

**Illustrated Key to the
Dendroctonus
of North America**

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Version 08-28-2013

An Illustrated Key to the *Dendroctonus* of North America

Introduction and use of this key

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Bark beetles in the genus *Dendroctonus* are among the most important members of the subfamily Scolytinae in both the ecological and economic senses. These beetles are well named, with several of the species renowned for widespread damage in conifer forests and plantations. One, the mountain pine beetle, *Dendroctonus ponderosae*, is currently wreaking havoc throughout much of western North America, including potentially threatening the existence of whitebark pine. Accurate identification of members of this genus is important to tracking the distribution and impacts thereof, especially where human actions may be exerting influence.

Despite the justifiable recognition of the flaws and limitations inherent in a dichotomous key, some taxa do not lend themselves to matrix-based identification aids such as LUCID™. This is particularly true of taxa such as *Dendroctonus*, whose identification is largely dependent upon the assessment of subtle character states. Consequently, this key is arranged in the standard dichotomous manner.

The key is largely based upon that used by the late Stephen L. Wood in his landmark 1982 treatment of North and Central American bark beetles. Several characters I have found unreliable or felt were too difficult to assess have been omitted, as have several species found outside of North America. Unlike Wood, I've had the privilege of access to superb digital imagery, along with access to the talents of a true artist of that medium, Steven A. Valley. Consequently, the users of this key will be able to rely

An Illustrated Key to the *Dendroctonus* of North America

Introduction and use of this key (continued)

on images of all the character states utilized herein. This is a vast improvement over reliance primarily upon textual descriptions, although identification of these bark beetles is not yet necessarily a “snap”.

There are fourteen species of *Dendroctonus* described from North America north of Mexico. Although this species diversity is far from daunting in and of itself, identification of these species can be challenging. Several of the characters used for identification require subtle interpretation. Identification can be complicated by sexual dimorphism and great intraspecific variation in size. It is critical to have clean specimens, especially on the frons and elytral apex, and it is often helpful to have good series of material from which to work. Even with perfect specimens and long series, several species pairs can be difficult to reliably determine and it may be necessary to submit material to a cooperating taxonomist.

A particular cautionary note: several of the images show pale brown or reddish brown specimens versus dark specimens. With the possible exception of *Dendroctonus terebrans* versus *D. valens*, color is not a reliable characteristic. Recently eclosed adults are often pale, but darken with age.

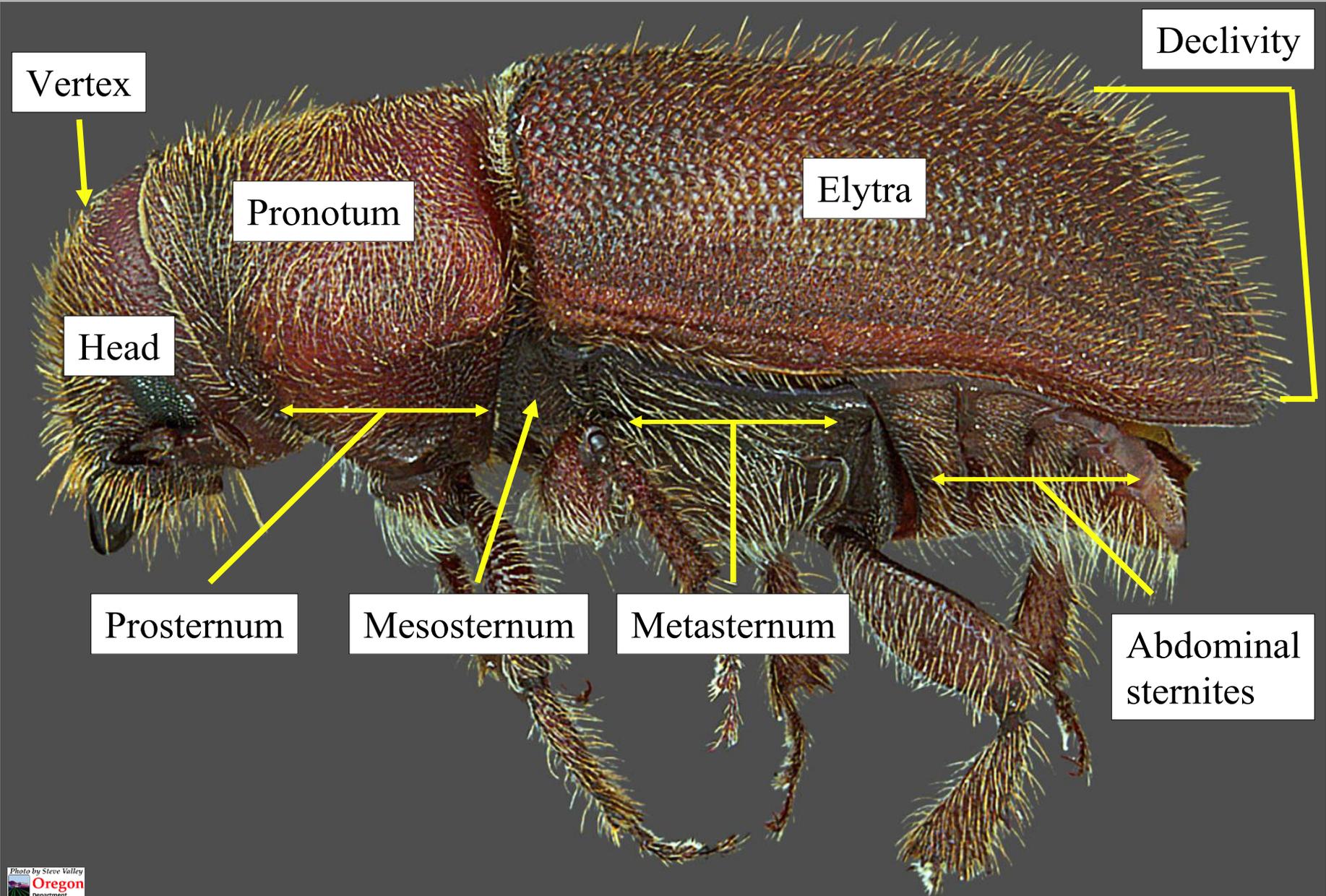
Acknowledgements

Although a great many people have helped with this project, I want to single out a few for special recognition, without whose help success would have been impossible:

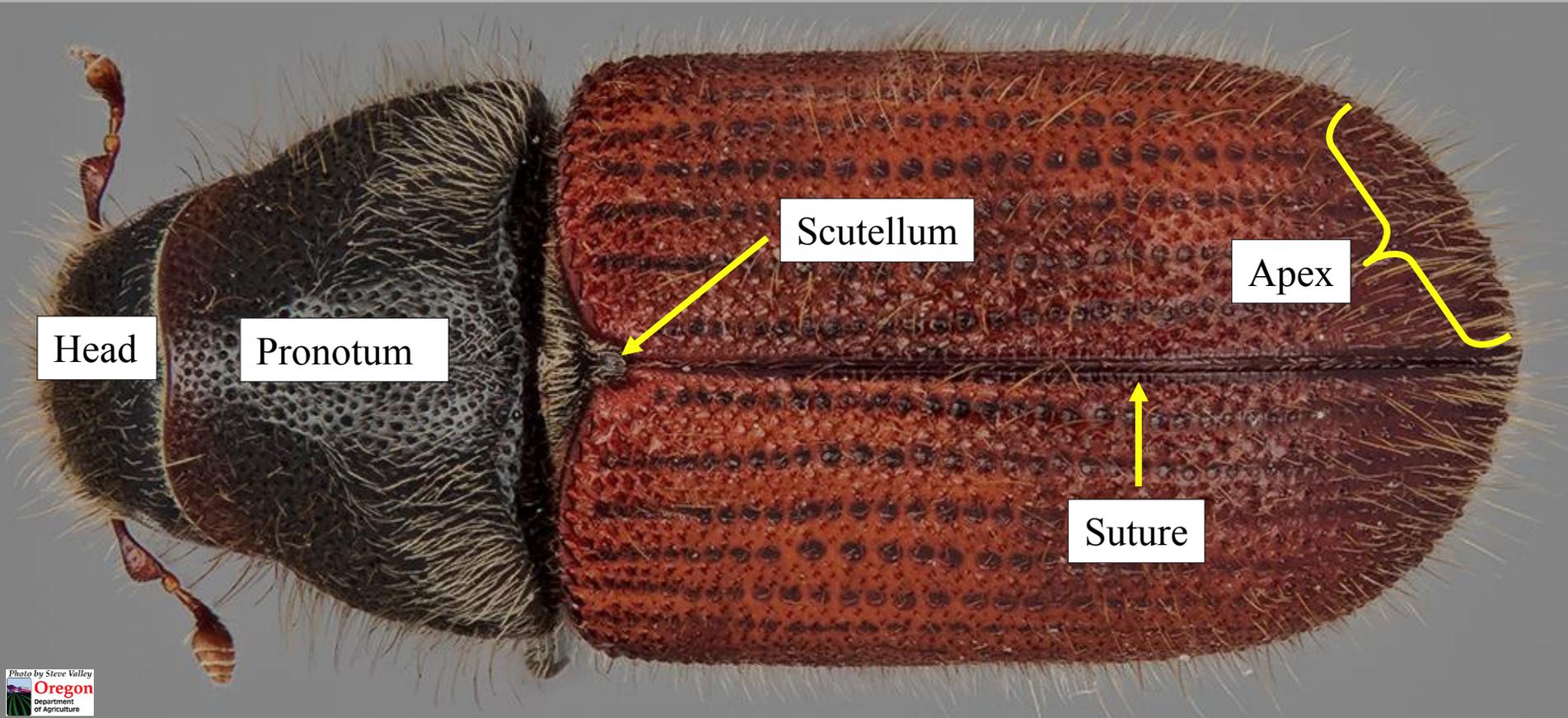
Joshua Vlach, my long-suffering colleague at Oregon Department of Agriculture, who helped borrow, prepare, and curate specimens, and, more importantly, vetted my ideas on how best to present this information.

