

**A study on the Nearctic species of the genus *Anthaxia*
(Coleoptera: Buprestidae: Buprestinae: Anthaxiini).
Subgenus *Melanthaxia*. Part I**

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Abstract. The first part of a taxonomic study on the Nearctic species of the subgenus *Melanthaxia* Richter, 1949 of the genus *Anthaxia* Eschscholtz, 1829 is provided. Eight species-groups are defined and keyed: *Anthaxia* (*M.*) *neofunerula* Obenberger, 1942 species-group, *A.* (*M.*) *nanula* Casey, 1884 species-group, *A.* (*M.*) *prasina* Horn, 1882 species-group, *A.* (*M.*) *leechi* Cobos, 1958 species-group, *A.* (*M.*) *oregonensis* Obenberger, 1942 species-group, *A.* (*M.*) *strigata* LeConte, 1859 species-group, *A.* (*M.*) *californica* Obenberger, 1914 species-group and *A.* (*M.*) *aeneogaster* Gory & Laporte, 1839 species-group. The diagnostic characters and representatives of the particular species-groups are illustrated.

Key words. Coleoptera, Buprestidae, Anthaxiini, *Anthaxia*, subgenus *Melanthaxia*, taxonomy, species-groups, key, Nearctic Region

Introduction

The Holarctic subgenus *Melanthaxia* Richter, 1949 (type species: *Melanthaxia godeti* Gory & Laporte, 1839, subsequent designation by RICHTER (1949)) is one of the best defined subgenera of the large genus *Anthaxia* Eschscholtz, 1829. The subgenus is well-characterised by the bionomy – as far as we know all species develop in conifers. There are about 60 species in the Palaearctic Region and about 30 species in the Nearctic Region (BÍLÝ 1997) but the number of species in North America is not definite; it is obvious after the revision of the type specimens of the Nearctic species that some are conspecific and most probably a few species are awaiting description.

The Palaearctic species are relatively better known and some species-groups have already been revised (e.g. BÍLÝ 1984a,b, 1986) but the taxonomic position of some North American

species is not still clear and in collections even the most common species are often mixed together. The distribution of the subgenus *Melanthaxia* in North America is concentrated predominantly in the western portion of the continent most probably due to the enormous diversity of conifers at this part of America and it is limited in the south by the United States – Mexican border; only a few species reach the northern part of Baja California and only two species reach the northeastern portion of the U.S.A.

Except for the original descriptions of single species, the Nearctic species of the genus *Anthaxia* were treated in several fundamental studies (HORN 1882; CASEY 1884; OBENBERGER 1917, 1928; COBOS 1958; BARR 1971; BRIGHT 1987) and catalogues (CHAMBERLIN 1926, BÍLÝ 1997, BELLAMY 2008, NELSON et al. 2008). Although some of these studies were rather critical and comprehensive (e.g. OBENBERGER 1917, 1928; COBOS 1958), the authors usually did not work with the type specimens of all species (in the case of OBENBERGER (1917, 1928) clearly without types) and some species have been interpreted by different authors in different ways. Any serious revision of such a difficult group is not possible without the study and comparison of all types due to the wide distribution of some species and due to their external similarity and variability.

All the above mentioned studies (except for the catalogues) contained keys in which the species were more or less grouped. The most important paper containing the division of the Nearctic species of *Melanthaxia* (but treated as *Anthaxia* s. str.) into the species-groups is that of COBOS (1958) who also constructed a somewhat problematic ‘phylogenetical tree’. He overestimated the importance of the presence/absence of the spines on male meso- and metatrochanters. This character, introduced for the first time by CASEY (1884), can be rather variable not only within one species-group but also in one species. In addition, the form of male genitalia may be rather variable within one species-group – they usually follow only a general pattern within the group. We have based our species-groups mainly on the pronotal and elytral sculpture, width of the vertex, the type of frontal pubescence and on the shape of male genitalia.

The present contribution is the first part of the large taxonomic study on the Nearctic species of the subgenus *Melanthaxia* which should be published group by group in the near future. All nomenclatorial and taxonomic problems will be treated in the following relevant parts.

