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The Larva of *Neocuris gracilis* Macleay (Coleoptera: Buprestidae)

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With 18 Figures and 1 Table

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Abstract

The larva of *Neocuris gracilis* Macleay is described from material collected during September 1984 from the Griffith University grounds, Brisbane, Queensland, Australia. Comparisons are made with previously described extra-Australian larvae from the tribes Kisanthobiini, Anthaxiini, Melanophilini (subfamily Buprestinae). The larval morphology of *N. gracilis* suggests that the species differs significantly from other known Anthaxiini and Melanophilini but has some affinities with the Palearctic genus *Kisanthobia* (tribe Kisanthobiini). This suggests that the Australian *Neocuris* may have to be placed in a new tribe when studies of other species and related Australian genera are completed.

Introduction

The general biology and taxonomy of the Australian genus *Neocuris* is poorly known (Hawkeswood 1985a). Observations and collections by one of us (T.J.H.) has resulted in the acquisition of larval and pupal material of *N. gracilis* Macleay from dead main stems and branches of *Pultenaea villosa* Willd. (Fabaceae) (Hawkeswood 1985a). On the basis of this material, the larva is described below. The terminology used for the larval description generally follows that of Alexeev (1960), Benoit (1964, 1966), Bílý (1972, 1975a, 1975b, 1986), Hawkeswood (1985b) and Volkovitsh (1975, 1979).

Description of larva (Fig. 1–17)

Length of last instar 6.3–8.3 mm (mean 7.4 mm), width of the prothorax 1.5–2.0 mm (mean 1.8 mm), width of abdomen 0.5–0.7 mm (mean 0.6 mm). Larva is of the usual buprestid type with an enlarged prothorax into which the head capsule is retracted; this larva corresponds to the 2nd morpho-ecological type of *Acmaeoderella* larva (Volkovitsh 1979). Body whitish, apodous, very weakly sclerotized except for mandibles, epistome, hypostome and spiracles. Epistome and hypostome reddish-brown to black, strongly sclerotized. Body almost glabrous except for series of bristles (long, sharp setae), microspinulae and microampullae; all these types are present on the prothorax (Fig. 4) surrounding the mouthparts; bristles (sharp setae) present on the lateral margins of the thorax and abdominal segments (Fig. 5); indistinct zones of microspinulae on the anterior margin of prothorax and anterior-lateral margins of prothoracic plates and near abdominal spiracles (Fig. 7); rather coarse microampullae developed on the prothoracic plates (Fig. 6) and at the anterior margins of the dorsal surface of the meso-,

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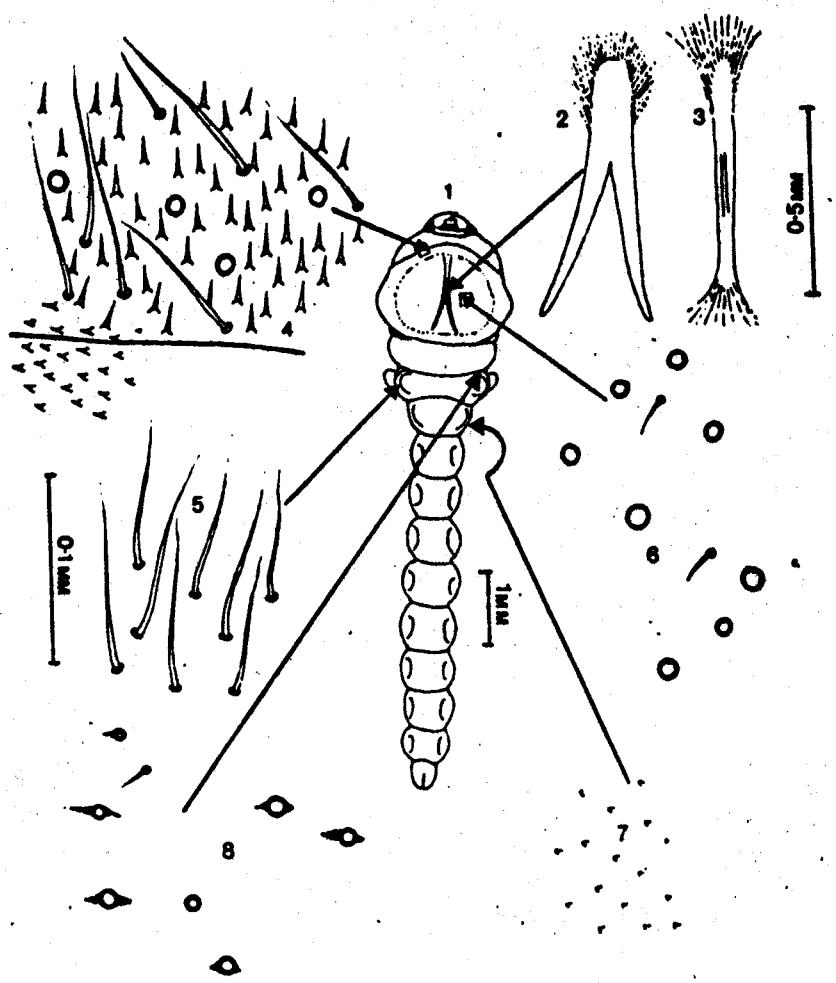