David Maddison, Curator, and Chris Marshall, Collections Manager, Oregon State University Arthropod Collection, for generous loans of material, often on short notice.

BASIC BODY PARTS OF SCOLYTINAE

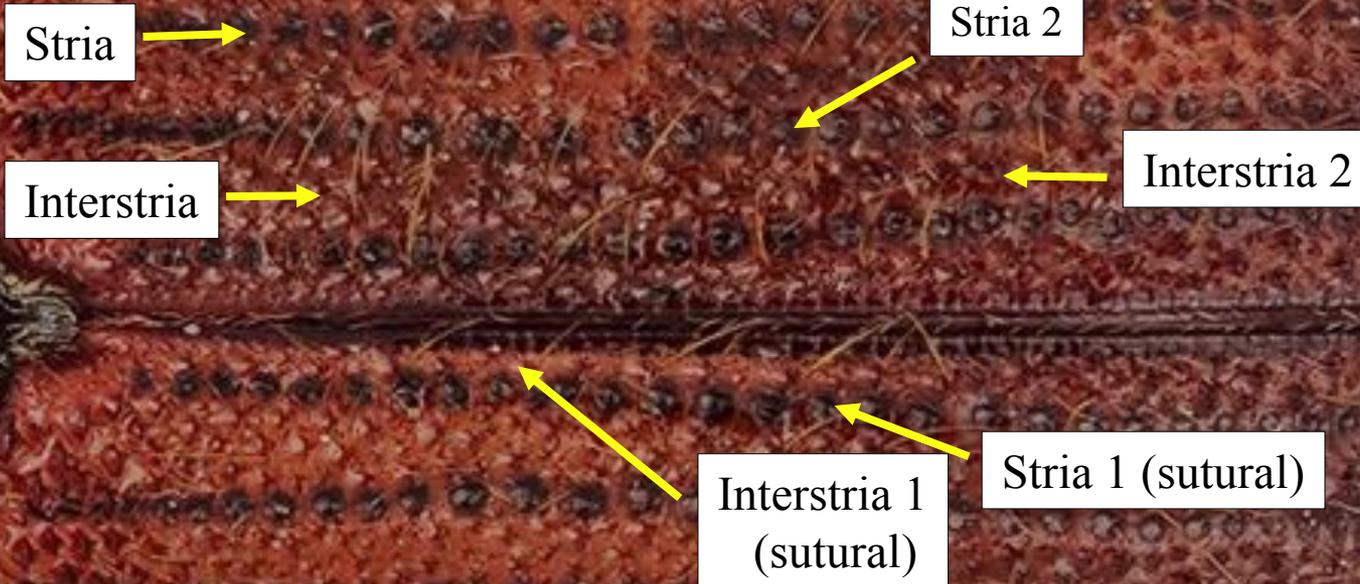


BASIC BODY PARTS OF SCOLYTINAE



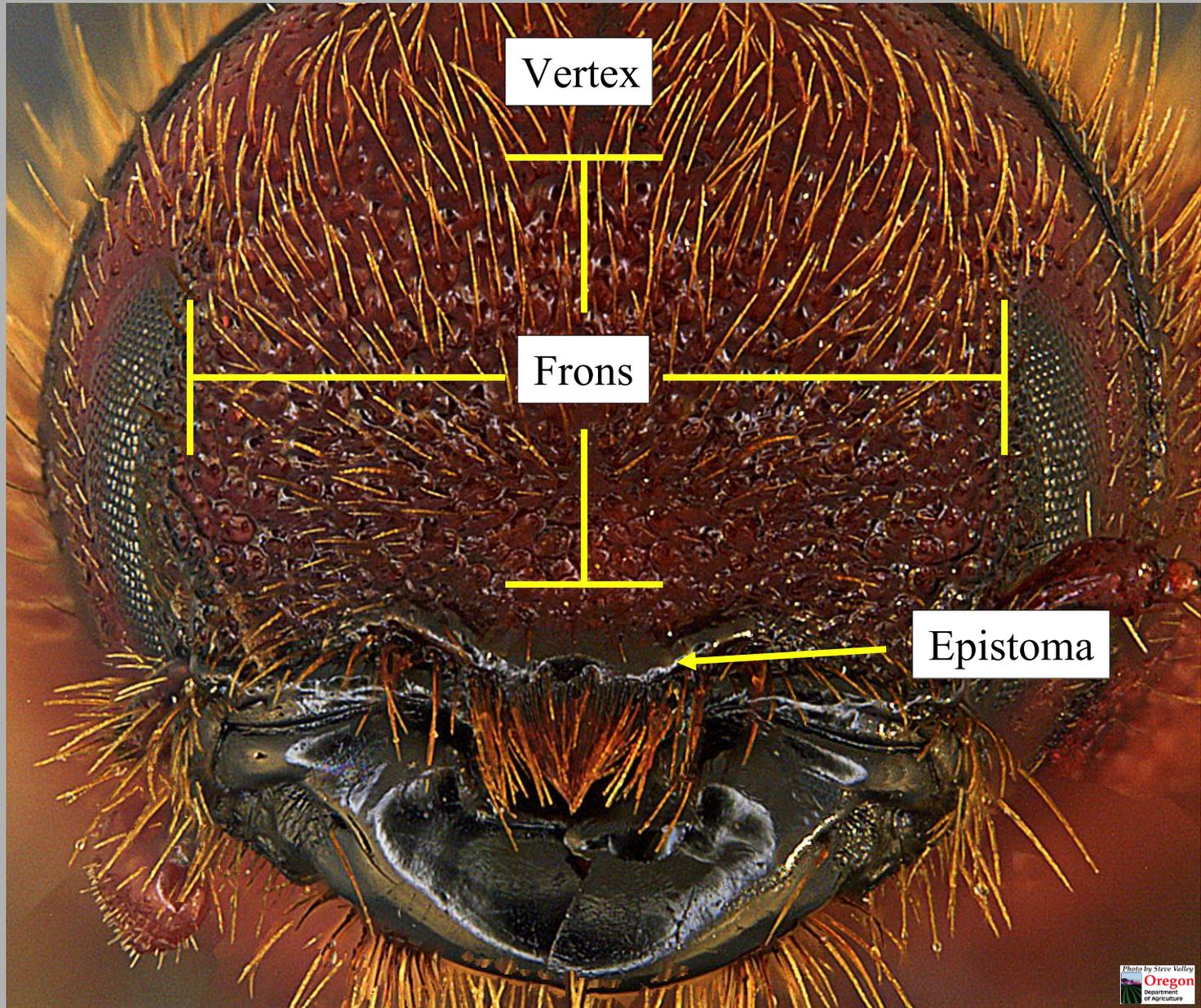
BASIC BODY PARTS OF SCOLYTINAE

Striae are the series of large, linearly arranged, punctures on the elytra. These (and the interstriae) are counted from the suture (sutural stria = 1).



Interstriae are the more-or-less flattened ridges between striae. Interstriae may or may not be punctate - if these are, the punctures are normally smaller than those of the striae.

BASIC BODY PARTS OF SCOLYTINAE



A Few Technical Terms

Tubercle: a bump, a generally rounded process emerging from a surface, generally no longer than wide

Vestiture: a clothing of hairs or scales

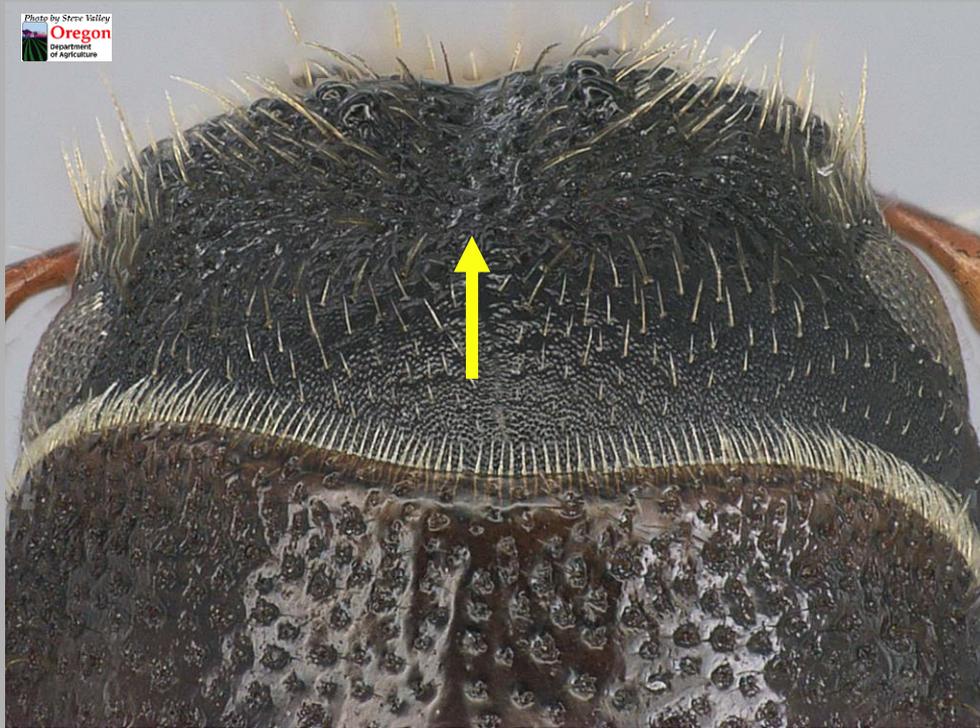
1: Part I

Frons with deep, narrow, median groove between eyes, usually with one or more tubercles on each side (a); dorsal vestiture of elytra shorter and dense (c).....2

