

**AUSTRALIAN LARVAL CARABIDAE OF THE SUBFAMILIES
BROSCINAE, PSYDRINAE AND PSEUDOMORPHINAE**
(Coleoptera)

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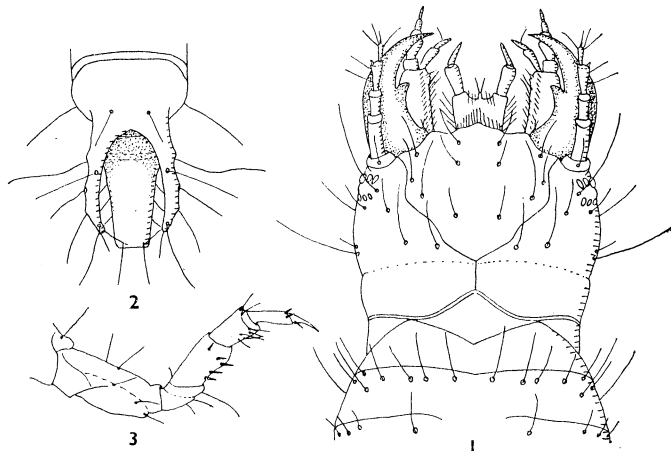
Abstract: Larvae of the following Carabidae are described and figured for the first time: *Promecoderus concolor* Germ. and *Eurylychnus blagravei* (Cast.) (both Broscinae); *Melisodera picipennis* Westw. (Psydrinae); and *Sphallomorpha* sp. (Pseudomorphinae). All four genera were previously unknown in the larval state and two of them (*Melisodera* and *Sphallomorpha*) represent hitherto unknown or doubtfully known subfamilies. Larval *Sphallomorpha* occur as inquiline in nests of the ant *Iridomyrmex detectus* Sm.

Subfamily BROSCINAE

Promecoderus concolor Germar Figs. 1-3.

Upperside mostly light brown but head somewhat darker; underside pale, whitish.

Head of average size, transverse, heavily chitinized; frontal piece slightly concave; epicranial suture distinct; nasale obtusely dentate; neck well marked, with strong cervical keels; ocelli present, 6 on each side; antenna a little shorter than mandible, 4-segmented; mandible rather stout, with a basal penicillus; retinaculum well developed; maxilla with



Figs. 1-3. *Promecoderus concolor* Germar, 2nd instar larva (L₂):
1, fore parts; 2, anal cerci and pygopodium; 3, right mid leg.

inner margin setose; inner lobe present as a small tubercle, unisetose at apex; maxillary palp 3-segmented, palpiger distinct; labium quadrate, palp 2-segmented; ligula small, conical, bisetose. *Pronotum* transverse, strongly chitinized, about as wide as head; legs short and stout, with a single, strong terminal claw, the latter with a spine on each side near base. *Abdomen* with tergites moderately chitinized, sides unmarginated except near anterior angles; pleurites with prominences lightly chitinized; sternites membranous; cerci short, fixed, unsegmented, but with setiferous nodes; pygopodium well developed, setose, longer than cerci.

Length: L_2 , 14.5 mm; L_3 (expanded), 21–24 mm. Head-width: L_2 , 1.6 mm; L_3 , 2.1–2.4 mm.

Described from 1 L_1 & 3 L_3 (St. Albans, Victoria, 1. VI. 1958 & 13. IX. 1959, respectively) taken by myself at a locality where *P. concolor* was abundant and was the only broscine noted during 1958–60, inclusive.

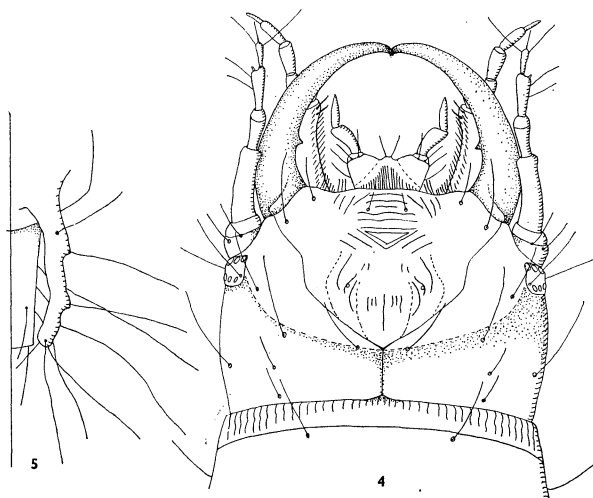
***Eurylychnus blagravei* (Castelnau)** Figs. 4–5.

Upperside mostly chestnut brown; underside pale, whitish.