Material and methods

The present study (and the following parts) is based on the extensive number (about 13,000) of specimens from the whole territory of Canada and the U.S.A. which have been sent for study from numerous institutional and private collections in the course of the last 15 years; the particular collections will be mentioned in the revisions of the species-groups.

Since some species of the defined species-groups are habitually very similar, all male type specimens and a great number of the studied males had to be dissected and the genitalia had to be extracted. Usually they were only half-pulled from an abdomen but in some cases they had to be extracted completely and preserved on separate labels.

An Olympus SZX 12 microscope with a fixed camera was used to capture the colour images and a MBS-10 stereoscopic microscope for drawings. The specimens used for the colour images are deposited in the National Museum, Prague (NMPC) if not mentioned otherwise.

A key to the species-groups of Nearctic *Anthaxia* (*Melanthaxia*)

- 1 (6) Vertex wide, 2.0–2.8 times as wide as width of eye (Figs. 23–25); elytra asetose or with short, recumbent pubescence. 2
- 2 (3) Frons with very short, recumbent white pubescence (Fig. 23); elytra asetose; elytral sculpture consisting of fine, longitudinal rugae on very finely microsculptured background; frons flat; pronotal sculpture without central grains (Fig. 23); male meso- and metatrochanters without spine on posterior margin. Habitus as in Fig. 15.
..... **A. (M.) neofunerula** Obenberger, 1942 species-group
- 3 (2) Frons with distinct, erect, white, brown or black pubescence; elytra asetose or with more or less distinct semi-erect pubescence; elytral sculpture consisting of fine, regular granulation or elytra finely punctate, punctures often forming indistinct, longitudinal rows along suture; frons convex, flat, finely grooved or weakly concave medially (Figs. 24–25); male meso- and metatrochanters unarmed or with small spine on posterior margin (Figs. 12–13). 4
- 4 (5) Frons weakly concave or flat and depressed medially (Fig. 24), rarely flat with shallow, oval depression; pronotal sculpture consisting of polygonal cells which are sometimes more elongate at lateral sides of pronotum forming short, nearly longitudinal rugae; pronotal reticulation with small, sharp or wide, flat central grains (Fig. 24); usually smaller, subparallel, dark bronze species. Habitus as in Fig. 16.
..... **A. (M.) nanula** Casey, 1884 species-group
- 5 (4) Frons convex, rarely flat (Fig. 25); pronotal sculpture nearly homogenous, consisting of polygonal cells with or without indistinct central grains; male meso- and metatrochanters unarmed or with small spine (Fig. 13); usually larger, stouter, less lustrous species; entire body bronze, blue or blue-green, rarely dark bronze, matt with silky lustre. Habitus as in Fig. 17. **A. (M.) prasina** Horn, 1882 species-group
- 6 (1) Vertex narrow, 1.2–1.8 times as wide as width of eye (Figs. 26–30); elytra always with distinct pubescence. 7
- 7 (8) Frons concave; vertex 1.8 times as wide as width of eye (Fig. 26); aedeagus very long and slender except for basal third of parameres which is conspicuously enlarged (Fig. 4); pubescence of head white; pronotal sculpture homogenous, consisting of large, regular, polygonal cells without distinct central grains (Fig. 26); male meso- and metatrochanters unarmed. Habitus as in Fig. 18.
..... **A. (M.) leechi** Cobos, 1958 species-group
- 8 (7) Frons convex or flat, sometimes with fine median depression (Figs. 27–30); aedeagus slender, subparallel or spindle-shaped (Figs. 5–8); pubescence of head black, brown, rarely white, very often mixed: anterior portion of frons with white pubescence, upper portion of frons and vertex with brown or black pubescence; pronotal sculpture otherwise; male meso- and metatrochanters simple or with short spine. 9
- 9(10) Body more elongate, subparallel; elytra 1.9–2.0 times as long as wide; pubescence of head white; frons flat; pronotal sculpture homogenous, consisting of large polygonal cells without distinct central grains (Fig. 27); male metatibiae modified (Fig. 9); black species. Habitus as in Fig. 19.
..... **A. (M.) oregonensis** Obenberger, 1942 species-group