Frons without deep median groove between eyes, without tubercles (b); dorsal vestiture of elytra longer and less dense (d).....6



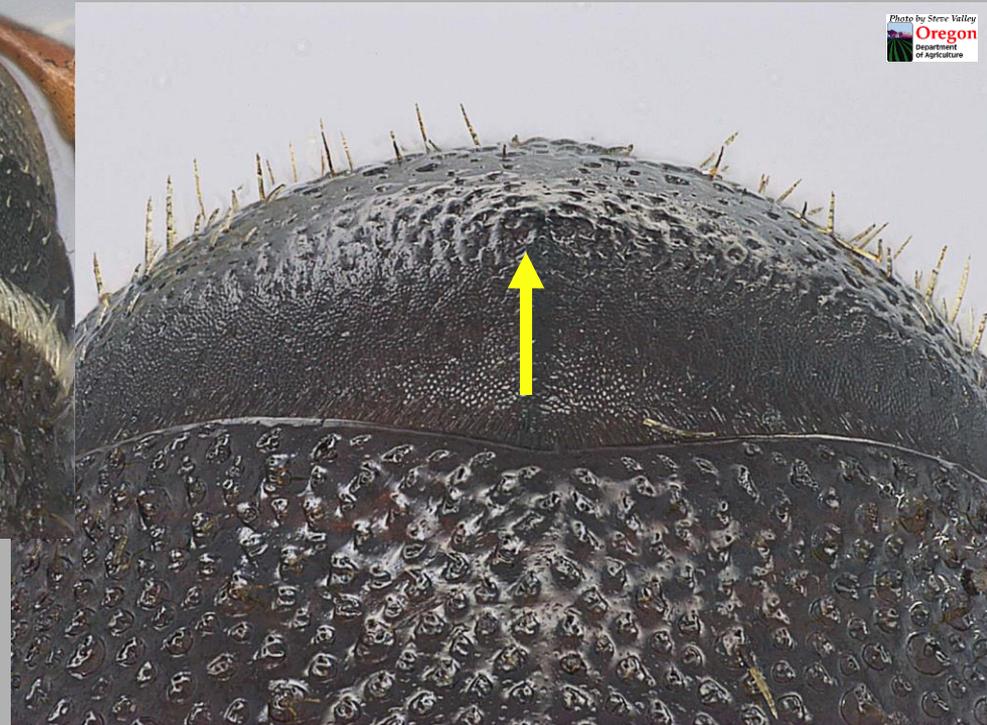
Photo by Steve Valley
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of Agriculture



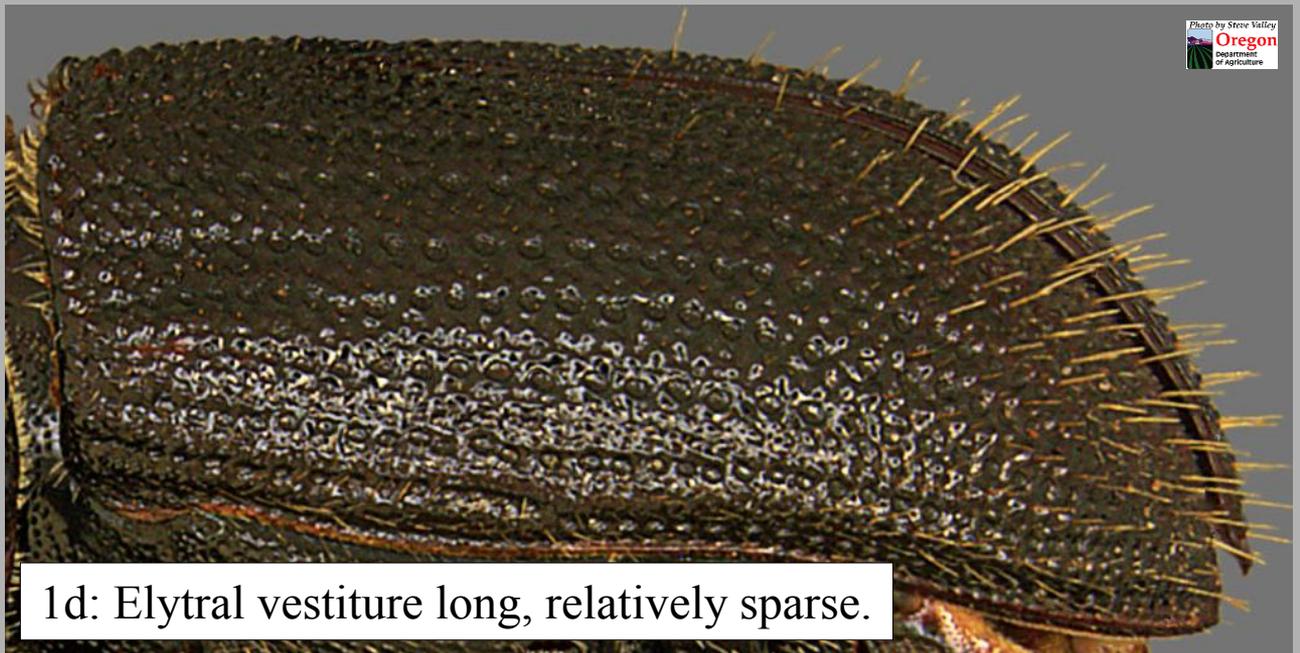
1a: Frons with median groove (dorsal view).

1b: Frons without median groove (dorsal view).

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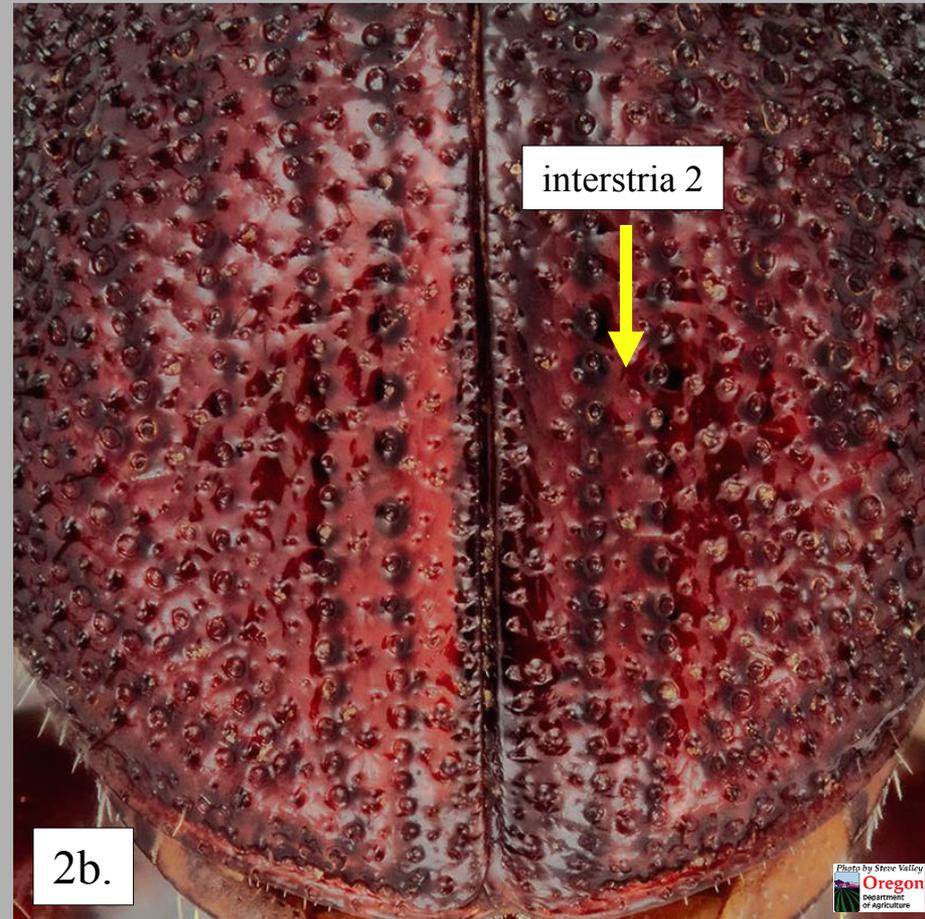
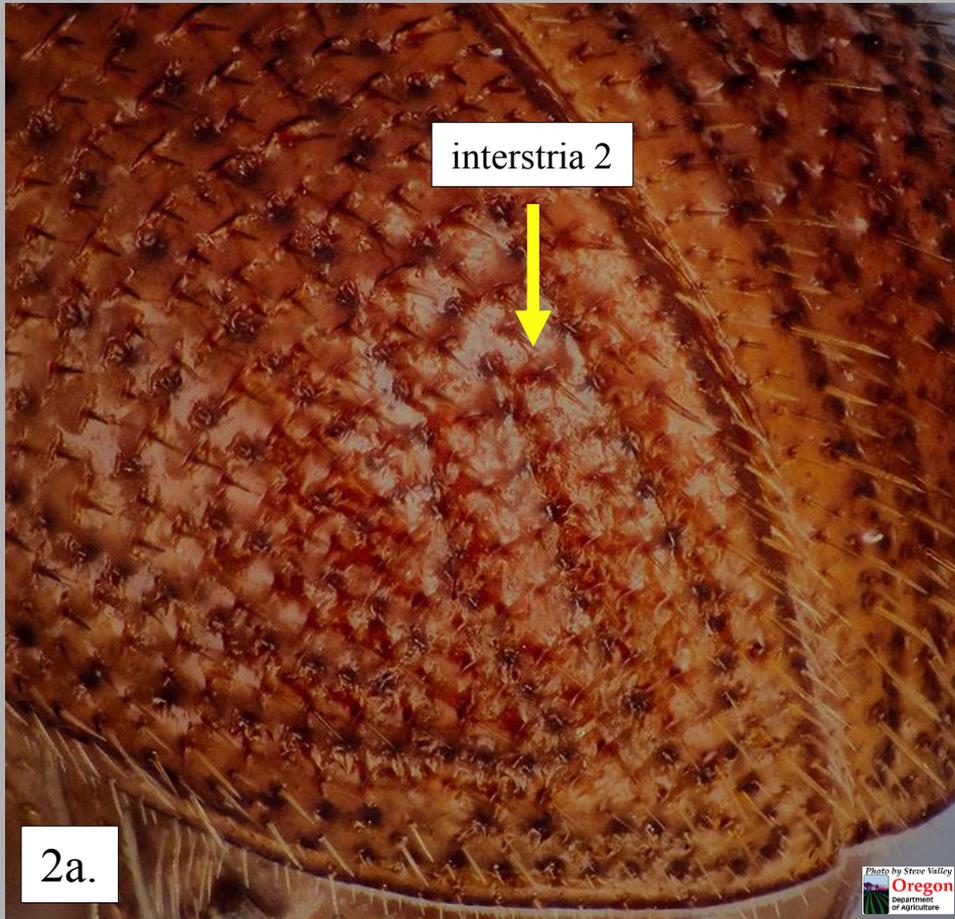
1: Part II



