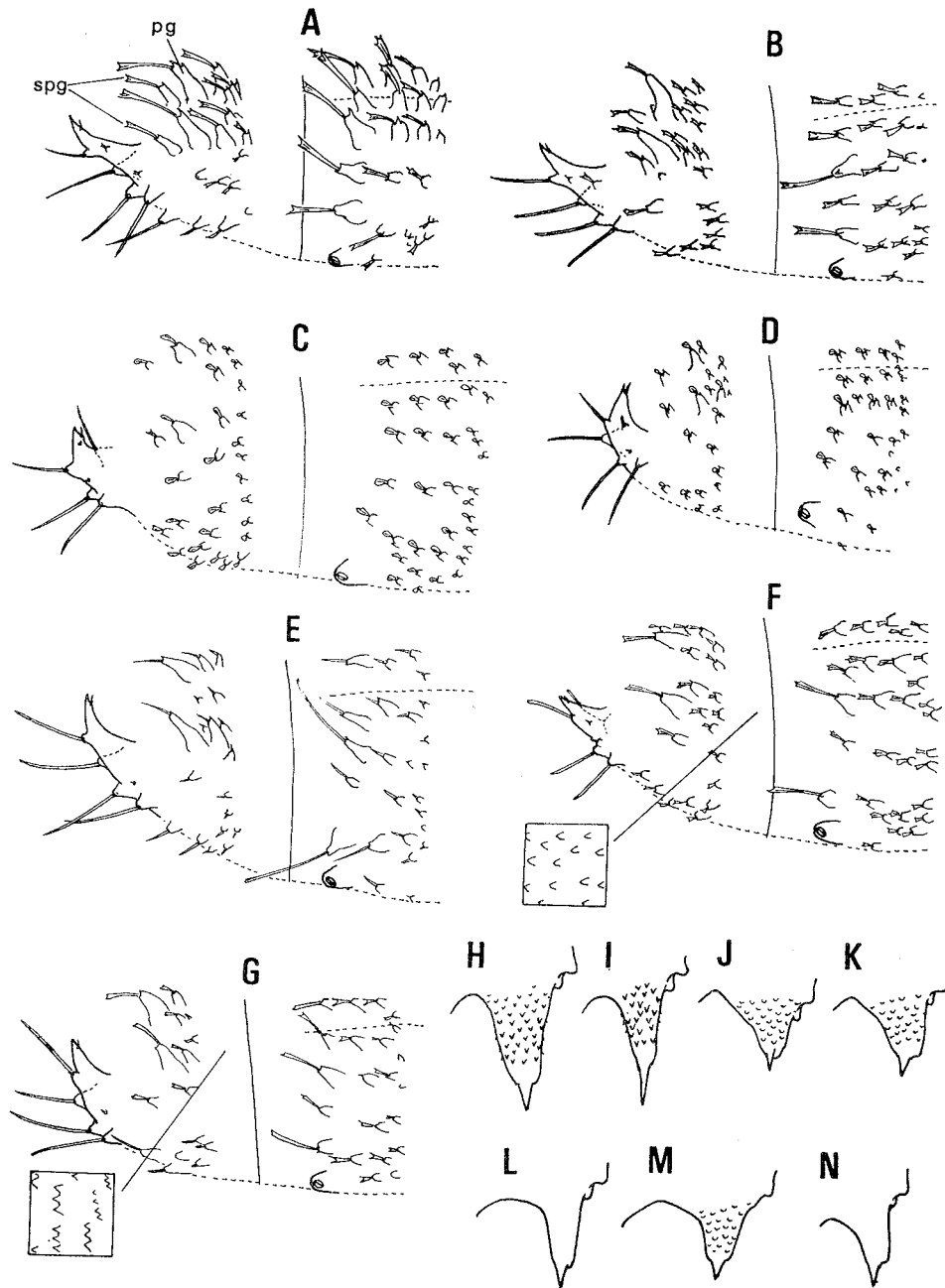


Plate XXVI

Eighth and 9th abdominal segments of *Haptoncus* spp. (dorsolateral aspect in slide-mounted specimen).

A: *ocularis*. B: *luteolus*.

Urogomphi of *Haptoncus* spp. (right; dorsal view).

C: *ocularis*. D: *luteolus*.

Eighth to 10th abdominal segments.

E: *Aphenolia pseudosoronia* (dorsal view). F: ditto (lateral view) (af: anal hooks). G: *Amphicrossus japonicus* (dorsal view). H: ditto (lateral view). I: *Soronia lewisi* (dorsal view). J: ditto (lateral view).