- 10 (9) Body more stout; elytra 1.7–1.8 times as long as wide; pubescence of head black, brown, rarely white, often mixed; pronotal sculpture otherwise; frons flat or convex, rarely with fine median depression; male metatibiae simple or with fine, inner, preapical serration (Fig. 10); usually dark bronze species, often with metallic underside. 11
- 11 (12) Cells on lateral sides of pronotum forming longitudinal rows, their borders form fine, longitudinal carinae or rugae (Fig. 28); male meso- and metatrochanters always with sharp, long spine (Fig. 14). Habitus as in Fig. 20.
..... *A. (M.) strigata* LeConte, 1859 species-group
- 12 (11) Pronotal sculpture more or less homogenous, consisting of nearly regular, polygonal cells with or without central grains (Fig. 29); cells on lateral sides of pronotum sometimes somewhat more elongate but not forming longitudinal rows or carinae (Fig. 30); male meso- and metatrochanters with sharp spine or only with small, weakly developed spine. 13
- 13 (14) Elytra subparallel, widely rounded at apical fourth, roughly, regularly granulate; posterior third of elytral margins finely serrate or elytra narrowly rounded at apical third with roughly and sharply serrate margins; pronotal reticulation rough, completely homogenous (Fig. 29); convex species; male meso- and metatrochanters with long, sharp spine. Habitus as in Fig. 21.
..... *A. (M.) californica* Obenberger, 1914 species-group
- 14 (13) Elytra less parallel, narrowly rounded at apical third; elytral sculpture finer, elytra densely punctate, punctures often forming indistinct, longitudinal rows along suture; posterior third of elytral margins smooth or with very fine serration; pronotal reticulation much finer, prescutellar portion of pronotum with tree-like sculpture (Fig. 30); flattened species; male meso- and metatrochanters unarmed or with very small spine (Fig. 12). Habitus as in Fig. 22.
..... *A. (M.) aeneogaster* Gory & Laporte, 1839 species-group

Definitions of the species-groups of Nearctic *Anthaxia* (*Melanthaxia*)

Anthaxia (*Melanthaxia*) *neofunerula* Obenberger, 1942 species-group

(Figs. 1, 15, 23)

Diagnosis. Medium-sized (4.3 mm), black, matt, convex species (Fig. 15); frons with very short, poorly visible, recumbent pubescence; elytra asetose; elytral sculpture consisting of fine, longitudinal rugae on very finely microsculptured background; frons flat; vertex about twice as wide as width of eye; pronotal sculpture homogenous, consisting of fine, regular polygonal cells without distinct central grains; pronotum at midlength usually with four more or less distinct, rounded foveae; apical third of elytral margins and anal ventrite without lateral serration; male meso- and metatrochanters without spines; male meso- and metatibiae with nearly indistinct, inner, preapical serration; aedeagus short, spindle-shaped (Fig. 1).

Representatives of this species-group resemble some species of the *A. (M.) quadripunctata* (Linnaeus, 1758) species-group from the Palearctic region differing from them by the finer,

more homogenous pronotal sculpture and by the shorter aedeagus with apically narrowed median lobe (Fig. 1).

Species included. *Anthaxia (M.) neofunerula* Obenberger, 1942.

Anthaxia (Melanthaxia) nanula Casey, 1884 species-group

(Figs. 2, 16, 24)

Diagnosis. Small to medium-sized (2.8–4.2 mm), rather flat, usually lustrous, dark bronze species; frons concave, flat or flat with median depression, always with distinct erect or semi-erect black or brown pubescence; vertex 2.0–2.8 times as wide as width of eye; elytra 1.8–2.0 times as long as wide with distinct recumbent or semi-recumbent dark pubescence; elytral sculpture consisting of fine, more or less regular granulation; pronotal sculpture nearly homogenous, consisting of polygonal cells which are exceptionally more elongate at lateral sides of pronotum forming short, nearly longitudinal rugae (*A. (M.) exasperans*); pronotal reticulation with small, sharp or wide, flat central grains; posterior third of lateral elytral margins and lateral margins of anal ventrite only very finely serrate; male meso- and metatrochanters with small, short spine on posterior margin or unarmed; male meso- and metatibiae simple or with very fine, indistinct, inner preapical serration; aedeagus more elongate, usually nearly parallel-sided, sometimes parameres slightly widened at basal half (Fig. 2).