2 (1)

Declivital interstriae 2 as wide as 1 and 3, not constricted posteriorly; punctures and granules more abundant, confused (a); 2.5-5.0 mm in length.....3

Declivital interstriae 2 narrower than 1 and 3 or constricted posteriorly; punctures and/or granules sparse, in a single row (b); 3.8-7.4 mm in length.....5



3 (2): Part I

Pubescence in posterior half of elytra more-or-less uniformly short, longest no more than about 1/2 width of interstriae (best seen in lateral view) (a); elytral declivital striae indistinct, not impressed (c); transverse ridges of interstriae in anterior 1/3 of elytra less than full width (e); portraits (g-h).....
.....*Dendroctonus brevicomis* LeConte

At least some pubescence in posterior half of elytra long, as wide as interstriae (best seen in lateral view) (b); elytral declivital striae distinct, impressed (d); transverse ridges of interstriae in anterior half of elytra longer, at least some as wide as the interstriae (f).....4



3a. *Dendroctonus brevicomis*: pubescence all short.

3b. Some pubescence long.



3 (2): Part II



3c. *Dendroctonus brevicomis*: striae shallow, indistinct.

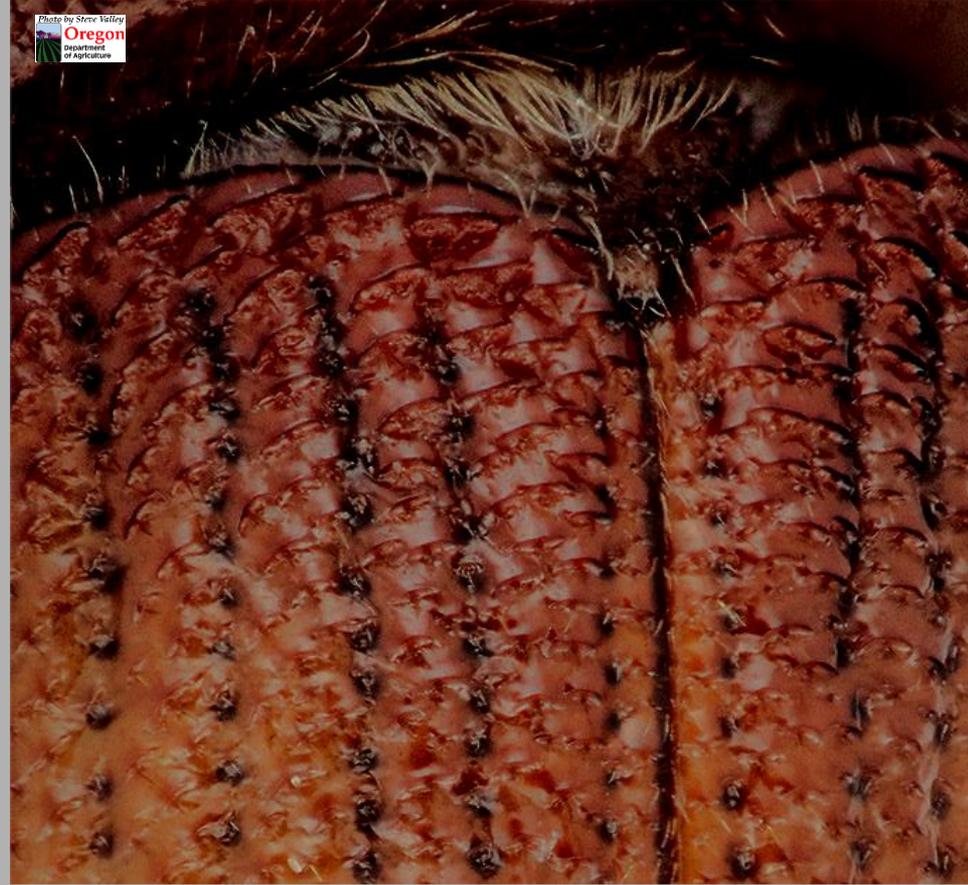


3d. Striae impressed, distinct.

3 (2): Part III



3e. *Dendroctonus brevicomis*: transverse ridges on interstriae shorter, less than full width thereof.



3f. Transverse ridges on interstriae longer, full width thereof.

3 (2): Part IV

Dendroctonus brevicomis LeConte



3g.



3h.



4 (3): Part I

Vertex and frons with punctures smaller, more widely spaced, and less extensively distributed with larger punctures not extending beyond mid-width of eye on vertex nor onto lower frons above epistoma (**a, c**); discal interstriae smoother, with ridges smaller (**e**); total average size smaller, 2.0-3.2 mm (average 2.8 mm); Arizona, eastern U.S., and Honduras; portraits (**g-h**).....*Dendroctonus frontalis* Zimmerman

Vertex and frons with larger and more closely spaced punctures (causing the surface to appear rugose) extending to the posterior margin of the eyes on the vertex and onto the lower frons above the epistoma (**b, d**); discal interstriae rough, with larger ridges (**f**); total average size larger, 2.3-3.7 mm (average 3.2 mm); southern Arizona and Mexico; portraits (**i-j**).....
.....*Dendroctonus mexicanus* Hopkins

4 (3): Part II



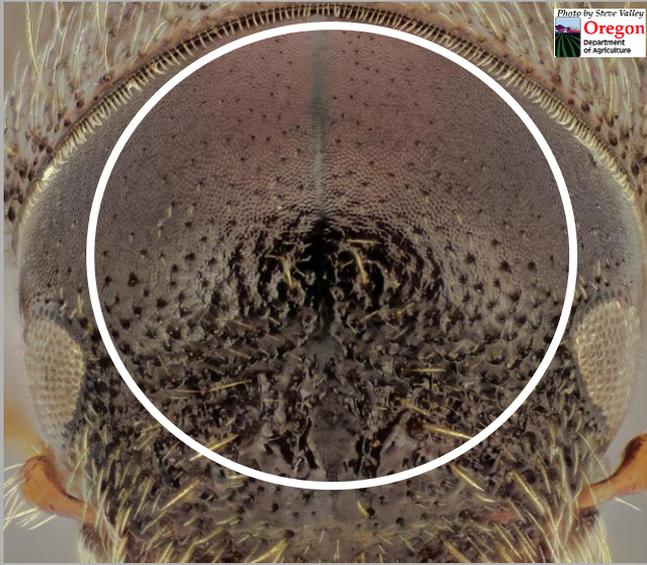
4a. Female *D. frontalis* frons & vertex.



4b. Female *D. mexicanus* frons & vertex.

4 (3): Part III

4c.
Male *D. frontalis*
frons &
vertex.



4d.
Male *D. mexicanus*
frons &
vertex.



4e. Smooth interstriae of *D. frontalis*.



4f. Rough interstriae of *D. mexicanus*.



4 (3): Part IV

Dendroctonus frontalis Zimmerman



3g.

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3h.

