

Larvae of Australian Buprestidae (Coleoptera). Part 1. Genera *Austrophorella* and *Pseudotaenia*

Svatopluk BÍLÝ¹⁾ & Mark G. VOLKOVITSH²⁾

¹⁾ Department of Entomology, National Museum, Kunratice 1,
CZ–148 00 Praha 4, Czech Republic; e-mail: sv.bily@jelly.cz

²⁾ Zoological Institute, Russian Academy of Sciences, Universitetskaya nab. 1,
RU–199034 St. Petersburg, Russia; e-mail: polycest@zin.ru

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Abstract. Larvae of *Austrophorella quadrisignata* (Saunders, 1872) and *Pseudotaenia gigas* (Hope, 1846) are fully described and illustrated. Diagnostic characters of both genera and their bionomy are discussed, and a comparative table of the character states of larvae of chalcophorine genera from the Australian region and beyond are given.

Taxonomy, larval morphology, classification, Coleoptera, Buprestidae, Chalcophorini, *Austrophorella*, *Pseudotaenia*, Australian region

INTRODUCTION

Knowledge of the larval morphology of Australian Buprestidae is extremely limited. Only larvae of a few buprestid genera from the Australian region are described, some of them poorly illustrated or insufficiently described. Dumbleton (1932) described larvae of *Nasciodes* Kerremans, 1903 and *Maoraxia* Obenberger, 1937; Levey (1978) described a larva of *Prospheres* Thomson, 1878; Volkovitsh & Hawkeswood described in several papers larvae of *Neocuris* Fairmaire, 1877 (1987), *Agrilus* Curtis, 1825 and *Ethonion* Kubáň, 2000 (as *Ethon* Gory et Laporte, 1839) (1990), *Melobasis* Laporte et Gory, 1837 (1994), *Anilara* Thomson, 1879 (1993) and *Prospheres* Thomson, 1878 (1999); Bellamy (1987) published an illustration and a very brief larval description of *Synechocera* Deyrolle, 1864; Bílý described larvae of *Anocisseis* Bellamy, 1990 (1997) and *Euleptodema* Obenberger, 1928 (2000); Hawkeswood (1985) published a larval description of *Diadoxus* Thomson, 1878 and briefly discussed the main diagnostic characters of *Pseudotaenia waterhousei* (Van de Poll, 1886); Turner & Hawkeswood published illustrations of larvae of *Astraeus* Laporte et Gory, 1837 (1996), *Melobasis* Laporte & Gory, 1837 (1994, 1996) and an unsatisfactory larval illustration of *Dinocephalia* Obenberger, 1923 (1994); and finally Turner published larval illustrations of *Melobasis* Laporte et Gory, 1837 (2001a), *Agrilus* Curtis, 1825 (2001b) and *Hypocisseis* Thomson, 1879 (2001c). Quite recently, Bílý & Volkovitsh (2002) published descriptions of several larvae of tropical buprestids, including the genera *Paracupta* Deyrolle, 1864 and *Melobasis* (subgen. *Dicercopygus* Deyrolle, 1864). In fact, larvae of only twelve buprestids from the Australian region are described in detail and the descriptions can be used for comparative morphology: *Agrilus australasiae* Laporte et Gory, 1837, *Anilara antiqua* Théry, 1908, *A. nigrata* Kerremans, 1898, *Anocisseis danieli* Bílý, 1997, *Diadoxus erythrurus* (White, 1843), *Euleptodema sainvali* Bílý, 2000, *Ethonion affine* (Laporte et Gory, 1839) (sub *Ethon* affine), *Maoraxia eremita* (White, 1846), *Melobasis* (*Dicercopygus*) *viridiauratus* Deyrolle, 1864, *M. (Melobasis) vertebralis* Carter, 1923, *Nasciodes enysi* (Sharp, 1877) and *Prospheres aurantopicta* (Laporte et Gory, 1836).

In this paper, larvae of *Austrophorella quadrisignata* (Saunders, 1872) and *Pseudotaenia gigas* (Hope, 1846) are described and compared with other larvae of the chalcophorine complex from the Australian region and beyond. The morphological terminology follows that used in the papers of Volkovitsh & Bílý (1997) and Volkovitsh & Bílý (2001). Images of the larvae are to be found at <http://www.zin.ru/Animalia/Coleoptera/rus/buplarau.htm>.

Abbreviations used in the text: CALM – Department of Conservation and Land Management, Perth, W Australia; NMPC – National Museum, Prague, Czech Republic; ZINAS – Zoological Institute of the Russian Academy of Sciences, Sankt Petersburg, Russia.

LARVAL DESCRIPTIONS

Austrophorella quadrisignata (Saunders, 1872)

(Figs 1–10, 23)

SPECIMENS STUDIED. 1 adult and 1 middle-aged larvae: Australia, Queensland, 5 km E of Duarling, 28.x.2001, M. Hanlon leg.; larvae taken from the stem of *Alphitonia excelsa* (Rhamnaceae); material deposited in NMPC and ZINAS.

DESCRIPTION. Measurements: body length 26.0 and 56.0 mm; width of prothorax 4.2 and 9.5 mm., respectively.

