



SCREENING AID FOR THE BUPRESTIDAE OF THE WESTERN U.S.A.

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Contributions and Acknowledgements

James LaBonte, ODA (Oregon Department of Agriculture: Design and compilation of the screening aid.

Steve Valley, ODA: Acquisition of the images.

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Joshua Vlach, ODA. Specimen preparation, review of screening aid.

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USDA Forest Service for funding of this project and USDA APHIS for the acquisition of the imaging system.

Introduction

This screening aid is not a comprehensive treatment of western North American Buprestidae (flat-headed or metallic wood borers). It is designed to enable efficient sorting and identification of the most abundant species found in wood boring insect trap samples from surveys conducted by the ODA and the USDA FS in the Pacific Northwest and the West over the past ten years. Several exotic pest species are also included. *This aid will be most reliable in the conifer forest regions west of the Rocky Mountains. It may not function well with species found in the desert West and east of the Rockies.

This screening aid is designed to be used by individuals with a wide range of taxonomic expertise. Images of all character states are provided. **It is not intended to operate completely independently of support by a taxonomist but instead in the context of a presented workshop.

Use of This Screening Aid: I

The screening aid functions much like the traditional dichotomous key, with couplets. However, extensive use of PowerPoint navigational features, such as buttons linking non-sequential couplets and enabling return to the originating couplet, have been utilized (see “Navigation” slide at beginning of key).

If there are more images than can fit on a single slide, the multiple slides for the couplet are indicated by “Part I”, “Part II”, etc., following the couplet number at the top of the slide.

Taxonomic jargon has been kept to a minimum. Most terms and character states are explained via the images and associated labels. The first several slides following the introduction illustrate the basic body parts of buprestids and the terms applied

Use of This Screening Aid: II

to them. A single slide explaining a few technical terms follows those. An index slide with images of all the screening aid species follows these introductory slides. The navigation slide is next, followed by the screening aid key. Couplets dealing with exotic species have text in white.

THIS IS VERY IMPORTANT!

This aid is designed so that specimens not keying to screening targets will end at a couplet half with “FTT”, which stands for “Forward To Taxonomist”. These specimens are NOT unimportant nor should they be discarded - quite the opposite! Any specimen that does not appear to be a screening target should be forwarded to a cooperating taxonomist for further identification.



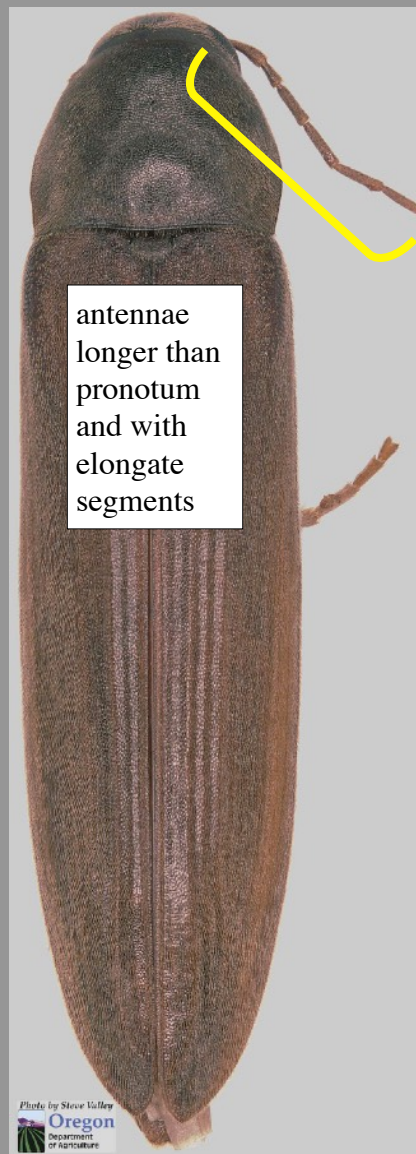
Features of Non-Buprestids



Elateridae



Eucnemidae



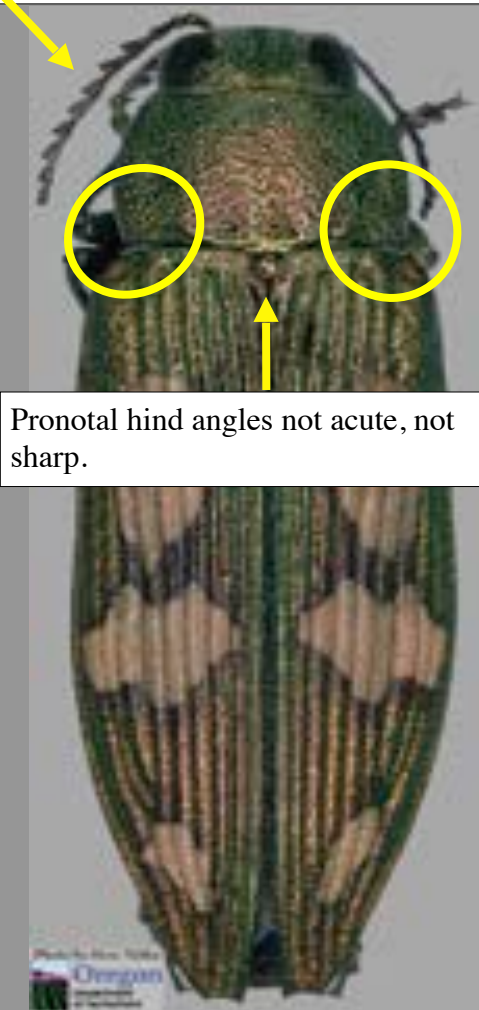
Melandryidae



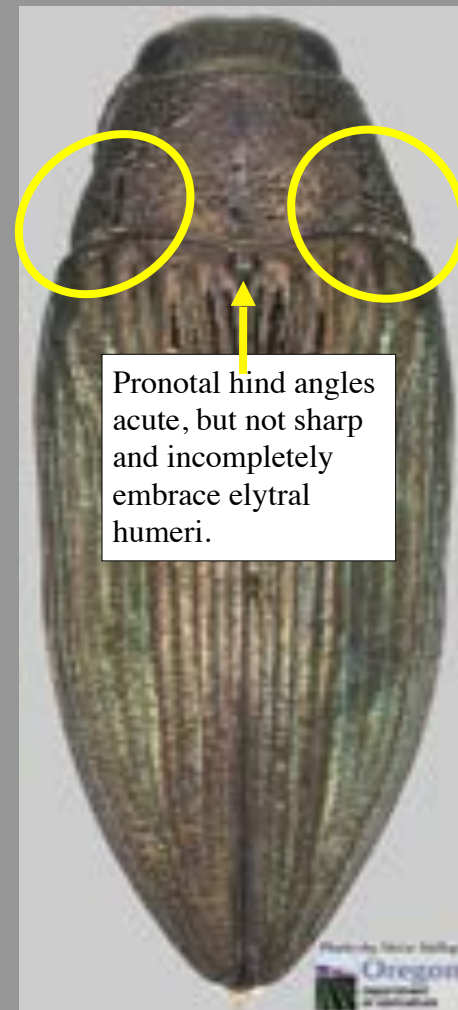
Throscidae

Features of Typical Buprestids

Antennae do not extend beyond posterior margin of the pronotum.
Antennae composed of short segments.

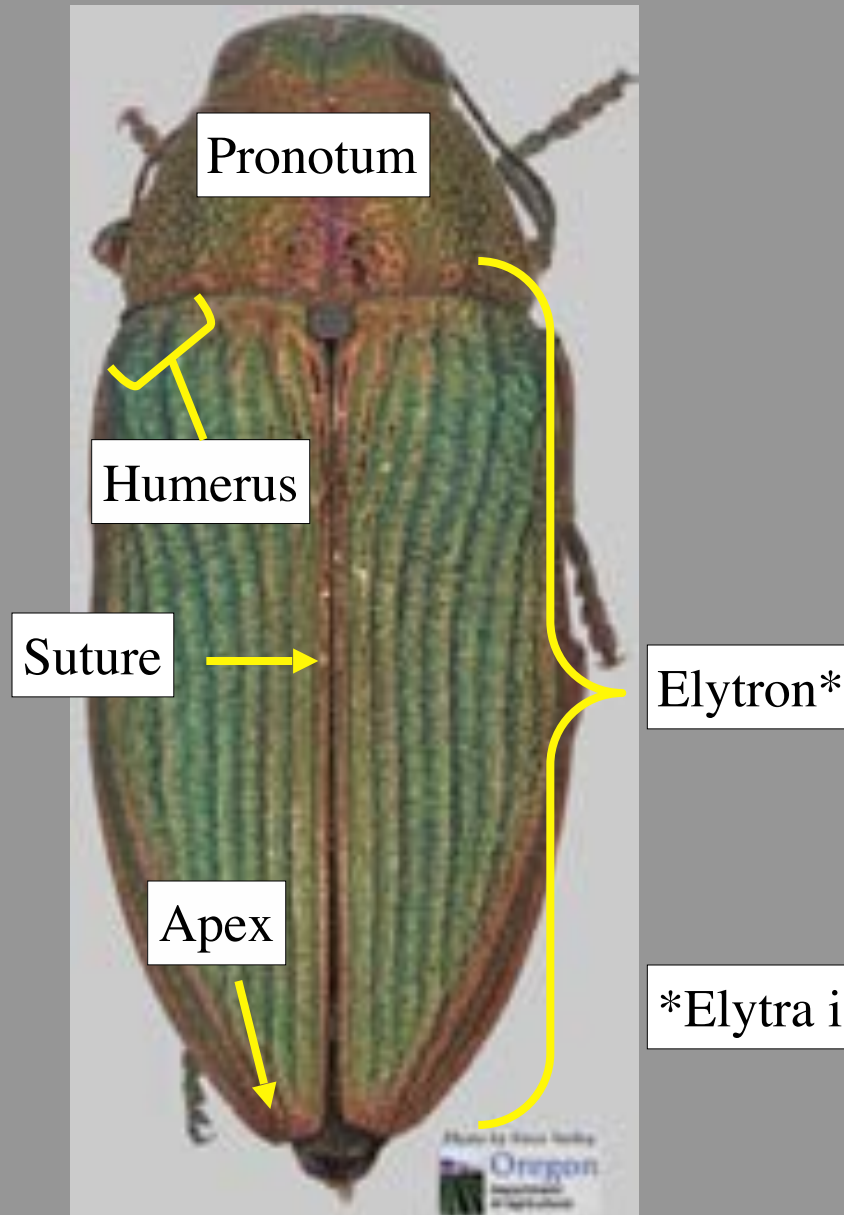


Pronotal hind angles not acute, not sharp.



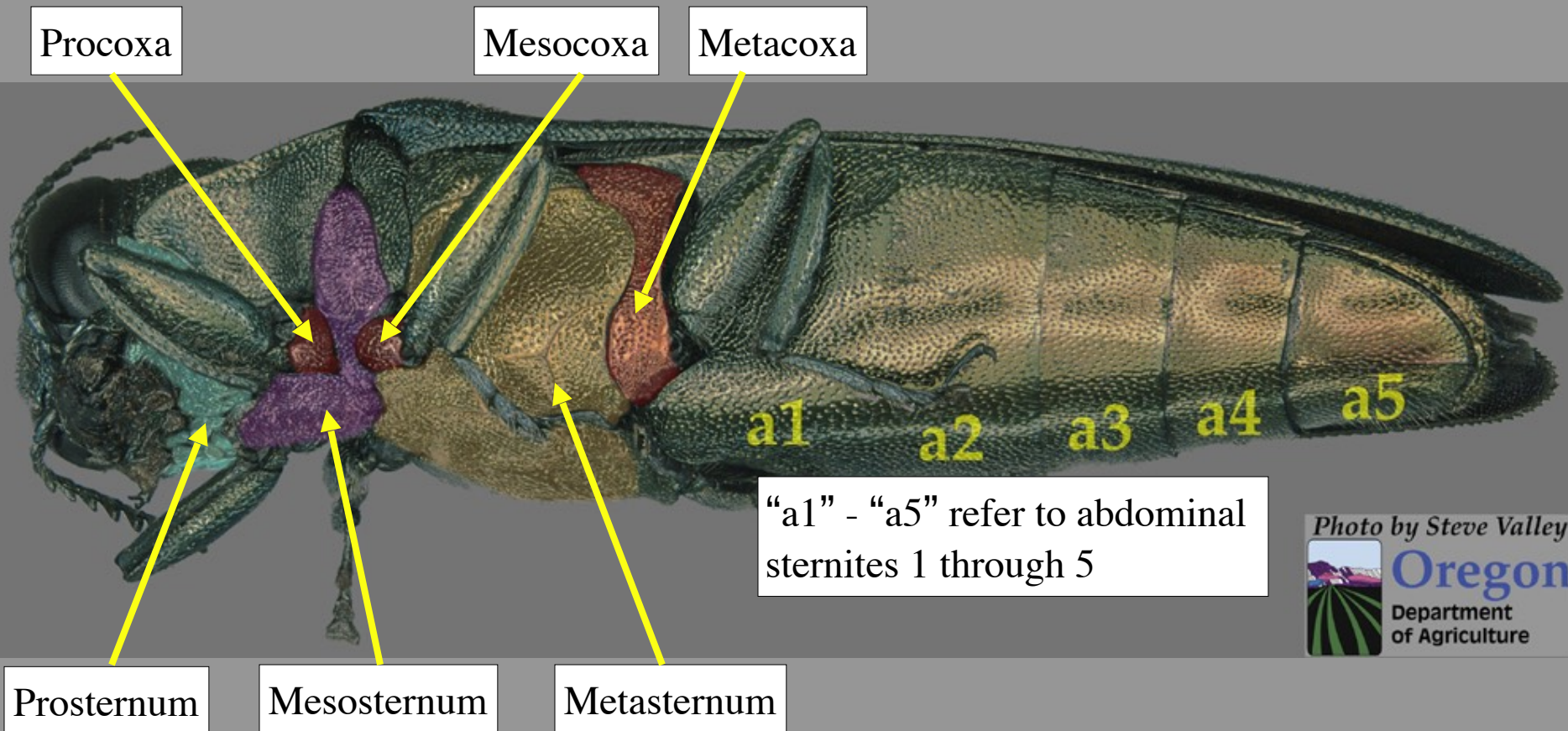
Pronotal hind angles acute, but not sharp and incompletely embrace elytral humeri.