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4 (3): Part V

Dendroctonus mexicanus Hopkins



3i.

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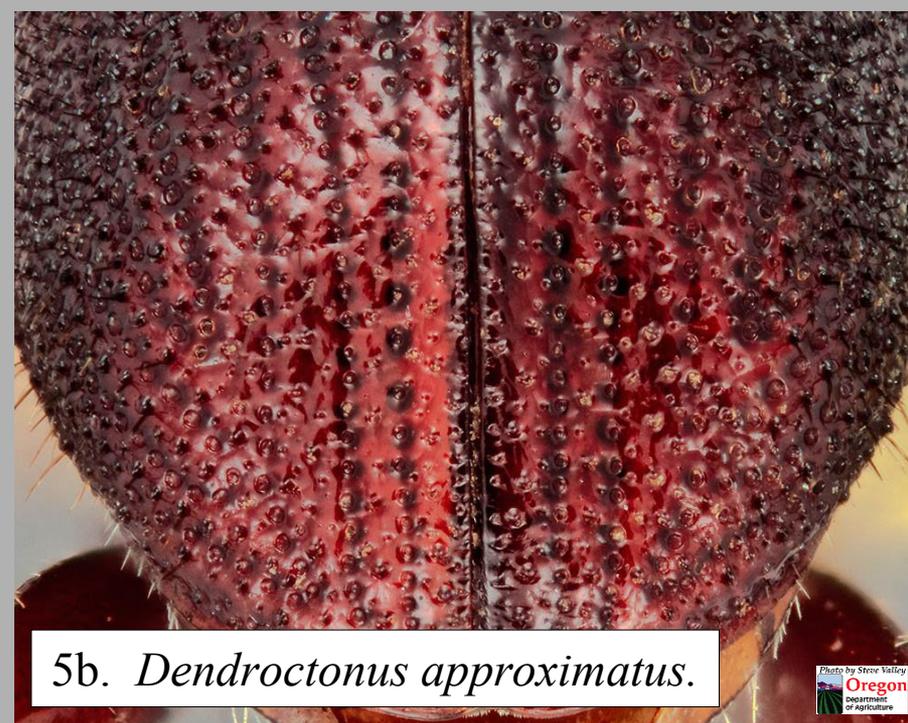
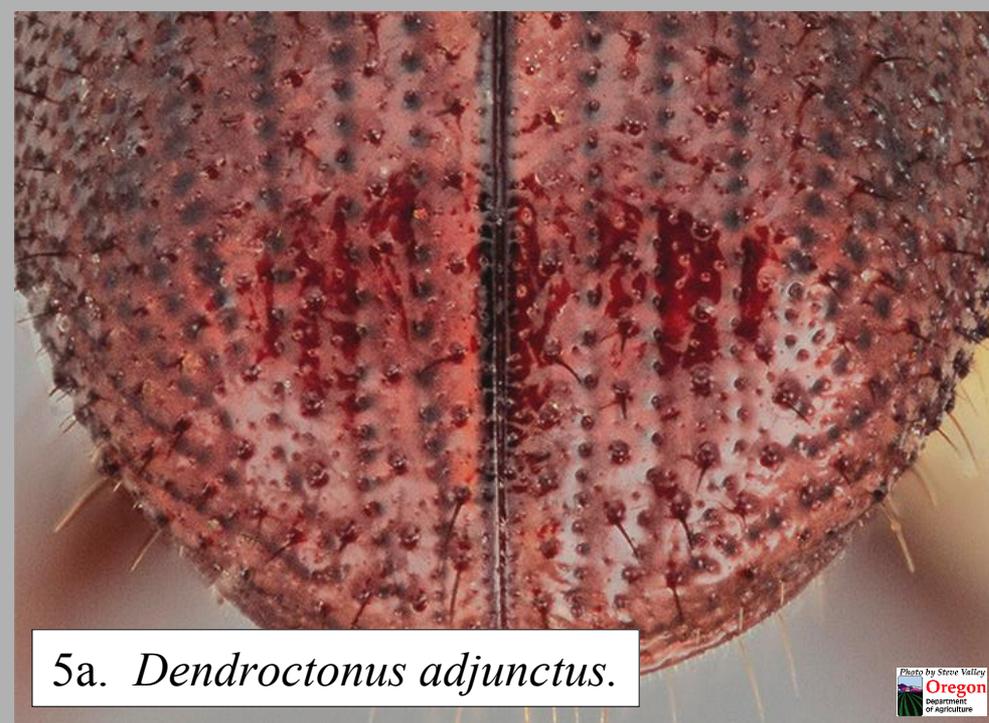
3j.

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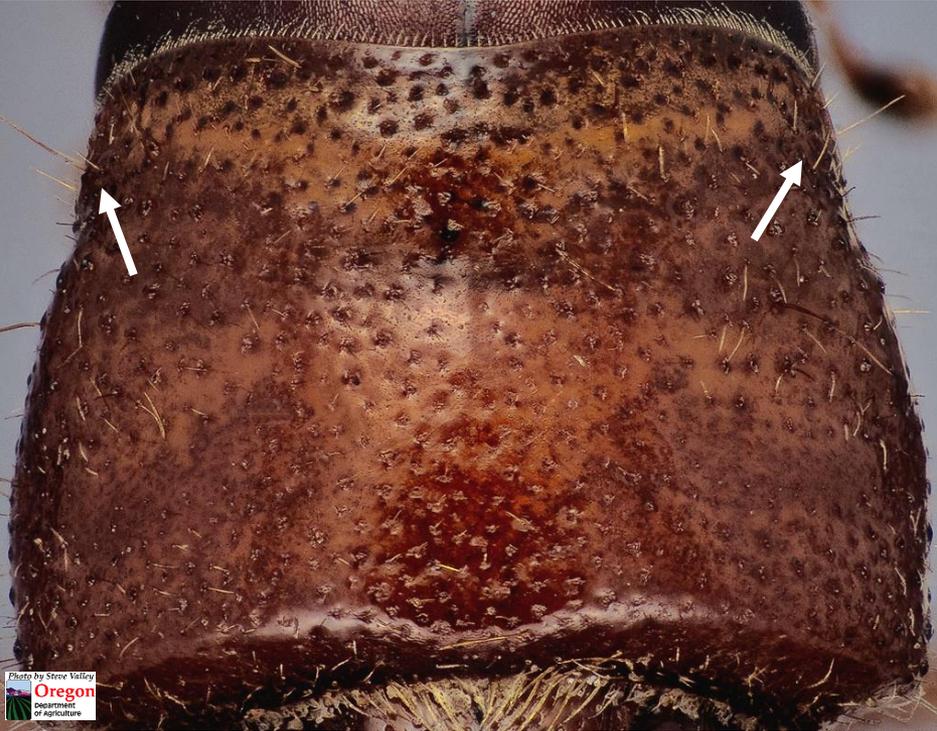
5 (2): Part I ■

Granules on elytral declivital interstriae 1 and 3 sparse, in a single row (a); transverse elevation of female pronotum poorly defined laterally (c); male frons without lateral tubercles (e-f); portraits (i-j)...*Dendroctonus adjunctus* Blandford

Granules on elytral declivital interstriae 1 and (usually) 3 more abundant, confused (b); transverse elevation of female pronotum very prominent laterally (d); male frons with prominent lateral tubercles (g-h); portraits (k-l).....
.....*Dendroctonus approximatus* Dietz



5 (2): Part II

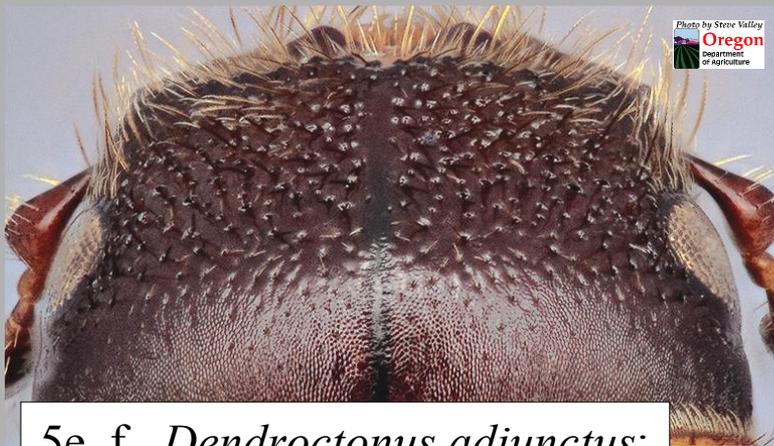


5c. *Dendroctonus adjunctus*: transverse elevation of female pronotum less prominent, especially laterally.

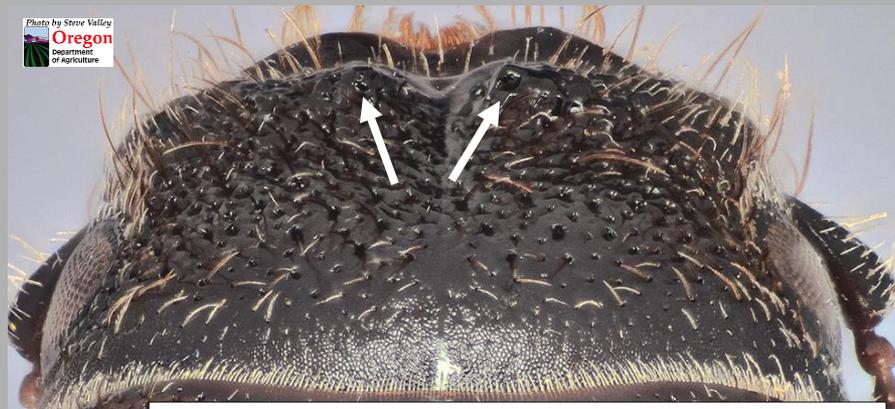
5d. *Dendroctonus approximatus*: transverse elevation of female pronotum prominent, esp. laterally.