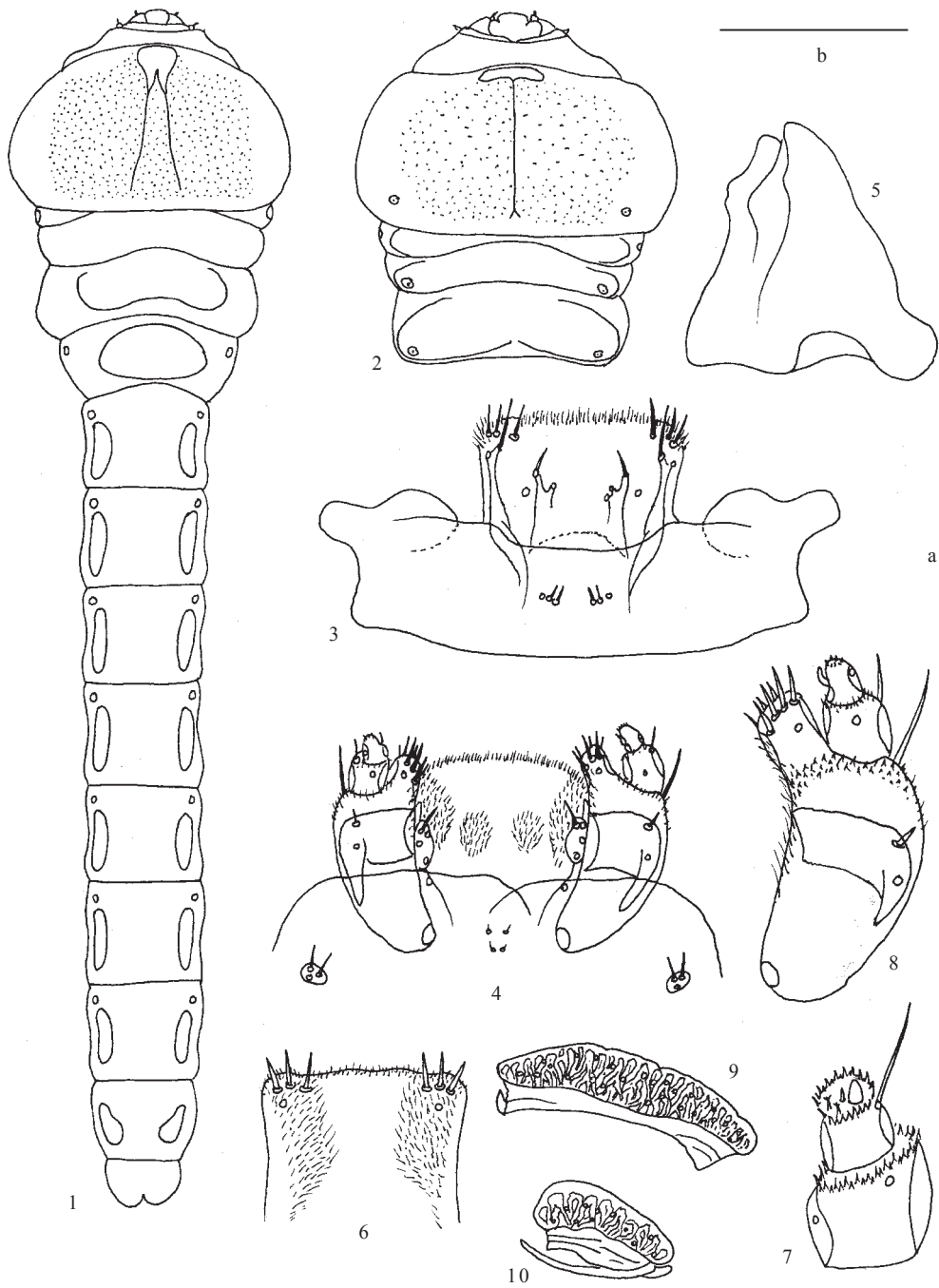
Larva is cream-white, of the typical buprestoid shape (Figs 1, 2), morpho-ecological subtype 2 (Volkovitsh 1979); pilosity of the whole body short, poorly visible.

Head. Epicranium completely invaginated into prothorax. Epistome (Fig. 3) narrow, 4.3 times as wide as long, anterior margin bisinuate with collar poorly developed, anterior lobe slightly projecting; mandibular condyles semiglobular, posterior margin bisinuate, central part not extending posteriorly; lateroposterior corners obtuse, strongly projecting outwards, lateral margins sharply separated from antennal depressions, nearly straight; epistomal sensillae (Fig. 3) arranged linearly above the middle of epistomal length in two groups with 2 relatively long setae with nearly fused bases and 1 campaniform sensilla each. Clypeus strongly transverse with a few microspinulae laterally. Labrum (Fig. 3) slightly transverse, 1.4 times as wide as long, almost parallel-sided, anterior margin almost straight in younger larva, that in mature larva with moderately developed lateral lobes; lateral sides arcuated anteriorly, nearly parallel-sided posteriorly; palatinae sclerites well-developed and sclerotized, medial branches broad, lateral branches curved and narrow; medial sensillae of labrum: 1c-2t-3c (t – trichoid, c – campaniform); 2t short, extending only posterior margin of anterior microsetal area, 1c situated on medial branch (in adult larva there are 2 campaniform sensillae on the right side – Fig. 3), 3c situated on membrane near to median branch; anterolateral sensillae of labrum (t – trichoid, c – campaniform) arranged as follows: external – (1t, 2c)-3t-4t, internal – 1c-2t+3t+4t; labrum dorsally with very narrow area of long, dense microsetae along complete anterior margin and isolated patches on lateral lobes, posterior margin of microsetal area nearly straight; ventral side of labrum (epipharynx – Fig. 6) with 2 longitudinal fields of dense microsetae on lateral lobes.

Antennae (Fig. 7) two-segmented, basal segment 1.25 times longer than the apical one, completely glabrous, situated in the incision of epistome; 1st antennomere slightly transverse, widened apically, submerged into completely glabrous articular membrane and hardly longer than wide, outer margin

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Figs 1–10. larva of *Austrophorella quadrisignata* (Saunders). 1 – habitus, dorsal view, 56.0 mm; 2 – anterior part of body, ventral view; 3 – epistome and labrum; 4 – labiomaxillary complex; 5 – right mandible; 6 – epipharynx; 7 – right antenna; 8 – right maxilla; 9 – mesothoracic spiracle; 10 – 1st abdominal spiracle; scale bars: a – 1.0 mm (3, 4, 5, 6), b – 0.3 mm (7, 8, 9, 10).