BASIC BODY PARTS OF BUPRESTIDS: I

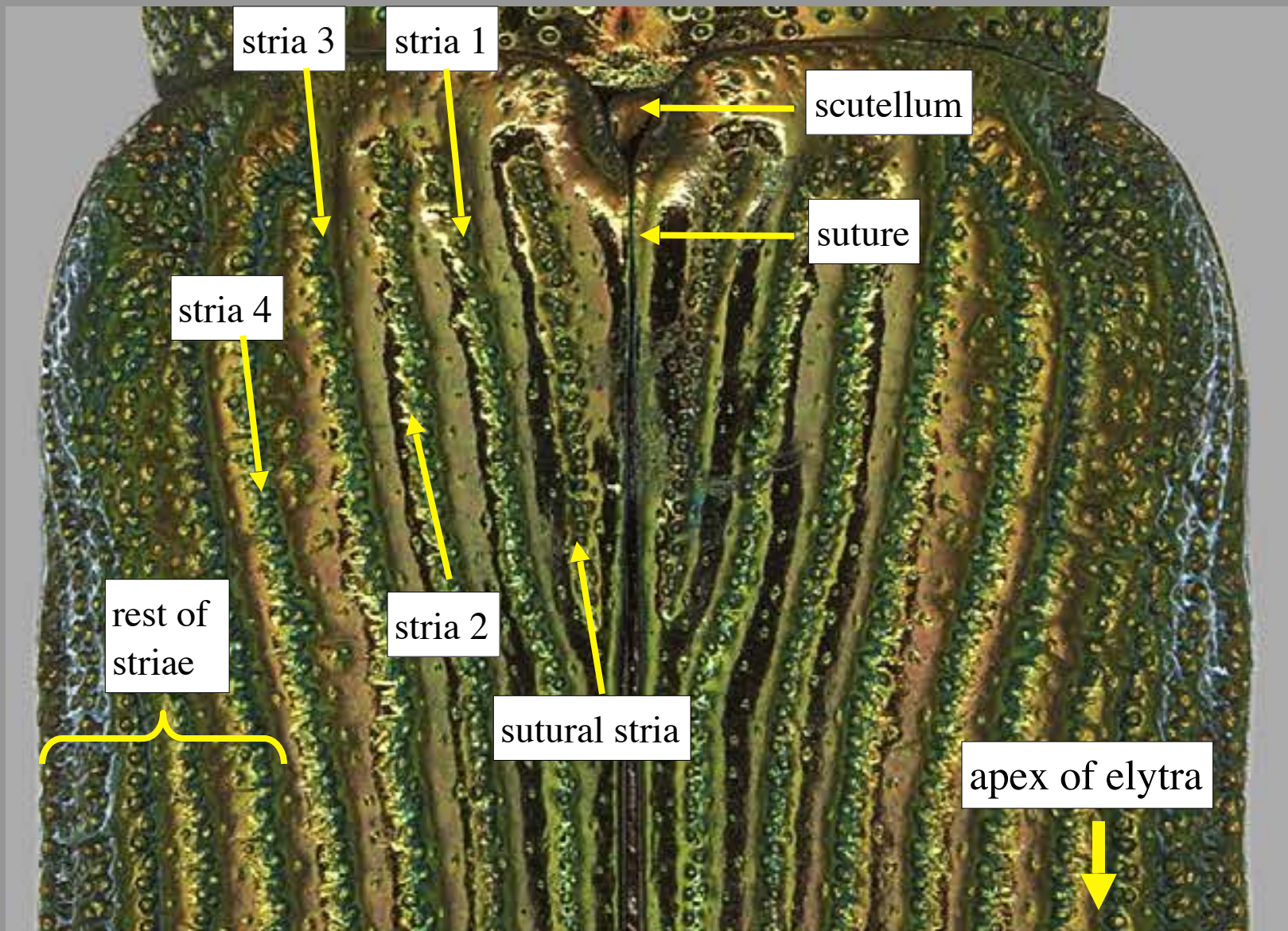


*Elytra is the plural of elytron

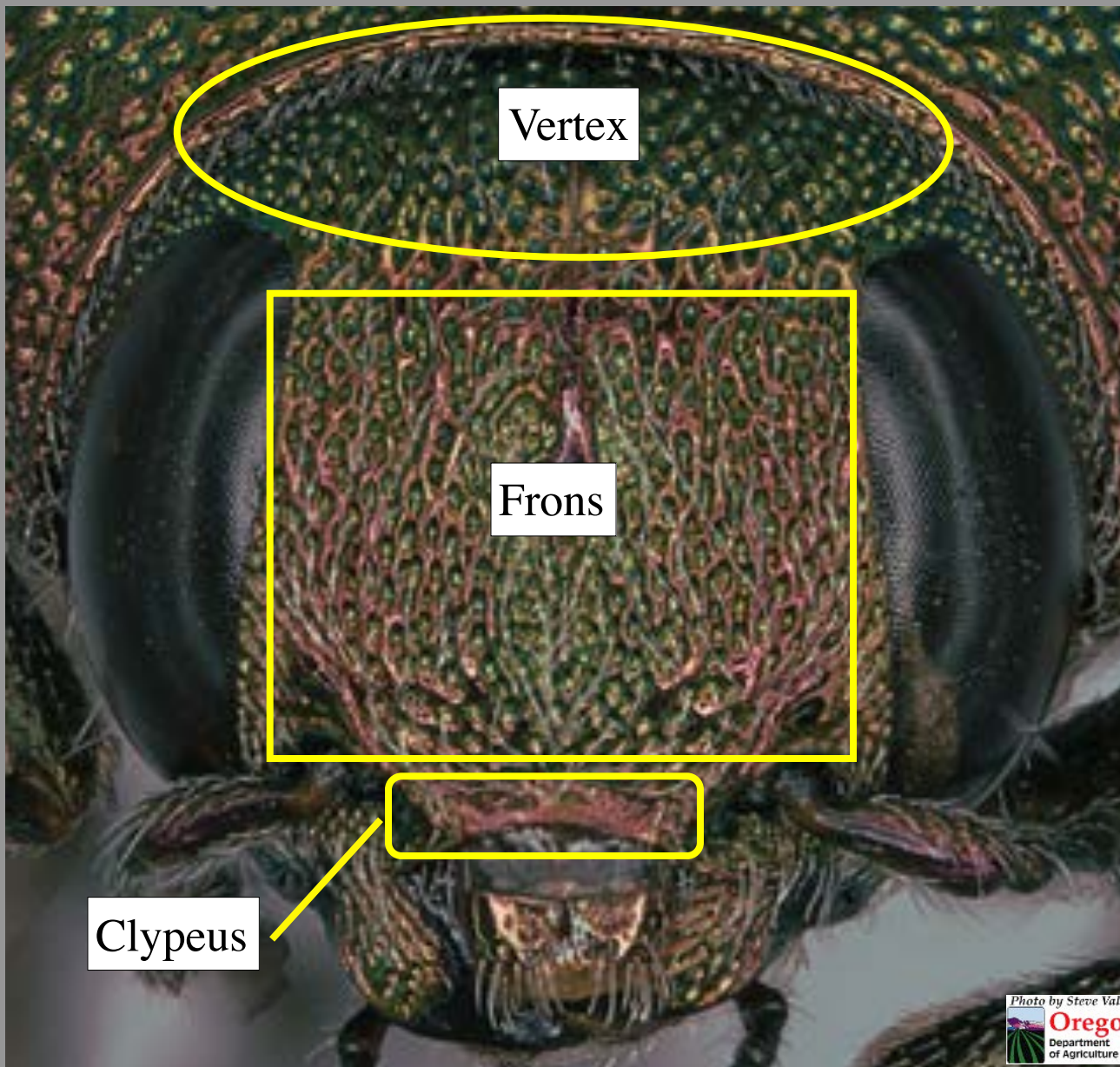
BASIC BODY PARTS OF BUPRESTIDS: II



BASIC BODY PARTS OF BUPRESTIDS: III



BASIC BODY PARTS OF BUPRESTIDS: IV

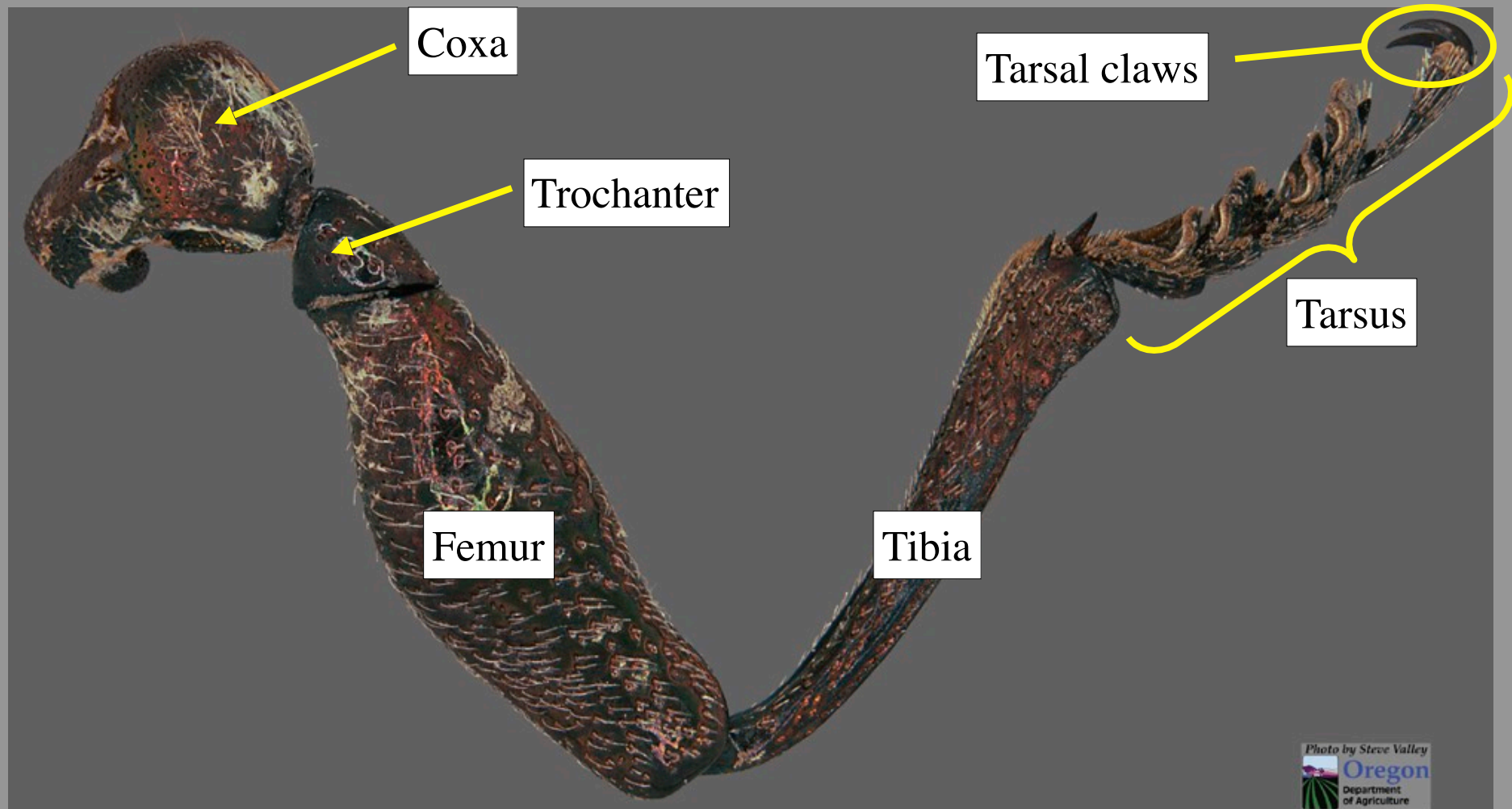


Vertex

Frons

Clypeus

BASIC BODY PARTS OF BUPRESTIDS: V



A Few Technical Terms

Acuminate: strongly and abruptly tapered to a narrow apex

Arcuate: arched

Carina: an elevated ridge (plural is “Carinae”)

Elytral: of or on an elytron or the elytra

Pubescence: short, fine, closely set hair-like structures

Pubescent: covered with pubescence

Punctate: with punctures

Rugae: ridges or wrinkles

Rugose-punctate: with ridges and punctures

Serrate: with notched edges like the teeth of a saw

Seta: relatively long, stiff hair-like structures (plural is “Setae”)

Setose: covered with setae

Sinuate: referring to a structure or the margin of a structure
is winding or wavy

Strigae: fine, impressed lines or streaks. “Strigate” = with strigae.

Transverse: running across the longitudinal axis at right angles

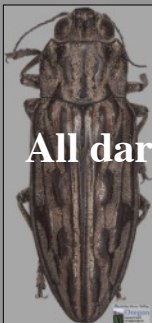
Truncate: squared off

Venter: underside. “Ventral” = on venter.



Beginning

Index Page: select image of desired species



All dark species



Chalcophora angulicollis *Melanophila acuminata*



"Spotted" species



Phaenops drummondi *Melanophila consputa*



"Black" *Anthaxia* spp.



Buprestis laeviventris



Buprestis langi



Chrysobothris spp.



Xenomelanophila miranda



Agrilus biguttatus 🙄

Targets

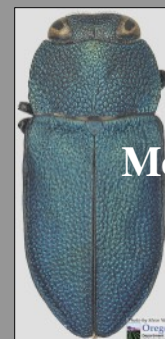


Agrilus



Agrilus

auroguttatus 🙄 *planipennis* 🙄



Metallic species



"Metallic" *Anthaxia* spp.



Phaenops gentilis



Chrysobothris viridicyanea



Buprestis langi



Buprestis subornata



Buprestis lyrata



Buprestis adjuncta



Buprestis aurulenta



Elytra with conspicuous pale markings (a-f).....2



1a-f. Elytra with conspicuous pale markings.

Elytra without conspicuous pale markings (g-k).....12



1g-h. Elytra without conspicuous pale markings.

Inconspicuous
pale
markings

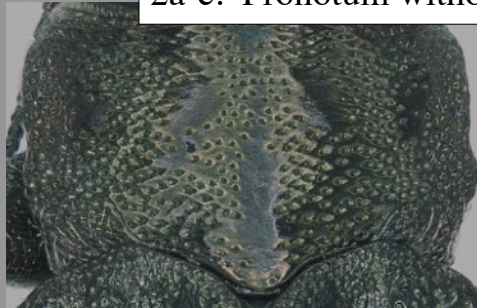


2 (1)

Pronotum without coating of long setae (a-e).....3



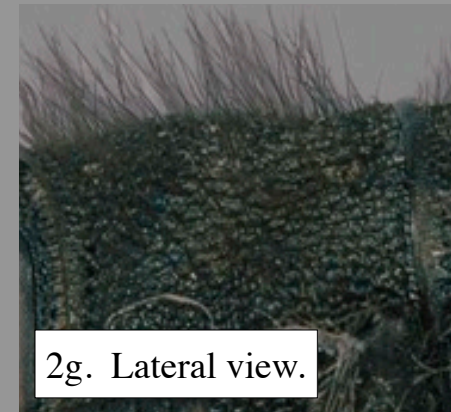
2a-e. Pronotum without coating of long setae.



Pronotum with coating of long setae (f, g).....FTT



2f. Dorsal view of pronotum with long setae.

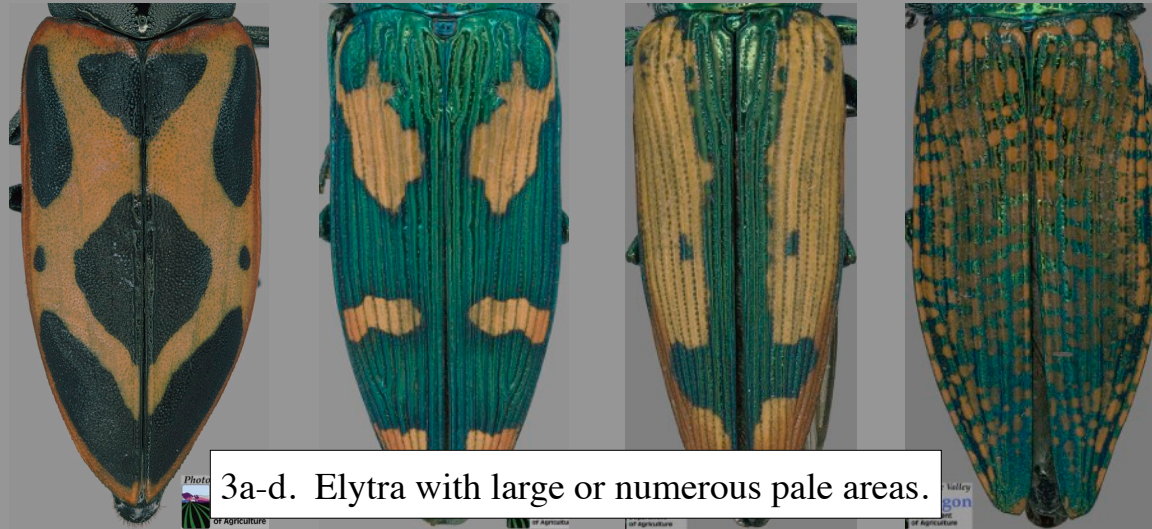


2g. Lateral view.



3 (2)

Elytra with pale areas large or of numerous small spots (**a-d**).....4



Elytra mostly dark, with pale areas of relatively few spots (**e-g**)...7





4 (3): Part I

Pale area of elytron sinuate (**a**); portrait (**e**).....*Xenomelanophila miranda*



Pale area of elytron not sinuate (**b-d**).....5



4b. Pale area linear.



4c. Pale area composed of small dots.



4d. Pale area composed of large patches.



4 (3): Part II

*Xenomelanophila
miranda*



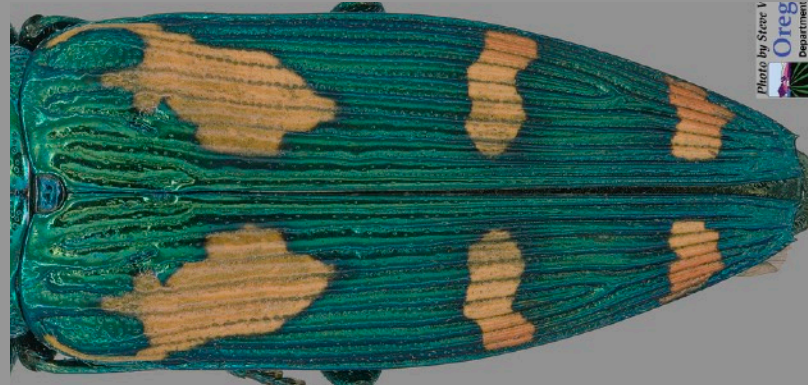
4e.

5 (4)

Pale area of elytron composed of large patches (a).....6



5a. Pale area composed of large patches.



Pale area of elytron not composed of large patches, either linear or composed of many small dots (b, c).....FTT

5b. Pale area linear.



54c. Pale area composed of many small dots.



6 (5): Part I

Lateral edge of anterior pale elytral spot NOT extending forward to contact humerus (a); portrait (c).....*Buprestis langi*

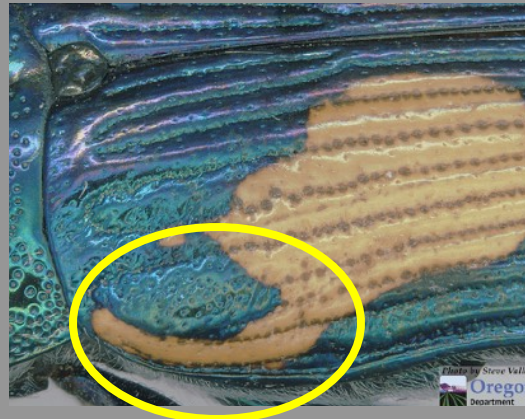
*This species also has an immaculate form that keys to couplet 21.

6a. Pale spot not contacting the humerus.



Lateral edge of anterior pale elytral spot extending forward along lateral margin to contact humerus (b).....FTT

6b. Pale spot contacting the humerus.





6 (5): Part II

*Buprestis
langi*

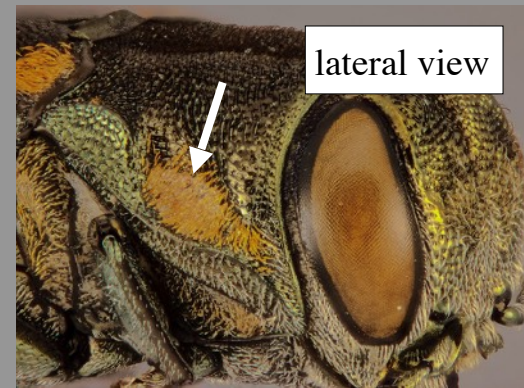
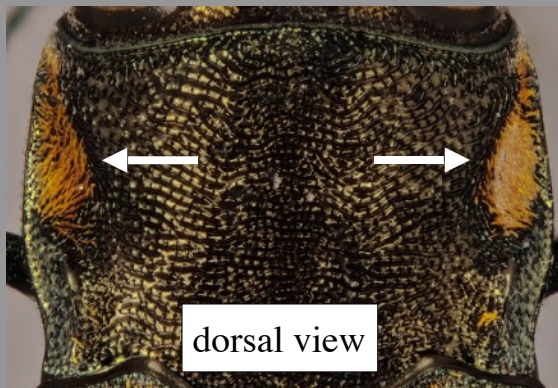




7: Part I (3)

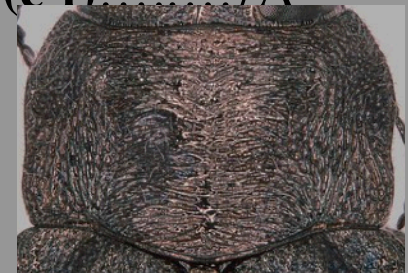
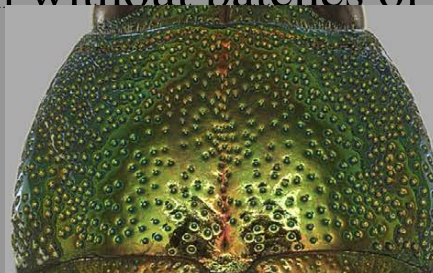
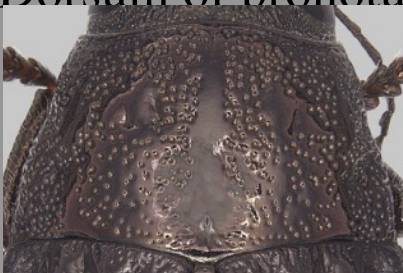


Dorsum of pronotum with a patch of orange pubescence at and posterior to each anterior angle (a-b); portraits (g-h)...*Agrilus auroguttatus*, the Gold-spotted Oak Borer* This insect is believed to have been introduced into southern California, perhaps via fire-wood. It is thought to be responsible for extensive oak mortality in that area.



7a-b. Dorsum of pronotum with patches of orange pubescence.

Dorsum of pronotum without patches of orange pubescence (c-f).....7A



7c-f. Pronotum without patches of pale pubescence.



7: Part II (3)




Agrilus auroguttatus,
the Gold-spotted
Oak Borer*



7g.

Photo by Steve Valley
 **Oregon**
Department
of Agriculture

Photo by Steve Valley
 **Oregon**
Department
of Agriculture



7h.