Species included. *Anthaxia (M.) cupriola* Barr, 1971, *A. (M.) embrikstrandella* Obenberger, 1936, *A. (M.) exasperans* Cobos, 1958, *A. (M.) helferiana* Bílý, 1995, *A. (M.) nanula* Casey, 1884, *A. (M.) porella* Barr, 1974, *A. (M.) simiola* Casey, 1884, *A. (M.) tarsalis* Barr, 1971, *A. (M.) wallowae* Obenberger, 1942.

Anthaxia (Melanthaxia) prasina Horn, 1882 species-group

(Figs. 3, 13, 17, 25)

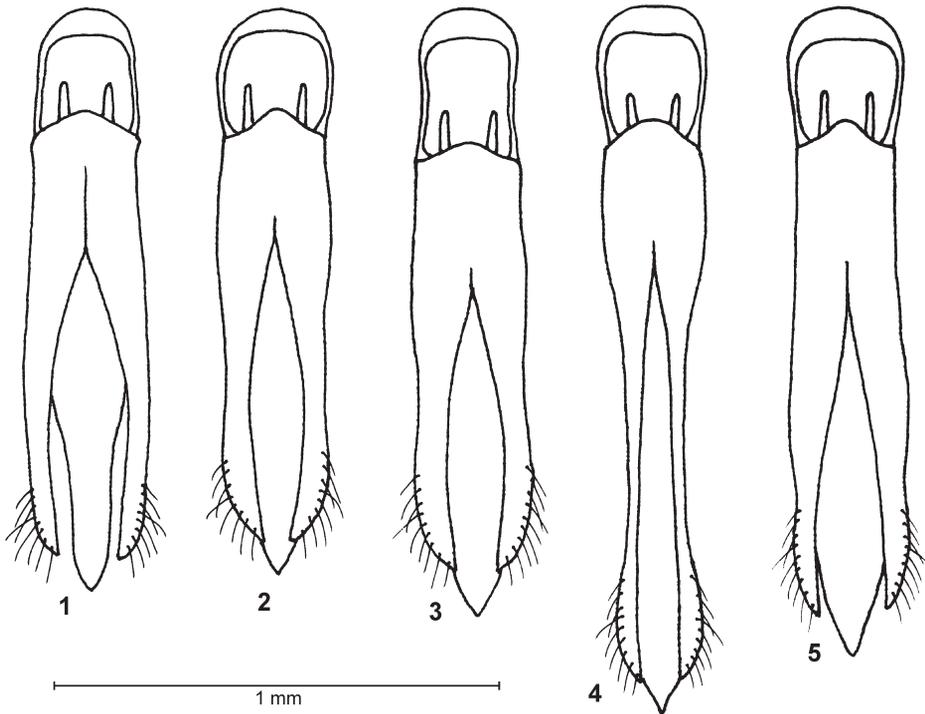
Diagnosis. Medium-sized (3.6–6.1 mm), convex, stout, matt species with silky lustre; dorsal surface bronze, blue, blue-green, rarely dark bronze; frons convex, rarely flat, always with dark, erect pubescence; vertex about twice as wide as width of eye; pronotal sculpture nearly homogenous, consisting of polygonal cells without or with poorly developed central grains; elytra 1.6–1.8 times as long as wide; elytral sculpture consisting of sparse, simple punctures; elytral pubescence well-developed or elytra mostly asetose except for very short, indistinct pubescence at apical third; male meso- and metatrochanters unarmed or with very small spine (Fig. 13); male meso- and metatibiae with fine, inner preapical serration; posterior third of lateral elytral margins and lateral margins of anal ventrite very finely serrate; aedeagus moderately long, parameres usually weakly widened at basal half or nearly subparallel (Fig. 3).