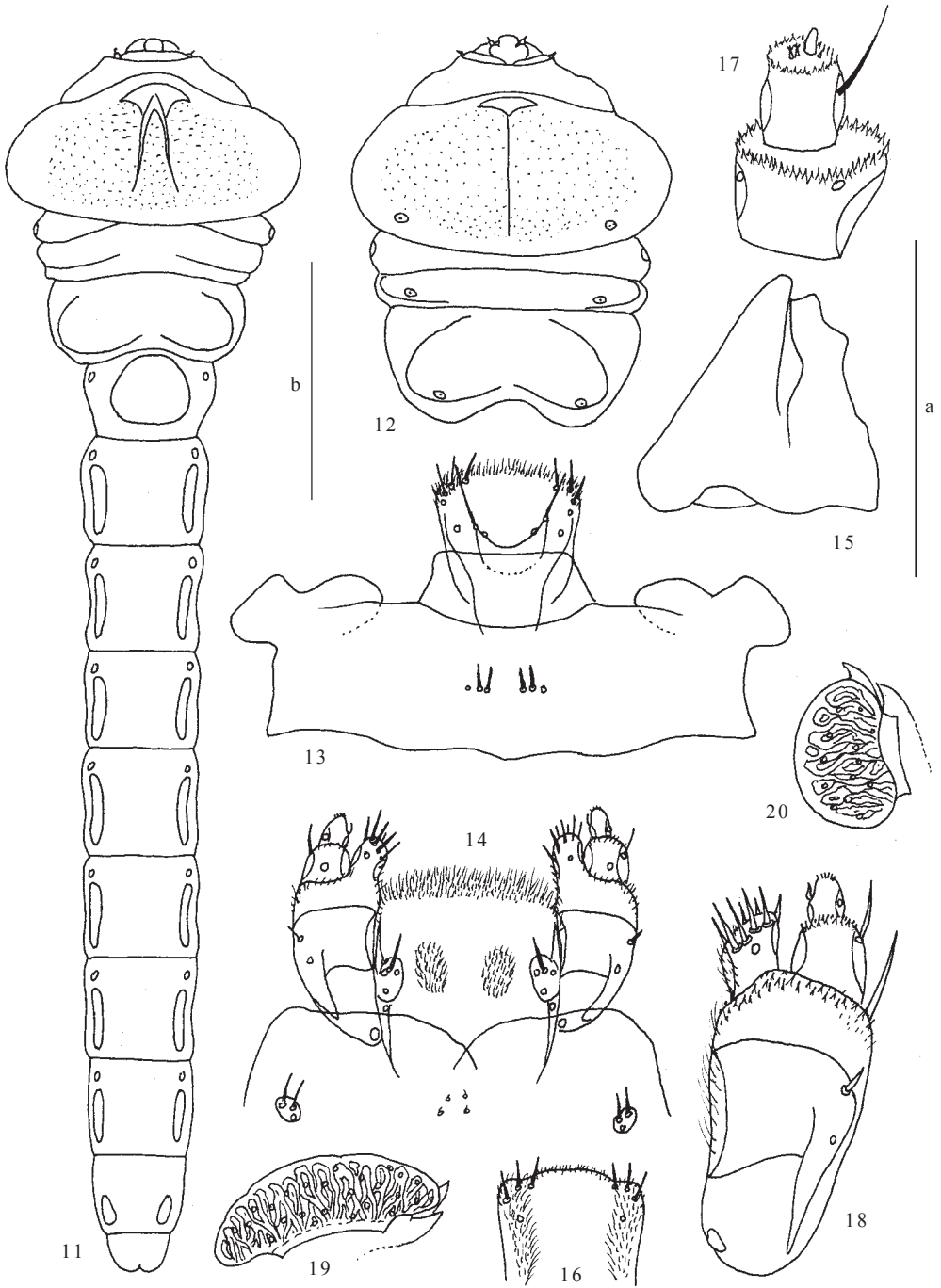


much longer than inner one, anterior margin strongly sloped inward; inner sclerite well-developed, segment with 2 campaniform sensillae (one internal and one external) and with short and dense microspinulae around anterior margin; 2nd antennomere subcylindrical, longer than wide, with maximal width at base, feebly straightly narrowed to apex; with well-defined inner sclerite and dense microspinulae around the apical cavity; apical cavity well-developed with 1 trichosensilla (slightly shorter than 2nd antennomere), 1 long, conical and sharpened apically sensory appendage, 1 basiconic and 2 palmate sensillae. Mandibles (Fig. 5) triangular, as long as wide, strongly sclerotized and nearly black at anterior 2/3 (basal part brown) without setae and visible inner glandules; apical tooth long, curved, obtuse apically; cutting edge dorsally with upper blunt tooth and lower ridge sitting on the common base far from each other, ventrally with short ridge with straight anterior edge below the apical tooth; small additional tooth situated on inner surface between cutting edges. Hypostome moderately sclerotized with a few short setae. Ocelli slightly developed, poorly visible. Maxillae (Figs 4, 8); cardo triangular almost as wide as long, isolated sclerites of cardo well-developed, ovoid with 2 short setae and 1 campaniform sensilla each; stipes long, nearly parallel-sided with well-developed and defined, rather complicate inner sclerite bearing poorly sclerotized, almost transparent posterior process; apical seta longer than palpus maxillaris; lateral seta and campaniform sensilla situated at external margin near anterior 1/3; stipes with long microsetae along complete anterior margin, finely microspined internally. Palpus maxillaris two-segmented, basal palpomere slightly longer than the terminal one; basal palpomere short, transverse with apical seta which is longer than the terminal palpomere, 1 campaniform sensilla near to external margin and with a row of long microsetae along anterior margin laterally and internally; 2nd (apical) palpomere subcylindrical, hardly longer than wide with curved external margin; curved sensilla short, about 1/2 of palpomere length situated along internal margin; campaniform sensilla above the middle at external margin, apical, conical sensillae (10) short, peg-like, equal in length. Mala nearly parallel-sided, as long as wide with well-defined inner sclerite and externally with 1 campaniform sensilla near external margin and 3 long and 2 short setae apically; internally mala bears 5 long, thick setae and long, very dense microsetae; internal projection of mala absent. Labium (Fig. 4); postmentum with 2 pairs of distantly disposed, short setae; prementum trapezoid, distinctly wider than long, anterior margin widely arcuate, lateral sides slightly arcuately converging to the base; prementum bears dorsally (hypopharynx) 2 longitudinal, lateral fields of dense, long microsetae and ventrally narrow, interrupted in the middle stripe of microsetae along the very anterior margin and 2 oblique microsetal zones between corner sclerites; corner sclerites of labium almost ovoid, extending anteriorly, bearing short apical setae, far not extending posterior border of anterior microsetal area and 5 campaniform sensillae: 3 near the base of apical seta, 1 near the base of apical sclerite and 1 with sclerotized base beneath the posterior end of apical sclerite.

