PHYLOGENY AND GENERIC CLASSIFICATION OF THE SUBFAMILY Lycoperdininae WITH A RE-ANALYSIS OF THE FAMILY ENDOMYCHIDAE (COLEOPTERA: CUCUJOIDEA)

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Abstract — A cladistic analysis of the family Endomychidae based on adult and larval characters to resolve the relationships between its subfamilies is presented. Monophyly of the Endomychidae and all subfamilies was tested, and the family and all currently recognized subfamilies including the largest subfamily, Lycoperdininae are hypothesized to be monophyletic groups. Cladistic analysis was performed separately on adult and on the combined character sets. The adult data matrix was coded for 69 characters for 65 ingroup taxa (38 genera of Lycoperdininae and 27 genera from all remaining endomychid subfamilies, representing Eupsilobinae, Danascelinae, Mycetinae, Leistinae, Merophysinae, Anamorphinae, Pleganophorinae, Xenomycetinae, Endomychinae, Stenotarsinae and Eppiciinae), and 4 outgroup taxa representing 3 families of Cucujoida: Coccinellidae (Sticholottis and Rhizobius), Corylophidae (Holoepis) and Cerylonidae (Hyponotella). Combined matrix was prepared in two variants, first included all 69 taxa and 96 morphological, adult plus larval characters, and the second variant included 33 taxa (only those with known larvae) coded for 96 morphological, adult and larval characters. The shortest, most parsimonious solutions were investigated using NONA WinClada and Hennig86. The monophyly of the largest subfamily Lycoperdininae was supported and based on the results of the analyses five generic groups may be recognized: Daulis group, Amphix group, Amphisternus group, Eumorphus group - monophyletic and Lycopera group not supported by apomorphic characters. All 38 genera of Lycoperdininae are described, diagnosed and included in an identification key, the larvae of 10 genera are also described. The first larval descriptions are given for Amphisternus verrucosus Gotthom, Acnaces sp., Amphix vestitus cinctus (labcricus), Encymon immaculatus (Montruzaver) Gerstaecker nem nov is proposed here for Euguia Gerstaecker, 1857 (ne Euguia Perty, 1833) type species are designated for the following genera: Diodes Gerstaecker, 1857 (Diodes columbim Gerstaecker, 1857), Lumorphodes Guerin, 1858 (Eumorphus tetraspis Hope, 1832), Enasimus Guerin, 1858 (Eumorphus quadrijugatus Gerstaecker, 1857), Haplophorus Guerin, 1858 (Eumorphus bipunctatus Perty, 1831), Heterandris Guerin, 1858 (Eumorphus confusus Guerin, 1857), Rhachidophorus Guerin, 1857 (Cacodaemon hopei Thomson, 1857 (=Eumorphus hopei Guerin, 1857)), Olenus Thomson, 1857 (Trychurus senegalensis Gerstaecker, 1857) Daulis Erichson and Dauletus Lea, treated in the recent classification of Endomychidae (Tomaszewksa 2000) as genera incertae sedis, are confirmed here to belong in Lycoperdininae. The following new synonym is proposed: Evolocera chapea Sharp, 1891 (=Adama mexicana Tomanewska, 2000), consequently Evolocera Sharp, previously classified in Merophysinae, is moved here to Eupsilobinae. The lectotype of Evolocera chapea is designated here. The history of classification and the known aspects of the biology of the subfamily are provided.

The genus Polynus Mulsant, 1846 is treated here as incertae sedis, due to the unavailability of material for study.

Key words — Coleoptera, Cucujoida, Endomychidae, Lycoperdininae, genera, adults, larvae, morphology, phylogeny
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INTRODUCTION

Main subject of study

Lycoperdininae constitute the largest subfamily of Endomycidae, containing 38 genera and over 635 described species (of the 120 genera and about 1300 species of the family). They are distributed mostly in the Oriental Region. Some genera are known from Afrotropical and Palaeartic Regions, while only three genera are distributed in the Nearctic, four genera in Neotropical, and two genera are known from Australia.

It is difficult not to agree with Gerstaeker (1858), that Lycoperdininae are the largest and most beautiful beetles among Endomycidae. They are mostly black, brown or red, almost always with contrasting markings on the elytra (spots, stripes, transverse bands etc.). Sometimes the taxa also bear amazing ornaments, in the form of long spines or high tubercles on their elytra. Such coloration suggests that Lycoperdininae, like most Coccinellidae having aposematic colour patterns, are distasteful or even poisonous to predators. The impressive ornaments, like spines may also serve as a defence against predators. The strongly developed sexual characters result in the presence of different teeth, spines, thickenings or fringes of hairs on the legs (mainly tibiae and femora).

Historical view

The nomenclatural history of the subfamily Lycoperdininae began in the middle of the 19th century, when Redtenbacher (1844, 1845) established the subfamily Lycoperdininae to accommodate the genera Endomychus Panzer, Lycoperdina Lateille and Dapsa German.

The status of the subfamily Lycoperdininae (=Eumorphinae) (Pakulak, Slipiński and Lawrence 1994, Lawrence and Newton 1995, Tomaszewska 2000) has changed several times in the course of the century. The classification of this taxon has changed many times, moving from the subfamily Lycoperdininae (Redtenbacher 1844), to the family Eumorphidae (Gistel 1856), division Eumorphini (Gerstaeker 1858), subfamily Eumorphinae (Bates 1861), again to the family Eumorphidae (Thorham 1873), and once again to the division Eumorphini (Arrow 1925) and to the subfamily Eumorphinae (Strohecker 1953).

Gerstaeker (1858) in his monograph of the Endomycidae Leach, 1815, the first general survey of the family, erected the division levels for the first time within the family. All genera known at the time, classified presently within Lycoperdininae, were placed in two divisions: Eumorphini and Dapsini. Within Eumorphini, Gerstaeker accommodated Eumorphus Weber, Amphisternus Germar, Corynomalus Dejean and his seven newly described genera: Spathomeles, Engonis, Trycherus, Pedanous, Dioedes, Encymon and Cymbachus. Although Eumorphini was based on the overall appearance of adults, including their size, beauty, and structures of the mouthparts and antennae, all those genera belong presently to the subfamily Lycoperdininae. Gerstaeker’s Dapsini, however, next to presently recognized Lycoperdininae (Acinaces, Phalantha, Ceramis – described by Gerstaeker (1858) – and Indalimus Lateille, Ancylopus Costa, Dapsa Lateille, Daulis Erichson, Lycoperdina Lateille, Mycetina Mulsant), included also the members of the present Epipociinae, Stenotarsinae and even Anamorphinae.

Gorham (1873) elevated Eumorphini to the family level and classified within it the genera from Gerstaeker’s division excluding Corynomalus. He established the family Corynomalidae for Corynomalus and included Acinaces, which was placed previously in Gerstaeker’s Dapsini. Gorham placed the remaining genera of Dapsini, in his families Lycoperdininae, Epipociidae and Palacemorphae. All these families, however, were subsequently downgraded to the subfamily level (Gorham 1890) within the family Endomycidae.

Arrow (1925) in his Fauna of British India returned to the concept of divisions. He discovered and described the stridulatory organs on the head and pronotum present in the members of Eumorphini and indicated them as characteristic features for this division. He also paid attention to the development of sexually dimorphic features within the division. In Arrow’s Eumorphini, there were 14 genera, including his Pseudalindalus (Arrow 1920a) and Brachytrycherus (Arrow 1920b). Arrow also established Beccariini for Beccaria Gorham, 1885 (=Beccariola Arrow, 1943), where he observed neither the stridulatory organs nor sexually dimorphic characters.

Strohecker (1953) in his generic review and world catalogue – the largest work on the Endomycidae of the 20th century – proposed a revised classification of endomycid suprageneric taxa. Based on the presence of the stridulatory organs, he placed Gerstaeker’s Eumorphini and part of Dapsini (Acinaces, Hylaia Guerin (=Ceramis), Indalimus, Ancylopus, Dapsa, Lycoperdina and Mycetina) in the subfamily Eumorphinae. Archipines (=Phalantha) and Daulis were placed, however, in the very diverse subfamily Stenotarsinae based on the following diagnosis: “rarely glabrous, mostly smaller species, the pronotum often very broadly margined, the head without occipital file”. In 1964 Strohecker reviewed the genera of his division Amphisternini and in the following papers he reviewed the genera Eumorphus (Strohecker 1968), Beccariola, Dryadites and Cymbachus (Strohecker 1970), Engonis and Paralindalus (Strohecker 1971a), Encymon (Strohecker 1971b), Pseudalindalus (Strohecker 1977) and Amphex (Strohecker 1980). He also described five genera and many species of Lycoperdininae (=Eumorphinae).
Present position and current research

The present author (Tomaszewksa 2000) undertook the first phylogenetic study of the family Endomychiidae, based on the detailed morphology of selected genera. That study was aimed at the resolution of three major taxonomic problems: the relationships between Endomychiidae and Coccinellidae, the limits of Endomychiidae as a monophyletic taxon, and the limits and relationships of the endomychid suprageneric taxa in order to provide a soundly based subfamily or tribal classification. The cladistic analysis confirmed the sister relationships between Endomychiidae and Coccinellidae and yielded 12 clearly defined evolutionary lineages (subfamilies of Endomychiidae), each based on apomorphic features. Despite the confirmation of the monophyly of all subfamilies, limitations of the data matrix did not provide a solid hypothesis of relationships between them. In most of the trees, the subfamily Lycoperdininae formed a large group with Endomychiinae, Epipocinae, Stenotarsinae and Xenomyctinae that was not supported by a unique apomorphy, because the pseuderotumerous tarsi uniting these taxa are shared with most Coccinellidae. In spite of the monophyly of these subfamilies within this group, their relationships have remained unclear. There is some evidence for sister relationships between Lycoperdininae and Epipocinae, based on structures of the male genitalia and terminalia. Regarding the monophyly of Lycoperdininae, the analysis in 2000 (using species of five selected genera of Lycoperdininae) confirmed that the stridulatory organs on the head and the pronotum are unique for the subfamily, although these vary in their development on the pronotum (e.g. variably reduced among the species of Trychera and obsolete in Beccariola). The occipital file on the head is, however, always well developed. The ovipositor with coxites fused medially was postulated as one more synapomorphy of Lycoperdininae.

The results of the most recent studies on the Lycoperdininae were presented in a series of papers, on Pseudindalmus Arrow, Amphistethus Strohecker, Beccariola Arrow, Archipines Strohecker, Dapsa Latreille, Acinaces Gerstaecker, Avencymon Strohecker, Dryadites Frivaldszky (Tomaszewksa 2001a, 2001b, 2002a, 2002b, 2003a, 2003b, 2003c, 2003d, Tomaszewska and Pal 2003) and Achuarmychus (Tomaszewksa and Leschen 2004), containing descriptions of new species and revisions of a few genera, including support for their placement within Lycoperdininae and identification keys to their species. Immature stages were described for Archipines (Tomaszewksa 2002b) and Achuarmychus (Tomaszewksa and Leschen 2004).

The objectives of current study are:

- to revise the recognized genera of Lycoperdininae,
- to hypothesize the sister taxa of Lycoperdininae and the placement of the subfamily in Endomychiidae.

In present analyses every possible attempt has been made to include available larvae of Endomychiidae with a hope that this additional data set will help to resolve the relationships within the family. Despite the limited larval data the analysis was performed for a combination of adult and larval characters and its results seem to largely support the relationships based on the adult characters as proposed by Tomaszewska (2000).

Immature stages and biology

The knowledge of the immature stages of the family is still very poor. Of 120 currently recognized genera of Endomychiidae, larvae of only 30 genera have been described so far (three genera in the present paper). Of the 12 subfamilies, the larvae remain unknown for Danascelinae Tomaszewska, 2000. The first larva of Eupsilobiinae (Palakuk and Ślipiński 1990) is treated for the first time in this paper.

The larvae of Endomychiidae are highly diverse in form, sculpture and vestiture (Lawrence 1991), and this diversity results in similarities to other cucujoids. Lycoperdininae seem to be especially morphologically diverse. Burakowski (1997) and Burakowski and Ślipiński (2000) grouped all known Lycoperdininae larvae into four morphological groups. The larva of Mycetina cruciata (Schaller) (Burakowski 1997, Beutel et al. 2000), appears to be most similar to Aphorista vitata (Fabricius) with their short thoracic and abdominal lateral, tergal lobes, vestiture of specialized fan-shaped setae, tergal plates with weak protuberances and tergum 9 emarginate. Amphiex with its odd, onisciform shape without apparent dorsal vestiture and with dorsal spiracles, and Lycoperdina with its paired, acute processes on abdominal terga, form separate monogenic groups. Eumorphus, on the other hand seems to be most similar to Ancylopus in having narrow dehiscent processes along thoracic and abdominal edges and the presence of repugnatorial gland openings on abdominal tergum 1.

Characters of the recently described Archipines larva (Tomaszewksa 2002b) have brought more confusion to this informal division. Archipines is most similar to a group including Eumorphus, Encymon and Ancylopus, which have dehiscent body processes, but Archipines has a distinctly emarginate tergum 9 like that found within the group including Aporistata and Mycetina, and a 1-segmented labial palp, like that of Eumorphus and Achnarrymus (Tomaszewksa and Leschen 2004). The larva of Achnarrymus is similar to Archipines, Aphorista and Mycetina. The body lacking tergal sclerotisations and verrucae distinguishes Achnarrymus from Aphorista and Mycetina, while the absence of deciduous tergal lobes separates it from Archipines.
To date, no larval synapomorphies have been proposed for Lycoperdinidae. As more endomychid larvae are described (e.g., Tomaszewska 2002b, Tomaszewska and Leschen 2004), it appears that many characters are not in congruence with the monophyly of some endomychid subfamilies. Some of them, in particular Epipociniae, Stenotarsiniae, and Lycoperdiniae, share many larval similarities (McHugh and Pakaluk 1997, Burakowski and Slipiński 2000), but without any recognizable synapomorphies.

Endomychidae are mostly mycophagous, feeding on a wide variety of fungal types, and Lycoperdiniae larvae are also fungus feeders, almost without exception. Their most frequent habitats are rotten wood and fungus-infested bark. The larvae may occur under bark, in rotting wood or more often, on wood or bark surfaces. Some of them, including Mycetina perpuscula (Newman), Lycoperdinia sp., and Aphorista vittata (Fabr.) have obligate host relationships to Basidiomycetes. Species of Lycoperdinia have internally feeding larvae, which occur in puffsballs of the genus Lycoperdon (Lawrence 1991), although the specimens of L. ferruginea LeConte were also collected from forest litter or debris (Pakaluk 1984). The internally feeding larvae have mouthparts highly adapted for sporophagy. Lawrence (1977) referred to the mandibular morphology of puffball beetles as a “spore mill”, which is “powerful enough to crush any spores before they are swallowed”, with the enlarged mola provided with numerous tubercles, and the top of the mandible reduced and truncated.

Sometimes the specific food source is difficult to verify. For example, Aphorista marosa LeConte was found in association with a yellow plasmidium of a slime mould (Myxomycetes). There is, however, no evidence that none of the Endomychidae genus utilizes plasmidia as a food source (Lawrence 1988, 1991). A species of Amphrix was found feeding on spore capsules of an ascomycete fungus, while the larva of Trycherus was reported to feed on lichens (Strohecker 1953).

Leschen (1994) discussed very interesting correlations between fungal ecology and larval behaviour of mycophagous Coleoptera, and hypothesized that many larval behaviours have evolved in a defensive context. The antipredator adaptations include: egg protection, aposatism, larval gregariousness, pupal locations, parental care and other behaviours. Reports of larvae that pupate within sporocarps involve the tax feeding on tough and persistent, lignicolous fungi, like Amphrix spp. Amphrix may pupate in clusters, but the significance of this is uncertain.

**Material and methods**

This study is based on approximately 6000 adult specimens of nearly 400 species and most of the known larvae of Endomychidae, examined during the past four years. Species representing all the Lycoperdiniae genera and many genera of the remaining endomychid subfamilies were examined, including all available types.

The studied material came from the following institutions:

- **ANIC** – Australian National Insect Collection, Division of Entomology, CSIRO, Canberra, Australia;
- **BPBM** – Bernice P. Bishop, Museum, Honolulu, USA;
- **CASC** – California Academy of Sciences, San Francisco, USA;
- **EMLU** – Entomological Museum, Lund University, Lund, Sweden;
- **FMNH** – Field Museum of Natural History, Chicago, Illinois, USA;
- **FSCA** – Florida State Collection of Arthropods, Gainesville, FL, USA;
- **HNHM** – Hungarian Natural History Museum, Budapest, Hungary;
- **LSAM** – Louisiana State Arthropod Museum, Baton Rouge, LA, USA;
- **MCZ** – Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA;
- **MHNG** – Muséum d’Histoire Naturelle, Genève, Switzerland;
- **MIZ** – Muzeum i Instytut Zoologii PAN, Warszawa, Poland;
- **MNHN** – Muséum National d’Histoire Naturelle, Paris, France;
- **NCI** – National Collection of Insects, Pretoria, South Africa;
- **NHMB** – Naturhistorisches Museum, Basel, Switzerland;
- **NHMV** – Naturhistorisches Museum, Vienna, Austria;
- **NMB** – Naturhistorisches Museum für Naturkunde der Humboldt Universität, Berlin, Germany;
- **NME** – Naturkundemuseum Erfurt, Germany;
- **NMNH** – National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA;
- **NMP** – National Museum, Prague, Czech Republic;
- **NZAC** – New Zealand Arthropod Collection, Auckland, New Zealand;
- **QMB** – Queensland Museum, Brisbane, Australia;
- **SMNS** – Staatliches Museum für Naturkunde, Stuttgart, Germany;
- **SMT** – Staatliches Museum für Tierkunde, Dresden, Germany;
- **TMNH** – Transvaal Museum of Natural History, Pretoria, South Africa.

For detailed examination of characters that might be used for cladistic analysis, at least one male and one female of one or more species of the studied genus were completely cleared in 10% cold potassium hydroxide and
disarticulated and placed in glycerine on slides for further study. The structural illustrations were made from these preparations using a camera lucida attached to an Olympus dissecting microscope SZH 10 or to a Zeiss Ampliflu microscope (smaller structures). Measurements of the following were made using a filar micrometer body length, from apical margin of Clypeus to apex of elytra, body width, across both elytra (maximum), pronotal length, from the middle of anterior margin to margin of basal foramen, pronotal width, across widest part, elytral length, along suture including scutellum.


In taxonomy section, the “species examined” are cited below each generic description, and the type species of the genus is marked with asterisks (*).

**Taxonomy**

*Lycopepoda* Redtenbacher, 1844
118 Type genus *Lycopepoda* Latreille 1807

*Eumorphidae* Gouvel 1856 382 Type genus *Eumorphus* Weber 1801
*Eumorphus* Gerstaecker, 1857 214 Type genus *Eumorphus* Weber 1801

*Dapsa* Gerstaecker 1858 170 Type genus *Dapsa* Latreille 1829
*Coryonomada* Gorham 1873 14 Type genus *Coryonomada* Gerstaecker, 1857

*Amphisternum* Cask 1910 25 Type genus *Amphix* Laporte, 1840
*Beccari* Arrow 1925 278 Type genus *Beccari* Gorham, 1885 (nec Trinchesia 1870) Unavailable name based on preoccupied type genus

*Amphisternum* Strohecker 1964 320 Type genus *Amphisternum* Germain 1843

**Characteristics of the subfamily**

**Adults** Head (Figs 1–6) partially retracted in prothorax. Frontoclypeal suture distinct, straight. Antennal grooves absent, antennal sockets visible from above. Occiput covered with fine, reticulate microsculpture and provided with median, transversely ridged cephalic stridulatory area (occupital file). Gular sutures rarely well developed and widely separated (Fig. 6), most often are confluent medially (Figs 2, 4, 5) or indistinct to absent. Antenna 11-segmented, almost always with 3-segmented club. Clypeus transverse, flat, widest at base. Mandible (Figs 96–176) broad, strongly concave ventrally, convex dorsally, mola large, well developed, strongly sclerotized, transversely ridged, prostheca rather narrow, membranous, setose, submola small, densely setose, membranous. Maxilla (Figs 177–241) with 4-segmented palp, lacinia with mesal and dorsal surfaces provided with more or less regularly arranged hairs and/or spines. Labium (Figs 242–279) with 3-segmented palp, palpomere 1 very small, rarely fused with palpomere 2, ligula short, membranous or submembranous, more or less distinctly lobed at sides. Tentorium with anterior arms fused medially, and widely divergent anteriorly, corpotentorium straight or weakly curved, without median process.

Prothorax (Figs 280–355) transverse. Pronotum almost always bordered laterally and often anteriorly, anterior edge with striolammary membrane, basal and lateral sulci almost always present, well developed. Anterior angles most often produced forwards, acute, blunt or rounded, posterior angles right-angled or weakly acute, pronotal disc at least weakly convex. Prosternum most often with a pair of pits at the front of procoxal cavities, prosternal process very differently developed (Figs 281, 285, 291, 295, 311, 343), front coxae prominent, circular in outline, their cavities externally open, internally widely closed. Trochantorine concealed.

Meso and metathorax (Figs 356–393) Mesoscutum sclerotized with small scutellum. Mesoscutum carinate, most often with a pair of pits near anterior margin, intercoxal process of different sizes and shapes, separating meso coxae, extending to about half of length of coxae. Mesoscutum circular in outline, its cavity outwardly open with trochantorine at least partially exposed. Meso-metaventral junction almost always with internal knobs. Elytra most often widest at about basal third or near mid length, elongate, convex, most often irregularly punctured, epipleuron often moderately wide, complete or almost so. Metaventrite large, transverse, weakly convex, narrowing towards its anterior margin, provided with postcoxal pits, sometimes also with characters of sexual dimorphism, with intercoxal process often widely bordered and raised, discerned most often longer than half length of metaventrite. Metaventrite transverse, widely separated, femoral lines almost always absent. Metendosternite most often with short stalk and widely separated anterior arms and tendons. Hind wing with anal lobe, anal veins single (Figs 16, 18, 19) or double (Figs 15, 17), anal cells one (Figs 18, 19) or two (Figs 15–17) (if CuA2 well developed then forms closed cell with AA+CuA), Mp CuA cross vein vestigial, medial bridge present, medial fleck small or moderately large, oval or elongate, undivided (Figs 15, 19), partially divided (Fig. 18) or fully divided (Figs 16, 17) by (AA+CuA)+CuA2 connecting just before medial fleck and as a single, slender vein dividing medial fleck, radial cell reduced.

Legs (Figs 394–618) Trochantorofemoral attachment most often subheteromorph or heteromorbid, sometimes oblique. Femora usually moderately densely setose, and at least ventral surfaces of fore and mid femora provided with additional more or less distinct, regular or somewhat irregular rows of obliquely directed spinulae. Tibia and tarsus more densely setose than femur. Tibia widening
towards tarsus, without apical spurs. Tarsal formula 4-4-4 in both sexes; tarsi pseudotrimmerous with tarsomer 1 and 2 flattened and ventrally lobed; tarsomere 3 much shorter than terminal tarsomere. Claws simple or rarely modified (Figs 449, 487). Male legs almost always provided with characters of sexual dimorphism (Figs 405, 410, 421, 423, 425, 437–440, 447).

Abdomen with five pairs of functional spiracles on abdominal segments 1–5, situated dorsally on pleurites; ventrites 2–5 with internal, anterolateral apodemes. Five or sometimes six freely articulated ventrites; ventrite 1 longest. Ventrite 5 often with characters of sexual dimorphism (sometimes modified in both sexes). Male abdominal segment 8 (Figs 619–656) with sternite narrow and most often emarginate medially at apex. Male genital segment with sternite almost always at least weakly modified apically (Figs 657–732).

Aedeagus (Figs 733–807) usually stout, strongly sclerotized, at least weakly curved, resting on its side when retracted. Median lobe often with apical branches. Tegmen usually placed at base and reduced.

Female genitalia (Figs 808–846). Ovipositor with coxites always almost at least partially fused, rarely separated or strongly reduced; abdominal segment 8 or at least sternite 8 most often fused (or compactly connected) with genital segments. Spermatheca membranous, accessory gland usually present.

Larvae. Body (Figs 901, 911, 926, 942, 959, 977, 994, 1010, 1028, 1042) short-oval to long-oval, flattened dorsoventrally to moderately convex often with lateral, pleural and tergal processes (sometimes deciduous – easily breaking off, leaving scars); urogomphi present or absent. Dorsum usually light brown, well sclerotized; venter slightly lighter, moderately sclerotized; mola almost always dark brown. Dorsal vestiture consists of simple or frayed setae arising from small tubercles; ventral surfaces usually sparsely covered with simple, short setae.

Head protracted or retracted, at least partially visible from above, almost always hypognathous with mouthparts directed ventrally; moderately flattened dorsoventrally. Epicranial stern usually absent (Figs 927, 943, 995, 1029, 1043), sometimes present but short (Figs 901, 912, 960, 978, 1011), frontal arms long, U- or V-shaped. Median endocarina absent. Hypostomal rods present, usually single subparallel or rarely double – long and short (Figs 1012, 1030). Stemmata 4 per side, hemispherical. Frontoclypeal suture usually distinct and straight. Clypeus transverse, submembranous. Labrum free, sclerotized often with membranous, moderately large anterior part (Figs 920, 936, 951, 1007, 1020, 1037); anterior margin truncate or very shallowly emarginate, rarely multidenticate (Figs 974, 1053) or sinuate (Figs 920, 951). Antenna (Figs 902, 914, 929, 945, 964, 979, 998, 1013, 1034, 1045) 3-segmented, usually long and slender; situated in large, circular membrane, sometimes partially retracted into anten

nal insertions, almost always distant from mandibular articulations. Antennomere 1 short; antennomere 2 longest, almost always at least 3 x longer than antennomere 1; sensory appendage, usually at least as long as antennomere 3. Mandible broad, usually triangular with apex differently developed; prostheca moderately large, membranous, sometimes with additional submembranous or weakly sclerotized process (Figs 918, 919, 1001, 1002, 1015, 1016), or divided in two separated parts (Figs 907, 981); mola usually large, and usually finely ridged transversely with additional asperities. Maxillolabial complex retracted. Maxilla with well-developed articulating area; cardo usually somewhat triangular and stipites elongate; mala longer than wide, usually densely setose, sometimes with specialized setae (Figs 905, 917, 986) and/or characteristically arranged curved setae (Figs 1004, 1023). Maxillary palp 3-segmented based on large, membranous palpifer; palpomere 1 usually shortest and transverse; terminal palpomere always bearing a group of apical sensilla. Labium usually with mentum and submentum fused; labial palpi usually 2-segmented (sometimes 1-segmented), situated in membranous palpiers distant from each other.

Thorax widest across meso- or metathorax; prothorax almost as long as meso- and metathorax combined; each tergum strongly transverse, usually well sclerotized, with lighter or darker natal plates, and usually divided by pale longitudinal line. At least small tergal processes usually present on each segment. Obvious glands absent.

Legs usually long and rather slender; all pairs of subequal length with coxae usually widely separated; coxae sometimes bear frayed seate along with simple pubescence. Trochanter somewhat triangular; femur subcylindrical, often slender at base, densely setose; tibiotarsus sometimes distinctly longer than coxa and femur (Figs 1009, 1026); claw most often slender with single, comparatively long seta.

Abdomen widest most often across segment 2 or 3, bearing usually tergal and pleural or only tergal (sometimes dehiscent) processes. A1 sometimes with dorso-lateral gland openings (Figs 926, 994, 1000, 1010, 1017) and modified tergal processes (very small, covered with modified setae). A9 short sometimes with distinct urogomphi; A10 postero-ventral or ventral, rarely situated posteriorly (Figs 977, 1028). Spiracles annular, not raised on tubes, usually located in folds between tergal and pleural lobes; rarely situated dorsally – small, annular, accompanying with slightly smaller rounded tubercle, both surrounded with sclerotized ring (Figs 942, 949).

Key to the adults

1. Body vestiture double, consisting of suberect setae originating from punctures and very long, erect spines placed on small tubercles (Figs 12, 37, 38, 869,
870); pronotum with lateral margins coarsely crenulate (Figs 314, 316).......................... 2
-
Body glabrous or covered with one kind of vestiture (Figs 866, 867); pronotum with lateral margins smooth or at most finely crenulate/ denticulate (Figs 300, 308, 312, 322).......................................................... 3

2. Elytra irregularly punctured, covered with scattered black spots (Fig. 869); labium with terminal palpmere oval (Fig. 254); maxillary galea widely rounded at apex (Fig. 208); hind wing without medial fleck .................. Daulis Ericsson
-
Elytra with regular rows of punctures, without contrasting spots (Fig. 870); labium with terminal palpmere transverse (Fig. 255); maxillary galea broadly triangular (Fig. 209); hind wing with medial fleck ............... Daulotypus Lea

3. Mesoventre almost flat (Figs 356, 363); terminal antennomere with apical tubercles/ sensilla (Figs 20, 27); [coxites separated (Figs 810, 815)] ............. 4
-
Mesoventre carinate (Figs 358, 368, 377, 378); terminal antennomere without apical tubercles; [coxites almost always fused] .......................... 5

4. Pronotum with lateral margins widened into small, sharp tooth or at least weakly angulate near anterior third (Fig. 294), prosternal process vestigial (Fig. 295); mesosternal process very narrow with mesocoxa almost contiguous (Fig. 363); sternite of male genital segment visible in deep excision of ventrite 6; coxites vestigial (Fig. 815); mandible shallowly excised at apex (Figs 113, 114) Archipines Strohecker
-
Pronotum without lateral widening into small, sharp tooth and without distinct angulation near anterior third (Fig. 280), prosternal process long and moderately wide (Fig. 281); mesosternal process distinctly separating mesocoxa (Fig. 356); sternite of male genital segment invisible, coxites well developed (Fig. 810); mandible with long, sharp apical tooth (Figs 97, 98) .......................... Achnarmonychus Tomaszewska et Leschen

5. Mesoventre with intercoxal process longer than wide, provided with elongate median ridge at least along anterior half (Figs 362, 371, 380, 386); median lobe most often without apical branches (Figs 745, 746, 781, 782, 785, 786); [gular sutures well developed, widely separated] .................. 6
-
Mesoventre with intercoxal process as long as wide or transverse, rarely elongate – without elongate median ridge (Figs 357, 366, 368); median lobe more or less distinctly branching out at apex (Figs 737, 738, 743, 744, 761, 762) ..................... 9

6. Antennal club distinctly 3-segmented, without differences between sexes ....................................... 7
-
Antennal club 2-segmented (Fig. 46) or 3-segmented, with antennomere 9 in male larger than antennomere 10 (Fig. 44) .................. 8

7. Body minutely setose, more flattened; elytra unicolloured – blackish, or reddish-brown with elongate, black stripes, or dark brown to almost black with pale bases and apices (Fig. 853); pronotum with lateral margins smooth (Fig. 298); median lobe without apical branches (Figs 745, 746) .... Aphorista Gorham
-
Body distinctly setose, more convex (Figs 867, 868); elytra light brown decorated with black maculae of irregular shapes or rarely elytra uniformly light brown, or black with pale oval markings; pronotum with lateral margins weakly denticulate (Fig. 312); median lobe more or less distinctly branching out at apex (Figs 767, 768) .... Dapsa Latreille

8. Antennal club 2-segmented (Fig. 46); body at most finely pubescent; female genitalia with prodiger acutely produced backwards (Fig. 835) ........................................ Lycoperdina Latreille
-
Antennal club 3-segmented with antennomere 9 in male, larger than antennomere 10 (Fig. 44); body rather densely pubescent; female genitalia with proctiger simple at apex (Fig. 833) ......... Hylaia Guérin

9. Elytra (at least in males) with distinct tubercles and/or long spines (Figs 9 11, 13, 14); base of spermatheca at least with small, weakly sclerotized ring (Figs 809, 812, 819, 844, 845) .................. 10
-
Elytra without tubercles or spines; spermatheca lacking basal ring ........................................ 14

10. Prosternal process widely separating fore coxae, extending distinctly beyond them and deeply excised at apex (Figs 285, 287, 297) ............... 11
-
Prosternal process not as above .................. 13

11. Pronotum with anterior angles widely thickened and raised (Fig. 286); mandibular apices symmetrical (Figs 105, 106); spermatheca with small, weakly sclerotized ring (Fig. 812) .................................... Amphistethus Strohecker
-
Pronotum with anterior angles lacking wide, raised thickening (Figs 284, 296); mandibular apices asymmetrical (Figs 101–104, 121–124); spermatheca with large, nodulus-like structure (Figs 809, 819) .................. 12

12. Elytra covered with tubercles (Figs 9, 849); maxillary lacinia with tuft of S-like setae at apex (Figs 179, 180); metaventrite with intercoxal process widening at apex and covering part of coxae (Fig. 358) .................. Amphisternus Germar
-
Elytra covered almost always with long spines (Figs 10, 11, 859, 860) (rarely with tubercles – Fig. 861); maxillary lacinia without S-like setae at apex (Figs 197, 198); metaventrite with lateral margins of intercoxal process subparallel (Fig. 367) ............... Cacodea Thomson

13. Body less elongate (Fig. 898); pronotum with anterior angles lacking raised thickening (Fig. 352) ............... Stictomela Gorham
-
Body more elongate (Figs 896, 897); pronotum with anterior angles widely thickened and raised (Fig. 350) .................................. Spathomeles Gerstaecker
14. Mesoventer with intercoxal process widening towards apex and overlapping part of coxae (Figs 358, 359, 378, 384, 389, 391) ...................... 15

- Mesoventer with intercoxal process not widening towards apex (Figs 356, 357, 365, 376) ...................... 16

15. Body more elongate, subparallel with pronotum almost as wide as elytra (Fig. 890); maxillary lacinia with tuft of S-like setae at apex (Figs 228, 229) ................................................................. Ohtaius Ch’iu-jê

- Body less elongate, with elytra weakly rounded laterally, and pronotum narrower than base of elytra (Fig. 878); maxillary lacinia without S-like setae at apex (Figs 213, 214) ............... Gerstaecerus nom. nov.

16. Posterial process moderately widely separates fore coxae, deeply excised apically (forked), extending at most to hind margin of coxae (Figs 309, 311, 319, 349); [body usually broadly-ovate] .............................................. 17

- Prosternal process not as above (at most weakly excised/ emarginate apically) ............................................. 20

17. Pronotum without basal sulcus and with extremely reduced striulatory membrane (visible only on cleared specimens) (Fig. 8): legs and abdominal ventrites lacking characters of sexual dimorphism ....................................................... Beccariola Arrow

- Pronotum with well developed basal sulcus and striulatory membrane (Figs 310, 318, 348); legs (and/or abdominal ventrites) with characters of sexual dimorphism (Figs 506, 595, 596) ......................... 18

18. Metaventer with intercoxal process widely bordered and raised (Fig. 375); mandible with sharp apical tooth (Figs 138, 139); abdominal tergite 8 simply setose ............................. Dryadites Frivaldsky

- Metaventer with intercoxal process moderately widely bordered and weakly raised (Figs 374, 390); mandible with apex widely chisel-shaped (Figs 130, 170); abdominal tergite 8 with tuft of long setae at apex (Figs 630, 646) ........................................................... 19

19. Body more oval (Fig. 865); mesoventer with intercoxal process wider, distinctly pentagonal, almost flat (Fig. 374); aedeagus more elongate (Figs 671, 672) ............................................. Cymbachus Gerstaeccker

- Body more elongate (Figs 894, 895); mesoventer with intercoxal process narrower and at least weakly ridged or tuberculate (Fig. 390); aedeagus short and stout (Fig. 803) ......................... Sinocymbachus Strohecker et Ch’iu-jê

20. Head with gular sutures well developed and widely separated (Fig. 6); maxillary lacinia with tuft of S-like setae at apex (Figs 195, 196); [body broadly ovate, dark brown or black with yellow or red markings on elytra (Fig. 858)] ......................... Brachytrycherus Arrow

- Head with gular sutures indistinct or confluent in middle line (Figs 2, 4, 5); maxillary lacinia without S-like setae at apex (Figs 230, 235) .................................................. 21

21. Mesoventer with intercoxal process trapezoidal in shape (Figs 383, 393); prosternal process distinctly bordered with bordering margins extending (at least short) anteriorly as parallel or divergent ridges (Figs 343, 347) ................................. 22

- Mesoventer with intercoxal process not trapezoidal in shape (Figs 361, 387); prosternal process if bordered then bordering ridges not extending anteriorly (Figs 341, 351) ........................................... 23

22. Mesoventer with femoral lines (Fig. 393); male antennomere 9 with tendency to bulbous enlargement (Fig. 53); female genitalia with coxites fused (Fig. 840) ........................................... Pseudindalmus Arrow

- Mesoventer without femoral lines (Fig. 383); male antennomere 9 simple (Fig. 49); female genitalia with coxites separated (Fig. 838) .................................................. Mycetina Mulsant

23. Elytra with basal edge thickened and raised (Figs 10, 13); [body long-ovar] ........................................... 24

- Elytra with basal edge simple (Fig. 12) ..................... 27

24. Pronotum of female with lateral sulci connected medially by arcuate ridge (Fig. 292); mandible with long and sharp apical tooth (Figs 109, 110); labrum with sides subparallel (Fig. 63); male mid femora with fringe of long hairs almost throughout inner edge (Fig. 421) while hind femora simply pubescent .......... Ancylopus Costa

- Pronotum of both sexes with lateral sulci separated (Figs 334, 340) (not connected medially by arcuate ridge); mandible with apex minutely excised or blunt (Figs 154, 155, 162, 163); labrum with sides produced antero-laterally into rounded lobes (Figs 85, 88); male mid and hind femora with fringe of long hairs almost throughout inner edge (Figs 575, 576) or mid and hind femora simply pubescent .............. 25

25. Body black or brownish-black with elytra decorated with yellow transverse bands (Fig. 891); mandibular apex without teeth (Figs 162, 163); labial palp 2-segmented (Fig. 273) .......... Parindalmus Achar

- Prevailing body colour brown or deeply red and elytra without pale transverse bands (Figs 855, 885); mandibular apex minutely excised (Figs 115, 116, 154, 155); labial palp 3-segmented .................. 26

26. Colour of dorsal surface of body deeply red, with elytra surrounded by black area (Fig. 885); pronotum with lateral edges not crenulate and anterior angles rounded and not produced anteriorly (Fig. 334); lateral sulci very short and shallow (Fig. 334) ...................................................... Malindus Viliers

- Colour of dorsal surface of body light brown to dark brown (Fig. 855) or elytra entirely black; pronotum with lateral edges weakly crenulate and anterior angles blunt or weakly acute, distinctly produced anteriorly (Fig. 290); lateral sulci deep and long (Fig. 290) .......... Aacenymis Strohecker

27. Labium with palpomere 2 strongly transverse, semi-lunar in shape while terminal palpomere distinctly elongate (Fig. 249); legs without sexually dimorphic features; [body brown, often with black markings
on elytra, pronotum without basal sulcus (Fig. 848)]

- Labial palpi not as above (Figs 257, 265); legs almost always with characters of sexual dimorphism (Figs 467, 469, 530). .................................................. 28

28. Body covered with dense reticulate microsculpture with punctures extremely fine or sometimes dense reticulation present along with distinct punctures; elytra most often without markings, sometimes with black, elongate stripes, or only apices lighter .... 29

- Body distinctly punctured sometimes with fine reticulation on pronotum or elytra; elytra most often with contrasting markings .......................... 31

29. Antennal club rather narrow and weakly flattened (Fig. 32); body punctuation most often very distinct, mesoventrite with intercoxal process longer than wide (Fig. 368) ....... Callimodapsa Strohecker

- Antennal club wide and flattened (Figs 35, 43); body punctuation very fine to obsolete; mesoventrite with intercoxal process at most as long as wide, or transverse. ........................................ 30

30. Mandible with apical tooth widely chisel-shaped (Figs 146, 147); fore femur with apical part of dorsal surface deeply excised (Fig. 529); body more stout; body almost always deeply black (Fig. 879) ........................................ Haploscelis Blanchard

- Mandible with apical tooth comparatively sharp, not chisel-shaped (Figs 131, 132); fore femur without apical excision; body more slender; rarely entirely black (Fig. 866) .. Cynnotes Gorham

31. Prosternal process narrowly separating fore coxae (Figs 321, 331); mandible with very small apical and subapical teeth, subequal in size (Figs 140, 141, 150, 151); female abdominal segment 8 fused with genital segments, while sternite 7 free (Figs 829, 834) ....... 32

- Prosternal process moderately to rather widely separating fore coxae (Figs 305, 337, 355); mandible with apex not as above (Figs 127, 128, 156, 157, 175, 176); female abdominal segment 8 and sternite 7 fused with genital segments (Fig. 839), or only sternite 8 fused with coxites (Figs 821, 837, 846) ........ 33

32. Body colour green, blue-green, dark blue or black, with prothorax red or black and femora black or bicoloured, and elytra sometimes with pale, rounded spots; body more oval with elytra strongly convex (in most cases) (Figs 872, 873); base of pronotum weakly to distinctly narrower than base of elytra (Fig. 320); elytra widest near basal third or near mid length; antennal club wide and flattened (Fig. 40); labium with terminal palpmere very strongly transverse (much wider than palpmere 2) (Fig. 262). .................................. Enycymon Gerstaecker

- Body colour black or sometimes brown, always with contrasting (yellow or red) markings on the elytra (Figs 881, 882); body more elongate with elytra moderately convex; base of pronotum almost as wide as base of elytra; elytra widest beyond mid length; antennal club narrow and weakly flattened (Fig. 45); labium with terminal palpmere transverse but not much wider than palpmere 2 (Fig. 267). ........... Indalimus Gerstaecker

33. Elytra dark brown to black, almost always with irregular in shape, contrasting markings (pale or pale and/or black, stripes and bands) (Figs 864, 886, 899, 900); at least male abdominal tergite 8 truncate to somewhat emarginate at apex (Figs 637, 642, 654, 821, 837); female genitalia with spermatoeca lacking accessory gland (Figs 821, 837, 846); median lobe without long apical branches (Figs 759, 760, 797, 798) ........................................ 34

- Elytra black with more regular yellow spots, or sometimes brown or yellow with black spots, or without distinct spots or bands (Figs 851, 874, 877, 892); abdominal tergite 8 of both sexes more or less rounded apically (Figs 622, 648, 639); spermatoeca with distinct accessory gland (Figs 811, 830, 839); median lobe branching out at apex (Figs 739, 740, 775, 776, 789, 790) ........... 36

34. Antenna stout (Fig. 33); labrum with basal margin straight (Fig. 77); pronotum with sides widely bordered and this bordering coarsely punctured (Fig. 304); spermatoeca very large (Fig. 821) ........................ Chetlyrus Viljers

- Antenna more slender (Figs 48, 57); basal margin of labrum with median, triangular, raised ridge produced anteriorly (Figs 86, 90); pronotum with lateral margins narrowly bordered and without distinct punctuation (Figs 336, 354); spermatoeca small (Fig. 837, 846) ........... 35

35. Base of pronotum much narrower than base of elytra (Fig. 886); maxillary galea of equal width throughout, rounded at apex (Fig. 226); terminal maxillary palpmere about as long as wide (Fig. 226) ........ Microtrachytes Pic

- Base of pronotum at most slightly narrower than base of elytra (Fig. 899, 900); maxillary galea enlarged and triangularly produced towards apex (Fig. 241); terminal maxillary palpmere elongate (Fig. 241) .............. Trychurus Gerstaecker

36. Pronotum with striulatory membrane reduced, very small (Fig. 288); prosternal process not extending beyond fore coxae, truncate or weakly emarginate at apex (Fig. 289); elytra uniformly coloured, sometimes surrounded with black area (Fig. 851) or rarely with rounded or subquadrate black maculae; mandible with apical tooth widely chisel-shaped and with moderately large, blunt subapical tooth (Figs 107, 108); only abdominal sternite 8 compactly connected with female genitalia .... Amphix Laporte

- Pronotum with striulatory membrane well developed, conspicuous (Figs 324, 344); prosternal process extending at least shortly beyond fore coxae, rounded
at apex (Figs 323, 345), clytra almost always black with four yellow spots (Figs 874, 875, 877), mandible not as above (Figs 142, 143), abdominal segment 8 and sternite 7 fused with genital segments 37

Lateral margin of pronotum simple (Fig 344), intercoxal process of mesonotum almost flat (Fig 388), bordered anterior margin of intercoxal process of metanotum comparatively raised (Fig 388), male abdominal ventrites each with setose tubercles, male mid and hind femora provided with fringes of long hairs on inner edges (Fig 582) 37

Platndalmus Strohecker

Lateral margin of pronotum with tendency to form irregularly broken lines, inconstant and often asymmetrical (Fig 322), intercoxal process of mesonotum with ridges and concavities (Fig 377) intercoxal process of metanotum narrowly bordered and weakly raised (Fig 377), male abdominal ventrites without setose tubercles, male femora simply pubescent (without fringes of long hairs on inner edges) 37

Eumorphus Weber

Key to the larvae

1. Head with frontal arms U-shaped (Figs 927, 943, 995, 1011, 1029) 2
   - Head with frontal arms V shaped (Figs 912, 960, 977, 1043) 7

2. Tergite of abdominal segment 1 with repugnatorial gland openings (Figs 926, 994, 1000, 1010, 1017), body with lateral large processes 3
   - Tergite of abdominal segment 1 without repugnatorial gland openings, lateral body processes absent or very small 6

3. Body more oval (Fig 926), each tergum provided with a pair of lateral processes on each side, body processes not deciduous 7
   - Body more elongate (Figs 994, 1010), each tergum provided with one lateral process on each side, tergal processes deciduous 4

4. Body processes blunt apically, head broadened behind antennal insertions 7
   - Body processes at least subacute apically (Figs 997, 1019), head without distinct widening behind antennal insertions (Figs 995, 1011) 5

5. Epicranial stem present, although very short (Fig 1011), hypostomal rods paired (Fig 1012), labial palp 1-segmented (Fig 1024), body processes with setae arising from small tubercles (Figs 1018, 1019) 6
   - Epicranial stem absent (Fig 995), hypostomal rods single (Fig 996), labial palp 2 segmented (Fig 1005), body processes with setae arising from large tubercles (Fig 997) 37

Eumorphus Weber

6. Body short oval, apparently glabrous, abdominal spiracles placed dorsally (Fig 942), hypostomal rods single (Fig 944), antennomere 2 over 10.0 × longer than antennomere 1 (Fig 945), abdominal tergites without any processes 8
   - Body long oval, covered with short, suberect hairs (Fig 1028), abdominal spiracles placed laterally (not visible from above), hypostomal rods paired (Fig 1030), antennomere 2 at most 2.5 × longer than antennomere 1 (Fig 1034), abdominal tergites with dorsal, acute, paired processes (Figs 1028, 1032) 8

Lycoperdinia Latreille

7. Body short oval, lacking lateral processes or dorsal verrucae (Fig 911), mandibular prostheca provided with stout, finger like processes in apical half (Figs 918, 919) 9
   - Body elongate oval with dorsal verrucae and/or lateral processes (Figs 901, 959, 977, 1042), mandibular prostheca without finger like processes 8

8. Thoracic and abdominal terga with lateral large or moderately large processes, and without dorsal verrucae (Figs 901, 977), labial palp 1-segmented (Figs 908, 989), mandibular prostheca divided in two separated parts (Figs 907, 981), labrum with apical margin smooth (without denticles) 9
   - Thoracic and abdominal terga with lateral small processes and dorsal verrucae (Figs 959, 1042), labial palp 2 segmented (Figs 971, 1055), mandibular prostheca not divided (Figs 969, 970, 1047, 1048), labrum with apical margin multidentulate (Figs 974, 1054) 10

9. Body processes deciduous (Figs 977, 991), claw provided with stout seta rounded at apex (Fig 993) 10
   - Body processes not deciduous (Fig 901), claw with seta slender and pointed apically (Fig 910) 7

Achaearmythus Tomaszweska et Leschen

10. Thoracics segments 2 and 3 with 1 pair of dorsal, tergal protuberances (Fig 959), antennal insertions placed in about mid length of head (Fig 960), caudal notch on abdominal tergite 9 weakly emarginate (Fig 959) 11
    - Thoracics segments 2 and 3 with 2 pairs of dorsal, tergal protuberances (Fig 1042), antennal insertions located beyond mid length of head (Fig 1043), caudal notch on abdominal tergite 9 deeply emarginate (Fig 1042) 11

Mycetina Mulsant

Adult morphology

Achaearmythus Tomaszweska et Leschen
(Figs 20 61 97, 98, 192, 250, 280, 281, 356, 394–398 619, 657, 658, 749 750 810 847)

Achaearmythus Tomaszweska et Leschen 2004 207 Type species by original designation Achaearmythus carltoni Tomaszweska et Leschen 2004
Diagnosis. Achuarmychus is most similar to the genus Archipines in having the body densely setose, the terminal antennomere bearing small, setose tubercles/ sensilla on apical margin, the abdominal ventrite 6 partially visible, the ovipositor with separated coxites and the tegmen with strut comparatively long. Achuarmychus, however, differs from Archipines in having mandible with one, large apical tooth and without subapical teeth, the elytra at most 2.1 × longer than the pronotum, the prosternal process comparatively widely separating front coxae and extending beyond them, the intercoxal process of mesoventrite, pentagonal, about twice as long as wide, the ovipositor with well developed coxites and the male tibiae without sexually dimorphic characters. The overall body appearance of Achuarmychus resembles setose species of Lycoperdina, however the antennal club distinctly 3-segmented, the mandible without subapical teeth, the prosternal process widely separating front coxae and extending beyond them, the intercoxal process of mesoventrite elongate, pentagonal and flat, ovipositor with separated coxites and apex of tergite 10 (proctiger) simple, the tegmen with basal piece encircling penis in its half length and with tegminal strut long, and the male tibiae simple present in Achuarmychus, separate it easily from Lycoperdina.

Redesrciption. Length 3.65–3.70 mm. Body (Fig. 847) elongate-oval, comparatively convex, shiny, densely setose; moderately densely and coarsely but rather shallowly, confusedly punctured; ventral surfaces with interspaces covered with distinct, reticulate microsculpture. Colour dark reddish-brown with sterna slightly darker and antenna somewhat lighter. Head partially retracted in prothorax, weakly transverse. Eyes large, oval in outline, prominent, coarsely faceted. Occiput covered with reticulate microsculpture and with long-oval, finely ridged, central striulatory area. Postocciptal sutures present. Gular sutures short, widely separated, strongly convergent anteriorly. Antenna (Fig. 20) slightly shorter than half length of body, rather stout, with 3-segmented, scarcely flattened and rather narrow club; with antennomere 3 elongate (about 1.6 × longer than wide); antennomeres 4–6 scarcely longer than wide and antennomeres 7–8 slightly wider than long; terminal antennomere (Fig. 20) distinctly elongate with apical margin bearing small tubercles/ sensilla. Clypeus transverse, flat, with anterior margin weakly rounded, widest at base, narrowing from base towards about half length, thence parallel. Labrum (Fig. 61) moderately sclerotized with very narrow, membranous apex, strongly transverse, coarsely punctured, covered with long setae and with tufts of long and very long setae on sides; anterior edge weakly emarginate, tormae elongate, with mesal arms recurved posteriorly; labral rods absent. Mandible (Figs 97, 98) with strong and sharp apical tooth and without subapical teeth; mola large, well-developed, finely ridged; prostheca narrow, membranous, covered with short and fine setae, submola very small, setose, membranous. Maxilla (Fig. 192) with terminal palpomere conical, rounded at apex; galea large, broadly triangular, densely setose; lacinia short and very narrow apically, fringed with stiff, slightly curved setae on inner edge, with a few straight setae along dorsal surface and three long spines below them; digitus absent. Labium (Fig. 250) with palpi comparatively close together; palpomere 2 transverse; terminal palpomere elongate, narrowing from half length towards apex, weakly rounded apically. Mentum transverse, covered with rather sparse setae and with reticulate microsculpture at base, widest near basal third with scarcely arcuate, weakly raised ridge transversely. Prementum short, moderately sclerotized with ligula produced into distinct, lateral lobes.

Prothorax transverse, widest near half length, parallel from base toward basal third, thence weakly rounded toward anterior margin. Pronotum (Fig. 280) narrowly bordered laterally and basally; anterior edge with very small, produced anteriorly striulatory membrane; basal sulcus moderately deep, lateral sulci somewhat triangular, scarcely curved inwardly, deep and long with small pits at base; anterior angles shortly produced, blunt, posterior angles almost right-angled; pronotal disc comparatively convex. Prosternum (Fig. 281) with small pit at the front of each procoxal cavity; prosternal process moderately wide, extending distinctly beyond front coxae, somewhat bordered laterally and apically, weakly rounded at apex; front coxae prominent, circular in outline (Fig. 394); their cavities externally open, internally widely closed; trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum small, strongly transverse, rather sparsely punctured, angulate near base and widely rounded at apex. Mesoventrite (Fig. 356) without pits near anterior margin; intercoxal process almost flat, elongate, pentagonal, straight posteriorly; moderately widely separating mesocoxae, extending to about half of their length. Mesocoxa (Fig. 396) circular in outline, with cavity outwardly open and trochantin exposed. Meso-metaventral junction with internal knobs. Elytra widest near half length, thence abruptly narrowing towards apices; blunt apically; comparatively strongly convex with punctures dense and moderately coarse; humeri almost flat; lateral margins very narrowly flattened and scarcely visible from above; sutural stria absent; epipleuron comparatively wide, narrowing towards apex, reaching abdominal ventrite 5. Metaventrite (Fig. 356) strongly transverse, shorter than mesoventrite and abdominal ventrite 1, weakly convex, narrowing towards its anterior margin, which is rather narrowly bordered and scarcely raised, provided with a pair of small postcoxal pits; discrinen extending along ½ length of metaventrite. Metacoxae transverse widely separated. Metendosternite with rather short stalk and widely separated anterior arms and tendons. Wingless.
Legs moderately long and rather stout; trochantero-femoral attachment heteromeric (Figs 394–398). Femur widest near half length, densely setose; ventral and dorsal surfaces of fore and mid femora bear many obliquely directed, suberect, moderately long spines (Figs 394, 396); dorsal surfaces of mid and hind femora bear a few similar spines; tibia and tarsus very densely setose; tibia weakly widening towards tarsus (Fig. 397); tarsi (Figs 395, 398) with tarsomeres 1 and 2 moderately widely flattened and ventrally lobed; terminal tarsomere about 5 times longer than tarsomere 3. Claws simple, hollowed along inner edge; empodium distinct, bisetose.

Abdomen with intercostal process moderately wide; with five freely articulated ventrites and ventrite 6 partially visible. Ventrite 1 as long as 3.5 following ventrites combined; ventrites 2–4 gradually, weakly shorter. Ventrite 5 in male with weak, median excision at apex. Male abdominal segment 8 (Fig. 619) with sternite narrow and scarcely emarginate medially at apex; tergite large with very small membranous lateral lobes at base; female segment 8 with sternite and tergite simple apically. Male genital segment (Figs 657, 658) with sternite weakly emarginate and paired apophyses fused along at least ⅔ of their length; dorsal plate divided into two, lateral parts.

Aedeagus (Figs 749, 750) rather short and slender; tegmen comparatively large, placed near mid length of membranous lobe, with parameres fused and tegmal strut long. Median lobe strongly curved apically (curvature about 90°) and pointed at apex. Ejaculatory duct long, stout and partially coiled.

Female genitalia (Fig. 810). Ovipositor moderately sclerotized, with coxites well developed, separated; stylus absent. Spermatheca small, strongly elongate, membranous; accessory gland minute, rounded, membranous; sperm duct short, slender; bursa copulatrix elongate with lateral outlet of common oviduct and apical outlet of sperm duct.