Pronotum with punctures coarse & deep (a, b).....8

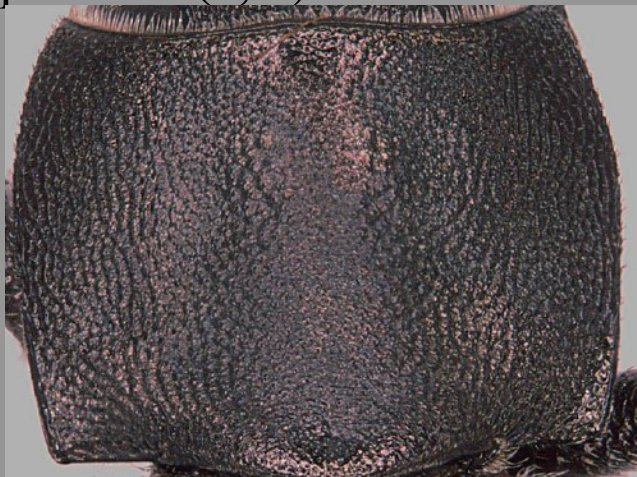


7Aa.

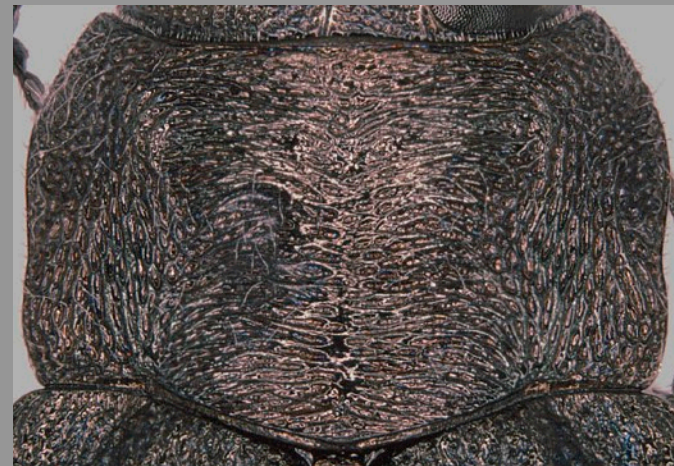


7Ab.

Pronotum with punctures fine & shallow or with surface rugose-punctate (c, d).....9

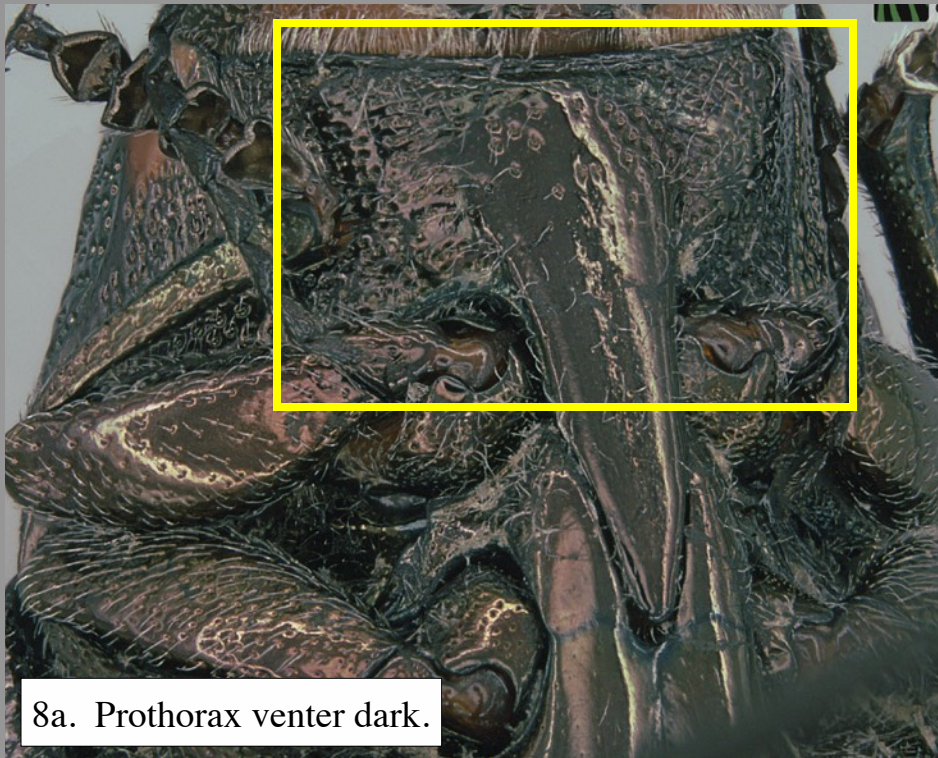


7Ac. Punctures fine, shallow.



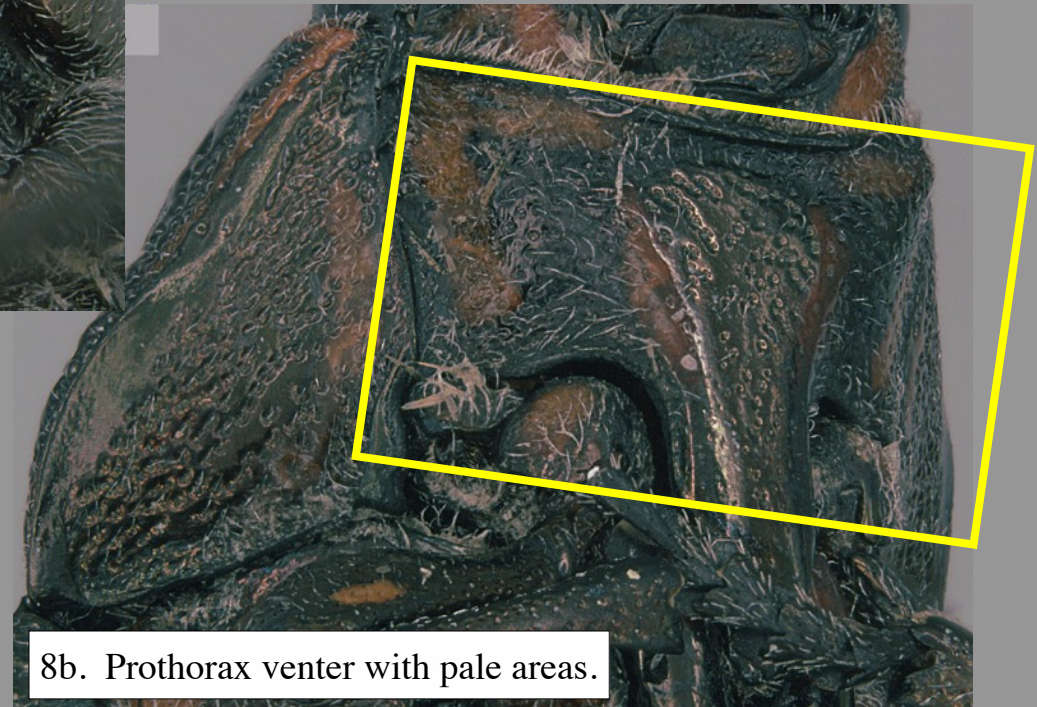
7Ad. Pronotal surface rugose-punctate.

8 (6): Part I



8a. Prothorax venter dark.

Venter of prothorax WITHOUT orange markings (a); hind angles of pronotum dark from dorso-lateral perspective (c) portrait (e).....*Buprestis laeviventris*



8b. Prothorax venter with pale areas.

Venter of prothorax with conspicuous orange markings (b); hind angles of pronotum orange from dorsolateral perspective (d).....FTT

8 (6): Part II

8c. Pronotum with dark hind angle.



8d. Pronotum with pale hind angle.



8 (6): Part III

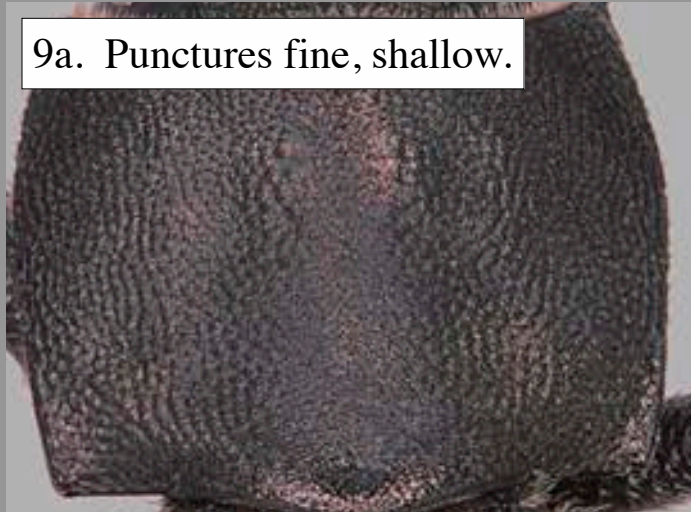
*Buprestis
laeviventris*



8e.

9 (7A): Part I

Pronotum finely punctate (a); elytra without setae (b); portrait (e).....
.....*Melanophila consputa*

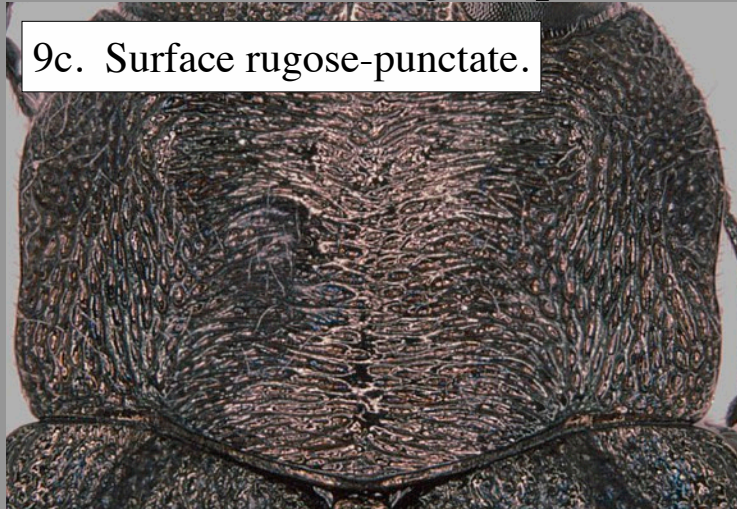


9a. Punctures fine, shallow.



9b. Elytra without setae.

Pronotum surface rugose-punctate (c); elytra with fine setae (d).....10



9c. Surface rugose-punctate.



9d. Elytra with setae.

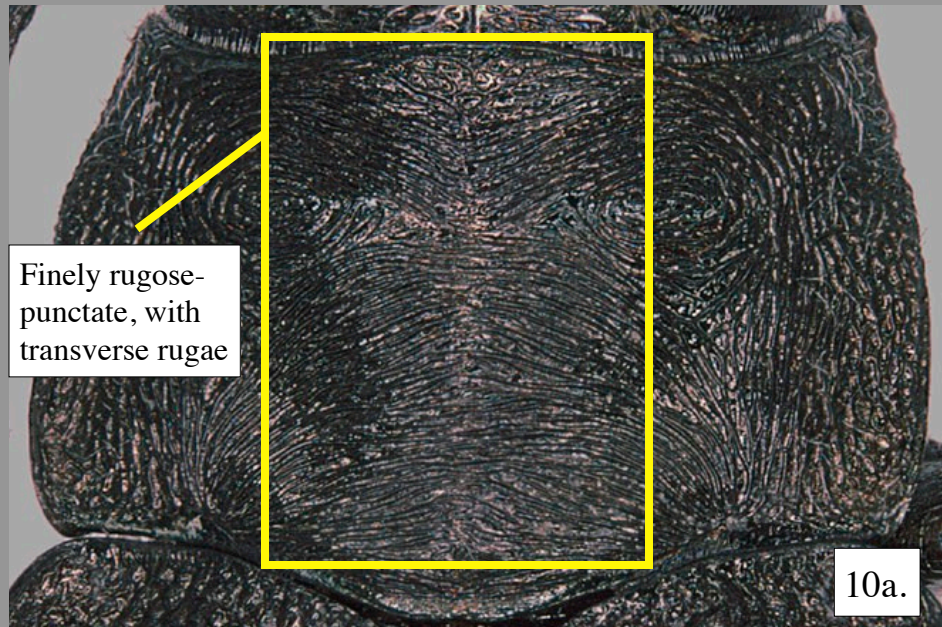



9 (5): Part II

*Melanophila
consputa*



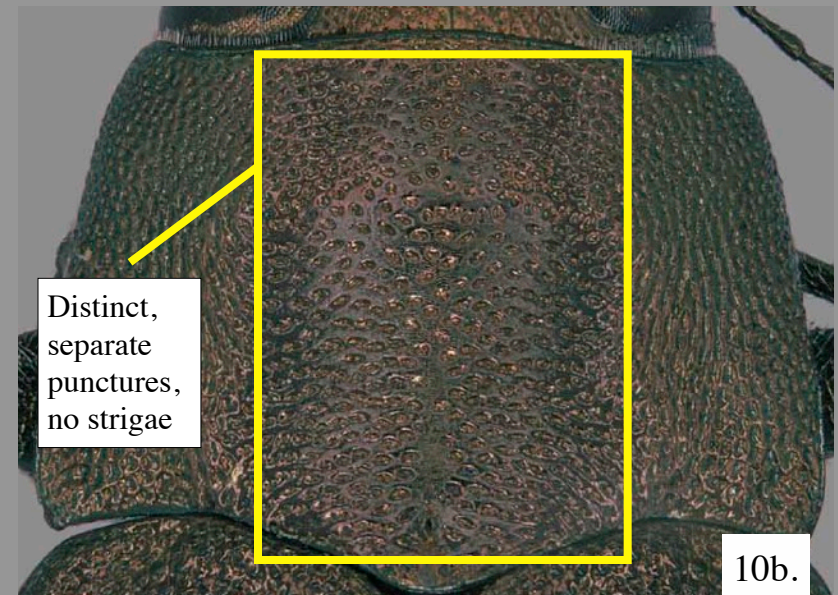
9e.



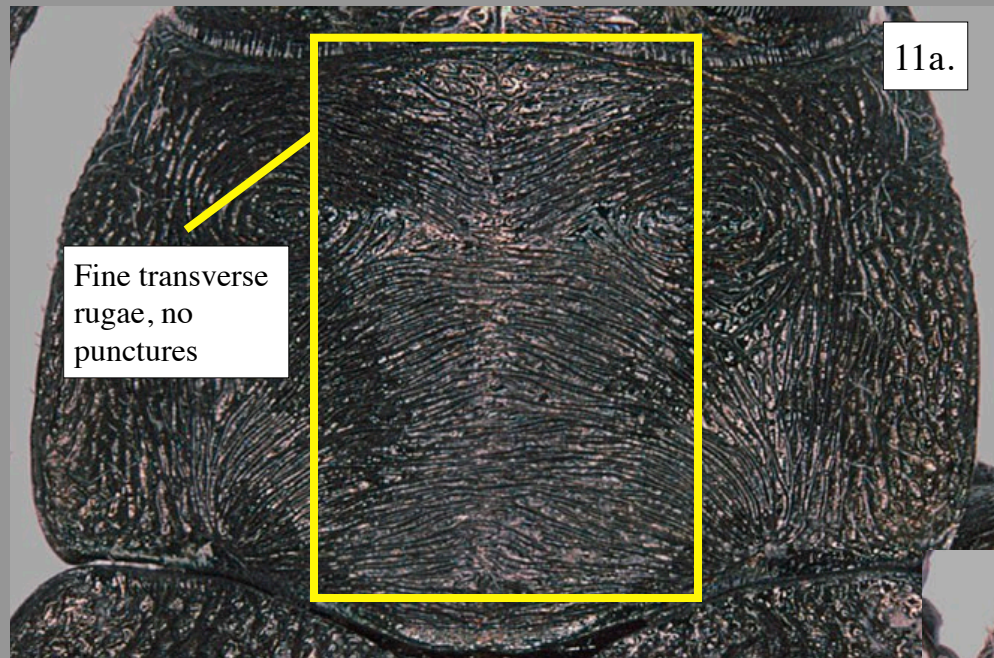
Pronotum with surface finely rugose-punctate, center of pronotum with transverse rugae (a).....11 

Individuals of species normally keying to couplet 11 may sometimes lack pale spots on the elytra, instead keying to couplet 37.

