

Larvae of Australian Buprestidae (Coleoptera)
Part 3. Genera *Maoraxia* and *Anthaxoschema* with a review
of larval characters of known anthaxiine taxa

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Abstract. The adult larvae of *Maoraxia auroimpressa* (Carter, 1924) and *Anthaxoschema carteri* (Théry, 1945) are described in detail, illustrated and compared with other known Australian and non Australian anthaxiine larvae. Discussion on taxonomic value and implication of larval characters of all studied anthaxiine genera is given. The results of larval study has shown that the classification and relations of anthaxiine taxa still require further investigations.

Taxonomy, larval morphology, Coleoptera, Buprestidae, Maoraxiini, Curini, *Maoraxia*, *Anthaxoschema*, Australia.

Introduction

This paper follows the previous study on Australian buprestid larvae (Bílý & Volkovitsh, 2003, Volkovitsh, Bílý & Hasenpush, 2003) and it is a part of the long-term project dealing with the larval taxonomy and morphology of the family Buprestidae.

Larval characters of *Maoraxia* Obenberger, 1937 for New Zealand species *M. eremita* (White, 1846) were originally examined by Dumbleton (1932). Larvae of another species, *M. auroimpressa* (Carter, 1924), (as *M. littoralis* Bellamy and Williams, 1985) were borrowed by junior author from Australian National Insect collection (ANIC, Canberra). Larvae of genus *Anthaxoschema* Obenberger, 1923, *A. carteri* (Théry, 1945), were collected by senior author during his trip to Western Australia in 2001 and are described below for the first time. Larvae of Australian and Oriental anthaxiine taxa *Neocuris* Saunders, 1868, *Anilara* Saunders, 1868, *Melobasis* Laporte & Gory, 1837 (s. str.) and *M. (Diceropygus)* Deyrolle, 1865) were studied by Volkovitsh and Hawkeswood (1987, 1993, 1995) and Bílý & Volkovitsh (2002) respectively. The larva of Neotropical genus *Agrilaxia* Kerremans, 1903 was described by Costa & al. (1988). Larva of one species of African genus *Chalcogenia* Saunders, 1871 was examined by Volkovitsh & Bílý (1997). And there are numerous publications on larval morphology of *Anthaxia* Eschscholtz, 1829 species (Soldatova, 1970, 1973, 1975, 1976, 1991; Bílý, 1975, 1999; etc.).

In this paper, larvae of *Maoraxia auroimpressa* (Maoraxiini) and *Anthaxoschema carteri* (Curini: Anilarina) are described and compared with the larvae of the genera *Anilara* Saunders, 1868 (Curini: Anilarina); *Neocuris* Saunders, 1868 (Curini: Neocurina); *Melobasis* Laporte & Gory, 1837 (Melobasini); *Anthaxia* Eschscholtz, 1829, *Chalcogenia* Saunders, 1871, *Bilyxia* Holyński, 1989 (Anthaxiini); *Hesperorhipis* Fall, 1930, and *Xenorhipis*

Leconte, 1866 (Xenorhipidini). The morphological terminology follows that used in the papers of Volkovitsh (1979), Volkovitsh & Bílý (1997), Bílý (1999), Volkovitsh & Bílý (2002) and Bílý & Volkovitsh (2003).

Abbreviations used in the text:

ANIC Australian National Insect Collection, Canberra, Australia:

NMPC National Museum, Prague, Czech Republic:

ZIN Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia.

Larval images are also available on:

<http://www.zin.ru/Animalia/Coleoptera/rus/buplarau.htm>.

Larval descriptions

Maoraxia auroimpresa (Carter, 1924)

(Figs 1-11)

Material studied. 2 specimens of the last instar (?): "[Australia.] NSW, At approx. 12 km E. Taree. G. I. T. Williams, extracted 26 Dec. 1982"; from dead dry branch of *Elaeodendron australe* (Celastraceae) in littoral rainforest; material deposited in ANIC (as *Maoraxia littoralis* Bellamy & Williams, 1985).

Measurements. Length of body: 8.9 and 10.8 mm; width of epistome: 4.2 mm.

Body cream-white of the buprestoid type (morpho-ecological subtype 1) with indistinct pubescence (visible only on slides), strongly elongate with expanded thoracic and strongly longitudinal, narrow abdominal segments (Fig. 1); head completely retracted into prothorax (structure see Dumbleton, 1932, figs 18, 19).

Mouth parts. Epistome (Fig. 3) strongly transverse, 4.2 times as wide as long, narrow; anterior margin distinctly emargined between mandibular condyles which are slightly transverse; posterior margin weakly bisinuous, latero-posterior corners sharp, almost rectangular, distinctly projecting outwards; lateral margins markedly emargined, antennal incisions broad and well-defined; epistomal sensillae arranged in two groups of 3 sensillae situated trapezoidly and superficially just above midlength of epistome, each group consisting of 2 short setae close to each other and 1 campaniform sensilla in front of them; distance between the latter and setae much longer than that between bases of setae. Clypeus (Fig. 3) trapezoid, 2.6 times as wide as long, membraneous and glabrous. Labrum (Fig. 3) nearly rectangular, slightly elongate, 1.2 times as long as wide, maximum width at anterior fourth, without lateral lobes, antero-lateral corners evenly rounded; anterior margin weakly emargined, lateral sides subparallel; palatinae sclerites well-defined, subparallel, moderately sclerotized, both medial and lateral branches well-defined; medial sensillae of labrum (t – trichoid, c – campaniform): 1c-2t-3c, apical setae very long, extending anterior margin of labrum, distance between apical seta and campaniform sensillae much longer than between bases of campaniform sensillae themselves; antero-lateral sensillae of labrum (t – trichoid, c – campaniform, “()” with fused bases, “+” with closed bases, “-” with distant bases): external sensillae (1t, 2c)-3t-4t; 1t and 2c nearly fused at bases, 1t, 3t and 4t long; internal sensillae (1t, 2t), bases fused; labrum dorsally with a broad, transverse stripe of microsetae along anterior margin, anterior outline of this stripe not reaching the margin itself which is glabrous, ventrally (epipharynx – Fig. 8) with two narrow, longitudinal stripes of sparse microsetae laterally.

Antennae (Fig. 6) two-segmented, situated in lateral incision between epistome and pleurostome, basal antennomere 2.4 times as long as terminal antennomere, articular mem-

brane glabrous; basal antennomere subcylindrical, nearly as wide as long with well-defined inner sclerites; armament of segment consisting of 2 campaniform sensillae at external margin and on dorsal surface anteriorly, apex of segment with fringe of dense microspinulae expanding to terminal antennomere; terminal antennomere reduced, very short, 1.75 times as wide as long without inner sclerite, externally completely covered with dense microspinulae; apical cavity reaching the top of basal antennomere, sensory appendage 2.08 times as long as wide extending anterior margin of cavity, both long palmate sensillae with closed bases extending midlength of sensory appendage; basiconic sensillae invisible, probably absent, trichosensilla slightly longer than the whole antenna arising from the base of terminal antennomere.

Mandibles (Fig. 5) triangular, nearly as long as wide, brown, strongly and almost uniformly sclerotised with one short seta on external margin above mandibular condyle and 2 small, narrow inner glandules at middle; setal brush absent, cutting edge with 5 obtuse teeth; apical tooth rather big, rounded apically, 2 obtuse internal teeth dorsally and ventrally, both arising from the common base; external tooth small but distinct.

Maxillae (Figs 4, 7). Cardo longer than wide, membraneous with areas of poorly defined microspinulae inward of isolated sclerites and on external sides; isolated sclerites small, triangular, poorly defined and sclerotised bearing 2 moderately long setae and one campaniform sensilla bellow them; stipes much longer than wide, inner sclerite well-defined bearing long internal process curved inward apically; apical seta longer than palpus maxillaris, situated at anterior internal corner, campaniform sensilla closer to external corner anteriorly, lateral seta short at external, anterior corner; armament of stipes consisting of fringe of long microspinulae along anterior margin externally and inconspicuous setae internally; internal margin with dense, long microspinulae; palpus maxillaris (Fig. 7) two-segmented, terminal palpomere being 1.4 times as long as basal palpomere; basal palpomere broad, transverse, twice as wide as long, apical seta situated at external margin, as long as terminal palpomere; campaniform sensilla situated beneath the base of apical seta, apical margin of palpomere with fringe of long microspinulae; terminal palpomere conical, slightly clongate, 1.3 times as long as wide, curved sensilla at inner margin, separated from palpomere and arising from its base; external margin with one campaniform sensilla near base, apex of palpomere with 9-10 peg-like, nearly uniform sensillae; mala elongate, narrowing apically, 1.7 times as long as wide, arising from inner surface of stipes and overlapping palpus maxillaris; inner sclerite moderately defined, internal lobe absent; armament of mala: externally with 2 short and 4 long setae apically and 5 obtuse setae along internal margin, internally with fringe of long microspinulae directed outwards.