Head large, transverse, heavily chitinized; frontal piece concave; epicranial suture distinct; nasale broadly truncate; egg-bursters a row of 6 spines on each side; neck not marked; cervical keels very weak; ocelli large, 6 on each side; antenna a little shorter than mandible, 4-segmented; mandible slender, strongly incurved at tip; basal penicillus present; retinaculum very small, especially in L_3 ; maxilla with inner margin setose; inner lobe absent, replaced by a stout seta; maxillary palp 3-segmented; palpiger distinct; labium broad, palp 2-segmented; ligula short, truncate, bisetose. *Pronotum* transverse, about as broad as head in L_3 , somewhat narrower in L_1 and L_2 , strongly chitinized; legs short and stout, with a single, strong terminal claw, the latter with a spine on each side near base. *Abdomen* with tergites strongly chitinized and margined along sides; pleurites with prominences chitinized; sternites mainly membranous; cerci short, fixed and unsegmented but with setiferous nodes, the setae very long; pygopodium well developed, setose, as long as cerci.

Length: L_1 , 13 mm; L_2 , 22 mm; L_3 , 28.5 mm. Head-width: L_1 , 1.9 mm; L_2 , 2.8 mm; L_3 , 3.6 mm.

Described from 1 L_1 (Mt. Donna Buang, Victoria, 30. I. 1960), 1 L_2 (Kiandra, New South Wales, 3. II. 1962) and 1 L_3 (Piccadilly Circus, Australian Capital Territory, 25. IV. 1961), Moore. No attempt was made to rear any of these larvae but since *E. blagravei* is



Figs. 4–5. *Eurylychnus blagravei* (Castelnau), 3rd instar larva (L_3): 4, head; 5, right anal cercus and pygopodium (right side).

common at all 3 localities and is the only broscine known to be present, of sufficient size to account for the largest larva, the identification seems secure.

Adult broscines are certainly among the most difficult of the Carabidae to classify, owing to their wide diversity of structure. The latest and most satisfactory arrangement is that of Ball (1956), where 3 groups, Barypina, Creobina and Broscina, are recognized, largely on the basis of aedeagal characters. If, as seems likely, these groups prove to be natural and to represent distinct phyletic lines, they should be discernible also on larval characters. Unfortunately, present knowledge of the larvae is insufficient for this purpose. However, larvae of the genera *Promecoderus* and *Eurylychnus*, here described, certainly differ in several important characters (notably the development of the sensory setae, cervical keels and inner lobe), as would be expected from Ball's system, where they fall into separate groups (Creobina and Broscina, respectively).

Of the larval genera keyed by van Emden (1942), *Cnemacanthus* Brullé is no longer regarded as broscine, on account of the conchoid parameres of the ♂ adult. This is in keeping with larval characters, such as the very short cerci and the existence of 2 tarsal claws, in which *Cnemacanthus* is quite atypical for his subfamily. Thus 4 genera of larval Broscinae are at present known and these may be separated as follows:

1. Inner lobe of maxilla small but distinct 2
 Inner lobe absent, replaced by a stout seta 3
2. Tergites margined at sides; mandibular penicillus absent; retinaculum small, about 1/3 as long as diameter of mandible at distal end of retinaculum; claws without a ventral spine on each side **Axonya** Andrewes
 Tergites not margined at sides; mandibular penicillus present; retinaculum larger, about 1/2 as long as diameter of mandible at distal end of retinaculum; claws with a ventral spine on each side near base.....**Promecoderus** Dejean
3. Tergites margined at sides; mandible slender, incurved at tip; retinaculum minute; cerci about as long as pygopodium **Eurylychnus** Bates
 Tergites not margined at sides; mandible stout, not incurved; retinaculum well developed; cerci much longer than pygopodium **Brosicus** Panzer

Subfamily PSYDRINAE

Melisodera picipennis Westwood Figs. 6-8.

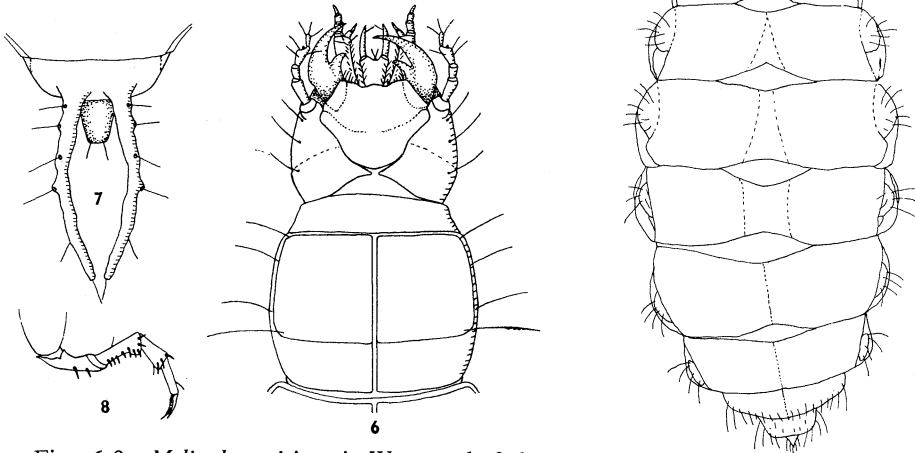
Pale, whitish, head and sclerites light brown.