**Species examined.** A. carltoni* Tomaszweska et Leschen – monotypic genus.

**Distribution.** South America: Ecuador.

**Acinaces** Gerstaecker

(Figs 21, 58, 99, 100, 177, 178, 249, 282, 283, 357, 399–403, 620, 659, 660, 733, 734, 808, 848)


**Diagnosis.** The general body appearance of *Acinaces* resembles those of *Amphix* and *Beccariola*. The unique form of the labial palp with palpomere 2 semilunar in shape while the terminal palpomere distinctly elongate, separates easily *Acinaces* from both genera (and all other genera of Lycoperdininae). Moreover *Acinaces* differs from *Amphix* by having mandible with apical and subapical, sharp teeth, the pronotum without basal sulcus and the legs devoid of sexually dimorphic features, while the body more elongate, the prosternal process truncate or at most very weakly emarginate at apex, the abdominal ventrite 5 bearing at least weak dimorphic characters and differently shaped antennal club, separate *Acinaces* from *Beccariola*.

**Redescription.** Length 4.05–6.27 mm. Body (Fig. 848) long-oval to short-oval in outline, convex; strongly shiny; confusionarily punctured, elytra moderately densely and coarsely punctured while the rest of the body very finely punctured with additional reticulate microsculpture covering interspaces. Colour yellowish-brown to dark reddish-brown, often with black maculae on the elytra.

Head transverse, narrowing from eyes towards labrum. Gular sutures poorly marked, strongly convergent, confluent medially, and in form of weak mid line reaching almost submentum. Eyes very large, transversely oval in outline, prominent, very coarsely faceted. Antenna (Fig. 21) about as long as half of body length, 11-segmented with 3-segmented, narrow or moderately wide, scarcely flattened, loose club; at least antenomeres 3–7 distinctly longer than wide; terminal antenomere somewhat variable in size and shape (weakly transverse to distinctly elongate, oval to somewhat rectangular with truncate or weakly excised apical margin. Clypeus transverse, narrowing from base towards basal third thence parallel, flat. Labrum (Fig. 58) densely punctured, covered with moderately dense and short setae and with lateral, weak brushes of long setae; apical edge narrowly truncate at apex;orumae elongate with mesal arms recurved posteriorly; labral rods absent. Mandible (Figs 99, 100) moderately wide, convex dorsally, weakly concave ventrally, with stout apical tooth and one subapical tooth (equal in size with apical one); mola heavily sclerotized, moderately large, finely ridged; prostheca narrow, submembranous, shortly setose; submola very small, membranous, setose. Maxilla (Fig. 177) with palpomere 2–3 distinctly widening towards their apices; terminal palpomere strongly elongate, weakly tapering toward apex, blunt or truncate apically. Galea large, strongly widening and setose apically. Lacinia (Fig. 178) short and narrow, tapering, with long, stout setae on its inner edge and two long spines below them. Labium (Fig. 249) with palpomere 2 large, transverse and somewhat semilunar in shape; terminal palpomere elongate, subcylindrical, weakly rounded at apex. Mentum transverse, widest near basal third, sparsely punctured and densely reticulate, covered with sparse, long setae. Prementum short, with ligula submembranous, strongly widening laterally, covered with short setae.

Prothorax strongly transverse, widest at base or near anterior third. Pronotum (Fig. 282) with anterior edge with distinct striolatory membrane; lateral margins most often moderately widely bordered; basal sulcus absent, lateral sulci well developed, long and linear; anterior angles produced anteriorly, acute, blunt or weakly.
rounded, posterior angles most often weakly acute. Pronotal disc weakly convex, most often finely punctured. Prosternal process (Fig. 283) moderately wide, bordered laterally Procoxae distinctly separated, prominent, circular in outline (Fig. 399), their cavities externally open, internally widely closed, trochantin concealed.

Meso- and metathorax Mesonotum with scutellum moderately large, distinctly transverse, somewhat heart shaped, weakly angulated near base. Mesoventrite (Fig. 357) without distinct pits near anterior margin, with transverse, declivous area in front of each coxa, intercoxal process flat or weakly convex, pentagonal, about as long as wide or weakly transverse, bordered anteriorly by more or less arculate, raised ridge and almost straight posteriorly, lateral edges weakly raised, widely separating mesocoxae, extending slightly beyond half of their length. Mesocoxa (Fig. 400) circular in outline, its cavity outwardly open, trochantin exposed. Meso-metaventral junction with small internal knobs. Elytra oval, most often weakly rounded from base toward apical third, then narrowing towards apex, strongly convex with lateral margins rather narrowly flattened, moderately densely and coarsely, irregularly punctured, epipleuron moderately wide, incomplete Metaventrite (Fig. 357) transverse, weakly convex with anterior margin weakly raised between coxae, with three pairs of postcoxal pits, discrinem extending at least to half length of metaventrite. Metacoxae transverse, widely separated, femoral lines absent. Metendosternite with moderately long stalk and widely separated anterior arms and tendons. Hind wing with one anal vein and one anal cell, medial fleck rather small, oval, divided.

Legs (Figs 399–403) long and moderately stout; trochanters femoral attachment subheteromorbid. Femur widest near middle length, about twice as wide as tibia, hardly setose but ventral surfaces of fore and mid femora bear rows of obliquely directed short spines, tibia and tarsus moderately densely setose, tibia weakly widening towards tarsus, tarsi with terminal tarsomere very long and slender, about 7 times longer than tarsomere 3. Claws simple, hollowed along inner edge (Fig. 403), empodium very small with two short setae.

Abdomen with intercoxal process weakly emarginate medially, with five freely articulated ventrites. Ventrite 1 as long as three following ventrites combined with narrow, postcoxal concavities, ventrites 2–4 subequal in length. Ventrite 5 bears weak characters of sexual dimorphism (more or less arcuate and/or weakly truncate at apex). Male abdominal segment 8 (Fig. 620) with sternite very narrow, most often at least weakly emarginate at apex, tergite arcuate apically with two lateral, membranous plates at base. Male genital segment with sternite rounded, truncate or emarginate apically and paired apophyses fused along most of their length, dorsal plate divided into two lateral parts connected medially by membrane (Figs 659, 660).

Aedeagus (Figs 733, 734) stout, moderately long, heavily sclerotized, moderately to strongly curved near base. Median lobe with one, apical branch. Tegmen placed basally, ring shaped with parameres fused and tegmental strut vestigial.

Female genitalia (Fig. 808) fused with abdominal sternite 8, which is membranous medially. Ovipositor moderately sclerotized, with coxites entirely fused, stylus absent. Spermatheca large, oval, submembranous with accessory gland rounded or oval, membranous, as large as spermatheca or larger. Bursa copulatrix moderately large, narrow with apical outlet of common oviduct and dorso-lateral outlet of sperm duct.


**Distribution.** Central and South America: Argentina, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Honduras, Panama, Paraguay, Peru, Surinam, Uruguay, Venezuela.

**Amphisternus** Gerstaecker

(Figs 9, 22, 59, 101–104, 179, 180, 243, 284, 285, 358, 404–408, 621, 661, 662, 735, 736, 809, 849)


**Diagnosis.** The species of *Amphisternus* are most similar to those of *Cacodaemon*, *Amphiastethus*, *Spathomeles* and *Stictomela* in having the elytra provided with high tubercles and/or spines. Among them, having the ovipositor with base of spermatheca provided with large, at least weakly sclerotized, nodulus-like structure, and the mandible with apices strongly asymmetrical. *Amphisternus* appears to be closely related to *Cacodaemon*. Both species common with *Cacodaemon* separate *Amphisternus* from *Amphiastethus*, *Spathomeles* and *Stictomela*. The maxillary lacina long and stout throughout, provided with tuft of S-like setae at apex and a row of subequal in length dorsal spines, the intercoxal process of mesoventrite widening apically and covering part of coxae and the intercoxal process of metaventrite widely bordered and raised (with deep concavity behind) can distinguished *Amphisternus* from *Cacodaemon*.

**Redescription.** Length 6.3–10.0 mm. Body (Fig. 849) elongate oval to short-oval, strongly convex, shiny or opaque, glabrous, coarsely and variably densely, confusedly punctured with interspaces reticulate. Colour brownish-black or most often black, elytra verrucose to
spinose, humeri carinate sometimes with spines; elytral tubercles black or orange-yellow.

Head rather deeply retracted in prothorax, weakly transverse, with two, elongate, shallow concavities between eyes. Eyes comparatively small, narrow and transverse, prominent, coarsely faceted. Occipital file moderately large. Gular sutures poorly marked, confluent medially (Fig. 5). Antenna long and stout (Fig. 22) with 3-segmented, narrow, moderately flattened and rather loose club; scape about twice as long as pedicel and as long as antennomere 3; antennomere 3 about 1.6 x as long as antennomere 4 or 5; antennomeres 6–8 subequal in length, slightly shorter than preceding antennomeres. Clypeus strongly transverse, flat, widest at base, weakly narrowing towards basal third, thence parallel with apical margin straight. Labrum (Fig. 59) sclerotized with membranous apex; strongly transverse, sparsely punctured, covered with long setae and with tufts of long setae on sides of anterior margin; anterior edge of membranous part simple or truncate and of sclerotized part simple or marginate medially; torulae elongate, with mesal arms recurved posteriorly; labral rods very slender, long, widely divergent anteriorly. Mandible (Figs 101–104) with asymmetrical apex – right mandible seems to have two large, apical teeth (one of them chisel-shaped) and one, minute subapical tooth; left mandible seems to have strong, chisel-shaped apical tooth and two subapical teeth, first as large as apical one and the second distinctly smaller, but much larger than this on left mandible; mola large, well-developed, finely ridged; prostheca large, membranous, moderately densely setose; submola comparatively large, setose, membranous. Maxilla (Fig. 179) with terminal palpomere elongate, subcylindrical, weakly rounded at apex, about 2.0 x as long as palpomere 3; galea moderately large, long-oval, bluntly rounded and densely setose apically; lacinia (Fig. 180) almost as large as galea (long and wide) not tapering, bluntly rounded at apex, with tuft of somewhat S-shaped, apical spines, with row of rather fine setae on its inner-ventral edge and row of long spines on inner-dorsal edge; digitus absent. Labium (Fig. 243) with palpi moderately close together; palpomeres 2 and 3 strongly transverse; terminal palpomere truncate at apex. Mentum transverse, flat, widest near basal third, covered with short, sparse, suberect setae. Prementum rather short, moderately sclerotized with ligula weakly lobed at sides.

Prothorax strongly transverse, widest near anterior third. Pronotum (Fig. 284) rather narrowly bordered laterally and anteriorly; anterior edge with conspicuous and weakly prominent striolatory membrane; basal sulcus distinct, weakly sinuate to almost straight, lateral sulci linear, subparallel, moderately deep and long; anterior angles produced, blunt or acute, posterior angles weakly acute or right-angled; pronotal disc convex but of uneven surface; sides with elongate concavities; punctuation very fine with interspaces reticulate or almost only reticulated. Prosternum with a pair of small pits at the front of procoxal cavities; prosternal process (Fig. 285) rather widely separates front coxae, deeply cleft apically, and extending beyond coxae; front coxae prominent, circular in outline (Fig. 404); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum rather small, strongly transverse, moderately densely punctured, widely rounded apically or somewhat heart-shaped. Mesoventricle (Fig. 358) with a pair of distinct, rather deep pits near anterior margin and with transverse, declivent area in front of each coxa; intercoxal process strongly transverse, with apex widening laterally, covering part of coxae; bordered anteriorly by weakly arcuate ridge and sinuate posteriorly, lateral edges weakly raised; widely separating mesoscoxae, extending slightly beyond half of their length. Mesoscoxa circular in outline, its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knobs. Elytra with basal margins moderately widely bordered and raised; convex, covered almost always with tubercles (Fig. 9); humeri most often strongly carinate; punctuation coarse and rather dense with interspaces reticulate; lateral margin narrowly flattened, visible from above, from humeri to about apical fourth; most often blunt at apices; epipleuron comparatively wide, complete. Metaventrite (Fig. 358) more than twice as wide as long, weakly convex, narrowing anteriorly; anterior margin especially of intercoxal process comparatively widely bordered and raised; provided with three pairs of postcoxal pits; discrmen complete or almost so. Metacoxae transverse, widely separated. Metendosternite with rather short stalk and widely separated anterior arms and tendons. Hind wing with different degree of reduction or well developed – then one anal vein and one anal cell present; medial f ench elongate, partially divided.

Legs (Figs 404–408) long and moderately stout; trochanterofemoral attachment heteromeroid. Femur clubbed, slender at base, hardly setose but ventral surfaces of fore femur bear rows of obliquely directed short spines, sometimes also mid femora have a few short spines; tibia and tarsus moderately densely setose; tibia weakly widening towards tarsus; terminal tarsomere very long and comparatively stout, about 9 times longer than tarsomere 3. Claws simple, hallowed along inner edge; empodium rather small with two short setae. Male tibiae with very distinctly marked sexual characters (Figs 405, 407) – fore tibia with distinct tooth in apical third and mid tibia may be more or less curved near apex.

Abdomen with intercoxal process scarcely emarginate at apex; five freely articulated ventrites. Ventrite 1 as long as three following ventrites combined with nar-
row, postcoxal concavities and sometimes also with pits; ventrites 2–4 gradually, slightly shorter. Male ventrite 5 arcuate to weakly truncate with tuft of short apical hairs. Male abdominal segment 8 with sternite very narrow, simple (Fig. 621), truncate or weakly emarginate at apex; tergite arcuate apically with two small, lateral, membranous plates at base. Male genital segment (Figs 661, 662) with sternite most often emarginate apically (sometimes arcuate) and paired apophyses fused along ½ of their length; dorsal plate divided into two lateral parts connected medially by membrane, additional internal sclerite present.

Aedeagus (Figs 735, 736) stout, moderately long, heavily sclerotized, weakly curved near base. Median lobe branched out at apex. Tegmen placed basally, ring-shaped with parameres fused and terminal strut vestigial.

Female genitalia (Fig. 809) fused with abdominal sternite 8. Ovipositor sclerotized, with coxites entirely fused; styli present, rather small, terminal or subterminal. Spermatheca large, rounded, membranous with weakly sclerotized, large, basal ring; sperm duct short, slender; accessory gland strongly elongate, membranous. Bursa copulatrix moderately large, narrow with lateral outlet of common oviduct and apical outlet of sperm duct.


Distribution. Widely distributed in the Oriental Region.

Amphistethus Strohecker
(Figs 16, 23, 62, 96, 105, 106, 181, 182, 244, 286, 287, 359, 409–415, 624, 663, 664, 737, 738, 812, 850)


Diagnosis. Amphistethus is most similar to Spathomeles, Stictomela, Amphisternus and Cacodaemon in having the elytra provided with tubercles and/or spines, and the base of spermatheca at least weakly sclerotized, but can be separated in having the terminal maxillary palpmere transverse or at most as long as wide. Moreover Amphistethus differs from Amphisternus and Cacodaemon by absence of many spines and/or high tubercles on the elytra, and by having the pronotum with anterior angles produced anteriorly, thickened and bluntly rounded. The prosternal process very wide, deeply excised apically can easily separated Amphistethus from Spathomeles and Stictomela.

Redescription. Length 7.5–11.0 mm. Body (Fig. 850) long-oval, highly convex, shiny, glabrous; confusedly punctured with interspaces reticulate. Colour black to brownish-black; elytra with yellow or orange maculae often placed on raised areas, humeri inflated or rarely produced into long spines.

Head rather deeply retracted in prothorax, almost as long as wide, with week, elongate, concavity between eyes. Eyes moderately large, transversely oval, rather prominent, moderately coarsely faceted. Occipital file large, long-oval. Gular sutures, strongly convergent, confluent medially near base and extending anteriorly as short median line. Antenna (Fig. 23) at least as long as half length of body, slender with 3-segmented, moderately wide to very wide, flattened and compact club; antennomeres 1–8 longer than wide; scape about twice as long as pedicel; antennomere 3 about 1.5 × longer than scape or antennomere 4; antennomeres 4 and 5 subequal in length, slightly longer than 6 or 7; antennomere 8 slightly shorter than preceding antennomeres; antennomere 9 more or less triangular; 9 and 10 transverse. Clypeus strongly transverse, flat, widest at base, narrowing towards basal third, thence parallel with apical margin straight. Labrum (Fig. 62) sclerotized with membranous apex; strongly transverse, moderately coarsely punctured, covered with rather short setae and with tufts of long setae on sides of anterior margin; anterior edge of membranous part simple or truncate, and of sclerotized part weakly emarginate medially; tormae elongate, with mesal arms recurved posteriorly; labral rods absent. Mandible (Figs 96, 105, 106) with apex chiselled-shaped and tip minutely incised, with moderately large subapical tooth; mola large, finely ridged; prostheca large, membranous, densely setose; submola comparatively large, setose, membranous. Maxilla (Fig. 181) with palp stout; terminal palpmere at least subquadrate, often transverse and axe-shaped, truncate at apex; galea moderately large, long-oval to somewhat triangular, bluntly rounded and densely setose apically with tuft of spine-like setae at tip; lacinia (Fig. 182) almost as large as galea, tapering, bluntly rounded at apex, with tuft of somewhat S-shaped, apical spines, row of rather fine setae on its inner-ventral edge and row of long spines on inner-dorsal edge. Labium (Fig. 244) with palpi rather close together; palpmere 2 and 3 strongly transverse; terminal palpmere truncate at apex. Mentum transverse, widest near basal third, covered with short, sparse setae, with week, arcuate and raised transverse ridge. Prementum rather short, moderately sclerotized with membranous ligula expanded at sides.

Prothorax strongly transverse, widest anteriorly or near anterior third. Pronotum (Fig. 286) with moderately widely bordered lateral margins and very widely bordered, thickened, raised and strongly produced anterior angles; anterior margin with comparatively small and not prominent stridulatory membrane; basal sulcus distinct, moderately deep, weakly sinuate or almost straight; lateral sulci linear, subparallel, moderately deep and short; hind angles weakly acute or right-angled; pronotal disc moderately convex, but of uneven surface; puncturation fine and shallow with interspaces densely reticulate. Prosternum without pits in front of procoxal cavities;
prosternal process (Fig. 287) widely separates front coxae, broadly excised at apex, extending beyond coxae, somewhat concave medially; front coxae prominent, circular in outline (Fig. 409); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum rather small, comparatively convex, strongly transverse, sparsely punctured, widely rounded apically or somewhat heart-shaped with pointed apex. Mesoventerite (Fig. 359) of uneven structure with a pair of distinct, deep pits near anterior margin, with median, convex tubercle near anterior margin and with transverse, declivous area in front of each coxa; intercoxal process strongly transverse, with apex widening laterally, covering part of coxae; bordered anteriorly by more or less sinuate and raised ridge and strongly sinuate posteriorly, lateral edges raised and middle part depressed; widely separating mesocoxae, extending slightly beyond half of their length. Mesocoxa circular in outline (Fig. 414), its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knobs. Elytra with basal edges moderately widely bordered and raised; convex, covered with week tubercles (raised areas); humeri inflated (with spines in one known species); punctuation rather coarse and moderately dense with interspaces finely reticulate, lateral margins narrowly flattened, visible almost throughout, blunt at apices; epipleuron comparatively wide, complete or almost so. Metaventerite (Fig. 359) more than twice as wide as long, narrowing anteriorly; anterior edge especially of intercoxal process widely bordered and raised; provided with three pairs of large, postcoxal pits, convex on sides of discrimen; discrimen almost complete. Metacoxae transverse, widely separated. Metendosternite with moderately long stalk and widely separated anterior arms and tendons.

Hind wing (Fig. 16) with one anal vein and two anal cells, medial fleck comparatively large, long-oval, divided.

Legs (Figs 409–415) long and slender with trochanterofemoral attachment heteromorph. Femur clubbed, slender at base and swollen before apex, almost glabrous; tibia and tarsus rather densely setose; tibia slender and scarcely widening towards tarsus, sometimes weakly curved in both sexes (more distinctly in males); tarsi with terminal tarsomere very long and comparatively stout, about 10 times longer than tarsomere 3. Claws simple, hollowed along inner edge (Fig. 412); empodium rather small with two short setae. Male fore tibiae most often with distinctly marked sexual characters (Figs 410, 411, 415).

Abdomen with intercoxal process weakly emarginate at apex; with five freely articulated ventrites. Ventrite 1 as long as 2.5 following ventrites combined, with narrow, deep postcoxal grooves; ventrites 2–4 subequal in length. Male ventrite 5 most often widely emarginate and impressed medially at apex. Male abdominal segment 8 with sternite very narrow, somewhat W-shaped (Fig. 624); tergite scarcely rounded apically with two large, lateral, membranous plates at base. Male genital segment (Figs 663, 664) with sternite narrow, with asymmetrical apical margin, and paired apophyses fused apically; dorsal plate undivided; additional internal sclerite present.

Aedeagus (Figs 737, 738) short and stout, heavily sclerotized, straight. Median lobe branched out apically. Tegmen placed basally, ring-shaped with parameres fused and tegminal strut vestigial.

Female genitalia (Fig. 812) fused with abdominal segment 8. Ovipositor sclerotized, with coxites entirely fused, and their apex more or less crenulate; styli present, small, terminal. Spermatheca small, rounded, membranous with weakly sclerotized, small basal ring; sperm duct short, slender; accessory gland minute, membranous. Bursa copulatrix moderately large, with lateral outlet of common oviduct and apical outlet of sperm duct.

Species examined. A. astrate Strohecker, A. phyllocerus (Arrow), A. postulifer (Gorham), A. stroheckeri Tomaszewska, A. superbus* Strohecker (externally) – all known species.

Distribution. Oriental Region.

Amphix Laporte
(Figs 24, 60, 107, 108, 183, 184, 242, 288, 289, 360, 416–420, 622, 665, 666, 739, 740, 811, 851)


Diagnosis. Amphix is most similar to Acinaces by the general body appearance, but differs in having the mandible with apex widely chisel-shaped, the labial palp with palpomere 2 transverse while the terminal palpomere elongate, subquadrate or transverse, the pronotum with well developed basal sulcus and the legs provided with at least weak characters of sexual dimorphism.

Redescription. Length 6.5–10.0 mm. Body (Fig. 851) oval in outline, convex; strongly shiny; confusedly punctured with additional reticulate microsculpture covering interspaces. Colour variable, yellowish-brown to dark reddish-brown, violet to black sometimes with black spots on the elytra and sometimes on pronotum; often only lateral margins of elytra (sometimes also along suture) lighter; legs and antenna often bicoloured.

Head about as long as wide. Gular sutures absent. Occipital file rather narrow, long-oval. Eyes rather small, narrowly oval in outline, moderately prominent, finely to moderately coarsely faceted. Antenna (Fig. 24) about as long as half length of body, with 3-segmented, narrow or moderately wide, comparatively flattened, rather compact club; antennomeres 1, 3–7 and often antennomere 8 distinctly longer than wide, scape about
2 x as long as pedicel, antennomere 3 about 3 x longer than pedicel and at least 1 5 x longer than antennomere 4, terminal antennomere as long as wide or transverse, with truncate apical margin. Clypeus transverse, narrowing from base towards basal third thence parallel, flat with somewhat arcuate apical margin. Labrum (Fig 60) sclerotized with comparatively wide, membranous apex, sparsely punctured, covered with fine, short setae and with moderately long setae on anterior sclerotized margin, apical edge of sclerotized part emarginate medially and of membranous part simple (somewhat truncate) or weakly emarginate, tormae elongate, with mesal arms recurved posteriorly, labral rods absent. Mandible (Figs 107, 108) moderately wide, convex dorsally with sharp, elongate ridge near lateral margin and concave ventrally, chisel-shaped at apex with moderately large, blunt subapical tooth, mola large, heavily sclerotized, finely ridged, prostheca moderately large, membranous or submembranous, finely setose, submola small, membranous, setose. Maxilla (Fig 183) with palpomeres 2-4 elongate, palpomeres 2-3 distinctly widening towards their apices, terminal palpomere about as long as 3, tapering towards apex and rounded. Galea large, strongly widening and setose apically. Lacinia (Fig 184) moderately long, narrow, tapering, with long, stout setae on apex and inner-ventral edge, with row of moderately long spines on dorsal surface and two longest spines below them. Labium (Fig 242) with palpomeres moderately close together, palpomere 2 transverse, terminal palpomere subcylindrical in shape, elongate, subquadrate or transverse, blunt at apex. Mentum strongly transverse, widest near basal third, sparsely punctured, covered with sparse, long setae anteriorly. Prementum short, with ligula submembranous, strongly widening laterally, shortly setose, with apical edge weakly emarginate, truncate or weakly rounded.

Prothorax strongly transverse, widest at base or near anterior third. Pronotum (Fig 288) with anterior edge provided with very small to moderately large stridulatory membrane, lateral and anterior margins narrowly to moderately widely bordered, basal edge margined, basal sulcus distinct, lateral sulci weakly marked to moderately deep, long and linear, subparallel, anterior angles produced anteriorly, blunt or rounded, posterior angles weakly acute or right-angled. Pronotal disc weakly convex, most often finely punctured. Prosternal process (Fig 289) moderately wide, narrowly bordered laterally, not extending beyond coxae, truncate or weakly emarginate at apex. Procoxae distinctly separated, prominent, circular in outline (Fig 416), their cavities externally open, internally widely closed, trochantin concealed.

Meso- and metathorax Mesonotum with scutellum moderately large, transverse, somewhat heart-shaped, and weakly angulate near base, narrowly rounded or somewhat pointed at apex. Mesoventrite (Fig 360) with small and shallow pits near anterior margin, with transverse, weakly declivent area in front of each coxa. Intercostal process pentagonal, about as long as wide or transverse, bordered anteriorly and laterally, flat or weakly concave, with straight posterior margin, widely separating mesocoxae, extending slightly beyond half of their length. Mesocoxa circular in outline (Fig 418), its cavity outwardly open, trochantin exposed. Mesoventral junction with small internal knobs. Elytra oval, widest near basal third, thence narrowing towards apex, blunt or weakly acute at apices, strongly convex with lateral margins rather narrowly flattened and visible from above almost throughout, densely and coarsely punctured, epipluron moderately wide, incomplete at apex. Metaventrite (Fig 360) strongly transverse, weakly convex with anterior margin moderately widely bordered and weakly raised, with extremely shallow postcoxal pits (one or three pairs), or rarely without pits, discrinn extending at least to mid length of metaventrite. Metacoxae transverse, widely separated, femoral lines absent. Metendosternite with moderately long stalk and widely separated anterior arms and tendons. Hind wing with one anal vein and one anal cell. Mp CuA cross vein absent, medial fleck small, oval, undivided.

Legs (Figs 416-420) long and moderately stout with trochanterofemoral attachment oblique or subheteromerod. Femur clubbed or widest near middle length, less than twice as wide as tibia, hardly setose but with short row of obliquely directed short spines on ventral surfaces of fore and mid femora, tibia and tarsus comparatively densely setose, terminal tarsomere very long and rather slender, 8-9 times longer than tarsomere 3. Claws simple, holowed along inner edge (Fig 420), empodium moderately large with two short setae, male fore tibiae may bear at least weak dimorphic features (Fig 417).

Abdomen with intercoxal process at least weakly emarginate medially, with five freely articulated ventrites. Ventrite 1 about as long as three following ventrites combined with narrow, postcoxal concavities, ventrites 2-4 subequal in length or gradually slightly shorter. Ventrite 5 sometimes with weak characters of sexual dimorphism in both sexes (more or less acute and/or weakly truncate at apex), male ventrites 1-4 sometimes with median tubercles or elongate ridges. Male abdominal segment 8 (Fig 622) with sternite very narrow, most often at least weakly emarginate at apex, tergite arcuate apically with two lateral, submembranous lobes at base. Male genital segment with sternite submembranous medially, emarginate at apex, paired apophyses fused at least along half of their length, dorsal plate divided in two lateral parts connected medially by membrane (Figs 665, 666).

Aedeagus (Figs 739, 740) stout, moderately long, sclerotized, weakly curved near base to almost straight. Median lobe most often with one, apical branch. Tegmen placed basally, ring-shaped with parameres fused and tegminal strut vestigial.
Female genitalia (Fig. 811) fused with abdominal sternite 8, which is membranous medially or formed by lateral, sclerotized plates without median connection. Ovispositor sclerotized, with coxites entirely fused, emarginate or somewhat truncate apically; styli absent. Spermatheca moderately large or large, oval, membranous with accessory gland long-oval, membranous, as large as spermatheca or much smaller. Bursa copulatrix moderately large, with apical outlet of sperm duct and medio-ventral outlet of common oviduct.

Species examined. A. dentatus (Fabricius), A. femoralis (Gerstäcker), A. marginatus* (Fabricius), A. subcordatus (Gerstäcker), A. tarsatus (Erichson), A. vestitus cinctus (Fabricius) – 6 of 49 known species.

Distribution. Neotropical Region.

Ancylopus Costa
(Figs 25, 63, 109, 110, 185, 186, 245, 292, 293, 361, 421-427, 627, 667, 668, 741, 742, 813, 852)


Diagnosis. The body of the Ancylopus species being long-oval and of moderate size resembles closely those of Avencymon and Malindus. Ancylopus however differs from both genera in having the female pronotum with lateral sulci connected medially by arcuate ridge, the elytra almost always decorated with black maculae and the labrum with sides subparallel.

Redescription. Length 4.0–6.0 mm. Body (Fig. 852) elongate, somewhat parallel-sided, moderately convex, shiny and glabrous; moderately densely and rather finely, confusedly punctured. Colour yellowish-brown to dark brown, almost always with black maculae on the elytra.

Head partially retracted in prothorax, weakly transverse. Gular sutures slender, confluent medially, and extending anteriorly as slender and moderately long median line. Eyes moderately large, oval in outline, prominent, coarsely faceted. Occipital file somewhat triangular in shape. Antenna moderately long (slightly shorter than half of body length) and rather slender (Fig. 25) with 3-segmented, very narrow and loosely articulated, not flattened club; scape about 1.5 x as long as pedicel; antennomere 3 at least as long as antennomeres 4 and 5 combined; antennomere 4 scarcely longer than 3; antennomeres 5–6 equal in size; antennomere 7 slightly dilated, distinctly broader than those preceding and succeeding it. Clypeus transverse, flat, widest at base, slightly convergent along basal third, hence parallel. Labrum (Fig. 63) with anterior edge weakly emarginate medially; strongly transverse, sclerotized with membranous apex and with more or less distinct small, triangular, raised edge at base; densely and moderately coarsely punctured, covered with rather short setae and with tufts of moderately long setae on sides; toriæ elongate, with mesal arms recurved posteriorly; labral rods very slender and short, almost parallel. Mandible (Figs 109, 110) moderately broad, concave ventrally and convex dorsally; sharply pointed at tip, narrowly chisel-shaped with small subapical tooth; mola rather large, well-developed, finely ridged; prostheca narrow, membranous, covered densely with fine setae; submola small, densely setose, membranous. Maxilla (Fig. 185) with 4-segmented palp; terminal palpomere elongate, slightly longer than palpomere 3, cylindrical, blunt at apex; galea broadly triangular, pointed at apex, densely setose; lacinia (Fig. 186) short and narrow, tapering, fringed with stiff setae on its inner edge and with two long spines below them; digitus absent. Labium (Fig. 245) with palpi close together, palpomere 2 distinctly transverse and terminal palpomere transversely rectangular. Mentum strongly transverse, widest in mid length, with raised, curved ridge transversely; sparsely covered with short setae. Prementum very short, moderately sclerotized with ligula formed by moderately large lobes at sides.

Prothorax transverse, widest near apical third. Pronotum (Fig. 292) very narrowly bordered laterally and anteriorly; anterior edge with conspicuous striudulatory membrane; basal sulcus deep; lateral sulci linear, subparallel, deep and long, extending beyond mid length; in female, anterior end of lateral sulci connected with deep median sulcus, by deep, curved channel (Fig. 292); anterior angles distinctly produced forwards, blunt; posterior angles right-angled or scarcely acute; pronotal disc slightly convex. Prosternum without pits; prosternal process (Fig. 293) very narrow, hardly separating front coxae, extending almost to their hind margin; coxae prominent, circular in outline (Fig. 422); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum rather small, transverse, more or less broadly rounded apically. Mesoventricle (Fig. 361) with a pair of pits near anterior margin; intercoxal process elongate, rather narrowly separating mesocoxae, with week raised, arcuate ridge anteriorly, almost truncate posteriorly; extending slightly beyond half length of coxae. Mesocoxa circular in outline (Fig. 421), its cavity outwardly open; trochantin exposed. Meso metaventral junction with internal knob. Elytra elongate, subparallel, convex, rounded at apices, with very narrow lateral margins, with punctures rather fine, moderately dense and irregular; epipleuron narrow, incomplete at apex. Metaventricle (Fig. 361) transverse, weakly convex, scarcely narrowing towards its anterior margin; intercoxal process moderately widely or widely bordered and raised, provided with three pairs of postcoxal pits; in males sometimes with small tubercles near hind coxae; discrimen very long but incomplete. Metacoxae transverse, widely separated; femoral lines absent.
Metendosternite with short stalk and widely separated anterior arms and long tendons. Hind wing with two anal veins and two anal cells, medial fleck comparatively large, elongate-oval, divided, radial cell absent.

Legs (Figs 421–427) Trochanterofemoral attachment heteromerod. Femur long, somewhat clavate, slender at base, hardly setose, dorsal and ventral surfaces of fore femur and ventral surfaces of mid femur bear rows of obliquely directed short spines, tibia and tarsus moderately densely setose, tibia widening towards tarsus. Tarsus with terminal tarsomere about six times longer than tarsomere 3. Claws simple, hollowed along inner edge, empodium distinct, bisetose. In males sexual characters may be present in all tibiae (Figs 423-425) and mid trochanters (Fig 421), male mid femora bear fringe of long hairs along almost throughout inner edge (Fig 421).

Abdomen with five freely articulated ventrites. Ventrite 1 longer than three following ventrites combined, with intercoxal process truncate at apex, ventrites 2-4 subequal in length. In male ventrite 5 weakly excised at apex. Male abdominal segment 8 (Fig 627) with sternite very narrow and deeply emarginate at apex, tergite provided with large, lateral, submembranous plates at base. Male genital segment with apical edge of sternite somewhat crenulate, paired apophyses fused along ¾ of their length, dorsal plate narrow, undivided (Figs 667, 668).

Aedeagus (Figs 741, 742) stout, moderately long, heavily sclerotized, weakly curved. Median lobe branched out apically. Tegmen placed basally, strongly reduced, ring-shaped with parameres fused and tegmental strut indistinct.

Female genitalia (Fig 813) fused with abdominal segment 8. Ovipositor sclerotized, with coxites at most partially fused by membranous connection, sternite 8 divided in two lateral, sclerotized plates and fused with coxites, styli small, terminal Spermatheca very small, oval, membranous, sperm duct short, slender, connected directly with spermatheca, accessory gland minute, elongate, membranous. Bursa copulatrix large with apical outlet of sperm duct and latero-apical outlet of common oviduct.

Species examined. A. ferrugineus Weise, Ancylopous melanocephalus* (Olivier), A. pictus indanus Strohecker, A. pictus papuanus Strohecker, A. phungi Pic - 4 of 13 known species.

Distribution. South Palaearctic, Orient and Africa.

Aphorista Gorham

Aphorista Gorham, 1873 4° Type species by original designation Eippoecus laetae LeConte, 1853 (cited by Gorham as Mycetina laeta)

Diagnosis. The species of Aphorista can resemble those of Lycoperdina and Mycetina Aphorista however can be easily distinguished from Lycoperdina in having the body less convex, the antennal club distinctly 3-segmented and the ovipositor with apex of proctiger simple, while from Mycetina it can be separated by having the prosternal process narrowly separating fore coxae, the intercoxal process of mesoventrite at least weakly longer than wide, provided with elongate ridge along anterior half, and the ovipositor with fused coxites.

Redescription. Length 5.5–8.0 mm. Body (Fig 853) elongate to elongate-oval, moderately convex, shiny, and minutely setose, confusedly punctured with additional fine reticulation. Colour brown or reddish-brown with elongate, black stripes on elytra and sometimes with black spots on pronotum, or body entirely black.

Head partially retracted in prothorax; almost as long as wide. Eyes moderately large, oval in outline, prominent, moderately coarsely faceted. Occipital file long-oval. Postocular suture distinct. Gular sutures well developed, widely separated, convergent anteriorly. Antenna (Fig 26) slightly shorter than half length of body and rather slender, with 3-segmented, narrow and scarcely flattened, loose club, scape slightly longer than pedicel, antennomere 3 at least 1.5 x as long as pedicel or antennomere 4, antennomeres 4–5 and 7 subequal in length, 6 and 8 slightly shorter, terminal antennomere longer than wide, somewhat truncate at apex. Clypeus transverse, flat, widest at base, convergent from base toward basal third, then parallel, weakly rounded at apex (Labrum (Fig 64) strongly transverse, sclerotized with membranous apex, moderately coarsely punctured, covered with short setae and with tufts of sparse, long setae on sides of anterior margin, apical margin of sclerotized part simple and of membranous part with median, small emargination. Tormae elongate, with mesal arms recurved posteriorly, labral rods short, very weakly divergent anteriorly. Mandible (Figs 111, 112) moderately broad, strongly concave ventrally, convex dorsally with sharp, elongate ridge laterally and weak tubercle near prostheca, sharply cleft at tip forming apical and subapical teeth of equal size and with additional, very small subapical tooth, mola large, finely ridged, prostheca rather small and narrow, membranous, sparsely setose, submola small, membranous, covered with dense, short setae. Maxilla (Fig 187) with terminal palpmere elongate, tapering from mid length to apex, blunt or rounded apically, scarcely longer than palpomere 3, galea rather narrow, weakly enlarged toward apex, moderately densely setose, lacinia (Fig 188) short and narrow, strongly tapering, fringed with rather stiff, long setae on apex and inner-ventral edge, with row of short spines on dorsal surface and two very long and stout spines below them. Labrum (Fig 247) with palpi close together, palpomere 2 transverse and terminal palpomere subquadrate, truncate at apex. Mentum transverse, flat, widest near mid length, moderately coarsely punctured and shortly setose on sides. Prementum very...
short, moderately sclerotized with ligula lobed at sides, weakly emarginate medially.

Prothorax strongly transverse, widest near mid length, or at base. Pronotum (Fig. 298) moderately coarsely and not very densely punctured; rather narrowly bordered laterally and anteriorly; base margined; anterior edge with conspicuous striulatory membrane; basal sulcus deep, lateral sulci linear, subparallel, deep and moderately long with deep pits at base; anterior angles distinctly produced forwards, blunt or subacute; posterior angles right-angled or weakly acute; pronotal disc weakly convex. Prosternum with a pair of pits in front of procoxal cavities; prosternal process (Fig. 299) very narrow, truncate apically, not extending beyond fore coxae, which are almost contiguous, prominent and circular in outline (Fig. 428); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum rather small, transverse, somewhat heart-shaped, angulate near base, somewhat pointed apically, sparsely punctured. Mesoventrite (Fig. 362) with a pair of pits near anterior margin; intercoxal process weakly elongate, comparatively widely separating mesocoxae, extending to about half of their length, almost flat, with weak elongate, median ridge along anterior half and lateral edges weakly bordered and raised (especially posteriorly); apical margin weakly sinuate. Mesocoxa circular in outline (Fig. 429), its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knobs. Elytra widest near mid length, elongate or oval, weakly to moderately convex, blunt at apices with punctures dense and rather fine; epipleuron rather narrow, incomplete at apex; lateral margins moderately widely flattened, visible from above throughout; humeri weakly prominent; sometimes with weak tubercles near scutellum. Metaventrite (Fig. 362) large, transverse, comparatively convex (especially in males) and weakly concave along discrmen; narrowing towards anterior margin which is moderately widely bordered and weakly raised; provided with three pairs of postcoxal pits; discrmen long but incomplete. Metacoxa transverse, widely separated; femoral lines absent. Metendosternite with rather short stalk and widely separated anterior arms and tendons. Hind wing with one anal vein and one anal cell; medial fleck moderately large, oval, at least partially divided.

Legs (Figs 428–433) with trochanterofemoral attachment heteromorid. Femur clubbed, widest near apex, slender at base, hardly to moderately densely setose with ventral surface of fore and often mid femora provided with obliquely directed, suberect spines; tibia and tarsus more densely setose than femur; tibia widening towards tarsus. Tarsomere 3 about seven times shorter than tarsomere 4. Claws simple, hollowed along inner edge. Empodium bisetose. Male fore and mid tibiae bear characters of sexual dimorphism (Figs 430, 431).

Abdomen with five freely articulated ventrites. Ventrite 1 as long as three following ventrites combined, with anterior margin of intercoxal process straight or weakly emarginate medially; ventrites 2–4 equal in length. Male ventrite 5 narrowly truncate or scarcely emarginate at apex. Male abdominal segment 8 (Fig. 623) with sternite very narrow and weakly emarginate at apex and tergite widely rounded. Male genital segment with sternite emarginate apically and paired apophyses fused along about half of their length; dorsal plate divided in two lateral parts meeting medially (Figs 669, 670).

Aedeagus (Figs 745, 746) long and moderately stout, sclerotized, weakly curved at base. Median lobe without apical branches. Segmen placed basally, strongly reduced, ring-shaped with parameres fused and tegminal strut vestigial.

Female genitalia (Fig. 814) fused with sternite 8. Ovipositor sclerotized, with coxites entirely fused, weakly emarginate at apex; styli absent. Spermatheca small, oval, membranous; sperm duct short, slender; accessory gland minute, elongate, membranous. Bursa copulatrix very long with apical outre of sperm duct and lateral outlet of common oviduct.

*Species examined.* *A. laeta* (LeConte), *A. morosa* (LeConte), *A. vittata* (Fabricius) – all known species.

*Distribution.* Nearctic Region.

**Archipines** Strohecker

(Figs 27, 65, 113, 114, 189, 190, 246, 294, 295, 363, 434–441, 626, 673, 674, 743, 744, 815, 854)

**Phalantha** Gerstaecker, 1885: 202 (syn Phalantha Gistl, 1839). Type species, by monotypy: *Phalantha exsanguis* Gerstaecker, 1858.

**Archipines** Strohecker, 1953: 57. Replacement name for *Phalantha* Gerstaecker, 1858.

**Diagnosis.** *Archipines* appears to be closely related to Australian genera *Daulis* and *Daulotypus* sharing similar body appearance, the terminal labial palpmere large and somewhat flattened dorso-ventrally, the labrum produced laterally into rounded lobes, the trochantero-femoral attachment being oblique, the apex of the sternite of the male genital segment visible in a deep excision of the ventrite 6 and the female genitalia with strongly reduced coxites. However the body vestiture simple, the lateral margins of the pronotum finely denticulate, widened into small, sharp teeth or at least weakly angulate near apical third, the prosternal process vestigial, and the mandible with small apical teeth can distinguished. *Archipines* from both genera.

**Redescription.** Length 3.90–6.06 mm. Body (Fig. 854) long-oval in outline, flattened above; shiny; very densely and coarsely, confusedly punctured. Colour light brown to dark brown or dark reddish-brown, with black or rarely bright spots on the elytra.
Head almost as long as wide, weakly narrowing from eyes towards labrum, occiput with transverse stridulatory area, gular sutures absent. Eyes very large, oval in outline, prominent, very coarsely faceted. Antenna as long as half of body length, with more or less distinct 3-segmented, narrow, scarcely flattened, loose club, apical margin of terminal antennomere with elongate, membranous sensilla (Fig. 27) Clypeus rectangular, flat. Labrum (Fig. 65) punctured, covered with sparse and short setae, apical edge deeply emarginate medially, tornae elongate, with mesal arms recurved posteriorly, labral rods short, subparallel. Mandible (Figs 113, 114) almost round, convex dorsally, weakly concave ventrally, with small apical tooth and one very small subapical tooth, mola heavily sclerotized, prostheca narrow, submembranous with brush of short setae near mola, submola very small, membranous. Maxilla (Fig. 189) with palpomere 2–4 distinctly widening towards their apices, terminal palpomere obliquely truncate at apex. Galea large, widening and densely setose apically. Labium (Fig. 246) with palpi close together, palpomere 2 small, transverse, terminal palpomere large, transverse, truncate at apex. Mentum somewhat pentagonal with arcuate anterior edge, punctured, covered with several long setae. Premomentum strongly widened near apex, punctured, covered with moderately long setae, ligula small, submembranous.

Prothorax transverse, widest near apical third. Pronotum (Fig. 294) narrowly bordered laterally and anteriorly, anterior margin with small but distinct stridulatory membrane, lateral margins most often distinctly reflexed, basal sulcus more or less distinct, lateral sulci most often short and poorly marked, sometimes long and deep or rarely absent, anterior angles weakly rounded or produced outwards into small sharp tooth, posterior angles right angled, acute or provided with small tooth, lateral margins widened into small, sharp tooth or at least slightly angulate near apical third. Pronotal disc scarcely convex, very coarsely and densely punctured. Prosternal process (Fig. 295) reduced. Procoxae (Fig. 435) contiguous, prominent, circular in outline, their cavities externally open, internally widely closed, trochantin concealed.

Meso- and metathorax. Mesonotum with scutellum moderately large, wider than long Mesoventrine (Fig. 363) with intercoxal process very narrow, extending to about half length of coxae and most often meeting very narrow intercoxal process of metaventrine or sometimes both processes separated, mesocoxae very narrowly separated. Mesocoxa circular in outline, its cavity laterally narrowly open, trochantin partially exposed. Meso-metaventral junction of straight-line type. Elytra most often heart shaped, widest near basal third thence abruptly narrowing towards apex, sometimes long-oval, widest in mid length, in males most often a little more elongate than in females, weakly convex with lateral margins narrowly to widely flattened, very densely and coarsely, irregularly punctured, epipleuron narrow to broad, incomplete. Metaventrine (Fig. 363) transverse, flat, without postcoxal pits, discrmen long, anterior edge rather narrowly bordered and very weakly raised. Metacoxae transverse, widely separated, femoral lines absent. Metendosternite with moderately long stalk and widely separated anterior arms and tendons. Hind wing with one anal vein and one anal cell, medial fleck small, oval, undivided.

Legs (Figs 434–441) with trochantero-femoral attachment oblique. Femur widest near mid length, about twice as wide as tibia, covered with long and dense setae, tibia and tarsus very densely pubescent, tibia weakly widening towards tarsus. In males fore tibia with more or less distinct tooth at about apical third or near mid length, often additionally finely denticulate on inner edge, middle and hind tibiae most often distinctly denticulate on inner edge, at least from apical third to apex, sometimes curved outwardly. Tarsomere 3 at least 5 times shorter than tarsomere 4. Claws simple. Empodium very small with one seta.

Abdomen. In female five freely articulated ventrites, in male ventrite sixth at least partially visible, anterior margin of intercoxal process very weakly emarginate. Ventritle 1 usually longer than metasternum and almost as long as two following ventrites combined. Ventritle 5 and/or 6 usually with characters of sexual dimorphism in both sexes. Male abdominal segment 8 with sternite at least weakly emarginate (Fig. 626). Male genitalic segment (Figs 673, 674) with sternite usually with asymmetrical (sinuate) apical edge and paired apophyses fused apically or in mid length, dorsal plate divided in two parts connected by narrow membrane.

Aedeagus (Figs 743, 744) usually long, stout and heavily sclerotized. Tegmen comparatively large with basal piece encircling median lobe near base, parameres fused, tegmental strut distinct, submembranous. Median lobe almost straight to strongly curved, with membranous or submembranous gonopore at apex.

Female genitalka (Fig. 815). Ovipositor almost membranous with coxites vestigial. Spermatheca small, round, membranous, accessory gland minute, weakly oval, membranous, sperm duct moderately long and slender.


Distribution. Neotropical Region.
**Avencymon** Strohecker
(Figs 28, 66, 115, 116, 191, 248, 290, 291, 364, 442–449, 625, 671, 672, 747, 748, 816, 855)

_Avencymon_ Strohecker 1971b 38 type species by original designation Ancylopus concolor Strohecker 1951 (=_Avencymon ruficarpa_ Ohta 1951)

**Diagnosis.** _Avencymon_ is most similar to _Malindus_ and _Ancylopus_ in having the body long-oval and of moderate size. The labrum with median part of basal margin raised and triangularly produced anteriorly is also shared by these genera. The female pronotum with lateral sulci not being connected medially by arcuate ridge, the elytra without maculae, the labrum with sides produced antero laterally into rounded lobes, and the intercoxal process of metaventrite more widely bordered and raised distinguishes _Avencymon_ from _Ancylopus_ while the body colouration, and the pronotum with lateral edges weakly sinuate, anterior angles distinctly produced anteriorly, and lateral sulci long and deep separate it from _Malindus_

**Redescription.** Length 5 10–6 40 mm. Body (Fig 855) elongate, parallel, flattened, shiny, glabrous, densely and coarsely, confusedly punctured. Colour light brown to dark brown or dark reddish-brown with sides of meso- and metaventrite and sometimes sides of abdomen infuscate, head at least dorsally, antennae, legs in part infuscate or black, elytra sometimes black.

Head partially retracted in prothorax, weakly transverse, with weak, long concavities between eyes. Eyes large, transversely oval in outline, prominent, coarsely faceted. Occipital file finely ridged, somewhat trapezoidal in shape. Gular sutures weak, confluent medially and extending anteriorly as complete median line (reaching submentum) Antenna about as long as half of body length and rather slender (Fig 28) with narrow, weakly flattened club, scape about 3 x as long as pedicel and distinctly longer than antennomere 3, antennomere 3 as long as antennomeres 4 and 5 combined, antennomeres 4–5 subequal in length, antennomeres 6–7 equal in length, slightly shorter than preceding ones, antennomere 8 shorter than 7 Clypeus transverse, flat, widest at base, slightly convergent basally, thence parallel with apical margin somewhat pointed medially. Labrum (Fig 66) sclerotized with membranous sides, strongly transverse, coarsely punctured, covered with moderately long setae and with tufts of long setae on sides, anterior edge emarginate medially, base with distinct triangular, raised edge medially, tormae elongate, with mesal arms recurved posteriorly, labral rods very slender, widely divergent anteriorly. Mandible (Figs 115, 116) with apex little produced and feebly notched, mola rather large, finely ridged, prostheca narrow, membranous, covered with moderately dense and fine setae, submola small, densely setose, membranous Maxilla (Fig 191) with terminal palpomere elongate (about 1 5 x as long as palpomere 3), cylindrical, truncate apically, galea large, broadly triangular, densely setose at apex, lacina moderately short and narrow, tapering, fringed with stiff setae on its inner edge and with two long spines below them, digitus absent Labum (Fig 248) with palpi close together, palpomere 2 and 3 strongly transverse. Mentum transverse, widest in middle of its length, with raised, curved ridge transversely, covered with short, sparse setae. Prementum short, moderately sclerotized, emarginate at apex, ligula produced into short, lateral lobes.

Prothorax transverse, widest near middle length Pronotum (Fig 290) rather finely punctured, narrowly bordered laterally and anteriorly, anterior edge with conspicuous striulatary membrane, basal sulcus deep, lateral sulci linear, subparallel, moderately deep and long, anterior angles produced, blunt, posterior angles almost right-angled, lateral margins feebly sinuate, pronotal disc weakly convex. Prosternum with small pit in front of each procoxal cavity, prosternal process (Fig 291) very narrow, not extending beyond front coxae, coxae prominent, circular in outline (Fig 442), almost contiguous, their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax Mesonotum sclerotized with scutellum rather small, transverse, sparsely punctured at base, somewhat truncate at apex. Mesoventrite (Fig 364) with pair of rather deep pits near anterior margin, intercoxal process elongate and narrow, sinuate posteriorly, with weakly raised, arcuate ridge anteriorly, rather narrowly separating mesocoxae, extending slightly beyond half of their length. Mesocoxa circular in outline (Fig 443), its cavity outwardly open, trochantin exposed. Mesos-metaventral junction with internal knobs. Elytra parallel-sided from humeri toward apical fourth, thence narrowing abruptly towards apex, blunt or weakly acute at apices, moderately convex with punctures dense, coarse and irregular, humeri weakly prominent, female elytra generally more elongate at apex, lateral margins visible throughout, epipleuron rather narrow, incomplete. Metaventrite (Fig 364) large, transverse, weakly convex, scarcely narrowing towards its anterior margin, intercoxal process moderately widely bordered and raised, provided with three pairs of postcoxal pits, discernibly long but incomplete. Metacoxae transverse, widely separated. Metendosternite with rather short stalk and widely separated anterior arms and tendons. Hind wing with single anal vein and one anal cell, medial fleck moderately large, oval, at least partially divided.

Legs (Figs 442–449) long and comparatively slender, trochanterofemoral attachment heteromorbid. Femur widest near half length, hardly setose but ventral surfaces of fore and middle tibiae bear rows of obliquely directed short spines, tibia and tarsus rather densely setose, tibia weakly widening towards tarsus, tarsi with terminal tarsomere very long, 5–6 times longer than tarsomere 3. Claws with a few distinct teeth (Fig 449).
Empodium bisetose. In males sexual characters present in all legs - fore and middle tibiae weakly enlarged apically, incurved and finely toothed along apical half (Figs 444, 446); hind tibiae (Fig. 448) somewhat enlarged at apex and produced into flattened laterally lobe; fore and middle trochanters with small tubercles (Figs 442, 443); hind femora with fringe of very long, erect setae on inner edge (Fig. 447).

Abdomen with five freely articulated ventrites. Ventrite 1 almost as long as three following ventrites combined, with anterior margin of intercoxal process at least weakly emarginate; ventrites 2–4 subequal in length or 2 slightly longer than 3 or 4. Ventrite 5 modified at apex in both sexes - excised in males, truncate or weakly emarginate in female. Male abdominal segment 8 (Fig. 625) with sternite narrow, somewhat W-shaped; tergite widely rounded apically with large, membranous, basal plate, emarginate medially. Male genital segment (Figs 671, 672) with sternite emarginate at apex and paired apophyses fused along at least 2/3 of their length; dorsal plate not divided, but with membranous median part.

Aedeagus (Figs 747, 748) stout, moderately long, heavily sclerotized, weakly curved. Median lobe with single, apical branch. Tegmen placed basally, ring-shaped with parameres fused and tegminal strut vestigial.

Female genitalia (Figs 816) fused with abdominal segment 8. Ovipositor sclerotized, with coxites entirely fused; styli absent. Spermatheca small, oval, membranous; sperm duct long, slender; accessory gland minute, elongate-oval, membranous, with ventro-apical outlet of common oviduct, and dorso-apical outlet of sperm duct.

Species examined. A. bicolor Tomaszewska, A. ruficephalus* (Ohta) - all known species.

Distribution. Widely distributed in the Oriental Region: China, Taiwan, Philippines, Indonesia (Celebes Is., Sumba Is., Java and Sumatra, Seram Is.).

Beccariola Arrow

(Figs 8, 29, 67, 117, 118, 193, 194, 251, 308, 309, 365, 450–454, 628, 675, 676, 751, 752, 817, 856, 857)


Beccariola Arrow, 1943: 129. Replacement name for Beccaria Gorham, 1885.

Diagnosis. The general body appearance of Beccariola resembles Cymbachus and Acinaces. The body almost rounded in outline (in most species) and the pronotum with extremely reduced stratidulatory membrane (visible only on cleared specimens) (Fig. 8) can separate Beccariola from both these genera. Moreover the terminal labial palpomere about as long as wide, the prosternal process excised apically with subacute lateral lobes (forked) and the intercoxal process of mesoventrite strongly transverse, separates easily Beccariola from Acinaces, and the antennal club narrower and less flattened, the mandible with apical and subapical teeth, the pronotum without basal sulcus, the legs devoid of sexually dimorphic features, the abdominal tergite 8 simple at apex and differently shaped antennal club, separate Beccariola from Cymbachus.

Redescription. Length 4.4–6.0 mm. Body (Figs 856, 857) short-oval, or almost circular in outline, strongly convex, subhemispherical; surface smooth and shiny; finely and confusedly punctured; colour black, with yellow or orange maculae on the elytra or yellow, or yellowish-brown with black maculae or at least black elytral margins.