Labium (Fig. 4). Prementum nearly as long as wide, rounded with nearly straight anterior margin and broadly rounded corners, lateral sides widely arcuate; armament of labium: dorsally (hypopharynx) with longitudinal stripes of sparse microsetae laterally, ventrally with extensive microspinulated area at anterior two third of labial length extending along entire anterior margin, posteriorly forming trapezoid, widened field with arcuate posterior margin extending far beyond bases of apical setae of corner sclerites; microspinulae dense, relatively short; corner sclerites of labium narrow, poorly sclerotized, apical sensillae long but not extending anterior margin of prementum; campaniform sensillae arranged in two groups: 3 sensillae above and 2 sensillae bellow bases of apical setae; postmentum glabrous without any traces of setae or campaniform sensillae.

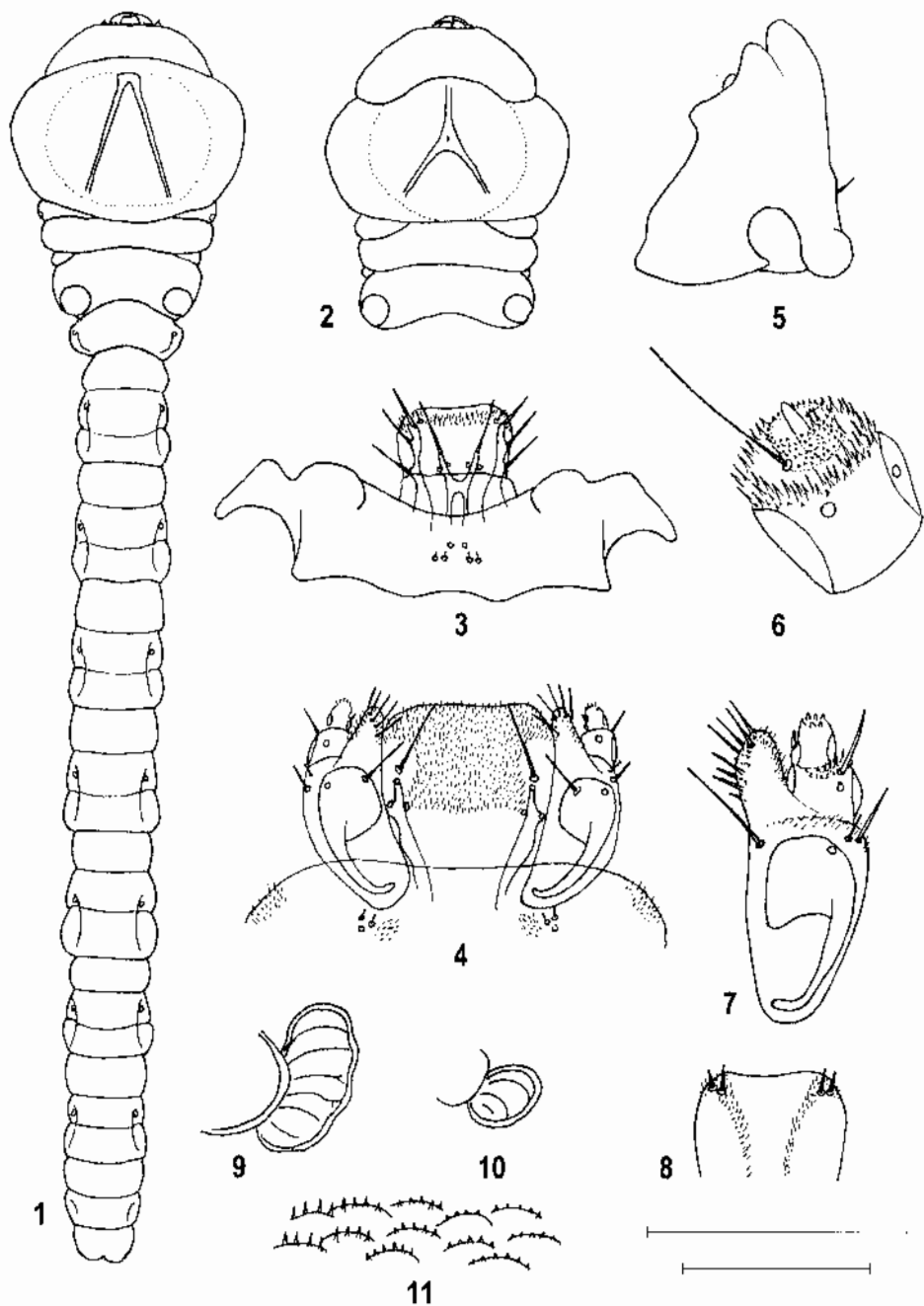
Thorax (Figs 1-2) strongly expanded, flattened, much wider than abdominal segments, rudiments of legs absent. Prothorax slightly transverse, 1.4-1.5 times as wide as long and

1.3 times as wide as mesothorax; anterior membrane with dense microspinulae and sparse, short setae, both dorsal and ventral plates yellowish, poorly defined and sclerotised, lateral sides evenly rounded with sparse, curved setae; pronotal plate mainly glabrous, covered with sparse microsetae and surrounded by semicircular area of poorly developed microspinulae except for basal part, central glabrous area without visible superficial sculpture: pronotal groove (Fig. 1) biramous, inverted V-shaped (42°), moderately sclerotised, brown in fixed specimens, hardly visible on slides; branches of groove nearly straight, almost extending base of plate; prosternal plate with the same sculpture as pronotal plate, prosternal groove (Fig. 2) moderately defined and sclerotised, brownish in fixed specimens, hardly visible on slides, 3-armed, branches straight, not extending base of plate forming angle 85° ; common part triangular at base, narrowing anteriorly, 1.4 times as long as length of branches forming with them angle 135° . Mesothorax strongly transverse, 3.4 times as wide as long and 1.2 times as wide as metathorax with well-developed secondary fold dividing segment into two parts, almost glabrous covered with very poorly developed microteeth situated on scale-like tubercles; lateral sides with sparse, short setae and poorly developed microspinulae anteriorly; ampular pads absent. Metathorax strongly transverse with deeply emargined base, 4.7 times as wide as long at middle and 1.6 times as wide as 1st abdominal segment, almost glabrous, bearing narrow area of very poorly defined microteeth on both sides; lateral sides with very sparse, short setae, ampular pads well-developed both on dorsal and ventral sides (Figs 1, 2); dorsal and ventral pairs of ampullae connected each other by inner duct with chitinous structure at the connection of the duct with ampulla.

Abdomen (Fig. 1) very long, narrow and flattened, lateral sides with sparse and short setae visible only on slides; lateral impressions poorly defined, narrow, subparallel with lateral margins of segments, ampular pads poorly developed both on dorsal and ventral sides only on 1st segment; terminal process absent; 1st abdominal segment cordiform, covered with microspinulae, twice as wide as long and 1.2 times as wide as segment 2; segments 2-8 strongly elongate, 1.6-2.0 times as long as wide, widened posteriorly, covered with microspinulae, each with 2 secondary folds dividing segments into 3 parts; anterior parts look like a separate segment; 9th segment nearly as long as wide covered with microspinulae; 10th segment subcylindrical, 1.3 times as wide as long, covered with microspinulae, anal rim vertical, not sclerotised.