Fig. 1–8. Last instar larva of *Neocuris gracilis* Macleay. 1. Dorsal view of the last instar larva. 2. Shape of pronotal groove of prothorax. 3. Shape of prosternal groove of prothorax. 4. Microspinulae, setae and microampullae on the anterior margin of prothorax. 5. Setae on lateral margins of body segments. 6. Short bristles (setae) and microampullae on the thoracic plates. 7. Microspinulae near spiracles on body segments. 8. Microspinulae with weakly sclerotised rings on meso- and metathorax and abdominal segments

metathorax and first abdominal segments where they are surrounded by weakly sclerotized rings (Fig. 8). Head and mouthparts:

Epistome (Fig. 13): about 4.8 times wider than long; anterior margin moderately bisinuate between the mandibular condyles which are large; posterior margin bisinuate between the lateral tentorial pits; epistome with sharp-pointed lateral margins and bearing two pairs of moderately long, sharp setae below two, very small sensory areas (epistomal sensory pits) in the middle. Clypeus narrow, membranous, glabrous, cream in colour, about 2.5 times wider than long, collar-shaped, anterior margin straight. Labrum (Fig. 15) transverse, pale brown, mostly membranous but bearing very prominent palantine sclerites; about 1.0—1.2 times wider than long; anterior margin weakly arcuate between broadly rounded lobes; with a fringe of dense, short, blunt, stiff setae