Thorax (Figs 1, 2) wider than abdominal segments with well-developed rudiments of legs on ventral surface of all segments. Prothorax is the widest body-segment, its lateral sides slightly rounded, glabrous with sparse short setae, bearing small, darker spot on each side; anterior membrane densely microspined bearing short setae; both dorsal and ventral plates well-defined due to rough asperities surrounded by dense microteeth; pronotal plate (Fig. 1) covered with dark asperities of the chalcophorine type which are smaller at the base of the plate; asperities (Fig. 23) small, rounded with poorly developed arms, almost regularly dispersed; surface between asperities glabrous, without microteeth, with sparse, short setae; asperated area surrounded by dense,

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Figs 11–20. larva of *Pseudotaenia gigas* (Hope). 11 – habitus, dorsal view, 82.0 mm; 12 – anterior part of body, ventral view; 13 – epistome and labium; 14 – labiomaxillary complex; 15 – left mandible; 16 – epipharynx; 17 – right antenna; 18 – right maxilla; 19 – mesothoracic spiracle; 20 – 1st abdominal spiracle;



yellowish microteeth; pronotal groove narrowly Y-shaped, well-defined and sclerotized, yellowish-brown; common part very short with sclerotized, nearly ovoid anterior area; branches of the pronotal groove slightly incurved, not extending the base of asperated area with posterior ends closely disposed; angle between branches about 30 grades; prosternal plate with the same armament like the pronotal plate (Fig. 2); prosternal groove straight, well-defined and sclerotized, slightly T-shaped with sclerotized, strongly transversely ovoid anterior area. Mesothorax (Figs 1, 2) slightly narrower than prothorax and almost as wide as metathorax, completely covered with microteeth which are getting changed into microspinulae laterally; lateral sides of mesothorax secondary divided by folds, ambulatory pads dorsally absent, ventrally hardly developed on sides. Metathorax (Figs 1, 2) slightly narrower than prothorax and almost as wide as mesothorax with the same type of armament like mesothorax but with small, glabrous areas; dorsal ambulatory pads poorly defined laterally, not extending lateral sides, ventral pads better defined laterally, also not extending lateral sides.

Abdomen (Fig. 1) flattened, much narrower than thorax, sides subparallel, glabrous with very sparse, short setae; lateral impressions well-developed, strongly elongate on segments 2–9, ambulatory pads developed only on the 1st segment both dorsally and ventrally; anal segment without terminal processes; 1st abdominal segment slightly conical, much narrower than metathorax, distinctly wider than the rest of the abdomen; segments 2–8 flattened, longer than wide, mainly glabrous with microspined areas, 9th segment nearly as wide as long with sparse, short setae, 10th segment short, transverse with widely rounded apex and with the same armament like the segment 9.

Spiracles (Figs 9, 10). Thoracic spiracles (Fig. 9) of the buprestoid type, reniform, strongly transverse, cribriform, situated at anterior part of the mesothoracic sides; perithrema cancellate, trabeculae numerous, strongly branched, atrium well-defined and sclerotized, closing apparatus well-developed; spiracles with 1–2 sclerotized hooks at upper and/or lower margins of the spiracle, invisible on the sides of segment from above and beneath; abdominal spiracles of the same type but smaller, adjacent hooks getting smaller posteriorly, missing on segments (7)–8; 1st abdominal spiracle situated dorsally at anterior part of the segment, spiracles on segments 2–8 situated in the anterior part of dorsal, lateral depressions.

Proventriculus well-developed, large, slightly cordiform with well-developed longitudinal folds; its inner structure of the same type like in *Pseudotaenia gigas* (see Fig. 21); main fields divided by longitudinal folds, well-sclerotized with dense, large, singular or grouped teeth sitting on large tubercles; side fields zig-zag-shaped with sparser and mainly singular teeth; anterior and posterior fields with very dense, long microsetae sitting in groups on common bases.

***Pseudotaenia gigas* (Hope, 1846)**

(Figs 11–22)

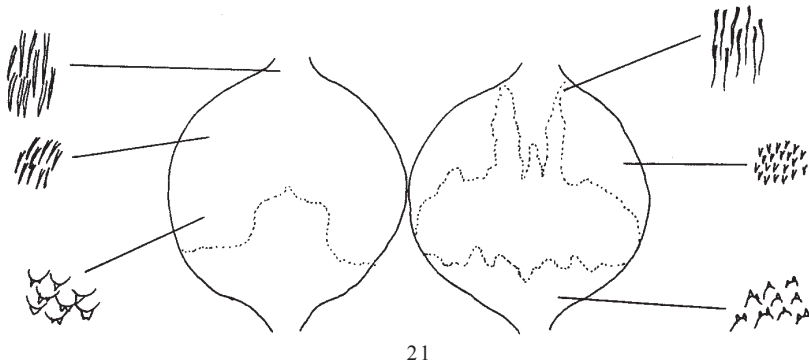
SPECIMENS STUDIED. 17 specimens of various instars incl. first and last instar: W Australia, Coolgardie, 18.x.2001, Sv. Bily leg.; all specimens taken from living trunks of *Acacia lasiocalyx* (Mimosaceae); material deposited in NMPC and ZINAS.