Spiracles (Figs 9-10). Thoracic spiracles (Fig. 9) of the buprestoid, cribriform type, reniform, transverse, 2.25 times as wide as long with singular, unbranched trabeculae and situated on sides of anterior part of mesothorax; perithrema cancellate, adjacent structures consisting of fine microspinulae; 1st abdominal spiracle (Fig. 10) of buprestoid, cribriform type, oblong, 1.4 times as long as wide with singular, unbranched trabeculae, situated on dorsal side in lateral depressions; perithrema cancellate, adjacent structures consisting of fine microspinulae; abdominal spiracles 2-8 of the same type as those on segment 1.

Proventriculus cordiform, well-developed, inner armament as follows: main fields (Fig. 11) with large, dense, poorly sclerotised and scale-like tubercles bearing rows of short microteeth; margins with longer tubercles bearing 1-3 microteeth; anterior part mainly glabrous, posterior with long, very fine microspinulae without tubercles changing gradually into shorter setae situated on common bases and then into tubercles bearing microteeth; central stripes absent.



Figs 1-11. Larva of *Moerxia auroimpressa* (Carter). 1 – adult larva, dorsal view, 10.8 mm; 2 – head and thorax, ventral view; 3 – epistome, clypeus and labrum; 4 – labiomaxillary complex; 5 – right mandible; 6 – right antenna; 7 – right maxilla; 8 – epipharynx; 9 – mesothoracic spiracle; 10 – 1st abdominal spiracle; 11 – inner structure of proventriculus, main field (schematically, not in the scale). Scale bars: a – 0.5 mm (Figs 3-5); b – 0.2 mm (Figs 6-10).

Anthaxoschema carteri Théry, 1945

(Figs 12-22)

Material studied. 10 larvae of the last instar: "W Australia, Peak Charles National Park, 8. xi. 2001, Sv. Bily leg."; under the bark of fallen trunks and branches (diameter 15-40 cm) of *Acacia lasiocalyx* (Fabaceae); material deposited in NMPC and ZIN.

Measurements. Length of body: 9.5-10.5 mm; width of epistome: 4.2-4.3 mm.

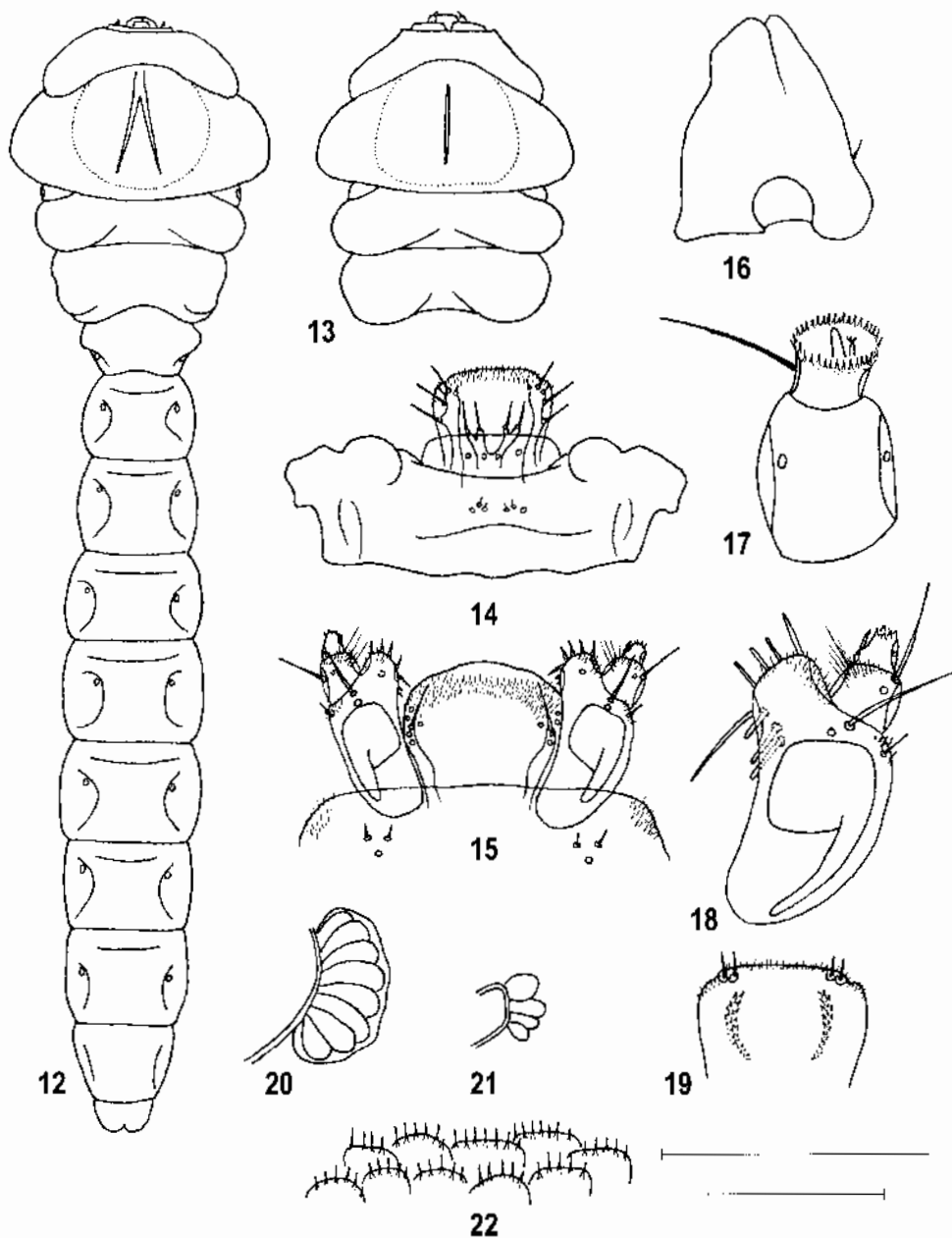
Body cream-white of the buprestoid type (morpho-ecological subtype 1), moderately elongate with expanded thoracic and transverse abdominal segments and with head completely retracted into prothorax (Figs 12-13); pilosity of the whole body sparse, inconspicuous, visible only on slides.

Mouth parts. Epistome (Fig. 14) strongly transverse, 4.3 times as wide as long, anterior margin distinctly emarginate between mandibular condyles which are semiglobular; posterior margin distinctly bisinuous, latero-posterior corners widely rounded, obtuse, not projecting outwards; lateral margins slightly emarginated, antennal incisions relatively narrow, well-defined; epistomal sensillae arranged linearly in two groups of 3 sensillae situated very closely to each other at anterior third of epistomal length, each group consisting of 2 short setae one above another and 1 campaniform sensilla outside of them.

Clypeus (Fig. 14) strongly transverse, 3.5 times as wide as long, membranous and glabrous.

Labrum (Fig. 14) slightly transverse, 1.2 times as wide as long, maximum width at anterior fourth, with indistinct lateral lobes, antero-lateral corners being slightly angularly rounded; anterior margin straight at the middle, sides converging posteriorly; palatine sclerites well-defined, moderately sclerotised, diverging forward, their branches nearly merging anteriorly each other and with bases of antero-lateral sensillae; medial branches well-defined forming sharp, anterior, sclerotised projection which extend bases of antero-lateral sensillae 1t and 2c; lateral branches well-defined forming sclerotised projection extending anteriorly at least the base of trichosensilla 3t; medial sensillae of labrum (t – trichoid, c – campaniform): 1c-2t-3c; apical setae short, not reaching even microsetal stripe, distance between apical seta and campaniform sensillae much longer than the distance between the bases of campaniform sensillae themselves; antero-lateral sensillae of labrum (t – trichoid, c – campaniform, "()" with fused bases, "+" with closed bases, "-" with distant bases): external (1t, 2c)-3t-4t. 1t and 2c nearly fused at bases, 1t, 3t and 4t short, bases of 1t, 2c and 3t enlarged and more sclerotised; internal 1t+2t, their bases close to each other but not fused; labrum armament: dorsally with narrow stripe of microsetae along anterior margin, anterior outline of this stripe not reaching the margin itself which is glabrous; ventrally (epipharynx – Fig. 19) with two oblique stripes of sparse microsetae laterally.