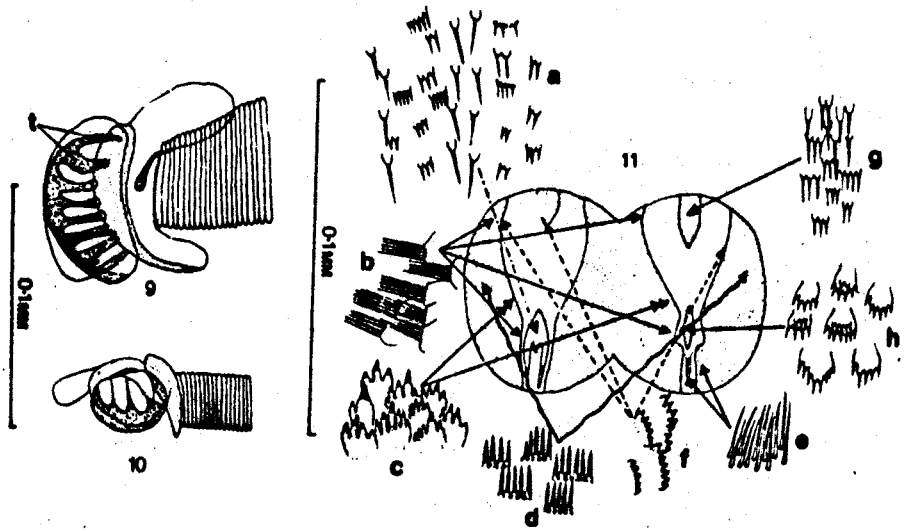

Fig. 9—11. Last instar larva of *N. gracilis*. 9. Thoracic spiracle showing trabeculae (t) and inner structures. 10. Spiracle on first abdominal segment. 11. Section of proventriculus showing the different types of spines and their occurrence

(arising from rounded membranous tubercles) on the anterior margin from the beginning of the lateral lobes and a sparser fringe of various-sized setae on the lateral lobes; labrum dorsally (hypopharynx) with the following setae on either side: two moderately long, sharp setae near the lateral margins of the lateral lobes; a similar but longer seta about 2/5 the distance from the lateral margins to the midline and a slightly shorter, somewhat blunt seta, about half the distance from the margin of the lateral lobe to the midline; hypopharynx bearing 2—3 campaniform sensillae either side, one between the palantine sclerite and the lateral margin, one arising from the palantine sclerite below one of the long setae, and the other, smaller one below the setae on the lateral lobe; ventral surface (epipharnyx) with covering of large, sparse spinulae (not shown) and 2 long, blunt setae either side at about the centre of the lateral lobes.

Antennae (Fig. 14): 2-segmented; 1st segment broadly cylindrical, strongly sclerotized, about 1.0—1.2 times wider than long, the internal margin shorter than the external, with a narrow fringe of stiff, short, microspinulae on the anterior margin and a prominent campaniform sensilla near the lateral margin below the anterior margin; 2nd segment about 0.8—1.0 times longer than wide, with a fringe of short, stiff, sharp microspinulae on the anterior margin and a very long sharp seta (trichosensilla) situated a short distance about 2/5 the distance from the anterior margin to the posterior margin near the external lateral margin; apex of 2nd segment deeply concave, encircling a prominent, rounded, spineless sensory appendage (often regarded as a 3rd antennal segment) and 2 palmate sensillae.

Mandibles (Fig. 12): black, short, robust with two blunt teeth at the apex.

Hypostome (Fig. 17): strongly sclerotised in some parts; posterior margin very broadly arcuate.

Labiomaxillary complex (Figs. 16, 17): maxillary palpus (cardo) (Fig. 16) membranous, glabrous except for two long sharp setae (one larger than the other) arising from a nonsclerotized area at the centre. Stipes (Fig. 16) moderately sclerotized, bearing one campaniform sensilla almost in the centre, one short, sharp seta near the lateral external