Pronotum with most punctures separate from one another, center of pronotum without transverse rugae (b).....FTT

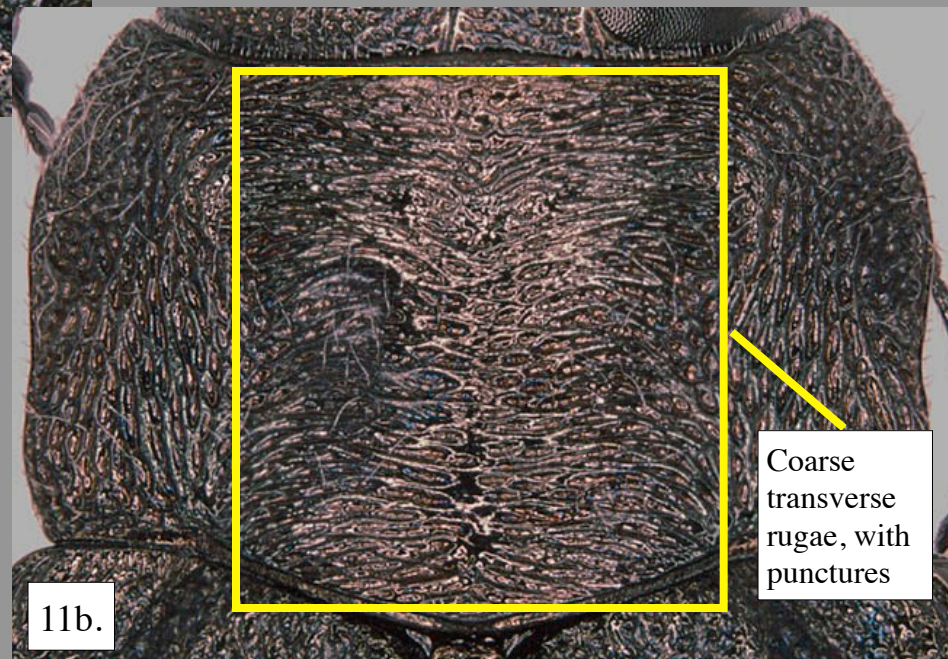


11 (10): Part I



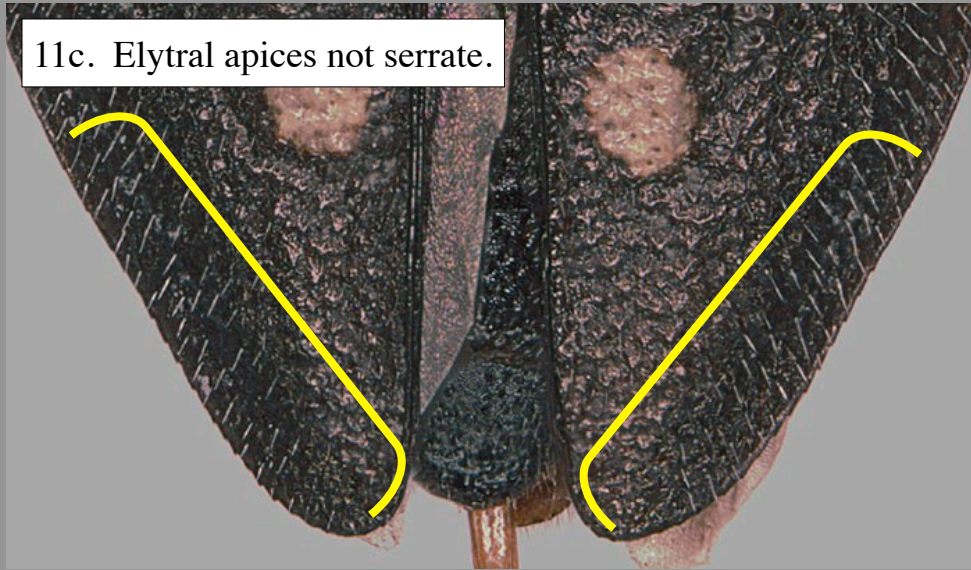
Center of pronotum with fine transverse rugae, usually with no distinct punctures (a); apices of elytra at most indistinctly serrate (c); portrait (e).....*Phaenops drummondi*

Center of pronotum with transverse rugae coarse and strong, usually with at least some punctures distinct (b); apices of elytra distinctly serrate (d).....FTT

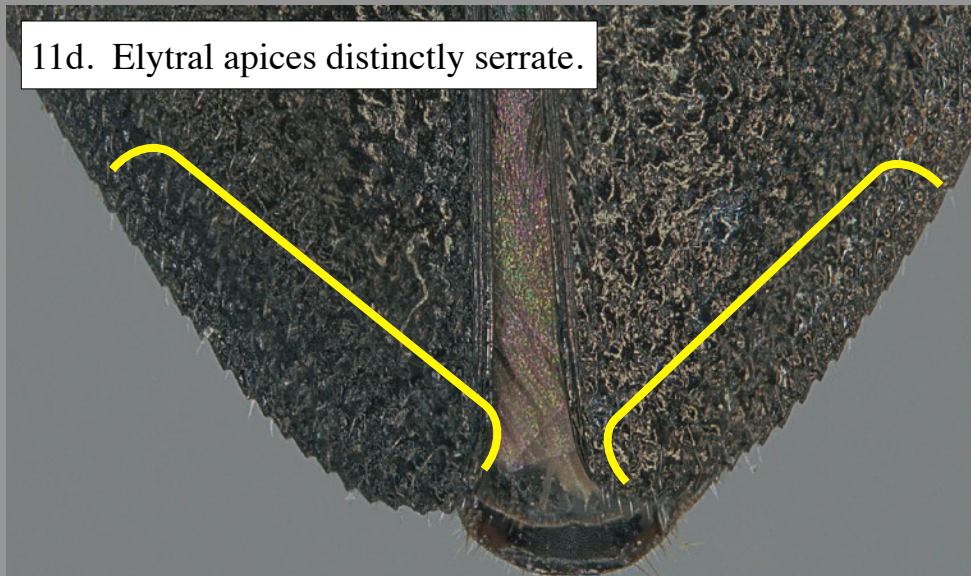


11 (10): Part II

11c. Elytral apices not serrate.



11d. Elytral apices distinctly serrate.





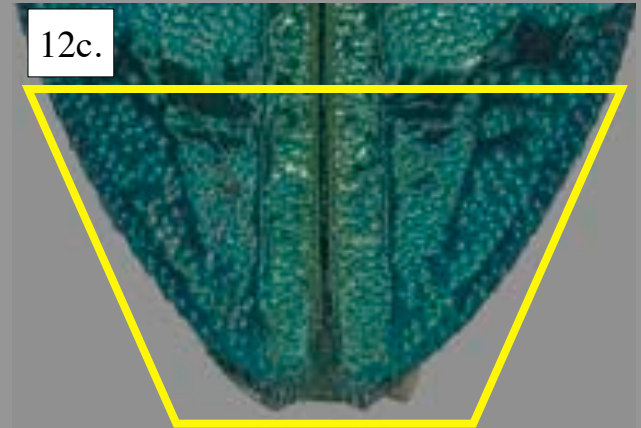
11 (10): Part III

*Phaenops
drummondi*

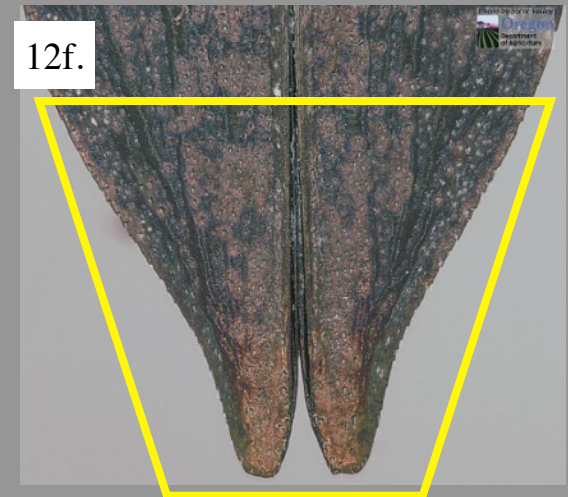
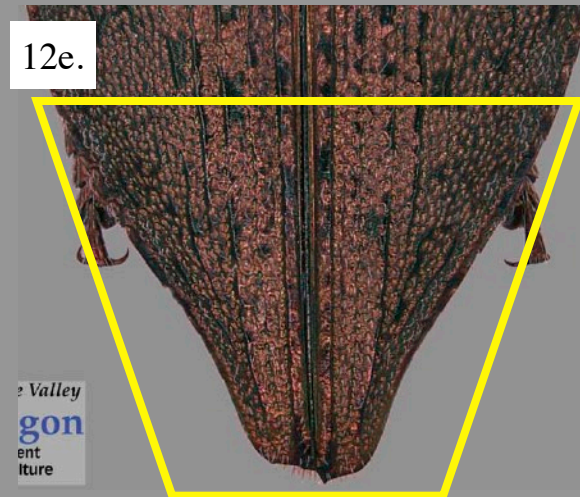
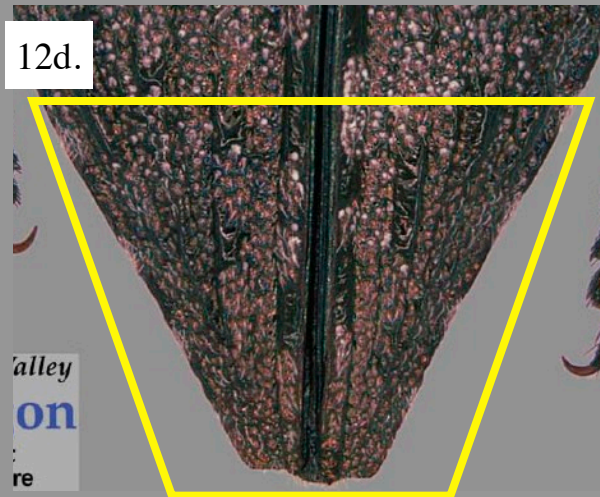


11e.

Elytral apices not narrowed and prolonged (**a-c**).....13 

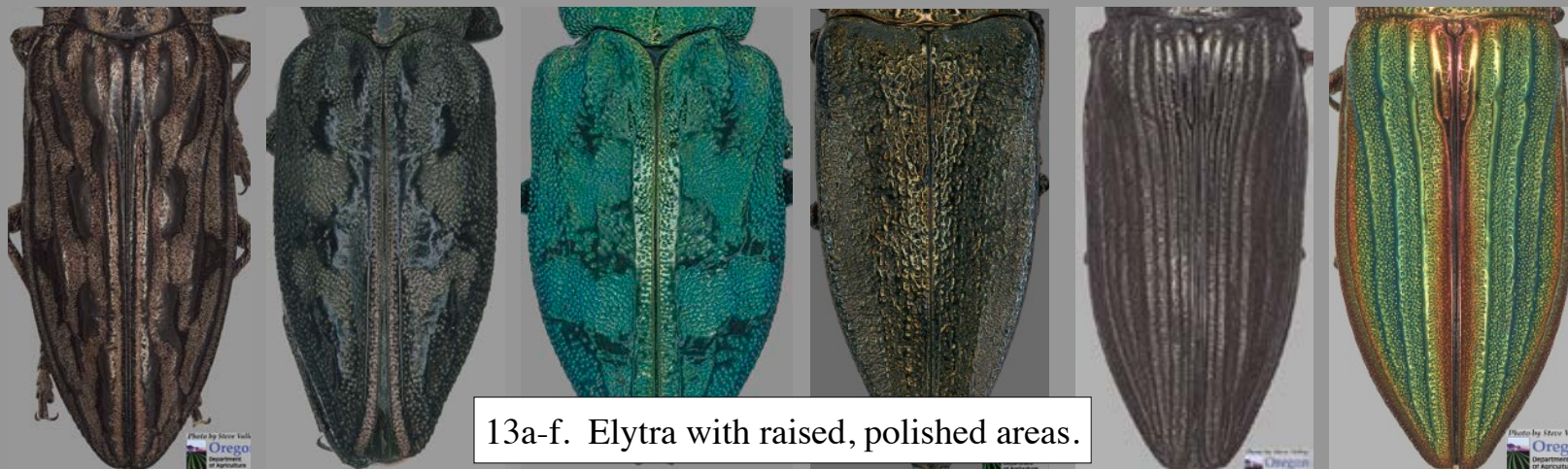


Elytral apices narrowed and prolonged (**d-f**).....FTT



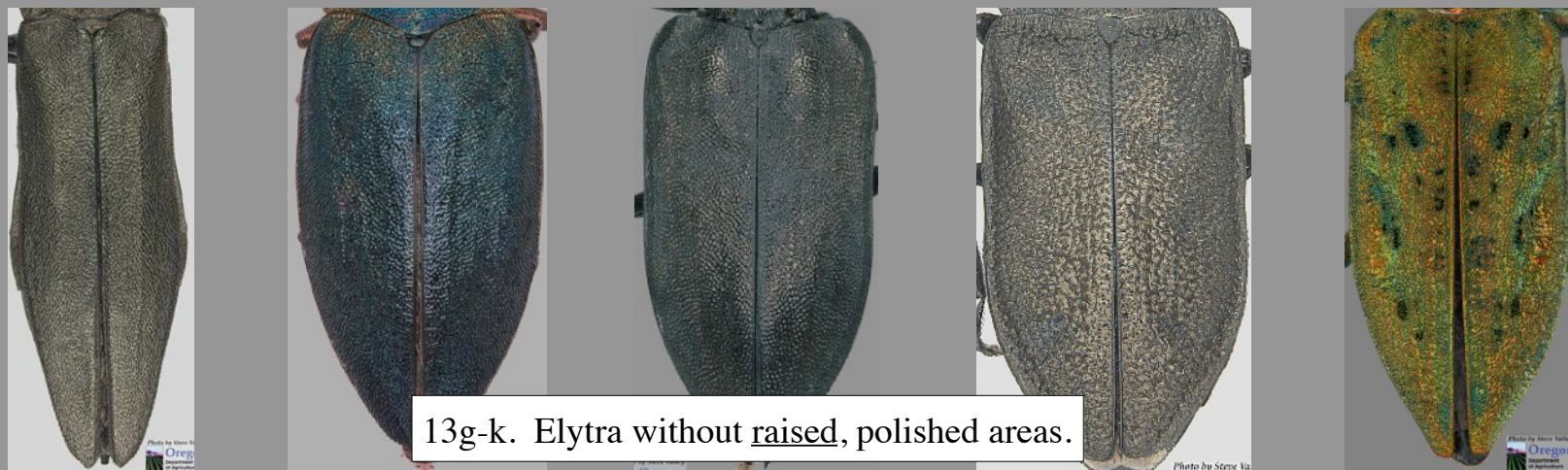
13 (12)

Elytra with raised, polished areas (including carinae running the length of the elytra) (**a-f**).....14



13a-f. Elytra with raised, polished areas.

Elytra without raised, polished areas (**g-k**).....24

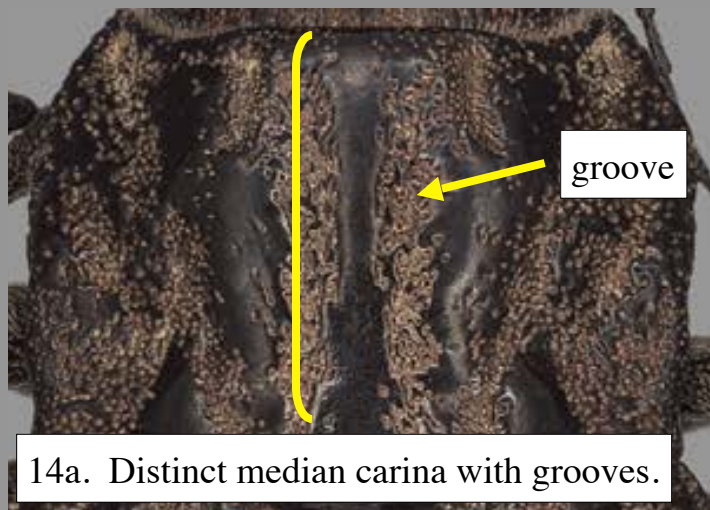


13g-k. Elytra without raised, polished areas.

14 (13): Part I

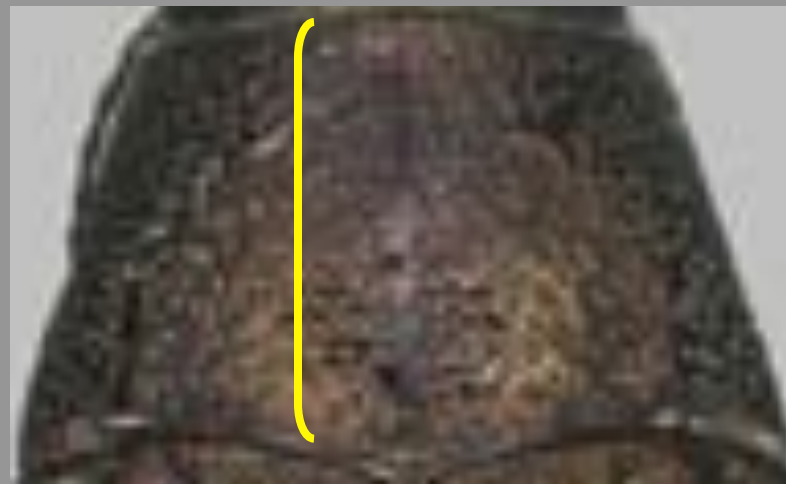
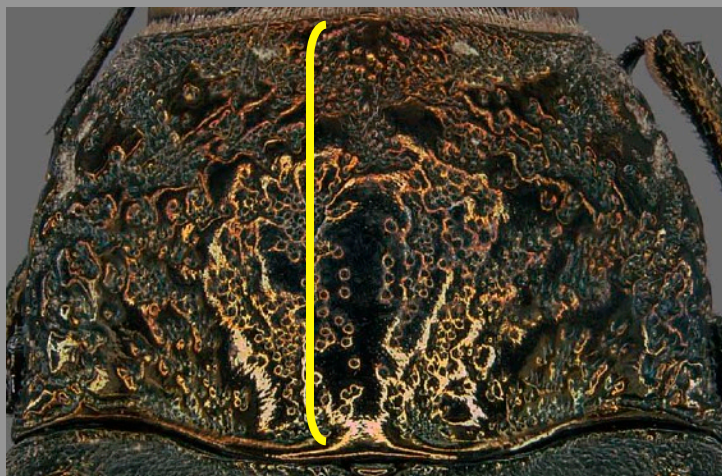
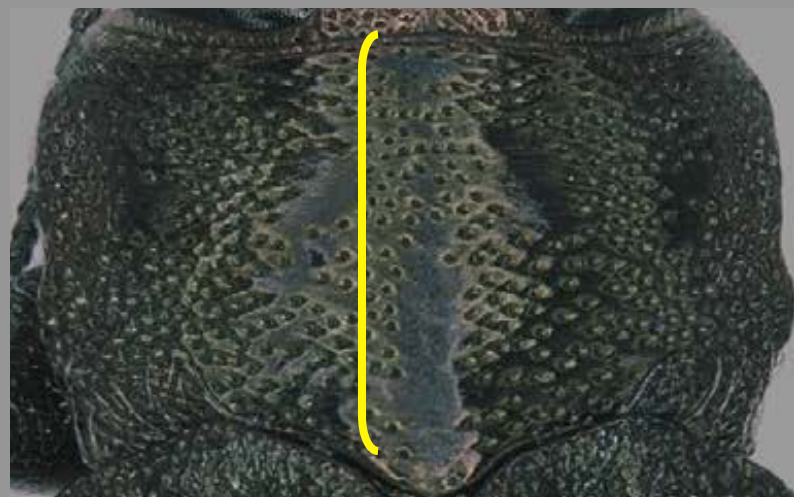
Pronotum with well-defined median carina bordered by deep grooves (a); frons with deep triangular depression between eyes (e); portrait (h).....

.....*Chalcophora angulicollis*



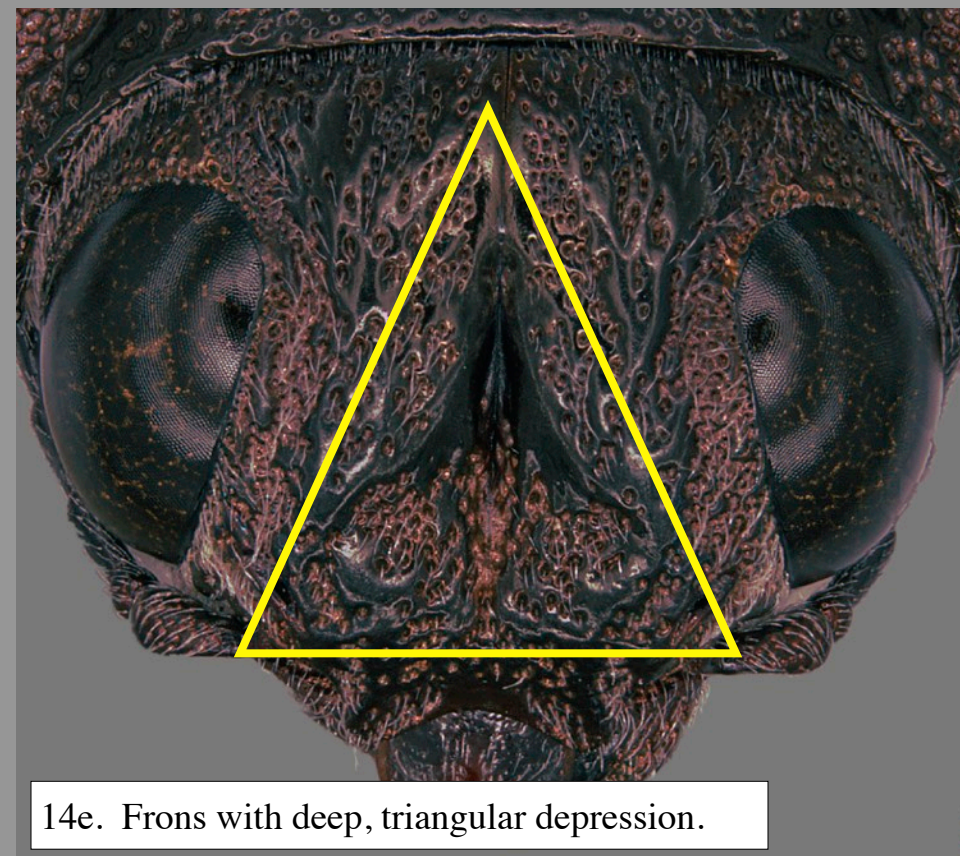
14a. Distinct median carina with grooves.