Antennae (Fig. 17) two-segmented, situated in lateral incision between epistome and pleurostome, articular membrane glabrous, basal antennomere 2.4 times as long as the terminal one; basal antennomere subcylindrical, elongated, distinctly longer than wide, inner sclerites well-defined, anterior margin glabrous, 2 campaniform sensillae situated at external margin and on dorsal surface anteriorly; terminal antennomere very short, slightly transverse, 1.35 times as wide as long, inner sclerites poorly defined, apical margin covered with sparse microspinulae; apical cavity well-developed, its bottom reaching the base of the terminal antennomere; long trichosensilla (as long as basal antennomere) arising from the wall of apical cavity, sensory appendage 2.2 times as long as wide not extending anterior margin of apical cavity; 2 short palmate sensillae and 1 basiconic sensilla at the base of sensory appendage.



Figs 12-22. Larva of *Anthaxoschema carteri* (Théry). 12 – adult larva, dorsal view, 10.5 mm; 13 – head and thorax, ventral view; 14 – epistome, clypeus and labrum; 15 – labiomaxillary complex; 16 – right mandible; 17 – right antenna; 18 – right maxilla; 19 – epipharynx; 20 – mesothoracic spiracle; 21 – 1st abdominal spiracle; 22 – inner structure of proventriculus, main field (schematically, not in the scale). Scale bars: a – 0.5 mm (Figs 14-16); b – 0.2 mm (Figs 17-21).

Mandibles (Fig. 16) triangular, brown, nearly as long as wide with short outer seta, strongly sclerotised at anterior half, basal part yellowish brown; setal brush absent, 1-2 narrow, elongate inner glandules situated at base; cutting edge with one obtuse-angled apical tooth and two lateral ridges, the ventral ridge being smaller than the dorsal one; external tooth absent.

Hypostome yellowish, poorly sclerotised with several short setae, ocelli absent.

Maxillae (Figs 15, 18). Cardio longer than wide, membranous, with a few microspinulae on external sides and with area of long microspinulae internally; isolated sclerites of cardo small, triangular, poorly defined and sclerotised bearing 2 very short setae and 1 campaniform sensilla below them; stipes longer than wide, inner sclerite moderately defined with long, curved and sclerotised internal process; apical seta longer than palpus maxillaris, situated at anterior margin between mala and palpus maxillaris, lateral seta short, situated at external, anterior corner; internal margin of stipes nearly glabrous, external armament consisting of a few microspinulae at external sides, internal armament consisting of a few microspinulae along anterior margin; campaniform sensillae situated close to external corner anteriorly. Palpus maxillaris (Fig. 18): basal palpomere nearly as long as terminal one, triangular, only very slightly wider than long, its external side longer than internal one; apical seta nearly 1.5 times as long as terminal palpomere, situated at external corner, campaniform sensilla situated at middle, closer to external side; internal armament of the basal palpomere consisting of sparse microspinulae length of which sharply increase inwards, 3-4 innermost ones inverted into very long setae which are longer than the basal palpomere itself; terminal palpomere subcylindrical, slightly elongate, 1.2 times as long as wide bearing one campaniform sensilla at external margin near the base and about 6 peg-like, apical sensillae, one of them distinctly larger than others; curved sensilla situated at internal margin, outside of palpomere and arising from its base. Mala (Fig. 18) slightly transverse, hardly narrowing apically, 1.4 times as wide as long, arising from antero-lateral part of stipes and not overlapping palpus maxillaris; inner sclerite well-developed, transverse, internal lobe absent; armament of mala consisting externally of one basal, campaniform sensilla and 2 short and 4 long setae apically; internal armament consisting of number of setae 3 of them being distinctly more robust than others, one very long seta at antero-lateral corner and fringe of long microspinulae directed outwards.

Labium (Fig. 15). Prementum nearly as long as wide, rounded, anterior margin widely arcuate, nearly straight; lateral sides widely arcuate, slightly converging posteriorly; dorsal side (hypopharynx) with poorly visible, lateral areas of sparse microsetae, ventral side with transverse stripe of long microspinulae along entire anterior margin but not reaching it; corner sclerites of labium rather broad, well-sclerotised, bearing long apical seta almost extending anterior margin of prementum and five campaniform sensillae: 3 above and 2 below bases of apical setae; postmentum glabrous without any traces of setae or campaniform sensillae.

Thorax (Figs 12-13) strongly expanded, flattened, much wider than abdominal segments, rudiments of legs absent. Prothorax transverse, 1.75 times as wide as long and 1.30 times as wide as mesothorax, anterior membrane with dense microspinulae and sparse, short setae; both dorsal and ventral plates poorly defined and sclerotised, yellowish, lateral sides angularly rounded with sparse, short setae, almost glabrous. Pronotum (Fig. 12): pronotal plate completely glabrous with sparse, short setae which are denser at antero-lateral corners, surface with grainy or rugose cuticular texture; pronotal groove V-shaped (30°), poorly defined and sclerotised, lightly brownish in fixed specimens, hardly visible on slides, branches nearly

straight, almost extending base of plate. Prosternum (Fig. 13): completely glabrous with sparse short setae which are denser at antero-lateral corners and small groups of microampullae; surface with grainy or rugose cuticular texture; prosternal groove uniramous, spindle-shaped, poorly defined and sclerotised (only central part well-distinct), pale yellow in fixed specimens, nearly invisible on slides. Mesothorax strongly transverse, 3.9 times as wide as long and 1.2 times as wide as metathorax with well-defined secondary fold dividing segment into two parts, glabrous with transverse groups of microampullae ventrally and with sparse, short setae laterally; ampular pads absent. Metathorax transverse, 3.9 times as wide as long at the middle and 1.4 times as wide as 1st abdominal segment, glabrous with transverse areas of microampullae forming 4 groups ventrally, lateral sides with very sparse, short setae; ampular pads absent.

Abdomen (Fig. 12) moderately long, narrow, flattened, lateral sides with very sparse, short setae, lateral impressions poorly defined, oblique and broad, ampular pads and terminal process absent; 1st abdominal segment transverse, 2.1 times as wide as long and 1.2 times as wide as 2nd segment, glabrous with groups of microampullae ventrally; segments 2-8 transverse 1.2-1.8 times as wide as long with median secondary folds not dividing segments into separate parts, glabrous with very sparse, short setae laterally and two groups of microampullae ventrally; 9th segment transverse, 1.5 times as wide as long, arcuately narrowing posteriorly, glabrous with very sparse, short setae laterally and single group of microampullae ventrally; 10th segment nearly spatulate, 1.3 times as long as wide, glabrous with isolated, short setae, anal rim vertical, not sclerotised.

Spiracles (Figs 20, 21). Thoracic spiracles (Fig. 20) of buprestoid, multiloculate type, transverse, reniform, 2.43 times as wide as long situated on the sides of anterior part of mesothorax, trabeculae absent, atrium poorly sclerotised, closing apparatus well-defined, adjacent structures consisting of a few poorly defined, sparse microspinulae; 1st abdominal spiracles (Fig. 21) of the buprestoid, multiloculate type, 2.18 times as wide as long, situated in the dorsal, lateral depressions; the shape is rather variable, atrium poorly sclerotised, closing apparatus well-defined and trabeculae absent; adjacent structures absent or composed of small groups of poorly defined microspinulae; spiracles on segments 2-8 of the same type and shape as these on the first abdominal segment.

Proventriculus rounded, well-developed with inner armament as follows: main fields with large, dense, poorly sclerotised, scale-like tubercles bearing rows of long microteeth (Fig. 22); margins with longer and sparse tubercles bearing strongly reduced microteeth; both anterior and posterior parts with rows of fine microspinulae with reduced bases; central stripe poorly developed posteriorly with separate areas consisting of sparse scale-like tubercles with reduced teeth directed in opposite direction than those on main fields and surrounded with long microspinulae laterally.

Discussion

Systematic list of studied anthaxiine genera and species.

MAORAXIINI Hołyński, 1984

Maoraxia Obenberger, 1937

M. auroimpressa (Carter, 1924): see under description → page 8.

– *M. littoralis* Bellamy & Williams, 1985

CURINI Hołyński, 1988

Anilarina Bílý, 2000

Anilara Saunders, 1868

A. nigrita Kerremans, 1898: “[Australia] Qld, Toowoomba, July 1988, T. J. Hawkeswood”. *Eucalyptus crebra* F. Muell (Myrtales, Myrtaceae) (ex dead wood); approx. 15 ex. (mature), ZIN (from T. Hawkeswood).