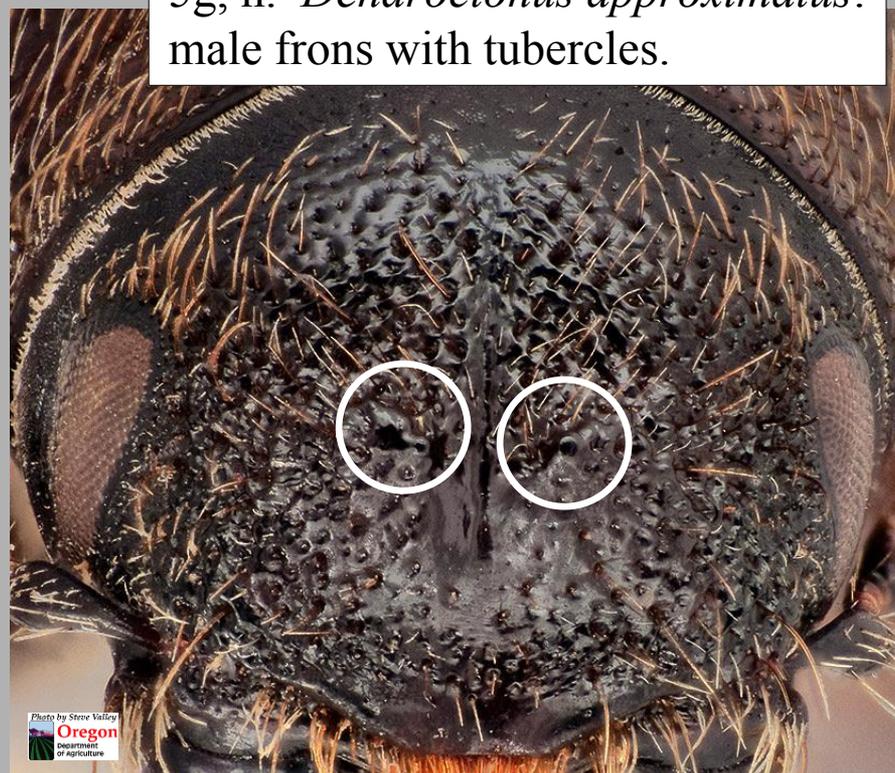
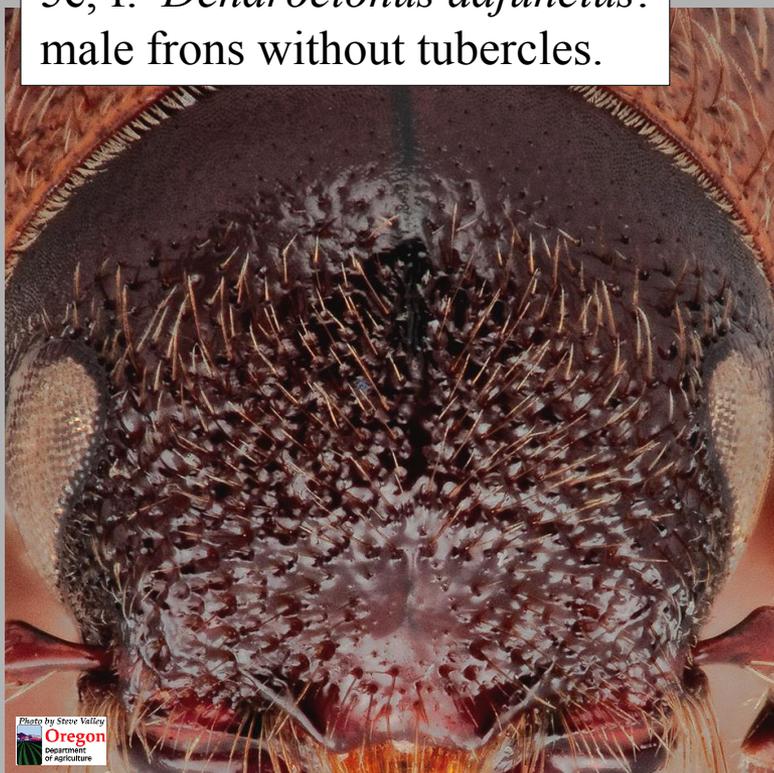
5 (2): Part III



5e, f. *Dendroctonus adjunctus*:
male frons without tubercles.



5g, h. *Dendroctonus approximatus*:
male frons with tubercles.



5 (2): Part IV

Dendroctonus adjunctus Blandford



5 (2): Part V

Dendroctonus approximatus Dietz



5k.

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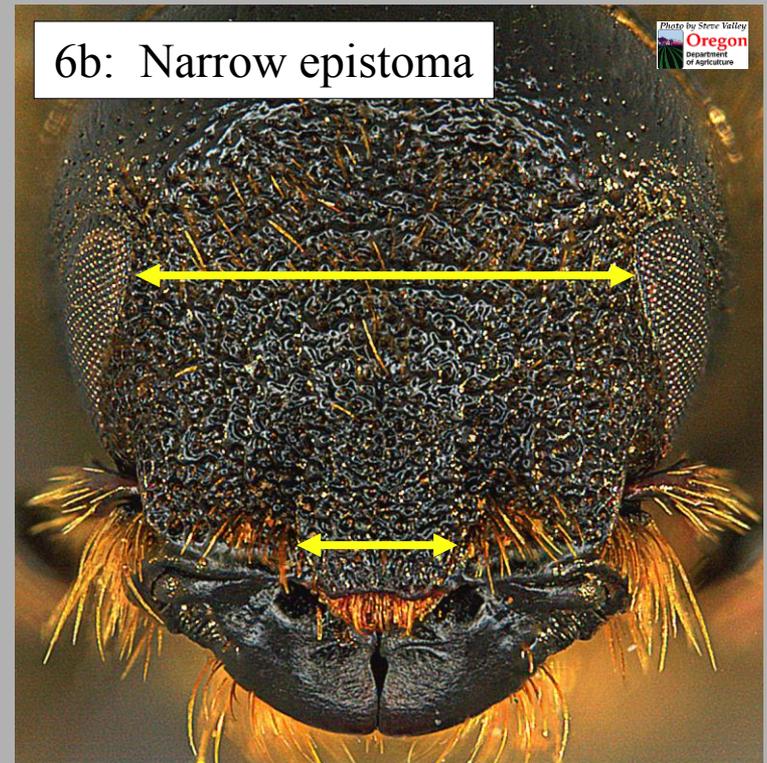
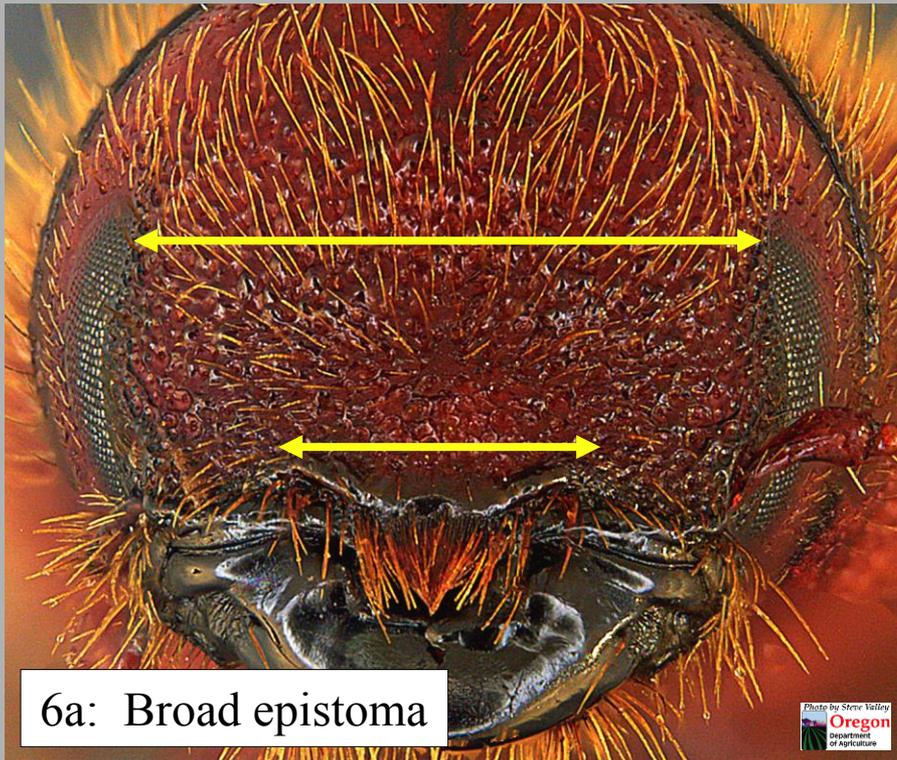
5l.