DESCRIPTION. Measurements: body length 5.8–82.0 mm; width of prothorax 2.1–13.8 mm.

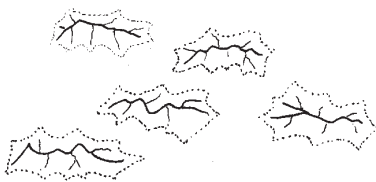
Larva is cream-white, of the buprestoid type (Figs 11, 12), morpho-ecological subtype 2 (Volkovitsh 1979); pilosity of the whole body is short, poorly visible.

Head. Epicranium completely invaginated into prothorax. Epistome (Fig. 13) narrow, 3.3–4.2 times as wide as long, anterior margin bisinuate, forming a collar with distinct lateral projections inwards of mandibular condyles which are semiglobular; posterior margin bisinuate on each side,

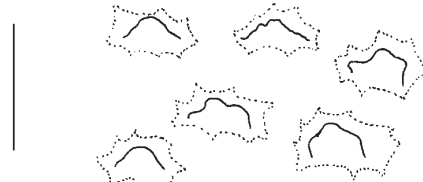
central part slightly extending posteriorly, lateroposterior corners sharp, strongly projecting outwards, lateral margins sharply separated from antennal depressions, slightly curved; antennal incisions deep, about $\frac{1}{2}$ of antennal depressions; epistome bears two groups of epistomal sensillae arranged linearly above the middle of epistomal length with 2 relatively long setae and 1 campaniform sensilla in each group. Clypeus transverse, finely microspiculated laterally. Labrum (Fig. 13) trapezoid, slightly transverse, anterior margin arcuately projecting anteriorly with moderately developed lateral lobes; lateral sides almost straight, feebly converging to the base; palatinae sclerites well-developed, medial branches broad, lateral branches narrow and curved; arrangement of medial sensillae of labrum (t – trichoid, c – campaniform): 1c-2t-3c; 2t long, extending anterior margin of labrum, 1c situated on medial branch, 3c situated on membrane between median and lateral branches; arrangement of antero-lateral sensillae of labrum (t – trichoid, c – campaniform): external (1t, 2c)+3t-4t, internal 1c+2t+3t+4t; labrum dorsally with relatively broad area of long, very dense microsetae along complete anterior margin and isolated patches on lateral lobes, posterior border of this microsetal area nearly straight; ventral part of labrum (epipharynx – Fig. 16) with 2 longitudinal fields of dense microsetae extending lateral lobes. Antennae (Fig. 17) two-segmented situated in the incision of epistome, their basal segment hardly longer than the terminal one; articular membrane glabrous with inconspicuous microspiculated area externally; 1st antennomere slightly longer than



21



22



23

Figs 21–23. 21 – scheme of inner armament of proventriculus of *Pseudotaenia gigas* (Hope); 22 – pronotal asperities of *P. gigas*; 23 – the same, *Austrophorella quadrioculata* (Saunders); scale bar: 0.05 mm.

wide, widened apically, half submerged into articular membrane with well-developed inner sclerite, outer margin hardly longer than inner one, anterior margin only slightly sloped inward; antennomere bears one internal and one external campaniform sensilla and ring of short, dense, apical microspinulae forming denser patches on the sides; 2nd antennomere barrel-like, with maximal width at basal 1/4, feebly arcuately narrowed to apex; longer than wide with well-developed inner sclerite and dense microspinulae around the apical cavity; apical cavity with 1 trichosensilla which is slightly shorter than antennomere, 2 palmate sensillae, 1 basiconic sensilla and conical, apically sharpened sensory appendage which extends the cavity. Mandibles (Fig. 15) triangular, nearly as long as wide, strongly sclerotized and black, only basal 1/3 brown; setae absent, inner glandules invisible; cutting edge with long, apically obtused apical tooth, 2 obtuse internal, dorsal teeth sitting on common base far of each other and 2 small internal, ventral teeth sitting on common base close to each other; small additional tooth is situated on inner surface between cutting edges. Hypostome moderately sclerotized with a few short setae. Ocelli well-developed. Maxillae (Fig. 14, 18); cardo elongate, isolated sclerites of cardo small, well-defined with 2 short setae and 1 campaniform sensilla each; stipes rather short with well-defined and sclerotized inner sclerite bearing long, incurved and well sclerotized posterior process; apical seta as long as palpus maxillaris; lateral seta and external campaniform sensilla situated at external margin at anterior 1/3; complete anterior margin of stipes with dense microsetae externally and densely microspined internally. Palpus maxillaris two-segmented, basal palpomere slightly longer than the terminal one; basal palpomere subcylindrical, apical seta 1.5 times longer than palpomere 2, campaniform sensilla situated near external margin internally, anterior margin with row of microsetae internally; apical palpomere subcylindrical with curved external margin, more than twice as long as wide; curved sensilla short, about of palpomere length situated along internal margin; campaniform sensilla present at basal 1/3 of external margin, apical, conical sensillae (approx. 10) short, peg-like, equal in length. Mala distinctly longer than wide, nearly parallel-sided with well-developed inner sclerite; mala bears externally 1 campaniform sensilla near external margin, 3 long and 2 short apical setae and 5 long, thick setae and very dense microsetae internally; internal projection absent. Labium (Fig. 14); postmentum with 2 pairs of closely disposed short setae or glabrous (younger instars?); prementum nearly circular, slightly wider than long with nearly regularly arcuated anterior margin and slightly converging to base lateral margins; dorsal part of labium (hypopharynx) with 2 longitudinal fields of very dense, long microsetae laterally; ventral part of labium with narrow area of dense microsetae along anterior margin, posterior border of this area being slightly emarginated, occupying 1/2 of labial length and with 2 oblique microsetal fields between corner sclerites; corner sclerites of labium almost ovoid, apical setae short, not extending posterior border of anterior microsetal area; campaniform sensillae of corner sclerite situated as follows: 3 near the base of apical seta, 1 near the base of apical sclerite and 1 (with sclerotized base) beneath the posterior end of apical sclerite.