A. antiqua Théry, 1911: “[Australia] Qld, Toowoomba, July 1988, T.J. Hawkeswood”, *Eucalyptus crebra* F. Muell (Myrtales, Myrtaceae) (ex dead wood); 3 ex., (mature), ZIN (from T. Hawkeswood).

Anilara sp.: “[Australia] WA, 28.5 km N of Perth, 31.42 SW, 115.53 E, M. Peterson leg.”, *Melaleuca preissiana* Schauer, 3 ex. (?mature), NMPC, ZIN.

Anthaxoschema Obenberger, 1923

A. carteri (Théry, 1945): see under description → page 12.

Neocurina Hołyński, 1988

Neocuris Saunders, 1868

N. gracilis Macleay, 1872: “Australia, Queensland, Brisbane, Griffith University campus, Sept.-Oct. 1984, T.J. Hawkeswood leg.”, *Pultenaea villosa* Willd. (Fabales, Fabaceae) (ex dead main stems and branches), 3 ex. (?mature), ZIN (from T. Hawkeswood).

MELOBASINI Bílý, 2000

Melobasis Laporte & Gory, 1837

M. (Melobasis) costata MacLeay, 1872: “[Australia] Qld, Mourauee Str., 18.iii.2001, M. Hanlon”, *Acacia harpophylla* F. Muell. (Fabales, Fabaceae), 2 ex. (? instar), NMPC, ZIN.

M. (M.) vertebralis Carter, 1923 (as *costifera* Thomson): “[Australia] Qld, Brisbane, Aug. 1987, T.J. Hawkeswood”, *Acacia leiocalyx* (Domin) Pedley (Fabales, Fabaceae), 8 ex. (different instars), ZIN (from T. Hawkeswood).

M. (Diceropygus) viridiauratus Deyrolle, 1864: “[Indonesia], Maluku, Seram, Solca, xi.1998, Sv. Bílý leg.”, from under the bark of branch (2-4 cm) of unidentified, dead tree, 2 ex. (mature), NMPC.

Melobasis sp.: “[Australia]”, Host plant unknown, 2 ex. (immature), ZIN (from T. Hawkeswood).

ANTHAXIINI Gory & Laporte, 1839

Anthaxia Eschscholtz, 1829

A. (Anthaxia) lucidiceps Gory, 1841: “Uzbekistan, Turkestan Ridge, Bakhmazar valley, SE of Usmat, 19.vi.1981, M. Volkovitsh leg.”, *Ferula* sp. (Apiales, Apiaceae), 1 ex. (mature), ZIN.

A. (Cratomeris) medvedevorum Alexeev, 1978: “Turkmenistan, Great Balkhan Mts., Uzun-Akkyr valley, 10.v.1981, M. Volkovitsh leg.”, *Halimodendron halodendron* (L.) Voss (Fabales, Fabaceae) (ex twigs), 1 ex. (mature), ZIN.

Larvae of numerous Central European species were also examined in the course of present study.

Chalcogenia Saunders, 1871

C. halperini Volkovitsh & Bílý, 1997: “Israel, N. Zihor, xi.91, J. Halperin leg.”, *Acacia gerrardii* Benth. ssp. *negevensis* Zohary (Fabales, Fabaceae) (ex branches), 3 ex. (different instars), ZIN (from J. Halperin).

***Bilyaxia* Holyński, 1989**

- B. concinna* (Mannerheim, 1837): "Chile, Santiago, El Monte, ix.1982, J. Beecke leg.",
Rubus ulmifolius Schott. (Rosales, Rosaceae), 1 ex., 1 pupa, NMPC.

XENORHIPIDINI Cobos, 1986***Hesperorhipis* Fall, 1930**

- H. alhofasciatus* Fall, 1930 (R. Westcott det.): "[USA] CA, Tulare Co., Tulare, F. G. Andrews, removed from wood 9.viii.75, English Walnut" [*Juglans regia* L.] (Juglandales, Juglandaceae), 3 ex. (?instar), ZIN (from R. Westcott).

***Xenorhipis* Leconte, 1866**

- X. paralellus* Waterhouse, 1889 (C. Bellamy det.): "Mexico, Puebla, Zapotitlan distr., 8.vii.1992, M. Volkovitsh leg.", *Prosopis* sp. (Fabales, Fabaceae) (ex branch), 1 ex. (?mature), 1 pupa, 1 adult, ZIN.

On the larval characters of anthaxiine taxa.

Comparison of larval characters of known anthaxiine taxa is shown in Table 1. It should be noted that because only single or a few species of each genus (excepting *Anthaxia*) were studied the variability and taxonomic and diagnostic value of many larval characters remain uncertain. To distinguish anthaxiine larvae among other characters shown in Table 1 we selected a few most important ones:

- mouthparts glabrous (*Anthaxia*, *Chalcogenia*) to bearing dense microspinulae or microsetae (all other studied genera); antennae unmodified (*Neocuris*) to modified, functionally unisegmented (*Anthaxia*, *Chalcogenia*, *Xenorhipidini*);
- prothoracic plates glabrous (*Anthaxoschema*, *Anilara*, *Melobasis* s.g., *Dicercopygus*, *Anthaxia*, *Chalcogenia*, *Xenorhipidini*) to covered with microteeth (*Maoraxia*, part) or/and with particular transverse asperities (*Bilyaxia*, *Melobasis* s. str.);
- pronotal grooves inverted "Y"-shaped (*Neocuris*) to inverted "V"-shaped with tendency to separation of branches (all other genera);
- prosternal groove uniramous (*Anthaxoschema*, *Neocuris*, *Anilara*, *Bilyaxia*, *Anthaxia*, *Chalcogenia*, *Xenorhipidini*) to 3-armed (*Maoraxia*, *Melobasis*);
- metathorax without defined ampular pads (*Anthaxoschema*, *Neocuris*, *Anilara*, *Melobasis*, *Xenorhipidini*) to bearing 2 pairs of ampular pads connected on each side with inner duct (*Maoraxia*, *Bilyaxia*, *Agrilus*, *Anthaxia*, *Chalcogenia*); however, some *Anthaxia* larvae feeding inside soft, living stems (*A. hypometaena*, *A. Igockii*, *A. flavicomis*) has no metathoracic ampular pads (Soldatova 1970, 1975); it is not clear whether these pads are lacking completely or those are poorly developed; studied larva of *A. lucidiceps* feeding inside flower stalks of *Ferula* has ampular pads well developed;
- body mainly glabrous (*Anthaxoschema*, *Neocuris*, *Anthaxia*, *Chalcogenia*, *Xenorhipidini*) to bearing extensive microspiculated areas (*Maoraxia*);
- proventriculus with poorly developed inner armament, particularly median stripes (*Maoraxia*) to well developed, complicated, with well defined median stripes (*Melobasis*, *Bilyaxia*, *Anthaxia* - *Chalcogenia*, *Xenorhipidini*); *Anilara* has poorly developed proventricular armament differing from other genera which is in many respects similar to that in *Melanophilini*.

This demonstrates that there are only a few reliable larval characters for delimitation anthaxiine genera; each group is characterized by rare automorphic states and a set of shared characters.

Maoraxia

Main diagnostic characters: abdominal segments 2-8 (Fig. 1) much longer than wide with 2 secondary folds dividing segments into 3 parts (character so far found only in *Nascio*); body with distinct areas of microspinulae; maxillary cardo with poorly defined areas of sparse microspinulae near isolated sclerites externally.

Shared characters: prosternal groove 3-armed (Fig. 2), nearly asterisk-shaped (*Melobasis*); metathorax (Figs 1, 2) with well defined ampular pads connected by inner

duct on each side (*Bilyaxia*, *AgriIaxia*, *Anthaxia* – *Chalcogenia*); proventriculus without median stripes (*Anthaxoschema*, and, partly, *Neocuris*).

Differences between *Maoraxia eremita* (Dumbleton, 1932) and *M. auroimpressa* are shown in Table 2. According to Dumbleton (p. 46, fig. 22) curved sensilla (chitinous process) in *M. eremita* is very characteristic arising from the base and being distinctly separated from palpomere body. In *M. auroimpressa* it is also distinctly separated from palpomere 2nd. However in other studied anthaxiine larvae the position of curved sensilla is sometimes very similar and variable (perhaps depending of the slide quality), thus the taxonomic value of this character is not quite clear.