Pronotum without distinct median carina and lacking grooves (b-d); frons evenly convex or flattened, without deep triangular depression between eyes (f, g).....15



14b-d. Indistinct median carina, no grooves.

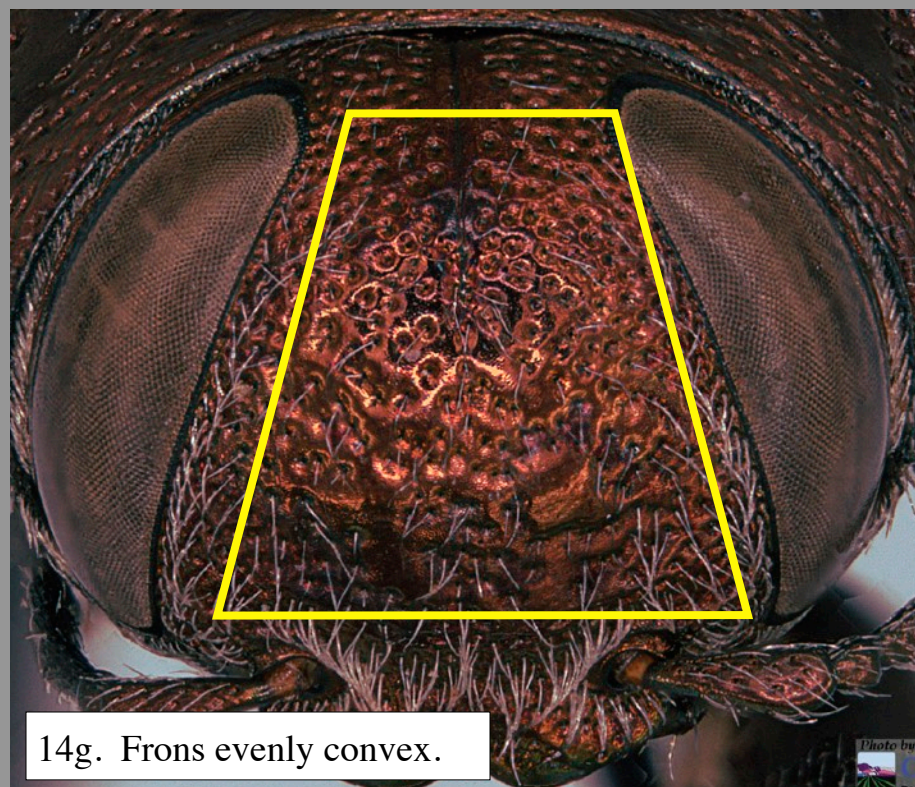
14 (13): Part II



14e. Frons with deep, triangular depression.



14f. Frons flattened.



14g. Frons evenly convex.

14 (13): Part III

*Chalcophora
angulicollis*



14h.

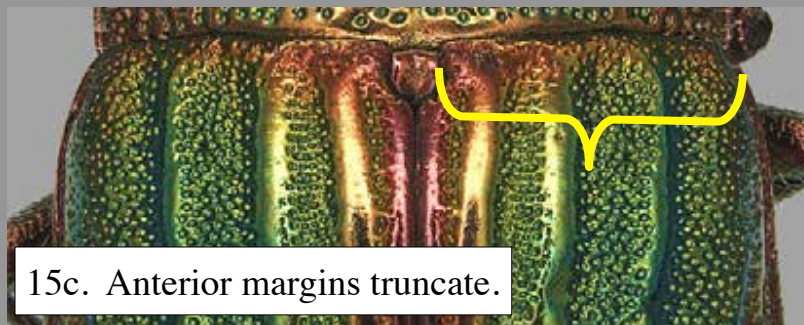
15 (14)

At least some portion of anterior margins of elytra strongly arcuate (a, b).....16



15a, b. Anterior elytral margins strongly arcuate.

Anterior margins of elytra more-or-less truncate (c), at most weakly arcuate (d, e).....17



15c. Anterior margins truncate.



15d, e. Anterior margins weakly arcuate.



16 (15): Part I

Dorsal color bright metallic blue or green; portrait (a).....

.....*Chrysobothris viridicyanea*

See slide 16: Part II.



Dorsal color black, often with metallic highlights; portraits (b-d).....

.....*Chrysobothris* spp.*

*Species level identification of this group of *Chrysobothris* is extremely difficult, often requiring extraction of genitalia and an extensive collection of reference specimens. Because of this difficulty, this screening aid will only treat these species as a group.

See slide 16: Part III.



Beginning

16 (15): Part II

*Chrysobothris
viridicyanea*



16a.




16 (15): Part III

Chrysobothris spp.

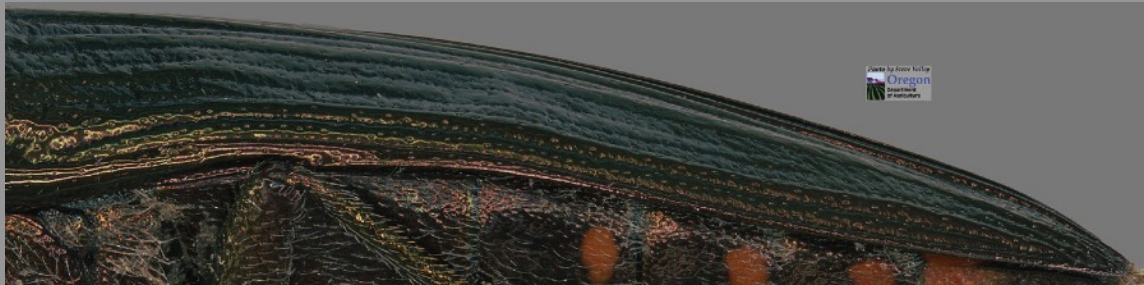




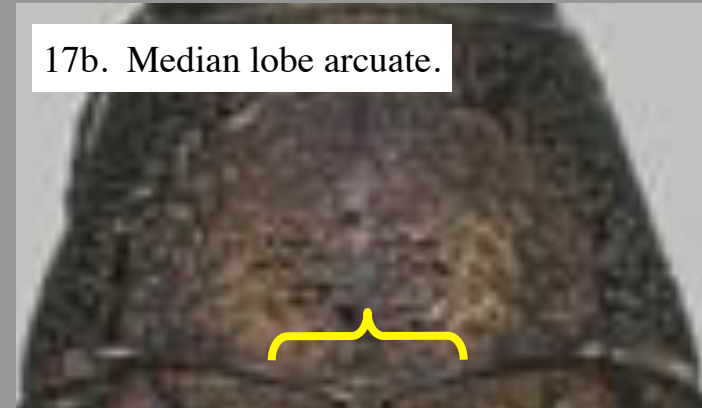
17 (15)

Surface of elytra without pubescence (**a**); median lobe of posterior pronotal margin arcuate (**b**).....18 

17a. Elytra without pubescence.



17b. Median lobe arcuate.

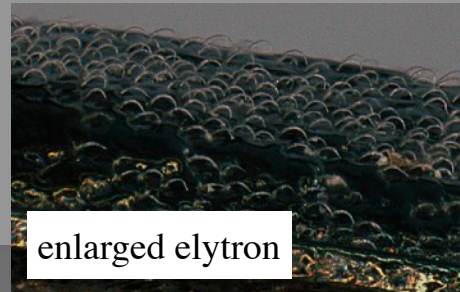


Surface of elytra with short, curved pubescence, especially near anterior margins (**c**); median lobe of posterior pronotal margin truncate (**d**)...FTT

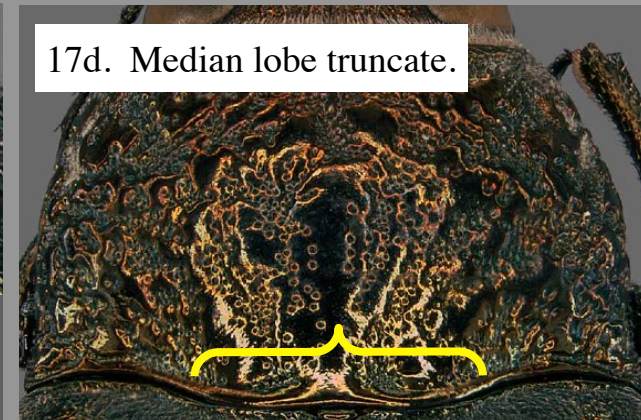
17c. Elytra with pubescence.



enlarged elytron



17d. Median lobe truncate.



18 (17)

Dorsal surface not bright metallic green or blue (a); head with orange or yellowish markings on frons (b); venter of abdomen usually with orange spots (c)19



18a. Dorsal surface not bright green or blue.



18b. Frons with pale markings.



18c. Venter of abdomen with spots.

Dorsal surface bright metallic green or blue (d); head (e) and venter of abdomen without orange or yellowish markings (f).....20



18d. Dorsal surface bright green or blue.



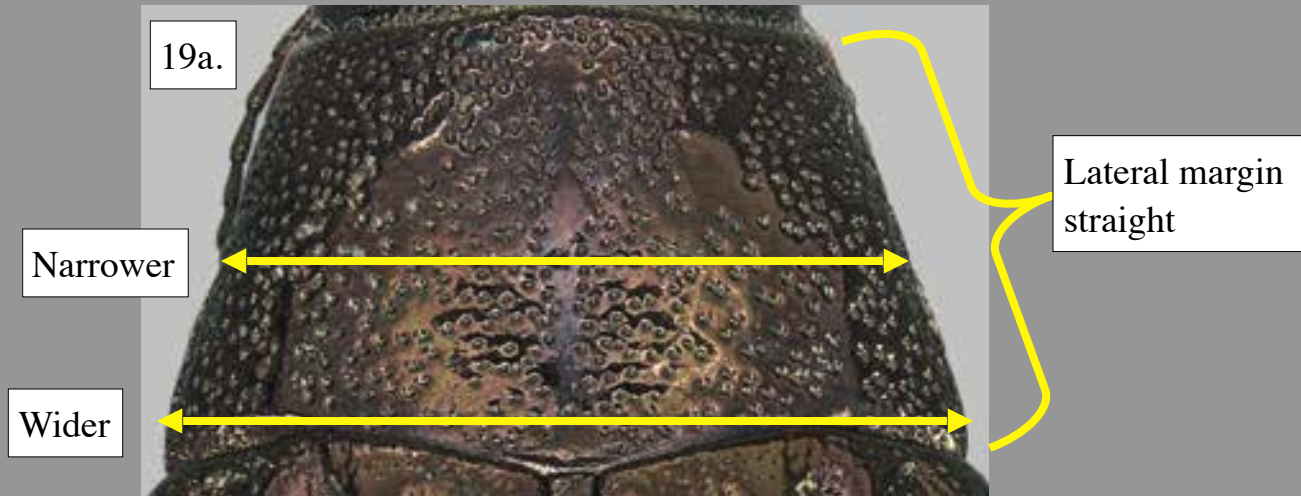
18e. Frons without pale markings.



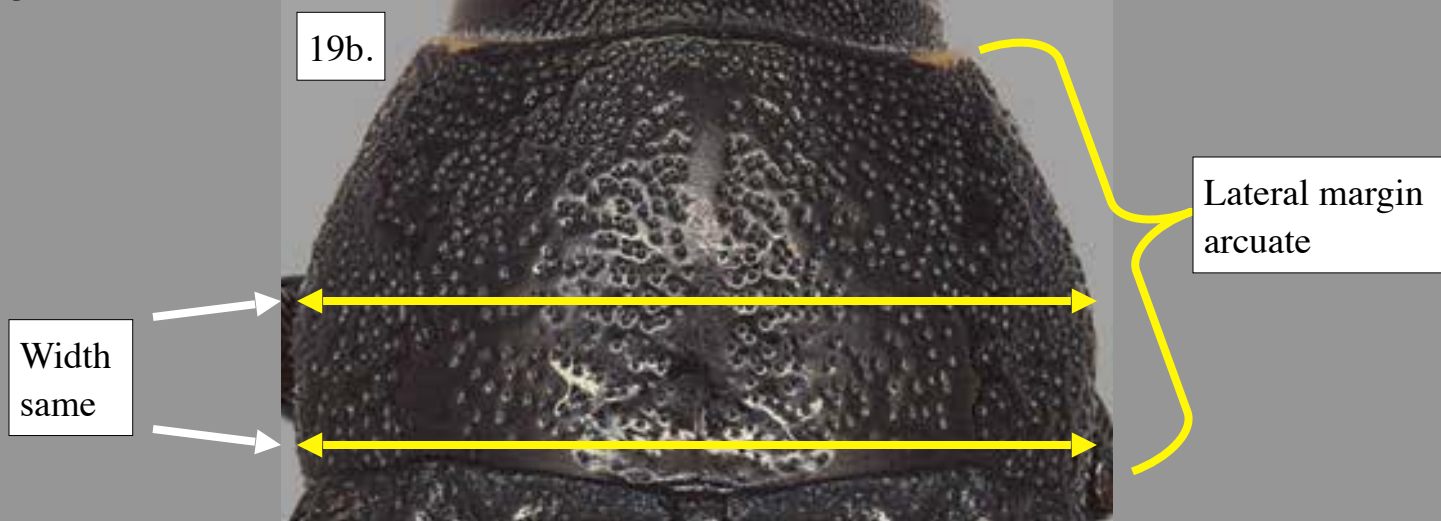
18f. Venter of abdomen without spots.

19 (18): Part I

Pronotum distinctly wider at posterior margin than near middle, lateral margins more-or-less straight (a); portrait (c).....*Buprestis subornata*



Pronotum about as wide near middle as at posterior margin, lateral margins more-or-less arcuate (b); portrait (d).....*Buprestis lyrata*





19 (18): Part II

*Buprestis
subornata*



19c.



19 (18): Part III

*Buprestis
lyrata*

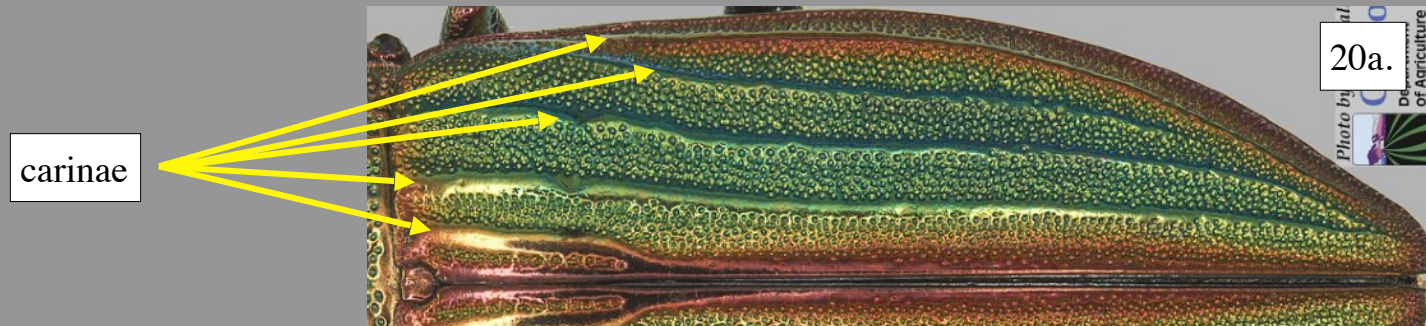


19d.

20 (18): Part I

Each elytron with 5 widely spaced carinae (counting the short sutural carina) (a); portraits (c-e).....*Buprestis aurulenta*

*This species has several color forms, with the elytra ranging from primarily green to primarily blue.



Each elytron with 6 to 10 closely spaced carinae (counting the short sutural carina) (b).....21



20 (18): Part II

Buprestis aurulenta



20c: Blue form.

Photo by Steve Valley
Oregon
Department
of Agriculture



20d: Inter-
mediate
form.

Photo by Steve Valley
Oregon
Department
of Agriculture



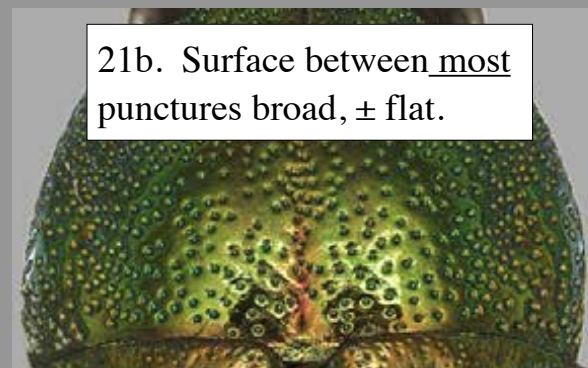
20e: Green form.

Photo by Steve Valley
Oregon
Department
of Agriculture

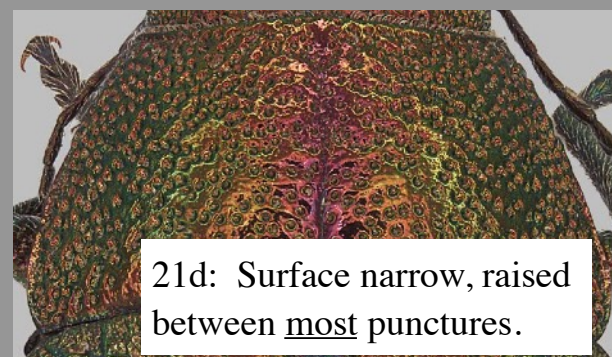
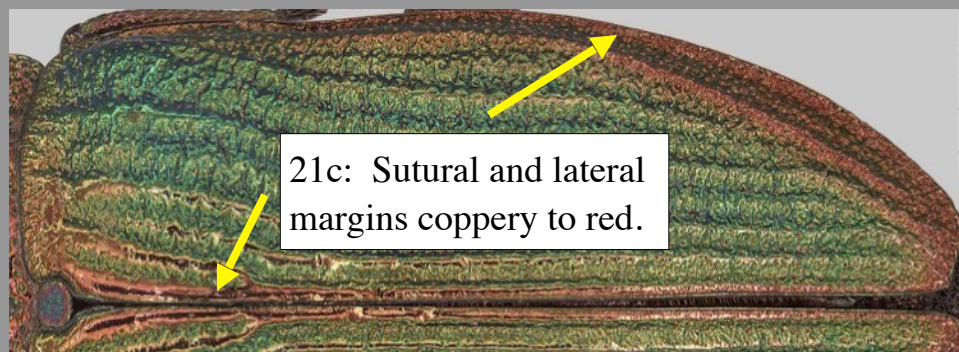
21 (20): Part I

Color of elytra uniform, brassy green to blue or purplish (a); pronotum surface between most punctures (including those along the sides of the pronotum) broad, \pm flat (b); portrait (e).....*Buprestis langi*

*This species has a color form with large pale spots on the elytra that keys to couplet 7.