Species included. *Anthaxia (M.) aenescens* Casey, 1884, *A. (M.) prasina* Horn, 1882, *A. (M.) subprasina* Cobos, 1958.

Anthaxia (Melanthaxia) leechi Cobos, 1958 species-group

(Figs. 4, 18, 26)

Diagnosis. Medium-sized (4.1–5.6 mm), posteriorly slightly acuminate, somewhat flattened, dark bronze, lustrous species; frons concave with short, erect, white pubescence; vertex



Figs. 1–5. Male genitalia. 1 – *Anthaxia* (*Melanthaxia*) *neofunerula* Obenberger, 1942, holotype, New Hampshire, Charlestown (NMPC); 2 – *A. (M.) nanula* Casey, 1884, California, Palomar Mts (NMPC); 3 – *A. (M.) prasina* Horn, 1882, California, Shingletown (); 4 – *A. (M.) leechi* Cobos, 1958, holotype, California, Riverside (California Academy of Sciences, San Francisco); 5 – *A. (M.) oregonensis* Obenberger, 1942, syntype, Oregon, Aspen Lake (NMPC).

1.8 times as wide as width of eye; pronotal sculpture homogenous, consisting of large, regular, polygonal, cells without distinct central grains; elytra slightly wedge-shaped, 1.8 times as long as wide with distinct semi-recumbent pubescence; elytral sculpture finely granulate; lateral elytral margins without apical serration; male meso- and metatrochanters unarmed; male meso- and metatibiae widely, shallowly emarginate at apical half of inner margins, without distinct serration; aedeagus very long, slender, parameres widened at basal fourth (Fig. 4).

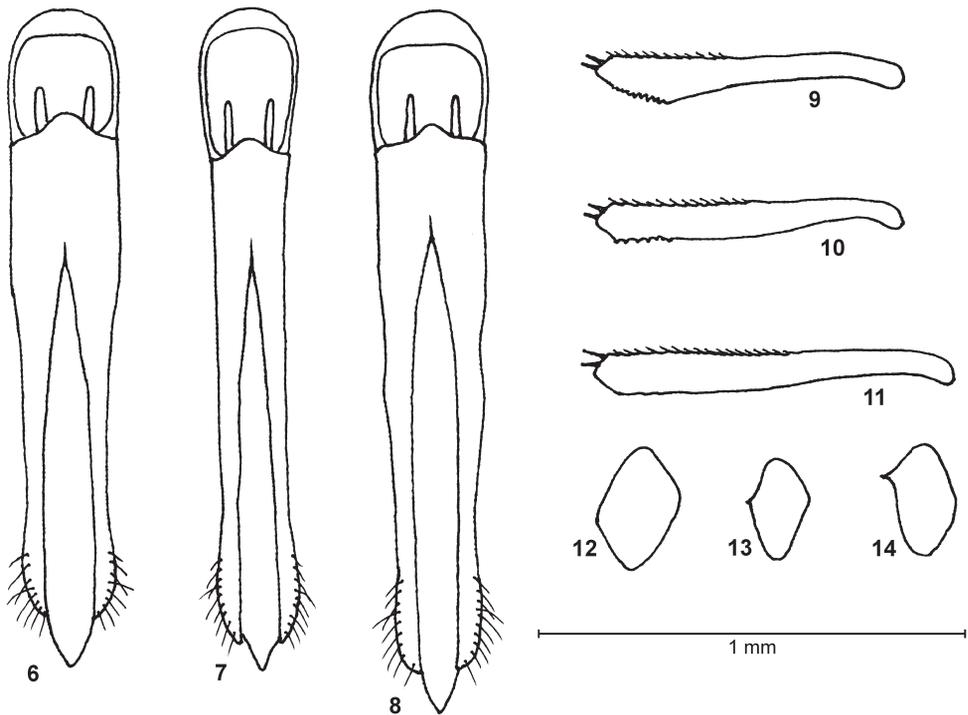
One of the best defined species-groups due to the strange form of the male genitalia (Fig. 4), concave frons with white pubescence and slightly wedge-shaped elytra.

Species included. *Anthaxia* (*M.*) *leechi* Cobos, 1958.