Head deeply retracted in prothorax, almost circular in outline. Gular sutures poorly marked, confluent medially; median line indistinct or sometimes slender and long. Eyes large, narrowly transverse, prominent, and coarsely faceted. Occipital file comparatively large, wide basally and strongly narrowing anteriorly. Antenna slightly shorter than a half of body length, (Fig. 29) with 3-segmented, narrow, loose, flattened club; antennomeres 9 and 10 with disto-medial angle acutely produced, especially in males; scape less than twice as long as pedicel; antennomere 3 almost as long as pedicel, or sometimes distinctly longer; antennomeres 4–8 subequal in length. Fronto-clypeal suture straight. Clypeus transverse, flat, weakly narrower at apex than at base. Labrum (Fig. 67) strongly transverse, covered with short setae, anterior edge truncate medially; tormae elongate, with mesal arms straight or recurved posteriorly; labral rods absent. Mandible (Figs 117, 118) strongly concave ventrally, convex dorsally; with one apical tooth and small subapical tooth; mola transversely ridged; prostheca large, covered with short setae; submola small, setose, membranous. Maxilla (Fig. 193) with terminal palpomere elongate, cylindrical, tapering, truncate at apex. Galea strongly enlarged toward its apex, densely setose apically, weakly recurved towards lacinia. Lacinia (Fig. 194) short and narrow, with long, apical and subapical stiff setae on inner edge and three long spines below them. Labium (Fig. 251) with palpi placed close together at base; palpomere 1 very small; palpomere 2 large, strongly transverse; terminal palpomere ovate. Mentum transverse; punctured, covered with long setae. Prementum transverse, sclerotized, punctured at apex; ligula densely setose at apex, strongly lobed at sides.

Prothorax strongly transverse, widest at base. Pronotum (Fig. 308) hardly bordered laterally and anteriorly; anterior margin with reduced, extremely small stratidulatory membrane (Fig. 8) (visible on cleared specimens, on high magnification); basal sulcus absent, lateral sulci shallow and short; basal margin weakly 3-sinuate. Anterior angles weakly produced, blunt; posterior angles acute. Pronotal disc weakly convex. Prosternal process (Fig. 309) short and comparatively broad, excised apically (to receive anterior part of pentagonal intercoxal process of mesov-
entrite), not produced beyond coxae Procoxa circular in outline (Fig 450), its cavity externally open, internally widely closed, trochanter concealed.

Meso and metathorax Mesonotum with scutellum rather small, transverse, widely rounded apically Mesoventerne (Fig 365) sometimes with pair of very shallow pits near anterior margin, with intercoxal process transversely pentagonal, broadly separating meso- coxae, not extending beyond them Mesocoxa circular in outline (Fig 451), its cavity outwardly open, trochanter exposed. Meso-metaventral junction with two small, lateral internal knobs Elytron oval, strongly convex, with punctures fine and irregular, (sometimes with rows of micropunctures), lateral margins moderately widely flattened, epipleuron broad apically, gradually narrowing towards etyral apex, complete or sometimes incomplete short distance before apex Metaventrite (Fig 365) transverse, weakly narrowing towards its anterior margin, with long discrum and with two pairs of postcoxal pits, intercoxal process weakly bordered, almost flat Metacoxae transverse, widely separated Metendosternite with long stalk and widely separated anterior arms Hind wing with one anal vein and two anal cells, Mp-CuA cross vein incomplete near MP, medial flec moderately large, elongate, divided.

Legs (Figs 450–454) simple in both sexes Trocthantero femoral attachment subheteromeral Femur widest near middle of its length, more than twice as wide as tibia, hardly setose, tibia and tarsus more densely setose than femur, tibia weakly widening towards tarsus Tarsi with tarsomere 3 about four times shorter than tarsomere 4 Claws simple Empodium distinct, basetose.

Abdomen with five freely articulated ventrites, anterior margin of intercoxal process very weakly emarginate, ventrite 5 simple in both sexes, ventrite 1 as long as three following combined, often with femoral lines and sometimes with small postcoxal pits, ventrites 3–5 subequal in length Male segment 8 (Fig 628) with sternite narrow, gently, widely rounded at apex and tergite without basal lobes Male genital segment (Figs 675, 676) with sternite weakly emarginate apically and single, long apophysis, dorsal plate divided and connected widely by membrane.

Aedeagus (Figs 751, 752) stout, moderately long, strongly sclerotized, curved Tegmen placed at base of median lobe, small, ring-shaped, parameres fused, tegmental strut absent.

Female genitalia (Fig 817) Ovipositor moderately sclerotized, with sternite 8 reduced to two lateral plates connected by membrane and at least medially fused with coxites, styli absent Spermatheca large, long-oval, membranous, sperm duct comparatively long, slender, accessory gland small, oval, membranous Bursa copulatrix moderately large with apical outlet of sperm duct and ventro-apical outlet of common oviduct

**Species examined** B celebensis Tomaszewska, B elongata Tomaszewska, B orca Heller, B pallida (Arrow), B papuensis* (Gorham), B selene Strohecker, B sikkimensis Tomaszewska, B wallacei (Gorham) – 8 of 31 known species

**Distribution** Widely distributed in the Oriental Region and one species is known from Madagascar

**Brachytrycherus** Arrow

(Figs 6, 30, 68, 119, 120, 195, 196, 261, 300, 301, 366, 455–461 629, 677, 678, 753, 754, 818, 858)

**Brachytrycherus Arrow**, 1920b 12 Tyype species by original designation **Brachytrcherus perotteti** Arrow, 1920b

**Diagnosis.** The species of Brachytrycherus resemble those of Ohtanis and Gerstaeckeris in having the body black or blackish-brown with elytra decorated most often with orange or yellow, transverse bands These genera share also the mandible with chisel-shaped apex The body less elongate, the head with well developed gular sutures and the intercoxal process of mesoventerne parallel sided, separate easily Brachytrycherus from both these genera Moreover the maxillary lacinia provided with tuft of S like setae at apex and a row of long, stout spines, subequal in length on inner dorsal edge can distinguish Brachytrycherus from Gerstaeckeris while the femora lacking fringe of long hairs on inner surface distinguish it from Ohtanis

**Redescription.** Length 60–75 mm Body (Fig 858) short oval, moderately convex, shiny, glabrous or minutely pubescent, finely or moderately coarsely, confusedly punctured with interspaces finely reticulate Colour dark brown to black with orange or yellow markings on elytra.

Head (Fig 6) rather deeply retracted in prothorax, weakly transverse, with two, weakly elongate, shallow concavities between eyes Eyes moderately large, narrow transversely, weakly prominent, moderately coarsely and rather loosely faceted Occupial file narrow, finely ridged Gular sutures well developed, widely separated, convergent anteriorly (Fig 6) Antenna long and rather slender (Fig 30) with 3 segments, narrow, loose, moderately flattened club, scape about twice as long as pedicel and slightly longer than antennomere 3, antennomere 3 about 1.3 x as long as antennomere 4 or 5, antennomeres 6–8 subequal in length, slightly shorter than preceding antennomeres Clypeus strongly transverse, flat, widest at base, weakly narrowing towards basal third, thence parallel with apical margin straight Labrum (Fig 68) sclerotized without membranous apex, strongly transverse, moderately densely punctured posteriorly and almost without punctures anteriorly, covered with rather short setae, anterior margin weakly truncate, tormae elongate, with medial arms recurved posteriorly, labral rods slender, long, divergent anteriorly Mandible (Figs 119, 120) comparatively weakly concave ventrally, with large, chisel-shaped apical tooth and moderately
large subapical tooth, mola large, well-developed, finely ridged, prostheca large, membranous, moderately densely and shortly setose, submola very small, membranous, setose. Maxilla (Fig 195) with terminal palpomere elongate, tapering anteriorly, rounded at apex, about 2:0 x as long as palpomere 3, galea moderately large, long oval, bluntly rounded and densely setose apically, lacina (Fig 196) almost as large as galea (long and wide) not tapering, bluntly rounded at apex, with tuft of S-shaped, apical spines, row of moderately long setae on its inner ventral edge and row of long spines on inner-dorsal edge, digitus absent. Labium (Fig 261) with palpi moderately close together, palpomeres 2 and 3 transverse with terminal palpomere truncate apically. Mentum transverse, with weak arcuate ridge transversely, widest near basal third, covered with short, sparse, suberect setae. Prementum rather short, moderately sclerotized with ligula submembranous, weakly expanded at sides.

Prothorax strongly transverse, widest near anterior third. Pronotum (Fig 300) rather narrowly bordered laterally and anteriorly, anterior edge with moderately large and weakly prominent striululatory membrane, base distinctly margined, basal sulcus distinct, straight, lateral sulci linear, subparallel, moderately deep and rather short, anterior angles produced, blunt or weakly acute, posterior angles weakly acute, pronotal disc comparatively convex, sometimes longitudinally channelled posteriorly. Prosternum without pits in front of procoxal cavities, prosternal process moderately widely separates front coxae, minutely cleft apically and bituberculate or forming rounded knob with longitudinal tubercle (Fig 301), extending shortly beyond coxae, front coxae prominent, circular in outline (Fig 455), their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax Mesonotum sclerotized with scutellum rather small, strongly transverse, rather sparsely punctured, widely rounded apically, weakly angulate near basal third. Mesoventrite (Fig 366) with a pair of distinct, rather deep pits near anterior margin and with transverse, declivent area in front of each coxa, intercoxaL process strongly transverse, bordered anteriorly by weakly arcuate ridge, sinuate posteriorly, with lateral edges weakly raised, widely separating mesocoxae, extending slightly beyond half of their length. Mesocoxa circular in outline (Fig 456), its cavity outwardly open, trochantin exposed. Meso metaventral junction with internal knobs. Elytra with anterior edge thickened and raised, convex with humeri weakly prominent, blunt or rounded at apices, lateral margins narrowly flattened, visible from base to about apical fourth, epipleuron comparatively wide, complete or incomplete at apex. Metaventrete (Fig 366) about 3 x as wide as long, weakly convex and concave along discernmen, narrowing anteriorly, anterior margin (especially of intercoxaL process) comparatively widely bordered and raised between coxae, provided with three pairs of postcoxal pits, discrmen extending along ¾ length of metaventrete. Metacoxae transverse, widely separated. Metendosternite with rather short stalk and widely separated anterior arms and tendons. Hind wing strongly reduced – very narrow and shorter than elytra.

Legs (Figs 455–461) long and comparatively slender, trochanterofemoral attachment heteromero. Femur somewhat clavate, moderately densely setose apically and with rows of obliquely directed short spines on ventral surfaces of fore and mid femora, tibia and tarsus rather densely setose, tibia weakly widening towards tarsus, tarsal tarsomere about 8–9 times longer than tarsomere 3, comparatively stout. Claws simple, hollowed along inner edge, empodium small with two short setae. Male tibiae with very distinctly marked sexual characters – small teeth and/or different degrees of curvature (Figs 457–459), male trochanters may bear small tubercles (Figs 455, 456).

Abdomen with five freely articulated ventrites. Ventrite 1 almost as long as three following ventrites combined, sometimes with shallow, elongate postcoxal pits, with anterior margin of intercoxal process weakly emarginate, ventrites 2–4 gradually, slightly shorter. Male ventrite 5 widely rounded apically. Male abdominal segment 8 (Fig 629) with sternite very narrow, with apical edge truncate or weakly emarginate medially, tergite widely rounded at apex with two moderately large, membranous, lateral plates at base. Male genital segment (Figs 677, 678) with sternite sinuate apically and paired apophyses fused at least along ¾ of their length, dorsal plate undivided, additional, internal, arcuate sclerite present.

Aedeagus (Figs 753, 754) stout, moderately long, heavily sclerotized, without basal curvature. Median lobe branched out apically. Tegmen placed basally, ring shaped with parameres fused and terminal strut very short.

Female genitalia (Fig 818) fused with abdominal sternite 8, which is divided in two lateral, sclerotized parts, connected medially by membrane. Ovipositor moderately sclerotized, with coxites entirely fused, sinuate at apex, styli present, small, terminal. Spermatheca and accessory gland very large, membranous, sperm duct moderately long, slender. Bursa copulatrix comparatively large with lateral outlet of common oviduct and apical outlet of sperm duct.

Species examined. B. madurensis Arrow, B. perrettii.* Arrow – 2 of 6 known species.

**Distribution.** Oriental Region (India, Laos, Thailand).

**Cacodaemon** Thomson


Cacodaemon Thomson 1857 153 Type species by subsequent designation of Strohecker (1964 145) *Eumorphus satanas* Thomson, 1856
**Diagnosis.** The species of *Cacodaemon* are most similar to those of *Amphisternus*, *Amphistethus*, *Spathomeles* and *Stictomela* in having the eytra provided with high tubercles and/or spines. Among them, *Cacodaemon* appears to be closely related to *Amphisternus* in having the ovipositor with base of spermapheca provided with, at least weakly sclerotized, nodulus-like structure, and the mandibles with apices strongly asymmetrical. Both features shared with *Amphisternus* separate *Cacodaemon* from *Amphistethus*, *Spathomeles* and *Stictomela*. Moreover the intercoxal process of mesoventrite with sides subparallel and the intercoxal process of metaventrite not margined anteriorly but convex, the different structures of maxillary lacinia, lacking S-like, apical setae and the eytra provided almost always with long and sharp spines can distinguish *Cacodaemon* from all mentioned genera.

**Redescription.** Length 7.0–11.0 mm. Body (Figs 859–861) elongate-oval to short-oval, strongly convex, shiny or opaque, glabrous; coarsely, sparsely to densely, confusedly punctured with interspaces reticulate. Colour brownish-black or most often black; eytra with long spines and/or tubercles, humeri carinate often with spines, elytral tubercles black or red.

Head rather deeply retracted in prothorax, almost as long as wide, with two, long, shallow concavities between eyes. Eyes comparatively small, narrow and transverse, moderately prominent, coarsely faceted. Occipital file moderately large, finely ridged, triangular in shape. Gular sutures poorly marked, strongly convergent anteriorly, fused medially at base; median line absent. Antenna long and comparatively slender (Fig. 31) with 3-segmented, narrow, weakly flattened and loose club; antennomere 3–8 longer than wide; scape almost 3 × as long as pedicel and as long as antennomere 3; antennomere 3 about 4 × longer than scape and 1.5–2.0 × as long as antennomere 4; antennomeres 4–8 gradually scarcely shorter or sometimes antennomere 4 may be longer than 5. Clypeus strongly transverse, flat, widest at base, weakly narrowing towards basal third, thence parallel with apical margin weakly arcuate. Labrum (Fig. 69) sclerotized with membranous apex; strongly transverse, moderately densely punctured, covered with short, sparse setae and with tufts of long setae on sides of anterior margin; anterior edge of membranous part sinuate or emarginate and of sclerotized part emarginate medially; tormae elongate, with mesal arms recurved posteriorly; labral rods absent. Mandible (Figs 121–124) with asymmetrical apex – right mandible bifid at apex (with two large, apical teeth); left mandible with strong, narrowly chisel-shaped apical tooth and one, moderately large subapical tooth; mola large, well-developed, finely ridged; prostheca large, membranous, moderately densely setose; submola rather small, setose, membranous. Maxilla (Fig. 197) with terminal palpomere elongate, subcylindrical, flattened laterally from half length towards apex, blunt apically, less than 1.5 × longer than palpomere 3; galea large, widely triangular, densely setose apically; lacinia (Fig. 198) much shorter than galea, narrow, tapering, bluntly rounded at apex, with a few, apical spines, row of moderately fine setae on its inner-ventral edge, row of long spines on inner-dorsal edge and 2 or 3 longest, mesal spines below; digitus absent. Labium (Fig. 256) with palpi close together; palpomeres 2 and 3 strongly transverse with terminal palpomere truncate apically. Mentum transverse, flat, widest near basal third, covered with few, short setae. Prementum short, moderately sclerotized with ligula produced at sides.

Prothorax transverse, widest anteriorly. Pronotum (Fig. 296) narrowly bordered laterally; anterior edge with small or moderately large striulatory membrane; basal sulcus moderately deep, most often at least weakly sinuate in mid length; lateral sulci short, subparallel, weakly arcuate; anterior angles produced into long acute spines, posterior angles weakly acute or right-angled; pronotal disc moderately convex but of uneven surface; punctures extremely fine with interspaces reticulate. Prosternum without pits in front of procoxal cavities; prosternal process (Fig. 297) widely separates front coxae, deeply cleft apically, extending distinctively beyond coxae; front coxae prominent, circular in outline (Fig. 462); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum rather small, strongly transverse, rather sparsely punctured, somewhat heart-shaped and point-ed at apex. Mesoventrite (Fig. 367) with a pair of small and shallow pits near anterior margin and with transverse, declivent area in front of each coxa; intercoxal process transverse, bordered anteriorly by weakly arcuate ridge and weakly sinuate posteriorly, lateral edges raised; widely separating mesocoxae, extending slightly beyond half of their length. Mesocoxa circular in outline, its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knobs. Elytra (Figs 10, 11) with basal margins moderately widely thickened and raised; convex, covered with tubercles and/or spines; humeri carinate, most often with spines; punctures coarse or very coarse and deep, moderately dense with interspaces reticulate; lateral margins narrowly flattened; most often produced into tubercle or spine at apices; epipleuron comparatively wide, complete. Metaventrite (Fig. 367) more than twice as wide as long, provided with three pairs of postcoxal pits; weakly convex, scarcely narrowing anteriorly; anterior margin moderately wide and raised, but intercoxal process not bordered, but in form of convex, triangular or oval area, defined posteriorly by shallow concavities; discern complete or almost so. Metacoxae transverse, widely separated. Metendosternite with short stalk and very widely separated anterior arms and tendons. Hind wing with different degree of reduction or well developed.
- then with one anal vein and two anal cells; medial fleck moderately large, elongate, partially undivided.

Legs (Figs 462–465) long and rather slender, hardly setose; trochanterofemoral attachment heteromoroid. Femur clubbed, very slender at base; sometimes glabrous, if setose then at least fore femora provided with rows of obliquely directed short spines on ventral surface; tibia very weakly widening towards tarsus; terminal tarsomere very long and comparatively stout, about 10 times longer than tarsomere 3. Claws simple, hallowed along inner edge (Fig. 465); empodium distinct with two short setae. In males fore tibiae often with distinct tooth near apex (Fig. 463), and fore trochanters sometimes rectangular.

Abdomen with five freely articulated ventrites. Ventrite 1 as long as 2.5 following ventrites combined, with anterior margin of intercoxal process comparatively wide and weakly emarginate; ventrites 2–3 subequal in length. Male ventrite 5 simple or modified - truncate or excised at apex. Male abdominal segment 8 (Fig. 632) with sternite very narrow, emarginate or somewhat truncate at apex; tergite arcuate apically with two small, lateral, submembranous plates at base. Male genital segment (Figs 679, 680) with sternite more or less emarginate at apex and paired apophyses fused along at least ½ of their length; dorsal plate not divided; additional internal, arcuate sclerite present.

Aedeagus (Figs 755, 756) stout, moderately long, heavily sclerotized, strongly curved near apex. Median lobe branched out apically. Segments placed basally, ring-shaped with parameres fused and tegmental strut short but distinct.

Female genitalia (Fig. 819) fused with abdominal sternite 8. Ovipositor sclerotized, with coxites entirely fused, sometimes with sinuate apex; stylly present, rather small, terminal. Sternite 8 divided in two lateral, sclerotized plates and fused with coxites. Spermatheca large, elongate-ovoidal, membranous with weakly sclerotized, large, nodulus-like structure between sperm duct and spermatheca; sperm duct short, slender; accessory gland elongate, membranous. Bursa copulatrix moderately large, narrow with lateral outlet of common oviduct and apical outlet of sperm duct, which is provided with small sclerite.

Species examined. C. aculeatus (Gerstaecker), C. bellicosus (Gerstaecker), C. bornensis (Frivaldszky), C. inaequalis (Germar), C. provarus Strohecker, C. satanass ᵄ (Thomson), C. spinicollis (Gerstaecker) – 7 of 24 known species.

Distribution. Widely distributed in the Oriental Region.

Callimodapsa Strohecker
(Figs 15, 32, 70, 125, 126, 199, 200, 257, 302, 303, 368, 466–471, 636, 681, 682, 757, 758, 820, 862, 863)

Callimodapsa Strohecker, 1974: 535. Type species, by original designation: Endomychus bivittatus Percheron, 1837.

Diagnosis. Callimodapsa is most similar to Indalmus in many aspects including body size and shape, colouration, the structures of mouthparts and sternum. Callimodapsa however differs from Indalmus in having the body less convex, covered with coarse reticulate microsculpture along with distinct punctuation, or sometimes punctures are very fine, and by the antennae and legs shorter and stouter.

Redescription. Length 4.9–7.0 mm. Body (Figs 862, 863) elongate, weakly convex, shiny, minutely pubescent to almost glabrous; confusedly punctured with interspaces densely reticulate. Colour light brown to dark brown or black; brown forms often have black, elongate stripes on the elytra.

Head moderately deeply retracted in prothorax, weakly transverse. Eyes large, oval in outline, prominent, coarsely faceted. Occipital file large, weakly trapezoidal in shape. Gular sutures poorly marked, confluent medi ally at base and extending as short median line. Antenna (Fig. 32) slightly shorter than half of body length, rather stout, with 3-segmented, narrow and weakly flattened, loose club; scape about twice as long as pedicel; antennomere 3 at least 1.5 × as long as antennomere 4; antennomeres 4–8 subequal in length, quadrate or transverse; terminal antennomere longer than wide. Clypeus transverse, flat, widest at base, slightly convergent basally, thence parallel. Labrum (Fig. 70) sclerotized with membranous apex; strongly transverse, moderately densely punctured, covered with short, sparse setae and with tufts of moderately long setae on sides of anterior margin; anterior edge of membranous part truncate and of sclerotized part weakly emarginate medially; base with distinct triangular, raised edge medially; tornae elongate, with mesal arms recurved posteriorly; labral rods absent. Mandible (Figs 125, 126) moderately broad, concave ventrally, convex dorsally; with sharp apical tooth and small, blunt subapical tooth; mola moderately large, finely ridged; prostheca narrow, membranous, minutely setose; submola small, setose, membranous. Maxilla (Fig. 199) with terminal palpomere elongate (about 1.5 × as long as palpomere 3), subcylindrical, blunt at apex; galea elongate and moderately broad, obliquely truncate at apex, densely setose; lacinia (Fig. 200) short and narrow, tapering, fringed with stiff setae on its inner edge and two long spines below them; digitus very small. Labium (Fig. 257) with palpi close together; palpomeres 2 and 3 strongly transverse with terminal palpomere truncate apically. Mentum transverse, widest near middle length, with raised, strongly curved ridge transversely; covered with sparse, rather long setae. Prementum very short, moderately sclerotized with ligula expanded laterally.

Prothorax strongly transverse, widest near anterior third or at base. Pronotum (Fig. 302) coarsely and moderately densely punctured; moderately widely bordered laterally and anteriorly; lateral edges simple or scarcely sinuate; anterior edge with conspicuous stridulatory
membrane, basal sulcus deep, lateral sulci linear, subparallel, deep and long, anterior angles distinctly produced forwards, blunt or weakly acute, posterior angles right angled, pronotal disc slightly convex. Prosternum with a pair of pits in front of procoxal cavities, pro- 

ternal process (Fig 303) narrow, rounded apically, 

extending almost to hind margin of procoxae and sepa-

rating them distinctly, coxae prominent, circular in out-

line (Fig 466), their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax Mesonotum sclerotized with 

cutellum rather small, transverse, with sides weakly 

angulate near base, rounded at apex Mesosventrite 

(Fig 368) with raised ridges, provided with a pair of pits 

near anterior margin, intercoxal process elongate and 

moderately widely separating meso coxae, extending to 

about half length of coxae, weakly arcuate anteriorly 

and emarginate posteriorly, with weakly raised borders 

Mesocoxa circular in outline (Fig 468), its cavity out-

wardly open, trochantin exposed. Meso-metaventral 

junction with internal knob Elytra subparallel, widest 

near apical third, elongate, moderately convex, blunt 

at apices with humeri scarcely prominent, punctures 

rather dense, moderately coarse and shallow, sometimes 

very fine, reticulate microsculpture very distinct and 

dense, epipleuron moderately wide, complete or almost 

so, lateral margins rather widely flattened, visible from 

above almost throughout Metaventrite (Fig 368) large, 

transverse, weakly concave along discrern and convex 

on sides of discrern, narrowing towards anterior 

margin, intercoxal process widely bordered and raised, 

provided with three pairs of postcoxal pits, in males 

sometimes also with small tubercles near hind coxae, 

discrern almost complete Metacoxae transverse, 

widely separated, femoral lines absent Metendosternite 

with rather short stalk and widely separated anterior 

arms and tendons. Hind wing (Fig 15) with two anal 

veins and two anal cells, medial fleck moderately large, 

long oval, undivided.

Legs (Figs 466–471) with trochanterofemoral attachment heteromorbid. Femur widest near half length, less than twice as wide as tibia, moderately densely setose, with rows of more or less distinct, obliquely directed short spines on ventral surfaces of fore and mid femora, tibia and tarsus more densely setose than femur, tibia widening towards tarsus. Tarsi with tarsomere 3 about five times shorter than tarsomere 4. Claws simple, empodium with two short setae. In males sexual characters may be found in all tibiae (Figs 467, 469).

Abdomen with five freely articulated ventrites Ventrite 1 as long as three following ventrites combined, with anterior margin of intercoxal process simple, ventrites 2–4 equal in length. In male, ventrite 5 truncate or excised at apex. Male abdominal segment 8 (Fig 636) with sternite very narrow, somewhat W-shaped, emarginate at apex, tergite rounded apically with submem-

branous, lateral lobes at base. Male genital segment (Figs 681, 682) with sternite sinuate or emarginate at apex, paired apophyses fused along ½ of their length, dorsal plate undivided.

Aedeagus (Figs 757, 758) stout, moderately long, strongly sclerotized, very weakly curved. Median lobe branched out apically. Tegmen placed basally, strongly reduced, ring shaped with parameres fused and tegmenal strut vestigial.

Female genitalia (Fig 820) fused with abdominal segment 8. Ovipositor sclerotized, with coxites entirely fused, sternite 8 sclerotized laterally and membranous in middle, fused with coxites, stylus present, small, terminal Spermatheca small, long-oval, membranous, sperm duct rather long, slender, accessory gland very small, elon-
gate, membranous. Bursa copulatrix moderately large, narrow with outlet of common oviduct on lateral left side of body and outlet of sperm duct at apex.

Species examined. C. atra Strohecker, C. nigro-

fusca (Gorham), C. obscura Strohecker, C. rufomacu

Strohecker – 4 of 16 known species.

Distribution. Africa.

Chetryrus Viliers
(Figs 1, 2, 33, 77, 127, 128, 201, 202, 258 304, 305 369 472–

476, 637, 683, 684, 759, 760, 821, 864)

Chetryrus Viliers 1953 1465 Type species by original designation Trycherus raffrey Gorham, 1885

Diagnosis. Chetryrus is most similar to Trycherus and Microtrycherus by general body appearance and the colouration. These genera appear to be closely related by having the spermatheca lacking the acces-
sory gland Chetryrus however can be distinguished from Microtrycherus and Trycherus by having the lateral margins of the pronotum widely bordered and coarsely punctured, and the antenna comparatively stout.

Redescription. Length 5.9–8.5 mm. Body (Fig 864) long-oval, moderately convex, shiny, glabrous or minute-

ly setose, confusedly punctured. Colour dark brown to black always with contrasting (yellow or orange) mark-
ings on the elytra, pronotum often bicoloured with disc dark and sides lighter.

Head (Figs 1, 2) partially retracted in prothorax, weakly transverse. Eyes large, oval in outline, prominent, 

coarsely faceted. Gular sutures poorly marked, strongly convergent and fused medially at base, extending short-

ly as median line (Fig 2). Occipital file small, oval, compar-

atively coarsely ridged. Antenna moderately long (slightly shorter than a half of body length) and rather stout (Fig 33), with 3-segmented, narrow and scarcely flattened, loose club, antennomeres 2 and 4–8 at least slightly wider than long, scape almost as long as pedicel and antennomere 3 combined, antennomere 3 about 1.5
× longer than antennomere 4, antennomeres 4–7 gradually slightly shorter, terminal antennomere elongate-oval. Clypeus transverse, flat, widest at base, slightly convergent from base toward half length, hence parallel Labrum (Fig 77) strongly transverse, sclerotized with membranous apex, densely and rather coarsely punctured, covered with moderately long setae and with tufts of long setae on sides, anterior edge of membranous part somewhat truncate and of sclerotized part weakly sinuate, tormae elongate, with mesal arms recurved posteri- orly, labral rods slender, divergent anteriorly Mandible (Figs 127, 128) moderately broad, strongly concave ventrally, convex dorsally with sharp, elongate ridge, with two sharp apical teeth and one blunt, subapical tooth, mola moderately large, finely ridged, prostheca rather narrow, membranous, finely setose, submola rather small, setose, membranous Maxilla (Fig 201) with terminal palpomere elongate (about 1 5 × longer than palpomere 3), cylindric, blunt at apex, galea broadly triangular, moderately densely setose, lacina (Fig 202) short and narrow, weakly tapering, fringed with stiff, long setae on its inner ventral edge, with row of spines on inner dorsal edge and two very long spines below them, digitus absent Labium (Fig 258) with palpi close together, palpomere 2 strongly transverse and terminal palpomere transversely rectangular Mentum transverse, widest near middle of its length, with raised, curved ridge transversely, covered with short setae in anterior part and densely reticulate posteriorly Prementum very short, moderately sclerotized with ligula in form of large, lateral lobes

Prothorax strongly transverse, widest at base, almost as wide basally as base of elytra Pronotum (Fig 304) coarsely and densely punctured, widely bordered laterally with margins raised and punctured, anterior edge narrowly bordered with minute striulatory membrane, basal sulcus deep, lateral sulci linear, subparallel, moderately long and deep, anterior angles produced forwards, blunt, posterior angles right-angled or weakly acute, pronotal disc moderately convex Prosternum with a pair of pits in front of procoxal cavities, prosternal process (Fig 305) moderately wide, parallel sided with edges weakly bordered, rounded apically, extending distinctly beyond procoxae and separating them distinctly, front coxae prominent, circular in outline (Fig 472), their cavities externally open, internally widely closed Trochantin concealed

Meso- and metathorax Mesonotum sclerotized with scutellum rather small, transverse, with sides angulate near base, widely rounded or somewhat truncate at apex Mesoventrite (Fig 369) with a pair of pits near anterior margin, intercoxal process pentagonal, elon- gate, widely separating mesocoxae, angulate anteriorly and almost truncate posteriorly, with raised borders and weakly concave median area, extending to about half length of coxae Mesocoxa circular in outline, its cavity outwardly open, trochantin exposed Meso-metaventral junction with internal knobs Elytra elongate oval, almost parallel sided, convex, blunt at apices with punctures moderately coarse and dense, humeri weakly prominent, lateral margins narrowly flattened, visible from above almost throughout, epipleuron moderately wide, incomplete at apex Metaventrite (Fig 369) large, transverse, moderately convex, narrowing towards its anterior margin which is moderately widely bordered and raised, provided with three pairs of postcoxal pits, discrimum long but incomplete Metacoxae transverse, widely separated, femoral lines absent Metendosternite with moderately long stalk and widely separated ante- rior arms and tendons Hind wing with two anal veins and one anal cell, medial fleck moderately large, oval, partially divided

Legs (Figs 472–476) with trochanterofemoral attachment heteromeroid Femur widest near half length, less than twice as wide as tibia, hardly to moderately densely setose, with rows of more or less distinct, obliquely directed short spines on ventral surfaces of fore and mid femora, tibia and tarsus densely setose, tibia widening towards tarsus, tarsi with tarsomere 3 about eight times shorter than tarsomere 4 Claws simple, hallowed along inner edge Empodium distinct, bisetose Sexual differences absent

Abdomen with anterior margin of intercoxal process truncate or weakly emarginate, with five freely articulated ventrites Ventrite 1 as long as three following ventrites combined, ventrites 2–3 equal in length, ventrite 4 slightly shorter Ventrite 5 in both sexes weakly raised at apex looking like truncate Male abdominal segment 8 with sternite moderately narrow, divided in two sclerotized, lateral parts connecting medially by very narrow membranous belt (Fig 637), and tergite widely truncate at apex with small, lateral, submembranous plates at base Male genital segment (Figs 683, 684) with sternite comparatively large, emarginate at apex, pared apophyses fused along ½ of their length, dorsal plate undivided

Aedeagus (Figs 759, 760) moderately long and rather slender, sclerotized, strongly curved near base Median lobe with membranous gonopore at apex, without apical branches Tegmen placed basally, large, ring-shaped with parameres fused and tegminal strut comparatively long

Female genitalia (Fig 821) fused with abdominal sternite 8 Ovipositor elongate, sclerotized, with coxites entirely fused, somewhat truncate apically, styli absent Spermaphaeca very large, membranous, sperm duct moderately long, slender, accessory gland absent Bursa copulatrix moderately large, long and narrow with lateral outlet of common oviduct and apical outlet of sperm duct, provided with small sclerite

Species examined Ch diversifasciatus (Pic), Ch raffrayi* (Gorham), Ch tricolor (Gerstaecker) – 3 of 8 known species

Distribution. Africa
Cymbachus Gerstaeker
(Figs 34, 72, 129, 130, 293, 204, 252, 310, 311, 317, 477–481, 630, 685, 686, 761, 762, 822, 865)

Diagnosis. This genus appears to be closely related to Sinocymbachus sharing numerous characters including labial an maxillary structures, the mandible with apex widely chisel-shaped, tergite 8 of both sexes with tuft of long setae at apex, and the aedeagus short with apical branches often as long as half length of median lobe. The body more oval, and the intercoxal process of mesoventricle distinctly pentagonal, almost flat, can separate Cymbachus from Sinocymbachus.

Redescription. Length 6.0–7.0 mm. Body (Fig. 865) broadly oval, highly convex, shiny, glabrous; pustules fine, moderately dense, confused. Prevailing body colour black with elytra decorated with yellow spots; sometimes elytra yellow with black markings.

Head partially retracted in prothorax, almost as long as wide, somewhat circular in outline, weakly concave between antennae. Gular sutures poorly marked, strongly convergent anteriorly, fused medially near base and extending anteriorly as long median line. Eyes strongly transverse, moderately large, prominent, and moderately coarsely facetted. Occipital file finely ridged, produced anteriorly, long-oval. Antenna about as long as half of body length, slender (Fig. 34) with 3-segmented, rather wide, flattened club; scape twice as long as pedicel; antennomere 3 less than twice as long as pedicel and about 1.2 x as long as antennomere 4; antennomere 4 distinctly longer than 5; antennomeres 5–8 subequal. Clypeus transverse, flat, widest at base, convergent along basal third, thence parallel, subtruncate at apex. Labrum (Fig. 72) large, transverse, sclerotized with membranous apex and sides; coarsely punctured and covered with long setae; anterior margin straight medially and rounded on sides (anterior margin of sclerotized part emarginate medially); tori medially, with mesal arms recurved posteriorly; labral rods absent. Mandible (Figs 129, 130) broad, concave ventrally, convex dorsally; with apex produced into long, chisel-shaped tooth and with moderately large, subapical tooth; mola strongly sclerotized, with inner surface finely ridged; prostheca large, moderately narrow, membranous, covered densely with short setae; submola small, densely setose, membranous. Maxilla (Fig. 293) with 4-segmented palp; terminal palpmere elongate (almost twice as long as palpmere 3 and about 1.5 x as long as 2), weakly tapering towards apex, minutely truncate; galea elongate, weakly widening towards apex and blunt, densely setose; labium (Fig. 204) moderately long and narrow, tapering, fringed with stiff setae on its inner edge, with two or three long spines below them; short digitus or long apical spine present. Labium (Fig. 252) with palpi moderately widely separated; palpmere 2 transverse; terminal palpmere long-oval, somewhat subcylindrical in shape, truncate apically. Mentum rectangularly transverse with angles rounded; covered with long setae. Proventrum rather short, moderately sclerotized with ligula membranous, transverse, weakly produced laterally into short lobes at sides, scarcely rounded at apex.

Prothorax strongly transverse, widest at base and narrowing anteriorly. Pronotum (Fig. 310) very narrowly bordered laterally and anteriorly; base weakly trisinate; anterior edge with large striulatory membrane; basal sulcus deep, lateral sulci moderately deep and rather short, weakly arcuate, anterior angles weakly produced forwards, acute; posterior angles weakly acute; protornal disc moderately convex. Prosternum without pits in front of procoxal cavities; prosternal process (Fig. 311) moderately wide, not produced beyond coxae, v-excised at apex receiving front angle of pentagonal mesosternum; front coxae prominent, circular in outline (Fig. 477); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum moderately large, almost as long as wide, somewhat heart-shaped. Mesoventrite (Fig. 374) without pits; intercoxal process rather flat, pentagonal, about as long as wide; moderately widely separating mesocoxae; extending at least to half of their length. Mesocoxa circular in outline (Fig. 478), its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knobs. Elytra widest near mid length or at basal third, short, highly convex, strongly rounded at sides, blunt apically with punctures dense, moderately coarse and irregular; epipleuron rather wide basally, narrowing towards apex, reaching apical fifth; humeri moderately prominent; lateral margins visible from above at least in apical half. Metaventrite (Fig. 374) large, transverse, weakly convex, narrowing towards its anterior margin which is rather narrowly bordered and weakly elevated, provided with a pair of small postcoxal pits; discrimin long but incomplete. Metacoxae transverse, widely separated; femoral lines absent. Metendosternite with moderately long stalk and widely separated anterior arms and tendons. Hind wing with one anal vein and one anal cell; median flex moderately large, round-oval, undivided.

Legs (Figs 477–481) with trochanterofemoral attachment subheteromeroid. Femur slender and almost parallel-sided, hardly setose; with rows of obliquely directed short spines on ventral surfaces of fore and mid femora; tibia and tarsus densely setose; tibia slender, weakly widening towards tarsus. Tarsi with tarsomere 3 about six times shorter than tarsomere 4. Claws simple, hallowed along inner edge (Fig. 481). Empodium distinct bisetose. Male fore trochanters with characters of sexual dimorphism (e.g. distinct tubercles) (Fig. 477).

Abdomen with five freely articulated ventrites. Ventrite 1 with anterior margin of intercoxal process straight or
emarginate medially, longer than three following ventrites combined, in male sometimes weakly impressed medially and with a pair of median tubercles near hind margin; ventrites 2–4 subequal in length. Ventrite 5 in male truncate at apex, in female weakly pointed. Abdominal segment 8 (Fig. 630) similar in both sexes, with sternite very narrow but well sclerotized (in male scarcely emarginate at apex); tergite weakly pointed at apex with tuft of long setae medially (in male with additional, small, lateral membranous plates at base) (Fig. 630). Male genital segment (Figs 685, 686) with additional narrow, internal, arched sclerite; sternite weakly emarginate medially at apex and paired apophyses fused at least along their apical third; dorsal plate divided in two, lateral, sclerotized plates, connected medially by membrane.

Aedeagus (Figs 761, 762) moderately short and stout, strongly sclerotized, weakly curved. Median lobe branched out apically; flagellum with long, slender, submembranous gonopore. Tegmen placed basally, ring-shaped with parameres fused and tegmental strut vestigial.

Female genitalia (Fig. 822). Ovipositor fused with abdominal sternite 8; coxites entirely fused, truncate at apex, with long apical setae. Spermatheca large, round-oval, membranous; accessory gland moderately large, oval, membranous; sperm duct long and slender. Bursa copulatrix moderately large with apical outlet of sperm duct and ventro-apical outlet of common oviduct.

Species examined. C. elegans Arrow, C. pulchellus* Gerstäcker – 2 of 5 known species.

Distribution. Southeast Asia: Indonesia (Java), Burma, Laos, Thailand, India (Sikkim), South Korea.

**Cymenes** Gorham


**Diagnosis.** This genus resembles *Callimodapsa* in an overall body appearance including the elytra widest beyond mid length and the body coarsely reticulate. The body more convex, most often with extremely fine punctures, and lacking contrasting markings on the elytra can separate *Cymenes* from *Callimodapsa*.

**Redescription.** Length 6.0–7.0 mm. Body (Fig. 866) long-oval, convex, shiny, glabrous; densely reticulate while punctures sparse and very fine. Colour yellow, brown, red or black without contrasting markings on the elytra.

Head partially retracted in prothorax, about as long as wide, almost circular in outline. Gular sutures poorly marked, confluent medially at base and extending anteriorly as short median line. Eyes moderately large, oval, prominent, and coarsely faceted. Occipital file finely ridged, moderately large, long-oval. Antenna long and rather slender (Fig. 35) with, 3-segmented, narrow or moderately narrow, flattened club; scape almost 2.5 times as long as pedicel and subequal in length with antennomere 3; antennomeres 4–5 subequal and about 2 × shorter than antennomere 3; antennomeres 6–8 equal in length, slightly shorter than 4 or 5. Clypeus transverse, flat, widest at base, slightly convergent from base toward half length, thence parallel. Labrum (Fig. 71) sclerotized with membranous apex; anterior margin of membranous part truncate or sometimes sinuate, of sclerotized part emarginate; strongly transverse, coarsely punctured, covered with moderately long setae and with tufts of long setae on sides; basal margin with produced anteriorly triangular, raised edge medially; tormae elongate, with mesal arms recurved posteriorly; labral rods absent. Mandible (Figs 131, 132) broad, concave ventrally, convex dorsally with long pointed, apical tooth and slightly shorter subapical tooth, or sometimes look like two large apical teeth; mola large, well-developed, finely ridged; prosthecum long and narrow, membranous, densely covered with short setae; submola small, setose, membranous. Maxilla (Fig. 205) with terminal palpomere longest (about 1.5 × longer than palpomere 3 and slightly longer than 2), cylindrical, blunt or weakly truncate at apex; galea broadly triangular, moderately densely setose; lacinia short and narrow, weakly tapering, fringed with moderately stiff setae on its inner edge and one or two long spines below them; digitus absent. Labium (Fig. 253) with palpi close together; palpomere 2 very short, strongly transverse and terminal palpomere transverse, rectangular to weakly oval, truncate at apex. Mentum transverse, with short, lateral lobes and arcuate, weakly raised anterior margin; covered with moderately long, sparse setae. Prementum short, moderately sclerotized; ligula with large, lateral lobes.

Prothorax transverse, widest at base. Pronotum (Fig. 306) narrowly bordered laterally and anteriorly; anterior edge with conspicuous striolatory membrane; posterior margin weakly trisinate; basal sulcus deep, lateral sulci moderately long, linear and subparallel; anterior angles produced, subacute, hind angles right-angled or produced posteriorly and acute; lateral edges weakly sinuate with more or less distinct narrowing near basal third; pronotal disc weakly convex. Prosternum with a pair of small pits in front of procoxal cavities; prosternal process (Fig. 307) very narrow but separating front coxae, extending to their hind margin; front coxae prominent, circular in outline (Fig. 482); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum small, transverse, somewhat heart-shaped. Mesoventrite (Fig. 370) with a pair of pits near anterior margin, carinate, intercoxal process as long as wide,
arcuate anteriorly and sinuate posteriorly, with weakly raised borders, moderately widely separating mesoxocxae, extending slightly beyond half of their length. Mesoxocxa circular in outline (Fig. 483), its cavity outwardly open, trochantin exposed. Meso metaventral junction with internal knobs. Elytra widest beyond mid length, elongate, convex, blunt at apices with punctures very fine and sparse, humeral plates weakly prominent, epipleuron rather narrow, complete or almost so. Metaventrile (Fig. 370) large, strongly transverse, weakly convex, narrowing towards its anterior margin, provided with three pairs of postcoxal pits, discrimin long, almost complete, intercoxal process moderately widely bordered and distinctly raised. Metacoxae transverse, widely separated, femoral lines absent. Metendosternite with short stalk and widely separated anterior arms and tendons. Hind wing with two anal vein and two anal cells, mesal flcck moderately large, almost rectangular, divided.

Legs (Figs 482–487). Trochantanofemoral attachment subheteromeronid. Femur long and somewhat clavate, slender at base, setose, fore and mid femora with short rows of obliquely directed spines on ventral surfaces, tibia and tarsus more densely setose than femur, tibia widening towards tarsus. Tarsi with terminal tarsomere about nine times longer than tarsomere 3. Claws simple or modified (Figs 486, 487). Empodium large, bisetose. In males sexual characters may be found in fore tibiae (stout tooth – Fig. 484) and mid tibiae (curvature and very small teeth).

Abdomen with five freely articulated ventrites. Ventrite 1 as long as three following ventrites combined with anterior margin of intercoxal process weakly emarginate medially, ventrites 2–4 subequal in length. Ventrite 5 may be modified in both sexes (excised or emarginate medially at apex). Male abdominal segment 8 (Fig. 631) with sternite very narrow and strongly emarginate medially, and tergite large, with membranous lobes at base. Male genital segment (Figs 693, 694) with sternite emarginate apically and paired apophyses fused along ½ of their length, dorsal plate undivided.

Aedeagus (Figs 763, 764) stout, moderately long, strongly sclerotized, very weakly curved. Median lobe with two apical branches of different length or subequal. Tegmen placed basally, ring shaped with parameres fused and tegmental strut very short, but distinct.

Female genitalia (Fig. 823) compactly connected with segment 8 – tergite 8 sclerotized, and sternite 8 in from of two lateral plates fused with coxites. Ovipositor moderately sclerotized, coxites entirely fused, styli present, small Spermatheca and accessory gland very small, elongate, membranous, sperm duct long and slender. Bursa copulatrix large, elongate with ventro apical outlet of common oviduct and apical outlet of sperm duct.

**Species examined.** *C. atrocolatus* (Fairmaire), *C. tenuipes* Strohecker – 2 of 9 known species.

**Distribution.** Madagascar.

**Dapsa Latteille**

(Figs 36, 73, 133, 134, 206, 207, 260, 312, 313, 371, 488–494, 633, 691, 692, 767, 768, 824, 867, 868)

**Dapsa Latteille** 1829 159. *Type species, by subsequent designation of* Astrow (1925 335) *Endomythus denticolis* Germar, 1817

**Phylira Mulsant, 1846** 22 (as subgenus) *Type species, by monotypy Dapsa trxiculata* Motschulsky, 1835

**Diagnosis** An overall body appearance (e.g., body shape, colouration and the shape of pronotum) of *Dapsa* resembles *Archypnes.* However, the head with well developed, widely separated gular sutures, the terminal antennomere without membranous sensilla, the labium with terminal palpmere not being strongly transverse, the mandible with well developed apical tooth, the meso-metaventral junction with internal knob, and sterna with postcoxal pits can easily separate *Dapsa* from *Archypnes.*

**Redescription** Length 3.0–5.5 mm. Body (Figs 867, 868) elongate, moderately convex, shiny, and shortly pubescent, densely and coarsely, confusedly punctured. Colour yellow, brown or dark reddish brown, most often with contrasting markings on the elytra (black or rarely lighter than background of elytra).

Head partially retracted in prothorax, almost as long as wide. Eyes moderately large, oval in outline, prominent, very coarsely faceted. Gular sutures well developed, widely separated, weakly convergent anteriorly. Occipital file large, oval, finely ridged. Antenna long and most often slender (Fig. 36) with 3-segmented, narrow and loose club, scape twice as long as pedicel, antennomere 3 1.5 × as long as pedicel or antennomere 4, antennomeres 4–7 subequal, antennomere 8 slightly smaller than 7 or 9. Clypeus transverse, flat, widest at base, slightly convergent from base toward half length, hence parallel. Labrum (Fig. 73) truncate apically or sometimes weakly emarginate, strongly transverse, sclerotized with membranous apex (at least at sides), moderately coarsely punctured, covered with long setae, tormae elongate, with mesal arms recurved posteriorly, labral rods very slender, divergent anteriorly. Mandible (Figs 133, 134) broad, concave ventrally, convex dorsally with long pointed, apical tooth and small subapical tooth (rarely left mandible with additional two very small subapical teeth), mola moderately large, well developed, finely ridged, prostheca long and narrow, membranous, densely setose, submola small, setose, membranous. Maxilla (Fig. 206) with terminal palpmere longest (almost as long as palpmeres 2 and 3 combined), subcylindrical, rounded at apex, galea broadly triangular, moderately densely setose, lacina (Fig. 207) short and narrow, tapering, provided with comb of stout setae on mesal edge, with row of slender spines on dorsal surface and two or three longest spines below them, digitus absent. Labium (Fig. 260) with palpi moderately close together, palpmere 2 weakly transverse and terminal
palpomere weakly elongate, rounded apically. Mentum transverse, almost rectangular in shape with weakly produced anterior angles, with weakly raised, curved ridge transversely or flat; covered with rather long setae. Prementum very short, moderately sclerotized with ligula formed by moderately large, lateral lobes.

Prothorax transverse, widest most often near apical third. Pronotum (Fig. 312) without lateral bordering; anterior edge with conspicuous striulatory membrane; basal sulcus deep, lateral sulci of different length, linear and subparallel or somewhat triangular, moderately deep; shape of pronotum variable, but generally with prominent, very acute angles; lateral edges often denticulate or at least sinuate; pronotal disc slightly convex. Prosternum with pair of pits in front of procoxal cavities; prosternal process (Fig. 313) very narrow, extending to hind margin of coxae, which are contiguous and prominent, circular in outline (Fig. 488); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum small, strongly transverse, widely rounded apically. Mesoventrite (Fig. 371) with a pair of pits near anterior margin, carinate; intrecioxal process elongate, with elongate carina, bifurcate near apex; narrowly separating mesocoxae; extending beyond half of their length. Mesocoxa circular in outline (Fig. 492), its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knob. Elytra widest near about basal third, elongate, convex, blunt at apices with punctures dense and irregular; humeral plates weakly prominent; epipleuron rather narrow, incomplete at apex. Metaventrite (Fig. 371) large, strongly transverse, weakly convex, narrowing towards its anterior margin, provided most often with two pairs of postcoxal pits; intrecioxal process rather narrowly bordered and weakly raised; discrmen long but incomplete; in males hind margin, between coxae provided with some modifications (e.g. tubercles). Metacoxae transverse, widely separated; femoral lines absent. Metendosternite with short stalk and widely separated anterior arms and tendons; anterior tendons comparatively short. Hind wing reduced (shorter and narrower than elytron) without anal lobe, or well developed, then with one anal vein, Mp-CuA cross vein reduced, and medial fleck undivided.

Legs (Figs 488–494). Trochanterofemoral attachment heteromерoid. Femur long and clavate, slender at base, setose; tibia widening towards tarsus. Tarsi with tarsomere 3 about four times shorter than tarsomere 4. Claws simple. Empodium bisetose. In males sexual characters may be found in fore trochanters (tubercles or spines) (Fig. 490) and fore and mid tibiae (teeth, spines and/or curvature) (Figs 489, 493).

Abdomen with five freely articulated ventrites. Ventritle 1 almost as long as three following ventrites combined with anterior margin of intrecioxal process at least weakly emarginate; ventrites 2–4 subequal in length. Ventritle 5 may be modified in both sexes (weakly truncate or emarginate apically). Male abdominal segment 8 (Fig. 633) with sternite very narrow and emarginate at apex, and tergite large, narrowly excised medially at base, without basal, membranous lobes. Male genital segment (Figs 691, 692) with additional narrow, internal, arched sclerite; sternite emarginate apically and paired apophyses fused along ⅔ of their length; dorsal plate undivided.

Aedeagus (Figs 767, 768) stout, moderately long, strongly sclerotized, very weakly curved. Median lobe sometimes weakly branched out apically; endophallus often with stout spines. Tegmen placed basally, strongly reduced, ring-shaped with parameres fused and tegminal strut vestigial.

Female genitalia (Fig. 824). Ovipositor fused with abdominal sternite 8; coxites entirely fused; stylt absent. Apex of bursa copulatrix sometimes in form of strongly sclerotized ring and whole bursa at least partially sclerotized. Spermatheca small, membranous; sperm duct short, rather slender; accessory gland very small, elongate, membranous. Bursa copulatrix moderately large, elongate with apical outlet of sperm duct and lateral (on left side of body) outlet of common oviduct.


Distribution. Widely distributed in PalaeartecRegion and northern Orient (India, Nepal and Burma).

Daulis Ericson

(Figs 12, 37, 74, 135, 208, 254, 314, 315, 372, 495–499, 635, 687, 688, 765, 766, 825, 869)


Diagnosis. Daulis appears to be closely related to Daulotypus sharing the dorsal vestiture double consisting of suberect setae originating from the punctures and very long, erect spines placed on small tubercles, the unique feature for the entire family Endomychiidae. The lateral margins of the pronotum being coarsely crenulate, the prosternal process comparatively long and narrow and the intrecioxal process of mesoventrite narrowly separating mesocoxae are also shared by Daulis and Daulotypus. Daulis however, can be separated from Daulotypus by having the terminal labial palpomere oval, the maxillary galea widely rounded at apex, and the elytral punctures arranged irregularly and the hind wing lacking medial fleck.

Daulis also seems to be closely related to the Neotropical genus Archipines sharing general body appearance, the
labrum produced laterally into rounded lobes, the apex of the sternite of the male genital segment visible in a deep excision of the ventrite 6, the terminal labial palpomere large and somewhat flattened dorso ventrally and the female genitalia with strongly reduced coxites However the body vestiture, the lateral margin of the pronotum coarsely crenulate and the mandible with blunt apex, without teeth separate easily Daulis from Archipines

Redescription Length 2 85–3 20 mm Body (Fig 869) long oval in outline, moderately convex, very shiny, comparatively coarsely and moderately densely, con fusedly punctured, covered with two kinds of pubescence – moderately long, suberect hairs growing out of punctures and about two times longer, sparse, erect hairs/ spines growing out of small tubercles, between punctures Colour light brown, with some scattered, irregular, infuscate spots on the elytra

Head weakly transverse, strongly narrowing from eyes towards Clypeus, occipital file small, elongate, somewhat vase-shaped, postoccipital suture present, gular sutures slender, strongly convergent and confluent mediadly at base. Eyes moderately large, weakly oval in outline, strongly prominent, coarsely faceted Antenna (Fig 37) about as long as half length of body, with all antennomeres longer than wide, club 3-segmented, nar row, long, scarcely flattened and loose, antennomeres 1–4 gradually, scarcely shorter, antennomeres 4–8 subequal in length, terminal antennomere longest Clypeus flat, almost rectangular, with weakly arcuate apical edge Labrum (Fig 74) strongly transverse, with sides produced laterally into rounded lobes, sclerotized with narrow membranous, apical part, coarsely punctured, covered with moderately dense, long setae and with sparse brushes of long setae on sides of apical margin, apical edge weakly emarginate mediadly, tormae elon gate, with mesal arms recurved posteriorly, labral rods somewhat V-shaped, divergent anteriorly Mandible (Fig 135) hemicycloid, rounded apically without teeth, ventral surface, along outer edge covered with numerous long setae, mola moderately large, sclerotized, finely ridged, prostheca moderately wide and very long, membranous, covered with moderately dense, short setae, submola rather small, densely setose, membra nous Maxilla (Fig 208) with palpomeres 2–4 much longer than wide, gradually slightly longer, terminal palpomere subcylindrical, blunt at apex Galea large, widening and rounded apically, densely setose Lacinia short and narrow, tapering towards its apex, with long, stout apical and mesal setae and two very long spines below them, growing out of dorsal surface Labium (Fig 254) with palpi rather close together, palpomere 2 transverse, terminal palpomere very large, about as long as wide, somewhat flattened dorso ventrally, oval in outline Mentum widest near half length with raised, curved ridge transversely, weakly concave and reticulate posteriorly Prementum moderately long, covered anteriorly with comparatively long setae, ligula lobed at sides, submembranous

Prothorax strongly transverse, widest between apical third and half length Pronotum (Fig 314) with anterior margin provided with reduced, very small, produced anteriorly striulatory membrane, lateral margins coarsely crenulate, basal sulcus deep and straight, lateral sulci comparatively long, deep, linear and subparallel, anterior angles very weakly produced forwards, blunt, posterior angles right-angled Pronotal disc weakly convex, coarsely and densely punctured Prosternum (Fig 315) with pair of pits in front of procoxal cavities, prosternal process very narrow, not extending beyond coxae, procoxae (Fig 495) contiguous, prominent, circular in outline, their cavities externally open, internally widely closed, trochantin concealed

Meso and metathorax Mesonotum with scutellum rather small, wider than long, somewhat heart-shaped with acute apex Mesoventrite (Fig 372) almost flat with pair of small and shallow pits near anterior margin, intercoxal process very narrow, flat, extending to about half length of coxae and meeting narrow intercoxal process of metaventrite, mesocoxa very narrowly separated Mesocoxa circular in outline (Fig 497) its cavity open outwardly, trochantin exposed Meso-metaventral junction with small internal knob Elytra (Fig 12) much wider basally than prothorax, widest near basal third, thence subparallel and abruptly narrowing from apical third towards apex, convex with lateral margins moderately widely flattened, visible from above, from humeri to apical third, densely and coarsely, irregularly punctured, epipleuron comparatively broad, narrowing towards apex, extending to half length of abdominal ventrite 3, humeri weakly prominent Metaventrite (Fig 372) transverse, weakly convex, with two pairs of postcoxal pits, anter ior margin narrowly bordered and weakly raised, disci men long, incomplete Metacoxae transverse, moderately widely separated, femoral lines absent Metendosternite with comparatively long stalk and widely separated anterior arms and tendons Hind wing with one anal vein and one anal cell, medial fleck absent

Legs (Figs 495–499) with trochanterofemoral attach ment oblique Femur widest near mid length, about twice as wide as tibia, covered with long and dense setae and at least tore femur bears a few additional, perpendicularly directed spines, tibia and tarsus very densely pubescent, tibia very weakly widening towards tarsus, with outer edge provided with erect, very long setae Tarsi with tarsomere 3 about 5–6 times shorter than terminal tarsomere Claws simple Empodium moderately large with two long setae

Abdomen with six freely articulated ventrites (in male ventrite sixth at least partially visible), intercoxal process with anterior margin straight Ventrite 1 in male not much longer than ventrite 2, in female almost as long as two following ventrites combined, ventrites 2–4
subequal in length. In female ventrites 5 and 6 simple at apex; in male ventrite 5 truncate to weakly emarginate at apex, ventrite 6 (Fig. 635) strongly incurved medially exposing apex of male genital segment; tergite 8 weakly emarginate medially at apex in both sexes. Male genital segment (Figs 687, 688) with sternite weakly rounded apically and paired apophyses fused along half length; dorsal plate undivided.