Thorax (Fig. 11, 12) wider than abdominal segments with well-marked rudiments of legs on ventral surface of all segments. Prothorax is the widest of all thoracic segments, its lateral sides widely arcuate; anterior membrane densely microspined bearing short setae, sides glabrous with sparse, short setae and small dark spot on each side; both pronotal and prosternal plates well-defined due to asperities surrounded with dense microteeth; Pronotum (Fig. 11) with somewhat trapezoidal pronotal plate covered with large asterisk-shaped asperities of the chalcophorine type (Fig. 22) which are smaller and denser at the base of the plate; asperities transverse with well-developed arms, space between them glabrous without microteeth, with very sparse setae; asperated area surrounded by dense, yellowish microteeth; pronotal groove well-sclerotized, biramous, somewhat Y-shaped; common part of grooves very short with sclerotized, transverse,

umbrella-shaped anterior area, anterior margin of the area broadly arcuated; branches slightly incurved, not extending the base of asperated area with posterior ends closely disposed; angle between branches about 25 grades; prosternal plate covered with asperities of the same type like those on pronotal plate; prosternal groove (Fig. 12) uniramous, well-defined and sclerotized, yellowish-brown with darker basal 2/3; anterior part of the groove with well-sclerotized, transverse, umbrella-shaped area with arcuated anterior margin; mesothorax distinctly narrower than prothorax and slightly wider than metathorax, almost completely covered with microteeth which are getting changed into microspinulae on lateral sides; lateral sides with secondary folds and short, sparse setae; dorsal ambulatory pads absent, ventral pads hardly defined on sides; metathorax distinctly narrower than prothorax and slightly narrower than mesothorax, covered with microteeth which are getting changed into microspinulae on lateral sides; dorsal ambulatory pads poorly defined not extending lateral outline of metathorax, ventral pads better defined than dorsal ones also not extending outline of the segment.

Abdomen (Fig. 11) flattened, much narrower than thorax, subparallel and glabrous only with sparse, short setae; lateral depressions well-developed on segments 2–9, strongly elongate; ambulatory pads developed only on the first segment both dorsally and ventrally, terminal process absent; 1st segment subconical, much narrower than metathorax, anteriorly nearly as wide as segment 2; segments 2–8 flattened, slightly longer than wide, glabrous with microspined areas; segment 9 nearly as wide as long, narrower posteriorly with microspined areas and short, sparse setae; terminal abdominal segment short, transverse, glabrous with areas of microspinules and very short and sparse setae, apex of segment widely rounded.

Spiracles (Figs 19, 20); thoracic spiracles (Fig. 19) cribriform, of the buprestoid type, reniform, situated at anterior part of mesothoracic sides; peritrema cancellate, trabeculae numerous, strongly branched, atrium well-defined and sclerotized, closing apparatus well-developed; spiracles with 2 big, well-sclerotized hooks at upper and lower margins of spiracle, well-visible on the mesothoracic sides from above and beneath; abdominal spiracles of the same type but smaller; adjacent sclerotized hooks well-developed and visible from above and beneath only on anterior pairs of abdominal spiracles getting less distinct and invisible from above and beneath posteriorly.

Proventriculus (Fig. 21) well-developed, large, slightly cordiform with well-developed longitudinal folds; inner armament rather complicate and very similar to that in *Austrophorella quadrisignata*; main fields divided by longitudinal folds with dense, large, singular or grouped teeth sitting on large tubercles; side fields zig-zag-shaped with sparse and mainly singular teeth; anterior field with long and dense microteeth and microspinulae sitting in groups on the common bases, posterior field with very dense, long microsetae sitting in groups on common beses.

DISCUSSION

In order to compare the larvae of *Austrophorella* and *Pseudotaenia* with those of other Chalcophorinae genera, the dissected (noted by the asterisk *) and undissected larvae of following taxa (ordered according to Volkovitsh 2001) were examined.

Chalcophorioid lineage

Paratassini Bílý et Volkovitsh, 1996: *Paratassa* Marseul (*P. coraebiformis* (Fairmaire)*)

Nanularia generic group: *Nanularia* Casey (*N. californica* (Horn)*)

Chalcophorini Lacordaire, 1857

Chrysochroina Laporte, 1835: *Callopietus* generic group: *Steraspis* Dejean (*S. speciosa* (Klug))

Chalcophorina Lacordaire, 1857

Cyphogastra generic group: *Cyphogastra* Deyrolle (*C. bruyini* Landsberg)*, *Paracupta*

Deyrolle (*P. erythrocephala* (Montrouzier)*
Chrysodema generic group: *Chrysodema* Laporte ET Gory (*C. impressicollis* Laporte et Gory*, *C. lewisi* Saunders)*
Texania generic group: *Texania* Casey (*T. campestris* (Say))
Chalcophora generic group: *Chalcophora* Dejean (*C. angulicollis* (LeConte), *C. detrita* (Klug)*, *C. intermedia* Rey*, *C. mariana* (Linnaeus))*
Hypoprasini Hołynski, 1993
Euchromatina Hołynski, 1993: *Euchroma* Solier (*Euchroma* sp.)
Poecilonotini Alexeev et Bebka, 1970
Poecilonotina Alexeev et Bebka, 1970: *Palmar* Schaeffer (*P. (Scintillatrix) mirifica* (Mulsant)*, *P. (S.) rutilans* (Fabricius))* , *Poecilonota* Eschscherich (*P. variolosa* (Paykull))*