Anthaxia (*Melanthaxia*) *oregonensis* Obenberger, 1942 species-group

(Figs. 5, 9, 19, 27)

Diagnosis. Small (3.7–4.8 mm), subparallel, rather lustrous, flat, black species; frons flat, slightly widely grooved at anterior half with short, white pubescence; vertex 1.8 times as



Figs. 6–14. 6–8 – Male genitalia: 6 – *Anthaxia (Melanthaxia) strigata* LeConte, 1859, California, Mt. Diablo (NMPC); 7 – *A. (M.) californica* Obenberger, 1914, California, San Diego (NMPC); 8 – *A. (M.) aeneogaster* Gory & Laporte, 1839, syntype, California (Museum national d’Histoire naturelle, Paris). 9–11 – male left metatibiae: 9 – *A. (M.) oregonensis* Obenberger, 1942, syntype, Oregon, Aspen Lake (NMPC); 10 – *A. (M.) strigata*, California, Mt. Diablo (NMPC); 11 – *A. (M.) aeneogaster*, syntype, California (Museum national d’Histoire naturelle, Paris). 12–14 – male metatrochanters: 12 – *A. (M.) aeneogaster*, syntype, California (Museum national d’Histoire naturelle, Paris); 13 – *A. (M.) prasina* Horn, 1882, California, Shingletown (NMPC); 14 – *A. (M.) strigata*, California, Mt. Diablo (NMPC).

wide as width of eye; pronotum twice as wide as long with wide, shallow lateroposterior depressions; pronotal sculpture homogenous, consisting of large polygonal cells without central grains; elytra twice as long as wide, regularly granulate with distinct, recumbent, dark pubescence; posterior third of elytral margins and lateral margins of anal ventrite without distinct serration; male meso- and metatrochanters with sharp spine on posterior margin; male mesotibiae with several sharp, apical teeth on inner margin, male metatibiae flattened and widened at apical fourth with several small, sharp preapical teeth (Fig. 9); aedeagus rather robust, nearly subparallel (Fig. 5). This group is further well-defined due to the white frontal pubescence, flat pronotum with wide lateroposterior depressions and the quite characteristic form of male meso- and metatibiae.

Species included. *Anthaxia (M.) hurdi* Cobos, 1958, *A. (M.) oregonensis* Obenberger, 1942.

***Anthaxia* (*Melanthaxia*) *strigata* LeConte, 1859 species-group**

(Figs. 6, 10, 14, 20, 28)

Diagnosis. Medium-sized (3.8–6.5 mm), dark bronze, flattened species; frons flat, slightly grooved medially; vertex 1.2–1.4 times as wide as width of eye; pubescence of head combined: anterior portion of frons with white, posterior portion and vertex with brown or black pubescence; pronotum 1.7–1.8 times as wide as long, regularly convex with nearly indistinct lateroposterior depressions; pronotal sculpture consisting of rather rough polygonal cells with well-developed central grains; cells on lateral sides of pronotum longitudinally more elongate forming typical, longitudinal rugae or fine carinae (Fig. 28); elytra 1.7–1.8 times as long as wide, with fine, dense and nearly regular punctation; apical third of elytral margins finely but distinctly serrate; elytral pubescence short, brown to black, semi-erect; ventral surface lustrous, metallic green-bronze or blue-green with sparse but rather long, recumbent white pubescence; anal ventrite with fine, sharp lateral serration, male meso- and metatrochanters with long, sharp spine on posterior margin (Fig. 14); male meso- and metatibiae with fine, sharp, inner preapical serration (Fig. 10); aedeagus rather long and robust, parameres somewhat narrowed at posterior half (Fig. 6).

Species of this group resemble in habitus those of the *A. (M.) aeneogaster* species-group but they differ by the characteristically more elongate pronotal sculpture with large, well-developed central grains, sharp, long spines on the male meso- and metatrochanters, well-developed lateral serration of elytral apex and anal ventrite and by the metallic colouration of ventral surface.

Species included. *Anthaxia (M.) strigata* LeConte, 1859, *A. (M.) hatchi* Barr, 1971, *A. (M.) barri* Bílý, 1995.