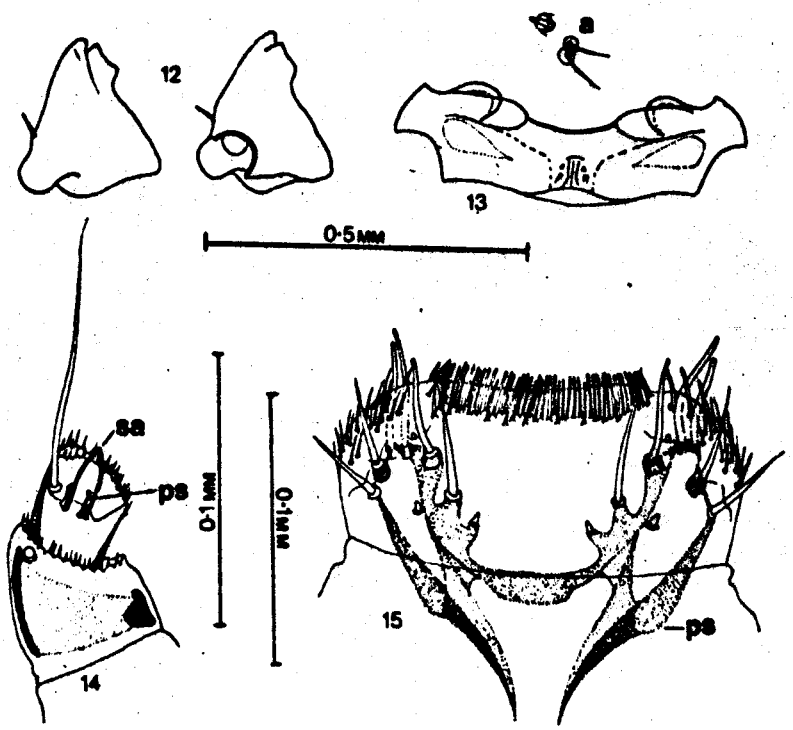

Fig. 12—15. Last instar larva of *N. gracilis*. 12. Left mandible, dorsal and ventral views. 13. Epistome. 13a. Epistomal sensory pits. 14. Antennae. sa, sensory appendage; ps, palmate sensilla. 15. Labium. ps, palantine sclerite

margin above the sclerotized area and one long, sharp seta near the anterior margin below the mala; anterior margin and internal surface are microspinulated. Maxillary palpus (Fig. 16): 2-segmented, basal segment strongly sclerotized, about 1.0—1.2 times wider than long, the basal segment with a long sharp seta arising from near the anterior-lateral margin and a campaniform sensilla situated almost in the middle; the external margin and a portion of the anterior margin with very short, sharp setae; 2nd segment about 1.2 times longer than wide, with one modified curved sensilla internally near the internal margin and one campaniform sensilla at the external margin and 6 or 7 small conical sensory structures at the apex. Mala (Fig. 16): strongly sclerotized, about 1.2 times wider than long, with one campaniform sensilla at the centre and 2 moderately long, sharp setae on the external surface; the internal margin also with a few small microspinulae. Labium (Fig. 17): variable in shape, partly sclerotized, weakly transverse, with broadly arcuate anterior margin; external surface of prementum (prelabium) with a dense triangular-shaped zone of short, sharp spines in the centre and extending to the lateral margins of labium; spines arising from membranous tubercles; base of labium with 2 sclerotized plates, each bearing one long, sharp seta and 3 campaniform sensilla at the apex and a smaller campaniform sensilla at about the centre of the plate; 2 very long sharp setae arising from the postmentum (postlabium).

Thorax (Fig. 1—3)

Prothoracic plates glabrous except for small indistinct zone of microspinulae on the anterior-lateral margins and sparse, short bristles and microampullae (Fig. 4, 6); teeth