Dorso-paramedian tubercles of 5th abdominal segment of *Soronia* spp. (lateral view).

K: *lewisi*. L: *japonica*.

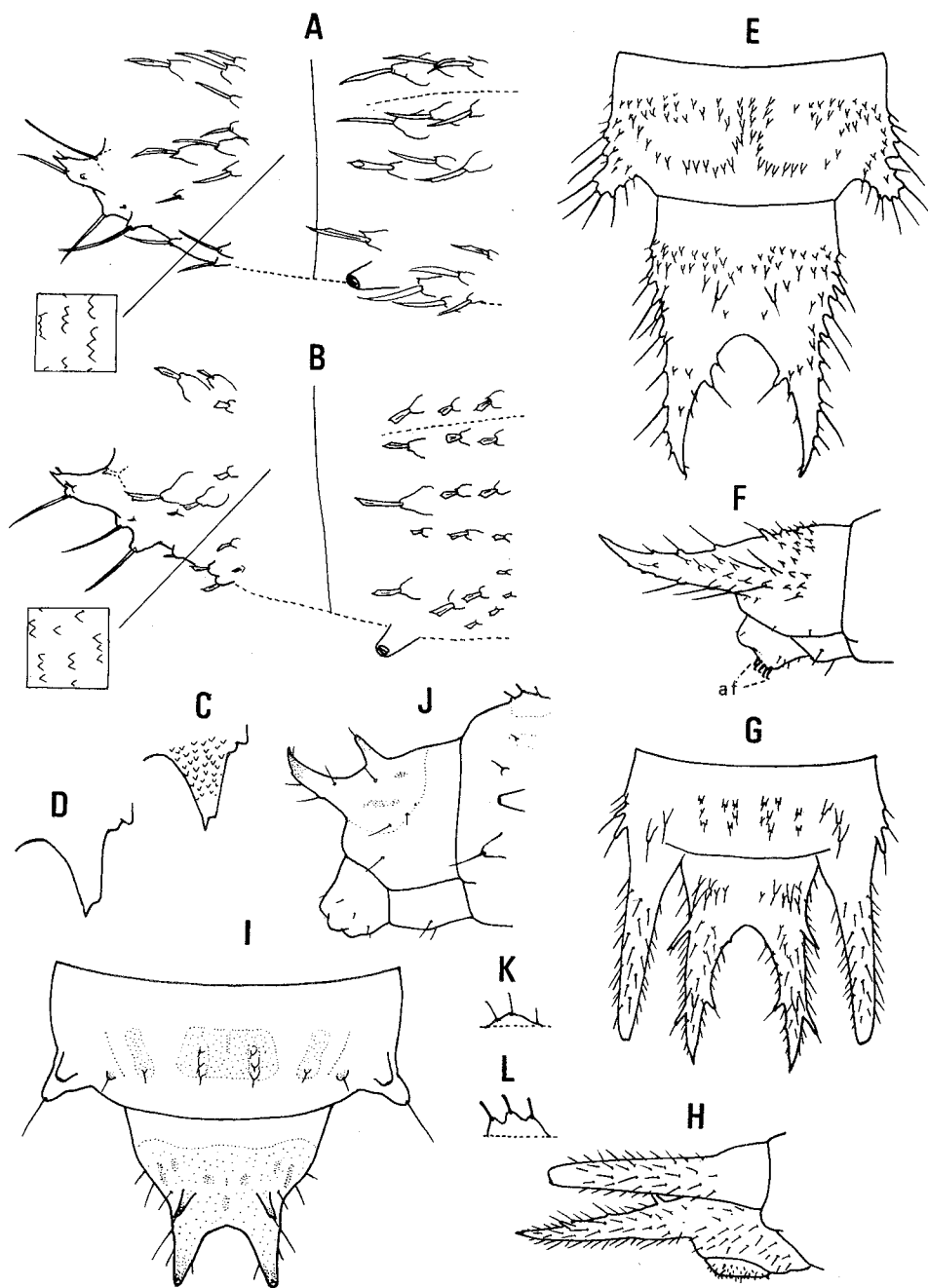


Plate XXVII

Eighth to 10th abdominal segments.

A: *Atarphia quadripunctata* (dorsal view). B: ditto (lateral view). C: *Aethina maculicollis* (dorsal view). D: ditto (lateral view). E: *Physoronia explanata* (dorsal view). F: ditto (lateral view). G: *Cycharmus dorsalis* (dorsal view). H: ditto (lateral view). I: *Pocadius nobilis* (dorsal view). J: ditto (lateral view). K: *Pocadius* sp. (dorsal view). L: ditto (lateral view).