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6 (1): Part I ■

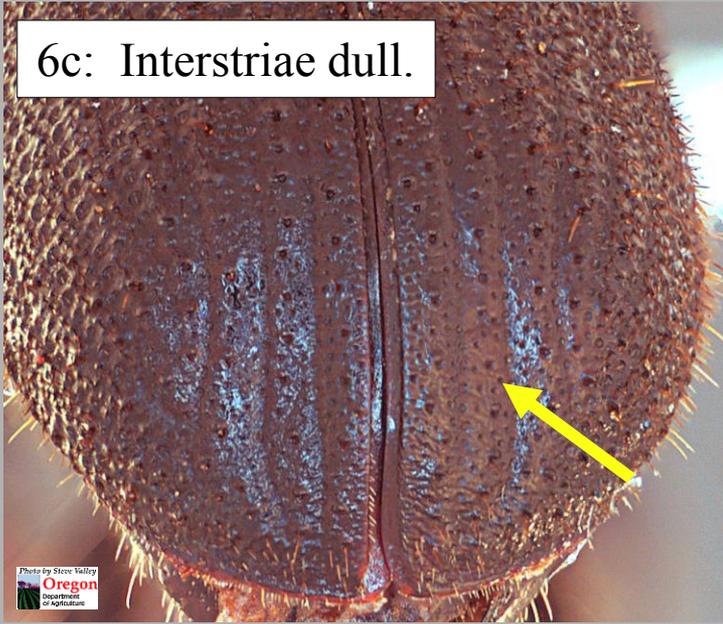
Epistomal process broader, distance between eyes about 2X its basal width (a); elytral declivital interstriae dull (usually roughened) (c) or, if shining, punctures virtually all granulate (d)7

Epistomal process narrower, distance between eyes about 3X its basal width (b); elytral declivital interstriae smooth and shining, most punctures impressed (sometimes a few granulate) (e).....10 ■

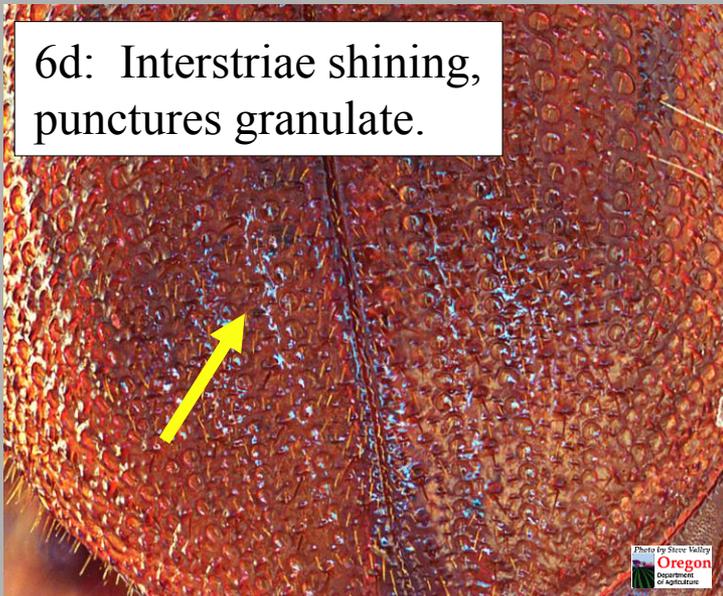


6 (1): Part II

6c: Interstriae dull.



6d: Interstriae shining, punctures granulate.

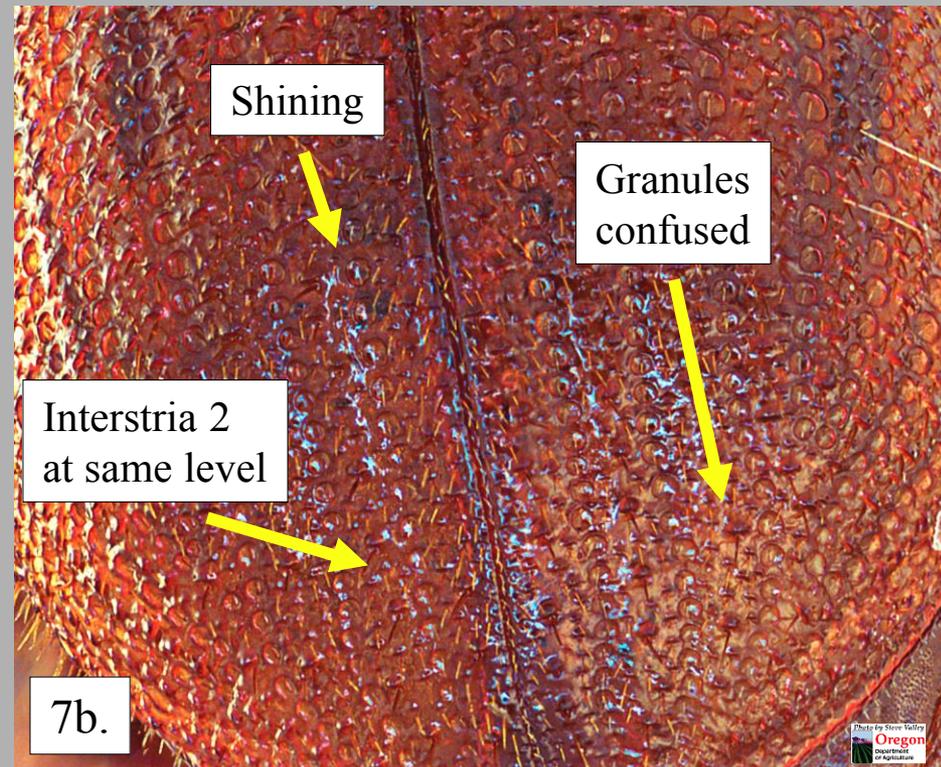
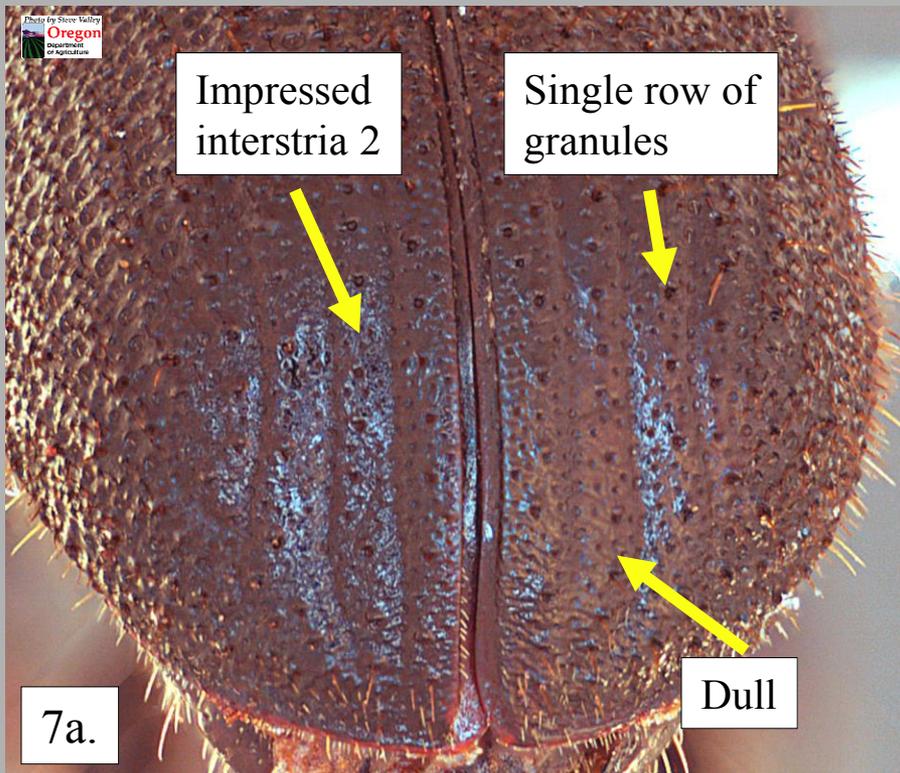


6e: Interstriae smooth, shining, punctures Impressed.

7 (6)

Surface of elytral declivity dull; declivital interstriae 2 impressed, usually flat, interstriae 1 strongly elevated; granules of declivital interstriae usually in a single, distinct row (a).....8

Surface of elytral declivity shining; declivital interstriae all at same level; granules of declivital interstriae numerous and confused, NOT forming a single row (b).....9