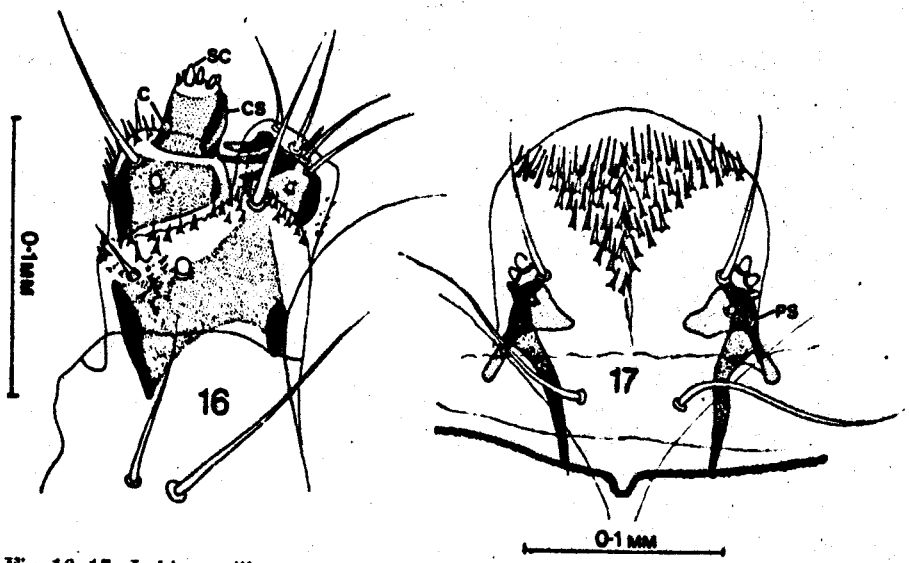

Fig. 16, 17. Labiomaxillary complex showing cardo, stipes, maxillary palpus, setae and ampullae. cs, curved sensilla; sc, sensory cones; c, campaniform sensilla. 17. Labium, ps, palantine sclerite

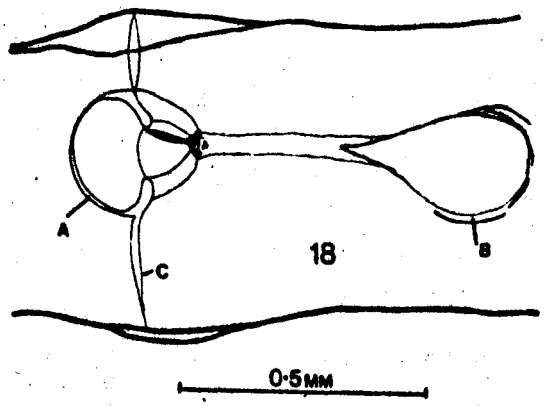

Fig. 18. *Cratomerus medvedevorum* Alexeev. Metathorax. a) dorsal ampule; b) ventral ampule; c) transverse cuticular folding

or spines absent. Median grooves (Fig. 2, 3) weakly defined and coloured: brownish-yellow in live specimens, colourless in preserved specimens. Pronotal groove (Fig. 2) inverted "Y"-shaped, dividing into 2 weakly curved branches at about half its length; angle between these branches about 32—39°. Prosternal groove (Fig. 3) uniramous, poorly defined at hind half of plate only. Metathorax (Fig. 1) with a pair of large ambulatory pads at the ventral surface; these pads are without internal structures. Thorax without rudiments of legs.

Spiracles (Fig. 9, 10): thoracic spiracles (Fig. 9) weakly sclerotized, of usual form, with small number of branched trabeculae; abdominal spiracles (Fig. 10) of normal rounded form, unicamerate or with poorly defined trabecular structures.

Proventriculus (Fig. 11) with diverse range of armature and small additional zones of microspinulae (Figs. 11a, b).

Material examined: 25 last instar larvae, ex. *Pultenaea villosa* Willd. (Fabaceae), September–October 1984, Griffith University campus, Brisbane, Queensland, col. T. J. Hawkeswood.

Discussion

In addition to the larva of *Neocuris*, we have studied the larvae of *Melanophila picta picta* (Pall.) and *Phaenops cyanea* (Fabricius) (both Melanophilini), *Anthaxia lucidiceps* Gory and *Cratomerus medvedevorum* Alexeev (both Anthaxiini) and *Kisanthobia ariasi* Robert (Kisanthobiini). *Kisanthobia* was studied through the courtesy of Dr. A. V. Alexeev. Descriptions and diagnoses of the larvae of Melanophilini, Anthaxiini and Kisanthobiini are contained in the papers of Schaefer (1949), Alexeev 1(964), Alexeev and Soldatova (1968), Soldatova (1969, 1970) and Bílý (1975). Differences between *Neocuris gracilis* larvae and those genera examined in the above-mentioned tribes are outlined in Tab. 1. These are the main morphological features we consider to be of taxonomic importance; we have not considered the structures of the mandibles and pro-

Table 1. Comparison of the main taxonomic characters between the larva of *Neocuris gracilis* (Macleay) and those of *Kisanthobia*, *Anthaxia*, *Cratomerus*, *Melanophila* and *Phaenops*