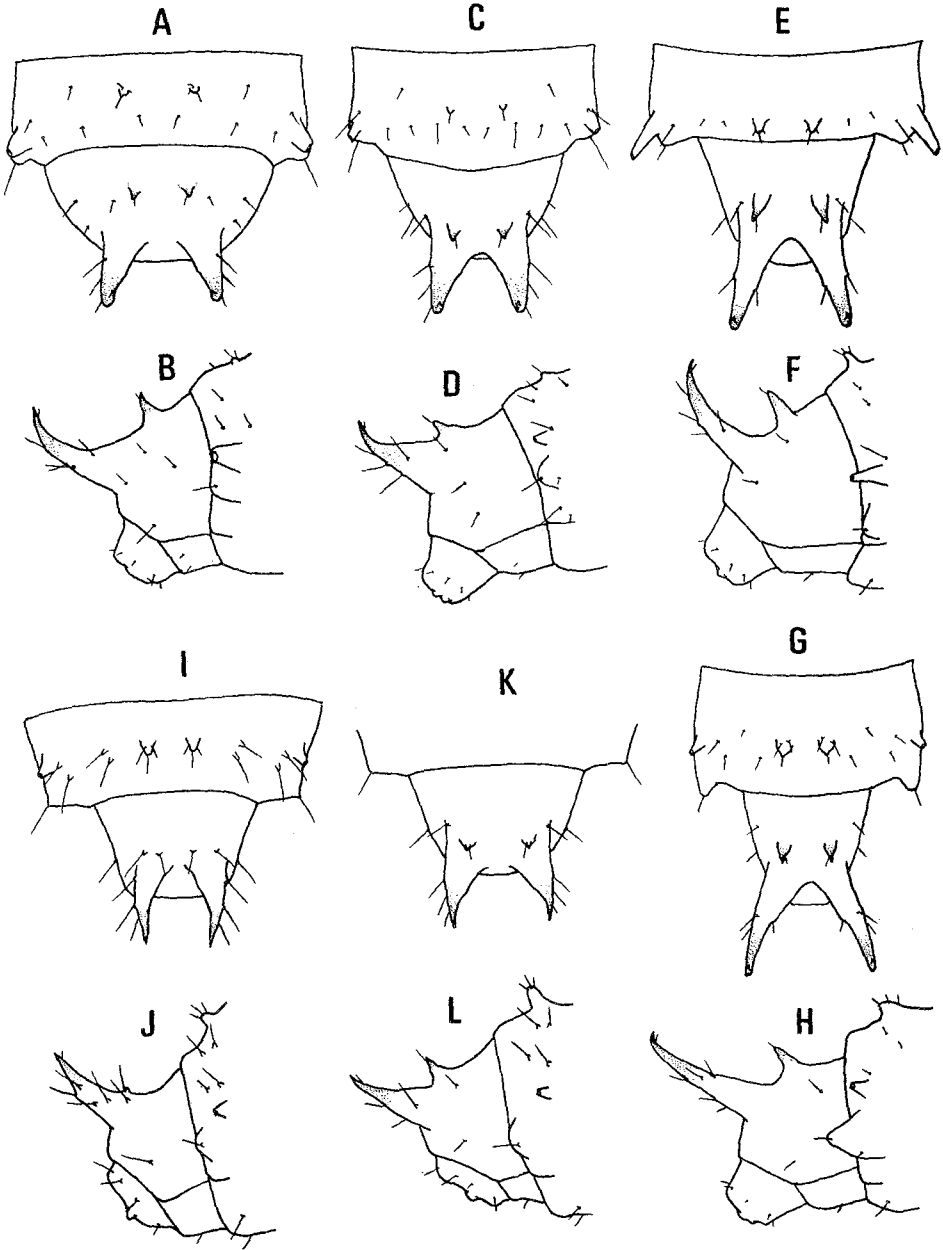


Plate XXVIII

Eighth to 10th abdominal segments.

A: *Pocadites corpulentus* (dorsal view). B: ditto (lateral view). C: *Cyllodes ater* (dorsal view). D: ditto (lateral view). E: *Cyllodes literatus* (dorsal view). F: *Cyllodes nakanei* (dorsal view). G: ditto (lateral view). H: *Pallodes umbratilis* (dorsal view). I: ditto (lateral view). J: *Neopallodes harmandi* (dorsal view). K: ditto (lateral view). L: *Neopallodes omogonis* (dorsal view). M: ditto (lateral view).