Color of elytra green to purple with the lateral and usually sutural margins broadly coppery or reddish (c); pronotum surface between most punctures (especially those along the sides of the pronotum) narrow and raised (d).....22





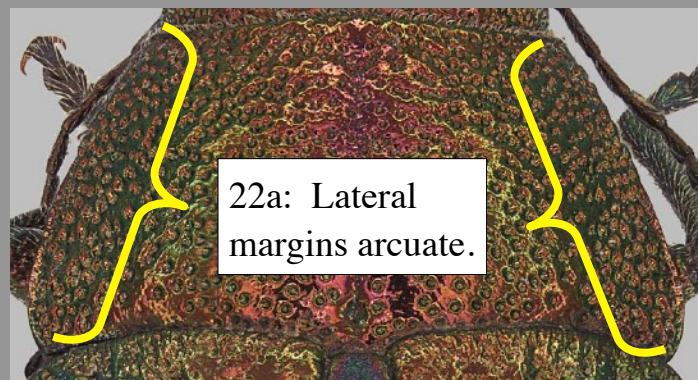
21 (20): Part II

*Buprestis
langi*

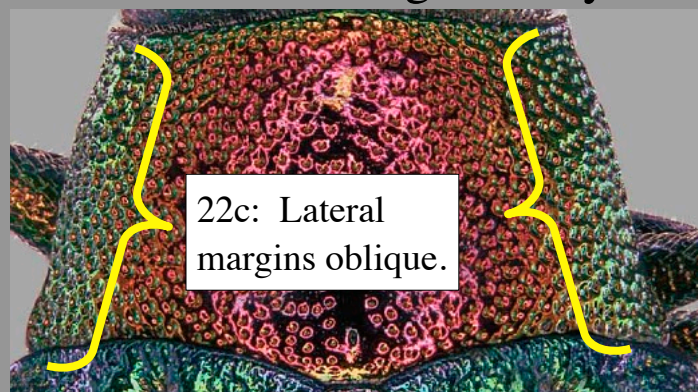


21e.

Pronotum with lateral margins arcuate, overall shape not trapezoidal (a); sutural margin of elytron normally coppery or red (b).....23



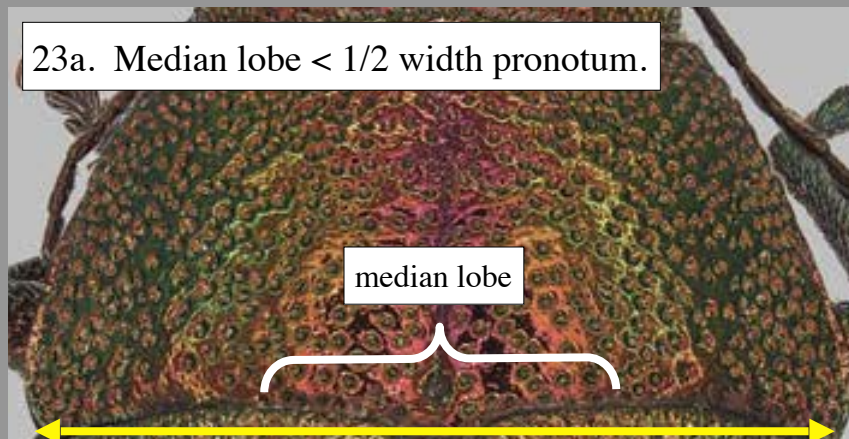
Pronotum with lateral margins oblique, overall shape trapezoidal (c); sutural margin of elytron not coppery or reddish (d).....FTT



23 (22): Part I

Median posterior lobe of pronotum $< 1/2$ width pronotum (a), surface between punctures smooth and glossy (b); punctures of anterior $1/4$ of sutural stria and striae 1 and 2 indistinct and coalescent (e); portrait (g).....*Buprestis adjecta*

23a. Median lobe $< 1/2$ width pronotum.

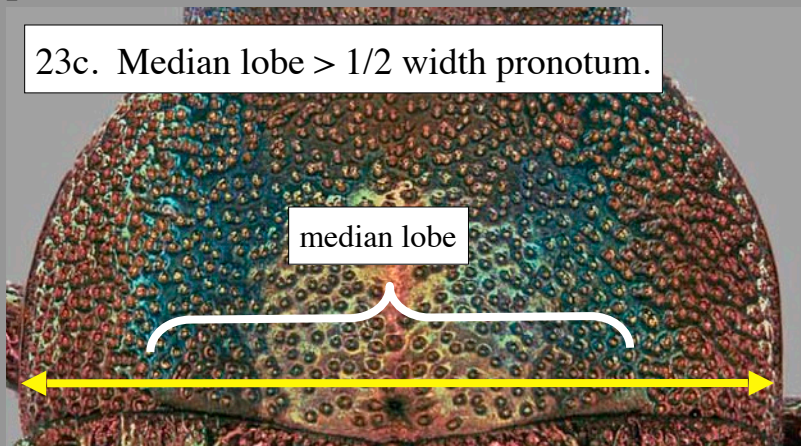


23b. Surface between punctures smooth, glossy.

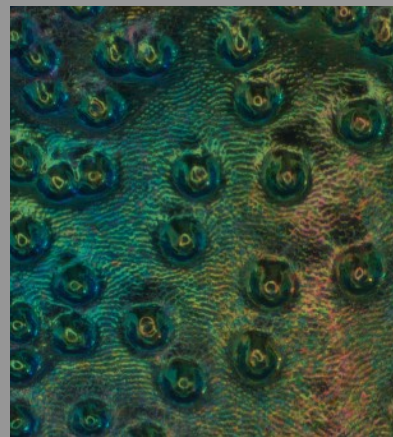


Median posterior lobe of pronotum $> 1/2$ width pronotum (c), surface between punctures finely meshed, dull (d); punctures of anterior $1/4$ of sutural stria and striae 1 and 2 distinct, separate (f).....FTT

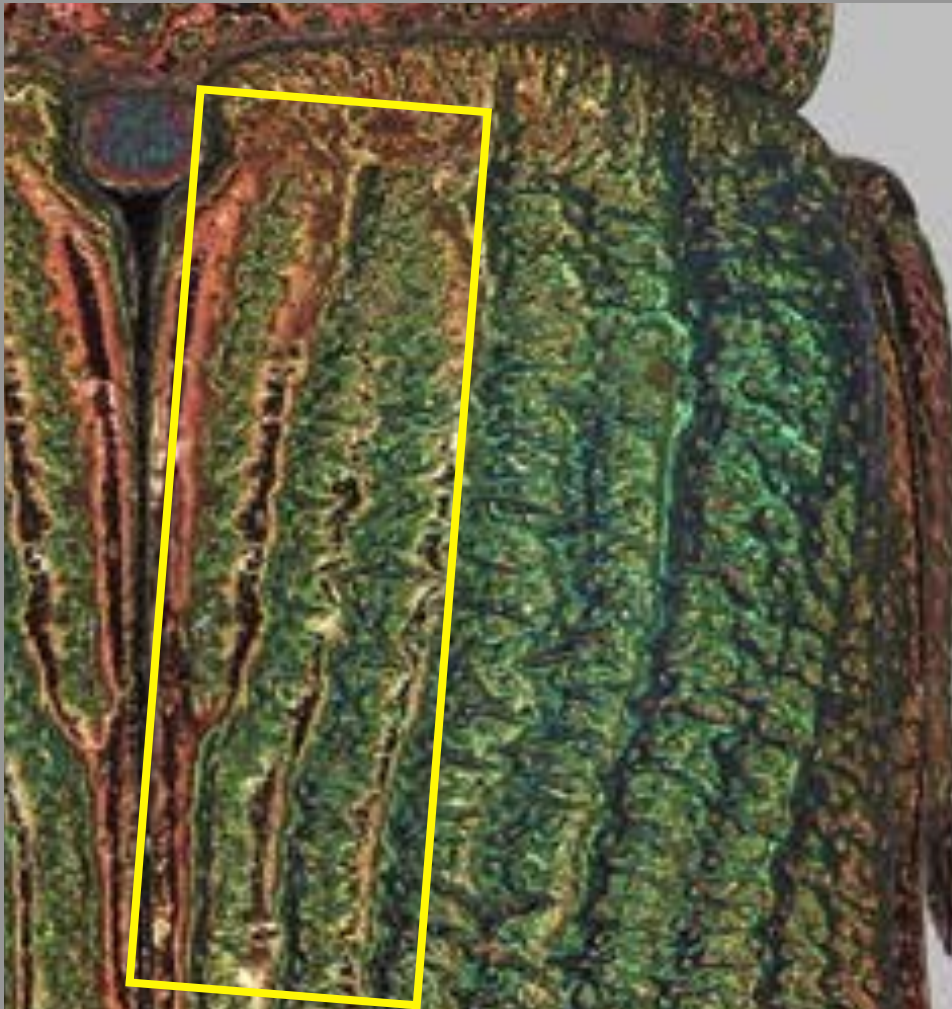
23c. Median lobe $> 1/2$ width pronotum.



23d. Surface between punctures finely meshed, dull.

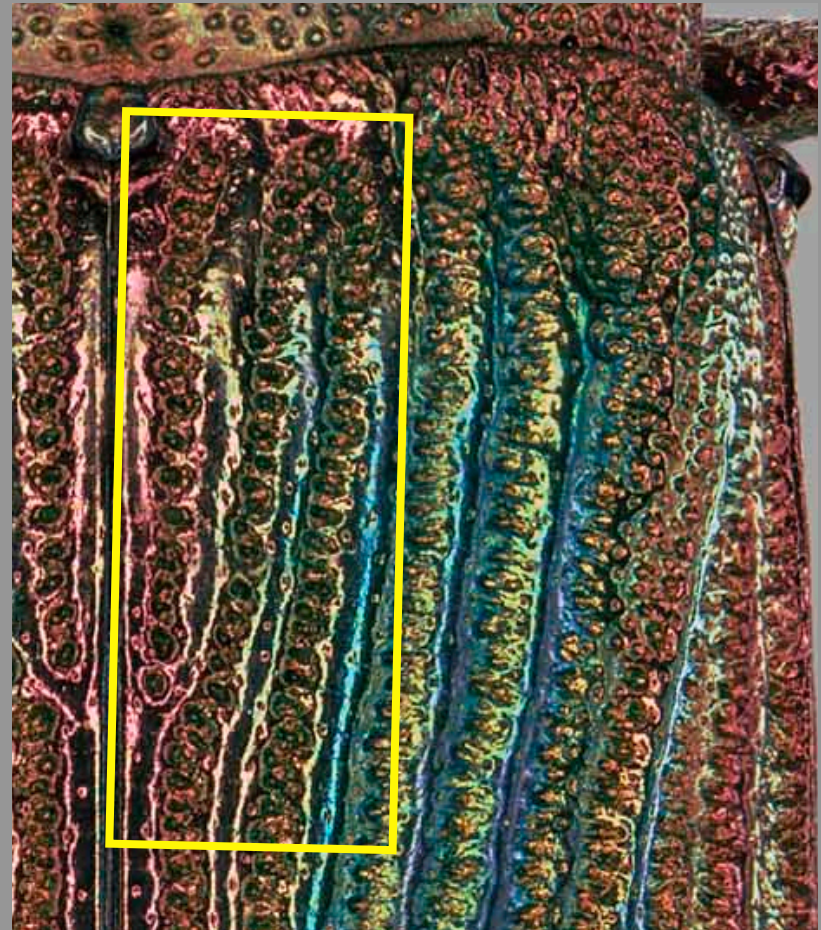


23 (22): Part II



23e. Punctures indistinct, coalescent.

23f. Punctures distinct and separate.





23 (22): Part III

*Buprestis
adjecta*



23g.

Photo by Steve Valley
Oregon
Department
of Agriculture

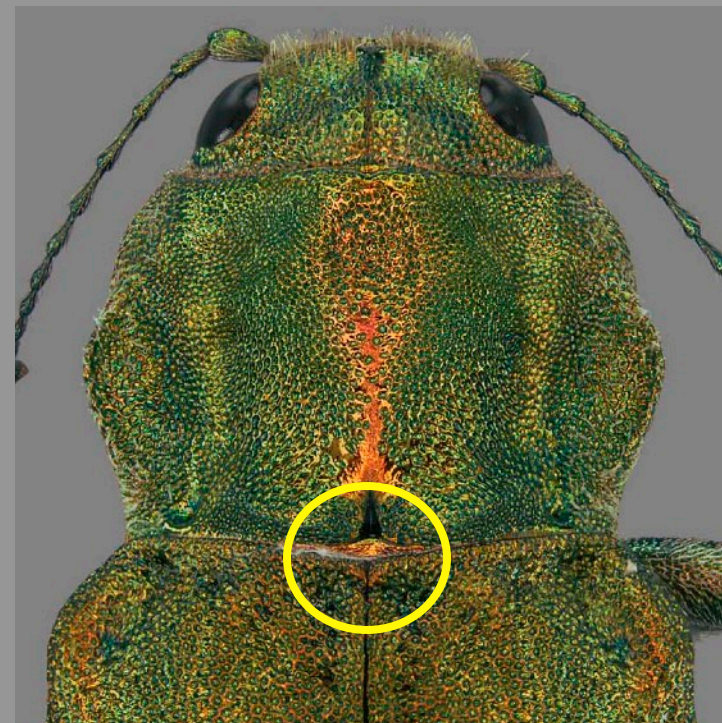
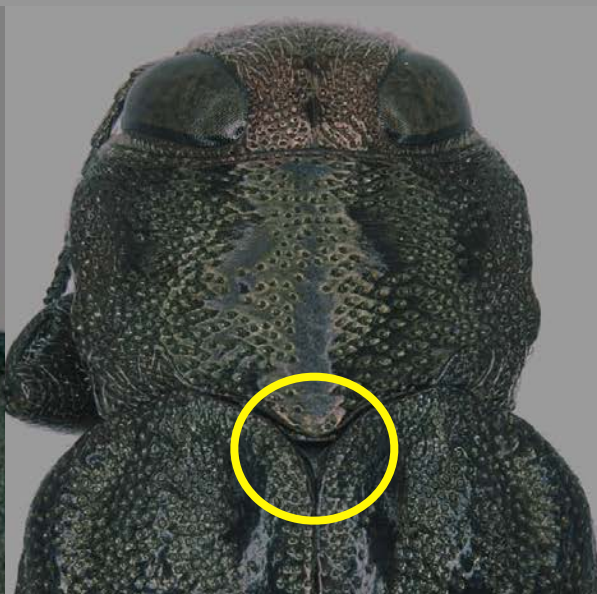
Scutellum visible (a-c)
.....25



24d. Scutellum not visible.

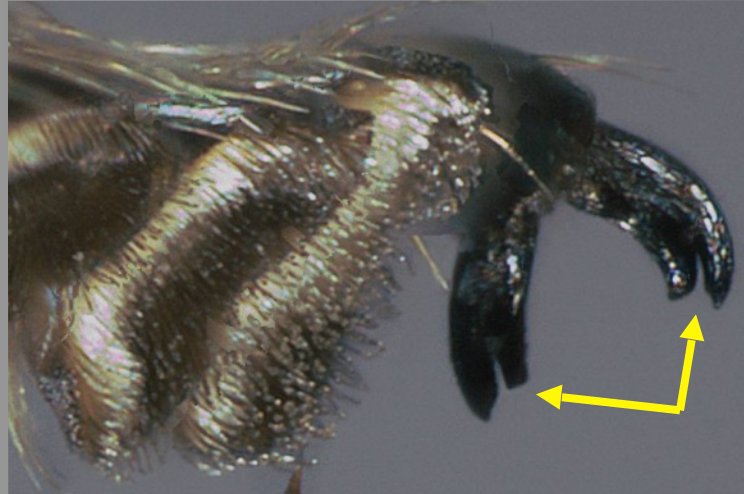


24a-c. Scutellum visible.



Scutellum not visible
(d).....FTT

Tarsal claws cleft (**a**).....26



25a. Tarsal claws cleft.

Tarsal claws simple, not cleft (**b**).....32



25b. Tarsal claws simple.

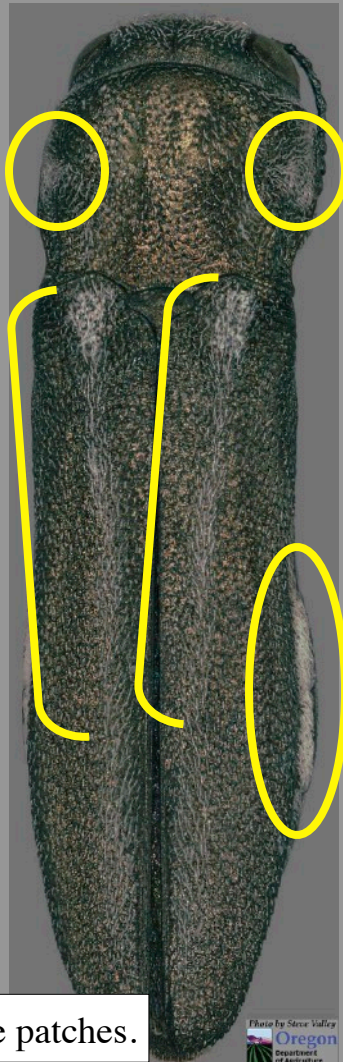


26 (25): Part I* Second half of this couplet is on next slide.

Pronotum, elytra, lateral portions of tergites and sternites or at least one of these body parts with pubescent pale patches or stripes (a-c).....27



26a, b. Dorsum with pale patches.



26c. Abdominal sternites with pale patches.



26 (25): Part II*

First half of this couplet is on preceding slide.

Neither dorsal or ventral surfaces with distinct pubescent pale patches or stripes (pubescence present, but scattered) (a-c).....30



26Aa-b. Dorsal surfaces without pale pubescent patches or stripes.



26Ac. Abdominal sternites without pale patches.

Elytra without pubescent stripes near suture (a, b).....28 



27a, b. No pubescent stripes near suture.



Elytra with pubescent stripes near suture (c, d).....FTT



27c, d. Pubescent stripes near suture.