Psilopteroioid lineage

Sphenopterini Lacordaire, 1857: *Sphenoptera* Dejean (*S. (Hoplística) arabica* Gory*, *S. (? Chilostetha) vestita* Jakovlev*)
Psilopterini Lacordaire, 1857
Hippomelanina Hołynski, 1993: *Gyascutus* Le Conte (*G. (Gyascutus) allenrolfiae* (Verity)), *Prasinalia* Casey (*P. imperialis* (Barr))
Psilopterina Lacordaire, 1857: *Lampetis* generic group: *Capnodis* Eschscholtz (*C. miliaris* (Klug))* , *Perotis* Dejean (*P. cuprata* (Klug))
Dicerca generic group: *Dicerca* Eschscholtz (*D. (Argante) moesta* (Fabricius)* , *D. (Dicerca) alni* (Fischer))*
Dicercomorpha generic group: *Dicercomorpha* Deyrolle (*D. interrupta* Deyrolle*)
Haplotrinchina Hołynski, 1993: *Haplotrinchus* Kerremans (*H. inaequalis* Deyrolle* , *H. embrikiellus* Obenberger*)

Differential characters

The differences between the larvae of *Austrophorella quadrisignata* and *Pseudotaenia gigas* are shown in Tab. 1. The common character (?synapomorphy) of both taxa is the more or less developed collar of the anterior margin of epistome (Figs 3, 13). The main diagnostic characters of the larva of *Austrophorella quadrisignata* are the short inner sclerite of maxillary cardo (Figs 4, 8), very narrow microsetal area along anterior margin of labium (Fig. 4), and the shape of anterior sclerotized areas of prothoracic grooves (Figs 1, 2); that of *Pseudotaenia gigas* is very large hooks adjacent to spiracles (Figs 19, 20).

Relationships

Relationships between the genera of the chalcophorine complex from the Australian region and beyond are given in the Tab. 2. The main diagnostic character of all studied Chalcophorini (including Chrysochroina) and Hypoprasini larvae is the presence of sharply defined prothoracic plates bearing very large, strongly sclerotized, irregular in shape, frequently asterisk-like, isolated or confluent asperities on a glabrous background (only *Chrysodema* has a narrow stripe of microteeth at the base of pronotal plate between the ends of the median groove). Apparently these asperities are not homologous to microteeth or grain-like asperities in psilopteroioid taxa and other groups of Buprestidae (see discussion in Volkovitsh & Hawkeswood 1994: 20, 21). In some chalcophoroid (Paratassini, *Namularia*, Poecilonotini) and psilopteroioid (Sphenopterini) taxa, prothoracic plates are either partly (in *Paratassa* with glabrous areas, see Bílý & Volkovitsh 1996) or completely covered with microteeth without any asperities that is presumed to be a plesiomorphic state. In psilopteroioid taxa, the prothoracic plates are completely covered with microteeth with grain-like

Tab. 1. Comparison of the main taxonomic characters between the larvae of *Austrophorella quadrisignata* (Saunders) and *Pseudotaenia gigas* (Hope)

character	<i>Austrophorella quadrisignata</i>	<i>Pseudotaenia gigas</i>
epistome, collar on anterior margin	poorly developed, without distinct lateral projections	well developed, with distinct lateral projections
antennae, articular membrane	completely glabrous	glabrous with inconspicuous microspiculed area externally
antennae, 1st antennomere	outer margin much longer than inner one, anterior margin strongly sloped inward (Fig. 7)	outer margin hardly longer than inner one, anterior margin only slightly sloped inward (Fig. 17)
antennae, 2nd antennomere	subcylindrical, with maximal width at base, feebly straightly narrowed to apex (Fig. 7)	barrel-like, with maximal width at basal L - 1/3, feebly arcuately narrowed to apex (Fig. 17)
labrum, medial apical setae	extending posterior border of anterior microsetal area	extending anterior margin of labrum
hypostomal ocelli	poorly developed, hardly visible	well developed
maxillary stipes, posterior projection of inner sclerite	indistinct, almost transparent	distinct, long, curved, strongly sclerotized
mala	nearly as long as wide	distinctly longer than wide
labium, anterior margin	with very narrow, interrupted in the middle microsetal area bordering anterior margin	with broad microsetal area along anterior margin occupying about 1/4 of labial length
pronotal plate	as on Fig. 1	as on Fig. 11
pronotal groove, anterior sclerotized area	irregularly ovoid, nearly as long as wide (Fig. 1)	umbrella-shaped, transverse, with broadly rounded anterior margin (Fig. 11)
prosternal plate	as on Fig. 2	as on Fig. 12
prosternal groove, anterior sclerotized area	T-shaped, truncated apically (Fig. 2)	umbrella-shaped, broadly rounded apically (Fig. 12)
prothoracic plates, asperities	slightly transverse, rounded (Fig. 23)	strongly transverse, irregular, sharp-edged (Fig. 22)
thoracic and 1 st abdominal spiracles	with 1-2 small adjacent sclerotized teeth invisible from above and beneath (Figs. 9, 10)	with 2 very large adjacent sclerotized hooks visible from above and beneath (Figs. 19, 20)

Tab. 2. Comparison of the main taxonomic characters among the larvae of known chalcophorine genera