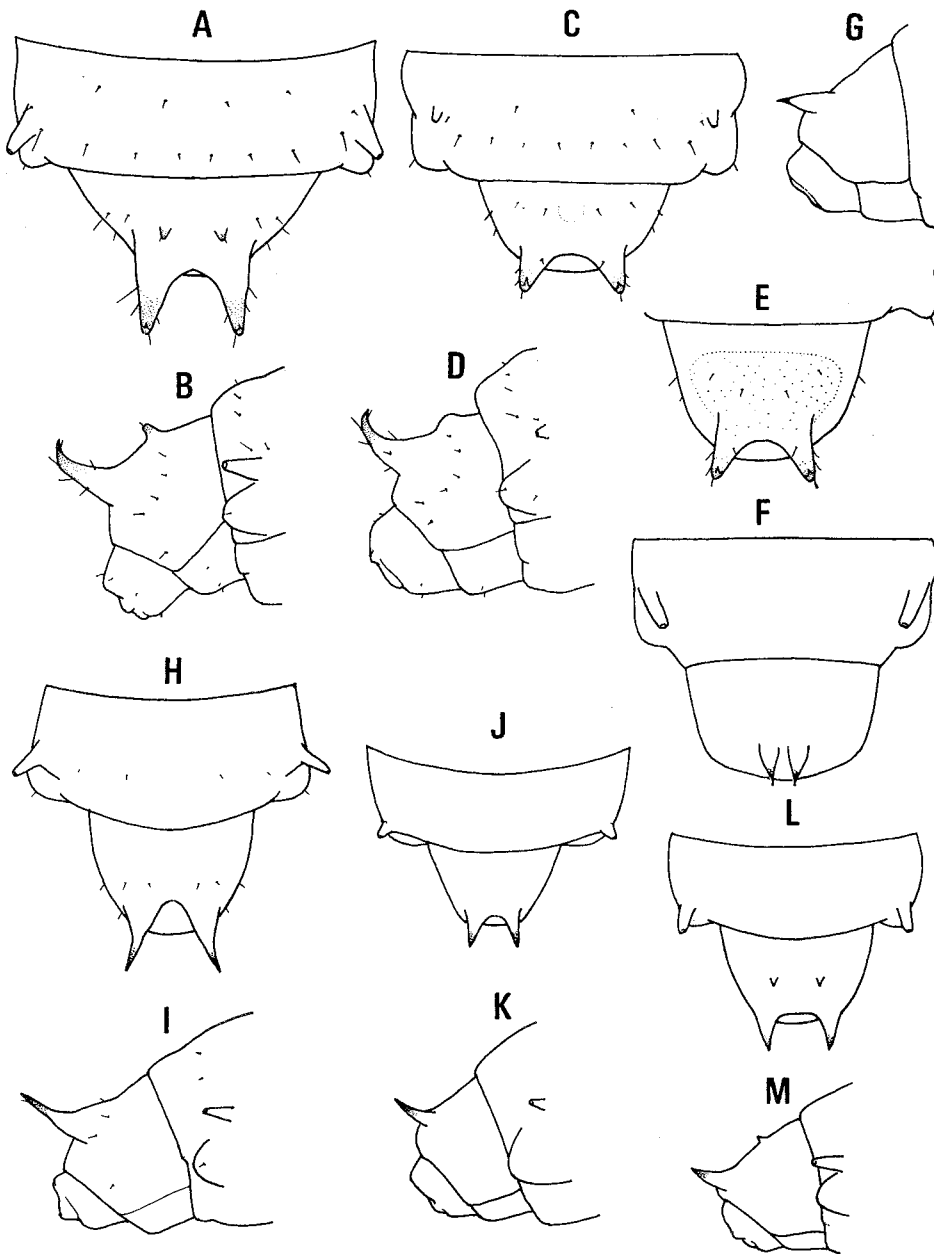


Plate XXIX

Eighth to 10th abdominal segments.

A: *Oxycnemus lewisi* (dorsal view). B: ditto (lateral view). C: *Cryptarcha strigata* (dorsal view) (las: lateral accessory spine. pg: pregomphus). D: ditto (lateral view). E: *Glischrochilus japonicus* (dorsal view). F: ditto (lateral view). G: *Glischrochilus rufiventris* (dorsal view). H: ditto (lateral view). I: *Glischrochilus christophi* (dorsal view). J: ditto (lateral view). K: *Cybocephalus nipponicus* (dorsal view). L: ditto (lateral view).