Aedeagus (Figs 765, 766) moderately long, rather thin, moderately sclerotized. Tegmen comparatively large with basal piece encircling penis near mid length; parameres fused; tegminal strut sclerotized, comparatively long, articulated or fused. Median lobe straight and curved apically, with small submembranous gonopore at apex.

Female genitalia (Fig. 825). Ovipositor almost membranous with coxites vestigial and stiuly absent. Spermatoheca small, membranous, elongate; accessory gland minute, membranous; sperm duct stout and moderately long. Bursa copulatrix moderately large, membranous with apical outlet of sperm duct and medio-ventral outlet of common oviduct.

Species examined. D. cimicoides* Ericson, D. montethli Tomaszewska – all known species.

Distribution. Australia.

**Daulotypus Lea**

(Figs 18, 38, 75, 136, 137, 209, 255, 316, 317, 373, 500–504, 634, 689, 690, 769, 770, 826, 827, 870)


**Diagnosis.** *Daulotypus* appears to be closely related to *Daulis* and *Archipines* by having similar body appearance, the terminal labial palpmere large and flattened dorso-ventrally, the labrum produced laterally into rounded lobes, the trochanterofemoral attachment being oblique, apex of the sternite of the male genital segment visible in a deep excision of the ventrite 6 and the female genitalia with strongly reduced coxites. However the elytra with punctures being coarse and arranged into regular rows separates *Daulotypus* from both genera. Moreover the terminal labial palpmere transverse, the maxillary galea broadly triangular, and the hind wing with medial fleck separate easily *Daulotypus* from *Daulis*. The dorsal vestiture double consisting of suberect setae originating from the punctures and a very long, erect spines placed on small tubercles, the lateral margins of the pronotum being coarsely crenulate, the prosternal process comparatively long, and the mandible with blunt apex, without teeth distinguished *Daulotypus* from *Archipines*.

**Redescription.** Length 2.30–5.50 mm. Body (Fig. 870) long-oval in outline, moderately convex; very shiny; punctures coarse and dense, arranged in regular rows on elytra; covered with two kinds of pubescence – moderately long, suberect hairs growing out of punctures and about two times longer, sparse, erect setae/ spines growing out of minute tubercles, between punctures. Colour light brown to reddish brown, sometimes bicoloured with prothorax, parts of head, antennae and legs black or infuscate.

Head weakly transverse, strongly narrowing from eyes towards clypeus; occiput with transverse, finely ridged stridulatory area. Gular sutures slender, confluent medially at base. Eyes large, weakly oval in outline, strongly prominent, coarsely faceted. Antenna (Fig. 38) about as long as half length of body, with all antennomeres longer than wide; club 3-segmented, rather narrow, long, weakly flattened and loose, with antennomeres 9 and 10 produced inwardly; scape 1 about 1.5 x as long as pedicel and antennomere 3; antennomere 4 slightly shorter than 3 and 5; antennomere 7 longer than 6 and 8; terminal antennomere longest, elongate-oval, somewhat pointed apically. Clypeus flat, almost rectangular, with weakly arcuate apical edge. Labrum (Fig. 75) strongly transverse, with sides produced laterally into rounded lobes; sclerotized with narrow memranous, apical and lateral area; moderately coarsely punctured, covered with rather sparse, moderately long setae and with sparse brushes of long setae on sides of apical margin; apical edge emarginate mediially; tormae elongate, with mesal arms recurved posteriorly; labral rods weakly divergent anteriorly. Mandible (Figs 136, 137) somewhat hemicycloid, rounded apically without teeth; ventral surface moderately concave, dorsum convex with elongate, sinuate ridge medi ally, with long setae near outer edge; mola moderately large, sclerotized, finely ridged; protheca rather narrow and long, membranous, covered with short, dense setae; submola rather small, densely setose, membranous. Maxilla (Fig. 209) with palpmeres 2–4 much longer than wide, gradually distinctly longer; terminal palpmere subcylindrical, weakly, obliquely truncate at apex. Galea large, broadly triangular, moderately densely setose at apex. Lacinia short and narrow, tapering towards its apex, with long, stout apical and mesal setae and two very long spines below them, on dorsal surface. Labium (Fig. 255) with palpi rather close together; palpmere 2 transverse; terminal palpmere very large, transverse, strongly flattened, truncate at apex. Mentum widest near basal third, sparsely setose, weakly concave and reticulate posteriorly. Prementum very short, sparsely and shortly setose; ligula acutely lobed at sides. Prothorax strongly transverse, widest near apical third. Pronotum (Fig. 316) moderately coarsely and densely punctured; narrowly bordered laterally and moderately widely bordered anteriorly; anterior margin with minute, produced anteriorly stridulatory membrane; lateral margins densely sinuate; basal sulcus deep and straight, lateral sulci moderately long, deep, linear and subparallel or scarcely convergent anteriorly;
antior angles weakly produced forwards, blunt or weakly acute; posterior angles weakly acute. Pronotal disc weakly convex with moderately deep impression on each side. Prosternum (Fig. 317) without pits in front of prosternal cavities; provided with two weak, median, elongate ridges; prosternal process narrow, extending to hind margin of procoxae, narrowly bordered laterally, rounded at apex; coxae (Fig. 500) narrowly separated, prominent, circular in outline; their cavities externally open, internally widely closed; trochantin concealed.

Meso- and metathorax. Mesonotum with scutellum rather small, wider than long, angulated near base, widely rounded apically to somewhat truncate. Mesoventrete (Fig. 373) with pair of small and shallow pits near anterior margin; intercoxal process narrow, flat, extending to about half length of coxae and meeting narrow intercoxal process of metaventrete; mesocoae narrowly separated. Mesocoxa circular in outline (Fig. 501), its cavity open outwardly; trochantin partially exposed. Meso-metaventral junction with small internal knob. Elytra much wider at base than prothorax; widest between basal third and half length, blunt apically; convex with lateral margins moderately widely flattened and finely denticulate (except apical part), visible from above almost throughout; densely and coarsely, more or less regularly punctured; epipleuron comparatively broad, narrowing towards apex, incomplete; humeri weakly prominent. Metaventrete (Fig. 373) strongly transverse, weakly convex, with two pairs of postcoxal pits; anterior margin narrowly bordered and weakly raised; discernable long, incomplete. Metacoae transverse, moderately widely separated; femoral lines absent. Metendosternite with comparatively long stalk and widely separated anterior arms and tendons. Hind wing (Fig. 18) with one anal vein and one anal cell; medial fleck moderately large, oval, partially divided.

Legs (Figs 500–504) with trochanterofemoral attachment oblique. Femur rather stout, widest near mid length, about twice as wide as tibia, covered with long and dense setae and at least four of the setae provided with a few additional, obliquely directed, erect setae/spines; tibia long and very densely pubescent, scarcely widening towards tarsus, with outer edge provided with perpendicularly erect, very long, sparse setae; apical spurs absent. Tarsomere 3 about 5–6 times shorter than terminal tarsomere. Claws simple. Empodium indistinct with two long setae. Male hind- and sometimes mid tibiae with weak characters of sexual dimorphism (e.g. incurred along apical half and weakly denticulate).

Abdomen with six freely articulated ventrites (in male ventrite sixth at least partially visible); intercoxal process with anterior margin weakly emarginate. Ventrite 1 in male not much longer than ventrite 2; in female as long as 2.5 following ventrites combined; ventrites 2–4 subequal in length. In female ventrite 6 simple or weakly depressed in middle; in male ventrite 5 widely emarginate apically, ventrite 6 (Fig. 634) strongly incurved medially exposing apex of male genital segment; tergite 8 widely rounded at apex with submembranous, lateral lobes at base. Male genital segment (Figs 689, 690) with sternite large, somewhat truncate at apex; paired apophyses fused apically; dorsal plate undivided.

Aedeagus (Figs 769, 770) moderately long and rather stout, strongly sclerotized. Tegmen moderately large with basal piece encircling penis in about half length; parameres fused; tegminal strut submembranous, long, with rounded capsule at apex. Median lobe straight, enlarged at base and somewhat branching out apically.

Female genitalia (Figs 826, 827). Ovipositor weakly sclerotized with coxites separated and reduced; styli absent. Spermatheca small, weakly or well sclerotized, elongate; accessory gland slightly smaller than spermatheca, membranous; sperm duct stout and short, sometimes with basal part in form of stout, weakly sclerotized pipe-like structure. Bursa copulatrix moderately large, membranous with apical outlet of sperm duct and ventro-apical outlet of common oviduct.


**Distribution.** Australia.

**Dryadites** Frivaldszky


**Dryadites** Frivaldszky, 1883: 128. Type species, by monotypy: *Dryadites borneensis* Frivaldszky, 1883.

**Diagnosis.** The species of *Dryadites* are similar to those of *Beccariola* and *Cymbachus* in having the body short-oval and the prosternal process excised apically with subacute lateral lobes (forked), but can be distinguished from both these genera by having the intercoxal process of metaventrete widely bordered and raised, and the female genitalia with outlet of sperm duct placed near base of bursa and the accessory gland strongly elongate, provided with additional very long process. Moreover the pronotum with well developed, large stridulatory membrane and the presence of basal sulcus can separate *Dryadites* from *Beccariola*, while the mandible with apical tooth at most narrowly chisel-shaped, the abdominal tergite 8 simple and median lobe without apical branches separate it from *Cymbachus*.

**Redescription.** Length 5.0–9.0 mm. Body (Fig. 871) short-oval, rarely elongate-oval; rather highly convex, shiny, glabrous; punctures sparse and fine to moderately dense and coarse, confused, often with a few additional, distinct rows of punctures (sometimes punctures arranged with only minute rows of fine punctures). Colour red, purple, brown or black, sometimes with purplish or violet sheen, elytra with or without contrasting spots.
Head partially retracted in prothorax, weakly transverse. Gular sutures slender, confluent medially at base and shortly produced anteriorly as very slender median line. Eyes moderately large, oval, prominent, and coarsely faceted. Occipital file finely ridged, moderately large, somewhat triangular in shape. Antenna moderately long and rather stout (Fig. 39) with, 3-segmented, moderately wide, flattened club; scape less than 2.0 times longer than pedicel and subequally long in length with antennomere 3; antennomere 3 about 1.5 × longer than antennomere 4; antennomeres 4 scarcely longer than 5; antennomeres 5–7 subequal or 5 may be slightly longer than 6 or 7; antennomere 8 slightly longer than 7. Clypeus transverse, flat, widest at base, slightly convergent from base toward half length, thence parallel; anterior margin straight. Labrum (Fig. 76) sclerotized with membranous apex; anterior margin of both – membranous and sclerotized parts straight; transverse, moderately coarsely punctured, covered rather sparsely with moderately long setae (densely on anterior edge) and with a few long setae on sides; tormae elongate, with mesal arms recurved posteriorly; labral rods slender, widely divergent anteriorly. Mandible (Figs 138, 139) moderately broad, concave ventrally; convex dorsally with high arcuate, dorsal ridge, with large and stout apical tooth and moderately large, blunt subapical tooth; mola large, well-developed, finely ridged; prostheca long and narrow, membranous, covered with dense, comparatively long and rather stiff setae. Maxilla (Fig. 217) stout with terminal palpomere longest (about 2.5 × longer than 3 and at most 1.5 × longer than palpomere 2), tapering, rounded at apex; galea enlarged apically, with apex longitudinally striped near outer edge and finely setose near inner edge; lacinia (Fig. 218) short and very narrow, weakly tapering, fringed with moderately stiff setae on its inner edge without longer spines below them; digitus absent. Labium (Fig. 259) with palpi rather close together; palpomeres 2 and 3 strongly transverse; terminal palpomere subtruncate at apex. Mentum transverse, widest in middle length; covered with fine, reticulate microsculpture and sparse, short setae. Prementum very short, moderately sclerotized; ligula with moderately large, lateral lobes.

Prothorax strongly transverse, widest at base, subparallel to about half length thence rounded toward anterior angles. Pronotum (Fig. 318) moderately widely bordered laterally and narrowly bordered anteriorly; anterior edge with conspicuous striululatory membrane; posterior margin bisinuate; basal sulcus deep, lateral sulci moderately long, linear, weakly divergent anteriorly or parallel; anterior angles produced and acute; hind angles right-angled or weakly acute; pronotal disc moderately convex. Prosternum without pits; prosternal process (Fig. 319) short and moderately wide, more or less excised apically (to receive anterior part of pentagonal mesosternum) to almost truncate, not produced beyond coxae; front coxae prominent, circular in outline (Fig. 508), their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum small, somewhat heart-shaped, sparsely punctured. Mesoventrite (Fig. 375) carinate, with pair of pits near anterior margin; intercoxal process extending to about half length of coxae, transverse, pentagonal with a pair of oblique ridges convergent to front angle, almost flat posteriorly. Mesocoxa circular in outline (Fig. 507), its cavity outwardly open; trochantin exposed. Meso- metaventral junction with internal knobs. Elytra very convex, widest near middle length, with sides rounded, blunt at apices with punctures rather fine and moderately dense most often with a few additional rows of punctures or elytra almost impunctate (with only minute rows of fine punctures); humeri weakly prominent; epipleuron wide, narrowing towards apex, almost complete or complete. Metaventrite (Fig. 375) large, strongly transverse; most often widely bordered and elevated between middle coxae, comparatively convex, weakly narrowing anteriorly, provided with three pairs of postcoxal pits; discrern long, almost complete. Metacoxae transverse, widely separated; femoral lines absent. Metendosternite with short stalk and widely separated anterior arms and tendons. Hind wing with two anal veins and one anal cell; medial fleck moderately large, rectangularly-oval, divided.

Legs (Figs 505–510) moderately long and rather stout with trochanterofemoral attachment heteromeroid. Femur widest near half length, slender at base, hardly setose; tibia and tarsus rather densely setose; tibia widening towards tarsus, without apical spurs. Tarsi with terminal tarsomere stout and about nine times longer than tarsomere 3. Claws simple, hollowed along inner edge, empodium absent (Fig. 510).

Abdomen with five freely articulated ventrites. Ventricle 1 at least as long as 3 following ventrites combined with intercoxal process comparatively wide, weakly emarginate medially; ventrites 2–4 gradually, slightly shorter. Ventricle 5 in male widely rounded apically, in female somewhat triangular. Male abdominal segment 8 (Fig. 653) with sternite very narrow, emarginate medially at apex, and tergite moderately sclerotized with small, lateral, membranous lobes at base. Male genital segment with additional, internal, paired, slender sclerites, connected medially by membrane; apical edge of sternite emarginate on sides and paired apophyses fused just at apex; dorsal plate divided in two separated, lateral parts (Figs 695, 696).

Aedeagus (Figs 771, 772) stout, moderately long, well sclerotized, curved. Penis weakly pointed apically, without distinct branches. Tegmen placed basally, ring-shaped with parameres fused and tegminral strut short, but distinct.

Female genitalia (Fig. 828). Ovipositor sclerotized, fused with abdominal sterno 8; coxites entirely fused.
with emarginate apex; styli absent or large. Spermatheca large, membranous, internally somewhat sclerotized, almost round with long and wide connection with sperm duct; accessory gland membranous, very long with additional apical, narrow projection; sperm duct moderately long and slender. Bursa copulatrix with large or moderately large, paired, sclerotized, internal plates; with outlet of sperm duct dorsally at about mid length of bursa; outlet of common oviduct at apex.

**Species examined.** *D. borneensis* Frivaldszky, *D. concolor* (Arrow), *D. purpureus* Arrow, *D. violaceus* Tomaszewska – 4 of 8 known species.

**Distribution.** Oriental Region.

**Encymon** Gerstaecker

(Figs. 40, 78, 140, 141, 210, 211, 262, 320, 321, 376, 511–516, 647, 697, 698, 773, 774, 829, 872, 873)


*Crotonephorus* Blackburn, 1895: 232. Type species, by monotypy: *Myella clavicornis* Blackburn, 1890 (= *Eumorphus immaculatus* Montruzier, 1855).

**Diagnosis.** This genus is very distinctive among Lycoperdininae by having the pronotum subquadrate with undulate sides, much narrower than base of the elytra, and the elytra strongly convex and very distinctly coloured (green, blue-green, dark blue or black with prothorax red or black and femora black or bicoloured). Among the genera of the Lycoperdininae, *Encymon* is most similar to *Avencymon* in having the labium with the terminal palpomere strongly transverse, the prosternal process narrow and not extending beyond front coxae, and the intercoxal process of mesoventrite elongate, and comparatively narrow between coxae. *Encymon* however, can easily be separated from *Avencymon* by having the body differently shaped and coloured, the antennal club wider and more flattened, and the mandible with apex produced, acute and bifid.

**Redescription.** Length 7.0–10.5 mm. Body (Figs 872, 873) long-oval, convex to strongly convex, shiny or pronotum sometimes opaque, glabrous; punctuation sparse and fine to moderately dense and coarse, confused. Colour may be green, blue-green, dark blue or black with prothorax red or black and femora black or bicoloured; elytra rarely with contrasting spots.

Head partially retracted in prothorax, weakly transverse. Gular sutures confluent medially at base and extending anteriorly as almost complete median line (median line sometimes absent). Eyes large, oval, very prominent, coarsely faceted. Occipital file large, oval, finely ridged. Antenna long and slender (Fig. 40) with 3-segmented, moderately narrow, flattened club; scape almost 3.0 × as long as pedicel; antennomere 3 almost 4.0 × longer than pedicel and 2.0 × longer than antennomere 4; antennomeres 4–5 subequal in length; antennomeres 6–8 slightly shorter than preceding antennomeres, subequal in length (or antennomere 8 slightly shorter than 6 or 7); antennomeres 9 and 10 with anterior, inner angles somewhat produced internally. Clypeus transverse, flat, widest at base, slightly convergent from base toward basal third, thence parallel; anterior margin weakly pointed in mid length. Labrum (Fig. 78) sclerotized with membranous apex; anterior margin of both – membranous and sclerotized parts emarginate; transverse, moderately coarsely punctured, covered with long setae, and with a few very long setae on sides; tormae elongate, with mesal arms recurved posteriorly; labral rods slender, widely divergent anteriorly. Mandible (Figs 140, 141) broad, concave ventrally, convex dorsally with apex produced, acute and bifid; mola large, finely ridged; prostheca long and narrow, membranous, covered with fine short setae and a few long setae at apex; submola small, setose, membranous. Maxilla (Fig. 210) with terminal palpomere subequal in length with palpomere 2 and about 1.5 × longer than 3, cylindrical, blunt or weakly truncate at apex; galea broadly triangular, densely covered with short setae; lacinia (Fig. 211) short and narrow, tapering, fringed with moderately stiff setae on its inner edge, with row of spinulae on dorsal surface and one long spine below them; digitus absent. Labium (Fig. 262) with palpi close together; palpomere 2 very short, strongly transverse; terminal palpomere large, transverse (at least 3 × wider than long), truncate at apex. Mentum transverse, with short, lateral lobes and arcuate, weakly raised margin in middle; covered sparsely with moderately long setae. Prementum short, moderately sclerotized; ligula with rather small, lateral lobes.

Prothorax transverse with sides undulate, widest at about apical third and decidedly contracted behind. Pronotum (Fig. 320) narrowly bordered laterally and anteriorly; anterior edge with conspicuous stridulatory membrane; posterior margin almost straight; basal sulcus deep, lateral sulci long, weakly arcuate; anterior angles strongly produced, subacute or blunt; hind angles right-angled; pronotal disc weakly convex. Prosternum without pits; prosternal process (Fig. 321) narrow, subparallel, rounded apically; separating front coxae, not extending beyond them; front coxae prominent, circular in outline (Fig. 511), their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum small, widely triangular, with rounded apex, densely punctured. Mesoscutum (Fig. 376) with one or sometimes two pairs of pits near anterior margin, carinate; intercoxal process narrow and longer than wide, with arcuate ridge anteriorly, weakly concave medially; comparatively narrowly separating mesocoxae; extending to about half of their length. Mesocoxa circular in outline, its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knob. Elytra
very convex, widest near mid length, with sides rounded, blunt at apices with punctures moderately coarse and dense; humeri moderately prominent; epipleuron rather wide, incomplete at apex. Metaventrite (Fig. 376) large, moderately widely bordered and elevated between middle coxae, strongly transverse, comparatively convex on both sides of discrern, narrowing anteriorly, provided with three pairs of postcoxal pits; discrern long, almost complete or complete. Metacoxae transverse, widely separated; femoral lines absent. Metendosternite with short stalk and widely separated anterior arms and tendons. Hind wing with one anal vein and one anal cell; medial fleck moderately large, rectangularly-oval, divided.

Legs (Figs 511–516) long and slender. Trochantero-femoral attachment heteromoroid. Femur long, strongly clavate, very slender at base, hardly setose; dorsal and ventral surfaces of fore femur and ventral surfaces of mid femur bear rows of obliquely directed short spines; tibia and tarsus densely setose especially at apical half. Terminal tarsomere very long, about nine times longer than tarsomere 3. Claws simple, hollowed along inner edge; empodium distinct, bisetose (Figs 516). In males sexual characters may be found in all tibiae (minute tooth, fine denticulation and curvature – Figs 512, 513, 514); all trochanters may bear more or less distinct tubercles (Fig. 511).

Abdomen with anterior margin of intercoxal process weakly emarginate medially; with five freely articulated ventrites. Ventrite 1 as long as about 2.5 following ventrites combined; ventrites 2–4 subequal in length; ventrite 5 may be modified apically in both sexes. Male abdominal segment 8 (Fig. 647) with sternite very narrow, with sinuate apical margin and additional emargination medially, tergite moderately sclerotized with large, lateral, membranous lobes at base. Male genital segment (Figs 697, 698) with sternite emarginate apically and paired apophyses fused along at least ⅔ of their length; dorsal plate undivided.

Aedeagus (Figs 773, 774) stout, moderately long, strongly sclerotized, weakly curved. Median lobe with long, more or less curved apical branch. Tegmen placed basally, ring-shaped with parameres fused and tegminal strut vestigial.

Female genitalia (Fig. 829) fused with abdominal segment 8 – tergite 8 moderately sclerotized, sternite 8 often in form of two lateral sclerotized plates connected medially by membrane and fused with coxites. Ovipositor moderately sclerotized; coxites entirely fused; styli absent. Spermatheca small, irregularly oval, membranous; accessory gland very small, elongate, membranous; sperm duct moderately long and slender. Bursa copulatrix large, partially sclerotized with apical outlets of sperm duct and common oviduct.

**Species examined.** *E. gorhami* Csiki, *E. immaculatus* (Montrzier), *E. regalis atripes* Csiki, *E. schwarzbaueri* Mader, *E. violaceus* *G*erstaecker – 5 of 19 known species.

**Distribution.** Widely distributed in Oriental and Australian Regions.

**Eumorphus Weber**

(Figs 41, 80, 142, 143, 212, 264, 322, 323, 377, 517–521, 648, 699, 700, 775, 776, 830, 874–877)


*Eumorphoides* Guérin, 1858: 12. Type species, by present designation: *Eumorphus tetrapilatus* Hope, 1832: 787.


*Haplomorphus* Guérin, 1858: 18. Type species, by present designation: *Eumorphus bipunctatus* Perty, 1831: 42.


**Diagnosis.** The species of this genus are most similar to those of *Platindalmus* and *Gerstaeckerus*. The lateral margin of the pronotum with tendency to form irregularly broken lines, inconstant and often asymmetrical, distinguishes *Eumorphus* from both genera. Moreover the mandible at most narrowly chisel-shaped at apex, the elytra with basal margin simple, the intercoxal process of mesoventrite with lateral margins subparallel, can easily separate *Eumorphus* from *Gerstaeckerus*, while the male femora lacking fringes of long hairs on inner edges distinguish it from *Platindalmus*.

**Redescription.** Length 7.0–20.0 mm. Body (Figs 874–877) elongate, moderately convex, shiny, glabrous; densely and moderately coarsely, confusedly punctured. Colour black or sometimes blackish-brown or brown, almost always with four yellow spots on elytra.

Head partially retracted in prothorax, as long as wide, distinctly concave between eyes. Eyes moderately large, transversely oval in outline, prominent, moderately coarsely faceted. Occipital file large, finely ridged. Gular sutures fused medially at base and extending anteriorly as long, sometimes complete median line. Antenna long (about as long as half length of body) and comparatively slender (Fig. 41) with 3-segmented, very flat and comparatively wide club; scape at least 2× as long as pedicel; antennomere 3 strongly elongate, about 3× as long as pedicel and at least twice as long as antennomere 4; antennomeres 4–8 gradually slightly shorter. Clypeus transverse, flat, widest at base, slightly convergent basally, thence parallel. Labrum (Fig. 80) sclerotized with membranous apex; strongly transverse, moderately coarsely punctured, covered with short and long setae, and with tufts of long setae on sides; anterior edge of membranous part weakly sinuate and sclerotized part with anterior edge straight; tormae elongate, with mesal arcs recurved posteriorly; labral rods slender but long, widely divergent anteriorly. Mandible (Figs 142, 143) with a few minute teeth or one strong, pointed api-
cal tooth; mola large, finely ridged; prostheca rather narrow, membranous, finely setose. Maxilla (Fig. 212) with terminal palpmere elongate (about 1.5 × as long as palpmere 3), cylindrical or weakly tapering towards apex, blunt apically; galea large, broadly triangular, densely setose; lacinia moderately short and narrow, tapering, fringed with stiff setae on its inner edge, a row of slender spinulae on dorsal surface and two long spines below them; digitus absent. Labium (Fig. 264) with palpi close together; palpmere 2 strongly transverse; terminal palpmere transversely rectangular, blunt or truncate. Mentum transverse, widest in middle of its length with arcuate anterior edge, sometimes with raised, curved ridge transversely; covered with rather long, sparse setae. Prementum extremely short, moderately scleritized with ligula produced into short, lateral lobes.

Prothorax transverse, widest at base or at apical third. Pronotum (Fig. 322) narrowly bordered laterally and anteriorly; anterior edge with conspicuous striulvidra membrane; basal sulcus deep, lateral sulci linear, subparallel, moderately deep and long; anterior and posterior angles generally produced — anterior blunt, posterior acute; lateral margin sinuate with tendency to form irregularly broken lines, inconsistent and often asymmetrical; pronotal disc slightly convex. Prosternum without pits in front of procoxal cavities; prosternal process (Fig. 323) rather narrow, weakly concave at apex, extending shortly beyond front coxae and separating them distinctly; front coxae prominent, circular in outline; their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum rather small, distinctly transverse, sparsely punctured basally, somewhat heart-shaped with weak narrowing near base or widely rounded apically. Mesoventrite (Fig. 377) with a pair of distinct, rather deep pits near anterior margin and with transverse, declivit area in front of each coxa; intercoxal process pentagonal, longer than wide, angulate anteriorly and sinuate posteriorly, with median ridge along basal half and raised sides; comparatively widely separating mesocoxae, extending slightly beyond half of their length. Mesocoxa circular in outline (Fig. 517), its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knobs. Elytra widest near mid length, convex with punctures dense, moderately coarse and irregular; in female generally more elongate at apex; humeri prominent; lateral margins visible throughout, in some species wide and flattened (then males have those margins wider than female); in male of some species elytra conically elevated; blunt or acute at apices; epipleuron narrow or wide, complete or almost so. Metaventrite (Fig. 377) large, transverse, weakly convex, scarcely narrowing towards its anterior margin; intercoxal process moderately widely bordered and moderately raised; provided with three pairs of postcoxal pits, in males sometimes also with small tubercles on sides of discrmen, in mid length; discrmen almost complete. Metacoxae transverse, widely separated. Metendosternite with rather short stalk and widely separated anterior arms and tendons. Hind wing with two anal vein and two anal cells; medial fiekd moderately large, almost rectangular, divided.

Legs (Figs 517–521) long and comparatively slender; trochanterofemoral attachment heteromorbid. Femur widest near half length or sometimes clavate, hardly setose but dorsal and ventral surfaces of fore femur and ventral surface of mid femur bear rows of obliquely directed short spines; tibia and tarsus rather densely setose, especially along apical half; tibia weakly widening towards tarsus; tarsi with terminal tarsomere very long, 8–10 times longer than tarsomere 3, sometimes finely denticulate at basal third. Claws simple, hollowed along inner edge (Fig. 520); empodium with two short setae. Male trochanter with small tubercles and male tibiae with very distinctly marked sexual characters — protibia almost always with long tooth on inner edge and some additional denticulation along apical third, mesotibia often curved with small tooth, also with additional denticulation, metatibia straight or curved often with prolonged apex.

Abdomen with anterior margin of intercoxal process at least weakly emarginate; with five freely articulated ventrites. Ventritle 1 almost as long as three following ventrites combined; ventrites 2–4 subequal in length. Ventritle 5 may be modified at apex in both sexes. Male abdominal segment 8 (Fig. 648) with sternite very narrow and deeply emarginate medially at apex; tergite somewhat triangular with large, membranous lobes at base. Male genital segment with sternite weakly emarginate apically and paired apophyses fused along ⅓ of their length; dorsal plate undivided (Figs 699, 700).

Aedeagus (Figs 775, 776) stout, moderately long, heavily sclerotized, very weakly curved. Median lobe branched out at apex. Tegmen placed basally, ring-shaped with parameres fused and tegminal strut vestigial.

Female genitalia (Fig. 830) fused with abdominal segment 8 and compactly connected with segment 7. Ovipositor sclerotized, with coxites entirely fused; sternite 8 divided in two lateral, sclerotized plates sometimes connected by membrane and fused with coxites; styli present, very small, terminal. Spermatheca very small, rounded, membranous; sperm duct short, slender; accessory gland minute, elongate, membranous. Bursa copulatrix moderately large with apical outlet of common oviduct and latero-apical outlet of sperm duct.

Species examined. E. assamensis subguttatus Gerstaecker, E. bipunctatus Perty, E. dilatatus Perty, E. marginatus (Fabricius), E. quadriguttatus* (Illiger), E. sybarita Gerstaecker, E. tetraspirotus Hope, E. westwoodi (Guérin) – 8 of 53 known species.

Distribution. Oriental Region.
Gerstaeckerus nomen novum
(Figs 42, 79, 144, 145, 213, 214, 263, 324, 325, 378, 522–527, 649, 701, 702, 777, 778, 831, 878)


Diagnosis. Gerstaeckerus resembles Ohtaius, Brachytrycherus and Eumorphus in general body appearance. The maxillary labium without tuft of S-like setae at apex and provided with short spinulae and two long spines on dorsal surface separate Gerstaeckerus from Brachytrycherus and Ohtaius. Additionally the body more elongate, the head lacking well developed, separated gular sutures, and the intercoxal process of mesoventrite widening apically and covering part of coxae, separate it from Brachytrycherus, while the femora without fringe of long hairs on inner surface can distinguish it from Ohtaius. The mandible with widely chisel-shaped apex, the elytra with basal margin thickened and raised, the differently shaped intercoxal process of mesoventrite, and more raised anterior margin of intercoxal process of metaventrite easily distinguish Gerstaeckerus from Eumorphus.

Redescription. Length 8.0–12.0 mm. Body (Fig. 878) elongate, strongly convex, shiny, and glabrous; moderately densely and coarsely, confusedly punctured. Colour black with pale spots on elytra.

Head partially retracted in prothorax, weakly transverse. Eyes rather large, transversely oval in outline, prominent, coarsely faceted. Occipital file elongate, large, finely ridged. Gular sutures fused medially at base and extending anteriorly as slender but sometimes long median line, reaching almost submentum. Antenna rather stout (Fig. 42) with 3-segmented, flat and moderately wide club; scape about 1.5 x as long as pedicel; antennomere 3 slightly more than twice as long as pedicel and 1.5 x as long as antennomere 4; antennomeres 4–5 and 6–8 equal in length (4 and 5 scarcely longer than 6, 7 or 8). Clypeus transverse, flat, widest at base, slightly convergent basally, thence parallel toward apex. Labrum (Fig. 79) sclerotized with submembranous apex; strongly transverse, coarsely punctured, covered with long setae and with tufts of long setae on sides; anterior edge of membranous part simple (scarcely rounded) and sclerotized part with anterior edge weakly emarginate; tormae elongate, with mesal arms recurved posteriorly; labral rods absent. Mandible (Figs 144, 145) with chisel-shaped apical tooth and large subapical tooth; mola large, well-developed, finely ridged; protheca rather narrow, membranous, covered with moderately dense and fine setae; submola small, densely setose, membranous. Maxilla (Fig. 213) with terminal palpomere about 1.5 x as long as palpomere 3, subcylindrical, truncate apically; galea large, broadly triangular, moderately densely setose; labinaria (Fig. 214) moderately long, rather slender, tapering, fringed with stiff setae on apex and its inner edge and a row of spines on ventral surface, and two longest spines below them. Labium (Fig. 263) with palpi close together; palpomere 2 strongly transverse; terminal palpomere large, strongly transverse, truncate. Mentum transverse, widest near posterior third with raised, curved ridge transversely; covered with moderately long, sparse setae variably directed. Prementum short, moderately sclerotized with ligula emarginate at apex, produced into large, lateral lobes.

Prothorax transverse, widest at base or at apical third. Pronotum (Fig. 324) rather narrowly bordered laterally and anteriorly; anterior edge with conspicuous striulatory membrane; basal sulcus deep, weakly sinuate, lateral sulci linear, subparallel, moderately deep and long; anterior angles moderately produced, blunt or subacute, posterior angles almost right-angled; lateral margin bisinuate; pronotal disc slightly convex. Prosternum without pits in front of procoxal cavities; prosternal process (Fig. 325) narrow to moderately wide, with apex weakly bident to feebly bituberculate, extending shortly beyond front coxae; coxae prominent, circular in outline (Fig. 522); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum rather small, distinctly transverse, sparsely punctured, somewhat heart-shaped with weakly pointed apex or widely rounded apically and angulate near base. Mesoventrite (Fig. 378) with a pair of distinct pits near anterior margin; intercoxal process subquadrate or weakly transverse, somewhat arcuately bordered anteriorly and sinuate posteriorly, flat with weakly concave area near anterior margin; widely separating mesocoxae, extending to about half of their length, widening apically and covering part of coxae. Mesocoxa circular in outline (Fig. 525), its cavity outwardly open; trochanter exposed. Meso-metaventral junction with internal knobs. Elytra with anterior edge thickened and raised; widest near mid length, convex with punctures moderately dense, moderately coarse and irregular; humeri comparatively prominent; lateral margins moderately widely flattened and visible from beyond humeri to almost apex; blunt at apices; epipleuron moderately wide, complete or almost so. Metaventrite (Fig. 378) large, transverse, weakly convex on sides of discrmen, scarcely narrowing anteriorly; anterior margin rather widely bordered especially between mesocoxae and raised; provided with three pairs of postcoxal pits; discrmen long but incomplete. Metacoxae transverse, widely separated. Metendosternite with rather short stalk and widely separated anterior arms and tendons. Hind wing with one anal vein and two anal cells; medial fleck moderately large, almost rectangular, divided.

Legs (Figs 522–527) long and comparatively slender; trochanterofemoral attachment subheteromeroead.
Femur somewhat club-shaped, widest near apical third, hardly setose but ventral surfaces of fore and mid femur bear rows of obliquely directed short spines; tibia weakly widening towards tarsus; terminal tarsomere very long, about 11 times longer than tarsomere 3, sometimes finely denticulate along basal third, on outer edge. Claws simple, hollowed along inner edge; empodium with two short setae. Male fore trochanter sometimes with small tubercle; male fore tibiae with stout, sharp tooth near mid length (Fig. 523), mesotibia curved and may have internal, small tooth; metatibia simple.

Abdomen with anterior margin of intercoxal process straight; five freely articulated ventrites. Ventrite 1 almost as long as three following ventrites combined; ventrites 2–4 subequal in length. Ventrite 5 may be modified apically in both sexes. Male abdominal segment 8 (Fig. 649) with sternite very narrow and emarginate medially at apex; tergite truncate or widely rounded apically with large, membranous, basal plate, lobed at sides. Male genital segment (Figs 701, 702) with sternite emarginate apically and paired apophyses fused along about half of their length; dorsal plate undivided; additional, internal V-shaped sclerite present.

Aedeagus (Figs 777, 778) rather short and stout, heavily sclerotized, without basal curvature. Median lobe branched out at apex. Tegmen placed basally, ring-shaped with parameres fused and tegminial strut vestigial.

Female genitalia (Fig. 831) fused with abdominal segment 8. Ovipositor moderately sclerotized, with coxites entirely fused; sternite 8 divided into two lateral, sclerotized plates connected medially by membrane and fused with coxites; styli present, very small, terminal. Spermatheca very small, oval, membranous; sperm duct moderately long, slender; accessory gland minute, rounded, membranous. Bursa copulatrix rather small with dorso-apical outlet of sperm duct and lateral outlet of common oviduct.

**Species examined.** *G. gratus* (Gorham), *G. kugi* (Gerstaecker), *G. sexguttatus* *s.* (Gerstaecker), *G. similis* (Arrow), *G. tetrasphaera* (Arrow) – 5 of 19 known species.

**Distribution.** Widely distributed in the Oriental Region.

**Haploscelis** Blanchard

(Figs 43, 81, 146, 147, 215, 216, 265, 326, 327, 379, 528–534, 651, 703, 704, 779, 770, 832, 879)

**Haploscelis** Blanchard, 1845: 312. Type species, by monotypy: *Eumeces atratus* Klug, 1832.


**Hybopetra** Fairmaire, 1883: 365. Type species, by monotypy: *Hybopetra plagicollis* Fairmaire, 1883.

**Diagnosis.** *Haploscelis* is very distinctive among the Lycoperdiniae. The body comparatively large, almost always deeply black, covered with coarse reticulate microsculpture, with punctures extremely fine or absent, and dorsal surface of apical part of fore femur deeply excised, separate easily *Haploscelis* from all other genera of Lycoperdiniae. Among them, the body comparatively convex, with extremely fine punctures, but coarsely reticulate, and the elytra lacking contrasting markings are similar as in *Cynomes*.

**Redescription.** Length 8.0–13.0 mm. Body (Fig. 879) elongate-oval, convex, shiny with pronotum sometimes opaque, glabrous; very finely and sparsely punctured, covered with dense, reticulate microsculpture. Colour almost always black.

Head partially retracted in prothorax, as long as wide, with weak median concavity between eyes. Gular sutures poorly marked, fused medially at base; median line slender but sometimes long, reaching submentum. Eyes moderately large, transversely oval, prominent, and moderately coarsely faceted. Occipital file, moderately large, long-oval, finely or comparably coarsely ridged. Antenna at least as long as third of body length (sometimes longer than half length of body), slender (Fig. 43) with 3-segmented, narrow or moderately wide, flattened, loose club; scape about 2.0 times as long as pedicel and slightly shorter than antennomere 3; antennomere 3 about 1.5 × longer than 4 or 5; antennomeres 6–7 subequal in length and slightly shorter than preceding ones; antennomere 8 distinctly shorter 7; terminal antennomere transverse with truncate or irregular apical edge. Clypeus transverse, flat, widest at base, strongly convergent from base toward basal third, thence parallel or even weakly divergent toward apex, with arcuate apical edge. Labrum (Fig. 81) sclerotized with membranous apex; anterior margin of both parts emarginate; strongly transverse, coarsely punctured, covered with long setae and with tufts of long setae on sides; termac elongate, with mesal arms recurved posteriorly; labral rods absent; basal margin with median raised ridge, triangularly produced anteriorly. Mandible (Figs 146, 147) moderately broad, concave ventrally, convex dorsally with strong, chisel-shaped apical tooth and large, blunt subapical tooth; mola moderately large, finely ridged; prostheca long and rather narrow, membranous, densely covered with short setae; submola small, setose, membranous. Maxilla (Fig. 215) with terminal palpomere longest (about 1.5 × longer than palpmemeres 3 or 2), subcylindrical, truncate at apex; galea broadly triangular, moderately densely setose; lacinia (Fig. 216) short and narrow, weakly tapering, fringed with comb of stiff setae on apex and inner edge, with row of moderately long spines and two very long spines on dorsal surface; digitus absent. Labium (Fig. 265) with palp close together; palpmere 2 short, strongly transverse; terminal palpomere transversely rectangular, blunt at apex. Mentum transverse, with short, lateral lobes near posterior third and arcuate, weakly raised ridge transversely; sparsely setose and coarsely reticulate. Prementum very short, moderately sclerotized; ligula in form of large, lateral lobes.
Prothorax strongly transverse, widest at base. Pronotum (Fig 326) moderately widely bordered laterally and anteriorly, anterior edge with conspicuous striulatory membrane, posterior margin weakly trissinate, basal sulcus deep, lateral sulci short, linear and subparallel, anterior angles produced, blunt or subacute, hind angles right-angled or weakly acute, lateral edges weakly sinuate with more or less distinct narrowing near basal third, pronotal disc convex. Prosternum with a pair of small pits in front of procoxal cavities, prosternal process (Fig.327) rather narrowly separating front coxae, not extending to their posterior margin, truncate or weakly emarginate at apex, coxae prominent, circular in outline (Fig.528), their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax Mesonotum sclerotized with scutellum rather small, transverse, somewhat heart-shaped, with weakly acute apex. Mesoventrite (Fig.379) with a pair of pits near anterior margin, carinate, with transverse, declivent area in front of each coxa, intercoxal process weakly transverse or subquadrate, pentagonal, with weakly raised borders and median part convex, widely separating mesocoxae, extending slightly beyond half of their length. Mesocoxa circular in outline (Fig.531), its cavity outwardly open, trochantin exposed. Meso-metaventral junction with internal knobs. Elytra widest near middle length, elongate oval, convex, blunt, acute or excised at apices, sometimes with sexual dimorphic features on apex (e.g. apex of each elytron produced into blunt lobe) or disc (elongate, widely flattened and laterally prominent area on each elytron), punctures very fine and sparse, humeral plates weakly prominent, epipleuron moderately wide, complete or almost so. Metaventrite (Fig.379) large, strongly transverse, weakly convex on sides of discernment and weakly concave along it, scarcely narrowing towards its anterior margin which is moderately widely bordered and rather weakly raised, provided with three pairs of postcoxal pits, discernment long but incomplete. Metacoxae transverse, widely separated, femoral lines absent. Metendosternite with rather short stalk and widely separated anterior arms and tendons. Hind wing one anal vein and one anal cell, Mp-CuA cross vein vestigial, medial bridge present, medial fleck moderately large, oval, undivided, radial cell reduced.

Legs (Figs 528–534) with trochantero-femoral attachment subheteromeroid. Femur long and somewhat clavate, slender at base, hardly setose, ventral surfaces of fore and mid femur provided with rows of obliquely directed short spines (sometimes only a few spines present), dorsal surface of apical part of fore femur deeply excised (Fig.529). Terminal tarsomere about ten times longer than tarsomere 3. Claws simple, empodium moderately large, bisetose. In males sexual characters may be found in fore and mid trochanters (Figs 528, 529) and all tibiae (Figs 530, 532).

Abdomen with anterior margin of intercoxal process truncate or emarginate medially, with moderately wide, raised margins beyond coxae, provided with one or two pairs of postcoxal pits, with five freely articulated ventrites. Ventrite 1 at least as long as three following ventrites combined, ventrites 2 slightly longer than 3 or 4. Ventrite 5 may be modified in both sexes, often truncate at apex. Male abdominal segment 8 (Fig.651) compactly connected with genital segment, sternite narrow, divided in two lateral, sclerotized parts connected medially by very narrow membranous belt, tergite widely truncate apically with sinuate edge, and with large, lateral, submembranous plates at base. Male genital segment with sternite moderately large, emarginate at apex, paired apophyses fused along 1/2 of their length, dorsal plate undivided (Figs 703, 704).

Aedeagus (Figs 779, 780) long, moderately stout, strongly sclerotized, weakly curved Median lobe branching out apically. Tegmen comparatively large, placed basally, ring-shaped with parameres fused and tegminal strut very short, but distinct.

Female genitalia (Fig.832) fused with segment 8 – tergite 8 sclerotized, sternite 8 membranous or formed by two lateral, sclerotized plates connected by membranous, median part, fused with coxites. Ovipositor well sclerotized, coxites sometimes asymmetrical, fused at least at base, stylie absent. Spermatheca small, rounded, membranous, accessory gland minute, elongate oval, membranous, sperm duct long and slender. Bursa copulatrix sometimes sclerotized, moderately large with dorso-lateral outlet of common oviduct (near mid length of bursa) and dorso-apical outlet of sperm duct.

Species examined. H. atratus* (Klug), H. columbinus (Gerstaecker), H. oblongulus (Fairmaire), Haploscelis sp. – 4 of 21 known species.

Distribution. Madagascar.

Hylaia Guerin
(Figs 44, 82, 148, 149, 219, 220, 266, 328, 329, 380, 541–545, 650, 705, 706, 781, 782, 833, 880)

Hylaia Guerin, 1857a. 273 Type species, by monotypy, Lycoperdina rubrocellis Germar, 1843b
Ceramis Gerstaecker, 1858. 220 Unnecessary replacement name for Hylaia Guerin, 1857a

Diagnosis. The species of Hylaia resembles those of Lycoperdina in having similar body appearance, the head with well developed gular sutures, the prosternal process strongly reduced with procoxal contiguous and the mesosternal process narrow, with elongate median ridge. The antennal club distinctly 3-segmented, with male antennomere 9 distinctly larger than 10 and the ovipositor with apex of proctiger simple can however separate Hylaia from Lycoperdina.
Redescription. Length 2.8–3.2 mm. Body (Fig. 880) elongate-oval, moderately convex; shiny, covered with rather dense, moderately long pubescence; confusedly punctured with additional very fine reticulate microsculpture. Colour yellowish-brown to reddish-brown with black maculae on the elytra, sometimes whole elytra black; pronotum sometimes bicoloured.

Head almost circular in outline. Postoccipital suture very distinct. Gular sutures well developed, moderately long, widely separated, weakly convergent anteriorly. Eyes moderately large, weakly oval in outline, prominent, coarsely faceted. Occipital file moderately large, elongate, somewhat trapezoidal in shape. Antenna (Fig. 44) slightly shorter than a half of body length, with 3-segmented narrow, loose club; scape almost twice as long as pedicel; antennomere 3 scarcely longer than pedicel and about 1.5 x as long as antennomere 4; antennomeres 4–8 short, at least weakly transverse; in male antennomere 9 distinctly larger than 10; terminal antennomere about as long as wide, weakly rounded apically. Clypeus transverse, flat, narrowing from base towards basal third, thence parallel, with simple apex. Labrum (Fig. 82) strongly transverse, sclerotized with submembranous apex; apical edge of sclerotized part truncate and of membranous part strongly emarginate medially; shortly setose with a few long setae on sides of anterior, sclerotized margin; tormae elongate, with mesal arms recurved posteriorly; labral rods moderately long, divergent anteriorly. Mandible (Figs 148, 149) moderately broad, strongly concave ventrally, convex dorsally with sharp, elongate ridge laterally; with acute apical tooth and small, blunt subapical tooth; mola moderately large, transversely ridged; prostheca narrow, finely setose; submola small, setose, membranous. Maxilla (Fig. 219) with terminal palpmere about 3 x longer than palpmere 3, subcylindrical, weakly tapering from mid length towards apex; blunt apically. Galea elongate, weakly enlarged toward apex, moderately densely setose. Lacinia (Fig. 220) comparatively long and narrow, weakly tapering and obliquely truncate at apex; fringed with comb of rather stiff setae on inner edge, with row of stout spines on dorsal surface and two longest spines below them; digitus absent. Labium (Fig. 266) with palpi moderately close together; palpmere 2 transverse; palpmere longer than wide, subcylindrical, truncate at apex. Mentum transverse, widest near posterior third with produced forwards anterior angles, punctured, and covered with moderately dense, long setae. Prementum transverse, sclerotized, densely setose anteriorly; ligula expanded laterally and produced into short lobes, truncate or weakly rounded apically.

Prothorax transverse, widest near apical third or at base. Pronotum (Fig. 328) most often with finely denticulate lateral edges; moderately coarsely and rather densely punctured; narrowly to moderately widely bordered laterally; anterior margin with conspicuous stridulatory membrane; basal sulcus deep, lateral sulci somewhat triangular, deep, moderately long and subparallel; anterior angles weakly to distinctly produced, rounded; posterior angles right-angled or weakly acute; pronotal disc convex. Prosternum (Fig. 329) with pair of deep pits in front of procoxal cavities; prosternal process very narrow and short; front coxae prominent and contiguous. Procoxa circular in outline (Fig. 541); its cavity externally open, and widely closed internally; trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum strongly transverse, widely rounded apically; weakly angulate near base. Mesoventrite (Fig. 380) with pair of pits near anterior margin; intercoxal process rather narrow with moderately raised, elongate, median ridge, ending before apex; narrowly separates mesocoxa, reaching about middle of their length. Mesocoxa circular in outline, its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knob. Elytron elongate, convex, widest near basal third, thence tapering towards apex; blunt or rounded at apices; comparatively coarsely and moderately densely punctured; epipleuron narrow and short (extending only along basal third); lateral margin very narrowly flattened sometimes invisible from above. Metaventrite (Fig. 380) short, strongly transverse, comparatively convex, narrowing towards its anterior margin which is moderately widely bordered and weakly raised; provided with two pairs of postcoxal pits; discren extending along basal third or along half length of metaventrite. Metacoxae weakly transverse, widely separated; femoral lines absent. Metendosternite with short stalk and widely separated anterior arms and tendons. Hind wing vestigial.

Legs (Figs 541–545) with trochanterofemoral attachment subheteromeroid; femur widest near half length, about twice as wide as tibia, moderately densely setose with rather irregularly arranged obliquely directed suberect spines on ventral surfaces of fore and mid femora. Tersomere 3 about five times shorter than tarsomere 4. Claws simple. Empodium distinct, bisetose. Male tibiae rarely with weak characters of sexual dimorphism.

Abdomen with five freely articulated ventrites; anterior margin of intercoxal process emarginate medially; ventrite 1 longer than 3 following ventrites combined and longer than metaventrite; ventrites 2–4 subequal in length; ventrite 5 in male sometimes weakly truncate at apex. Male abdominal segment 8 (Fig. 650) with sternite narrow, moderately sclerotized, truncate or emarginate at apex; tergite widely rounded apically with small submembranous, lateral lobes at base. Female sternite 8 emarginate apically. Male genital segment (Figs 705, 706) with sternite, with somewhat asymmetrical apical margin, at least partially truncate; paired apophyses fused near base or along apical third; dorsal plate large, undivided.

Aedeagus (Figs 781, 782) moderately long and rather slender, sclerotized, weakly arcuate. Tegmen placed near
base of median lobe, reduced, ring-shaped with parameres fused and tegmental strut short, submembranous.

Female genitalia (Fig. 833). Ovispositor at least compactly connected with sternite 8; moderately sclerotized, with coxites at least partially fused; styli moderately large, terminal. Spermatheca moderately large, elongate, membranous, accessory gland small, rounded, membranous; sperm duct short and slender. Bursa copulatrix elongate with apical outlet of sperm duct and lateral outlet of common oviduct.

**Species examined.** *H. dalmatina* Kaufmann, *H. reissi* Csiki, *H. rubricollis* (Germar) – 3 of 7 known species.

**Distribution.** South-eastern Europe and Caucasus.

*Indalmus* Gerstaecker
(Figs 17, 45, 83, 150, 151, 221, 222, 267, 330, 331, 385, 546–551, 652, 707, 708, 783, 784, 834)


*Mycella* Chapuis, 1876: 104. Type species, by monotypy: *Mycella linnellia* Chapuis, 1876.

**Diagnosis.** The species of *Indalmus* are most similar to those of *Callimodapsa* and *Parindalimus* by the overall body appearance, including the elytra being widest beyond mid length. *Indalmus* can be easily distinguished from *Parindalimus* in having the pronotum not much narrower than base of the elytra, the labrum with sides subparallel, the mandible with apical teeth, the labial palp distinctly 3-segmented, the male femora without fringes of long hairs on inner surface, and the hind margin of male metaventrite simple (without appendages). The body more convex, distinctly punctured sometimes with fine reticulation on the pronotum and elytra, the antennae and legs longer and more slender separate it from *Callimodapsa*.

**Redescription.** Length 5.5–8.0 mm. Body (Figs 881, 882) elongate, moderately convex, shiny, most often glabrous; sparsely and finely to densely and coarsely, confusedly punctured. Colour black or sometimes brown, always with contrasting (yellow or red) markings on the elytra.

Head partially retracted in prothorax, almost as long as wide. Gular sutures fused medially at base and extending anteriorly as short median line. Eyes moderately large, oval in outline, prominent, coarsely faceted. Occipital file moderately large, finely ridged, weakly elongate. Antenna long (slightly shorter than a half of body length) and comparatively slender (Fig. 45) with 3-segmented, most often rather narrow and weakly flattened, loose club; scape more than twice as long as pedicel; antennomere 3 twice as long as pedicel or antennomere 4; antennomeres 4–8 subequal or gradually slightly shorter. Clypeus transverse, flat, widest at base, slightly convergent from base toward half length, thence parallel. Labrum (Fig. 83) truncate apically; strongly transverse, sclerotized with membranous apex, rather coarsely punc- tured, covered with moderately long setae and with tufts of long setae on sides; tornae elongate, with mesal arms recurved posteriorly; labral rods absent; basal margin with median, raised ridge, triangularly produced anteriorly. Mandible (Figs 150, 151) broad, strongly concave ventrally, convex dorsally; sharply cleft at tip forming apical and subapical teeth; mola large, well-developed, finely ridged; prostheca rather narrow, membranous, covered densely with moderately long setae; submola small, densely setose, membranous. Maxilla (Fig. 221) with terminal palpmere elongate (at least 1.5 × as long as palpmere 3), cylindrical, blunt at apex; galea broadly triangular, densely setose; lacinia (Fig. 222) short and narrow, tapering, fringed with stiff setae on its inner edge and two long spines below them; digitus absent. Labium (Fig. 267) with palpi close together, 3-segmented; palmere 1 very small; palmpore 2 strongly transverse; terminal palmpore transversely rectangular. Mentum transverse, widest in middle of its length, with raised, curved ridge transversely; covered with short setae in anterior part. Prementum very short, moderately sclero- tized with ligula in form of large lobes at sides, strongly emarginate at apex.