character	<i>Cyphogastira</i>	<i>Paracupta</i>	<i>Chrysoedema</i>	<i>Austrophorella</i>	<i>Pseudotaenia</i>	<i>Chalcophora</i>
epistome, collar on anterior margin	absent	absent	absent	poorly developed, without distinct lateral projections	well developed, with distinct lateral projections	absent
labrum, medial apical setae	extending posterior border of anterior microsetal area	not extending posterior border of anterior microsetal area	extending anterior margin of labrum	extending posterior border of anterior microsetal area	extending anterior margin of labrum	extending posterior border of anterior microsetal area
maxillary cardo, isolated sclerite	with 2 short setae and 1 campaniform sensilla	with 2 long setae and 1–2 campaniform sensillae	with 2 long setae and 1 campaniform sensilla	with 2 short setae and 1 campaniform sensilla	with 2 short setae and 1 campaniform sensilla	with 2 short setae and 5 campaniform sensillae
maxillary stipes, posterior projection of inner sclerite	distinct, long, straight, strongly sclerotized	distinct, long, curved, strongly sclerotized	distinct, long, curved, moderately sclerotized	Indistinct, almost transparent	distinct, long, curved, strongly sclerotized	distinct, long, curved, strongly sclerotized
labium, anterior margin	with broad microsetal area with nearly straight posterior border along anterior margin occupying about 1/4 of labial length	with broad microsetal area with nearly straight posterior border along anterior margin occupying about 1/4 of labial length	with broad microsetal area with arcuately projecting slightly emarginated posterior border along anterior margin occupying about 1/4 of labial length	with very narrow, interrupted in the middle microsetal anterior margin occupying about 1/4 of labial length	with broad microsetal area with posterior border along anterior margin occupying about 1/4 of labial length	with narrow microsetal area bordering posterior border along anterior margin
corner sclerite of labium, apical seta	extending anterior margin	far not reaching anterior margin	extending beyond anterior margin	far not reaching anterior margin	far not reaching anterior margin	far not reaching anterior margin
pronotal plate	completely covered with asperities	completely covered with asperities	with distinct area of microteeth between the ends of medial groove	completely covered with asperities	completely covered with asperities	completely covered with asperities
pronotal groove, anterior sclerotized area	umbrella-shaped, slightly transverse, with shallowly emarginated anterior margin	umbrella-shaped, transverse, with truncated anterior margin	umbrella-shaped, transverse, with deeply emarginated anterior margin	irregularly ovoid, nearly as long as wide	umbrella-shaped, transverse, with broadly rounded anterior margin	umbrella-shaped, transverse, with broadly rounded anterior margin

Tab. 2. (continued)

character	<i>Cyphogastra</i>	<i>Paracupta</i>	<i>Chrysodema</i>	<i>Austrophorella</i>	<i>Pseudotaenia</i>	<i>Chalcophora</i>
prosternal groove, anterior sclerotized area	T-shaped, slightly emarginated apically	T-shaped, emarginated apically	umbrella-shaped, transverse, deeply emarginated apically	T-shaped, truncated apically	umbrella-shaped, transverse, broadly rounded apically	umbrella-shaped, transverse, emarginated apically
Thoracic and 1 st abdominal spiracles	without adjacent sclerotized teeth	with 1–2 small adjacent sclerotized teeth invisible from above and beneath	with 1–2 small adjacent sclerotized teeth invisible from above and beneath	with 1–2 small adjacent sclerotized teeth invisible from above and beneath	with 2 very large adjacent sclerotized hooks visible from above and beneath	with hardly visible adjacent sclerotized teeth

asperities only along the medial grooves. It is postulated (Volkovitsh & Hawkeswood 1994: 21) that asperities in buprestid larvae have a different origin: in chalcophorioid taxa and Melobasini (Buprestinae) they are presumably cuticular newgrowths while in psilopteroid and many other buprestid groups they are formed through modification of microteeth; both states may be regarded as synapomorphies of Chalcophorini + Hypoprasini and Psilopterini respectively.

The comparison of larval characters of chalcophorine genera (Tab. 2) has shown their uniformity throughout all studied taxa which differ mainly in shape and proportions of some mouthpart sclerites, the shape of the prothoracic plates and grooves, the structure of asperities, the shape and armament of the spiracles, and some other characters mentioned in the Tab. 2. Only a few taxa demonstrate distinct diagnostic characters which enable generic distinction, for example, very big claw-like hooks adjacent to mesothoracic and first abdominal spiracles in *Pseudotaenia*, short inner sclerite of maxillary stipes in *Austrophorella*, additional campaniform sensellae on isolated sclerite of cardo in *Chalcophora*, and narrow stripe of microteeth at the base of pronotal plate in *Chrysodema* (Tab. 2). In the same time it is difficult to confirm that these characters occurs in all members of above mentioned genera because the larvae of only single or a few species of each genus are known and examined in details.

Toyama (1986) established the genus *Austrophorella* Toyama, 1986 for the single species *Austrophorella quadrisignata* within his tribe Chalcophorellini Toyama, 1986 on the basis of slightly different wing venation (open anal cell). Holynski (1993) supposed both the tribe and the genus to be questionable and synonymized *Austrophorella* with *Pseudotaenia* Kerremans, 1903.

Though the differences in larval characters between both genera are so subtle, the comparison with other chalcophorine genera demonstrates (Tabs 1, 2) that they are of much higher level than those among the species of the same genus, for example, *Chrysodema* or *Chalcophora* (Bílý 1984) and justify that *Austrophorella* is rather a distinct genus. This suggestion is confirmed by some adult characters such as body shape, wing venation (Toyama 1996), antennal structures (sensory organs of *Austrophorella* are closer to *Chrysodema* and *Chalcophoropsis* Saunders while those of *Pseudotaenia* – to *Chalcophora*, see Volkovitsh 2001), the peculiar structure of the prosternum with the very deep and wide transverse depression completely separating the posterior process (in *Pseudotaenia* deep sulcus bordering anterior margin), angularly projecting outwards at the base of the epipleural carina (a similar state is also found in one unidentified species of *Chalcotaenia* Deyrolle), the basal part of the epipleuron subparallel as extending to opposite the hind coxae to a small distinct tooth (similar state in *Chalcotaenia* while in *Pseudotaenia* epipleuras gradually narrowing without a tooth). From such character state differences we suggest that *Austrophorella* is a distinct genus closely related to *Pseudotaenia* and *Chalcotaenia* which form together a purely Australian generic group of Chalcophorini. At the same time considering adult characters other than wing venation, we can agree with Holynski's (1993) opinion that *Austrophorella* has nothing in common with *Chalcophorella* Kerremans and related genera.

Bionomy

The bionomy of both species described and discussed herein are very similar; the larvae bore into the hardwood of living trunks. Tunnels are parallel with the axis of the trunk and hook-shaped pupal chamber is situated in the superficial part of the hardwood just under the bark.

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