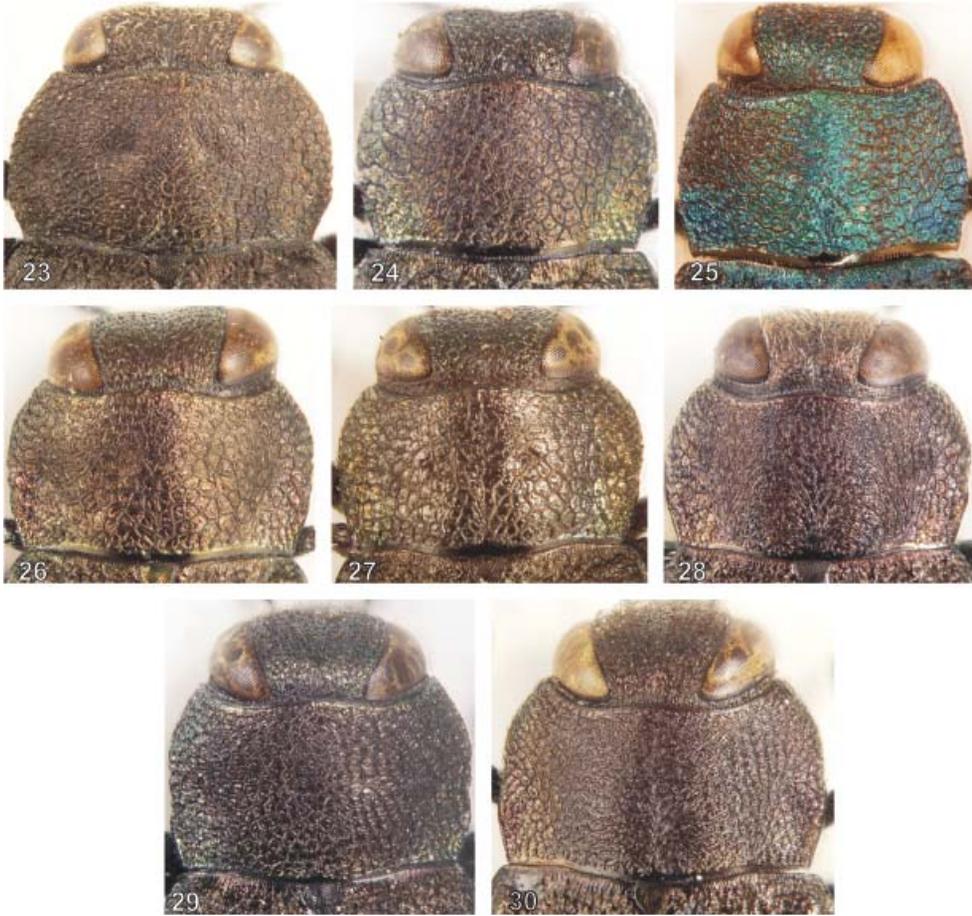
***Anthaxia* (*Melanthaxia*) *californica* Obenberger, 1914 species-group**

(Figs. 7, 21, 29)

Diagnosis. Medium-sized (4.1–5.9 mm), convex, rather roughly sculptured, subparallel, black species; frons convex; vertex 1.5–1.6 times as wide as width of eye; frontal pubescence semi-erect, rather long, white, distinctly obliquely directed toward respective side from longitudinal median line, that of vertex short, brown; pronotum nearly regularly convex, 1.8–1.9 times as wide as long with very poorly developed laterobasal depressions; pronotal sculpture consisting of small, dense, sharply limited cells with well-developed central grains which are poorly distinct on prescutellar portion of pronotum (Fig. 29); cells on lateral sides of pronotum exceptionally somewhat more elongate but not forming longitudinal lines or keels; elytra subparallel, 1.8–2.1 times as long as wide, regularly granulate with short, rather dense, semi-erect brown pubescence; apical third of elytral margins with fine or rather sharp