Prothorax transverse, widest near middle of its length. Pronotum (Fig. 330) rather narrowly bordered laterally and anteriorly; base margined; anterior edge with conspicuous striulatory membrane; basal sulcus deep, lateral sulci linear, weakly divergent anteriorly, deep and comparatively long; anterior angles distinctly produced forwards, acute; posterior angles right-angled or weakly acute; pronotal disc slightly convex. Prosternum with a pair of pits in front of procoxal cavities; prosternal process (Fig. 331) very narrow not extending beyond coxae, which are almost contiguous or sometimes moderately narrow with weak longitudinal ridge, extending shortly beyond procoxae and separating them distinctly; front coxae prominent, circular in outline (Fig. 546); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum rather small, transverse, somewhat pentagono- nal. Mesovenitrite (Fig. 385) with a pair of pits near anterior margin; intercoxal process pentagonal, longer than wide and comparatively widely separating mesocoxa, angulate anteriorly and sinuate posteriorly, with median tubercle or ridge and raised borders; extending to about half of length of coxae. Mesocoxa circular in outline (Fig. 548), its cavity outwardly open; trochan- tin exposed. Meso-metaventral junction with internal knobs. Elytra widest at about apical third, elongate, convex, blunt at apices with punctures dense and irregular; epipleuron rather narrow, complete or almost so. Metavenitrite (Fig. 385) large, transverse, weakly convex, scarcely narrowing towards its anterior margin; intercoxal process comparatively widely bordered and raised,
provided with three pairs of postcoxal pits, in males sometimes with small tubercles near hind coxae, discrimin almost complete Metacoxae transverse, widely separated, femoral lines absent Metendosternite with short stalk and widely separated anterior arms and ten dons. Hind wing (Fig 17) with two anal veins and two anal cells, medial fleck moderately large, rectangularly-oval, at least partially divided

Legs (Figs 546–551) with trochanterofemoral attachment subheteromorbid. Femur widest near half length, less than twice as wide as tibia, hardly setose Tarsis with terminal tarsomere four five times longer than tarsomere 3 Claws simple or rarely with distinct teeth (Fig 551) Empodium bisetose. In males sexual characters may be present in all tibiae (Figs 547, 549)

Abdomen with anterior margin of intercoxal process at least weakly emarginate, with five freely articulated ventrites Ventrite 1 longer than three following ventrites combined, ventrites 2–4 subequal in length Ventrite 5 may be modified apically in both sexes. Male abdominal segment 8 with sternite very narrow and emarginate at apex (Fig 652) Male genital segment (Figs 707, 708) with sternite weakly emarginate apically and paired apophyses fused along ⅔ of their length, dorsal plate undivided

Aedeagus (Figs 783, 784) stout, moderately long, strongly sclerotized, very weakly curved. Median lobe branched out apically Tegmen placed at base, strongly reduced, ring shaped with parameres fused and tegmenal strut vestigial

Female genitalia (Fig 834) Ovipositor sclerotized, fused with abdominal segment 8, coxites entirely fused, sternite 8 divided in two lateral, sclerotized plates some times connected by membrane and fused with coxites, styli present, small, terminal Spermatheca small, membranous, sperm duct short, slender, accessory gland very small, elongate, membranous Bursa copulatrix moderately large, elongate with apical outlet of sperm duct and ventral or lateral (on left side of body) outlet of common oviduct

Species examined I formosanus (Cski), I kirbyanus* (Latreille), I linea (Chapuis), I malayanus Arrow, I oblongulus Fairmaire, I pubescens (Arrow) – 6 of 30 known species

Distribution Eastern and South eastern Asia, Africa and North eastern Australia

Lycoperdina Latreille

(Figs 46, 84, 152, 153, 223, 224, 268, 332, 333, 386, 558–561, 655, 709, 710, 785, 786, 835, 883, 884)

Lycoperdina Latreille, 1807 73 Type species by monotypy Galleruca bor-siae Fabricius, 1792

Golga Monsant 1846 17 (as subgenus) Type species by monotypy Silpha succina Linnaeus, 1767

Lycoperdina Arrow 1920b 23 (as, Lycoperdina Champion 1913)

Type species by monotypy Lycoperdina niusosa Arrow 1920b Lycoperdinae Arrow, 1923 485 Replacement name for Lycoperdina Arrow 1920b

Falsyla Poc 1945 11 Type species by monotypy Falsyla obscura resuturalis Poc 1945

Diagnosis This genus is most similar to Hylaea and Achaearmythus in having similar body appearance and the head with well developed gular sutures. The prosternal process strongly reduced with procoxae contiguous and the mesosternal process narrow, with rounded antero-lateral borders and elongate median ridge present in Lycoperdina are also shared with Hylaea Lycoperdina however can be distinguished from both genera by the antennal club 2 segmented and the ovipositor with apex of protuber generally produced backwards. Moreover the mandible with small apical and subapical teeth, the procoxae contiguous, the intercoxal process of mesoventrite with median ridge, the ovipositor with fused coxites and the tegmen with basal piece encircling median lobe at its base separate easily Lycoperdina from Achaeaarmythus

Redescription Length 3.0–6.0 mm Body (Figs 883, 884) elongate to ovate, weakly to distinctly convex, shiny, covered with fine and very short pubescence, densely but rather finely, confusedly punctured Colour black, reddish black, reddish brown to light brown, sometimes with black markings on the elytra

Head almost circular in outline. Gular sutures well developed, widely separated, weakly convergent anteri- orly. Eyes moderately large, weakly oval in outline, prominent, very coarsely faceted Occipital file large, wide basally and narrowing anteriorly. Antenna slightly shorter than a half of body length (Fig 46), with 2 segmented narrow, loose club, scape almost twice as long as pedicel, antennomere 3 almost as long as pedicel, antennomeres 4–8 subequal in length or gradually shorter, antennomere 9 slightly longer and broader than 8, but narrower and shorter than 10 Clypeus transverse, flat, narrowing from base towards half length, thence parallel, with simple apex Labrum (Fig 84) strongly transverse, shortly setose with submembranous, emarginate apex, tormae elongate, with mesal arms straight or recurved posteriorly, labral rods absent or very short, divergent anteriorly. Mandible (Figs 152, 153) broad, strongly concave ventrally, convex dorsally, with small apical tooth and very small, blunt subapical tooth, mola transversely ridged, prosthca covered with sparse, short setae. Maxilla (Fig 223) with terminal palpomere elongate, subcylindrical, weakly tapering towards apex, and rounded, galea elongate, narrowing towards its apex, densely setose, lacinia (Fig 224) short and nar- row, fringed with rather stiff setae on its inner edge, a few long spinules and two longest spines below them on dorsal surface, digitius absent Labium (Fig 268) with palp widely separated, palpomere 1 almost square,
palpomere 2 transverse; terminal palpomere ovate or long-oval. Mentum transverse, widest in middle of its length, punctured, covered with several short setae and weakly raised across middle. Prementum transverse, sclerotized, punctured, shortly pubescent anteriorly; ligula densely setose, expanded laterally and emarginate medially at apex.

Prothorax transverse, widest near mid length or at apical third, narrowly bordered laterally. Pronotum (Fig. 332) with anterior margin provided with conspicuous striudulatory membrane; basal sulcus distinct, lateral sulci deep, long and subparallel; anterior angles weakly to distinctly produced, acute or narrowly rounded; posterior angles right-angled or acute; pronotal disc convex. Prosternum with a pair of small pits in front of procoxal cavities; prosternal process (Fig. 333) very narrow and short; front coxae prominent and contiguous. Procoxa circular in outline (Fig. 558); its cavity externally open, and widely closed internally; trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum transverse, most often semicircular in outline. Mesoventre (Fig. 386) with a pair of large pits near anterior margin; intercoxal process short, narrow, carinate, with sharp, median ridge; narrowly separating mesocoxae, not extending beyond them, reaching about half of their length. Mesocoxa circular in outline (Fig. 559), its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knob. Elytron elongate, convex, widest between basal third and mid length, thence strongly tapering towards apex; blunter apically, very densely, finely and irregularly punctured; epipleuron narrow or moderately wide, incomplete at apex. Metaventre (Fig. 386) transverse, weakly narrowing towards its anterior margin; intercoxal process moderately widely bordered and weakly raised; discrinen moderately long; postcoxal pits sometimes extremely large and deep. Metacoxae weakly transverse, widely separated; femoral lines absent. Metendosternite with short stalk and widely separated anterior arms and tendons. Hind wing well developed, but with reduced venation and with partially divided medial fleck, or shortened with reduced apical field (in both cases CuA2 absent); sometimes wingless.

Legs (Figs 558–561) with trochanterofemoral attachment subheteromeroi. Femur widest in apical third, about twice as wide as tibia, hardly setose, but ventral surfaces of fore and mid femora provided with numerous, obliquely directed short spines. Tarsomeres 1 and 2 comparatively narrowly flattened and ventrally lobed; tarsomere 3 about four times shorter than tarsomere 4. Claws simple. Empodium distinct, bisetose. In males, sexual characters may be found in all tibiae.

Abdomen with five freely articulated ventrites; anterior margin of intercoxal process straight; ventrite 1 as long as 3.5 following ventrites combined; ventrites 2–4 subequal in length; ventrite 5 simple in both sexes. Male abdominal segment 8 (Fig. 655) with sternite rather well developed and sclerotized at least at apex, weakly emarginate mediadally. Male genital segment (Figs 709, 710) with sternite weakly emarginate or distinctly asymmetrical at apex; paired apophyses fused near base or near mid length; dorsal plate divided in two sclerotized parts connected by membrane.

Aedeagus (Figs 785, 786) rather stout, moderately long, heavily sclerotized, weakly or distinctly curved. Tegmen placed at base of median lobe, reduced, ring-shaped with parameres fused and tegminal strut vestigial.

Female genitalia (Fig. 835). Ovipositor moderately sclerotized, with elongate coxites, fused at least partially; styli absent; sternite 8 partially or entirely fused with coxites. Spermatheca and accessory gland membranous; sperm duct short and slender; connected sometimes with stout, membranous connection between spermatheca and accessory gland. Bursa copulatrix moderately large, elongate with apical outlet of sperm duct and lateral outlet of common oviduct. Proctiger produced apically into more or less acute process.

Species examined. L. apicata Fairmaire, L. bovistae* (Fabricius), L. ferruginea LeConte, L. mandarinea Gerstaecker, L. maritima Reitter, L. morosa (Arrow) L. succincta (Linnaeus), L. validicornis Gerstaecker – 8 of 28 known species.

Distribution. Widely distributed in Palearctic and Nearctic Regions, South Africa and Madagascar.

Malinus Viliers
(Figs 3, 4, 47, 85, 154, 155, 225, 269, 334, 335, 381, 535–540, 656, 711, 712, 787, 788, 836, 885)


Diagnosis. Malinus resembles Avencymon and Anycoplus in general body appearance (long-oval and of moderate size). These genera share also the labrum with median part of basal margin raised and triangularly produced anteriorly. Malinus however can be easily separated from both genera in having a very distinctive body colouration, being dark red and the pronotum with anterior angles almost not produced. Moreover the female pronotum with lateral sulci not being connected mediadly by arcuate ridge, the elytra without maculae and the labrum with sides produced antero-laterally into rounded lobes, separate Malinus from Anycoplus, while the pronotum less transverse with lateral edges simple, and lateral sulci short and shallow separate it from Avencymon.

Redescription. Length 6.5–7.0 mm. Body (Fig. 885) elongate, weakly flattened; shiny, glabrous; confusedly punctured with more or less distinct reticulate microsculpture. Colour dark red with legs, antennae, clypeus, and base, sides and apex of elytra black.
Head (Figs 3, 4) partially retracted in prothorax, weakly transverse, with a pair of weak, elongate concavities between eyes. Eyes large, transversely oval in outline, prominent, coarsely faceted. Occipital file large, broadly-oval, finely ridged. Gular sutures poorly marked, fused medially at base, extending anteriorly as long (almost complete – reaching submentum) median line. Antenna (Fig. 47) longer than half length of body, slender, with 3-segmented, narrow, weakly flattened club; scape about 3 × as long as pedicel and distinctly longer than antennomere 3 and almost as long as 4 and 5 combined; antennomere 3 about 1.5 × longer than antennomeres 4; antennomeres 4 and 5 equal in length; 6–8 gradually slightly shorter; terminal antennomere elongate-oval, truncate at apex. Clypeus large, transverse, flat, widest at base, convergent towards half length, thence parallel with apical margin somewhat pointed mediad. Labrum (Fig. 85) sclerotized with membranous anterior margin, strongly transverse, with sides produced antero-laterally into rounded lobes; coarsely and densely punctured, covered with long setae and with a few very long setae on sides; anterior edge emarginate mediadly, base with median, triangular raised area; tormae elongate, with mesal arms recurved posteriorly; labral rods absent. Mandible (Figs 154, 155) with apex little produced and feebly notched; mola moderately large, finely ridged; prostheca large, membranous, covered with moderately dense and fine setae; submola small, minutely setose, membranous. Maxilla (Fig. 225) with terminal palpomere elongate (more than 1.5 × as long as palpomere 3), cylindrical, blunt at apex; galea large, broadly triangular, densely setose; lacinia short and narrow, tapering, fringed with stiff setae on its inner edge, with two long spines below them and two long spines at apex – both pairs on inner-dorsal surface, and with minute hairs on dorsal surface. Labium (Fig. 269) with palpi close together; palpomere 2 and 3 strongly transverse; terminal palpomere somewhat transversely rectangular with truncate apex. Mentum transverse, widest in mid length, with weakly raised, curved ridge transversely; covered with short, sparse setae and densely reticulate. Prementum very short, sclerotized with ligula formed by short, lateral lobes.

Prothorax transverse, almost rectangular, widest near apical third. Pronotum (Fig. 334) sparsely and shallowly punctured, with very distinct microsculpture; narrowly bordered laterally and moderately widely bordered anteriorly; base distinctly margined; anterior edge with moderately large striulatory membrane; basal edge weakly sinuate; basal sulcus rather deep, lateral sulci fine, short, weakly divergent anteriorly; anterior angles very weakly produced, rounded; posterior angles almost right-angled; pronotal disc weakly convex with weak median, cross-like concavity near base. Prosternum with small pit in front of each procoxal cavity; procoxal process (Fig. 335) narrow, not extending beyond front coxae; coxae (Fig. 535) prominent, circular in outline, distinctly separated; their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum rather small, transverse, comparatively convex, sparsely punctured, rounded apically. Mesoventrite (Fig. 381) with a pair of very small pits near anterior margin and with median, elongate, ridge in front of intercoxal process; with transverse, declivit area in front of each coxa; intercoxal process elongate and narrow, somewhat sinuate posteriorly, with weakly raised, arcuate ridge anteriorly and with raised lateral margins; narrowly separating mesocoxae, extending slightly beyond half of their length. Mesocoxxa circular in outline (Fig. 536), its cavity outwardly open; trochantin exposed. Mesoventrcostral junction with internal knobs. Elytra elongate, weakly arcuate laterally; moderately convex with punctures moderately dense and coarse but shallow and interspaces finely reticulate; sutureal striae deep, incomplete at apex; humeri weakly prominent; lateral margins narrowly flat, visible throughout; apices blunt; basal margin narrowly bordered and raised; epipleuron comparatively wide, incomplete at apex. Metaventrite (Fig. 381) large, transverse, weakly convex and concave along discum (especially along anterior half), provided with three pairs of postcoxal pits; scarcely narrowing towards its anterior margin; intercoxal process widely bordered and raised; discum long but incomplete. Metacoxae transverse, widely separated. Metendosternite with rather short stalk and widely separated anterior arms and tendons. Hind wing with two anal veins and one anal cell; medial flesk rather small, oval, undivided.

Legs (Figs 535–540) long and comparatively slender; trochantero-serral attachment heteromoroid. Femur widest near apical third, hardly setose, provided with short rows of obliquely directed short spines on ventral surfaces of fore and mid tibiae; tibia weakly widening towards tarsus; tarsi with terminal tarsomere about 7 times longer than tarsomere 3. Claws simple; empodium distinct, bisetose. Male fore and mid trochanters, and tibiae bear sexual dimorphic characters (Figs 537, 538).

Abdomen with anterior margin of intercoxal process truncate in males and weakly emarginate in females; with five freely articulated ventrites. Ventrite 1 as long as two following ventrites combined; ventrites 2–3 equal in length and ventrite 3 slightly shorter. Ventrite 5 modified in both sexes – in male, excised apically and in female narrowly truncate. Male abdominal segment 8 (Fig. 656) with sternite narrow, irregularly W-shaped, with apical edge sinuate; tergite widely rounded at apex, with very large, submembranous, basal lobes. Male genital segment with sternite moderately large, somewhat emarginate at apex and paired apophyses fused along ⅔ of their length; dorsal plate undivided, but with submembranous median part (Figs 711, 712).
Aedeagus (Figs 787, 788) stout, moderately long, heavily sclerotized, weakly curved. Median lobe branched out at apex, with apical submembranous gonopore provided with short, stout spines. Segmen placed basally, ring-shaped with parameres fused and tegmental strut vestigial.

Female genitalia (Fig. 836) fused with abdominal segment 8. Ovipositor sclerotized, with coxites entirely fused, emarginate at apex; styli absent. Sternite 8 sclerotized laterally with membranous middle part, fused with coxites. Spermatheca small, round-oval, membranous; sperm duct moderately long, slender; accessory gland minute, elongate-oval, membranous; outlet of common oviduct lateral and outlet of sperm duct near apex but covered by hood-like, submembranous structure formed by apex of bursa.

**Species examined.** *M. excavatus* Viliers – monotypic genus.

**Distribution.** Equatorial Africa (Congo, Cameroon, Guinea).

**Microtrycherus** Pic
(Figs 40, 86, 156, 157, 226, 227, 336, 337, 382, 525–557, 654, 713, 714, 797, 798, 837)


**Diagnosis.** The spermatheca lacking the accessory gland appears to be a unique character for *Microtrycherus, Chetryrus and Trycherus*. These genera share also the very similar body shape and the colouration. *Microtrycherus* however can be distinguished from *Chetryrus and Trycherus* in having the base of elytra much wider than the base of the pronotum, the maxillary galea short, bluntly rounded at apex and the terminal maxillary palpomere about as long as wide.

**Redescription.** Length 8.0–10.0 mm. Body (Fig. 866) elongate-oval to broad-oval, moderately convex, shiny, glabrous or minutely pubescent; confusedly punctured with interspaces densely reticulate. Colour dark brown to black with contrasting (yellow or orange) markings on the elytra.

Head rather deeply retracted in prothorax, transverse. Eyes very large, oval in outline, very prominent, coarsely faceted. Gular sutures fused medially at base and extending anteriorly as moderately long, slender median line. Occipital file reduced, very small, finely ridged, sometimes occult provided only with coarse reticulation.

Antenna (Fig. 40) shorter than half length of body, moderately slender, with 3-segmented, narrow, weakly flattened, loose club; scape almost 2 x longer than pedicel and subequal with antennomere 3; antennomere 3 about 1.5 x as long as antennomere 4; antennomere 4 slightly longer than 5; antennomeres 5-8 equal in length; terminal antennomere short, transversely-oval, weakly rounded at apex. Clypeus transverse, flat, widest at base, convergent from base toward basal third, thence parallel or weakly divergent toward apex, with weakly arculate anterior edge. Labrum (Fig. 886) strongly transverse, sclerotized with small, median, membranous area at apex; densely and moderately coarsely punctured, covered with rather short setae; anterior edge simple to weakly truncate, basal margin with median, triangular, raised area; tori elongate, with mesal arms recurved posteriorly; labral rods absent. Mandible (Figs 156, 157) moderately broad, strongly concave ventrally, convex dorsally with sharp, elongate ridge; shallowly notched at apex forming two apical teeth and with slightly smaller, blunt, subapical tooth; mola large, finely ridged, prosthecum moderately broad, membranous, finely setose. Maxilla (Fig. 226) with terminal palpomere elongate, subcylindrical or subquadrate, widest near mid length (about 1.5 x longer than palpomeres 3), truncate at apex; palpomeres 2 and 3 transverse; galea moderately large, elongate with blunt apex, densely setose apically; lacinia (Fig. 227) moderately long and narrow, weakly tapering, with comb of long setae on inner edge, with row of moderately long spines on dorsal surface and three longest spines below them. Labium (Fig. 270) with palpi close together; palpomeres 2 and 3 strongly transverse; terminal palpomere truncate at apex. Mentum transverse, widest near posterior third, somewhat pentagonal, finely setose, more or less concave medially, and densely reticulate posteriorly. Prementum very short, moderately sclerotized with ligula in form of small, submembranous, lateral lobes.

Prothorax strongly transverse, widest near anterior third or at base, distinctly narrower than base of elytra. Pronotum (Fig. 336) rather densely and moderately coarsely to very coarsely punctured and densely reticulate; sides sinuate with distinct constriction near basal third; lateral margins moderately widely bordered; anterior margin narrowly bordered with striulatory membrane reduced, sometimes only with strong thickening in middle of anterior edge; basal sulcus present, moderately deep, lateral sulci linear, subparallel, rather short and deep; anterior angles produced forwards, blunt; posterior angles weakly acute; pronotal disc moderately convex, in males sometimes with median, longitudinal concavity in posterior half. Prosternum with a pair of pits in front of procoxal cavities; prosternal process (Fig. 337) moderately wide, distinctly separating procoxae; almost parallel-sided with sides weakly bordered and apex narrowly rounded, extending distinctly beyond procoxae; coxae prominent, circular in outline (Fig. 552); their cavities externally open, internally widely closed. Trochantin concealed.

Mesos- and metathorax. Mesonotum sclerotized with scutellum rather small, transverse, widest at base, thence shortly convergent, then almost parallel-sided, widely rounded to almost truncate at apex. Mesovenitrite (Fig. 382) moderately carinate, with a pair of pits near anterior margin; intercoxal process somewhat pentagonal,
longer than wide, widely separating mesocoxae, angulate anteriorly and truncate to weakly emarginate posteriorly, with weakly raised borders and weakly convex medially; extending slightly beyond half length of coxae. Mesocoxa circular in outline (Fig. 554), its cavity outwardly open; trochantin exposed. Meso-metaventral junction with small internal knobs. Elytra broadly-oval, widest near half length, convex, blunt at apices, with punctures moderately dense and coarse; densely reticulate; humeri scarcely prominent; lateral margins moderately widely flattened, visible from above almost through; epipleuron comparatively wide, incomplete at apex. Metaventrite (Fig. 382) large, strongly transverse, weakly convex, narrowing towards its anterior margin which is moderately widely bordered and raised, provided with two pairs of rather small postcoxal pits; discern long but incomplete. Metacoxae transverse, widely separated; femoral lines absent. Metendosternite with moderately long stalk and widely separated anterior arms and tendons. Hind wing with one anal vein and one anal cell; medial fleck moderately large, almost rectangular in shape, divided. Legs (Figs 552–557) moderately long and rather stout; trochanterofemoral attachment heteromorbid. Femur widest near mid length, less than twice as wide as tibia, hardly setose, with row of rather sparse, obliquely directed short spines on ventral surface of fore and mid femora; terminal tarsomere about six–seven times longer than tarsomere 3. Claws simple, hollowed along inner edge. Empodium small, bisetose. Male trochanters provided with erect setae; inner edge of mid and hind femora fringed along basal half; fore tibiae weakly curved before apex and provided with small tooth (Figs 553).

Abdomen with anterior margin of intercoxal process weakly emarginate; with five freely articulated ventrites. Ventrite 1 longer than two following ventrites combined; ventrites 2–4 equal in length or ventrite 4 sometimes slightly shorter. Ventrite 5 may be weakly modified at apex in both sexes. Male abdominal segment 8 (Fig. 654) compactly connected with genital segment; sternite narrow, divided in two sclerotized, lateral parts connected medially by very narrow membranous belt; tegrite widely truncate at apex in both sexes, provided with large, lateral, submembranous plates at base (in females these plates smaller). Male genital segment (Figs 713, 714) with sternite narrow, emarginate at apex; paired apophyses fused along ⅔ of their length; dorsal plate undivided, but with submembranous, median connection.

Aedeagus (Figs 797, 798) moderately long and stout, sclerotized, strongly curved near base. Median lobe without apical branches. Tegmen moderately large, placed basally, ring-shaped with parameres fused and tegrnal strut vestigial.

Female genitalia (Fig. 837) fused with abdominal sternite 8. Ovipositor elongate, sclerotized, with coxites entirely fused, truncate apically; sternite 8 entirely fused with coxites; styli absent. Spermatheca small, mem-

branous, elongate-oval; sperm duct moderately long, slender; accessory gland absent. Bursa copulatrix moderately large, long and narrow with dorso-apical outlet of common oviduct and apical outlet of sperm duct.

Species examined. M. lutescensnatus* (Pic). M. rugicollis (Strohecker) – 2 of 4 known species.

Distribution. Central Africa.

**Mycetina** Mulsant


*Mycetina* Mulsant, 1846: 15. Type species, by monotypy: *Chrysolina cruciata* Schaller, 1783.

*Mycetina* Pic, 1929: 35 (as subgenus). Type species, by monotypy: *Pseudindalmas testacitatis* Pic, 1926: 35.


**Diagnosis.** This genus resembles *Pseudindalmas* possessing the antennae stout, the prosternal process long and rather narrow, the intercoxal process of mesoventrite trapezoidal in shape and the pronotum with sides parallel from base to about mid length thence rounded to the front angles, with short triangular lateral sulci. *Mycetina* however can be separated from *Pseudindalmas* by having antennomere 9 smaller than 10 in both sexes, without tendency for bulbous enlargement in males, the intercoxal process of mesoventrite distinctly shorter, the terminal labial palfomere as long as wide or weakly elongate, the elytra short (less elongate) and the metaventrite without femoral lines.

**Redescription.** Length 3.3–6.0 mm. Body (Figs 887–889) elongate-oval to short-oval, moderately convex, shiny, glabrous or rarely finely pubescent; confusedly punctured with interspaces on pronotum and elytra sometimes finely reticulate. Colour light brown, reddish-brown or black, often with contrasting markings on the elytra or sometimes bicoloured (e.g. pronotum and elytra of different colour).

Head partially retracted in prothorax, weakly transverse. Eyes moderately large, weakly oval in outline, prominent, moderately coarsely faceted. Occipital file large, transverse, finely ridged. Postoccipital suture present. Gular sutures fused medially at base and extending anteriorly as long, slender median line. Antenna (Fig. 49) stout, distinctly shorter than half length of body, with 3-segmented, moderately wide and weakly flattened, loose or somewhat compact club; scape almost 3 × as long as pedicel and 1.5 × as long as antennomere 3; antennomere 3 slightly longer than 4; antennomeres 4–5 and 6–8 often subequal in length; antennomeres 2 and 6–8 most often at most as long as wide; terminal antennomere weakly transversely oval. Clypeus transverse, flat, widest at base, convergent from base toward basal third, thence parallel. Labrum (Fig. 87) strongly transverse, sclerotized
with membranous apex; anterior edge of sclerotized part truncate, and of membranous part deeply emarginate medially; moderately coarsely and rather sparsely punctured, covered with rather short setae and with brushes of long setae on sides of anterior margin; torseae elongate, with mesal arms recurved posteriorly; labral rods short, subparallel. Mandible (Figs 158, 159) moderately broad, strongly concave ventrally, convex dorsally with sharp, curved, elongate ridge; most often sharply cleft at tip forming moderately large, apical and subapical teeth, sometimes with sharp, apical tooth and numerous fine teeth below; mola moderately large, finely ridged; prostheca narrow, membranous, densely setose; submola very small. Maxilla (Fig. 230) with palpomeres 2 and 4 distinctly longer than wide; terminal palpomere about 2 x as long as palpomere 3, subcylindrical, weakly tapering and narrowly rounded at apex; galea broadly triangular, moderately densely setose apically; lacinia (Fig. 231) short and narrow, tapering, fringed with stiff setae on its inner edge, with row of moderately long spines on dorsal surface and one longest spine below them. Labium (Fig. 271) with palpi close together; palpomere 2 strongly transverse; terminal palpomere cylindrical, as long as wide or weakly elongate, blunt or truncate at apex. Mentum transverse, widest anteriorly, flat; covered with sparse and short pubescence; anterior margin at least weakly acutely produced forwards in mid length. Prementum short, moderately sclerotized with ligula weakly lobed at sides, submembranous, truncate at apex.

Prothorax most often almost as wide as base of elytra, strongly transverse, nearly parallel-sided from base to near mid length, thence tapering anteriorly and produced into blunt anterior angles. Pronotum (Fig. 342) very finely to moderately coarsely punctured; narrowly to moderately widely bordered laterally; anterior edge with large striulatory membrane (Fig. 7); basal sulcus deep with large pits on sides; lateral sulci triangular (wide at base and narrowing anteriorly), deep and comparatively long; posterior angles right-angled or weakly acute, pronotal disc convex. Prosternum with a pair of pits in front of procoxal cavities; prosternal process (Fig. 343) moderately wide, extending distinctly beyond coxae, with lateral margins widely bordered, most often parallel-sided; truncate or rounded at apex; front coxae prominent, circular in outline (Fig. 562); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum with scutellum rather small, flat, weakly transverse, with truncate, rounded or weakly acute apex. Mesoventricle (Fig. 383) carinate, with oval median concavity; normally covered by apical part of prosternal process; provided with a pair of pubescent pits near anterior margin; intercoxal process moderately widely separating meso-, coxae, more or less trapezoidal, at most as long as wide; flat, truncate posteriorly; extending to about half length of coxae. Mesocoxa circular in outline, its cavity outwardly open; trochantin exposed. Meso-metaventral junction with broad internal knob. Elytra almost parallel-sided or widest near basal third, short-ovale, moderately convex, blunt or weakly rounded at apices with punctures rather moderately dense and fine; epipleuron moderately wide, incomplete at apex; lateral margins narrowly or moderately widely flattened, visible from above almost throughout; humeri weakly to distinctly prominent. Metaventrite (Fig. 383) strongly transverse, weakly convex, narrowing towards its anterior margin which is rather narrowly bordered and very weakly raised, provided with one pair of pubescent, postcoxal pits; discrènion reaching about mid length of metaventrite. Metacoxae transverse, widely separated; femoral lines absent. Metendosternite with short stalk and widely separated anterior arms and tendons. Hind wing with one anal vein and one anal cell; medial falcus comparatively large, roundly-ovate, partially divided.

Legs (Figs 562–566) with trochanterofemoral attachment subheteromeroid. Femur widest near apical third or mid length, slender at base, less than twice as wide as tibia, hardly setose, with row of rather weak, obliquely directed, short spines on ventral surfaces of at least fore femora; tibia and tarsus rather densely setose. Terminal tarsomere 7–8 times longer than tarsomere 3. Claws simple. Empodium small with two short setae. Male tibiae bear characters of sexual dimorphism (Figs 563, 564).

Abdomen with anterior margin of intercoxal process straight; with five freely articulated ventrites. Ventricle 1 slightly shorter than metaventrite and longer than three following ventrites combined, with anterior edge narrowly bordered and weakly raised; ventrites 2–4 subequal in length or gradually slightly shorter. Ventricle 5, in male sometimes weakly emarginate at apex. Male abdominal segment 8 (Fig. 644) with sternite narrow, somewhat W-shaped; tergite widely rounded at apex. Male genital segment (Figs 715, 716) with sternite moderately large, in form of two, lateral, sclerotized parts with median membranous connection, weakly emarginate at apex; paired apophyses fused throughout; dorsal plate divided in two lateral parts connected by membrane.

Aedeagus (Figs 793, 794) short to moderately long, slender to stout, strongly sclerotized, straight to moderately curved near base or near apex. Median lobe most often branched out apically. Tegmen obsolete, fused with base of median lobe.

Female genitalia (Fig. 838) at least compactly connected with sternite 8. Ovipositor sclerotized with coxites well developed, separated; styli absent. Spermatheca moderately large, elongate-oval, membranous; sperm duct short, slender; accessory gland very small, elongate, membranous. Bursa copulatrix moderately large, elongate with apical outlet of sperm duct and medio-ventral outlet of common oviduct.

Species examined. M. apicalis Motschulsky, M. cruciata (Schaller), M. cyanescens Strohecker, M. marginalis...
(Gebler), M. perpleusra (Newman), M. pulchella Arrow, M. rufipennis (Motschulsky), M. testaceitarsis (Pic), M. turneri Arrow – 9 of 66 known species.

**Distribution.** Widely distributed in Holarctic, Oriental and Afrotropical Regions.

**Ohtaius Chujô**

(Figs 50, 92, 160, 161, 228, 229, 272, 338, 339, 384, 567–573, 638, 717, 718, 799, 800, 842, 890)

*Ohtaius Chujô, 1938: 398* (as a subgenus of *Brachytricherus* Arrow, 1920b). Type species, by original designation: *Brachytricherus mushurus* Ohta, 1931.


**Diagnosis.** The species of *Ohtaius* are most similar to those of *Brachytricherus* and *Gersaecterus* in having the body black or blackish-brown with elytra decorated most often with orange or yellow, transverse bands. The mandible with widely chisel-shaped apex is also shared by these genera. *Ohtaius* however can be separated from *Brachytricherus* in having the body more elongate, the head lacking well developed, separated gular sutures and the intercoxal process of mesonotum widening apically and covering part of coxae. The maxillary lacinia provided with tuft of S-like setae at apex along with a row of long, stout spines, subequal in length, and the femora provided with fringe of long hairs on inner surface can distinguish *Ohtaius* from *Gerstaeckerus*.

**Redescription.** Length 8.0–11.0 mm. Body (Fig. 890) elongate-oval, subparallel, convex, shiny, glabrous or finely to distinctly pubescent; confusedly punctured with interspaces smooth or sometimes with weak reticulation. Colour brownish-black or black with yellow or orange, transverse bands on elytra.

Head rather deeply retracted in prothorax, transverse, with two elongate, shallow concavities between eyes. Eyes rather large, transversely oval, prominent, and coarsely faceted. Occipital file large, finely ridged. Gular sutures confluent medially at base and extending anteriorly as slender, rather short median line. Antenna as long as half length of body, rather stout (Fig. 50) with 3-segmented, narrow or moderately wide, weakly flattened, loose club; scape about 1.5 x as long as pedicel and almost as long as antennomere 3; antennomere 3 about 1.5 x as long as antennomere 4; antennomeres 4–6 equal in length, scarcely longer than antennomeres 7 or 8; terminal antennomere about as long as wide, bluntly rounded at apex. Clypeus strongly transverse, flat, widest at base, narrowing towards basal third, thence parallel with apical margin straight. Labrum (Fig. 92) sclerotized with membranous apex; strongly transverse, moderately densely punctured, covered with rather short setae and with a few long setae on sides of anterior margin; anterior edge of both – membranous and sclerotized parts truncate; tormae elongate, with mesal arms recurved anteriorly; labral rods slender, moderately long, widely divergent anteriorly. Mandible (Figs 160, 161) with strong, chisel-shaped apex and moderately large, blunt subapical tooth; mola large, finely ridged; prostheca large, membranous, moderately densely setose; submola comparatively large, setose, membranous. Maxilla (Fig. 228) with terminal palpomere elongate, weakly tapering, blunt at apex, at least 1.5 x as long as palpomere 3 and slightly longer than 2; galea moderately large, long-oval, bluntly rounded and covered with dense, long setae at apex; lacinia (Fig. 229) as large as galea, not tapering, bluntly rounded at apex, with tuft of somewhat S-shaped, apical spines, row of setae on its inner edge and row of long spines on inner-dorsal edge. Basistipes provided with small setose tubercle. Labium (Fig. 272) with palpi rather close together; palpomeres 2 and 3 strongly transverse; terminal palpomere truncate at apex. Mentum transverse, flat, widest near half length, covered with short, sparse, suberect setae, with interspaces densely reticulate. Prementum short, moderately sclerotized with ligula weakly lobed at sides, somewhat emarginate medially at apex.

Prothorax strongly transverse, widest near anterior third, sometimes at base or sides almost parallel. Pronotum (Fig. 338) comparatively widely bordered laterally and anteriorly; basal margin also bordered; anterior edge with conspicuous and weakly prominent striodulatory membrane; basal sulcus deep, weakly sinuate, lateral sulci linear, weakly arcuate or subparallel, deep and long; anterior angles produced, blunt or rounded, posterior angles weakly acute or right-angled; pronotal disc moderately convex sometimes with median tubercle; lateral areas of uneven surface; punctation moderately dense and coarse with interspaces finely reticulate, especially on sides (disc without microsculpture). Prosternum with a pair of small pits in front of procoxal cavities; prosternal process (Fig. 339) moderately wide, narrowly rounded at apex, extending at least to posterior margin of front coxae; coxae prominent, circular in outline (Fig. 567); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesoventrule sclerotized with scutellum rather small, weakly convex, strongly transverse, angulate at base, widely rounded apically, sparsely punctured. Mesonotrite (Fig. 384) carinate, with a pair of large, deep pits near anterior margin, and with transverse, declivent area in front of each coxa; intercoxal process transverse, bordered anteriorly by weakly arcuate ridge and sinuate posteriorly, with lateral edges weakly raised and median area of uneven surface; widely separating mesocoxae, extending slightly beyond half of their length, widening laterally at apex and overlapping part of coxae. Mesocoxae circular in outline (Fig. 569), its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knobs. Elytra elongate-oval, almost parallel-sided; rounded at apices; convex, with basal margins moderately widely bordered and raised;
Species examined. *O. annularis* (Gerstaecker), *O. lunulatus* (Gerstaecker), *O. mushanus* (Ohta), *O. signifer* (Gorham) – 4 of 8 known species

**Distribution.** Oriental Region

**Parndalmus** Achard

(Figs 51, 88, 162, 163, 232, 233, 273, 340, 341, 387, 574–579, 640, 719, 720, 791, 792, 841, 891)

**Parndalmus** Achard 1922 29 *Type species, by monotypy Parndalmus tonkinensis* Achard, 1922

**Pedanus,** Gerstaecker, 1857 230 (ne. **Pedanus** Fischer de Waldheim, 1829) *Type species by subsequent designation of Arrow (1925 319) Pedanus quadrirufatus* Gerstaecker 1857

**Diagnosis.** The species of **Parndalmus** resemble those of **Indalmus** in having similar body shape and colouration. The pronotum much narrower than base of the elytra, the labrum with sides produced antero-laterally into rounded lobes, the mandible without apical teeth, the labial palp appearing 2-segmented, the mid and hind femora of males provided with fringe of long hairs on inner surface, and the hind margin of male metaventrite with large appendages (Fig 387) (in most cases) can easily distinguish **Parndalmus** from **Indalmus**

**Redescription.** Length 7.0–9.0 mm. Body (Fig 891) long oval, highly convex, somewhat pear-shaped with thorax relatively small, shiny, finely and moderately sparsely setose, covered by fine, reticulate microsculpture along with rather dense and moderately coarse, confused punctures. Colour brownish black or black with two yellow or orange maculae on each elytron.

Head partially retracted in prothorax, weakly transverse, somewhat concave between antennal sockets. Gular sutures fused medially at base and extending anteriorly as slender, long median line. Eyes large, oval in outline, prominent, moderately coarsely faceted. Occipital file large, broad basally and acutely produced anteriorly, finely ridged. Antenna long (about as long as half of body length) and rather slender (Fig 51) with 3-segmented, rather narrow, moderately compact, flattened club, scape almost 3 × as long as pedicel and equal in length with antennomere 3 or longer, antennomere 4 about 1.5 × shorter than 3 and slightly longer than antennomere 5, antennomeres 5–8 subequal, antennomeres 9 and 10 with anterior, inner angles somewhat produced internally, terminal antennomere truncate at apex. Clypeus transverse, flat, widest at base, convergent toward basal third thereupon parallel, weakly produced and pointed medially at apex. Labrum (Fig 88) emarginate medially at apex, strongly transverse, produced antero-laterally into rounded lobes, sclerotized with lateral, membranous insertions and sometimes membranous in middle of anterior margin, rather coarsely punctured, covered with long, sparse, differently directed, curved apically setae and with lateral tufts of long setae, tormae elongate, with

humeri weakly prominent, puncturation moderately coarse and rather dense with interspaces rather smooth, lateral margins narrowly flattened, visible from above almost throughout, epipleuron comparatively wide, complete metaventrite (Fig 384) strongly transverse, convex (weakly concave along discrimen), narrowing anteriorly, anterior margin moderately widely bordered and distinctly raised (especially between coxae), provided with three pairs of postcoxal pits, discrimen long but incomplete. Metacoxae transverse, widely separated Metendosternite with rather short stalk and widely separated anterior arms and tendons. Hind wing two anal veins and one anal cell, medially flat, moderately large, almost rectangular in shape, undivided.

Legs (Figs 567–573) long and rather stout with trochanterofemoral attachment heteromorbid. Femur more or less clubbed, moderately slender at base, hardly setose but ventral surfaces of fore and mid femora provided with rows of obliquely directed short spines, tarsi with terminal tarsomere about 8–9 times longer than tarsomere 3. Claws simple, hollowed along inner edge, empodium very distinct, bisetose. Male hind femur and tibia fringed with long setae, at least along apical half (Figs 572, 573), fore tibiae (sometimes also mid and hind) with distinctly marked sexual characters – curvatures and/or small teeth (Fig 568).

Abdomen with five freely articulated ventrites. Ventrite 1 almost as long as three following ventrites combined with narrow, postcoxal concavities and sometimes also with postcoxal pits and anterior margin of intercoxal process weakly emarginate medially, ventrites 2–3 equal in length, ventrite 4 slightly shorter. Ventrite 5 in male with transverse, bilobed tubercle, in female simple or weakly modified at apex (emarginate or somewhat truncate). Male abdominal segment 8 with sternite very narrow, somewhat W-shaped, (Fig 638), emarginate at apex, tergite widely rounded apically with two large, lateral, submembranous plates at base. Male genital segment (Figs 717, 718) with sternite narrow, asymmetrically, strongly emarginate at apex, paired apophyses fused along ½ of their length with distinct, elongate ridge on ventral surface along fused part, dorsal plate undivided, additional, internal, somewhat V-shaped sclerite present.

Aedeagus (Figs 799, 800) short and stout, heavily sclerotized, almost straight. Median lobe branched out apically Tegmen placed near base, ring-shaped with parameres fused and tegminal strut vestigial.

Female genitalia (Fig 842) fused with abdominal segment 8. Sternite 8 visible as lateral sclerotized, wing-shaped, processes, tergite 8 emarginate at apex and compactly connected with tergite 9. Ovipositor sclerotized, with coxites entirely fused, stylly absent. Spermatheca small, rounded, membranous, sperm duct short, slender, accessory gland small, elongate-oval, membranous Bursa copulatrix moderately large with lateral outlet of common oviduct and apical outlet of sperm duct.
mesal arms recurved posteriorly; labral rods slender, divergent anteriorly; base with small triangularly raised area. Mandible (Figs 162, 163) hemicyclid with rounded apex without teeth; mola large, strongly sclerotized, finely ridged; prostheca large, moderately wide, membranous, covered densely with short setae. Maxilla (Fig. 232) with palpomere 2 longest (nearly twice as long as palpomere 3 or 4), terminal palpomere subcylindrical, truncate at apex; galea broadly triangular, covered with dense, short setae; lacinia (Fig. 233) half as long as galea, very narrow, tapering, fringed with stiff setae on its inner edge, with two rows of short spinulae and one very long spine below them, on dorsal surface. Labium (Fig. 273) with palp closely separated, short and compact, with palpomeres 1 and 2 fused, transverse; terminal palpomere large, transverse, truncate at apex, provided with tuft of long setae on anterior, inner edge. Mentum transverse with short, lateral lobes near base, covered with several long setae. Prementum short, moderately sclerotized; ligula membranous, transverse, lobed at sides, emarginate at apex.

Prothorax strongly transverse but distinctly narrower than base of elytra, almost always widest near apical third – nearly parallel in front and weakly contracted behind. Pronotum (Fig. 340) narrowly bordered laterally and anteriorly; basal margin straight; anterior edge with large strialutary membrane; basal sulcus deep, lateral sulci well marked and long (reaching about mid length of pronotum), linear; anterior angles more or less produced, blunt or rounded; posterior angles right-angled or weakly acute; pronotal disc moderately convex. Prosternum without pits in front of procoxal cavities; prosternal process (Fig. 341) narrow, shortly extending beyond coxae, rounded at apex; front coxae prominent, circular in outline (Fig. 574); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum moderately large, transverse, with apex truncate or widely rounded. Mesoventerite (Fig. 387) with a pair of pits near anterior margin; with median tubercle or ridge anteriorly; intercoaxial process somewhat pentagonal, longer than wide, comparatively widely separating mesocoaxae, extending slightly beyond half length of coxae, weakly angulate anteriorly and concave in basal half, with raised borders. Mesocoaxa circular in outline, its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knobs. Elytra widest near apical third, long-oval, convex, blunt or weakly rounded at apices with punctures rather dense, moderately coarse and irregular; epipleuron rather narrow, incomplete at apex; humeri prominent; narrow, reflexed margins visible at least from basal fifth to apical fifth. Metaventerite (Fig. 387) large, transverse, weakly convex, gradually margins anteriorly; in male often with a pair of characteristic appendages on hind margin, between hind coxae; anterior margin rather narrowly bordered but intercoaxial process convex, provided with three pairs of small, postcoxal pits; discri-

men almost complete. Metacoaxae transverse, widely separated, almost perpendicular to metasternum; femoral lines absent. Metendosternite with rather long stalk, widely separated anterior arms and moderately widely separated tendons. Hind wing with one anal vein and two anal cells; medial fleck rather large, rectangularly-oval, divided.

Legs (Figs 574–579) with trochanterofemoral attachment heteromorbid. Femur long and clavate, very slender at base, hardly setose but dorsal and ventral surfaces of fore femur and ventral surface of mid femur bear rows of obliquely directed short spines; tibia and tarsus densely setose. Tarsi with tarsomeres 1 and 2 strongly flattened and broadly lobed ventrally; terminal tarsomere at least 11 times longer than tarsomere 3. Claws simple, hollowed along inner edge. Empodium distinct, elongate with two setae. Mesotibiae of males with small tooth near apical third (Fig. 578); hind trochanters sometimes very long, produced in rounded lobe (Fig. 575).

Abdomen with anterior margin of intercoaxial process more or less distinctly emarginate medially; with five freely articulated ventrites. Ventrite 1 at least as long as two following ventrites combined; ventrites 2–4 subequal in length. Ventrite 5 may be modified apically in both sexes (e.g. emarginate and weakly concave). Male abdominal segment 8 (Fig. 640) with sternite very narrow, sinuate; tergite with large, lateral, membranous, basal lobes. Male genital segment (Figs 719, 720) with sternite emarginate apically and paired apophyses fused along at least ½ of their length; dorsal plate undivided, sclerotized.

Aedeagus (Figs 791, 792) short and stout, strongly sclerotized, weakly curved. Median lobe with long, pointed apical branch. Tegmen placed basally, strongly reduced, ring-shaped with parameres fused and tegminal strut vestigial.

Female genitalia (Fig. 841). Ovipositor fused with abdominal segment 8; moderately sclerotized, with coxites entirely fused, weakly rounded or emarginate apically; sternite 8 divided in two lateral, sclerotized plates connected medially by membrane and fused with coxites; styli small; tergite 8 somewhat truncate at apex, compactly connected with genital segments. Bursa copulatrix large with dorso-apical outlet of sperm duct and ventro-apical outlet of common oviduct. Spermapheca slightly larger than accessory gland – both small, membranous; sperm duct long and slender.

Species examined. P. quadrilunatus (Gerstaecker), P. tonkinensis* Achard – 2 of 5 known species.

Distribution. Oriental Region.

Platindalmus Strohecker


**Diagnosis.** Platindalmus appears to be closely related to Eumorphus. Apart from very similar body appearance, both genera share many characters, including labial structures and the female genitalia fused not only with segment 8 but also compactly connected with at least sternite 7. Platindalmus however differs from Eumorphus in having the intercoxal process of mesoventrite almost flat, the lateral margins of the pronotum simple, the male abdominal ventrites each with setose tubercles, and the male mid and fore femora provided with fringes of long hairs on inner edges.

**Redescription.** Length 7.0–8.0 mm. Body (Fig. 892) broad-oval, moderately convex, shiny, glabrous; covered with dense and fine reticulate microsculpture; punctures moderately dense, rather fine, confused. Colour black with four yellow spots on elytra.

Head partially retracted in prothorax, weakly transverse, with two elongate cavities between eyes. Eyes moderately large, transversely oval in outline, prominent, coarsely faceted. Occipital file moderately large, long-oval, finely ridged. Gular sutures fused medially at base and extending anteriorly as slender, short median line. Antenna about as long as half of body length and moderately slender (Fig. 52) with 3-segmented, weakly flattened and moderately broad club; scape at least twice as long as pedicle; antennomere 3 strongly elongate, about 3 x as long as pedicle and almost twice as long as antennomere 4; antennomeres 4–8 gradually scarcely shorter. Clypeus transverse, flat, widest at base, arcuately convergent toward basal third, thence parallel; anterior margin somewhat pointed in middle. Labrum (Fig. 95) sclerotized with membranous apex; strongly transverse, moderately coarsely punctured, covered with long, erect setae and with tufts of long setae on sides; anterior edge weakly emarginate; tormæ elongate, with mesal arms recurved posteriorly; labral rods absent. Mandible (Figs 164, 165) with large and strong, narrowly chisel-shaped apical tooth (large, hook-like apical tooth observed in one of eight examined specimens) (Fig. 166) and moderately large subapical tooth; mola large, well-developed, finely ridged; protheca moderately broad, membranous, covered with dense and rather long setae. Maxilla (Fig. 234) with terminal palpomere elongate (slightly longer than palpomere 3), tapering towards apex, blunt apically; galea large, broadly triangular, densely setose; lacinia short and narrow, blunt at apex, fringed with stiff setae on apex and inner edge, with dense and rather irregularly arranged short spinules/ hairs and three long spines somewhat below them, on dorsal surface. Labium (Fig. 274) with palpi close together; palpomere 2 strongly transverse; terminal palpomere transversely rectangular, truncate at apex. Mentum transverse, widest near mid length with arcuate anterior edge and weakly concave medially; covered with rather short and sparse setae. Prementum very short, moderately sclerotized with ligula produced into long, lobate lobes.

Prothorax transverse, widest near apical third. Pronotum (Fig. 344) narrowly bordered laterally and anteriorly; anterior edge with conspicuous stridulatory membrane; basal sulcus deep, lateral sulci linear, subparallel, moderately deep and long; anterior angles produced, blunt; posterior angles right-angled; pronotal disc slightly convex. Prosternum without pits in front of procoxal cavities; prosternal process (Fig. 345) moderately broad, weakly rounded apically, extending shortly beyond front coxae and separating them distinctly; front coxae prominent, circular in outline (Fig. 580); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum rather small, strongly transverse, semicircular, not angulate, comparatively coarsely punctured. Mesoventrite (Fig. 388) with a pair of small pits near anterior margin; intercoxal process subquadrate, flat with side and front edges raised; widely separating meso coxae, extending slightly beyond half of their length. Mesocoxa circular in outline (Fig. 581), its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knobs. Elytra widest near mid length, thence abruptly rounded and blunt apically; convex with punctures dense but rather fine; humeri almost flat; comparatively narrowly flattened lateral margins visible almost throughout; epipleuron moderately wide, incomplete at apex. Metaventrite (Fig. 388) large, transverse, weakly convex on sides of discrum, especially near hind coxae; scarcely narrowing towards its anterior margin which is moderately widely bordered and distinctly raised; provided with two pairs of postcoxal pits; discrum long but incomplete. Metacoxae transverse, widely separated. Metendosternite with rather short stalk and widely separated anterior arms and tendons. Hind wing with two anal veins and two anal cells; medial fleck moderately large, almost rectangular, divided.

Legs (Figs 580–587) long and comparatively slender; trochanterofemoral attachment heteromeroid. Femur widest near half length, hardly setose but ventral surfaces of fore and mid femora bear long rows of obliquely directed, moderately long, suberect spines; tibia and tarsus rather densely setose; tibia weakly widening towards tarsus; tarsis with terminal tarsomere 8–9 times longer than tarsomere 3. Claws simple, hollowed along inner edge; empodium with two short setae. Male fore tibia with stout, broadly triangular tooth on inner edge, near apical third (Fig. 586); male hind tibia (Fig. 584) with apical, acutely triangular lobe directed mesad and fringed with setae; female hind tibia with somewhat similar lobe, but much shorter and rather rounded at apex, not directed mesad (Fig. 583); male mid and hind femora with long, fringle-like setae along inner edge, almost throughout (Fig. 582).

Abdomen with anterior margin of intercoxal process weakly emarginate; with five freely articulated ventrites.
Ventrite 1 almost as long as three following ventrites combined; ventrites 2–4 subequall in length. Ventrite 5 emarginate apically in both sexes, each ventrite of male bears tuft of dense and rather long setae along middle. Male abdominal segment 8 (Fig. 639) with sternite very narrow and strongly emarginate at apex; tergite rounded apically with large, membranous, basal lobes. Male genital segment (Figs 721, 722) with sternite weakly emarginate at apex and paired apophyses fused along ⅔ of their length; dorsal plate undivided.

Aedeagus (Figs 789, 790) stout, moderately long, heavily sclerotized, very weakly curved. Median lobe weakly branched out at apex. Tegmen placed basally, ring-shaped with parameres fused and tegminal strut short.

Female genitalia (Fig. 839) fused with abdominal segment 8 and at least with sternite 7. Ovipositor sclerotized, with coxites entirely fused, weakly emarginate at apex; sternite 8 divided in two lateral, sclerotized plates and fused with coxites; styli absent. Spermatheca very small, oval, membranous; sperm duct short, slender; accessory gland small, elongate-oval, membranous. Bursa copulatrix moderately large with dorso-apical outlet of sperm duct and ventro-apical outlet of common oviduct.

Species examined. *P. calcaratus calcaratus* (Arrow) – monotypic genus (incl. 2 subspecies of the type species).


**Pseudinadamus Arrow**

(Figs 19, 53, 94, 167, 168, 235, 275, 346, 347, 393, 588–592, 641, 723, 724, 801, 802, 840, 893)


*Falsodanae* Pic, 1940: 11. Type species, by monotypy: *Falsodanae rafonotata* Pic, 1940.

Diagnosis. Most similar to *Myctena* in having stout antennae, long and moderately wide prosternal process, trapezoidal intercoxal process of mesoventrite, the pronotum with sides parallel from base to about mid length thence rounded to the front angles, and with short triangular lateral sulci. *Pseudinadamus* however is easily distinguished from *Myctena* by its male antennomere 9 larger than 10 with tendency for bulbous enlargement, the intercoxal process of mesoventrite distinctly longer, the terminal labial palpomere transverse, the elytra more elongate and the mataventrite with femoral lines.

Redescription. Length 5.0–7.0 mm. Body (Fig. 893) elongate-oval, weakly to moderately convex, shiny, glabrous; confusedly punctured with interspaces on pronotum and sometimes on elytra finely reticulate. Colour dark brown to black, always with contrasting (yellow or red) markings on the elytra.