Neocuris gracilis	Kisanthobiini (*Kisanthobia*)	Anthaxiini (*Anthaxia*, *Cratomerus*)	Melanophilini (*Melanophila*, *Phaenops*)
Antennae with microspinulae on the anterior margins of the 1st & 2nd segments (Fig. 14)	Antennae with dense microsetae on anterior margins of 1st & 2nd segments	Antennae without setae or microspinulae	Antennae with very dense microsetae on anterior margins of segments 1 & 2
Hypopharynx with fringe of dense setae along portion of the anterior margin; anterior-lateral margins with sparser setae; palantine sclerite of epipharynx with 2 setae near the anterior-lateral margins of internal surface; epipharynx with sparse covering of microspinulae on the lobes (Fig. 15)	Hypopharynx with fringe of dense setae along all of anterior margin; palantine sclerite of epipharynx with 3 setae near the anterior-lateral margins of internal surface; epipharynx with a sparse covering of microspinulae on the lobes	Hypopharynx glabrous. Palantine sclerite of epipharynx with 2 setae at the anterior-lateral margins of internal surface; epipharynx with a sparse covering of microspinulae on the lobes	Hypopharynx with fringe of very dense, short setae along anterior margin. Palantine sclerite of epipharynx with 2 setae near the anterior-lateral margins of internal surface; epipharynx with dense covering of setae on the lobes
Maxillary basis (cardo) with 2 sharp setae arising from membranous area (Fig. 16); isolated sclerite absent	Maxillary basis with 2 sharp setae and 1 campaniform sensilla arising from weakly sclerotized membranous zone; isolated sclerite absent	Maxillary basis with 2 sharp setae and 1 campaniform sensilla arising from a small, isolated, weakly sclerotised sclerite	Maxillary basis with 2 sharp setae and 1 campaniform sensilla arising from a small, isolated, strongly sclerotized sclerite

Table 1 (continued)

Neocuris gracilis	Kisanthobiini (*Kisanthobia*)	Anthaxiini (*Anthaxia*, *Cratomerus*)	Melanophilini (*Melanophila*, *Phaenops*)
External surface of prementum (prelabium) with dense, triangular-shaped zone of short, sharp spines (Fig. 17)	External surface of prementum with dense, triangular-shaped zone of short, sharp spines	External surface of prementum glabrous	External surface of prementum densely covered with short setae, forming a variable-sized zone
Premental sclerotized plates each with one long, sharp seta, exceeding the anterior margin of labium (Fig. 17)	Premental sclerotized plates with one short seta, not exceeding the anterior margin of labium	Premental sclerotized plates with one short seta, not exceeding the anterior margin of labium	Premental sclerotized plates with one short seta, not exceeding anterior margin of labium
Postmentum with 2 very long setae at the base (Fig. 17)	Postmentum with 2 short, but clearly defined setae at base	Postmentum with 2 very short, indistinct setae at the base or setae absent	Postmentum with 2 short, indistinct setae at the base
Prothoracic plates glabrous except for small, indistinct zones of microspinulae at the anterior-lateral margins and sparse, short setae and distinct microampullae (Fig. 1, 4, 6)	Prothoracic plates glabrous except for small zones of microspinulae at anterior and posterior margins and sparse, short setae; microspinulae absent	Prothoracic plates glabrous, without zones of microspinulae, but with sparse, short setae and indistinct microampullae	Prothoracic plates with large, strongly sclerotized tubercles and distinct microspinulae over whole surface
Pronotal (dorsal) groove inverted Y-shaped, dividing into 2 weakly curved branches at about half its length (Fig. 2)	Pronotal groove inverted Y-shaped, dividing into 2 weakly curved branches at about half its length	Pronotal groove V- or Y-shaped, dividing into 2 curved branches near its anterior end	Pronotal groove inverted V-shaped, dividing into 2 straight branches at its anterior end
Cuticle with sparse setae, microampullae forming small zones at the dorsal surface of body segments and very indistinct zones of microspinulae mainly near abdominal spiracles (Fig. 4, 5, 7, 8)	Cuticle with very sparse, indistinct setae; microspinulae absent	Cuticle with sparse setae, microampullae and indistinct zones of microspinulae	Cuticle with sparse setae; whole surface covered with microspinulae; microampullae absent
Metathorax with large ambulatory pads at the ventral surface (Fig. 1)	Metathorax without distinct ambulatory pads	Metathorax with distinct ambulatory pads both at dorsal and ventral surfaces connected by inner structures (Fig. 18)	Metathorax without distinct ambulatory pads