Anthaxoschema

Main diagnostic characters: maxillary palpomere 1 (Fig. 18) internally bearing microspinulae and setae, among them innermost ones are very long, longer than palpomere itself.

Shared characters: latero-posterior corners of epistome (Fig. 14) obtuse-angled not projecting,

anterior margin of antennomere 1st (Fig. 17) glabrous or with a few microspinulae, body mainly glabrous (*Anthaxia* – *Chalcogenia*, Xenorhipidini); mala internally (Fig. 18) with 3 enlarged setae, body, including prothoracic plates, with small groups of microampullae ventrally (*Neocuris*).

Supposedly larva of *Anthaxoschema* is of most generalized type among studied Australian taxa which has certain similarity to *Anthaxia* – *Chalcogenia* and Xenorhipidini. From the other hand, it demonstrates more relations to *Neocuris* rather than to *Anilara* or other Australian taxa in having distinctly enlarged setae on internal surface of mala (Fig. 18) (though not so thick and sclerotized as those in *Neocuris*) and symmetrically located groups of microampullae ventrally. The later seems to be the enlarged and stronger sclerotized bases of setae (though setae itself are lacking) and possibly serve for fixing the body when larva feeds and moves in galleries like ampular pads or armed plates in other groups.

Neocuris

Main diagnostic characters: latero-posterior corners of epistome strongly obtuse-angled, projecting inward; 1st antennal segment nearly as long as 2nd; pronotal groove "Y"-shaped.

Shared characters: isolated sclerite of maxillary cardo and campaniform sensilla absent, there are only 2 very long setae situating on membrane (Xenorhipidini); mala with 3 strongly enlarged modified setae internally (*Anthaxoschema*); body with small groups of microampullae (*Anthaxoschema*); postmentum with 2 very long setae (*Melobasis* part, *Bilyaxia*).

Anilara

Main diagnostic characters: proventriculus with sparse, poorly developed microteeth (similar to Melanophilini) nearly completely covered dorsal and ventral surfaces leaving narrow glabrous areas; mala strongly elongated; other characters see in Table 1.

Shared characters: antero-lateral sensillae of labrum with only one seta internally (*Melobasis*).

Melobasis

Main diagnostic characters: bases of external antero-lateral sensillae of labrum 1t, 2c, and 3t fused forming separate sclerite; postmentum with 2 long setae and 2 campaniform sensillae; prothoracic plates glabrous with big transverse asperities along the grooves (*Melobasis* s. str.).

Shared characters: prosternal groove 3-armed, sometimes nearly asterisk-like (*Maoraxia*); antero-lateral sensillae of labrum with only one seta internally (*Anilara*).

Bilyaxia

Main diagnostic characters: prothoracic plates covered with well defined microteeth combined with big transverse asperities forming distinct areas along grooves.

Shared characters: labrum externally with microsetal areas only at antero-lateral corners; anterior margin glabrous at the middle (*Agrilaxia*); metathorax with 2 pairs of well defined ampular pads on each side connected with inner duct (*Maoraxia*, *Agrilaxia*, *Anthaxia* – *Chalcogenia*).

Anthaxia*, *Chalcogenia

Main diagnostic characters: labrum and prementum completely glabrous externally; external antero-lateral sensillae of labrum with first medianmost seta (1t) strongly reduced, looking like campaniform one.

Shared characters: antero-posterior corners of epistome obtuse-angled, weakly or not projecting inward (*Anthaxoschema*, *Neocuris* part., *Xenorhipidini*); antennae situated in lateral depressions of epistome, 1st segment much longer than 2nd which is reduced and partly retracted into 1st; anterior margins of 1st or both antennomeres glabrous, bottom of antennal cavity usually retracted into anterior 1/2 of 1st (*Xenorhipidini*); prementum transverse, distinctly wider than long (*Xenorhipidini*); prothoracic plates glabrous (*Anthaxoschema*, *Anilara*, *Melobasis* subgen. *Dicercopygus*, *Xenorhipidini*); metathorax with 2 pairs of well defined ampular pads on each side connected by inner duct (*Maoraxia*, *Bilyaxia*); body glabrous (*Xenorhipidini*); proventriculus with dorsal and ventral median stripes which are well developed on both surfaces (*Melobasis*, *Bilyaxia*, *Xenorhipidini*; part.).

Xenorhipis*, *Hesperorhipis

Main diagnostic characters: palatine sclerites of labrum with median branches strongly reduced; labrum completely covered with microspinulae at anterior half.

Shared characters: latero-posterior corners of epistome obtuse-angled, weakly or not projecting inward (*Anthaxoschema*, *Neocuris* part., *Anthaxia* – *Chalcogenia*); antennae situated in lateral depressions of epistome (*Anthaxia* – *Chalcogenia*); 1st antennal segment much longer than 2nd which is strongly reduced and partly retracted into 1st (*Anthaxia* – *Chalcogenia*); anterior margins of 1st antennomere glabrous (*Anthaxoschema*, *Anthaxia* – *Chalcogenia*); isolated sclerite of maxillary cardo and campaniform sensilla absent, there are only 2 very long setae sitting on membrane (*Neocuris*); prementum transverse, wider than long (*Anthaxia* – *Chalcogenia*); prothoracic plates glabrous (*Anthaxoschema*, *Anilara*, *Melobasis* part., *Anthaxia* – *Chalcogenia*); body glabrous (*Anthaxia* – *Chalcogenia*).

Agrilaxia

We could not study the larva of *Agrilaxia* but from the description of unidentified species by Costa & al. (1988) it may be concluded that in many respects it is quite similar to that of *Bilyaxia* (Table 1): the shape of 2nd antennal segment which is normal; anterior margins of both antennal segments microspinulated; apical cavity of 2nd antennal segment not retracted into 1st segment; anterior margin of labrum with microsetal area; prementum with microsetae at least at the sides; postmentum with 2 long setae; metathorax with 2 pairs of ampular pads; unfortunately there is no information about so important character as the armament of prothoracic plates. Thus many larval characters (the shape and armament of antennae, labrum and labium) contradict to adult antennal structures which support the affinity of *Agrilaxia* to *Anthaxia* rather than to *Cylindrophora* sensu lato (Volkovitsh, unpublished data).

Table 1. Comparison of the main taxonomic characters among the larvae of known anthaxiine genera