Head comparatively deeply retracted in prothorax, weakly transverse. Eyes large, oval in outline, prominent, coarsely faceted. Occipital file large, elongate, somewhat trapezoidal in shape. Gular sutures fused medially at base and extending anteriorly as slender, long median line. Antenna at least as long as ⅔ length of body, comparatively stout (Fig. 53) with 3-segmented, moderately wide and very weakly flattened, loose club; antennomere 9 in male with tendency to bulbous enlargement, sometimes large, swollen; scape about twice as long as pedicel and 1.5 × as long as antennomere 3; antennomere 3 equal in length with antennomere 4 or slightly longer; antennomeres 4–8 most often as long as wide or at least 7–8 weakly transverse; antennomeres 9–10 produced inwardly; terminal antennomere transversely oval, somewhat truncate at apex. Clypeus transverse, flat, widest at base, convergent from base toward basal third, thence parallel. Labrum (Fig. 94) strongly transverse, sclerotized with narrow submembranous apex (at least laterally), with anterior edge deeply emarginate medially; moderately coarsely and rather sparsely punctured, covered with long setae; tormae elongate, with mesal arms recurved posteriorly; labral rods slender, weakly divergent anteriorly. Mandible (Figs 167, 168) broad, strongly concave ventrally, convex dorsally with sharp, curved, elongate ridge; sharply cleft at tip forming moderately large, apical and subapical teeth; mola large, finely ridged; prostheca rather narrow, membranous, finely setose. Maxilla (Fig. 235) with terminal palpomere elongate, about 1.5 × as long as palpomere 3 and subequal in length with palpomere 2, subcylindrical, blunt or narrowly rounded at apex; galea broadly triangular, rather sparsely setose at apex; lacina short and narrow, tapering, fringed with stiff setae on its inner edge, with row of long spinule on dorsal surface and three longest spines below them. Labium (Fig. 275) with palpi close together; palpomere 2 strongly transverse; terminal palpomere transversely rectangular. Mentum transverse, widest in mid length, flat with anterior raised, transverse ridge; covered with sparse and moderately long setae. Prementum short, moderately sclerotized with ligula formed by moderately large lobes at sides, strongly emarginate medially at apex.

Prothorax transverse, nearly parallel-sided from base to beyond mid length, thence tapering anteriorly and produced into blunt anterior angles. Pronotum (Fig. 346) very finely to moderately coarsely punctured with interspaces finely reticulate; narrowly to comparatively widely bordered laterally and narrowly bordered anteriorly; lateral margins weakly raised; anterior edge with moderately large stridulatory membrane; basal sulcus deep, sometimes with distinct impression in mid length; lateral sulci triangular (wide at base and narrowing anteriorly), subparallel, deep and comparatively long; posterior angles right-angled or weakly acute; pronotal disc convex. Prosternum with sinuate anterior edge and weak median, transverse ridge; with a pair of densely pubescent pits in front of procoxal cavities;
prosternal process (Fig 347) narrow to comparatively broad, extending far beyond coxae, distinctly bordered laterally, most often almost parallel-sided, truncate or rounded at apex, front coxae prominent, circular in outline (Fig 588), their cavities externally open, internally widely closed. Trochantin concealed.

Meso and metathorax. Mesonotum sclerotized with scutellum rather small, flat, transverse, with truncate, rounded or weakly acute apex. Metaventrite (Fig 393) carinate, with long, median concavity, normally covered by apical part of prosternal process, provided with a pair of densely pubescent pits near anterior margin, intercoxal process moderately widely separating meso coxae, more or less trapezoidal, at least slightly longer than wide, weakly concave medially with bordered and raised lateral margins, truncate posteriorly, extending to about half length of coxae. Mesocoxa circular in outline (Fig 589), its cavity outwardly open, trochantin exposed. Meso metaventral junction with wide internal knob. Elytra almost parallel sided or widest at about basal third, elongate-oval, weakly to moderately convex, blunt or weakly rounded at apices with punctures rather dense and moderately coarse with interspaces most often finely reticulate (sometimes glabrous), epipleuron moderately wide, incomplete at apex, lateral margins narrowly or moderately widely flattened, visible from above almost throughout, humeri almost flat. Metaventrite (Fig 393) large, transverse, weakly convex, narrowing towards its anterior margin, provided with one pair of densely pubescent, postcoxal pits, discerning reaching about mid length of metaventrite, intercoxal process narrowly bordered and weakly raised. Metacoxae transverse, widely separated, femoral lines present. Metendosternite with short stalk and very widely separated anterior arms and tendons. Hind wing (Fig 19) with one anal vein and one anal cell, medial fovea moderately large, rounded-oval, undivided.

Legs (Figs 588–593) with trochanterofemoral attach ment heteromeroid. Femur widest near mid length, slender at base, less than twice as wide as tibia, hardly setose, with row of rather weak, obliquely directed spines on ventral surfaces of front and mid femora, tibia and tarsus more densely setose than femur. Terminal tarsomere 7–8 times longer than tarsomere 4. Claws simple. Empodium bisetose. In males sexual characters may be found in tibiae (Figs 591, 592), femora (Fig 589) and trochanters (Fig 588).

Abdomen with anterior margin of intercoxal process straight or emarginate between coxae, with five freely articulated ventrites. Ventrite 1 slightly shorter than metaventrite and longer than three following ventrites combined, with weakly raised margins beyond coxae, ventrites 2–4 gradually slightly shorter. Ventrite 5, in male sometimes weakly emarginate at apex. Male abdominal segment 8 (Fig 641) with sternite narrow, divided in two separated lateral parts, tergite widely rounded apically. Male genital segment (Figs 723, 724) with sternite moderately large, weakly sclerotized, emarginate at apex, paired apophyses fused shortly beneath apex, dorsal plate divided in two lateral parts connected by membrane.

Aedeagus (Figs 801, 802) short to moderately long, slender to stout, strongly sclerotized, straight to moderately curved near base (sometimes with two curvatures – near base and in mid length). Median lobe most often branched out apically. Tegmen placed basally, strongly reduced, ring-shaped with parameres fused and tegmenally strut short.

Female genitalia (Fig 840) Ovipositor sclerotized, with coxites entirely fused, sternite 8 widely emarginate at apex, sclerotized with submembranous anterior part, compactly connected or fused with coxites, stylus present, small, terminal spinemethca small, membranous, sperm duct short, slender, accessory gland very small, elongate, membranous. Bursa copulatrix large, elongate with apical outlet of sperm duct and lateral (near apex) outlet of common oviduct.


**Distribution.** Widely distributed in Oriental Region.

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**Sinocymbachus** Strohecker et Chüyô (Figs 54, 93, 169, 170, 236, 276, 348, 349, 390, 594–598, 646, 725, 726, 803, 843, 894, 895).

Sinocymbachus Strohecker et Chüyô, 1970. 511. Type species by original designation *Engonus excisus* Strohecker 1943.

**Diagnosis.** Sinocymbachus appears to be closely related to *Cymbachus* sharing numerous characters including labial an maxillary structures, the mandible with apex widely chisel shaped, tergite 8 of both sexes with tuft of long setae at apex, and the aedeagus short with apical branches often as long as half length of median lobe. Sinocymbachus however differs from *Cymbachus* in having the body decidedly larger (in most cases), more elongate, and the intercoxal process of mesoventrite narrower and at least weakly ridged or tuberculate.

**Redescription.** Length 7.5–10.0 mm. Body (Figs 894, 895) short oval to long oval, highly convex, shiny, glabrous, rather densely and moderately coarsely, confusedly punctured. Colour brownish black or black, sometimes with purple reflections or cupreous sheen, always with yellow markings on the elytra.

Head partially retracted in prothorax, almost as long as wide, somewhat circular in outline, with weak, elongate concavities between eyes. Gular sutures fused medially at base and extending anteriorly as slender, moderately long median line. Eyes moderately large, oval in outline,
prominent, moderately coarsely faceted. Occipital file large, wide basally, narrowing and strongly produced anteriorly, finely ridged (sometimes with coarse ridges at base). Antenna about as long as half length of body, rather slender (Fig 54) with 3-segmented, wide, flattened club, scape more than twice as long as pedicel, antennomere 3 more than twice as long as pedicel and twice as long as antennomere 4, antennomeres 4–7 subequal, antennomere 8 slightly shorter. Clypeus transverse, flat, widest at base, slightly convergent toward apex and weakly rounded apically. Labrum (Fig 93) somewhat truncate apically, strongly transverse, sclerotized with membranous apex, coarsely punctured and covered with long setae, toraeae elongate, with mesal arms recurved posteriorly, labral rods absent. Mandible (Figs 169, 170) broad, concave ventrally, convex dorsally, with apex chisel shaped and with subapical tooth, mola large, strongly sclerotized, with dorsal and ventral edges finely ridged and inner surface densely granulate, protheca large, moderately narrow, membranous, covered with dense, short setae. Maxilla (Fig 236) with terminal palpomere elongate (slightly longer than palpomere 3 and slightly shorter than 2), subcylindrical, blunt at apex or minutely truncate, galea widening towards apex and rounded, densely setose, lacinia comparatively long and narrow, tapering, fringed with stiff setae on its inner edge, with a few long subapical spineae on dorsal surface and two or three long spines below them. Labium (Fig 276) with palpi moderately widely separated, palpomere 1 very small, palpomere 2 longer than wide, terminal pal pomere distinctly elongate or sometimes subquadrate, subcylindrical in shape. Mentum rectangularly trans verse with angles rounded, with weakly raised, arcuate ridge transversely, covered with long setae. Prementum short, moderately sclerotized with ligula membranous, transverse, lobed at sides, truncate at apex.

Prothorax transverse, almost always widest at base, with sides often truncate basal. Pronotum (Fig 348) narrowly bordered laterally and anteriorly, base weakly trisinuate, anterior edge most often with large stridulatory membrane, basal sulcus deep, lateral sulci rather well marked and comparatively long, linear, subparallel, anterior angles strongly produced forwards, bluntly rounded or subacute, posterior angles weakly acute, pronotal disc moderately convex. Prosternum without pits in front of procoxal cavities, prosternal process (Fig 349) moderately wide, not extending beyond coxae, distinctly v excised at apex, front coxae prominent, circular in outline (Fig 594), their cavities externally open, internally widely closed. Trochantin concealed.

Meso and metathorax Mesonotum sclerotized with scutellum moderately large, transverse, somewhat semicircular or slightly more elongate apically. Metaventrite (Fig 390) with a pair of small and shallow pits near anterior margin, intercoxal process somewhat pentagonal, as long as wide, with median ridge and distinct tubercle, comparatively widely separating mesocoxae, extending at least to half length of coxae. Mesocoxa circular in outline, its cavity outwardly open, trochantin exposed. Meso metaventral junction with internal knobs.

Elytra widest near mid length, elongate, convex, blunt or weakly acute at apices (in males sometimes weakly sinuate apically) with punctures dense, moderately coarse and irregular, epipleuron rather narrow, incomplete at apex. Humeri prominent. Metaventrite (Fig 390) large, transverse, weakly convex, narrowing towards its anterior margin which is moderately widely bordered and weakly raised, provided with three pairs of postcoxal pits, discrimen complete. Metacoxae transverse, widely separated, femoral lines absent. Metendosternite with rather long stalk, widely separated anterior arms and moderately widely separated tendons. Hind wing with one anal vein and two anal cells, medial falcate moderately large, roundly oval, divided.

Legs (Figs 594–598), with trochanterofemoral attachment subheteromeroid. Femur not clavate, less than twice as wide as tibia, hardly setose, tibia and tarsus rather densely setose, tibia slender. Terminal tarsomere about five times longer than tarsomere 3, in male terminal tarsomere sometimes with weak tooth (or tubercle) at about basal third. Claws simple, hallowed along inner edge. Empodium distinct with two or three setae. Mesotibiae of males with sexual characters (teeth and various excisions) (Fig 595).

Abdomen with anterior margin of intercoxal process straight or emarginate medially, with five freely articulated ventrites. Ventritle 1 as long as three following ventrites combined, ventrites 2–4 subequal in length and gradually slightly shorter. Ventritle 5 simple or rarely may be modified in both sexes (e.g. in male – apex sinuate with double concavity and tuft of long setae laterally, while in female somewhat triangular). Male abdominal segment 8 (Fig 646) with sternite very narrow, truncate or emarginate apically, tergite with apical tuft of setae medially and sometimes with additional, large, asymmetrical, basal membrane. Male genital segment (Figs 725, 726) with sternite weakly or distinctly emarginate apically and paired apophyses fused near base or along ¼ of their length, dorsal plate divided in two, lateral, sclerotized plates, connected medially by membrane.

Aedeagus (Fig 803) short and stout, strongly sclerotized, curved. Median lobe strongly branching out apically, endophallicus provided with large sclerite. Tegmen placed basally, strongly reduced, ring-shaped with parameres fused and tegrnal strut vestigial.

Female genitalia (Fig 843) fused with abdominal sternite 8, which is divided in two lateral, sclerotized plates connected medially by membrane. Ovipositor moderately sclerotized, with coxites entirely fused, stylus absent, tergite 8 somewhat triangular with apical tuft of long setae, loosely connected with genital segments. Spermatheca and accessory gland moderately large,
membranous; sperm duct short and slender. Bursa copulatrix elongate with lateral outlet of sperm duct and latero-apical outlet of common oviduct.

**Species examined.** *S. bimaculatus* (Pic), *S. excisipes* (Strohecker), *S. humerosus* (Mader) – 3 of 10 known species.

**Distribution.** South and East China, Taiwan, Vietnam.

**Spathomeles** Gerstaecker

(Figs 14, 55, 91, 171, 172, 237, 238, 277, 350, 351, 391, 599–605, 645, 727, 728, 795, 796, 844, 896, 897)


**Diagnosis.** *Spathomeles* appears to be closely related to *Amphistethus*, *Stictomela*, *Amphisternus* and *Cacodaemon* by having the elytra (at least in males) provided with tubercles and/or spines, and the base of spermatheca with at least small sclerotized structure. The pronotum with anterior angles produced anteriorly, thickened and raised distinguishes *Spathomeles* from *Stictomela*, *Amphisternus* and *Cacodaemon*, and the terminal maxillary palpmere at least weakly elongate and differently shaped prosternal process separate it from *Amphistethus*. The last character differs *Spathomeles* also from *Amphisternus* and *Cacodaemon*.

**Redescription.** Length 10.0–14.0 mm. Body (Figs 896, 897) long-oval, strongly convex, very shiny with pronotum or elytra sometimes dull, glabrous, rarely shortly pubescent; confusedly punctured (rarely punctures regularly arranged) with interspaces finely to distinctly reticulate. Colour blackish-brown or black, sometimes with bluish or green sheen, with yellow or orange maculae on elytra and often with tubercle; male elytra often provided with erect or curved spines.

Head moderately deeply retracted in prothorax, almost as long as wide, with two weak, elongate concavities between eyes. Eyes large, transversely-oval, prominent, moderately coarsely facetted. Occipital file moderately large, long-oval, finely ridged. Gular sutures fused medially at base and extending anteriorly as slender, almost complete median line. Antenna (Fig. 55) shorter than half length of body, moderately slender with 3-segmented, wide, flattened and compact club; scape about twice as long as pedicel and almost as long as antennomere 3; antennomere 3 at least 1.5 × longer than 4; antennomeres 4–5 subequal in length or antennomeres 4–8 gradually slightly shorter; terminal antennomere transversely oval. Clypeus strongly transverse, flat, widest at base, narrowing towards basal third, thence parallel, truncate apically. Labrum (Fig. 91) sclerotized with very narrow, submembranous apex; strongly transverse, moderately coarsely and densely punctured, covered with moderately long setae, anterior edge truncate; tormae weakly elongate, with mesal arms recurved posteriorly; labral rods very short and slender, widely divergent anteriorly. Mandible (Figs 171, 172) with strong, chisel-shaped apical tooth and small sub-apical tooth; mola large, finely ridged; prostheca large, membranous, with tuft of long setae along apical half; submola moderately large, densely setose, membranous. Maxilla (Fig. 237) with terminal palpmere elongate, subcylindrical or sometimes subquadrate, truncate or blunt at apex; galea moderately large, long-oval, weakly enlarged apically, densely setose at apex; lacinia (Fig. 238) comparatively large (long and wide), weakly tapering along basal third, thence parallel, rounded at apex, with tuft of somewhat S-shaped, apical spines, row of rather fine setae on its inner-ventral edge and row of long spines on inner-dorsal edge; digitus absent. Labium (Fig. 277) with palpi rather close together; palpomeres 2 and 3 strongly transverse; terminal palpmere somewhat cup-shaped, truncate at apex. Mentum transverse, widest near basal fourth, almost flat; covered with short, sparse setae. Prementon short, moderately sclerotized with ligula lobed at sides and with apical edge emarginate medially.

Prothorax strongly transverse, widest in about half length; lateral edges weakly sinuate with distinct narrowing near base. Pronotum (Fig. 350) with lateral margins rather narrowly bordered along basal half and widely bordered along apical half – borders at base distinctly raised; anterior margin moderately widely bordered with small and weakly prominent striulatory membrane; basal sulcus deep, weakly sinuate to almost straight, lateral sulci linear, weakly curved, moderately deep and long; anterior angles produced forwards, rounded, posterior angles weakly acute; pronotal disc of uneven surface, in males sometimes with deep, long, median sulcus; sides widely dilated; punctures minute to moderately dense and coarse with interspaces finely reticulate. Prosternal process (Fig. 351) moderately wide or wide, bordered laterally, concave along middle, expanded apically or subparallel, rounded, truncate or even shallowly excised at apex, sometimes with apical tubercle; extending shortly beyond front coxae and separating them distinctly; front coxae prominent, circular in outline (Fig. 599); their cavities externally open, internally widely closed. Trochantin concealed.

Mesos- and metathorax. Mesonotum sclerotized with scutellum rather small, strongly transverse, moderately densely punctured, widely rounded apically or somewhat emarginate; angulate near base, widely rounded apically. Mesonventrite (Fig. 391) with a pair of small, shallow pits near anterior margin or pits absent; intercoxal process transverse, somewhat angulate anteriorly and sinuate posteriorly, with lateral borders raised, expanded laterally at
apex and covering part of coxae; widely separating meso-
coxae, extending slightly beyond half of their length; of
uneven surface, sometimes with distinct, median eleva-
tion. Mesocoxa circular in outline, its cavity outwardly
open; trochanter exposed. Meso-metaventral junction
with internal knobs. Elytra (Fig. 14) moderately coarsely
and densely punctured with fine reticulation; basalar
margins moderately widely bordered and raised; sides nearly
parallel from beyond shoulders to about apical fourth
thence abruptly tapering towards apices; very convex
with tubercles and often with spines (in males); humeri
prominent; lateral margin moderately widely flattened,
visible throughout from above; blunt or rounded at api-
ces; epipleuron moderately wide, complete. Metaventrite
(Fig. 391) about twice as wide as long, convex (es-
specially on sides of discrmen), narrowing anteriorly; anterior
edge moderately widely bordered and distinctly raised
between coxae and weakly raised laterally; provided with
three pairs of very small postcoxal pits; discrmen long,
complete; deep, oval concavity placed beneath raised
margin of intercoxal process. Metacoxae transverse,
widely separated. Metendosternite with rather short stalk
and widely separated anterior arms and tendons. Hind
wing with one anal vein and two anal cells; medial fleck
rather small, rectangularly-oval, divided.

Legs (Figs 599–605) long and moderately stout; tro-
chanterofemoral attachment subteremoid. Femur
somewhat clavate, slender at base, very hardly setose,
with rows of short, erect, obliquely directed spines on
ventral surfaces of fore and mid femora; tibia and tarsus
moderately densely setose along apical half and hardly
setose basally; tibia very weakly widening towards tarsus;
terminal tarsomere about 10 times longer than tarsomere
3. Claws simple, hollowed along inner edge; empodium
distinct with two short setae. Male tibiae, and sometimes
also femora and trochanters provided with very distinct
characters of sexual dimorphism (Figs 600, 602, 603).

Abdomen with anterior margin of intercoxal process
weakly emarginate; with five freely articulated ventrites.
Venitrite 1 almost as long as three following ventrites
combined; ventrites 2–4 gradually slightly shorter or
subequal in length. Male venitrite 5 may be modified
at apex (e.g. truncate). Male abdominal segment 8
(Fig. 645) with sternite very narrow, W-shaped; tergite
widely rounded apically with two large, lateral, sub-
membraneous plates at base. Male genital segment with
sternite narrow, strongly emarginate mediately at apex;
paired apophyses fused along about ½ of their length;
dorsal plate narrow, undivided (Figs 727, 728); addi-
tional, internal U-shaped sclerite present.

Aedeagus (Figs 795, 796) stout, moderately long,
heavily sclerotized, very weakly curved basally or almost
straight. Median lobe strongly branched out apically,
with submembranous gonopore provided with numer-
ous small sclerites. Tegmen placed basally, ring-shaped
with parameres fused and tegminal strut very short.

Female genitalia (Fig. 844) fused with abdominal
segment 8 – sternite 8 entirely fused with coxites and
tergite 8 compactly connected with tergites 9 and 10.
Ovipositor sclerotized, with coxites entirely fused; styli
present, small, terminal. Sperrmatheca small, oval, mem-
branous with weakly sclerotized, basal ring; sperm duct
short, slender; pessary gland very small, elongate-oval,
membranous. Bursa copulatrix partially sclerotized,
short with ventro-lateral outlet of common oviduct and
apical outlet of sperm duct.

*Species examined.* *S. angylyptus* Gerstaecker, *S. anceps*
(Gorham), *S. bontainicus* Heller, *S. decoratus* Gerstaecker,
*S. dohrnii* Gerstaecker – 5 of 15 known species.

**Distribution.** Oriental Region.

_Stictomela_ Gorham  
(Figs 13, 56, 89, 173, 174, 239, 240, 278, 352, 353, 389,
606–612, 643, 729, 730, 804, 805, 845, 898)  
_Stictomela_ Gorham, 1886: 155. Type species, by subsequent designation

**Diagnosis.** The species of _Stictomela_ are most similar to
to those of _Spathomeles_ but can be distinguished by
having the body less elongate and the pronotum with
anterior angles weakly produced anteriorly, without
raised thickening. Having the elytra strongly tuberculate
and the base of the spermatheca with sclerotized struc-
ture _Stictomela_ appears to be related also to _Amphisterthus,
Amphisternum_ and _Cacodaemon_. _Stictomela_ differs how-
ever from these genera in having differently shaped
prosternal process (not extending beyond fore coxae
and not being deeply excised at apex). Additionally the
mandibles with apices symmetrical separate it from
_Amphisternum_ and _Cacodaemon._

**Redescription.** Length 8.0–10.5 mm. Body (Fig. 898)
short-oval, strongly convex, very shiny, sometimes
covered with minute pubescence; sparsely and very
finely, confusedly punctured with interspaces on elytra
glabrous while on pronotum reticulate. Colour black
with elytra blood-red, coopyery- or purplish-brown,
sometimes with orange spots.

Head moderately deeply retracted in prothorax, almost
as long as wide, with two, elongate concavities between
eyes. Eyes moderately large, very narrow and transverse,
prominent, coarsely faceted. Occipital file large, finely
ridged, strongly produced anteriorly into rounded lobe.
Gular sutures poorly marked, fused medially at base
and extending anteriorly as slender but almost complete
median line. Antenna long and slender (Fig. 56) with
3-segmented, narrow, moderately flattened and rather
loose club; scape less than twice as long as pedicel; anten-
nomeres 3–8 distinctly widening apically; antennomere 3
strongly elongate, about 2 x as long as pedicel and anten-
nomere 4; antennomeres 4–8 gradually slightly shorter.
Clypeus strongly transverse, flat, widest at base, narrowing towards basal third, thence parallel. Labrum (Fig. 89) sclerotized with membranous apex; strongly transverse, covered with two kinds of punctuation – coarse and minute punctures, with long, stiff setae on anterior margin; anterior edge of membranous part straight and of sclerotized part emarginate medially; formae elongate, with mesal arms recurved posteriorly; labral rods slender, widely divergent anteriorly. Mandible (Figs 173, 174) with strong, chisel-shaped apical tooth and moderately large subapical tooth; mola large, well-developed, finely ridged; prostheca large, membranous, rather sparsely setose; submola small, setose, membranous. Maxilla (Fig. 239) with terminal palpmere somewhat oval in shape, rounded at apex, about 1.5 × as long as palpmere 3; galea moderately large, long-oval, rounded and densely setose apically; lacinia (Fig. 240) comparatively large (long and wide) tapering along basal third, thence parallel, rounded at apex, with tuft of somewhat S-shaped, apical spines, row of rather fine setae on its inner-ventral edge and row of long spines on inner-dorsal edge. Labium (Fig. 278) with palpi moderately close together; palpmere 2 strongly transverse; terminal palpmere almost as long as wide, somewhat cup-shaped, truncate apically. Mentum transverse; widest near basal fourth with weakly raised, strongly curved ridge transversely; covered with moderately long, sparse setae variably directed. Prementum short, moderately sclerotized with ligula moderately lobed at sides and emarginate at apex.

Prothorax strongly transverse, widest in about half length. Pronotum (Fig. 352) rather narrowly bordered laterally and anteriorly; anterior edge with conspicuous and prominent striolulitary membrane; basal sulcus distinct, weakly sinuate, lateral sulci linear, subparallel, moderately deep and long; anterior angles produced, blunt, posterior angles weakly produced, blunt or somewhat acute; pronotal disc convex with deep median sulcus; sides widely dilated; punctuation very fine with interspaces reticulate. Prosternum with a pair of pits in front of procoxal cavities; prosternal process (Fig. 353) moderately wide, rounded or truncate apically with high tubercle before apex, extending shortly beyond front coxae and separating them distinctly; front coxae prominent, circular in outline (Fig. 606); their cavities externally open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with scutellum rather small, strongly transverse, moderately densely punctured, widely rounded apically or somewhat emarginate; weakly angulate near base. Mesoventricle (Fig. 389) with a pair of distinct, rather deep pits near anterior margin and with transverse, declivent area in front of each coxa; intercoxal process distinctly transverse, somewhat rectangular, weakly angulate anteriorly and sinuate posteriorly, almost flat, moderately widening laterally at apex; widely separating mesocoaxae, extending slightly beyond half of their length. Mesocoxa circular in outline (Fig. 608), its cavity outwardly open; trochantin exposed. Meso-metaventral junction with internal knobs. Elytra (Fig. 13) with basal margins moderately widely thickened and raised, regularly rounded from base to apex or lateral margins nearly parallel from beyond shoulder to about apical fourth; very convex with uneven surface near base and distinct, small tubercle near scutellum; sutural striae complete; humeri inflated and produced outwards; lateral margins narrowly flattened, visible almost throughout; rounded at apices; epipleuron comparatively wide, incomplete at apex. Metaventrite (Fig. 389) more than twice as wide as long, weakly convex, narrowing anteriorly; anterior margin comparatively widely bordered and raised between coxae; provided with three pairs of postcoxal pits; discernim complete. Metacoxae transverse, widely separated. Metendosternite with rather short stalk and widely separated anterior arms and tendons. Hind wing reduced (shorter and narrower than elytron).

Legs (Figs 606–612) long and stout, coarsely punctured; trochanterofemoral attachment heteromeroid. Femur widest near mid length, somewhat clavate, hardly setose but ventral surfaces of fore and mid femora bear rows of obliquely directed short spines; tibia and tarsus moderately densely setose, especially along apical half; tibia weakly widening towards tarsus; terminal tarsome more than 10 times longer than tarsomere 3. Claws simple, hollowed along inner edge; empodium distinct, bisetose. Male tibiae with very distinct sexual characters (Figs 607, 609, 610) – curvatures and apical teeth.

Abdomen with anterior margin of intercoxal process weakly emarginate; with five freely articulated ventrites. Ventricle 1 almost as long as three following ventrites combined; ventrites 2–4 subequal in length. Male ventrites 4 and 5 may be modified (e.g. provided with tubercles). Male abdominal segment 8 (Fig. 643) with sternite W-shaped; tergite weakly rounded apically with two small, lateral, membranous plates at base. Male genital segment (Figs 729, 730) with sternite reduced, emarginate apically and paired apophyses fused along ½ of their length; dorsal plate undivided; additional, internal U-shaped sclerite present.

Aedeagus (Figs 804, 805) stout, moderately long, heavily sclerotized, without basal curvature. Median lobe branched out apically. Tegmen placed basally, ring-shaped with parameres fused and tegmental strut short.

Female genitalia (Fig. 845) fused with abdominal segment 8. Ovipositor sclerotized, with coxites entirely fused; styli present, small, terminal. Spermatheca small, oval, membranous with weakly sclerotized, basal ring; sperm duct short, slender, connected directly with spermatheca; accessory gland very small, rounded, membranous. Bursa copulatrix short with lateral outlet of common oviduct and apical outlet of sperm duct.

Species examined. S. chrysomeleoides* Gorham, S. inflata (Gorham) – 2 of 4 known species.

Distribution. Sri Lanka, India (Kerala).
Trycherus Gerstaecker
(Figs 57, 90, 175, 176, 241, 279, 354, 355, 392, 613–618, 642,
731, 732, 806, 807, 846, 899, 900)

Trycherus Gerstaecker, 1857: 222. Type species, by subsequent
designation of Strohecker (1953: 97): Trycherus bifasciatus
Gerstaecker, 1857.

Olenus Thomson, 1857: 157 (nec Dalman 1826). Type species, by pre-
sent designation: Trycherus senegalensis Gerstaecker, 1857: 223.

Bolus Guérin, 1857a: 261 (nec Gistel 1848). Replacement name for
Olenus Thompson, 1857.

**Diagnosis.** The body shape and the colouration of
Trycherus are very similar to those of Chetryrus and
Microtrycherus. These genera appear to be closely
related by having the spermapheca lacking the accessory
gland. Trycherus however differs from Microtrycherus in
having the base of elytra slightly wider than base of the
pronotum, the maxillary galea broadly triangular and
the terminal maxillary palpomere distinctly elongate
and from Chetryrus it differs in having the antenna
longer and more slender, and the lateral margins of the
pronotum rather narrowly bordered.

**Redescription.** Length 8.0–13.0 mm. Body (Figs 899,
900) long-oval, moderately convex, shiny, glabrous; con-
fusedly punctured with interspaces densely reticulate.
Colour dark brown to black, almost always with con-
trasting (yellow or orange) markings on the elytra.

Head partially retracted in prothorax, weakly trans-
verse. Eyes large, oval in outline, prominent, moderately
coarsely faceted. Gular sutures fused medially at base and
extending anteriorly as long, sometimes complete medi-
an line. Occipital file finely ridged, small, oval (some-
times occult provided only with coarse reticulation). Antenna (Fig. 57) shorter than a half length of body,
moderately slender with 3-segmented, narrow or mod-
erately wide, weakly flattened, loose club; scape almost
2 x longer than pedicel and subequal with antennomere
3; antennomere 3 about 1.5 x as long as antennomere
4; antennomeres 4–8 equal in length or antennomere 4
slightly longer; terminal antennomere short, transverse,
truncate apically. Clypeus transverse, flat, widest at base,
convergent from base toward half length, thence parallel,
with weakly arcuate anterior edge, sometimes with weak-
ly pointed apex. Labrum (Fig. 90) strongly transverse,
sclerotized sometimes with membranous apex, densely
and moderately coarsely punctured, covered with long
setae and with tufts of long setae on sides; anterior edge
truncate to weakly emarginate; basal margin with medi-
an, triangular, raised area; tormae elongate, with mesal
arms recurved posteriorly; labral rods present or absent.
Mandible (Figs 175, 176) broad, strongly concave ventral-
ly, convex dorsally with sharp, elongate ridge; shallowly
notched at apex with moderately large, blunt, subapical
tooth; mola large, finely ridged; prostheca rather nar-
row, membranous, finely setose; submola rather small,
setose, membranous. Maxilla (Fig. 241) with terminal
palpomere elongate (about 1.5 x longer than palpomeres
2 or 3), subcylindrical, blunt at apex; galea broadly tri-
angular, moderately densely setose; lacinia short and
narrow, tapering, fringed with stiff, long setae on apex
and inner-ventral edge, with row of short spines on dor-
sal surface and one or two very long spines below them.
Labium (Fig. 279) with palpi close together; palpomere 2
strongly transverse; terminal palpomere transversely rec-
tangular, blunt at apex. Mentum transverse, widest near
posterior third, with raised, curved ridge transversely;
covered with short setae anteriorly and densely reticu-
late posteriorly (beyond ridge). Premament very short,
moderately sclerotized with ligula in form of moderately
large, submembranous, lateral lobes.

Prothorax strongly transverse, widest at base. Pronotum
(Fig. 354) rather finely punctured and densely reticu-
late; sides sinuate with distinct constriction near basal
third; lateral margins moderately widely bordered; ante-
rior margin narrowly bordered with minute striulatary
membrane; basal sulcus present or absent, lateral sulci
linear, subparallel, moderately long and deep; anterior
angles produced forwards, blunt; posterior angles acute;
pronotal disc moderately convex. Prosternum sometimes
with a pair of very shallow pits in front of procochal
cavities; prosternal process (Fig. 355) moderately wide,
parallel-sided with sides scarcely bordered, more or less
distinctly rounded apically, extending distinctly beyond
procoxae and separating them distinctly; coxae promi-
cent, circular in outline (Fig. 613); their cavities externally
open, internally widely closed. Trochantin concealed.

Meso- and metathorax. Mesonotum sclerotized with
scutellum rather small, transverse, widely rounded or
somewhat truncate at apex. Mesoventrete (Fig. 392) weakly
carinate, with a pair of pits near anterior margin or some-
times pits absent, or very shallow; intercochal process
somewhat pentagonal, longer than wide, widely separat-
ing mesocoxae, weakly angulate anteriorly and truncate
posteriorly, with weakly raised borders and weakly convex
median area; extending slightly beyond half length of
coxae. Mesocoxa circular in outline (Fig. 614), its cavity
outwardly open; trochantin exposed. Meso-metaventral
junction with small internal knobs. Elytra elongate-oval,
widest near half length, convex, blunt or sometimes round-
ed at apices, with punctures fine and moderately dense;
humeri weakly prominent; lateral edge moderately widely
flattened, visible from above almost throughout; epipleu-
ron comparatively wide, incomplete at apex. Metaventrete
(Fig. 392) large, strongly transverse, weakly convex, nar-
rrowing towards its anterior margin which is moderately
widely bordered and raised, sometimes provided with one
pair of very shallow postcochal pits; discrmen long but
incomplete. Metacoxae transverse, widely separated;
 femoral lines absent. Metendosternite with moderately
long stalk and widely separated anterior arms and tendons.
Hind wing with one anal vein and one anal cell; medial
fleck rather small, oval, at least partially divided.
Legs (Figs 613–618) long and comparatively stout; trochanterofemoral attachment heteromeroid. Femur widest near half length, less than twice as wide as tibia, hardly to moderately densely setose, with long rows of obliquely directed short spines on ventral surface of fore and mid femora; tibia and tarsus moderately densely setose; terminal tarsomere about 10 times longer than tarsomere 4. Claws simple, hollowed along inner edge. Empodium distinct, bisetose. Male fore and mid tibiae with characters of sexual dimorphism (Figs 615, 616).

Abdomen with anterior margin of intercoxal process truncate or weakly emarginate at apex; with five freely articulated ventrites. Ventrite 1 longer than two following ventrites combined; ventrites 2–4 equal in length or ventrite 2 sometimes slightly longer. Ventrite 5 simple or modified apically in both sexes (e.g., in males often truncate and with weak concavity, in females with different degrees of emargination, sometimes deeply excised). In males, one or more of remaining ventrites sometimes provided with tubercles or carinae. Male abdominal segment 8 (Fig. 642) with sternite narrow; weakly emarginate medially at apex; tergite truncate to weakly emarginate at apex with moderately large, lateral, submembranous plates at base. Male genital segment (Figs 731, 732) with sternite comparatively large, emarginate at apex; paired apophyses fused along 1/3 of their length; dorsal plate undivided.

Aedeagus (Figs 806, 807) moderately long and stout, sclerotized, strongly curved near base. Median lobe with membranous gonopore at apex, poorly branched at apex. Tegmen moderately large, placed basally, ring-shaped with parameres fused and tegmental strut vestigial.

Female genitalia (Fig. 846) fused with abdominal sternite 8. Ovipositor elongate, sclerotized, with coxites entirely fused, somewhat truncate apically; sternite 8 entirely fused with coxites, without distinct borders; styli absent. Spermatheca rather small, membranous, oval; sperm duct moderately long, slender; accessory gland absent. Bursa copulatrix moderately large, long and narrow with dorso-apical outlet of common oviduct; outlet of sperm duct placed at apex, provided with small sclerite.


**Distribution.** Afrotropical Region.

**Genera incertae sedis**

**Polymus** Mulsant


– Marseul 1868: 111; Strohecker 1953: 91.

Mulsant described this species based on a single specimen from "le environs de Loudun", which is neither in Paris nor in Lyon Museums. All references in the literature are based on this specimen and it seems that apart from the author, only Marseul (1868) saw it. The subsequent redescription of Strohecker (1953) was based on the original description (Mulsant 1846) and redescription of Marseul (1868). He (Strohecker 1953) placed *Polymus* in the subfamily Eumorphinae (=Lycoperdininae) based on Marseul, who emphasized its resemblance to *Dapsa* and *Hylaia*. Strohecker (1953) indicated however that "the description of the insect could apply very well to some species of the Asiatic genus *Saula*". I studied a series of specimens from the collection of Oberthür in Paris Museum, and labelled probably by Oberthür as *Polymus nigricornis* Muls. They were collected by Simon in 1892, from Sri Lanka and Java and belong doubtless in the genus *Saula* Gerstaecker (classified in the subfamily Stenotarsinae). It is probable that the Mulsant’s specimen was mislabelled and it was not a European species, and that *Polymus* is a senior synonym of *Saula*, but without a study of the holotype of *P. nigricornis* and without any additional specimens of *Polymus* discovered from Europe its status cannot be resolved.

**Larval morphology**

*Achuarmychus* Tomaszewska et Leschen (Figs 901–910)

**Diagnosis.** Among Lycoperdininae, the larva of *Achuarmychus* is most similar to *Archipines* by having the prostheca present as two widely separate and fixed parts and 1-segmented labial palp (present also in *Eumorphus*) and to *Aphorista* and *Myctetina* by having similar-looking body. *Achuarmychus* can be distinguished from all of these larvae by having the mala fimbriate, and the terga lacking dorsal tubercles and/or sublateral lobes. Moreover it differs from *Archipines* and *Eumorphus* by the absence of deciduous tergal lobes, from *Eumorphus* by the absence of urogomphi and double hypostomal rods, and from *Aphorista* and *Myctetina* by the lack of tergal sclerotizations or verrucae.

**Description of mature larva.** 2.8 mm long, 1.5 mm wide. Body (Fig. 901) broadly ovate, moderately dorsoventrally flattened, lacking dorsal lobes or scoli, gradually narrowing posteriorly, constricted between segments; colour dark yellow tan, with tips of frayed setae, mouthparts, antennae, legs, and lateral lobes of abdominal segment 1 lighter. Surface texture microgranulate. Vestiture consisting of apically branching, frayed setae (Fig. 906), longer on the lateral lobes and denser on lateral lobes, and head.

Head transverse in dorsal view and triangular in anterior view, hypognathous, and visible in dorsal view. Epicranial stem present and short, frontal arms V-shaped. Median endocarina absent. Hypostomal rods present, single, and elongate extending to edge of cranium; par-
agarular area well developed and bordered posteriorly by a transverse endocarina. Stemmata 4 per side; 1 directly ventral to antennal insertion, the remaining stemmata positioned posterior to insertion. Antenna (Fig. 902) inserted in well developed circular membrane; partially retracted; about 0.25 x as long as head, ratio: A1:A2:A3 = 1.9:2.2:0.6; surface slightly granulate; antennomere 1 with a single campaniform sensillum; antennomere 2 with three apical and subapical setae; terminal antennomere shorter than sensorium with 4 apical scolenia and two short setae along shaft. Frontoclypeal suture present, and nearly straight. Clypeus transverse and glabrous. Labrum (Fig. 903) free; slightly longer than clypeus and 2 x wider than long, glabrous and very weakly emarginate with 4 pairs of long setae, 3 pairs of shorter anterior setae, and 6 apical setae. Epipharynx with 4 anteromedial campaniform sensilla; tormae transverse; sclerotized brace present posteriorly. Mandible (Fig. 907) more or less transverse with a simple incisor lobe lacking subapical ridges or teeth; "prostheca" present as two widely separated and fixed parts, apically bushy and posteriorly hyaline and falcate; mola well developed and finely tuberculate. Maxillolabial complex retracted; well developed articulating area present; maxilla (Fig. 904) with stipes about 2 x longer than wide, cardo divided by internal ridge, distal portion triangulate and proximal portion diminutive, well defined and longitudinally ovate; mala (Fig. 905) fimbriate and flattened distally bearing 2 inner rows of elongate rake-like setae and an outer uncus, unmodified present on the inside base (7) and outer apical margins (4); maxillary palpmere 1 short with 2 campaniform sensilla; palpmere 2 1.2 x longer and slightly wider than 1, unisetose with campaniform sensillum; palpmere 3 narrow and longer than 1 and 2 combined, unisetose, bearing an apical elongate conical sensillum. Labium (Fig. 908) with mentum and submentum fused, demarcated by a weak transverse line; prementum rather short with ligula narrowly rounded at apex; labial palps 1-segmented (palpiger not present?), elongate (over 2 x longer than basal width), bases approximate; with 1 subapical campaniform sensillum and apical elongate conical sensillum. Hypopharynx with 4 longitudinal rows of laterally directed trichia; sclerites consisting of well developed lantern-shape hypopharyngeal sclerome (Fig. 909), braco, and slightly convergent posteriorly directed hypopharyngeal rods.

Thorax about 0.5 x as long as body length, widest across mesothorax; prothorax as long as meso- and metathorax together. Terga transverse with plates absent; ec dysial suture present on segments T1-3. Terga lacking dorsal tubercles or sublateral lobes, expanded laterally to form lateral lobes (absent from T1); obvious glands absent. Lateral lobes weakly developed on T2, well developed on T3.

Legs (Fig. 910) slender, relatively long, setose, and isomorphic. Coxae widely separated at their bases; lateral surfaces with short frayed setae and a few unmodified setae. Trochanter short with 1 primary seta, at least 2 secondary setae, and 6 campaniform sensilla. Femur with two pores, 1 very long seta, 8 shorter primary setae, and 2 campaniform sensilla. Tibiotarsus narrower and about equal to femur with several setae along inner surface; claw with single subapical seta.

Abdomen. Lateral lobes well developed on A1-8; lobes on A1-7 delimited by a line of granules; long frayed setae arising from well developed lateral tubercles. Laterosterna of A1-8 bearing posterolateral lobes delimited by a furrow at their bases (especially A4-8) and smaller than tergal lobes. Abdominal sternum mainly with evenly distributed unmodified setae: S1, asetose; S2 with 4 very short frayed setae at middle and 2 at each side; S3 with 2 very short simple setae at middle; S4 with 4 elongate (= primary) setae at middle and 4 very short frayed setae at each side; S5 with 4 primary and 6 smaller (secondary) setae at middle and 3 very short frayed setae at each side; S6 with 4 primary and 10 secondary setae at middle and 1 very elongate seta at each posterolateral corner; S7 with 4 primary and 10 secondary setae at middle and 1 very elongate seta at each posterolateral corner; S8 with 4 primary and 1 very elongate seta at each posterolateral corner. Ter gnum 9 without urogomphi. Sternum 9 with 4 primary setae. Segment A10 bearing simple setae. Spiracles annular, raised on very short tubercles, hidden between tergal and sternal lobes; perispiracular setae or sensilla absent.


Acinaces Gerstaecker (Figs 911-925)

Diagnosis. Larva of Acinaces is somewhat similar to Amphix in having the body short-oval, somewhat onisciform, finely pubescent and without any processes, verrucae or tubercles. Acinaces however differs from Amphix in having the head with epicranial stem present, the frontal arms V-shaped, the spiracles visible ventrally and the body covered with fine, simple setae.

Description of mature larva – first description for the genus. Length 4.50–4.60 mm; head width 1.35 mm; width of thorax 3.20 mm; width of abdomen 3.25 mm. Body (Fig. 911) broadly-oval, somewhat onisciform, very weakly constricted between segments, convex dorsally and flat to weakly concave ventrally, with lateral parts of tergites tucked ventrally; each pleurite (visible ventrally) weakly convex bearing small patch of hairs that looks like a small process; widest at middle (across abdominal segment 2), gradually, weakly tapering anteriorly and
posteriorly; without urogomphi. Dorsum brown with sides and venter slightly paler; antennae, mouth frame and claw dark brown. Surface texture microgranulate. Vestiture consisting of short, fine, simple and moderately dense setae arising from small tubercles (ventral surfaces sparsely setose); legs covered with moderately long and long, pointed setae arising from tubercles. Head (Figs 912, 913) protractored, hypognathous, somewhat triangular, moderately flattened dorsoventrally, at least partially visible from above; about 0.83 x as long as wide and about 0.48 x as wide as prothorax; comparatively densely setose. Epicranial stem short, frontal arms long, V-shaped. Median endocarina absent. Hypostomal rods present, moderately long and divergent posteriorly. Stemmata 4 per side, hemisphaerical; 3 stemmata placed close together, situated on moderately large convexity/ tubercle, posteriorly to antennal base, and 1 stemmata situated antero-ventrally to antennal insertion. Frontoclypeal suture rather poorly marked, incomplete. Clypeus strongly transverse, bearing 2 pointed setae. Labrum (Fig. 920) free, about 1.45 x as wide as long, with anterior margin narrowly membranous, emarginate medially and sinuate laterally, bearing 2 pairs of long setae medially; sclerotized part with 3 pairs of long pointed setae transversely, near anterior margin. Epipharynx (Fig. 921) membranous; sides of anterior margin provided with 3 pairs of long, weakly curved and pointed setae; antero-median area with 2 patches of outwardly directed, fine setae and 2 pairs of pores. Antenna (Figs 914, 915) rather short and slender, 3-segmented, inserted in weak convexities of head, in circular membrane, distant from mandibular articulations. Antennomere 1 short bearing 2 dorsal pores; antennomere 2 about 8.0 x as long as 1 and over 13.0 x as long as antennomere 3, with 1 dorsal, subapical pore and 2 long, subapical setae; antennomere 3 almost 1.3 x longer than sensory appendage, subcylindrical with 2 elongate, apical process and 1 short ventral seta; sensory appendage swollen at base and abruptly narrowing towards mid length, then produced into long apical process and 2 shorter subapical processes, with 2 campaniform sensilla ventrally. Mandible (Figs 918, 919) broad, somewhat triangular with two sharp apical teeth; incisor edge weakly denticulate; ventral accessory process absent; prostheca large, membranous, minutely setose, with stiff, submembranous, curved processes in apical part; mola well developed, large, covered with coarse transverse ridges, prominent with mesal surface weakly incised; outer edge with two long, stout, pointed setae. Maxillolabial complex retracted. Maxilla (Figs 916, 917) with well-developed articulating area; cardo triangular; stipes elongate with 3 ventral setae proximal, 2 ventral setae near base of palp on outer edge, and 1 long, ventral seta mesally to palpifer. Mala almost twice as long as wide, submembranous, with 2 stout, triangular meso-apical processes; apex provided with elongate, stout and blunt apically, modified setae/ processes; dorsal surface with oblique row of 6 long, pointed setae near inner edge (Fig. 917). Maxillary palp 3-segmented, based on large membranous palpifer, provided with very long seta on ventral surface; terminal palpomere as long as palpomeres 1 and 2 combined; palpomere 1 slightly shorter than palpomere 2, with 1 ventral pore and short dorsal seta; palpomere 2 with very long seta on outer edge and group of very short processes/ sensilla on dorsal surface; terminal palpomere weakly tapering, bearing 3 moderately long setae, 1 dorsal pore and a group of short, apical sensory processes. Labium (Fig. 922) with prementum at least as long as wide, ligula submembranous, produced anteriorly into narrow densely setose, rounded lobe; postmentum large, well developed, much longer than wide with mentum and submentum fused, bearing 2 pairs of setae (2 mesal setae extremely long and 2 lateral setae moderately long); palpi 2-segmented, with palpigers submembranous, large and somewhat prominent, moderately distant from each other, each bearing 1 very long, pointed seta; palpomere 1 about 0.6 x shorter than terminal palpomere, provided with 1 short seta, directed outwardly; terminal palpomere subcylindrical, rounded at apex with 1 ventral pore and group of apical sensilla; hypopharynx (Fig. 923) with well developed, sclerotized parts consisting of large hypopharyngeal sclerome, brac- con and parallel hypopharyngeal rods; submembranous anterior part covered with dense, minute setae, directed outwardly.

Thorax about 0.45 x as long as body length, widest across metathorax; prothorax almost 3.0 x as wide as long, widest posteriorly, 1.75 x longer than mesothorax and 2.10 x longer than metathorax; ec dysial suture and a pair of small, lighter notal plates distinct on each tergum. Obvious glands absent.

Legs (Figs 924, 925) moderately long and rather stout, covered with short and a few long, pointed setae; coxae moderately widely separated at their bases, almost as long as trochanters and femur combined, with a few pointed setae, trochanter elongate, with 5 short mesal setae and 2 ventral pores; femur about 2.0 x as long as wide, with few short setae, and 3 long mesal setae; tibia and tarsus almost as long as femur, narrowing towards apex, bearing numerous, short, pointed setae; claw moderately stout with single, pointed seta.

Abdomen widest across segment 1. Segments A1–7 similar in shape, but gradually narrowing posteriorly; terga of A1–3 bearing similar notal plates as those on tho- rax; pleural regions (visible ventrally) with similar very small projections. A8 distinctly shorter and narrower than preceding segments. A9 small, postero-ventral, not visible from above. Segment 10 ventral. Spiracles small, annular, surrounded with sclerotized ring, not raised on tubes, located in folds between tergites and pleurites.

**Amphisternus** Germar
(Figs 926–941)

**Diagnosis.** The larva of *Amphisternus* is most similar to those of *Ancylops, Encymon and Eumorphus* in having the body provided with lateral, large processes and the tergite of abdominal segment 1 with gland openings. *Amphisternus* larva however can be separated from all mentioned larvae by having the body more oval, the body processes paired on each tergum, somewhat rounded apically and not being deciduous, and the apex of maxillary mala covered with numerous, long, pointed setae.

**Description of mature larva – first description for the genus.** Length 5.80 mm; head width 1.50 mm; width of thorax 4.85 mm; width of abdomen 5.20 mm. Body (Fig. 926) broadly-oval, comparatively convex dorsally and flat ventrally with lateral, tergal, paired, not deciduous processes – anterior larger, elongate-oval and posterior much smaller, somewhat triangular; body widest across abdominal segment 3 and 4, gradually narrowing anteriorly and posteriorly, constricted between segments, with long urogomphi. Dorsum well sclerotized, light brown with body processes lighter; venter pale, moderately sclerotized; mandibular apex, mola and claw dark brown. Surface texture microgranulate. Dorsum covered with dense and small but distinct tubercles with one, two or three short setae arising from each tubercle; anterior part of head covered with a few long pointed setae; ventral surfaces with very sparse and fine, simple setae arising from small tubercles; body processes (Fig. 931) with large tubercles provided with stout, pointed spines, along with setose tubercles similar to those on dorsal surface of body; legs and antennae with long, pointed setae arising from small tubercles.

Head (Figs 927, 928) retracted, not visible from above; hypognathous with mouthparts directed ventrally; moderately flattened dorsoventrally; dorsal surface with three strongly convex areas of antennal insertions and median part between antennae (Fig. 928). 0.70 × as long as wide and about 0.55 × as wide as prothorax; covered with simple, short setae arising from moderately large tubercles and a few long, pointed setae anteriorly. Epicranial stem absent; frontal arms long, U-shaped. Median endocarina absent. Hypostomal rods present, long, subparallel. Stemmata 4 per side, hemisphaerical; 3 stemmata surrounding closely antennal insertions posteriorly, ventrally and antero-ventrally and 1 stemmata situated postero-ventrally, moderately far from antennal insertion. Frontoclypeal suture poorly marked, straight. Clypeus strongly transverse, emarginate anteriorly, submembranous, bearing a few, short setae. Labrum (Fig. 936) free, about 0.50 × as long as wide, with membranous, moderately large anterior part; anterior margin of sclerotized part emarginate, and of membranous part truncate; membranous part provided with 2 pairs of setae, 1 pair of pores, and with dense brush of somewhat triangular setae on anterior margin; sclerotized part with 1 long, stout seta accompanying with one pore on each side anteriorly, and with 4 pairs of moderately long setae directed posteriorly, positioned in central area. Epipharynx (Fig. 937) membranous with 3 long stout, blunt apically, curved setae on each side of anterior margin, a few lateral rows of inwardly directed, short setae and 2 pairs of pores positioned anteriorly to moderately large central sclerotization. Antenna (Figs 929, 930) 3-segmented, long and moderately stout, about 0.75 × as long as head; situated in circular membrane; distant from mandibular articulations. Antennomere 1 very short with 1 dorsal seta and 3 ventral pores; antennomere 2 longest, about 10.0 × as long as 1 and about 20.0 × as long as antennomere 3, densely setose; sensory appendage (Fig. 930) situated meso-apically, about as large as antennomere 3, subcylindrical with somewhat sinuate, membranous apex and with small, blunt, process; antennomere 3 weakly tapering anteriorly with blunt, membranous apex. Mandible (Figs 934, 935) broad, triangular with blunt apical tooth and incisor edge somewhat chisel-shaped, provided with a few similar blunt teeth; prostheca large, membranous; ventral accessory process absent; mola large, transverse, moderately coarsely ridged and granulate; outer edge with one stout seta. Maxillolabial complex retracted. Maxilla (Figs 932, 933) with well-developed articulating area; cardo somewhat triangular with one, outer seta; stipes elongate with one ventral, long seta near palp and one long seta on outer edge, near cardo; mala about 2.5 × as long as wide, rounded apically, with apex covered with numerous, long, pointed setae and subapical, dorsal surface provided with 2 rows of very long, pointed setae (5 setae in inner row and 3 setae in outer row). Maxillary palp 3-segmented based on large, membranous palpifer provided with long outer seta; palpmere 1 with two ventral pores; palpmere 2 with one ventral pore and two setae on outer edge; terminal palpmere about 1.35 × longer than palpmeres 1 and 2 combined, somewhat conical, narrowly rounded apically, bearing 2 setae and apical group of sensilla. Labium (Fig. 938) with mentum and submentum fused; prementum without distinct ligula, sinuate anteriorly and with weakly rounded anterior angles; 2 pairs of setae positioned anteriorly, 1 pair of setae in central area between palps, 1 pair of setae directed posteriorly on hind margin and patch of outwardly directed fine setae on each side (antero-laterally); labial palp 2-segmented with palpigers moderately distant from each other; palpmere 1 cylindrical, almost as long as wide, provided with one seta; terminal palpmere elongate, about 1.4 × as long as palpmere 1, subcylindrical, weakly tapering anteriorly, rounded at apex, with two pores and group of apical sensilla; hypopharynx (Fig. 939) with well developed, sclerotized parts consisting of large hypopharyngeal sclerome, bracon and parallel, long hypopharyngeal rods; anterior submembranous part covered densely with fine setae.
Thorax about 0.38 x as long as body length, widest across metathorax, prothorax about 1.4 x as long as mesothorax and 1.28 x as long as metathorax, each tergum strongly transverse, sclerotized, meso- and metatergum with a pair of smaller lighter notal plates, and each tergum divided by pale longitudinal line. Paired lateral, tergal, not dehiscent processes present on each segment. Obvious glands absent.

Legs (Figs 940, 941) moderately long and rather stout, all pairs of subequal lengths, coxae widely separated, covered with a few moderately long, pointed setae. Trochanter elongate, somewhat triangular with one long, and few short setae, and two pores, femur subcylindrical, slender at base, weakly widening towards apex, moderately densely setose and with 1 long seta on inner edge, and 2 ventral pores, tibiotarsus narrower and about 1.25 x longer than femur, bearing numerous stout, pointed, short and moderately long setae, claw with single, long seta.

Abdomen widest across segments 3 and 4, segments A1 and A3–6 subequal in length, A2 slightly longer and A8 shorter A1 with lateral, repugnatorial gland openings (Fig 926) Segments A1–8 bearing paired lateral, tergal, not dehiscent processes, same as those on thoracic segments, and two pairs of small notal plates A9 positioned postero-ventrally with only urogomphi visible from above, segment 10 ventral. Spiracles annular, not raised on tubes, visible ventrally.

**Material examined.** *Amphisternum verrucosus* Gorham, Java occ. Tjibodas, 1400 m Rarahan, on tree trunk, Endomychid with its supposed larva (1 BMNH) – associated with adults, *Amphisternum verrucosus*, det H F Strohecker.