ventriculus since these characters are often very variable within the same genus (SOLDATOVA 1970, 1973, VOLKOVITSH 1979).

CARTER (1929) placed the exclusively Australian genus *Neocuris* in the tribe Buprestini (subtribe Anthaxiae) of the subfamily Buprestinae, along with apparently closely related genera of *Pseudanilara*, *Anilara*, *Nolographus*, *Torresita* and *Melobasis*; according to CARTER (1929) the most closely related genus to *Neocuris* is *Pseudanilara*, although biological data and detailed larval information for *Pseudanilara* needed for comparisons are lacking. CARTER (1928) revised *Neocuris*, recognizing 25 species, but did not discuss its higher taxonomy and relationships with other genera apart from a few comments on the non-related genus *Curis*. According to a recent classification of the higher taxonomy of the world Buprestidae by BELLAMY (1985) the genus *Neocuris* is placed in the tribe Anthaxiini of the subfamily Buprestinae. However, despite any superficial resemblance of *Neocuris* adults to members of the Anthaxiini of the Northern Hemisphere and elsewhere, the larval characters of *N. gracilis* differ considerably from the Anthaxiini already described and the related tribes Melanophilini and Kisanthobiini (Tab. 1, this paper). Of the 10 broad larval features (15 characteristics in total) listed in Tab. 1, *Neocuris* shares only three with Anthaxiini- the pronotal groove being Y-shaped and dividing into two weakly curved branches, epipharynx with a sparse covering of microspinulae on the lobes, and the maxillary basis with 2 sharp setae (simple matching coefficient of similarity = 0.2). Also, *N. gracilis* larva shows little affinity with Melanophilini apart from the hypopharynx with a fringe of setae on the anterior margins and the palantine sclerite of the epipharynx with 2 setae on the anterior-lateral margins on the internal surface (coefficient of similarity = 0.11). The *Neocuris* larva is probably marginally more related to Kisanthobiini (ALEXEEV and SOLDATOVA 1968) in the presence of similar setae on the antennae, labrum and labium, in the shape of the prothoracic grooves and in the almost complete absence of teeth on the prothoracic plates (coefficient of similarity = 0.28). However, examination of Tab. 1 also shows many significant differences between the two larvae. Marked differences between the mouthparts and head structures of *Neocuris* and the other groups could be expected since *Melanophila* and *Phaenops* are known to develop in various species of conifers (softwoods) while many species of *Anthaxia* breed in softwood *Pinus*, *Larix* and *Picea* tree species (BÍLÝ 1982). On the other hand, *N. gracilis* breeds in dry, shrubby, hardwood *Pultenaea villosa* (Fabaceae) (HAWKESWOOD 1985a).

The higher taxonomy of Australian Buprestidae is in a state of flux despite the apparent "stable" classification of BELLAMY (1985). As pointed out by HAWKESWOOD (1985b) and HAWKESWOOD and PETERSON (1982), detailed studies on Australian larvae should greatly clarify adult taxonomy as more numerous and readily identifiable characters can be utilized. The present study has indicated that *Neocuris* has little affinity with Anthaxiini and related groups based on larval morphology and should be placed in a separate tribe. Anthaxiini (sens. stricto) are a group apparently evolved independently of the southern Gondwanaland fauna to which *Neocuris* belongs. However, such moves to transfer *Neocuris* and related genera to other tribes should wait until further larvae are described.

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