Character	<i>Maoraxia</i>	<i>Anthaxoschema</i>	<i>Neocuris</i>	<i>Anilara</i>
Epistome: latero-posterior corners	Rectangular, distinctly projecting outwards (Fig. 3)	Obtuse-angled, rounded, not projecting (Fig. 14)	Strongly obtuse-angled, tapering posteriorly	Rectangular, distinctly projecting outwards
Antennae: position	In lateral incision between epistome and pleurostome	In lateral incision between epistome and pleurostome	In lateral incision between epistome and pleurostome	In lateral incision between epistome and pleurostome
Antennae: shape	1 st segment much longer than 2 nd which is reduced (Fig. 6)	1 st segment much longer than 2 nd which is reduced (Fig. 17)	1 st segment nearly as long as 2 nd	1 st segment much longer than 2 nd which is normal
Antennae: anterior margins of segments, armament	Both segments microspinulated (Fig. 6)	1 st segment glabrous (Fig. 17)	Both segments microspinulated	Both segments microspinulated
Labrum: shape	Elongate (Fig. 3)	Transverse (Fig. 14)	Transverse	Elongate
Labrum: palatine sclerites	Subparallel, well defined	Diverging, well defined	Diverging, well defined	Subparallel, well defined
Labrum: external armament	With stripe of microsetae posteriorly of anterior margin (Fig. 3)	With narrow stripe of microsetae posteriorly of anterior margin (Fig. 14)	With narrow stripe of microsetae posteriorly of anterior margin	With stripe of microsetae posteriorly of or along anterior margin
Labrum: antero-lateral sensillae, arrangement	(1I, 2c)-3t-4t (1I, 2t) (Figs 3, 8)	(1I, 2c)-3t-4t (1t+2t) (Figs 14, 19)	(1I, 2c)-3t-4t (1I, 2t)	(1I, 2c)-3t-4t (1I)
Maxillary cardo: armament	With small areas of sparse microspinulae near isolated sclerites externally and on the sides (Fig. 4)	With a few microspinulae on the sides and internally (Fig. 15)	Glabrous	With microspinulated areas on the sides and internally
Maxillary cardo: isolated sclerite	Present, bearing 2 setae and 1 campaniform sensilla (Fig. 4)	Present, bearing 2 short setae and 1 campaniform sensilla (Fig. 15)	Absent; 2 very long setae sitting on membrane; campaniform sensilla absent	Present, bearing 2 setae and 1 campaniform sensilla
Maxillary palpus: palpomere 1, armament internally	Without long setae (Fig. 7)	Bearing microspinulae and setae, innermost ones very long (Fig. 18)	Without long setae	Without long setae
Mala: shape, armament	Elongated, without modified setae (Fig. 7)	Subquadrate, with 3 enlarged modified setae internally (Fig. 18)	Subquadrate, with 3 very thick modified setae internally	Strongly elongated, without modified setae
Labium: prementum, shape	Slightly elongated, rounded (Fig. 4)	Nearly as long as wide, rounded (Fig. 15)	Nearly as long as wide, pentagonal	Nearly as long as wide, rounded
Labium: prementum, externally, anterior microspinulated area	Large, reaching anterior margin and extending bases of apical setae on corner sclerites posteriorly (Fig. 4)	Large, not reaching anterior margin and the bases of apical setae on corner sclerites (Fig. 15)	Large, not reaching anterior margin and bases of apical setae on corner sclerites	Large, not reaching anterior margin and extending bases of apical setae on corner sclerites
Postmentum: armament	Glabrous (Fig. 4)	Glabrous (Fig. 15)	With 2 very long setae extending the bases of apical setae on corner sclerites	Glabrous
Prothoracic plates: armament (excluding setae)	Glabrous with inconspicuous microteeth surrounding the plate*	Completely glabrous	Glabrous with small areas of inconspicuous microteeth anteriorly	Completely glabrous
Pronotal groove: shape	"V"-shaped (Fig. 1)	"V"-shaped (Fig. 12)	"Y"-shaped	"V"-shaped
Prosternal groove: shape	3-armed (Fig. 2)	Uniramous (Fig. 13)	Uniramous	Uniramous
Metathorax: presence of ampular pads	Present (Figs 1-2)	Absent (Figs 12-13)	Absent	Absent

* According to Dumbleton (1932) prothoracic plates of *M. eremita* covered with asperities which are presumably the microteeth well developed over entire surface.

<i>Melobasis</i>	<i>Bityaxia</i>	<i>Anthaxia Chalcogenia</i>	<i>Xenorhipis Hesperorhipis</i>
Rectangular, distinctly projecting outwards In lateral incision between epistome and pleurostome 1 st segment much longer than 2 nd which is normal	Rectangular, distinctly projecting outwards In lateral incision between epistome and pleurostome 1 st segment much longer than 2 nd which is normal	Obtuse-angled, weakly or not tapering posteriorly In lateral depression of epistome 1 st segment much longer than 2 nd which is reduced and partly retracted into 1 st	Obtuse-angled, weakly or not tapering posteriorly In lateral depression of epistome 1 st segment much longer than 2 nd which is strongly reduced and partly retracted into 1 st 1 st segment glabrous
Both segments microspiculated	Both segments microspiculated	1 st or both segments glabrous	1 st segment glabrous
Subquadrate	Transverse	Transverse	Transverse
Subparallel, well defined	Diverging, well defined	Diverging, well defined	Diverging; median branches strongly reduced
With stripe of microsetae along anterior margin (1t, 2c, 3t)-4t (1t)	With microsetal areas at anterior corners; anterior margin glabrous at the middle (1t, 2c)-3t-4t (1t, 2t)	Glabrous (1c, 2c)+3t-4t 1t-2t	Completely covered with microspinulae at anterior half (1t, 2c)-3t-4t 1t-2t
With microspiculated areas internally	Glabrous	With sparse, poorly defined microspiculated areas internally	Glabrous
Present, bearing 2 setae and 1 campaniform sensilla	Present, bearing 2 setae and 1 campaniform sensilla	Present, bearing 2 setae and 1 campaniform sensilla	Absent; 2 short setae sitting on membrane; campaniform sensilla absent
Without long setae	Without long setae	Without long setae	Without long setae
Subquadrate, without modified setae	Slightly elongated, without modified setae	Elongated, without modified setae	Subquadrate, without modified setae
Subquadrate	Nearly as long as wide	Transverse, definitely wider than long	Transverse, wider than long
Large, reaching anterior margin and extending bases of apical setae on corner sclerites	Large, reaching anterior margin and extending bases of apical setae on corner sclerites	Completely glabrous	Large, reaching anterior margin and extending the bases of apical setae on corner sclerites
With 2 long setae and 2 campaniform sensillae	With 2 long setae	Glabrous or with 2 campaniform sensillae	Glabrous
Glabrous with or without big transverse asperities along the grooves "V"-shaped	With microteeth and big transverse asperities along the grooves "V"-shaped	Completely glabrous "V"-shaped	Completely glabrous "V"-shaped
3-armed	Uniramous	Uniramous	Uniramous
Absent	Present	Present**	Absent

** According to Soldatova (1970, 1975) the larvae of *Anthaxia* species feeding inside living stems have no meta-thoracic ampular pads.

Character	<i>Maoraxia</i>	<i>Anthaxoschema</i>	<i>Neocuris</i>	<i>Anilara</i>
Body: armament (excluding setae)	With extensive areas of microspinulae	Glabrous, with groups of microampulae ventrally	Nearly glabrous, with groups of microampulae and poorly defined microspinulae	Nearly glabrous, with areas of poorly defined microspinulae near spiracles
Abdominal segments 2-8: shape	Much longer than wide with 2 secondary folds (Fig. 1)	Wider than long, with 1 secondary fold (Fig. 12)	Wider than long to slightly longer than wide	Wider than long to slightly longer than wide
Proventriculus: main fields	With dense scale-like tubercles bearing single or rows of short microteeth (Fig. 11)	With dense scale-like tubercles bearing rows of long microteeth (Fig. 22)	With dense scale-like tubercles bearing rows of short microteeth	With sparse poorly developed microteeth sitting in groups of 2-3 on common bases or singularly
Proventriculus: dorsal and ventral median stripes	Absent	Poorly developed only at anterior and posterior parts	Poorly developed only at anterior and posterior parts	Nearly completely covered with sparse, poorly developed microteeth leaving narrow glabrous areas

On the taxonomic position of *Maoraxia* and *Anthaxoschema*.

Maoraxia

The tribal placement of *Maoraxia* Obenberger, 1937 originally described as *Maoriella* Obenberger, 1924 (nom. praecox.) and placed within subfamily Mastogeniinae raised heated debate (see historical review in Bellamy & Williams, 1985). Holyński (1984) established a new tribe Maoraxiini having pointed that relations of this tribe with Mastogeniini remains an open question. Bellamy & Williams (1985) supported the placement of *Maoraxia* within Anthaxiini (Australian Anthaxiinae, Carter & Théry, 1929) giving it proximity to *Neocuris* and *Pseudounilara* and Bellamy (1986) even synonymized Maoraxiini under Anthaxiini. Holyński (1988, 1993) resurrected this taxon as subtribe Maoraxiina of Anthaxiini and this viewpoint was adopted by Bellamy (1990, 1991).

Bellamy (1990) discussed a phylogeny of *Maoraxia* based on cladistic analysis of Australian anthaxiine taxa (including those that were attributed to Melanophilini); his results have shown the closest relations of *Maoraxia* to *Australorhipis* and *Notographus*.

Bilý (2000) treated Maoraxiini as an independent tribe of uncertain position having noted that based on Dumbleton's description the larval characters of this genus support some relationship with Anthaxiini.

Volkovitsh (2001) indicated that antennal structures of *Maoraxia* differ strongly from other buprestoid taxa bearing some similarity to Mastogeniini though larval and some adult characters support the affinity of *Maoraxia* to anthaxiine taxa (Anthaxioid lineage). This contradiction led to conclusion that *Maoraxiini* is a distinct relict tribe that should be placed at the base of Buprestoid phyletic stock and that conflicting characters do not allow its certain attribution to either Buprestoid or Anthaxioid lineage. Bellamy (2003) reflected this placement in his summary of higher classification of Buprestoidea.