**Amphix** Laporte (Figs 942–958)

**Diagnosis** The larva of *Amphix* can resemble *Actinaces* in having the body short-oval, onisciform, almost glabrous and without any processes, verrucae or tubercles, but it is separated from *Actinaces* in having the head without epipranial stem, the frontal arms U-shaped, the spiracles placed dorsally and the body being apparently glabrous.

**Description of mature larva – first description for the species** Length 5.00–6.00 mm, head width 1.75–1.80 mm, width of thorax 3.50–4.60 mm, width of abdomen 4.80–5.00 mm. Body (Fig 942) broadly-ovate, onisciform, very weakly constricted between segments, comparatively convex dorsally and flat ventrally, without body processes, apparently glabrous, widest at middle (across abdominal segment 2), gradually tapering anteriorly and posteriorly, without urogomphi. Dorsum light brown with sides pale, venter slightly paler and feeble sclerotized than dorsum, mandibular apex and mola, claw and dorsal body plates dark brown. Surface texture microgranulate. Dorsal vestiture consisting of sparse, minute club-like setae (Fig 950) (slightly longer and denser laterally) and sparse simple setae on anterior and ventral surfaces of head, ventral surfaces covered with very sparse simple, minute setae, legs covered with stout, erect, pointed setae of different length.

**Head** (Figs 943, 944) protracted, partially visible from above, hypognathous, somewhat triangularly-oval, moderately flattened dorsoventrally, about 0.70 x as long as wide and about 0.60 x as wide as prothorax, covered with club-shaped setae posteriorly and moderately dense, pointed setae anteriorly. Epicranial stem and median endocarina absent, frontal arms long, U-shaped Hypostomal rods long and subparallel. Stemmata 4 per side, hemispherical, 3 stemmata close together and situated posteriorly to antennal insertions, and 1 stemmata positioned antero-ventrally to antennal insertion. Frontoclypeal suture rather weakly developed, straight Clypeus transverse, bearing few pointed setae. Labrum (Fig 951) free, about 1.75 x as wide as long, with anterior moderately large submembranous part, anterior margin sinuate, bearing 4 pairs of setae and 2 pores, sclerotized part with 2 long setae antero-laterally on each side, 6 median setae and 2 pores positioned laterally, and 2 pairs of setae near posterior margin. Epipharynx (Fig 952) membranous with two antero-lateral patches of short spines directed inwardly and 2 pairs of pores in central area, postero median part with large sclerotization, accompanying with patches of dense setae laterally and a pair of campaniform sensilla anteriorly. Antenna (Figs 945, 946) comparatively long (about 0.75 x as long as head) and rather slender, 3 segmented, situated in circular membrane, distant from mandibular articulations. Antennomere 1 very short, antennomere 2 longest, about 11.5 x as long as antennomere 1 and almost 14.5 x as long as antennomere 3, covered densely with very fine pubescence, with 2 very long subapical, pointed setae and two ventral pores, antennomere 3 subequal in length with sensory appendage, broad basally and narrowing towards apex with pointed apical processes, sensory appendage elongate, subcylindrical with acute process apically and two setae of different length. Mandible (Figs 947, 948) broad, somewhat triangular with blunt apex, incisor edge weakly hollowed medially with sharp edges, ventral accessory process absent, prostheca moderately large, membranous with apex acutely produced mesally, mola well developed, large, prominent with mesal surface somewhat arcuate, and transversely ridged, outer edge with two long, stout setae, ventral surface, near outer edge with 2 moderately long setae. Maxillolabial complex retracted Maxilla (Fig 953) with well-developed, articulating area, cardo elongate, stipes more than 2.0 x as long as wide, with numerous ventral setae proximal, and one ventral pore. Mala about 4.0 x as long as wide, submembranous, covered with dense...
fringe of long apical setae and one ventral subapical, very long, pointed seta, dorsal surface provided with elongate row of 8 very long, pointed subapical setae near inner edge. Maxillary palp 3-segmented, based on large membranous palpifer, provided with 2 very long setae on outer edge, palpomere 1 provided with 2 ventral pores, subequal in length with terminal palpomere and slightly longer than palpomere 2, palpomere 2 with long seta on outer edge and one ventral pore, terminal palpomere (Fig 954) subcylindrical, weakly tapering apically, provided with short subapical seta, one subapical pore and apical group of short sensory processes Labium (Fig 955) with mentum and submentum fused, prementum almost as long as wide, with weakly rounded apical margin and somewhat produced basally into narrowly rounded median lobe, ligula submembranous with numerous short spinules, 2 long, pointed setae and 2 pores, posterior part of prementum with 2 stout setae behind palps and 2 setae directed backwardly, each situated laterally on posterior margin, postmentum moderately large, well developed, palpi 2 segmented, with palps distant from each other, palpomere 1 about 0.75 x as long as terminal palpomere 1, provided with 1 very long seta on outer edge, terminal palpomere subcylindrical, rounded at apex with group of apical sensilla, hypopharynx (Fig 956) with well developed, sclerotized parts consisting of large hypopharyngeal sclerome, bracon and subparallel hypopharyngeal rods, anterior membranous part covered laterally and apically with very dense minute setae, directed inwardly.

Thorax about 0.55 x as long as body length, widest across metatorax, prothorax about 0.40 x as wide as long, widest near mid length, 1.37 x longer than meso or metatorax, protergum bearing two large natal plates, mesotergum about 0.25 x as wide as and metatergum about 0.25 x as wide as long, each with two moderately large, tergal plates (distinctly smaller than those on prothorax), broad ecdysial line present on each tergum Obvious glands absent.

Legs (Figs 957, 958) moderately long and stout, coxae about 3 x longer than wide, moderately widely separated at their bases, covered with a few rather short setae, trochanters elongate, triangular with a few short and one very long setae, and two ventral pores, femur elongate, about 2.4 x as long as wide, with numerous short setae, 1 long mesal seta and 1 ventral pore, tibiotarsus about 1.2 x as long as femur, narrowing towards apex, bearing a few short setae on dorsal and ventral surfaces and 7 setae on inner edge, claw rather slender with single, long seta.

Abdomen widest across segment 2 Segments A1–7 similar in shape, terga A1–8 bearing natal plates similar to those on thorax, but smaller, A1 (Fig 949) with small, paired, pubescent tubercle on sides, A2–8 with very small, dark, granulated plates near spiracles A8 distinctly shorter than preceding segments A9 short, rounded posteriorly Segment 10 posteroventral Spiracles located dorsally, small, annular, accompanying with slightly smaller rounded tubercle, both surrounded with sclerotized ring, not raised on tubes (Figs 942, 949).

Material examined. Amphix vestitus cinctus (Fabr.); Canal Zone Achiote Rd, 9 mi SW Gatun, 19 VI 1976, surface of logs 4138 [FL (Newton), ascomyc Amphix sp (6 ANIC) – associated with adults.

Aphorista Gorham (Figs 959–976)

Diagnosis. The larva of Aphorista is most similar to Mycetina. Both larvae share numerous characters including the body with short thoracic and abdominal lateral, tergal lobes, vestiture of specialized fan-shaped setae, the tergal plates with weak protuberances/verrucae, the tegum 9 emarginate and the labrum with anterior margin multidentulate. Aphorista can be separated from Mycetina by having the thoracic segments 2 and 3 with one pair of dorsal, tergal protuberances, the frayed setae shorter, the antennal sockets placed in about mid length of head and the caudal notch on the abdominal tergite 9 weakly emarginate.

Description of mature larva. Length 800 mm, head width 1.35 mm, width of thorax 3.55 mm, width of abdomen 4.00 mm Body (Fig 959) elongate-oval, somewhat onisciform, constricted between segments, weakly dorsoventrally flattened, with lateral pleural and tergal, small processes, widest at middle (across abdominal segment 3), gradually, weakly tapering anteriorly and posteriorly, without urogomphi Dorsum yellowish-brown with venter slightly paler, feeble sclerotized than dorsum, mandibular apex and mola dark brown Surface texture microgranulate Dorsal vestiture consisting of frayed (fan-shaped) setae arising from distinct tubercles (Fig 963) (longer on lobes – Fig 962) and sparse simple setae on head, ventral surfaces covered with numerous simple minute setae, and sparse frayed setae, body processes provided with modified setae and legs covered mainly with short and long, pointed setae arising from small tubercles.

Head (Figs 960, 961) protracted, hypognathous, somewhat triangular, moderately flattened dorsoventrally, partially visible from above, about 0.74 x as long as wide and about 0.46 x as wide as prothorax, covered with fan-shaped setae and a few long, pointed setae anteriorly Epicranial stem very short, frontal arms long, V-shaped Median endocarina absent Hypostomal rods present, long and divergent posteriorly Stemmata 4 per side, hemispherical, 2 stemmata close together and situated posteriorly to antennal base, 1 situated far posteriorly to both of them, and 1 positioned ventrally to antennal insertion F1ontoclypeal suture rather distinct and almost straight Clypeus transverse, bearing few
pointed setae. Labrum (Fig. 973) free, about 2.3 × as wide as long, rather evenly sclerotized; anterior margin bearing 6 obtuse denticles, 2 short setae laterally and 2 pores positioned medially; two median setae near anterior margin, one very long, pointed seta, each on lateral edge and posterior half bearing three pairs of long setae positioned transversely near posterior margin and two pores anteriorly to them. Epipharynx (Fig. 974) membranous; each side of anterior margin provided with five long, obliquely directed, curved and pointed setae; central part with two patches of somewhat posteriorly directed, short spinules; lateral parts with similar short spinules, directed antero-mesally; median area, near posterior margin with 3 pairs of sensilla. Antenna (Figs 964, 965) rather short and slender, 3-segmented, situated in large, circular membrane, distant from mandibular articulations. Antennomere 1 short; antennomere 2 about 4.5 × as long as 1 and almost 15.0 × as long as antennomere 3, with three long, subapical setae and one campaniform sensillum near mid length; antennomere 3 almost 2 × shorter than sensory appendage, subcylindrical with 4 long, apical setae and 1 acute, apical process; sensory appendage elongate, swollen at base and distinctly narrowing apically, incised at apex in two pointed processes. Mandible (Figs 969, 970) broad, somewhat triangular with pointed apical tooth; incisor edge sharp with a few small, subapical teeth; ventral accessory process absent; prostheca moderately large, membranous, minutely setose; mola well developed, moderately large, prominent with mesal surface somewhat arcuate, with coarse, transverse ridges; outer edge with two long, stout setae; ventral surface, near mola with minute spinules, directed mesally. Maxillolabial complex retracted. Maxilla (Figs 966, 967) with well-developed articulating area; cardo somewhat triangular; stipes elongate with 2 ventral setae proximal, 1 ventral seta near base of palp, 1 ventral and one dorsal short setae directed mesally, near mala, and two long setae on outer edge near palp. Mala about twice as long as wide, membranous, covered densely with long, pointed setae on apical, ventral surface (Fig. 966); dorsal surface provided with many similar setae on apical edge, additionally with oblique row of long setae/ spines across middle part of mala, and 6 campaniform sensilla near them (Fig. 967). Maxillary palp 3-segmented, based on large membranous palpalifer, provided with very long seta on outer edge; terminal palpomere longest, about as long as palpomeres 1 and 2 combined; palpomere 1 with 2 ventral pores, palpomere 2 with 1 ventral and 1 dorsal pore and long seta on outer edge, terminal palpomere (Fig. 968) subcylindrical, weakly tapering apically, bearing a group of short, apical sensory processes. Labium (Fig. 971) with prementum short, much wider than long, provided with 2 pairs of very long, pointed setae between palps and 2 pairs of short setae near posterior edge; ligula membranous, widely rounded at apex, with 3 apical setae; postmentum large, well developed; men- tum and submentum fused; palpi 2-segmented, with bases distant from each other; palpomere 1 about 2 × shorter than terminal palpomere, provided with 1 very long seta; terminal palpomere subcylindrical, rounded at apex, bearing group of apical sensilla; hypopharynx (Fig. 972) with well developed, sclerotized parts consisting of large hypopharyngeal sclerome, bracoon and subparallel hypopharyngeal rods; membranous anterior part covered densely with minute setae.

Thorax about 0.35 × as long as body width, widest across metathorax; prothorax about 2.20 × as wide as long, widest near posterior third, 1.65 × longer than mesothorax and 1.80 × longer than metathorax; protergum bearing two large natal plates and small lateral projections; meso- and metatergum about 4.3–4.6 × as wide as long, each with a pair of moderately large, tergal plates (much smaller than those on prothorax) and with lateral lobes covered with fan-like setae; ecys- sial suture distinct on pro- and mesotergum and at least partially on metatergum. Obvious glands absent.

Legs (Figs 975, 976) moderately long and stout, covered with comparatively long, stout, pointed setae, and coxa provided also with sparse frayed setae; coxae moderately widely separated at their bases, with a few pointed setae and a few fan-shaped setae; trochanter elongate, somewhat triangular with 7 short and one long, mesal setae; femur elongate, about 3 × as long as wide, with numerous short setae, 2 moderately long mesal setae and 1 ventral pore; tibiotarsus about as long as femur, narrowing towards apex, bearing numerous, short setae; claw slender with single seta.

Abdomen widest across segment 3. Segments A1–7 similar in shape; terga bearing 2 pairs of dark (more setose) natal plates (lateral plates smaller than medial ones) and with dorsolateral lobe on each side; pleural regions with similar projections — all covered with frayed setae (Fig. 962). A8 distinctly narrower than preceding segments, provided with a pair of median, setose tubercles, situated near posterior margin. A9 small, emarginate posteriorly. Segment 10 ventral.

Spiracles very small, annular, surrounded with sclero- tized ring, not raised on tubes, located in folds beneath tergal lobes.


Archipines Strohecker (Figs 977–993)

**Diagnosis.** The larva of Archipines is similar to Eumorpha, Encyphon and Ancylopus, which are oval or elongate and have dehiscent processes on abdominal
terga and pleura, but possessing the distinctly emarginate tergum 9, Archipines resembles Aphorista and Mycetina, and having 1-segmented labial palpi it resembles Eumorphus and Achuarmycthus. Among all these genera Archipines is most similar to Achuarmycthus, sharing also the prosthecum present as two widely separated and fixed parts. Archipines larva however can be distinguished from all of these genera by having the mandible with acute apex, provided with long spine, the mala covered with two kinds of setae at apex, and the claw with stout, rounded apically seta.

**Description of mature larva.** Length 3.50 mm; head width 1.25 mm; width of thorax 2.50 mm; width of abdomen 2.80 mm. Body (Fig. 977) ovate, flattened dorsoventrally with lateral, pleural and tergal, turgid, large processes (tergal processes deciduous – easily breaking off, leaving scars); widest across abdominal segment 2, gradually narrowing posteriorly, constricted between segments, without urognathophore. Dorsum yellowish brown, well sclerotized; venter lighter, slightly feeler sclerotized than dorsum; mola dark brown. Dorsal vestiture moderately dense, consists of long, erect, branched (easily breaking off) setae (Fig. 984) born on conical, truncate apically tubercles, and very fine, simple pubescence covering fine microsculpture on basal parts of processes.

Head (Fig. 978) protracted, hypognathous with mouthparts directed ventrally, not visible from above, moderately flattened dorsoventrally; 0.7 x as long as wide and about 0.5 x as wide as prothorax. Stemmata 4 on each side, hemispherical; one positioned outwardly and three posteriorly to antennal insertion. Epicranial stem short but very distinct; frontal arms long, V-shaped. Frons broad, with 3 pairs of pores posteriorly, and moderately densely covered with setal tubercles near clypeus. Frontoclypeal suture more or less distinct, weakly arcuate. Clypeus transverse, submembraneous. Labrum (Fig. 982) free, with anterior margin broadly, shallowly emarginate; 0.45 x as long as wide, with 3 pairs of long, stout setae (one pair positioned in central area, second directed mesally, near anterior angles, third pair on outer edge) and 3 pairs of short setae and two pores along anterior margin. Epipharynx (Fig. 983) membranous with two oblique rows of stout, moderately long setae directed inwardly and 3 pairs of pores in central area. Antenna (Figs 979, 980) 3-segmented, more than 0.3 x as long as head; inserted in large, circular membrane, distant from mandibular articulations. Antennomere 1 short with 4 pores; antennomere 2 longest, 3.8 x as long as antennomere 1 and 2.5 x as long as antennomere 3, with 2 mesal setae near apex and 1 pore near outer edge in apical part; sensory appendage (Fig. 980) situated ventro-medially, about 0.5 x as long as antennomere 3, with elongate, cylindrical, stout process in mid length, near antennomere 3 and a few apical setae and membranous sensilla; antennomere 3 weakly curved outwardly in mid length, rounded at apex, with 4 apical processes (one pointed, two cylindrical and one rounded apically) and a few fine hairs. Mandible (Fig. 981) broad, triangular with acute apex provided with long, stout spine directed mesally; prosthecum large, divided in two separated parts – apical part covered with long spines and basal, membranous lobe; ventral accessory process absent; mola large, transversely ridged; outer mandibular edge with one stout seta. Maxillolabial complex retracted. Maxilla (Figs 985, 986) with well-developed articulating area, with cardo semi-oval and stipes long-oval. Mala about 2 x as long as wide, elongate apically into narrow, rounded lobe covered with tuft of long setae thickened apically on one side (Fig. 987); rest of apical margin (from apex toward palp) with symmetrically thickened apically long setae (Fig. 988); outer edge of stipes (between palp and cardo) with three long, simple, pointed setae; mesal edge with single, ventral pore. Maxillary palp 3-segmented based on short membranous palpifer, bearing one, very long seta; palpmere 1 very short with two pores, palpmere 2 longer than wide with 3 setae and fine pubescence, terminal palpmere more than 7 x as long as 1st and almost 2 x as long as 2nd, tapering towards apex and rounded, bearing 2 setae, 5 pores and a group of sensilla at apex. Labium (Fig. 989) concave ventrally, as to be folded with palpi directed backwardly; with mentum and submentum fused; prementum short, transverse with median, triangular sensory area; ligula membranous, short, deeply emarginate medially at apex, bearing 6 pairs of moderately long and 1 pair of very long, pointed setae along apical margin; labial palp 1-segmented arising from membranous palpifer; palp somewhat conical, rounded at apex with one subapical and a few apical sensilla; hypopharynx (Fig. 990) with well developed, sclerotized parts consisting of large hypopharyngeal sclerome, bracan and divergent posteriorly hypopharyngeal rods; anterior membranous parts with a few rows of oblique rows of minute hairs directed mesally.

Thorax about 0.3 x as long as body length, widest across mesothorax; prothorax as long as meso- and metathorax together; each tergum strongly transverse, sclerotized and divided by pale longitudinal line. Pro- and mesothorax with large, lateral, pleural and tergal lobes; metathorax with only pleural lobes. Obvious glands absent.

Legs (Figs 992, 993) slender, comparatively long; all pairs of subequal length with coxae rather widely separated, covered with numerous pointed setae. Trochanter weakly triangular with 1 spine, 4 setae and 3 pores; femur cylindrical with 2 pores, 1 spine and 1 seta; tibiotarsus distinctly narrower and slightly longer than femur, flattened medially and bearing numerous stout, pointed setae on inner edge; claw long with single seta.

Abdomen widest across segment 2, bearing largest tergal processes; A1 longest, A2–3 and A7–8 slightly shorter than A1, subequal; A4–6 equal in length, shortest. A1–8 bearing pleural, not dehiscent and tergal dehiscent.
processes as shown on Fig. 991 (most of abdominal tergal processes broken off, leaving large scars); each tergite between processes covered with numerous long setae. A7–8 weakly arcuate; A9 emarginate medially with apical setae; segment 10 posteroverentral, weakly emarginate. Spiracles annular, not raised on tubes, situated between tergal and pleural processes.


**Encymon** Gerstäcker
(Figs 994–1009)

**Diagnosis.** The larva of *Encymon* seems to be related with *Eumorphus* and *Anyclyopus*. The body elongate with lateral, long, branch-like, at least subacutic apically, dehiscent thoracic and abdominal processes, the apex of maxillary mala with 4 rows of hook-like setae on ventral surface and the tergite of abdominal segment 1 with gland openings are shared by these larvae. *Encymon* however can be separated from both larvae in having the antenna with antennomere 2 more than 20.0 × longer than antennomere 1. Moreover it differs from *Anyclyopus* larva by having the head not bulged behind antennal fossae, the body processes more acute apically and the abdominal segments lacking tergal plates, while the body processes provided with larger, setose tubercles and the pleural body processes being also deciduous separate it from *Eumorphus* larva. The gland openings present on the tergite of abdominal segment 1 is shared also with *Amphisternus* larva, but the body processes in *Amphisternus* being not dehiscent, shorter, blunt or rounded at apex, and the mala differently setose, separate both genera.

**Description of mature larva – first description for the genus.** Length 6.50–7.00 mm; head width 1.55–1.65 mm; width of thorax 2.15–2.50 mm; width of abdomen 2.40–2.70 mm (width of body parts excluding processes). Body (Fig. 994) long-oval, moderately flattened dorsoventrally with lateral, pleural and tergal, elonget, somewhat pointed apically, large, deciduous processes, easily breaking off, leaving scars; body widest across abdominal segment 1 (excluding processes), weakly narrowing anteriorly and posteriorly; short urogomphi present. Dorsum light brown, moderately sclerotized; venter slightly lighter, feeble sclerotized than dorsum; mouth frame, mandibles and claw dark brown. Body vestiture moderately dense, consists of pointed setae of different length, arising from very small tubercles, and only body processes provided with large tubercles (Fig. 997).

Head (Figs 995, 996) protracted, visible from above, hypognathous with mouthparts directed ventrally; moderately flattened dorsoventrally; about 0.70 × as long as wide and slightly narrower than prothorax; provided with 4 pairs of long setae anteriorly and moderately densely setose posteriorly. Epicranial stem and median endocarina absent; frontal arms long, U-shaped. Hypostomal rods very long, weakly arcuate and convergent posteriorly. Stemmata 4 per side, hemispherical; all stemmata moderately close together and situated postero-ventrally to antennal base – 3 stemmata positioned in straight line and 1 stemmata ventrally to anterior one. Frontoclypeal suture distinct and straight. Clypeus transverse, submembranous, bearing a pair of long setae. Labrum (Fig. 1007) free, about 0.50 × as long as wide, with membranous, moderately large anterior part; anterior margin of both – sclerotized and membranous parts – emarginate medially; membranous part provided with 3 pairs of setae and a few fine setae on anterior margin; sclerotized part with 2 pairs of setae on each side anteriorly, and 1 pair of moderately long setae positioned in central area, and 1 pore between them. Epipharynx (Fig. 1008) submembranous with a pair of antero-lateral and a pair of postero-medial patches of inwardly directed, short setae, and 3 long, stout, blunt apically setae situated on both sides of anterior margin. Antenna (Figs 998, 999) 3-segmented, long and moderately slender, at least 1.5 × longer than head; situated in circular membrane; distant from mandibular articulations. Antennomere 1 very short without setae or pores; antennomere 2 very long, 25.0 × as long as antennomeres 1 and 3, densely covered with long, pointed setae; sensory appendage (Fig. 999) situated apically, about as long as antennomere 3, subcylindrical with narrow, blunt apical process; antennomere 3 with three apical, pointed setae and long, apical, pointed process. Mandible (Figs 1001, 1002) very broad, triangular with two blunt apical teeth and incisor edge with two or three, small and blunt subapical teeth; ventral accessory process absent; prostheca moderately large, with apical part sclerotized and basal part membranous provided with small denticles; mola large, moderately coarsely, transversely ridged; outer edge with 4 stout setae; ventral surface with 1 pore near prostheca and 1 long, pointed seta near outer edge. Maxillolabial complex retracted. Maxilla (Figs 1003, 1004) with well developed articulating area; cardo triangular; stipes elongate with 1 ventral seta in central area and 1 seta on outer edge, beyond palp. Mala about 3 × as long as wide, produced triangularly into subacute apex; ventral apical surface covered with 4 oblique rows of long, curved apically setae; dorsal apical surface with numerous fine setae and 7 inwardly directed long, stout and pointed, subapical spines near inner edge. Maxillary palp 3-segmented based on large, membranous palipfer provided with long stout seta on outer edge; palpomere 1 shortest with 1 ventral pore and 1 ventral seta; palpomere 2 with 1 ventral pore and 1 seta on outer edge; terminal palpomere about 1.35 × as long as palpomere 2 and about 3.0 × as long as palpomere 1, cylindrical and rounded at apex, bearing 2 ventral setae and group of
sensilla at apex. Labium (Fig. 1005) with distinct suture between mentum and submentum; prementum with ligula widely rounded apically with 3 pairs of setae anteriorly and one pair of long setae medially; mentum with numerous setae anteriorly; labial palp 2-segmented with palpigers distant from each other; palpmere 1 large, distinctly widening anteriorly, longer and much wider than terminal palpmere, densely setose; terminal palpmere subcylindrical, rounded apically, with group of apical sensilla; hypopharynx (Fig. 1006) with well developed, sclerotized parts consisting of large hypopharyngeal sclerome, bracoon and long, parallel hypopharyngeal rods; anterior submembranous part with lateral patches of inwardly directed, moderately long setae.

Thorax about 0.3 × as long as body length, widest across metathorax; prothorax slightly shorter than meso- and metathorax combined; each tergum strongly transverse, sclerotized, meso- and metatergum with small lighter notal plates, and each tergum divided by pale longitudinal line. Long, lateral, tergal dehiscent processes present on each segment; pleural processes absent. Obvious glands absent.

Legs (Fig. 1009) very long and rather slender; all pairs of subequal length; coxae widely separated, covered with numerous short, pointed setae. Trochanter somewhat triangular with 5 long setae on inner edge and 1 seta on outer edge; femur about 4.30 × as long as wide, subcylindrical, with a few short setae on outer edge and more densely setose on inner edge, additionally with 1 very long seta in mid length; tibiotarsus longest, distinctly narrower and 1.35 × longer than femur, bearing numerous stout, pointed, moderately short setae; claw slender with single, short seta.

Abdomen widest across segment 1 and gradually narrowing posteriorly; segments A2-7 bearing lateral long, dehiscent, tergal and pleural processes (in Fig. 994 almost all processes broken off); A1 with lateral, repugnatorial gland openings, each accompanying with tergal process modified into short, rounded apically lobed covered with long spines (Figs 994, 1000); A8 slightly shorter than preceding ones, provided only with pleural processes. Segment 9 short with distinct urogomphi; segment 10 ventral. Spiracles annular, not raised on tubes.


**Eumorphus** Weber

(Figs 1010–1027)

**Diagnosis.** The larva of *Eumorphus* is most similar to *Encymon* and *Ancyroplus* by having the body elongate with lateral, long, branch-like, at least subacute apically, dehiscent thoracic and abdominal processes, the apex of maxillary mala with 4 rows of hook-like setae on ventral surface and the tergite of abdominal segment 1 with gland openings. The head not bulged behind antennal fossae and the body processes more acute apically distinguish *Eumorphus* from *Ancyroplus* while the pleural body processes being not deciduous and the antennomere 2 less than 20.0 × as long as antennomere 1 separate it from *Encymon*. The tergite of abdominal segment 1 with gland openings is shared also with *Amphisternus* larva, but the different body processes (shorter, blunt or rounded at apex and not dehiscent, in *Amphisternus*), and the mala differently setose, separate both genera. The double hypostomal rods in *Eumorphus* are shared with *Lycoperdina*. *Eumorphus* however differs from *Lycoperdina* by mentioned above characters and by having the head hypognathous with the antennal insertions distant from mandibular articulations.

**Description of mature larva.** Length 10.00 mm (11.50 mm including urogomphi); head width 3.00 mm; width of thorax 3.80 mm; width of abdomen 4.25 mm (width of body parts excluding processes). Body (Fig. 1010) long-oval, flattened dorsoventrally with lateral, pleural and tergal, elongate, somewhat pointed apically, large processes (tergals processes deciduous – easily breaking off, leaving scars); body, including processes, widest posteriorly, across abdominal segments 4 and 5, weakly narrowing anteriorly towards metathorax and scarcely narrowing towards A7, thence strongly narrowing posteriorly; long urogomphi present. Dorsum light brown, well sclerotized, venter slightly lighter, moderately sclerotized; mala dark brown. Dorsal vestiture moderately dense, consists of short, frayed setae arising from small tubercles and simple, short and moderately long scate on anterior part of head; ventral surface comparatively densely covered with simple, short setae; body processes and legs bearing long, pointed setae arising from small tubercles (Figs 1018, 1019, 1026).

Head (Figs 1011, 1012) protracted, visible from above, hypognathous with mouthparts directed ventrally; moderately flattened dorsoventrally; 0.55 × as long as wide and about as wide as prothorax; covered with fan-shaped seate posteriorly and simple, shorter and longer seate anteriorly. Epicranial stem short but distinct, frontal arms long, U-shaped. Median endocarina absent. Hypostomal rods double, long and short, subparallel. Stemmata 4 per side, hemispherical; 2 stemmata close together and situated posteriorly to antennal base, 1 situated far posteriorly to both of them, and 1 positioned antero-ventrally to antennal insertion. Frontoclypeal seate distinct and straight. Clypeus transverse, submembranous, bearing few pointed setae. Labrum (Fig. 1020) free, about 0.44 × as long as wide, with membranous, moderately large anterior part; anterior margin truncate or very shallowly emarginate, provided with 2 pairs of setae and 1 pair of pores; sclerotized part with 6 long, stout setae on each side anteriorly, and 1 pair very long and 3 pairs of moderately long setae positioned in central area. Epipharynx
(Fig. 1021) membranous with a pair of anterior and a pair of central patches of inwardly directed, short setae, and 2 pairs of pores anteriorly and posteriorly to small central, cross-shaped sclerotization. Antenna (Figs 1013, 1014) 3-segmented, comparatively long and slender, about 0.55 x as long as head; situated in large, circular membrane; partially retracted into antennal insertions; distant from mandibular articulations. Antennomere 1 short with 2 dorsal setae, 5 dorsal pores and 1 ventral pore; antennomere 2 longest, 4.1 x as long as antennomere 1 and about 14.0 x as long as antennomere 3, with 1 dorsal and 3 ventral pores and 3 very long subapical setae; sensory appendage (Fig. 1014) situated apically, about as long as antennomere 3, subcylindrical with narrow, blunt apical process; antennomere 3 with 3 apical, pointed setae and 1 minute, rounded apically process. Mandible (Figs 1015, 1016) very broad, triangular with blunt apex and incisor edge somewhat chisel-shaped lacking subapical teeth; prostheca moderately large, membranous with additional submembranous process denticulate on its inner edge; mola large, finely ridged transversely; outer edge with 4 stout setae. Maxillolabial complex retracted. Maxilla (Figs 1022, 1023) with well-developed articulating area; cardo triangular; stipes elongate with 5 ventral, long setae near outer edge, beyond palp; mala about 3 x as long as wide, produced into subacute apex, with ventral surface covered with four, oblique rows of long setae, somewhat curved apically and with numerous fine setae on apical-dorsal surface, and dorsal surface below apex provided with elongate row of nine, long, pointed spines, near inner edge. Maxillary palp 3-segmented based on large, membranous palpifer; palpomere 1 with 2 pores and 1 ventral and 1 dorsal setae; palpomere 2 with 1 dorsal, 1 ventral and 4 outer setae and 1 ventral pore; terminal palpomere about 1.7 x as long as 2 and over 3 x as long as palpomere 1, cylindrical and rounded at apex, bearing 1 ventral and 1 dorsal setae and group of sensilla at apex. Labium (Fig. 1024) somewhat pentagonal with mentum and submentum fused; prementum densely setose without distinct ligula, truncate anteriorly, with right-angled anterior angles; labial palpi 1-segmented, rounded apically, each with two pores and group of apical sensilla, situated in large, membranous palpigers distant from each other; hypopharynx (Fig. 1025) with well-developed, large sclerotized parts consisting of large hypopharyngeal sclerome, bracon and parallel hypopharyngeal rods; anterior submembranous part with seven pairs of obliquely directed rows of moderately long setae.

Thorax about 0.4 x as long as body length, widest across metathorax; prothorax as long as meso- and metathorax combined; each tergum strongly transverse, sclerotized, with lighter notal plates, and divided by pale longitudinal line. Long, lateral, tergal dehiscent processes present on each segment. Obvious glands absent.

Legs (Figs 1026, 1027) long and rather slender; all pairs of subequall length with coxae widely separated, covered with numerous short and a few long pointed setae. Trochanters somewhat triangular with 1 very long, 1 slightly shorter and a few short setae; femur subcylindrical, slender at base, densely setose, with 1 very long seta on inner edge; tibiotarsus longest, distinctly narrower and slightly longer than femur, scarcely flattened mediually and bearing numerous stout, pointed, short setae; claw rather slender with single, comparatively long seta.

Abdomen widest across segment 5 and posteriorly to it, bearing longest tergal processes; segments A1–7 subequal in length, A8 slightly shorter. A1 with lateral gland openings (Fig. 1017) and modified tergal process (very small, covered with fan-shaped setae). Segments A1–8 bearing pleural, not dehiscent processes and A2–8 bearing tergal dehiscent processes as shown on Fig. 1010—many of abdominal tergal processes broken off leaving scars. A9 short with long urogomphi; A10 ventral. Spiracles annular, not raised on tubes, located in folds between tergal and pleural lobes.


**Lycoperdina** Latreille
(Figs 1028–1041)

**Diagnosis.** The larva of _Lycoperdina_ is very distinctive among known larvae of Lycoperdinidae by its body provided with paired acute, dorsal processes and the head prognathous with the antennal sockets placed close to the mandibular articulations. The double hypostomal rods in _Lycoperdina_ are shared with _Eumorophus_, but the characters mentioned above separate easily the larvae of both genera.

**Description of mature larva.** Length 9.40 mm; head width 1.45 mm; width of thorax 2.95 mm; width of abdomen 3.40 mm. Body (Fig. 1028) elongate, weakly dorsoventrally flattened with dorsolateral and lateral, pleural and tergal, small verrucae, and with paired dorsal spines along midline; widest at middle (across abdominal segment 3), gradually tapering anteriorly and posteriorly; with urogomphi. Dorsum yellowish brown, well sclerotized; venter lighter, slightly feeble sclerotized than dorsum; mola dark brown. Dorsal vestiture consisting of simple, moderately dense, short and suberect setae; ventral surfaces sparsely pubescent; body processes and legs covered with longer setae arising from very small tubercles.

Head (Figs 1029, 1030) protracted, visible from above, prognathous; transversely-oval in dorsal view
and somewhat triangular in anterior view; about 0.65 x as long as wide and 0.65 x as wide as prothorax. Epirac- nial stem absent, frontal arms long, U-shaped. Median endocarina absent. Hypostomal rods present, paired (long and short). Stemmata 4 per side, hemispherical; 1 ventral to antennal insertion, remaining stemmata positioned posteriorly to first one (almost in straight line). Frontoclypeal suture distinct, and arcuate. Clypeus transverse, submembranous. Labrum (Fig. 1037) free, with anterior margin truncate; nearly 2 times as wide as long, with 5 pairs of long, stout setae (two pairs positioned on sides near anterior margin, two pairs positioned on lateral edges near mid length and fifth pair positioned in central area). Epipharynx (Fig. 1038) membranous with 3 stout spines on each side of anterior margin and with a few oblique rows of stout, short spines anteriorly and 2 pairs of pores in central area. Antenna (Fig. 1034) 3-segmented, very short, situated in large, circular membrane, inserted near mandibular articulation. Antennomere 1 with 1 ventral and 2 dorsal pores; antennomere 2 longest, 2.0 x as long as antennomere 1 and almost 3.0 x as long as antennomere 3, with 1 dorsal pore, and 1 short dorsal, and 1 short ventral setae – each near apex; antennomere 3 about as long as sensory appendage, subcylindrical with truncate apex and 6 apical processes; sensory appendage elongate, tapering with subacute apex. Mandible (Fig. 1033) short and broad, with truncate apex; incisor lobe without subapical ridges or teeth; protheca moderately large, membranous with obtuse, submembranous accessory process; mola well developed, large, finely ridged and tuberculate; outer edge with one stout seta. Maxillolabial complex retracted. Maxilla (Figs 1035, 1036) with well-developed articulating area; cardo somewhat pentagonal with 1 seta; stipes elongate with ventral surface provided with 2 setae proximad and 1 seta near base; mala about 1.5 x as long as wide, membranous, covered with dense fringe of long setae ventrally, many short spines dorsally, 6 subapical stout spines surrounding mesal edge and one stout spine below them on dorsal surface. Maxillary palp 3-segmented based on short membranous palpifer; maxillary palpmere 1 in form of sclerotized, incomplete ring provided with two ventral pores, palpmere 2 slightly narrower and about as long as palpmere 1, terminal palpmere elongate, subcylindrical, almost as long as palpmeres 1 and 2 combined, provided with long dorsal spine and bearing 8 apical sensory processes. Labium (Fig. 1039) with rather distinct suture between mentum and submentum; prementum short, submembranous at base, with ligula lobed at sides and setose; palpi 2-segmented with bases distant from each other; palpmere 1 in form of sclerotized, reduced medially ring; terminal palpmere elongate, over 2 x longer than palpmere 1, subcylindrical, somewhat rounded at apex with 1 subapical campaniform sensillum and a few apical sensilla; hypopharynx (Fig. 1040) with well developed, sclerotized parts consisting of large hypopharyngeal sclerome, braco and slightly convergent posteriorly directed hypopharyngeal rods; each side of anterior part of hypopharynx with a few oblique rows of stout, short setae.

Thorax about 0.27 x as long as body length, widest across metathorax; prothorax about 2 x as wide as long, widest posteriorly, slightly shorter than meso- and metathorax combined; provided with two large notal plates, each somewhat depressed centrally; meso- and metathorax about 4 x as wide as long, each with two moderately large, tergal plates (much smaller than those on prothorax); ecdyssial suture absent. Terga lacking dorsal tubercles or sublateral lobes; obvious glands absent.

Legs (Fig. 1041) short and stout, covered with comparatively long, stout setae, increasing in size posteriorly; coxae comparatively widely separated at their bases, covered with numerous setae; trochanter somewhat triangular with 4 pores and 6 setae ventrally, and 2 pores and 3 setae dorsally; femur elongate, about twice as long as wide, with 1 ventral and 2 dorsal pores, and with 9 ventral, and 3 dorsal setae; tibiotarsus about as long as femur, slightly narrowing towards apex, bearing 4 ventral and 3 dorsal setae; claw moderately stout with single seta.

Abdomen widest across segment 3. Segments A1–7 about 4–5 x as wide as long, and A8–9 about 3 x as wide as long. Segments A1–8 bearing small lateral, pleural, setose processes/ tubercles; A1–9 with dorsal acute (Fig. 1032), and dorsolateral, rounded apically (Fig. 1031), tergal processes, becoming approximate posteriorly. Dorsal acute processes increasing in size posteriorly, and on A9 forming apparent urogomphi. Segment 10 posteroventral. Spiracles annular, not raised on tubes.


Mycketina Mulsant
(Figs 1042–1057)

Diagnosis. The larva of Mycketina is most similar to Aphorista in having the body with short thoracic and abdominal lateral, tergal lobes, vestiture of specialized fan-shaped setae, the tergal plates with weak protubrances, the tergum 9 emarginate and the labrum with anterior margin multidenticate. Mycketina however differs from Aphorista by having the thoracic segments 2 and 3 with 2 pairs of tergal protuberances, the frayed setae longer, the antennal sockets placed distinctly beyond mid length of head and the caudal notch on the abdominal tergite 9 deeply emarginate.

Description of mature larva. Length 5.20 mm; head width 1.30 mm; width of thorax 2.60 mm; width of
abdomen 3.00 mm. Body (Fig. 1042) broadly-ovate, somewhat onisciform, constricted between segments, weakly dorsoventrally flattened, with lateral pleural and tergal, small processes and small verrucae; widest at middle (across abdominal segment 2), gradually, weakly tapering anteriorly and posteriorly; without urogomphi. Dorsum greyish yellow with venter slightly paler, feeble sclerotized than dorsum; mandibles, mouth frame, claw and frayed setae brown. Dorsal vestiture consisting of frayed (fan-shaped) setae (Fig. 1049), long hairs and few pointed setae; ventral surfaces covered with many simple minute setae, and a few long pointed setae; body processes provided with modified setae and legs covered with short and long, pointed setae arising from very small tubercles.

Head (Figs 1043, 1044) protracted, hypognathous, triangular, moderately flattened dorsoventrally, partially visible from above; about 0.70 × as long as wide and about 0.60 × as wide as prothorax; covered mainly with fan-shaped setae and a few long, pointed setae anteriorly. Epicranial stem very short but distinct, frontal arms long, U-shaped. Median endocarina absent. Hypostomal rostrs present, long and weakly divergent posteriorly. Stemmata 4 per side, hemispherical; 2 stemmata close together and situated posteriorly to antennal base, 1 situated ventrally and 1 antero-dorsally to antennal insertion. Frontoclypeal suture distinct and straight. Clypeus transverse, bearing 3 pairs of setae. Labrum (Fig. 1053) free, with anterior margin bearing 16 obtuse/rounded denticles, somewhat asymmetrically positioned between halves; about 2 times as wide as long, with 4 setae near anterior margin, a pair of long, pointed setae positioned centrally, 2 pairs of long, pointed setae on each side and three pores positioned transversely in central area. Epipharynx (Fig. 1054) membranous; sides of anterior margin provided with 2 long, directed medially, pointed setae; median area with three pairs of sensilla and 1 pair of pores positioned posteriorly to sensilla; lateral and posterior areas covered with obliquely directed, minute spinules. Antenna (Figs 1045, 1046) rather short and slender, 3-segmented, partially retracted in antennal insertions, situated in large, circular membrane, distant from mandibular articulations. Antennomere 1 short with single ventral pore; antennomere 2 longest, about 2.7 × as long as antennomere 1 and almost 3.0 × as long as antennomere 3, with 3 long, subterminal setae and one campaniform sensillum; antennomere 3 slightly shorter than sensory appendage, subcylindrical with 3 long, apical setae, 1 short subapical seta and 1 apical process; sensory appendage elongate, swollen at base and distinctly narrowing apically, with pointed apex. Mandible (Figs 1047, 1048) broad, triangular with pointed apical tooth; incisor edge smooth and sharp lacking subapical ridges or teeth; ventral accessory process absent; prosthca moderately large, hyaline without setae; mola well developed, large, prominent with mesal surface arcuate, and transverse rows formed by fine asperities; outer edge with 2 long, stout setae; dorsal surface with single campaniform sensillum. Maxillolabial complex retracted. Maxilla (Figs 1050, 1052) with well-developed, narrow articulating area; cardo somewhat triangular with 1 seta; stipes elongate with 2 setae proximad and 2 setae near base of palp. Mala at least 2 × as long as wide, membranous, with apex covered with dense fringe of long setae dorsally, and many stout, moderately long spines ventrally; 4 subapical, stout spines near mesal margin, on dorsal surface present (Fig. 1050). Maxillary palp 3-segmented based on large membranous palpiter; terminal palpomere longest, about 2 × as long as palpomere 1 and 1.5 × as long as palpomere 2; palpomere 1 with single ventral pore, palpomere 2 with two ventral pores and long seta, terminal palpomere (Fig. 1051) provided with short mesal seta, one pore on outer edge near apex and bearing a group of apical sensory processes. Labium (Fig. 1055) with prementum short, wider than long, provided with two long setae; ligula membranous, widely rounded at apex, with one pair of apical setae; postmentum large, well developed; mentum and submentum fused; palpi 2-segmented, subequal in length, with bases distant from each other; palpomere 1 with one long, inner seta and one short, outer seta; terminal palpomere subcylindrical, rounded at apex with 2 pores and a few apical sensilla; hypopharynx (Fig. 1056) with well developed, sclerotized parts consisting of large hypopharyngeal sclerome, bracoon and subparallel hypopharyngeal rods; membranous anterior part with dense obliquely directed minute setae.

Thorax about 0.40 × as long as body length, widest across meso- and metathorax; prothorax about 2.50 × as wide as long, widest near mid length, 1.33 × longer than mesothorax and 1.66 × longer than metathorax; protergum bearing dorsal protuberances and lateral projections; meso- and metatergum, each with 4 rounded verrucae and with lateral lobes, covered with fan-like setae; ecdysial suture distinct on pro- and mesotergum. Obvious glands absent.

Legs (Fig. 1057) relatively short and stout, covered with comparatively long, stout, pointed setae, and only coxa provided with sparse frayed setae; coxae moderately widely separated at their bases, with numerous pointed setae and few fan-shaped setae; trochanter elongate, somewhat triangular with 4 short and 1 long, mesal setae; femur elongate, about 3 × as long as wide, with numerous short setae, 1 long mesal seta and 1 ventral pore; tibiotarsus about as long as femur, narrowing towards apex, bearing numerous, rather short setae; claw slender with single seta.

Abdomen widest across segment 2. Segments A1–8 similar in shape; terga bearing similar verrucae as those on thorax and with dorsolateral lobe on each side; pleural regions with similar projections – all covered with fan-shaped setae. A9 small, deeply emarginate
posteriorly. Segment 10 ventral. Spiracles very small, annular, surrounded with sclerotized ring, not raised on tubes, located in folds beneath tergal lobes.


**Endomychidae Leach**

**New synonym and lectotype designation**

Evolocera championi Sharp, 1891 (=Adania mexicana Tomaszewska, 2000).


As a consequence, Evolocera Sharp, previously classified in Meropysini, is moved here to Eupsilobiinae.

**Phylogenetic analysis**

**Methods**

In order to examine relationships of Lycoperdini genera and the placement of the subfamily in Endomychidae adult and available larval data were examined and subjected to cladistic analyses.

To test the resolution provided by the limited larval character set, the analyses were performed first using adult characters only and then using the combined larval/adult dataset. Sixty nine morphological characters were scored in 69 taxa for the phylogenetic estimate based on adult morphology (Table 3). The adult matrix was subsequently combined with twenty seven larval characters coded for 33 taxa and the combined data matrix was jointly analysed with missing larval data (Table 4) or with taxa that larvae were unknown deleted from the matrix (Table 5). Missing data were coded as “?”. All characters were always equally weighted and unordered, and character polarities were determined in the context of the phylogenetic analysis. All autapomorphies of terminal taxa are included in the analyses with notion that they will be clearly available for further analyses and their influence of the cladogram characteristics is of no importance.

Phylogenetic relationships were reconstructed using computer software to find most parsimonious trees. Hennig86 (Farris 1988) and NONA version 2.0 (Goloboff 1999) were used for heuristic searches. Character data were edited, cladograms prepared and character optimisations conducted using WinClada, version 1.00.08 (Nixon 2002). Ambiguous optimisations were mostly resolved using accelerated transformation (ACCTRAN) which favours reversals over parallelisms to explain homoplasy (Farris 1970) and therefore maximises homology.

The following analyses were performed:

(a) heuristic search (NONA) according to the following command sequence: “hold 10000; hold/10; mult *100” (hold 10,000 in memory; hold 10 starting trees in memory; perform TBR branch swapping on 100 random addition replicates);

(b) ratchet (or island hopper; NONA) as described by Nixon (1999) with 1000 iterations (ambiguity = polytomous, 20% constrained nodes, 10 characters to sample and 10 trees to hold per iteration);

(c) successive approximation weighting (Hennig86; Farris 1988) using multiple commands sequence “mh* bb* xsteps w cc”.

Bootstrap analysis (Felsenstein 1985) using 1000 resampling replicates (calculated in WinClada with settings: number of replications = 1000, no. research replications = 10, no. trees per replication = 10) was used to study the level of character support in the dataset for hypothesized clades.

The jackknife analysis (Farris et al. 1996) using 1000 replicates (settings identical to those for bootstrap above) was used to examine the effect of taxon sampling on hypothesized clades. The latter values are not presented on cladograms because their values are almost identical to the bootstrap ones.

Because of limited application of bootstrap values for morphological characters alone a support for clades was tested further by calculating Bremer support values (Bremer 1988, 1994) in NONA using the following commands: “mult*25; max*; hold 15000; sub 10; find*; bs”.

**Taxa used in analysis**

**Outgroups.** Characters states were polarized using outgroup comparison (Nixon and Carpenter 1993). Based on the sister group relationships between Endomychidae and Coccinelidae which were extensively tested in my former paper (Tomaszewksa 2000), two coccinellid genera Sticholotis Crotch (S. quadrimaculata (Blackburn)) and Rhysobius Stephens (Rhysobius ventralis (Lea)) were chosen as closely related outgroups. Both genera belong to basal clades in Coccinellidae and have relatively unmodified adult and larval morphology allowing direct character homology tests between outgroup and ingroup taxa. Corylophid genus Holopsis Broun (Holopsis sp. from Tasmania), and a cerylonid genus Hypodiacnella Slipiński (Hypodiacnella euxestoides
Slipinski) were chosen and used in present analyses as more distantly related outgroups.

**Ingroup.** The principal ingroup in the present analyses consists of the subfamily Lycoperdininae, with its all genera as the terminal taxa, with representative members of remaining currently recognized endomychid subfamilies: Danascelinae, Xenomycetinae, Endomychinae, Anamorphinae, Merophysinae, Lycoperdininae, Stenotarsinae, Epipocinae, Eupsilobiinae, Pleganophorinae, Mycetaeinae, Leiestinae (Tomaszewski 2000).

Table 1. Taxa of Endomychidae (excluding Lycoperdininae) directly examined or characters coded based on published descriptions.

(*) Among Merophysinae the only Holoparamecous and Colucocas larvae are known. Therefore in combined data matrices, in case of Displota and Merophysa used in adult data, as larval characters were coded those of closely related Colucocas.

<table>
<thead>
<tr>
<th>Subfamily</th>
<th>Genus</th>
<th>Species Adult (A) and/or larva (L) studied</th>
<th>Larval material studied and additional (or only) published, larval descriptions used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danascelinae</td>
<td><em>D. elangata</em> Tomaszewski (A)</td>
<td><em>H. chandler</em> Bousquet and Leschen (A)</td>
<td>larva unknown</td>
</tr>
<tr>
<td>Eupsilobiinae</td>
<td><em>E. minutus</em> Sharp (A)</td>
<td><em>E. iaticollis</em> Wollaston (A)</td>
<td>larva unknown</td>
</tr>
<tr>
<td><em>Microxenus</em></td>
<td><em>E. champion</em> Sharp (A, L)</td>
<td><em>E. subterranea</em> Fabricius (A, L)</td>
<td>ANIC, BMNH, Böving and Craighhead (1931), Lawrence (1991)</td>
</tr>
<tr>
<td><em>Agaricophilus</em></td>
<td><em>A. refulxus</em> Motchulsky (A, L)</td>
<td><em>A. californica</em> Horn (A)</td>
<td>ANIC, Burakowski and Slipinski (2000)</td>
</tr>
<tr>
<td><em>Phymaphora</em></td>
<td><em>P. pulchella</em> Newman (A, L)</td>
<td><em>P. californica</em> Horn (A)</td>
<td>larva unknown</td>
</tr>
<tr>
<td><em>Rhamnidae</em></td>
<td><em>R. unicolor</em> (Ziegler) (A, L)</td>
<td><em>R. unicolor</em> (Ziegler)</td>
<td>ANIC, Burakowski and Slipinski (2000)</td>
</tr>
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<td><em>Holoparamecous</em></td>
<td><em>H. caurum</em> Aubé (A)</td>
<td><em>H. sp. from Burma</em> (A)</td>
<td>larva unknown</td>
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<tr>
<td><em>Merophysa</em></td>
<td><em>M. merophysa</em> sp. from Rhodes (A)</td>
<td><em>M. merophysa</em> sp. from Rhodes (A)</td>
<td>larva unknown</td>
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<tr>
<td><em>Displota</em></td>
<td><em>D. beloni</em> (Wasmann) (A)</td>
<td><em>D. beloni</em> (Wasmann) (A)</td>
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<td><em>Colucocas</em></td>
<td><em>C. formicaria</em> Motchulsky (L)</td>
<td><em>C. formicaria</em> Motchulsky (L)</td>
<td>Silvestri (1912)</td>
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<td><em>Anamorphinae</em></td>
<td><em>M. asiaticus</em> Sasaji (A, L)</td>
<td><em>M. asiaticus</em> Sasaji (A, L)</td>
<td>Sasaji (1978a)</td>
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<td><em>Symbiotes</em></td>
<td><em>S. gibberosus</em> Lucas (A, L)</td>
<td><em>S. latus</em> Redtenbacher (A)</td>
<td>BMNH</td>
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<td><em>Pleganophorinae</em></td>
<td><em>T. desjardins</em> Guérin (A, L)</td>
<td><em>T. desjardins</em> Guérin (A, L)</td>
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<tr>
<td><em>Trochaideus</em></td>
<td><em>T. dalmani</em> Westwood (L)</td>
<td><em>T. dalmani</em> Westwood (L)</td>
<td>NMNH</td>
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<tr>
<td><em>Cyclotoma</em></td>
<td><em>C. cingalensis</em> (Gorham) (A)</td>
<td><em>C. cingalensis</em> (Gorham) (A)</td>
<td>Kemner (1924)</td>
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<tr>
<td><em>Bolbomorphus</em></td>
<td><em>B. spinifera</em> Arrow (A)</td>
<td><em>B. spinifera</em> Arrow (A)</td>
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<td><em>E. coccineus</em> (Linnaeus) (A, L)</td>
<td><em>E. coccineus</em> (Linnaeus) (A, L)</td>
<td>BMNH, Böving and Craighhead (1931)</td>
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<td><em>E. armencanen</em></td>
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<td><em>E. armencanen</em> Motchulsky (A)</td>
<td>larva unknown</td>
</tr>
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<td><em>E. thoracicus</em></td>
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<td><em>E. thoracicus</em> Charpentier (A)</td>
<td>larva unknown</td>
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<td><em>E. divisus</em></td>
<td><em>E. divisus</em> Arrow (A)</td>
<td><em>E. divisus</em> Arrow (A)</td>
<td>larva unknown</td>
</tr>
<tr>
<td><em>E. punctatus</em></td>
<td><em>E. punctatus</em> Arrow (A)</td>
<td><em>E. punctatus</em> Arrow (A)</td>
<td>larva unknown</td>
</tr>
<tr>
<td><em>E. gorhami</em></td>
<td><em>E. gorhami</em> Lewis (A)</td>
<td><em>E. gorhami</em> Lewis (A)</td>
<td>Hayashi and Nakamura (1953)</td>
</tr>
</tbody>
</table>
Table 2. The larvae of Lycoperdininae examined or included in the analyses based on the published data.

All 38 known genera of Lycoperdininae were examined and included in the analyses. The detailed lists of the adult species examined for each genus is listed in "material examined" below each generic description. The larvae of Lycoperdininae used in the analyses are listed in Table 2.

Characters and discussion

The character states within each character are unordered. Thus the character state 0 not necessarily means plesiomorphic condition and the relative order of character states should not be regarded as a hypothesis of transformation direction or polarity.

Adult characters
0. Body: glabrous or covered with one kind of setae (0); covered densely with two kinds of setae (1).