Figs. 15–22. Habitus of males. 15 – *Anthaxia (Melanthaxia) neofunerula* Obenberger, 1942, 4.0 mm, holotype, New Hampshire, Charlestown; 16 – *A. (M.) nanula* Casey, 1884, 3.8 mm, California, Palomar Mts.; 17 – *A. (M.) prasina* Horn, 1882, 4.0 mm, California, Shingletown; 18 – *A. (M.) leechi* Cobos, 1958, 4.1 mm, California, nr. Hemet; 19 – *A. (M.) oregonensis* Obenberger, 4.0 mm, California, Riverside; 20 – *A. (M.) strigata* LeConte, 1859, 5.0 mm, California, E of Stockton; 21 – *A. (M.) californica* Obenberger, 1914, 4.4 mm, California, Palomar Mts.; 22 – *A. (M.) aeneogaster* Gory & Laporte, 1839, 5.5 mm, California, Mukelumne River.





Figs. 23–30. Pronotal sculpture. 23 – *Anthaxia* (*Melanthaxia*) *neofunerula* Obenberger, 1942, holotype, New Hampshire, Charlestown; 24 – *A. (M.) nanula* Casey, 1884, California, Palomar Mts.; 25 – *A. (M.) prasina* Horn, 1882, California, Shingletown; 26 – *A. (M.) leechi* Cobos, 1958, California, near Hemet; 27 – *A. (M.) oregonensis* Obenberger, 1942, California, Riverside; 28 – *A. (M.) strigata* LeConte, 1859, California, E of Stockton; 29 – *A. (M.) californica* Obenberger, 1914, California, Palomar Mts.; 30 – *A. (M.) aeneogaster* Gory & Laporte, 1839, California, Mukelumne River.

serration; ventral surface lustrous, bronze with brass tinge with rather long, white pubescence; anal ventrite with fine or rather rough lateral serration; male meso- and metatrochanters with small but sharp spine on posterior margin; male meso- and metatibiae with very fine, inner preapical serration; aedeagus subparallel, rather long or very long and slender, median lobe pointed apically (Fig. 7).

This species-group is well-defined by the convex frons, not very long but rather dense, rigid dorsal pubescence, rough pronotal and elytral sculpture, short, sharp spine on male trochanters, distinctly serrate apex of elytral margins and by the long, slender male genitalia (Fig. 7).

Species included. *Anthaxia (M.) californica* Obenberger, 1914, *A. (M.) serripennis* Obenberger, 1936.

***Anthaxia (Melanthaxia) aeneogaster* Gory & Laporte, 1839 species-group**

(Figs. 8, 11–12, 22, 30)

Diagnosis. Medium-sized to rather large (4.1–6.6 mm), dark bronze to black, moderately convex, subparallel species; frons flat or weakly convex; vertex 1.3–1.6 times as wide as width of eye; pubescence of head brown to black, erect, rather long; pronotal and elytral pubescence short to very short, brown or black, recumbent; pronotum 1.7–2.0 times as wide as long usually with shallow but distinct laterobasal depressions, sometimes also with weak median, longitudinal depression or four more or less distinct, round foveae at midlength; pronotal sculpture homogenous, consisting of small, nearly regular, polygonal cells with or without central grains which are sometimes very flat merging with basal microsculpture of cells (Fig. 30); elytra subparallel, regularly convex; elytral sculpture consisting of small, dense, simple punctures; apical portion of lateral margins without distinct or only with very indistinct serration; ventral surface lustrous, black or bronze with rather long, recumbent white pubescence; anal ventrite with very fine lateral serration or smooth; male meso- and metatrochanters unarmed or with very small teeth on posterior margin (Fig. 12); male meso- and metatibiae with fine, inner preapical serration or unarmed; aedeagus moderately long, usually parallel-sided, median lobe sharply pointed apically (Fig. 8).

This is the most problematic species-group which needs the most thorough taxonomic revision; some of the included species are most probably conspecific.

Species included. *Anthaxia (M.) aeneogaster* Gory & Laporte, 1839, *A. (M.) furnissi* Barr, 1971, *A. (M.) inornata* (Randall, 1838), *A. (M.) nevadensis* Obenberger, 1928, *A. (M.) retifer* LeConte, 1860, *A. (M.) sculpturata* Barr, 1971.

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