Head small, transverse; frontal piece concave, reaching hind-margin, the epicranial suture thus obsolete; nasale slightly emarginate, edentate; cervical keels present; no obvious neck; ocelli absent; antenna shorter than mandible, 4-segmented; mandible strong and sharp; retinaculum large; basal penicillus present; maxilla with inner margin setose; inner lobe absent; maxillary palp 3-segmented, palpiger distinct; ligula vestigial, bisetose; labial palp 2-segmented. *Pronotum* transverse, broader than head; legs short, with numerous ventral spines and 2 subequal terminal claws. *Abdomen* with tergites lightly chitinized and weakly margined along sides; pleural prominences strongly chitinized; ventrites membranous; cerci moderately long, fixed and unsegmented but with setiferous nodes; pygopodium short.

Length: L₃, 18 mm. Head-width: L₃, 1.5 mm.

Described from 1 L₃ (about to pupate) and larval exuviae from which an adult was reared (Mt. Gingera, Australian Capital Territory, 1800 m, 13.II.1963). The 2 larvae, together with a pupa and several teneral adults, were taken from a damp log, in company with larvae of the stag beetle *Syndesus cornutus* F., upon which they had doubtless fed.

This is the first fully authenticated larval psyrine to be described, although Jeannel (1948) has already published details of a supposed larva of the northern *Nomius pygmaeus* (Dej.). The overall resemblance between the 2 forms supports Jeannel's identification but important differences exist and these confirm the view (Moore, in press) that *Nomius* is the more primitive genus. The differences may be tabulated as follows:



Figs. 6-8. *Melisodera picipennis* Westwood, 3rd instar larva (L₃): 6, fore parts; 7, anal cerci and pygopodium; 8, right mid leg.

Fig. 9. *Sphallomorpha* sp., 2nd or 3rd instar larva.

Inner lobe of maxilla present, though very small; ocelli present, 3 on each side; retinaculum minute; pygopodium long.....	Nomius Castelnau
Inner lobe absent, replaced by a stout seta; ocelli absent; retinaculum large; pygopodium short.....	Melisodera Westwood

Subfamily PSEUDOMORPHINAE

Sphallomorpha sp. Fig. 9.

Eruciform; entirely pale, white, except for head and pronotum, light brown.

Head very small, elongate, parallel-sided; frontal piece slightly convex, reaching hind-margin on a wide front; nasale emarginate, edentate; cervical keels and neck absent; ocelli absent; antenna very short, 4-segmented; mandible short and stout, with a seta on outer face; retinaculum and basal penicillus absent; maxilla with inner margin glabrous; in-

ner lobe absent; outer lobe minute; maxillary palp 3-segmented, palpiger distinct; labium small; ligula small but distinct, bisetose; labial palp 2-segmented. *Pronotum* trapezoidal, markedly narrowed in front and closely adapted to head; legs very short, unarmed except for 2 short terminal claws. *Abdomen* without sclerites, much wider than foreparts; segment 10 very small, conical, not forming a pygopodium; cerci absent.

Length: (2nd or 3rd instar) 9–12 mm. Head-width: 0.5 mm.

Described from 12 larvae, all apparently of same instar, taken by myself from brood-chambers of the ant *Iridomyrmex detectus* Sm. (Canberra distr., 23.II–2.III.1963). Some of these larvae lived in captivity for several months but they refused to feed upon ova, larvae or pupae of the ants with which they were found, and were not reared. Possibly the ants feed them in nature. Adults of 2 species of *Sphallomorpha*, viz. *colymbetoides* (Westw.) and *nitiduloides* Guer. were found from time to time, under cover beside the nests in question and one specimen of the former actually occurred inside a nest. Thus, evidence in support of the generic identification of the inquiline larvae is good but uncertainty exists at the specific level. Since *S. colymbetoides* (length about 15 mm) was by far the commoner species, the larvae are more likely to belong to it, and therefore be L₂, than to belong to *nitiduloides* (length about 10 mm), of which they would need to be L₃. However, specific differences, if they exist at all, are unlikely to be important with degenerate larvae of this type.

These larvae appear to be the 1st of the Pseudomorphinae to be discovered and described. Very little is known of the biology of this aberrant subfamily but the association of the adults (particularly those of the genus *Adelotopus* Hope) with ants has been frequently noticed (See Lea, 1910). Their smooth, streamlined form, short, retractile antennae and great speed seem admirably adapted to a myrmecophilous existence, which may well prove to be the general habit of the group.

The larval *Sphallomorpha* strongly recall the few known degenerate, semi-parasitic larvae of the subfamilies Lebiinae and Brachininae, especially the latter, to which they would run in van Emden's (1942) key. This is in keeping with adult characters and supports the concept of a separate group, the Balteifera Jeannel (1941–42), uniting the Pseudomorphinae and Brachininae. The most important larval character separating these 2 subfamilies would appear to be the ligula, which is small but distinct in *Sphallomorpha* but absent in *Brachinus* and its allies.

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