Present study demonstrates that 1) larval characters of *Maoraxia auroimpressa* with a few exceptions (Table 2) match well to those of *M. eremita* as described by Dumbleton (1932); and 2) the larval characters of *Maoraxia* (Table 1) indicate its indubitable relation to anthaxiine taxa and allows attribute this enigmatic genus to Anthaxioid lineage sensu Volkovitsh (2001). This supports the earlier viewpoints of Holyński (1988, 1993), Bellamy & Williams (1985), and Bellamy (1990, 1991) about close relation of *Maoraxia* to Anthaxiini but in the same time, combined with adult characters, allows treat Maoraxiini as an independent relict sister-tribe to Anthaxiini sensu lato as indicated by Bilý (2000) and, in part, by Volkovitsh (2001).

<i>Melobasis</i>	<i>Bilyaxia</i>	<i>Anthaxia Chalcoenia</i>	<i>Xenorhipis Hesperorhitis</i>
Nearly glabrous, with small areas of poorly defined microspinulae	Nearly glabrous, with small areas of poorly defined microspinulae	Glabrous	Glabrous
Wider than long to slightly longer than wide	Wider than long to slightly longer than wide	Wider than long to slightly longer than wide	Wider than long to slightly longer than wide
With very dense scale-like tubercles bearing single or rows of short microteeth	With poorly developed, scale-like tubercles bearing single or rows of short microteeth	With very dense overlapping long microteeth	With very dense overlapping long microteeth sitting in rows on common bases
Well developed dorsally	Well developed dorsal stripe of long microspinulae; ventrally poorly developed	Well developed on both surfaces	With well developed dorsal and short ventral stripes

Anthaxoschema

This taxon was treated either as a synonym of *Notographus* or as a distinct genus (see discussion in Bellamy & Peterson, 2000), the later viewpoint is currently predominant (Bilý, 2000; Bellamy, 2002, 2003). Currently it is placed within Curini: Anilarina (Bilý, 2000; Bellamy, 2002) or, informally, within *Anilara* generic group of Anthaxiinioid branch (Anthaxioid lineage) together with *Anilara* and *Notographus* (Volkovitsh, 2001). The larval characters (Table 1) indicate that it is much closer to *Neocuris* (Neocurina) rather than to *Anilara*. But *Notographus* larvae remain unknown so far, so we suppose such a shift would be untimely.

On the taxonomic concept of Anthaxiini and related taxa.

Since Holyński (1988) suggested a new concept of Anthaxiini which was greatly different from traditional one (Bellamy, 1985), the content, classification, and phylogeny of this group became a widely debated topics. Holyński (1988, 1989, 1993) attributed to Anthaxiini a number of subtribes (Nascionina, Trachykelina, Kisanthobiina, Bubastina (= Philanthaxiina, Thomassetiina), Anthaxiina, Xenorhipina, Trigonogenina, Coomaniellina, Maoraxiina, Neocuridina, Curidina, Melanophilina, and Sphenopterina). This classification though with many reservations was adopted by Bellamy (Bellamy, 1990, 1991, 1996, 1997, etc.).

Bilý (2000) disputed the concept of Anthaxiini sensu Holyński. He postulated that Bubastina in Holyński's interpretation is a completely artificial group, and that Nascionina, Trachykelina, Coomaniellina, and Sphenopterina have no relation to anthaxiine taxa (what is completely supported by many adult and larval characters). Remaining taxa were upgraded to tribal level and regarded as more or less closely related to Anthaxiini. New con-

Table 2. Comparison of the main taxonomic characters between the larvae of *Maoraxia auroimpressa* (Carter, 1924) and *M. eremita* (White, 1846) (after Dumbleton, 1932).

Character	<i>Maoraxia auroimpressa</i>	<i>Maoraxia eremita</i>
Body length	9-11 mm	19-22 mm
Mandibles, number of teeth on cutting edge	Five: one apical tooth and two obtuse teeth with common bases dorsally and ventrally	Four: two apical teeth and one small tooth (retinaculum) dorsally and ventrally
Cardo, isolated sclerite	Poorly defined and sclerotised	Well defined and sclerotised
Prothoracic plates, armament	Mainly glabrous, covered with sparse microsetae and surrounded with area of poorly developed microspinulae besides the base	Covered with chitinous asperities (?microteeth)

cept of Anthaxiini and related groups is as follows: Anthaxiini (incl. Anthaxiina, Xenorhipidina), Thomassetiini, Melanophilini, Kissanthobiini, Melobasini nov., Anilarini nov. (incl. Anilarina, Neocurina, and Curina), Trigonogenini, Maoraxiini, and Bubastini. Bellamy (2002) noted that Curini Holyński, 1988 has a priority over Anilarini Bílý, 2000 but adopted the changes suggested.

Volkovitsh (2001) based on antennal morphology raised another hypothesis of possible relations of anthaxiine genera (included only taxa with examined antennal structures) though he underlined that it reflected mainly the similarity in antennal structures and their morphoclines rather than a new concept of classification. He placed *Maoraxia* separately (see above) while all other Australian anthaxiine genera were combined in 6 informal generic groups within Anthaxiinioid branch of Anthaxioid lineage: *Curis* (currently *Selagis* Dejean, 1836), *Neocuris*, *Torresita* Gemminger & Harold, 1869, *Theryaxia* Carter, 1928, *Anilara* (including *Anilara*, *Anthaxoschema*, *Notographus*), and *Melobasis*. Besides above mentioned groups Anthaxiinioid branch included formal tribes Trigonogeniini, Coomaniellini, Anthaxiini (comprising informal *Cylindrophora* generic group and subtribe Anthaxiina), and Xenorhipidini (*Xenorhipis* and *Trichinorhipis* generic groups). Relations of these taxa and those attributed to the second, Thomassetiinioid branch (*Neobubastes*, *Aristosoma*, *Philanthaxia*, *Kurosawaia* generic groups, Thomassetiini and Kisanthobiini) of Anthaxioid lineage are still unclear.

Bellamy (2003) combined the recent classification hypotheses altogether and content of Anthaxiinioid branch sensu Volkovitsh, 2001 became comprising 6 tribes as follows: Trigonogeniini, Coomaniellini, Curini, Melobasini, Anthaxiini, and Xenorhipidini.

Though the latest this classification requires further corrections and additional examination concerning the relations and taxonomical level of many taxa included. According to Bílý (2000) Coomaniellini is an independent tribe of Buprestinae what is currently supported by larval characters (Bílý & Volkovitsh, unpublished). The relations of Trigonogeniini whose larvae are still unknown remain unclear. Among other taxa Melobasini and Xenorhipidini seems quite natural while the taxonomical structure of Curini and Anthaxiini looks rather artificial. After splitting of *Cylindrophora* sensu lato by Holyński (1988) some taxa were attributed to Curini (*Ctenoderus* Germain, 1856, *Cylindrophora*, *Romanophora* Bílý, 2004) whereas *Bilyaxia* to Anthaxiini (Bílý 2000, 2004). Meantime, the larval characters of *Bilyaxia concinna* (Table 1) indicate that those are much closer to Curini than to Anthaxiini. The same is true for *Agriaxia* (Costa & al. 1988) though its antennal structures are similar to *Anthaxia*. Antennal characters of *Paracuris* Obenberger, 1923 and *Tetragonoschema* Thomson, 1857 (Volkovitsh 2001) are of the same type as in Australian taxa and *Cylindrophora* sensu lato, both antennal and larval morphology of *Brasilaxia* Théry, 1935 are unknown. The taxonomic position and relations of *Selagis* Dejean, 1836 (= *Curis* Gory & Laporte, 1838) and poorly known *Anthaxioides* Cobos, 1978 whose larvae are still unknown also remain an open question. Current state of knowledge of anthaxiine larvae partly support a hypothesis that Old World (and partly Nearctic) and Australo-Neotropical anthaxiine taxa belong to separate though closely related phyletic lineages (Volkovitsh 2001) but further investigations of still unknown genera are necessary to make final conclusions.

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