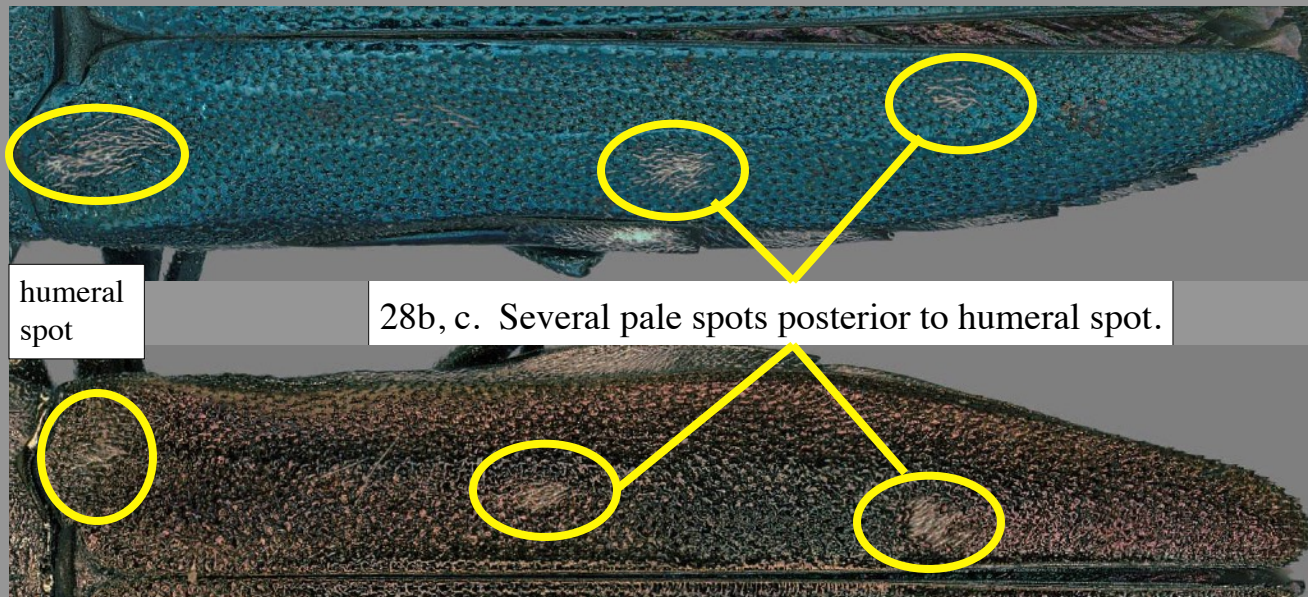


28 (27)

Elytron with a single pale spot posterior to the pale spot on the humerus (both spots may be somewhat vague) (a).....29



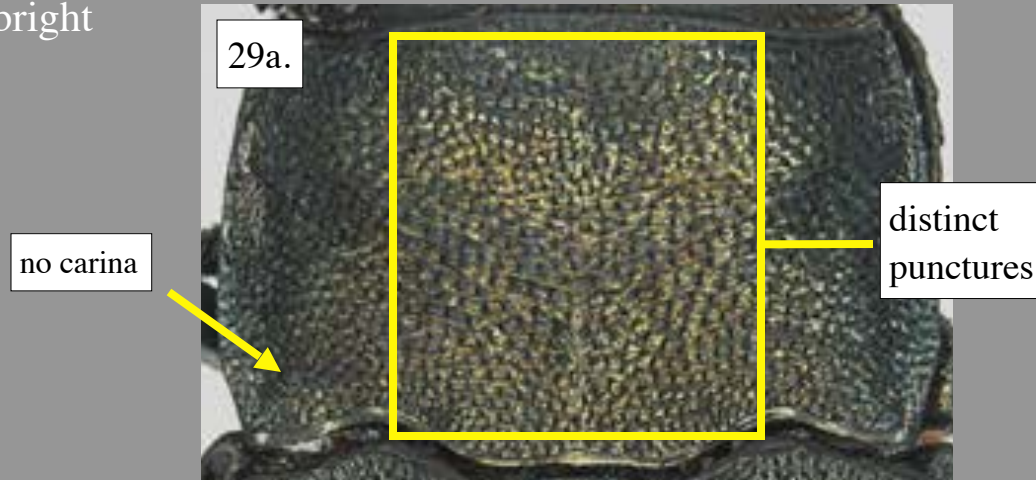
Elytron with 2 or 3 pale spots posterior to the pale spot on the humerus (the humeral spot may be somewhat vague) (b, c).....FTT



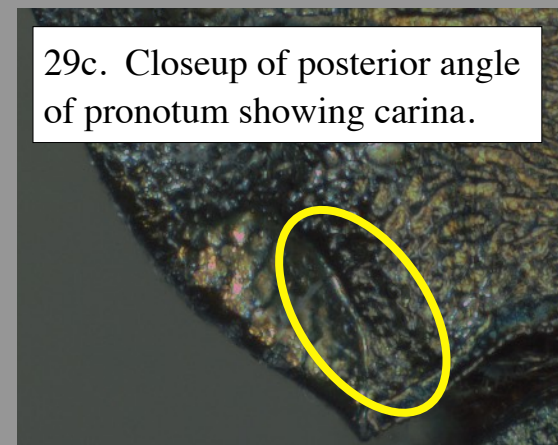
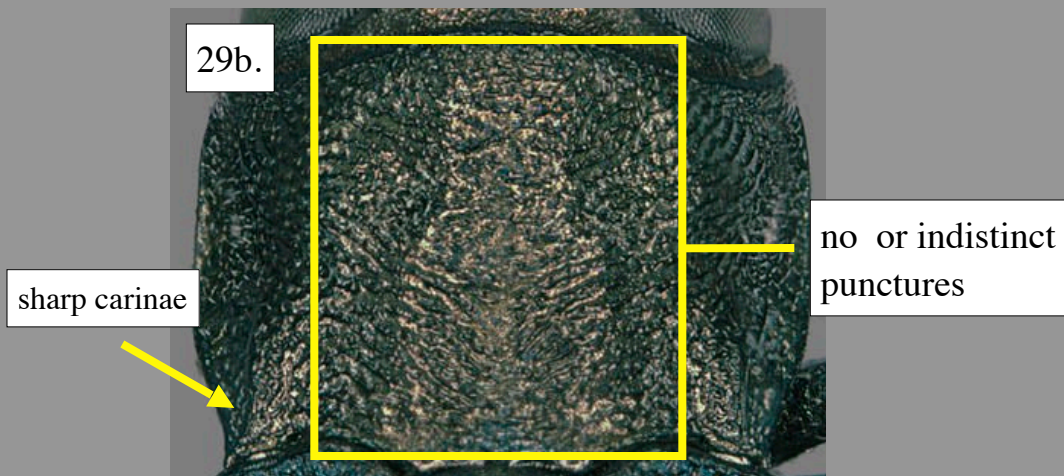
29 (28): Part I

No carinae at posterior angles of pronotum, distinct (though often coalescent) punctures on median portion of pronotum (a); portraits (d, e).....*Agrilus biguttatus**

*This species is an exotic not known from western North America. It varies in dorsal coloration from dull to bright bronzy green.



Sharp carinae at posterior angles of pronotum, no (or very indistinct) punctures on median portion of pronotum (b, c).....FTT



29 (28): Part II



29d. “Dull”
form.

Photo by Steve Valley
Oregon
Department
of Agriculture

Agrilus
*biguttatus**

*This species is an exotic not known from western North America. It varies in dorsal coloration from dull to bright bronzy green.

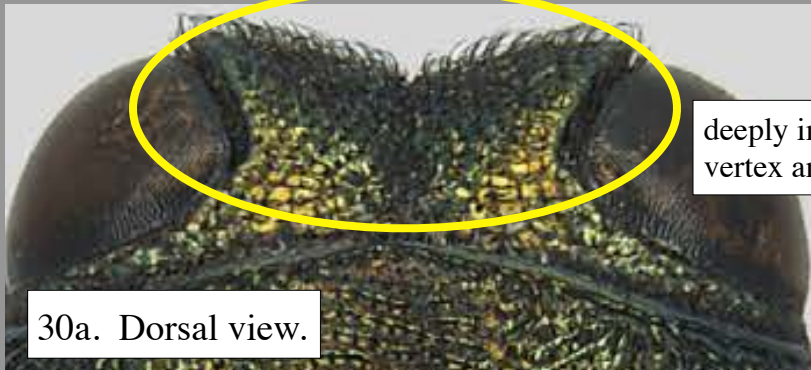


29e. “Bright”
form.

Photo by Steve Valley
Oregon
Department
of Agriculture

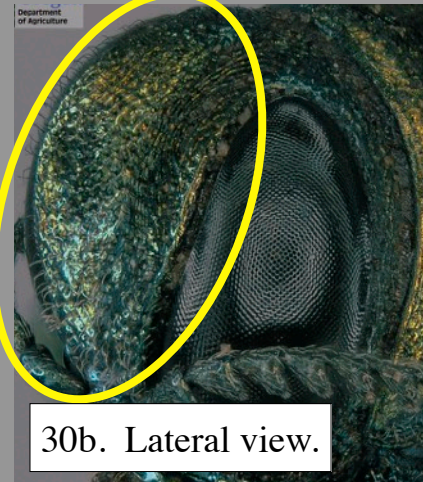
30 (26: Part II)

Vertex and frons deeply impressed and concave (a, b).....31



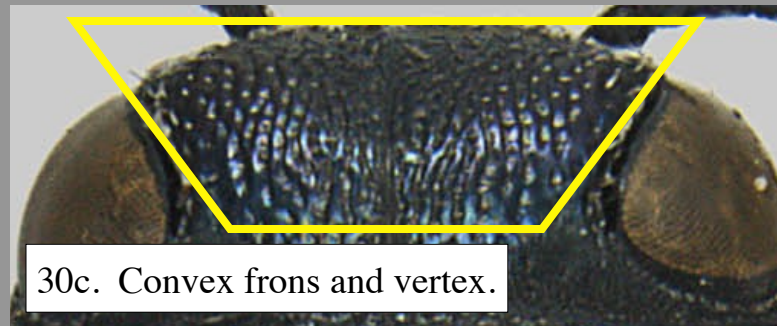
30a. Dorsal view.

deeply impressed
vertex and frons

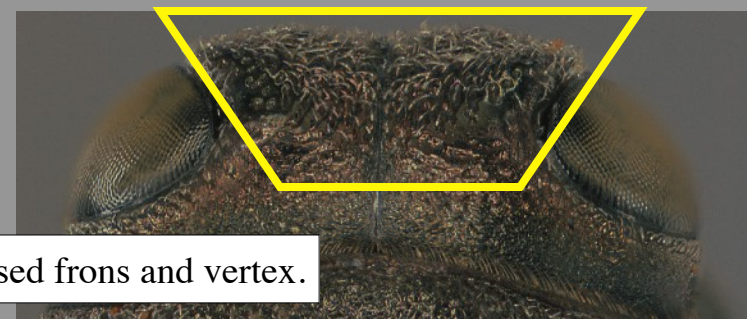
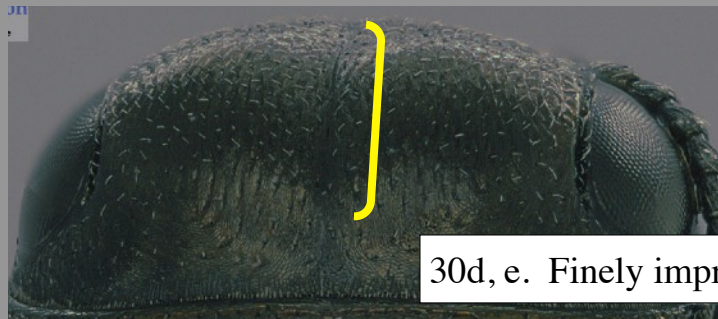


30b. Lateral view.

Vertex and frons convex, at most with a finely impressed median line (c-e)
.....FTT



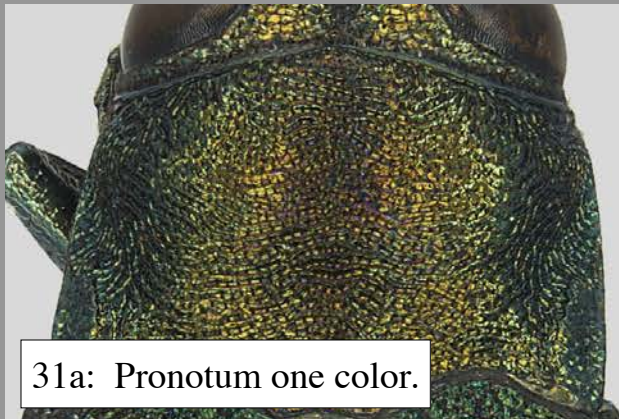
30c. Convex frons and vertex.



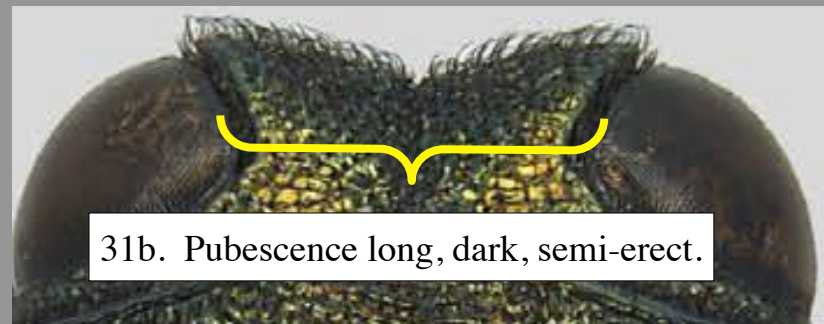
30d, e. Finely impressed frons and vertex.

31 (30): Part I

Pronotum all one color, metallic green (sometimes with bluish tints) (a); from dorsal view, frons with semi-erect, long, dark pubescence (b); portrait (f).....*Agrilus planipennis*, the Emerald Ash Borer*
 * This exotic species is not yet known from western North America.

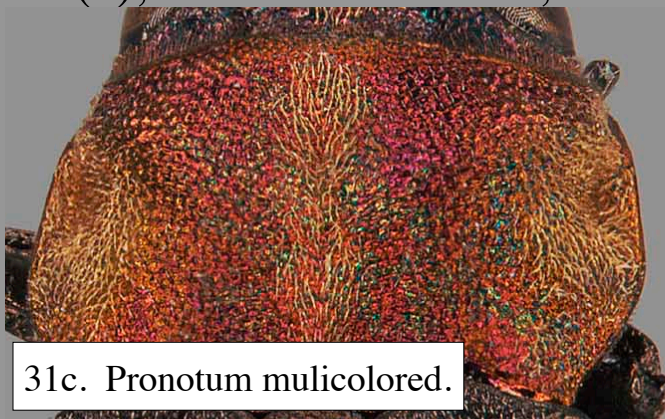


31a: Pronotum one color.

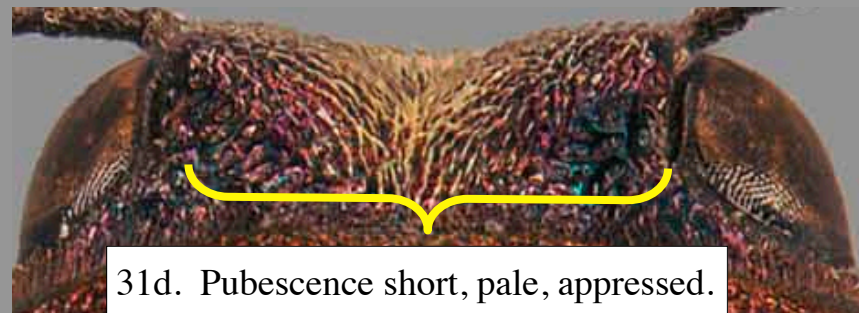


31b. Pubescence long, dark, semi-erect.

Pronotum multi-colored, with coppery stripes on either side of median line (c); from dorsal view, frons with appressed, short, pale pubescence (d).....FTT



31c. Pronotum multicolored.



31d. Pubescence short, pale, appressed.




31 (30): Part II

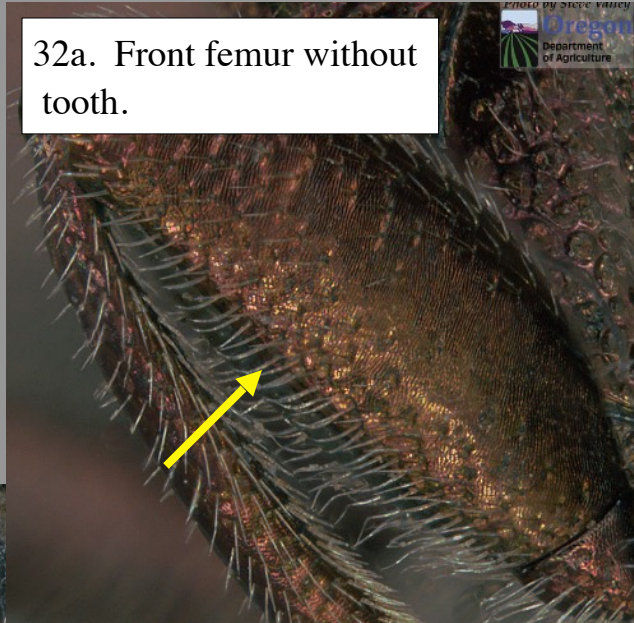
Agrilus
planipennis,
the Emerald
Ash Borer*

* This exotic species is not yet known from western North America.

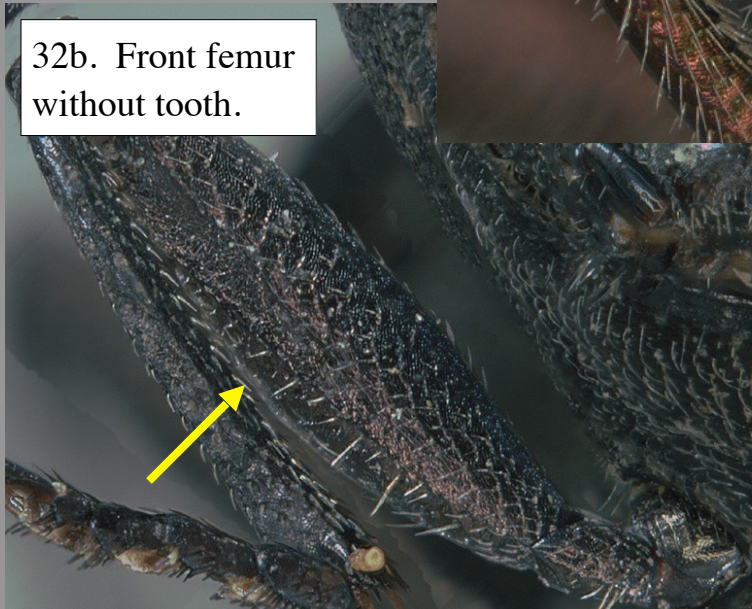


Middle of anterior
margin of front
femur without
tooth (a, b).....
.....33 

32a. Front femur without
tooth.