The body vestiture double, consisting of suberect setae originating from the punctures and very long, erect spines placed on small tubercles. This is a unique
character for Australian genera Daulis and Daulotypus (Figs 12, 37, 38, 869, 870)

1. Occipital file absent (0), present (1)

   The cephalic striulatory area (occipital file) on the head is a unique character for the subfamily Lycoperdininae, although sometimes small or strongly reduced to obsolete in some species of Trycherus, Microtrycherus and Chertyrus (Fig 1)

2. Fronto clypeal suture absent (0), present (1)

   The fronto clypeal suture is absent in Coccinellidae and in Holopis. All members of Endomychidae have a distinct fronto clypeal suture. It occurs also in more distantly related Hypodacneilla (state 1)

3. Gular sutures well developed, separated (0), confluent or absent (1)

   The well developed and widely separated gular sutures (state 0) occurs in outgroups, in most subfamilies of Endomychidae and in some Lycoperdininae (Achiarmychus, Aphorista, Brachytrycherus, Dapsa, Hylazia and Lycoperdina). Most of the Lycoperdininae and Epiopineae have the gular sutures confluent (Figs 2, 4, 5) or sometimes indistinct or absent (1)

4. Head with antennal grooves absent (0), present (1)

   Most members of Endomychidae do not possess antennal grooves on the ventral surface of the head. This character occurs in almost all outgroups (absent in Sticholotts), in some Merophysinae (Merophysina and Displotera), and in Eupisilobinae

5. Antenna 9–11 segmented (0), 4–5 segmented (1)

   The 4–5 segmented antenna is characteristic for Pleganophorinae (with 7 segments in females of some species of Trochoideus)

6. Terminal antennomere only setose (0), with vestible vesicles (1), with apical sensilla (2)

   The terminal antennomere possessing apical sensilla is characteristic for Lycoperdininae Achiarmychus and Archipnus (Figs 20, 27) (state 2), whileversible vesicles occur in distantly related Holopis (state 1)

7. Male antennomere 9 with tuft of long setae arising from deep concavity on inner edge absent (0), present (1)

   This character occurs only in Danasidus (Danascelinae) in present analysis

8. Mandibular mola well developed (0), reduced or absent (1)

   The well developed mandibular mola is characteristic for some outgroups and all members of Endomychidae. It is reduced or absent in Coccinellidae

9. Mandibular prostheca reduced or absent (0), well developed, setose (1), well developed with setae and apical, sclerotized, elongate projections (2)

   The large, membranous, more or less setose mandibular prostheca occurs in most Endomychidae and Cerylonidae (Hypodacneilla) (state 1), while it is reduced or absent in Coccinellidae and Holopis (state 0). Among Endomychidae, some Merophysinae (Displotera and Merophysina) have the prostheca provided additionally with elongate, sclerotized projections (state 2)

10. Labrum with basal margin flat (0), with raised median ridge, triangularly produced anteriorly (1)

   The basal margin of labrum provided with raised median ridge, that is produced anteriorly occurs only in some Lycoperdininae Ancylopus, Avenecymon, Callmodapsu, Gymenes, Haploscelis, Indalms, Malndus, Microtrycherus, Parryndalus and Trycherus (Figs 63, 66, 70, 71, 81, 83, 85, 86, 88, 90)

11. Labrum with sides subparallel, weakly rounded at sides or expanded antero laterally (0), strongly produced laterally into rounded lobes (1)

   The outgroups, almost all subfamilies of Endomychidae, and most of Lycoperdininae have labrum with sides subparallel or at most expanded and rounded antero-laterally. The labral sides produced laterally into rounded lobes are present only in Saula (Stenotarsinae) and some Lycoperdininae (Archipnus, Daulis, Daulotypus) (Figs 65, 74, 75)

12. Maxillary lacinia with apex bearing at most a patch of simple setae or spines (0), bearing numerous stout, somewhat S-shaped setae (1)

   The tuft of S shaped setae on an apex of maxillary lacinia is an unusual character found only in some Lycoperdininae Amphisternus, Amphistethus, Brachytrycherus, Ohtaus, Spathomeles and Stutumelia (Figs 180, 182, 196, 229, 238, 240)

13. Lacinia with mesal and dorsal surfaces without hairs or covered with longer or less irregularly arranged pubescence/ spines (0), with inwardly directed teeth (1), with regular rows of setae and/or spinulae (2)

   The regular rows of setae/ spinulae covering mesal and dorsal surfaces of maxillary lacinia are characteristic for Lycoperdininae (Figs 178, 180, 188, 196, 204) (state 2), the lacinia of Holopis has mesal teeth (state 1) while the rest of Endomychidae and rest of outgroups have no character state 0

14. Terminal maxillary palpomere subcylindrical or somewhat flattened dorso-ventrally (0), flattened laterally along apical half (1)

   The terminal maxillary palpomere that is distinctly flattened laterally occurs only in Cacocerdaemon (Fig 197), in present analysis

15. Labium with prementum shorter than wide (0), distinctly longer than wide (1)

   The elongate prementum is a unique character for Endomychidae (Botbomorphus, Cyclotoma and Endomythus) in present data set

16. Labium with ligula distinct, membranous or submembranous — most often lobed at sides (0), ligula indistinct — whole prementum evenly sclerotized (1)

   The labium with prementum entirely sclerotized without membranous ligula is characteristic for Endomychidae (except for Endomythus). All remaining Endomychidae and the outgroups have at least small membranous ligula, which is most often lobed at sides
17. Mentum: flat or with large, raised triangular area or transverse ridge (0); with small, triangular, setose tubercle placed medially (1).

The mentum provided with small, setose, tubercle in the central area is a unique character for Mycetaeinae.

18. Mentum widest beyond mid length (0); expanded and widest anteriorly (1).

This character occurs only in Coccinellidae and some Lycoperdininae, Mycetina and Pseudindalbida (Figs 271, 275). The remaining Endomychidae and the rest of outgroups have mentum widest beyond mid length, or with sides subparallel.

19. Labial palp: distinctly 3-segmented (0); 2-segmented (1); appearing 2-segmented, with palpomeres 1 and 2 fused (2).

The labial palp 3-segmented occurs throughout Endemychidae, Coccinellidae and Hypodacnelia while 2-segmented palp occurs in Holopsis. The palpomeres 1 and 2 fused, and the palp appearing 2-segmented is a unique character for Parindalbus (Fig. 273).

20. Labial palp with palpomere 2: simple, elongate subcylindrical or transverse (0); bulbous (1); semilunar (2); oval, inflated (3).

Oval and inflated labial palpomere 2 (state 3) is characteristic for Meropysinae (Holoparamurus, Displota and Merophysta). The interesting semilunar shape of the labial palpomere 2 is unique for Acremies (Fig. 249) (state 2), while bulbous palpomere 2 is found in Hypodacnelia (state 1). The remaining Endomychidae, Coccinellidae and Holopsis have palpomere 2 transverse or elongate and subcylindrical.

21. Tentorium with corpotentorium: absent (0); present, without median process (1); present with median process (2).

The distinct corpotentorium possessing long median process is characteristic for Hypodacnelia. In most Endomychidae the corpotentorium is present but without the median process. In the remaining outgroups and Meropysinae the corpotentorium is absent.

22. Tentorium with anterior arms: separated (0); meeting medially (1).

Most outgroups and Anamorphinae have the anterior tentorial arms separated (state 0). Holopsis and Endomychidae (excluding Anamorphinae) have the anterior arms meeting medially.

23. Anterior margin of pronotum with striulatory membrane: absent (0); present, sometimes reduced (1).

The striulatory membrane on anterior margin of the pronotum is a unique character for Lycoperdininae (Figs 284, 292) although different degrees of reduction of this structure are observed in Amphit, Trycherus and Chetryrus. The membrane is entirely obsolete in some species of Microtrycherus and all species of Beccariola (Figs 8, 308).

24. Pronotum with anterior angles: simple (0); strongly thickened and raised (1).

The anterior angles of the pronotum, which are widely bordered, thickened and raised, occur only in Amphistethus and Spathomeles (Figs 286, 350). The remaining Endomychidae and members of outgroups have character state 0.

25. Pronotum with lateral margins smooth or finely crenulate/ denticulate (0); coarsely and sparsely dentriculate (1).

The different degrees of crenulation and/or denticulation of lateral margins of the pronotum (always rather fine) are observed within some Endomychidae and outgroups. The coarsely, although rather sparsely crenulate sides of the pronotum is unique for Lycoperdininae genera Daulis and Daulotypus (Figs 314, 316).

26. Base of pronotum: with at most single fovea on each side (0); with paired foveae on each side (1).

Paired foveae on each side of the pronotum occur only in Danascelinae (Danascelis and Hadromyctus).

27. Pronotum of female with lateral sulci: separated or absent (0); extending arcurately towards middle of disc and connected medially (1).

This interesting structure occurs only in Ancypelus (Fig. 292) in present analysis.

28. Pronotum with prebasal tubercles and/or carinae: absent (0); present (1).

This character occurs only in some Meropysinae (Holoparamurus), in present data set.

29. Procoxal cavities: transverse (0); round or oval (1).

The procoxal cavities transverse occur in Holopsis. Endomychidae and Hypodacnelia have the procoxal cavities round, while Coccinellidae have the procoxal cavities oval in outline.

30. Procoxal cavities: open outwardly (0); closed outwardly (1).

The closed outwardly procoxal cavities are characteristic for Hypodacnelia (Cerionidae) in present analysis.

31. Prosternal process rounded, truncate or weakly emarginate at apex (0); excised apically with subacute lateral lobes (forked) not extending beyond front coxae (1); deeply excised at apex with at least weakly rounded lateral lobes extending beyond coxae (2).

The members of outgroups and almost all Endomychidae except for some Lycoperdininae have character state 0. The prosternal process forked, extending at most to hind margin of front coxae is characteristic for Beccariola, Cymbachus, Dryadites and Sinocymbachus (state 1) (Figs 309, 311, 319, 349), while prosternal process extending beyond coxae, deeply excised at apex with at least weakly rounded lateral lobes, occurs in Amphisternus, Amphistethus and Cacodaemon (state 2) (Figs 285, 287, 297).

32. Prosternum with antennal grooves: absent or poorly developed (0); present (1).

The distinct, comparatively deep antennal grooves on prosternum occur in some Meropysinae (Displota and Merophysta). The remaining Endomychidae and
the remaining outgroups have the prosternum without antennal grooves, although weak grooves was observed in *Hypodactella* (Cerylombidae) (state 0).

33. Procoxal cavity with small oval slit antero-laterally absent (0), present (1)

Small, oval slits present in antero-lateral part of procoxal cavities are characteristic for *Leestinae*, *Mycteaena* and some Pleganophorinae (*Pleganophorus*). All remaining Endomychidae and the outgroups have character state 0.

34. Mesoventrite with sides of intercoxal process subparallel throughout its length (0), expanded laterally before apex and overlapping part of coxae (1)

The outgroups and most *Endomychidae* have intercoxal process of mesoventrite with sides subparallel or even convergent posteriorly. The intercoxal process with apex expanded laterally and overlapping part of coxae (state 1) is found only in some *Lycoperdininae* (*Amphisternus, Amphistethus, Gerstaeckerus, Ohtauus, Spathomeles and Stictomela*) (Figs 358, 359, 378, 384, 389, 391).

35. Intercoxal process of mesoventrite almost flat or with concavities and/or tubercles (0), with at least single, median carina or multicarina (1)

An intercoxal process of mesoventrite, possessing a distinct elongate, median ridge extending at least along anterior half length of process, or complete, occurs in *Danascelinae, Xenomyctetes* and some *Lycoperdininae* (*Aphorista, Dapsa, Hylaea and Lycoperdina*) (Figs 362, 371, 380, 386). The outgroups and remaining *Endomychidae* have character state 0.

36. Intercoxal process of mesoventrite without or with weakly defined borders, or defined as rectangular or somewhat irregular in shape (0), trapezoidal in shape (1), transversely pentagonal (2), boat-shaped defined by strong carinae (3)

The intercoxal process of mesoventrite distinctly trapezoidal in shape (Figs 383, 393) is unique for *Metycina* and *Pseudindalminus* in present analysis. At least weakly transversely pentagonal intercoxal process of mesoventrite occurs in some *Lycoperdininae* (*Acraeae, Amphux, Beccariola, Cymbachus, Dryadites, Haplocels and Snicymbachus*) (Figs 357, 360, 365, 374, 375, 379, 390). The boat-shaped intercoxal process is characteristic for *Leestinae*.

37. Mesocoxal cavity open outwardly (0), closed outwardly (1)

The mesocoxal cavity open outwardly occurs in *Coccinellidae* and most of *Endomychidae* (state 0), while the lateral mesocoxal closure occurs in *Hypodactella, Holopsis* and *Pleganophorinae, Merophyssinae*, and *Anamorphinae* (state 1).

38. Mesotrochantin exposed (0), concealed (1)

The concealed mesotrochantin occurs in the outgroups and in some endomychid subfamilies *Leestinae, Myctaeinae, Anamorphinae, Merophyssinae*, and *Pleganophorinae* (state 1). The remaining subfamilies of *Endomychidae* have the mesotrochantin exposed (state 0).

39. Intercoxal process of metaventrite with anterior margin at most finely bordered and almost flat (0), widely bordered and raised or intercoxal process convex (1).

The anterior margin of intercoxal process at least moderately widely bordered and raised or almost unbordered but entire process convex, is characteristic for most *Lycoperdininae* (*Amphisternus, Amphistethus, Ancypopus, Avencymon, Brachytrycherus, Cacodaemon, Callimodapsa, Chetryrus, Cymones, Dryadites, Encymon, Eunorphus, Gerstaeckerus, Haplocels, Indalminus, Malindus, Microtrycherus, Ohtauus, Parindalminus, Platindalminus, Spathomeles, Stictomela and Trycherus* (Figs e.g. 358, 359, 367). The members of outgroups and remaining *Endomychidae* have intercoxal process of metaventrite finely bordered or unbordered and almost flat (state 0).

40. Elytron with basal edge simple (0), thickened and raised (1)

The elytron with basal edge simple occur in the outgroups and in most of the *Endomychidae* (state 0). The thickened and raised basal margin of the elytron is characteristic for some *Lycoperdininae* (*Amphisternus, Amphistethus, Ancypopus, Avencymon, Brachytrycherus, Cacodaemon, Gerstaeckerus, Malindus, Ohtauus, Parindalminus, Spathomeles and Stictomela*) (Figs 10, 13).

41. Elytra with tubercles and/or spines absent (0), present (1)

The elytra within outgroups and *Endomychidae* usually have smooth surface, or at most, humeri more or less prominent. The presence of distinct, large tubercles and/or spines on the elytra is a unique character for some *Lycoperdininae* (*Amphisternus, Amphistethus, Cacodaemon, Spathomeles and Stictomela*) (Figs 9–11, 13, 14, 849, 850, 859–861, 897, 898).

42. Elytra widest near basal third or mid length (0), beyond mid length (1).

The elytra widest beyond mid length is found only in *Callimodapsa, Cymones, Indalminus, Malindus and Parindalminus* (Figs 862, 866, 881, 885, 891).

43. Dorsal surface of fore femur with oval slit apically absent (0), present (1)

This interesting character occurs only in *Haplocels* (Fig 529) in present analysis.

44. Tarsi 3- or 4-segmented with segments simple (sometimes weakly lobed) (0), pseudotrorimeros (1)

The simple 3- or 4-segmented tarsi are present in *Hypodactella* and some endomychid subfamilies *Danascelinae, Eupsilobiinae, Myctaeinae, Leestinae, Merophyssinae, Anamorphinae, Pleganophorinae* and *Xenomyctetinae* (state 0). The pseudotrorimeros tarsi occur in *Coccinellidae, Corylophidae* and most *Endomychidae* (state 1).

45. Femora with grooves deep and long throughout or almost so (0), shallow and reaching at most half length of femur (1)

The outgroups have the femora possessing long and deep grooves to receive tubiae in repose, among *Endomychidae* this character was found only in *Eodorus*.
(state 0); the remaining Endomychidae have the grooves short and if longer, then they are shallow (state 1).

46. Abdomen with: 7 pairs of functional spiracles (0); 5 pairs of functional spiracles (1).

In Endomychidae and Coccinellidae occur 5 pairs of abdominal spiracles. The remaining outgroups have 7 pairs of functional spiracles on the abdomen.

47. Ventrite 5 in male with prominently elevated, elongate, median tubercle with additional cone-shaped tubercle on each side: absent (0); present (1).

This character occurs only in Xenomyceset.

48. Tergite 8 with apex: simply pubescent or at most with tuft of long setae in one sex (0); apex of tergite 8 with tuft of long setae in both sexes (1).

The tuft of long setae on an apex of the tergite 8 of both sexes occurs in Cymbachus and Sinocymbachus (state 1) (Figs 630, 646). The outgroups and almost all Endomychidae have apex of the tergite 8 simply pubescent. Rarely (e.g. in Acinaces) similar tuft of setae occurs in one sex.

49. Male sternite 8 undivided, sclerotized or partially membranous (0); in two lateral, sclerotized parts connected medially by narrow membranous belt (1); in two lateral parts without membranous connection (2).

Most Endomychidae and the outgroups have character state 0. The male sternite 8 in form of two lateral sclerotized parts with median membranous connection is found only in some African genera of Lycoperdininae: Chetryrus, Haplocelis and Microtricherus (Figs 637, 651, 654) (state 1), while the sternite divided in two separated parts (without median membrane) is a unique character for Oriental Pseudindalmus (Fig. 641) (state 2).

50. Sternite of male genital segment: with lateral and apical edges simple or sternite divided in two plates or reduced (0); sclerotized plate with lateral edges deeply asymmetrically incurved (1); with apical edge at least weakly emarginate or sinuate (2).

The character state 0 occurs in most Endomychidae and in the outgroups. The members of Epipocidae have the sternite of the male genital segment with at least lateral edges deeply asymmetrically incurved (state 1), while in almost all Lycoperdininae (except for Daulis) the only apical edge is more or less distinctly modified (Figs e.g. 663, 667, 691, 717) (state 2). This character is coded as polymorphic in Daulis (states 0 and 2).

51. Tegment: well developed with trilobed phallobase (0); reduced, encircling median lobe in apical half length or almost throughout, loosely joined with median lobe or tegmen absent (1); strongly reduced to simple, short ring encircling median lobe in half length, with long, membranous, flat strut (2); reduced, strongly sclerotized, encircling and compactly joined with basal part of median lobe (3).

The trilobed phallobase, comprises basal piece, basal lobe and parameres is characteristic for Coccinellidae (state 0). The remaining outgroups and most members of Endomychidae have the aedeagus with tegmen more or less well developed (but with phallobase lacking basal lobe and parameres often absent) encircling the median lobe in about mid length or near apex, or sometimes the tegmen is large and encircling median lobe almost throughout (state 1). The reduced, short ring but with long, membranous, flat strut occurs in Stenotarsinae, Endomychidae and Danascelinae (state 2). Almost all Lycoperdininae (except for Achairmyrus, Daulis and Daulotypus) and Epipocinae have the tegmen small strongly sclerotized, with strut strongly reduced to obsolete, encircling and compactly joined with basal part of median lobe (state 3).

52. Median lobe: almost straight or curved (0); coiled apically (1).

This character is unique for Eupsilobiinae in present analysis.

53. Median lobe: smooth along basal part (0); curled along ⅔ of basal length (1).

This character is unique for most Endomychidae (excluding Endomychus).

54. Median lobe with T-shaped capsule at base: absent (0); present (1).

The T-shaped capsule at the base of median lobe is a usual feature within Coccinellidae, and occurs in endomychid Eupsilobiinae (state 1); the remaining outgroups and remaining Endomychidae have the median lobe simple at base.

55. Ejaculatory duct of median lobe: unmodified (0); provided with large, bobbin-shaped gland (1).

This interesting structure was observed only in some Stenotarsinae (Saula and Danae).

56. Female abdominal segment 8 free (0); at least sternite 8 solidly connected or entirely fused to coxites (1).

The only Lycoperdininae (except for Achairmyrus, Archipenes, Daulis and Daulotypus) have at least sternite 8 (sometimes also tergite) fused to the coxites. The rest of Endomychidae and outgroups have the female abdominal segment 8 loosely connected with genital segments.

57. Female segment 7 free (0); at least 7th sternite solidly connected to genital segments (1).

This character is unique for Euomorphus and Platindalmus (Fig. 839).

58. Ovipositor with stiff, inflated, infundibulum-like structure between bursa copulatrix and sperm duct: absent (0); present (1).

This structure is unique for Eupsilobiinae in present analysis.

59. Ovipositor with coxites: well developed (0); reduced (1).

The strongly reduced coxites are characteristic for some Lycoperdininae (Archipenes, Daulis and Daulotypus) (state 1) (Figs 815, 825, 826).

60. Coxites: separated (0); fused (1).

The outgroups and most Endomychidae have the ovipositor with coxites separated (state 0). The fused coxites
are unique for Lycoperdininae, except for Achuarmychus, Ancolopus, Archipnes, Daulus, Daulotypus and Mycetina Ancylopus and some species of Mycetina have however the coxites partially connected, (e.g. by submembranous connection)

61. Base of coxites simple or weakly emarginate (0), deeply excised (1)

This character is unique for Stenotarsinae (Danae, Saula and Stenotarsus)

62. Spermatheca with accessory gland present (0), absent (1)

A simple spermatheca lacking accessory gland is characteristic for Chetryrus, Microtrichyerus and Trycherus (Figs 821, 837, 846)

63. Sperm duct attachment directly to spermatheca (0), to broad connection between spermatheca and accessory gland (1)

This unusual character was found only in Endomychidae (except for Endomychus) and in Stenotarsus (Stenotarsinae)

64. Spermatheca uniformly membranous or sclerotized (0), membranous with large, nodulus like structure or at least with small weakly sclerotized ring at base (1)

The spermatheca is usually uniformly membranous or sometimes weakly sclerotized throughout Endomychidae. However, a weakly sclerotized ring at base of the spermatheca is found in Lycoperdininae Amphistethus, Spathamolemes and Stictomela (Figs 812, 844, 845), and larger, nodulus-like structure is present in Amphisternus and Cacodaemon (Figs 809, 819) (state 1)
The remaining Endomychidae and the outgroups have character state 0

65. Outlet of sperm duct situated on or near apex of bursa copulatrix (0), situated near base of bursa (1)

This character is unique for Dryadites (Fig 828) in present analysis

66. Ovipositor with apex of proctiger widely rounded (0), acutely produced backwards (1)

The proctiger with apex acutely produced backwards is a unique character for Lycoperdina (Fig 835)

67. Mandible with apical tooth sharp or reduced (0), widely chisel shaped (1)

The outgroups and most Endomychidae have apical mandibular tooth sharp or reduced. The mandible with apical tooth widely chisel-shaped is present in some genera of Lycoperdinae (Amphisternus, Amphistethus, Amphix, Brachytrichyerus, Cacodaemon, Cymbachus, Gerstaeckerus, Haploscelis, Microtrichyerus, Ohtaesus, Smocymbachus, Spathamolemes, Stictomela) (Figs 102, 106, 108, 120, 124, 130, 144, 146, 156, 160, 170, 171, 174)

68. Male genital segment with additional, internal sclerite (somewhat V or U shaped) absent (0), present (1)

An additional internal sclerite present in the male genital segment was found only within Lycoperdininae (Amphisternus, Amphistethus, Brachytrichyerus, Cacodaemenon, Cymbachus, Dapsa, Gerstaeckerus, Microtrichyerus, Ohtaesus, Spathamolemes, Stictomela) (Figs 661, 663, 667, 679, 686, 691, 701, 713, 717, 727, 729)

Larval characters (numbered continuously)

69. Sternite pairs 0 (0), 2 (1), 3 (2), 4 (3)

In Merophsinae and Anamorphinae sternite do not occur (state 0) Two pairs of sternite are present in Holopsis and Hypodacnella among outgroups and in some Endomychidae (Eupsilobinae, Mycteaeninae and Pleganophorinae) (state 1) Cocconellidae, Leestinae and Xenomyctinae have 3 pairs of sternite (state 2) 4 pairs are observed in Endomychinae, Stenotarsinae, Epipocinae and Lycoperdininae (state 3)

70. Frontal arms absent or poorly developed (0), lyriform (1), well developed, long, V- or U-shaped (2)

Absent or poorly developed frontal arms occur in Holopsis, Hypodacnella and some members of Endomychidae (Anamorphinae, Mycteaeninae, Eupsilobinae, Xenomyctinae) (state 0), Cocconellidae and part of Endomychidae (Leestinae, Pleganophorinae, Merophsinae) have the frontal arms lyriform (state 1)
The well developed V or U shaped frontal arms occur in Lycoperdininae, Epipocinae, Stenotarsinae and Endomychidae (state 2)

71. Epicranial stem absent (0), present (1)

The epicranial stem is present in some I ycoperdininae (Achuarmychus, Acinaces, Aphorista, Archipnes, Eumorphus and Myctea) (Figs 901, 912, 960, 978, 1011, 1043) The remaining known larvae of Endomychidae and outgroups have character state 0

72. Antennal sensory appendage at least as long as antennomere 3 (0), distinctly shorter than antennomere 3 (1)

The antennal sensory appendage is at least as long as antennomere 3 in the outgroups and most Endomychidae (state 0) The sensory appendage shorter than the terminal antennomere is characteristic for Leestinae (state 1)

73. Hypostomal rods present (0), absent (1)

The hypostomal rods are absent in Holopsis (Corylphidae), Stenotarsinae and Epipocinae (Eppicus, Andrythus, Stenotarsus, Saula) among Endomychidae

74. Labrum with apical margin simply rounded, somewhat truncate or weakly emarginate medially (0), sinuate or multidenticate (1)

The labrum with an apical margin at least sinuate or distinctly multidentate was found in some Lycoperdininae Acinaces, Amphix, Aphorista and Mycetina (Figs 920, 951, 973, 1053) The remaining Lycoperdininae, all remaining Endomychidae, and outgroups have character state 0

75. Labrum evenly sclerotized or submembranous (0), sclerotized with membranous apex (1)

Character state 0 occurs in Rhyzobius (Cocconellidae), in most Lycoperdininae (Figs 920, 936, 951) and Endomychidae (Endomychus) Almost all members of
the outgroups and remaining Endomycidae, including Lycopodinae *A chuarmychus, Aphorista, Archipines,* and *Myce tina* have character state 0.

76. Mandibular apex: well developed (0); reduced or entirely missing (1).

The mandible with the apex reduced or entirely missing is a unique character for Anamorphinae.

77. Mandibular mola: well developed (0); reduced or absent (1); replaced by membranous lobe (2).

The mandibular mola present as membranous lobe was found only in *Endomy chus,* in present data set (state 2), while mola reduced or absent is characteristic for Coccinellidae (state 1). The remaining Endomycidae and remaining outgroups have character state 0.

78. Prostheca: absent or reduced (0); modified – rigid tooth (1); well developed, at least partially membranous (2); well developed, at least partially membranous, divided in two separated parts (3).

*Hy podac cnel la, Coccinellidae and some Endomychidae* (Leiestinae, Anamorphinae, Merophyline and Pleg anophorinae) have the mandible lacking the prostheca or it sometimes may be strongly reduced. The well developed and at least partially membranous prostheca occurs in *Holopsis* and endomychid Lycopodinae, Epipocinae, Sterotarsinae, Endomycidae and Xenomy- cetinae (state 2), although it is divided in two separated parts in Lycopodinae *A chuarmychus* and *Archipines* (Figs 907, 981) (state 3). Mycteinae and Eupsilobiinae have the prostheca modified in form of rigid process or sclerotized tooth (state 1).

79. Ventral mouthparts: protracted (0); retracted (1).

The protracted ventral mouthparts occur in *Holopsis.*

The remaining outgroups and Endomycidae have the ventral mouthparts retracted (state 1).

80. Labial palpgers: separated (0); conjoined medially (1).

The labial palpgers conjoined medially occur only in *Xenomy cetes.*

81. Maxillary cardo and stipes: articulated (0); fused/ indistinct (1).

Maxillary stipes and cardo articulated occur in *Hy podac cnel la* and in all Endomycidae. Coccinellidae and Coryphoidae have the stipes and cardo fused or indistinct (state 1).

82. Maxillary articulating area present (0); indistinct/ absent (1).

Indistinct or absent maxillary articulating area is characteristic for Coccinellidae and Coryphoidae in present analysis. *Hy podac cnel la* and Endomycidae have the articulating area well developed.

83. Maxillary mala: obtuse (0); at least weakly falciform (1).

The falciform maxillary mala is characteristic for Anamorphinae and Pleganophorinae (*Trochoideus* in present data) (state 1). The rest of Endomycidae and the outgroups have the mala more or less obtuse.

84. Maxillary mala with subapical part of ventral surface: at most setose (0); with rows of paired asperites (1); with 4 oblique rows of hook-like setae (2).

The rows of paired asperites on the ventral surface of the maxillary mala are characteristic for Epipocinae (state 1), while rows of hook-like setae occur in some Lycopodinae (state 2) (*A chuarmychus, Encymon* and *Eumorphus*) (Figs 1004, 1023).

85. Maxillary palpmere 1: transverse (0); longer than wide (1).

The elongate maxillary palpmere 1 is a unique character for *Amphix* in present analysis (Fig. 953).

86. Tergal plates and/or sclerotization: present (0); absent (1).

The body lacking tergal plates or sclerotization occurs only in Anamorphinae and *A chuarmychus.*

87. Body with frayed setae: absent (0); present (1).

The frayed setae on the body occur in members of Eupsilolineidae (*Evolocera,* Mycetetinae (*Myce tinae,* Xenomy cetinae (*Xenomy ctes*) and Lycopodinae (*A chuarmychus, Aphorista, Eumorphus* and *Myce tina*). The remaining Endomycidae and outgroups have character state 0.

88. Tergite of abdominal segment 1 with glandular opennings: absent (0); present, simple (1); in modified tergal processess (2).

The simple glandular opennings occur in larvae of Coryphoidae (*Holopsis*) while these opennings in form of interesting structure of modified tergal processess was found only in some Lycopodinae genera (*Amphisterrus, Encymon* and *Eumorphus*) (Figs 926, 994, 1000, 1010, 1017).

89. Tergite of abdominal segment 8 with paired glands: absent (0); present (1).

This character is unique for Coryphoidae (*Holopsis*).

90. Lateral parascoli on abdominal terga: absent (0); present (1).

As compared with known larvae of Endomycidae and outgroups, the abdominal terga with large lateral parascoli is a unique character for Sterotarsinae (*Saula* and *Stenotarsus*).

91. Abdominal terga with dorsal, acute, paired processes: absent (0); present (1).

The character state 1 is unique for *Lycop er dinia* (Figs 1028, 1032).

92. Thoracic and abdominal tergites with (at most) single lateral processes (0); with paired, lateral processes (1).

The paired lateral processes on thoracic and abdominal tergites were found only in *Amphisterrus,* in present analysis (Fig. 926).

93. Apex of tibiotarsus provided with: simple setae (0); spathulate setae (1).

The presence of the spatulate setae is characteristic for Coccinellidae. The remaining outgroups have character state 0. Among Endomycidae this character was found only in *Mycoth enus* (Anamorphinae).
94. Claw: simple (0); with basal tooth (1).
   The claw toothed at the base occurs only in Coccinellidae. All remaining outgroups and Endomychiidae have claws simple.
95. Claw with seta: pointed (0); clavate (1); rounded apically (2).
   The seta that is clavate was found in Halopsis, while stout and rounded apically is characteristic for Archipinops (Lycoperdininae) (Fig. 993). All remaining outgroups and Endomychiidae have the claw provided with pointed seta.

Results

The cladistic analyses of the variants (Table 6, Figs 1058–1074) have not provided a single answer to the questions about the subfamilial phylogeny of Endomychiidae or the generic phylogeny of Lycoperdininae. However, the results supply enough evidence either for or against a number of relationships and these will be discussed below. The following discussion is based on all analyses and cross comparisons of their results. Clearly at present, the available larvae are insufficient to resolve the phylogeny of Endomychiidae on its own but the larval data is critical for delimiting several monophyletic groups (e.g., Anamorphinae). It is clear that a combined larval and adult matrix (Table 4) with all its missing data for the unknown larvae provides the most robust results. It is in agreement with Wiens (1998) conclusions that the missing data should generally be included in parsimony analyses. Recently Ashe (2005) has also found that the inclusion of even incomplete larval data had a dramatic effect on the resolution of the reconstructed trees in basal Aloocharinae (Staphylinidae). As a consequence the phylogenetic relationships are exclusively based on the combined datasets.

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**Note:** The table contains the names of genera from the subfamily Lycoperdininae. Each genus is listed with its corresponding scientific name.
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<td>Archaeophyllum</td>
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<td>Archipinae</td>
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<td>Lycopodinae</td>
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<tr>
<td>Mycetina</td>
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</table>

Table 5. Variant III. Adult and larval data matrix (limited) used in the cladistic analysis. Characters numbered as in the text "characters and discussion." Characters not examined are marked with ‘*’.
Table 6. Results of cladistic analyses of different variants of the adult and larval matrices (Tables 3–5) listing all the trees and the parameters of their strict consensus

<table>
<thead>
<tr>
<th>Variants</th>
<th>Heuristic searches</th>
<th>Ratchet (island hopper)</th>
<th>Successive weighting</th>
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<tr>
<td></td>
<td>NONA</td>
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<tr>
<td>I. adults</td>
<td>trees</td>
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<td></td>
<td>L</td>
<td>Cl</td>
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<tr>
<td>10000</td>
<td>123</td>
<td>57</td>
<td>91</td>
</tr>
<tr>
<td>Strict cons.</td>
<td>152</td>
<td>54</td>
<td>85</td>
</tr>
<tr>
<td>II. adults + larvae (complete)</td>
<td>7680</td>
<td>182</td>
<td>65</td>
</tr>
<tr>
<td>Strict cons.</td>
<td>208</td>
<td>57</td>
<td>84</td>
</tr>
<tr>
<td>III. adults + larvae (limited)</td>
<td>140</td>
<td>148</td>
<td>80</td>
</tr>
<tr>
<td>Strict cons.</td>
<td>165</td>
<td>72</td>
<td>91</td>
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</tbody>
</table>

**Phylogeny of Endomychidae**

The monophyly of Endomychidae and its position within Cucuoidea has been elaborated in my previous paper (Tomaszewksa 2000) and it is not discussed further here. It should, however, be noticed that present analysis has not confirmed a sister relationships between Endomychidae and Coccinelidae. On generated cladograms Coccinelidae seem to be more closely related to Corylophidae than they are to Endomychidae. Much more data is needed to resolve relationships between Coccinelidae and Endomychidae. More research is needed with inclusion of the taxa of an entire Cerylonid Series and the Cucuoidea as a whole. All subfamilies of Endomychidae recognized in Tomaszewska (2000) are still recognized here as valid and are supported by a series of apomorphic characters. One of the shortcomings of my former analysis was an inability to provide strong evidence for relationships between recognized subfamily taxa. The present study was undertaken using the expanded adult data with inclusion of larval characters to shed some light on this problem.

The major clades are discussed according to a preferred cladogram (Fig. 1069), chosen as the best hypothesis that is supported by the most data (total evidence), following a successive weighting in parsimony analysis. Some cross comparisons of the results of analyses of adult and combined data are also provided.

**Merophsiinae**

The analysis of adult and combined characters (Figs 1064, 1069–1071, 1074) strongly suggests that Merophsiinae form a sister clade to all other endomychids. They appear to be the most plesiomorphic members of the family and are distinguished from all other Endomychidae in having tentorium without corpopentorium (# 21.0), the plesiomorphic condition occurring commonly in Coccinelidae and Corylophidae. Merophsiinae form a clearly monophyletic group (Fig. 1069), supported by adult apomorphy, labial palpomere 2, oval, inflated (# 20.3). They are also supported by larval character: number of stemmata 0 (# 69.0), a character shared with Anamorphinae.

**Pleganophorinae and Anamorphinae**

Among remaining Endomychidae that are supported by adult synapomorphy: tentorium with corpotentorium present, without median process (# 21.1), Anamorphinae and Pleganophorinae – all widely distributed throughout the world, form the distinct group of closely related subfamilies. The close relationships between both subfamilies are supported by larval apomorphic feature: maxillary mala at least weakly falciform (# 83.1).

Surprisingly the morphologically uniform Anamorphinae do not appear as a monophyletic group, based on the adult data only (Figs 1058, 1064). They have, however, one larval synapomorphy (# 76.1 – mandibular apex reduced or entirely missing) and in analysis of the combined data (Figs 1069, 1073, 1074) the Anamorphinae form a distinct clade supported, in addition to the larval synapomorphy, by other larval characters, like number of stemmata 0 (# 69.0), character shared with Merophsiinae, and the body with the tergal plates and/or sclerotization absent (#86.1), character occurring also in lycoperdinine genus Achuarmythus. Anamorphinae are also supported by an adult characters (# 22.0 – anterior tentorial arms separate, sharing with Coccinelidae and Hypodacnella).

Pleganophorinae form a monophyletic group based on an adult synapomorphy, antenna 4-5 segmented (# 5.1).

**Leiestinae**

Although the analysis of adult and limited combined data (Figs 1058, 1064, 1073, 1074) suggests that Leiestinae and Mycetaecinae form a sister group, supported by having the procoxal cavity provided with small, oval, antero-lateral slit (# 33.1) (occurring also in part of Pleganophorinae), the analysis of the complete, combined data does not support close affinities between both subfamilies, as shown on the preferred tree (Fig. 1069).

The Holarctic Leiestinae form a clearly monophyletic group in all analyses, and are distinguished by adult
synapomorphy (36,1 – intercoxal process of mesoventricle boat-shaped defined by strong carinae), and one larval synapomorphy (72,1 – antennal sensory appendage distinctly shorter than antennomere 3). Leiestinae are also supported by having the number of larval stemmata 3 pairs (# 69,2), character sharing with Xenomycetes and Coccinellicidae).

**Mycetaeinae**

In spite of habitual differences between the only two genera of Holarctic and Afrotropical Mycetaeinae (Mycetae and Agaricophilus), they share a clear adult synapomorphy: mentum provided with small triangular, setose tubercle placed medially (# 17,1) justifying their monophyletic status, as shown on the preferred tree (Fig. 1069). The larvae of both genera show very few affinities to each other. This may reflect their different modes of life, but may partially be due to the character coding of Agaricophilus larva from the quite inaccurate description by Mamaev (1977). Both genera, however, share prostheca in form of rigid tooth (# 78,1) as shown on Figs 1073, 1074 (character occurring also in Eupsilobiinae).

**Eupsilobiinae**

Among remaining, seven subfamilies of Endomychidae that are united by adult synapomorphy: mesotrochantin exposed (# 38,0), the Eupsilobiinae form a very distinct, monophyletic group, although without clear relationships to any other subfamilies.

The single known larva of Eupsilobiinae (Evolvera) shares prostheca in form of rigid tooth (# 78,1) with Mycetaeinae. Eupsilobiinae form, however, a well defined, monophyletic group based on adult synapomorphies, like median lobe coiled apically (# 52,1) and ovipositor with stiff, inflated, infundibulum-like structure between bursa copulatrix and sperm duct (# 58,1). Other characters, like head with antennal grooves (# 4,1) occurs also in almost all outgroups and in Merophyssinae, and the median lobe provided with T-shaped capsule at base (# 54,1) characteristic for Eupsilobiinae occurs also in Coccinellicidae.

**Xenomycetinae and Danascelinae**

An interesting and intriguing result of the present analyses is the placement of the monogeneric, Nearctic Xenomycetinae near the Holarctic Danascelinae. The relationship of Xenomycetes to any other subfamily and its placement within Endomychidae has remained unclear so far. In the analysis of Tomaszewska 2000, the tarsi of Xenomycetes were coded as pseudotrimorphic, which resulted in its grouping with Endomychidae, Stenotarsiinae, Epipocinae and Lycoperdininae. After an extensive study of Endomychidae I realized that the tarsi of Xenomycetes are somewhat intermediate and I coded them as simple in the present analysis. This change resulted in a much closer relationship of Xenomycetes to Danascelinae than to “higher Endomychidae”. Their sister-group relationship is based on the intercoxal process of mesoventrite with at least single, median carina or multicarinate (# 35,1), occurring also in some Lycoperdininae.

Following the preferred cladogram, the Xenomycetinae should tentatively be considered as a sister group to Danascelinae, until more adult and larval morphological and molecular data are known.

Danascelinae form a well defined monophyletic group supported by an adult character: base of pronotum with paired foveae on each side (# 26,1). The second postulated synapomorphy for Danascelinae in the analysis of Tomaszewska (2000), remains an autapomorphy for Danascelis – male antennomere 9 provided with tuft of long setae growing from deep concavity on inner edge (# 7,1), as this character was not observed in the second known genus of the subfamily Hadromycthus (Bousquet and Leschen 2002). Danascelinae are also supported by having the tegmen strongly reduced to simple, short ring encircling median lobe in half length, with long, membranous, flat strut (# 51,2), character sharing with Endomychidae and Stenotarsiinae.

Xenomycetinae form a monogeneric subfamily, supported by adult (# 47,1 – ventrite 5 in male with prominently elevated, elongate, median tubercle with cone-shaped tubercle on each side) and larval (# 80,1 – labial palps conjoined medially) autapomorphies of Xenomycetes.

The “Higher Endomychidae” (Endomychidae, Stenotarsiinae, Epipocinae and Lycoperdininae)

The group that includes Xenomycetinae and Danascelinae is a sister-taxon to four remaining endomychid subfamilies, of so-called “higher Endomychidae”. This group is united by the presence of pseudotrimorphic tarsi of adults (# 44,0) (sharing with Coccinellicidae and Coryphophilaee) and supported by larval synapomorphies – frontal arms well developed, V- or U-shaped (# 70,1) and the presence of 4 pairs of stemmata (# 69,3) (although the last character is not shown on the preferred tree).

The “higher Endomychidae”, consist of Holarctic and Oriental Endomychidae, Stenotarsiinae widely distributed in warmer regions of the world, Epipocinae distributed in the Neotropical and Nearctic Regions, and Lycoperdininae occurring in all main zoogeographical regions.

The present analyses provided some evidence of the close relationships among Epipocinae, Stenotarsiinae and Endomychidae. There is some degree of relationship between Epipocinae and Stenotarsiinae, based on a single larval character (hypostomal rods absent – # 73,1), shared also with Holopsis, and both families show some affinity to Endomychidae, based on the tegmen in the form of a reduced short ring with a long, membranous, flat strut (# 50,1) (occurring also in Danascelinae while
Epipocincae have character state # 50,3). These three subfamilies form a sister group to Lycoperdiniae. The adult data, however, suggest Epipocincae to be most closely related to Lycoperdiniae (Fig. 1064). This relationship is supported by the gular sutures being indistinct or confluent in midline (# 3,1) and the tegmen reduced, strongly sclerotized, encircling and compactly joined with basal part of median lobe (# 51,3), but none of these appears to be very convincing synapomorphic character as shown on the preferred cladogram (Fig. 1069).

Epipocincae, with their adult synapomorphy – sternite of male genital segment well developed with lateral edges deeply asymmetrically incurved (# 50,1), and larval synapomorphy – maxillary mala with subapical part of ventral surface with rows of paired asperities (# 84,1) form a clearly defined monophyletic group.

Stenotarsinae are also well supported as a monophyletic group by an adult character – base of coxites deeply excised (# 61,1) and by a larval synapomorphy – abdominal terga with lateral parascoli (# 90,1).

Endomychiniae as monophyletic group are well supported by adult synapomorphy: labium with prementum distinctly longer than wide (# 15,1). Larvae, with only Endomychus larva known, have their synapomorphy (mandibular mola replaced by membranous lobe – # 77,2), but do not show any distinct affinity to other subfamilies within this group. They share, however, the labrum sclerotized with a membranous apex (# 75,1) with some members of Lycoperdiniae (Figs 1073, 1074).

**Phylogeny of Lycoperdiniae**

The monophyly of the Lycoperdiniae is very well supported by the following adult characters: the presence of an occipital file on the head (# 1,1), maxillary lacinia with mesal edge and dorsal surface covered with regular rows of setae and/or spinules (# 13,1), stridulatory membrane on anterior margin of the pronotum (# 23,1) and sternite of male genital segment well developed with apical margin at least weakly emarginate or sinuate (# 48,2) (simple in Daulettypus and one species of Daulis). Thus, as defined above the subfamily includes 38 genera distributed in all zoogeographic regions. In a contrary to my former analysis (Tomaszewski 2000) the present data do not support the fused coxites of the female genitalia as unique character for Lycoperdiniae. The separated coxites occur in Daulis, Daulettypus, Archipines and Achuarumychus that seem to represent most plesiomorphic types of the subfamily, but this character was also found in most species of more derived genera Mycetina and Ancylopus.

Generic relationships in Lycoperdiniae are far from being resolved and none of the three analytical variants provided very satisfactory results.

Consequently, the relationships within the Lycoperdiniae that are discussed below are based on a preferred cladogram from the analysis of the most complete, combined data (Fig. 1069), with some cross references to the adult analysis.

The preferred cladogram indicates five evolutionary lineages within Lycoperdiniae.

**Daulis-group**

A group comprising the Neotropical genera Achuarumychus and Archipines, and Australian genera Daulis and Daulettypus form a distinct clade supported by a larval synapomorphy: prostheca well developed, divided into two separated parts (# 78,1), and epicranial stem present (# 71,1), character shared with some other Lycoperdiniae. A highly probable scenario assumes the Daulis-group is the most basal clade of the subfamily. It forms a sister-group to the remaining Lycoperdiniae, that are united and well supported by the female 8th abdominal segment with at least the sternite compactly connected or fused with coxites (# 56,1) and by having ovipositor with fused coxites (# 60,1).

**Lycoperdina-group**

This group contains Lycoperdina, widely distributed in Holarctic and Afrotropical Regions, Palaeaeartic Hylaea and Palaeaeartic and northern Oriental Dapsa, and is supported by intercoxal process of the mesoventrite having at least single, median carina or multicarinate (# 35,1) (occurring also in Danascelinae and Xenomyctinae). This may not be a natural group because is not supported by independent adult cladograms (Figs 1058, 1063). The adult analysis supported Lycoperdina-group including Aphorista, but this group also lacks synapomorphy.

**Amphix-group**

A group includes Neotropical Amphix and Acinaces, Oriental genera Beccariola, Dryadites, Cymbachus, Sinocybanchus and Pseudindalus, Neartic Aphorista, and Mycetina widely distributed in Holarctic, Oriental and Afrotropical Regions. This group is supported by larval synapomorphy: labrum with apical margin sinuate or multidenticulate (# 74,1). Within this clade there are two distinct lines (although not supported by apomorphic characters). First comprising Aphorista, Mycetina and Pseudindalus with Mycetina and Pseudindalus constituting monophyletic group supported by adult synapomorphy: intercoxal process of mesoventrite trapezoidal in shape (# 36,1). Second group comprises Acinaces, Amphix, Dryadites, Cymbachus, Sinocybanchus and Beccariola. The Oriental genera among this group seem to be more derived and are well supported by a prosternal process that is forked apically and not extends beyond the front coxae (# 31,1).

**Ampisternus-group**

This group contains eight Oriental genera (Gerstaeckerus, Brachytrycherus, Ohtaius, Spathoneles, Stictomeletta, Ampisternus, Amphistethus and Cacodaemon). The
monophyly of this group is well supported by the form of the mesoventrite with the apex of the intercoxal process widened laterally, overlapping part of the coxae (# 34,1), moreover the elytra with basal margins thickened and raised (# 40,1) (occurring also in some genera of Eumorphus group), the mandible with apical tooth widely chisel shaped (# 67,1) sharing with some other Lycoperdininae, and male genital segment having additional, internal V or U shaped sclerite (# 68,1) occurring also in some other Lycoperdininae unite this group. It is interesting to note that this monophyletic group is similar in constitution to Anphisternini of Strohecker (1964), with the inclusion of Gerstaeckerius, which stays in a sister group position to the remaining genera, that are well supported by apex of maxillary lacinia covered with numerous stout, S shaped setae (# 12,1). The group containing Stathomelus, Stictotoma, Anphistethus, Anphisternus and Cacadaemon is another monophyletic part of the Anphisternini group, well defined by elytra possessing high tubercles and/or spines (# 41,1), and the base of the spermatheca with a large nodulus-like structure or at least with a small weakly sclerotized ring (# 64,1).

**Eumorphus-group**

This group includes 14 genera - 5 of them distributed in the Oriental Region (Avencymon, Eumonymon (including northern Australia), Eumorphus, Platndalum, Parndalum), 7 Afrotropical genera (including Mada gascar) (Malindus, Callmodapsa, Cymones, Haploosels, Chetryrus, Macrotrychmus, Irycherus), and Indalimus, and Ancylopus inhabiting old world tropics and subtropics. The monophyly of this large group is supported by one larval synapomorphy subapical part of maxillary mala with 4 oblique rows of hook like setae on ventral surface (# 84,1). Within this group, Encymon and the closely related genera Eumorphus and Platndalum, form basal clades. The group of remaining genera is well supported by the basal margin of labrum with median raised ridge, triangularly produced anteriorly (# 10,1). Among this group there are two distinct lines. First monophyletic group containing African genera (Haploosels, Chetryrus, Macrotrychmus, Irycherus) is supported by adult synapomorphy spermatheca with out accessory gland (# 62,1), the second group containing Ancylopus, Avencymon, Malindus, Parndalum, Callmodapsa, Cymones and Indalimus is supported by the elytra having basal edge thickened and raised (# 40,1), that is sharing with Anphisternini group. Within this group, however, Malindus, Parndalum, Callmodapsa, Cymones and Indalimus form a monophyletic clade supported by the elytra being widest beyond mid length (# 42,1).

**Biogeography**

The Endomychidae are a moderately large group including mostly tropical and subtropical beetles. They are distributed in all main zoogeographical regions, but are unknown from most of the Atlantic Islands and mid-Pacific Islands (except for the cosmopolitan species of Eudoreus – Eupsilobunae, known mainly from widely scattered islands, like Cuba, Guadeloupe, Virgin Islands, Galapagos, Mascarene Islands, Seychelles, Sri Lanka, Fiji, French Polynesia, Solomon Islands and Hawaii). The larger Pacific Islands including New Guinea and New Caledonia are, however, inhabited by a limited endomychid fauna, mainly by species of Stenotarsinae, Pleganophorinae (Irochoides spp) and some Lycoperdininae.

The present distribution of particular subfamilies of Endomychidae can be summarized as follows:
- Mycetaeinae with Mycetaeina distributed in Holarctic Region (eastern North America and Europe) and South Africa, and Agaricophillus restricted to Central and south eastern Europe
- Leestinae Holarctic - North America, Europe and Japan
- Eupsilobinae Central and South America, South Africa, and widely distributed species of Eudoreus (as indicated above),
- Pleganophorinae with Pleganophorus endemic in south eastern Europe, Dadosceris distributed in Oriental Region, and Trochoides occurring in tropical regions throughout the world,
- Metophyinae with plesomorphic Holoparames known from all main zoogeographical regions, and nearly all the other genera distributed in warmer parts of the Old World, excluding Australia and Madagascar (with some species of Displota known from northern South America),
- Anamorphinae occurring in all main zoogeographical regions,
- Xenomyctinae Nearctic – monotypic subfamily with two known species occurring in North America,
- Danasculinae Holarctic – North America and Pakistan,
- Endomychinae Holarctic and Oriental (with the species of most plesomorphic Endomychus widely distributed in North America, Europe and Asia, including Japan and northern Orient, while the other more derived genera occur mainly in Oriental Region and south eastern Palaearctic),
- Stenotarsinae widely distributed throughout the world, unknown from Europe, with most speciose species of Stenotarsus occurring in all warmer regions of the world,
- Epipocinae mostly Neotropical with some Nearctic species of Epipocus,
- Lycoperdininae distributed in all parts of the world with maximum diversity in the Oriental Region (21 genera – 16 of them endemic), with the presumably most plesiomorphic members of the subfamily (Achlaemyrus, Archipines, Daolis, Daolotypus) occurring in South America and Australia.
The past history of the Endomychiidae is poorly known. Fossils are known from Baltic amber (Eocene/Oligocene, ca. 38 MY ago [MYA] (like Lycoperdina and Myctetina) (Strohecker 1953). The older evidence is a little speculative, but the oldest fossil endomychid with Myctetinae-like characters was seen by R. Crowson (unpublished) in Canadian amber of upper Cretaceous age. This and the presence of Erotyliidae: Langurini fossils (see also Leschen 2003), also members of Cucujoidea, in Lebanon amber (early Cretaceous) (Crowson 1981) may suggest that Cucujoidea (Endomychiidae as well) existed and were well differentiated by mid/upper Cretaceous (ca. 110–100 MYA), before the break up of the main landmass of the Gondwana.

With the very limited fossil data, reconstructing the geological history of the family is very difficult. With very limited data from the past, and considering tentatively, widely distributed Merophsyinae as the most plesiomorphic members of Endomychiidae (as shown on the preferred cladogram – Fig. 1069), it is impossible to make a hypothesis about a centre of the origin of the family, and thus the dispersal routes of the family would be highly speculative.

There is no simple answer about the closest relatives of the subfamily Lycoperdininae, but the analysis of the adult characters indicates that Lycoperdininae may probably have evolved from a common ancestor of Epipocinae-Lycoperdininae stock (as shown on the strict consensus obtained after successive weighting – Fig. 1064). This, however, is not supported by a preferred cladogram.

None of the known genera of Lycoperdininae occur exclusively on two post-Gondwanan continents, Africa and South America or South America and North America. Additionally the South American Achuarmychus, Archipines and Australian Daulis, and Dauliotypus representing plesiomorphic members of the subfamily, do not seem to be closely related either to the African or North American Lycoperdininae. The exception is Holarctic, African and Oriental Myctetina which shares with Achuarmychus the coxites being well developed and separated, or Lycoperdina occurring in Holarctic Region and Africa, sharing with Achuarmychus well developed gular sutures. These connections may indicate either upper Cretaceous Gondwanan origin before the break up of Gondwana, or (South American) early post Gondwanan origin of the Lycoperdininae, after the separation of Africa and South America in upper Cretaceous/early Tertiary (95–65 MYA), with probable main dispersal routes to the north across the proto-Caribbean archipelago, that connected North and South America during middle Cretaceous but had broken just in the early Eocene (about 49 MYA) (Sanmartín and Ronquist 2004). Both models are equally possible so far.

Unfortunately the relationships within Lycoperdininae remain poorly resolved, therefore their evolutionary dispersal routes should be hypothesised very cautiously.

There seems, however, to be an easy explanation for the present distribution of most groups of the closely related genera of the subfamily. The distributional pattern of the Lycoperdina-group containing the Palearctic (European) Hylai, Palearctic Dapsa (with some species reaching northern Orient) and Lycoperdina inhabiting Nearctic, Palearctic and Africa, indicates movement between Nearctic and Palearctic. Easy dispersal between eastern North America and Europe (Euramerica) and western North America and Asia (Asiamerica) occurred during late Cretaceous and early Tertiary. Further movement that occurred with the closure of the mid-continental Seaway of North America in the Early Tertiary facilitated interchange between Euramerican and western American fauna. The following closure of the Turgai Straits in the late Eocene facilitated movement between Europe and Asia (Noonan 1988). The Beringia land route between western North America and Asia made possible dispersal between both continents, at least until the late Eocene/early Oligocene, before dramatic changes in climatic conditions occurred.

The dispersal via Beringia could also explain the present distribution of the Amphix-group, containing two Neotropical, one Nearctic, five Oriental genera of Lycoperdininae and the only Myctetina widely distributed in Holarctic, Orient and Africa. This group may have evolved in North America during the period of active dispersal around the northern Pacific, in the early Tertiary, with subsequent eventual dispersal of Amphix and Acinaces into South America and evolution of Beccriola, Dryadites, Cymbachus and Sinocymbachus in Asia with their dispersal into Malaya during climatic cooling, that begun in the mid to late Miocene. The evolution of Myctetina and its closest relatives Pseudindalimus and Aphrista and the present distribution of these genera could be similarly explain, with dispersal of Pseudindalimus into Malaya and a large radiation of Myctetina spreading through the whole Northern Hemisphere and Africa.

The close relationships between genera presently inhabiting the south-eastern tropics (Africa, Madagascar, India, Southeast Asia/Southeast Pacific, New Guinea and northern Australia) – Eumorphus-group – can be explained as a result of recent dispersal along the coasts of the Indian Ocean in the middle Miocene (about 18 MYA), when a close African-Eurasian connection was established, ending a long period of isolation (including various degrees of connections) between both landmasses (Ratcliffe 1984). Although Madagascar diverged from Africa in the early Cretaceous (121 MYA), both lands have, however, remained relatively close, because of the narrow Mozambique Channel being a comparatively minor barrier to dispersal for plants and animals. The study on biogeography of the Southern Hemisphere including plants and animals, showed that dispersal between Africa and Madagascar was more frequent than
between Africa and South America (Sanmartin and Ronquist 2004) According to this, the Madagascan Lycoper-diminae represent derived members of the subfamily and are certainly not old enough to have been present before the block of Madagascar and India broke away from Africa in the early Cretaceous The present distribution in Australia of some species of Indalmus and Encymon, is probably a result of Malaysian biotic introgression to Australia, when both plates collided in the Miocene The evolution of the Amphisternus-group and the present distribution indicate a strong radiation of its genera in the whole Oriental Region.

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