32b. Front femur
without tooth.



Middle of anterior margin
of front femur with large
tooth (c).....FTT

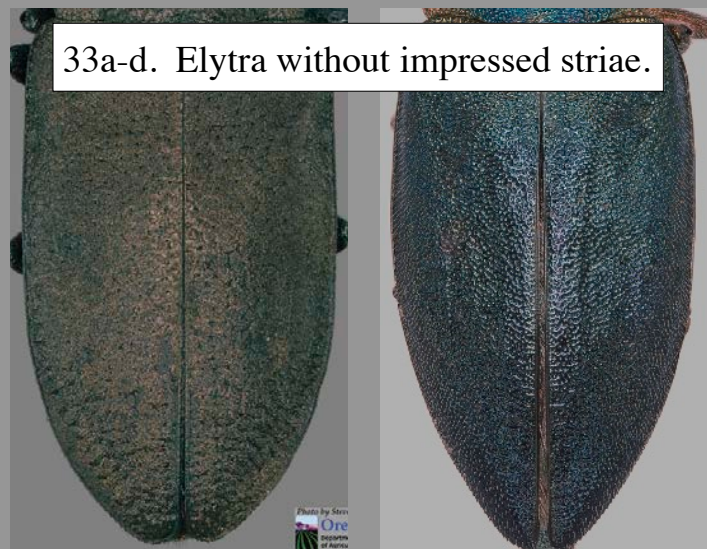
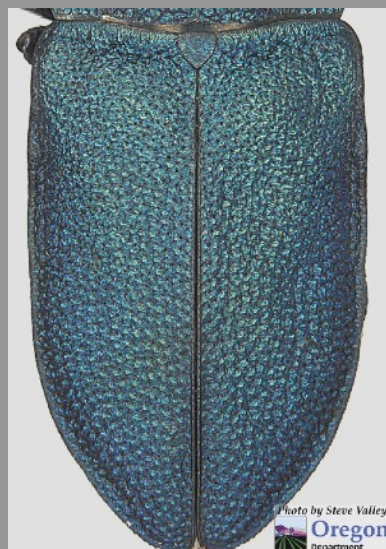


32c. Front femur with large tooth.

33 (32)



Elytra without impressed striae (**a-d**).....34



33a-d. Elytra without impressed striae.



Elytra with impressed striae (**d, e**).....FTT



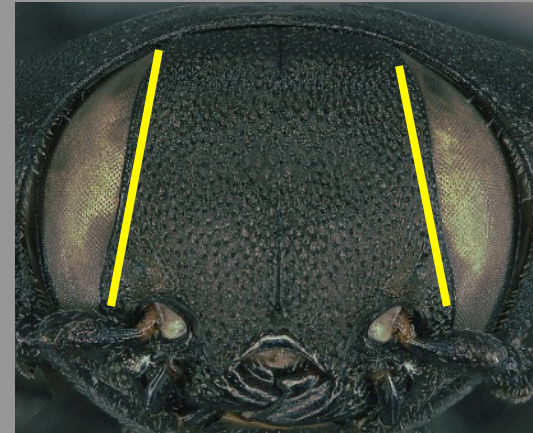
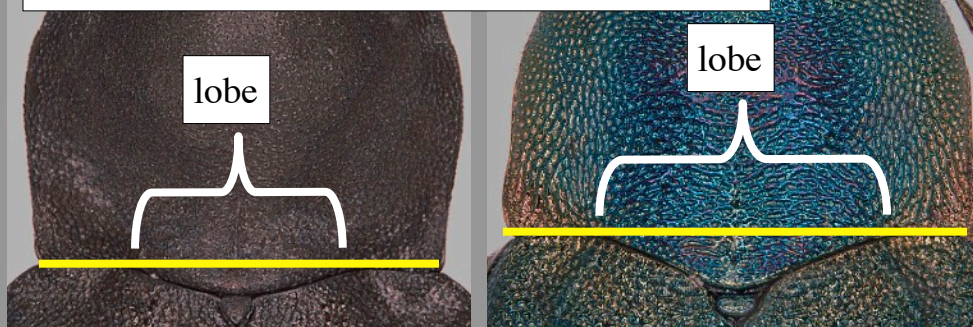
33c, d. Elytra with impressed striae.



34 (33)

Posterior margin of pronotum strongly lobed at middle, lobe extending posterior of hind angles (**a, b**); inner margins of eyes more distant at bottom than top (**c**).....35

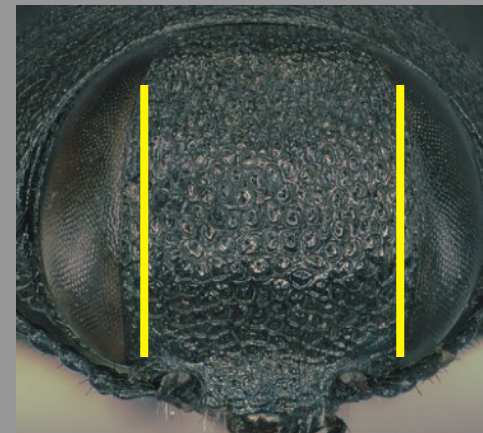
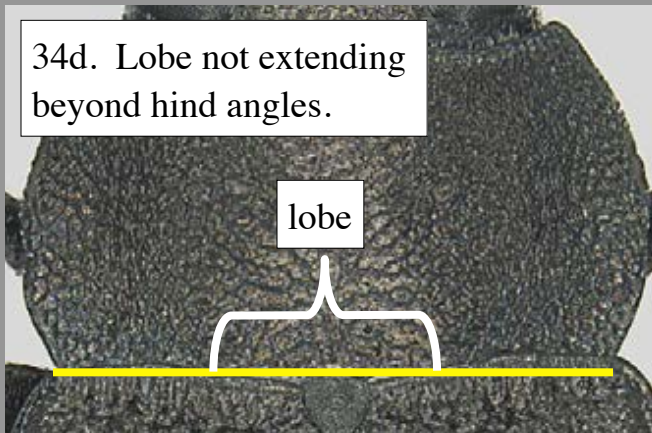
34a, b. Lobe extending posterior of hind angles.



34c. Inner margins of eyes not parallel.

Posterior margin of pronotum feebly lobed, lobe not extending posterior of hind angles (**d**); inner margins of eyes about parallel (**e**).....38

34d. Lobe not extending beyond hind angles.



34e. Inner margins of eyes about parallel.

35 (34)

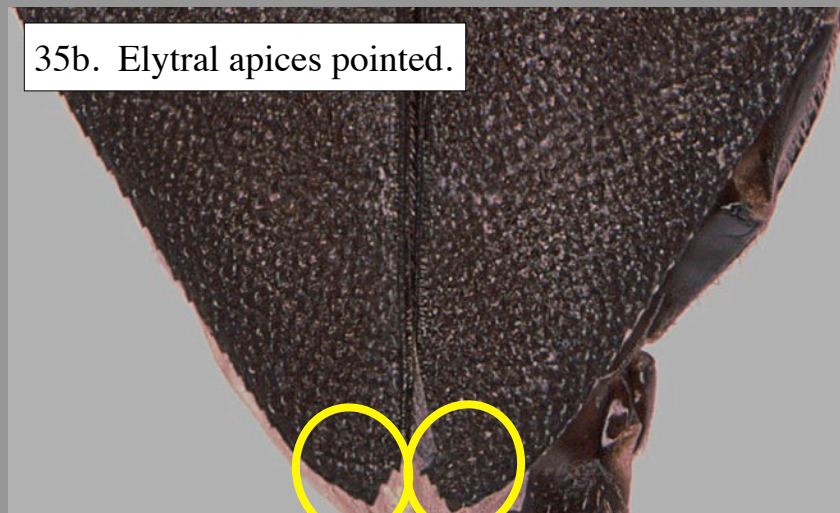
Punctures on pronotum shallow and fine (a); tips of elytral apices pointed (b).....36



35a. Punctures shallow and fine.



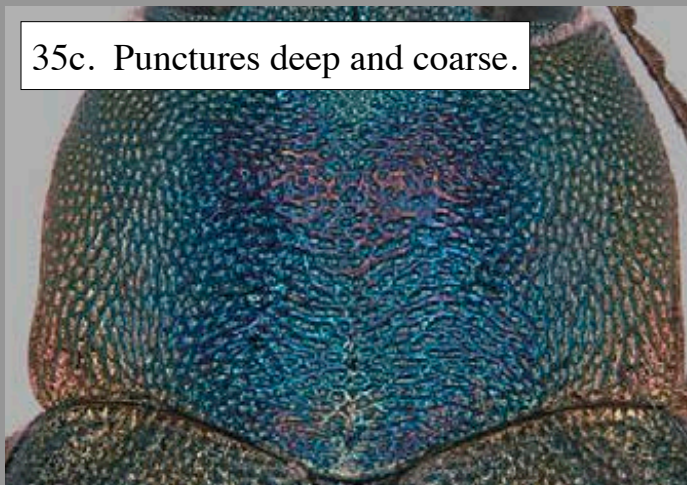
35b. Elytral apices pointed.



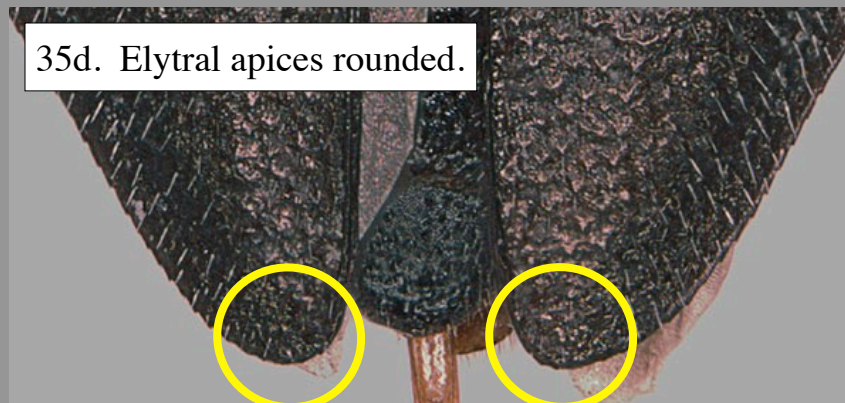
Punctures on pronotum deep and coarse (c); tips of elytral apices rounded (d).....37



35c. Punctures deep and coarse.



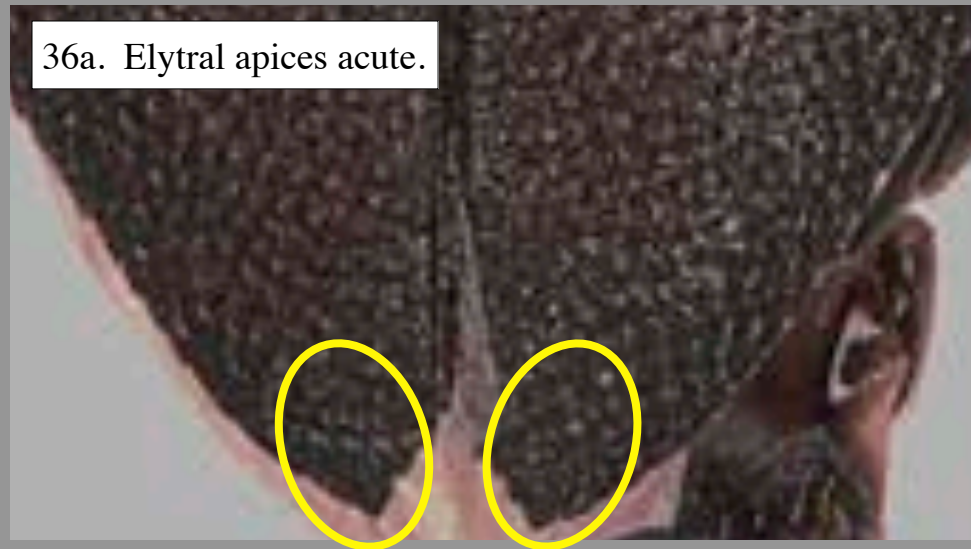
35d. Elytral apices rounded.



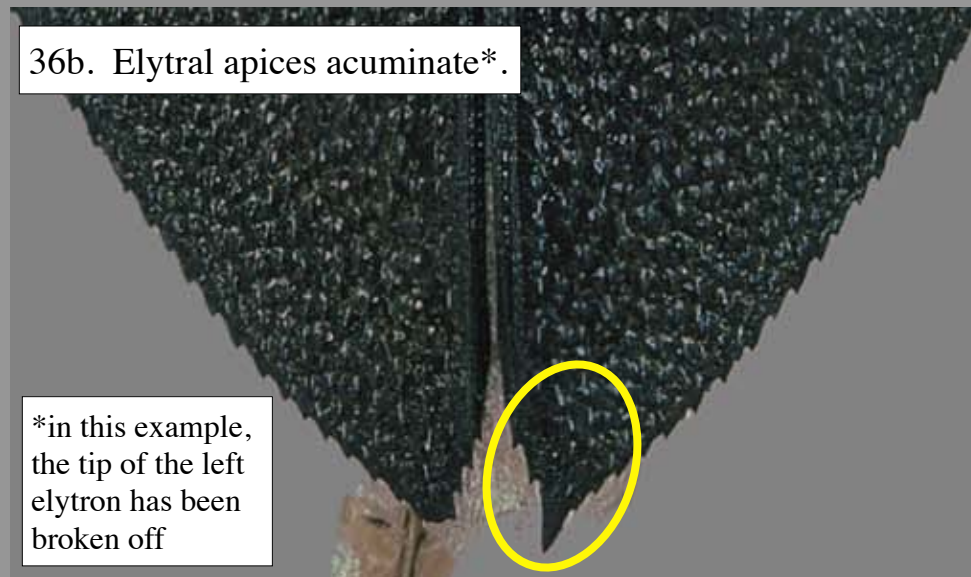
36 (35): Part I



Tips of elytral apices acute (a); portrait (c).....*Melanophila acuminata*



Tips of elytral apices acuminate (b).....FTT





36 (35): Part II

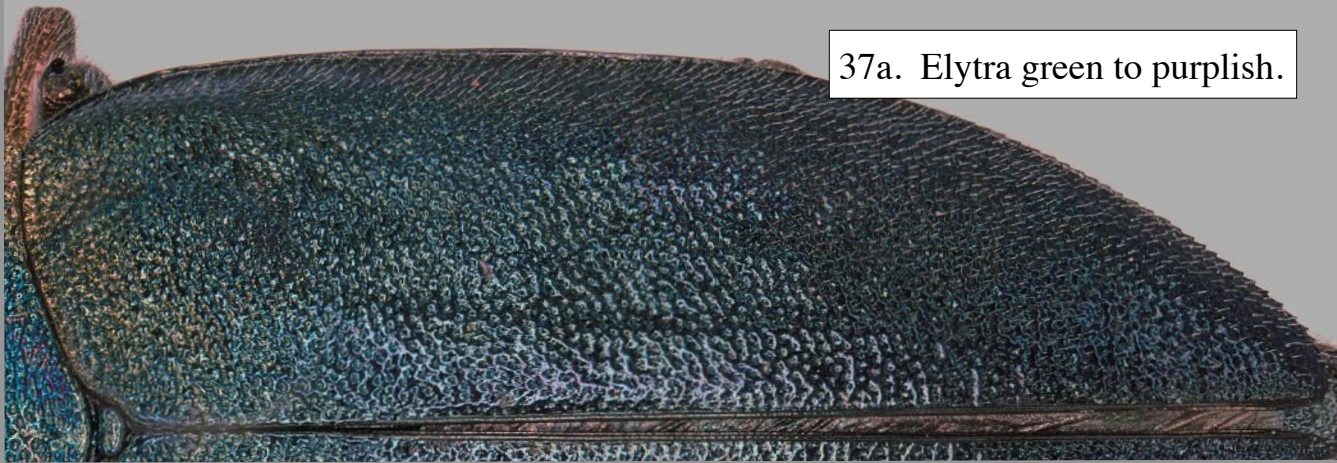
*Melanophila
acuminata*



36c.

37 (35): Part I

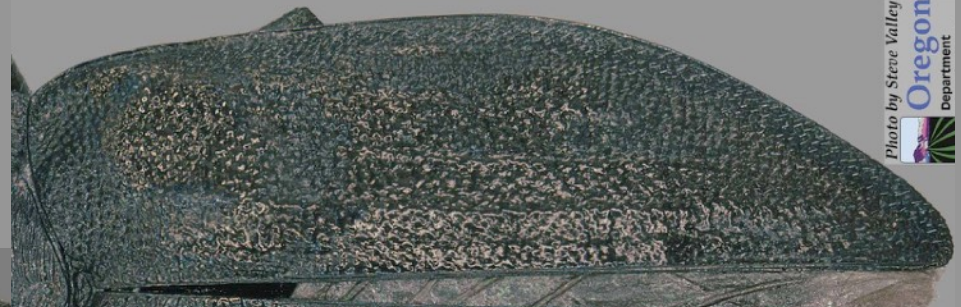
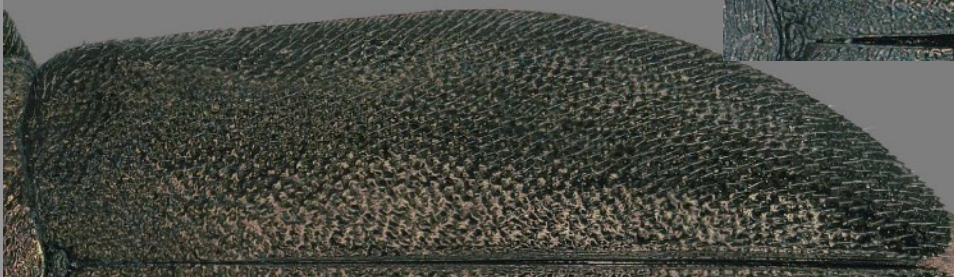
Elytra green to blue to purplish (a); portrait (d).....*Phaenops gentilis*



37a. Elytra green to purplish.

Elytra black to bronze (b, c).....FTT

37b, c. Elytra black to bronze.





37 (35): Part II

*Phaenops
gentilis*



37d.



38 (34): Part I

Dorsal color brown, black, rarely faintly metallic; portraits (**a, b**).....

..... "Black" *Anthaxia* spp.*



See below and slide 38: Part II.

Dorsal color metallic blue, coppery, green, or purplish; portraits (**c, d**).

..... "Metallic" *Anthaxia* spp.*



See below and slide 38: Part III.

*The genus *Anthaxia* is extremely speciose, with species often separated by subtle characters. None are known to be of regulatory significance, so for convenience, the species are herein crudely grouped by color.

38 (34): Part II



“Black”
Anthaxia
spp.





38 (34): Part III



“Metallic”
Anthaxia spp.