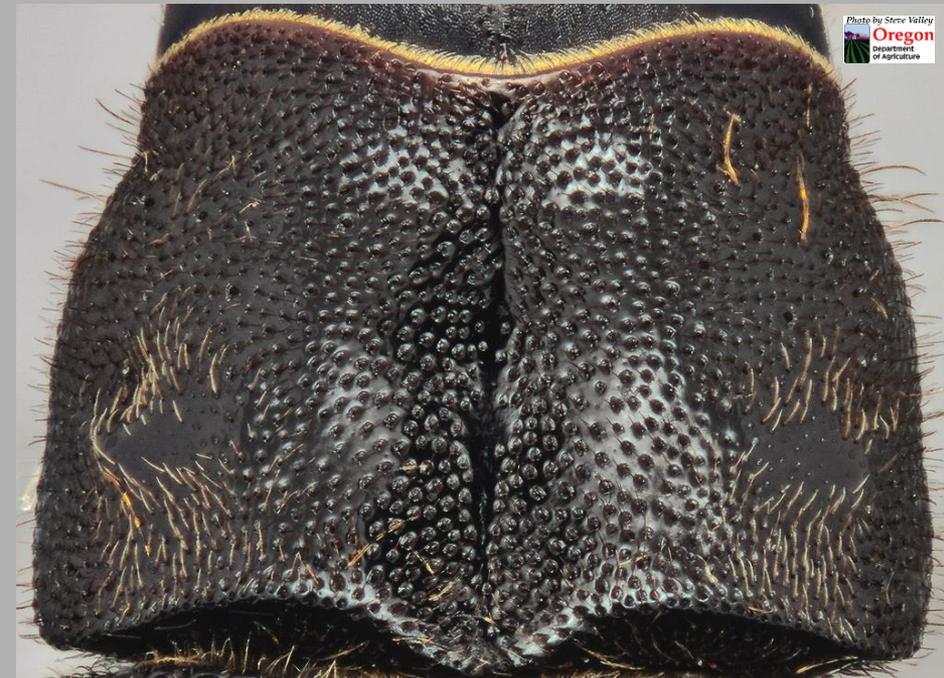
8 (7): Part I

Punctures on pronotum usually very small, separated by at least 2X their diameter (**a, c**), punctures simple (**c**); portraits (**e, f**)
.....*Dendroctonus jeffreyi* Hopkins

Punctures on pronotum large, separated on average by less than their diameter (**b, d**), punctures granulate (**d**); portraits (**g, h**)
.....*Dendroctonus ponderosae* Hopkins

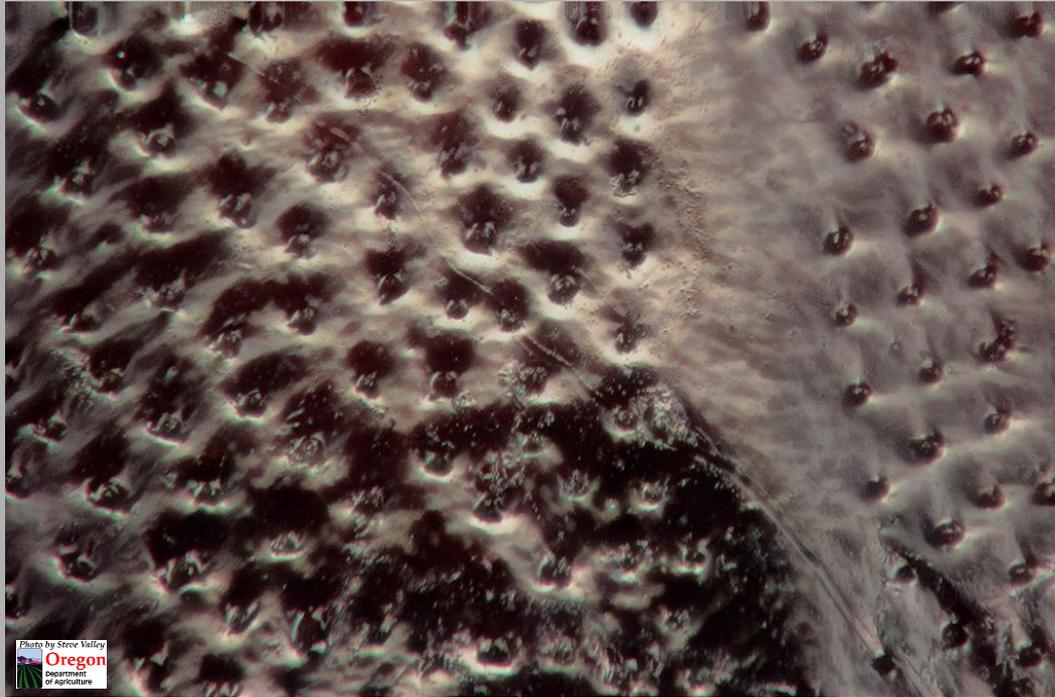


8a. *D. jeffreyi*: pronotal punctures small.



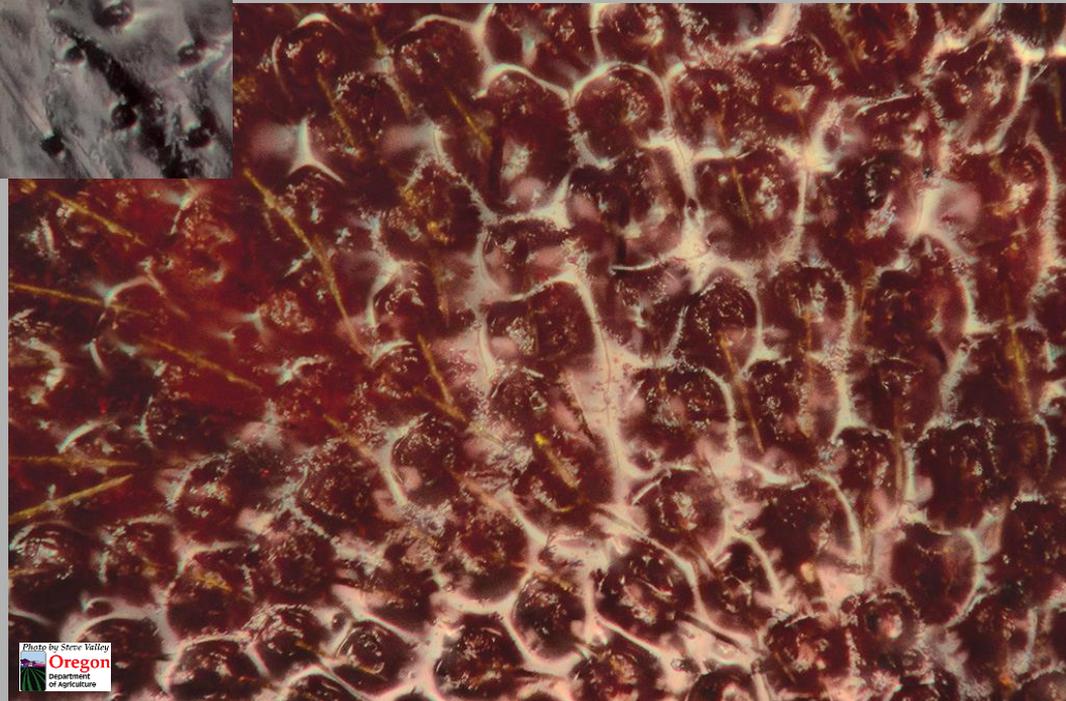
8b. *D. ponderosae*: pronotal punctures large.

8 (7): Part II



8d. *Dendroctonus ponderosae*:
pronotal punctures large,
granulate, narrowly separated.

8c. *Dendroctonus jeffreyi*: pronotal
punctures small, simple, widely
separated.



8 (7): Part III

Dendroctonus jeffreyi Hopkins



8e.

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8f.

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8 (7): Part IV

Dendroctonus ponderosae Hopkins



8g.

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8h.

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9 (7): Part I

Mature color black or dark brown (a); punctures on disc of pronotum larger (c); portraits (e, f).....*Dendroctonus terebrans* (Olivier)

Mature color reddish brown (b); punctures on pronotum smaller (d); portraits (g, h).....*Dendroctonus valens* LeConte



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9a: *Dendroctonus terebrans*:
color black or dark brown.

9b: *Dendroctonus valens*:
color reddish brown.



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9 (7): Part II



9c: *Dendroctonus terebrans*:
punctures larger.

9d: *Dendroctonus valens*:
punctures smaller.



9 (7): Part III

Dendroctonus terebrans (Olivier)



9e.

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9f.

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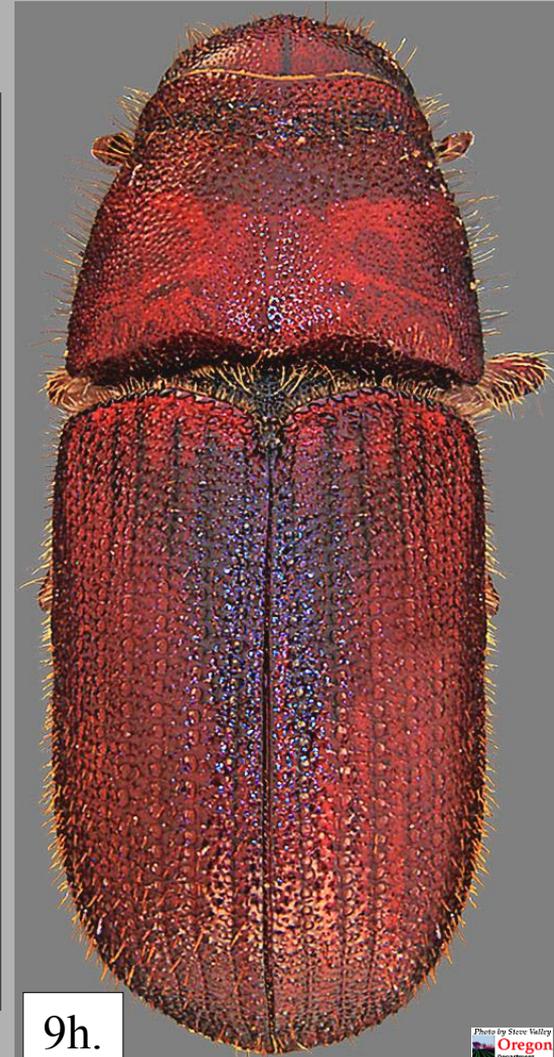
9 (7): Part IV

Dendroctonus valens LeConte



9g.

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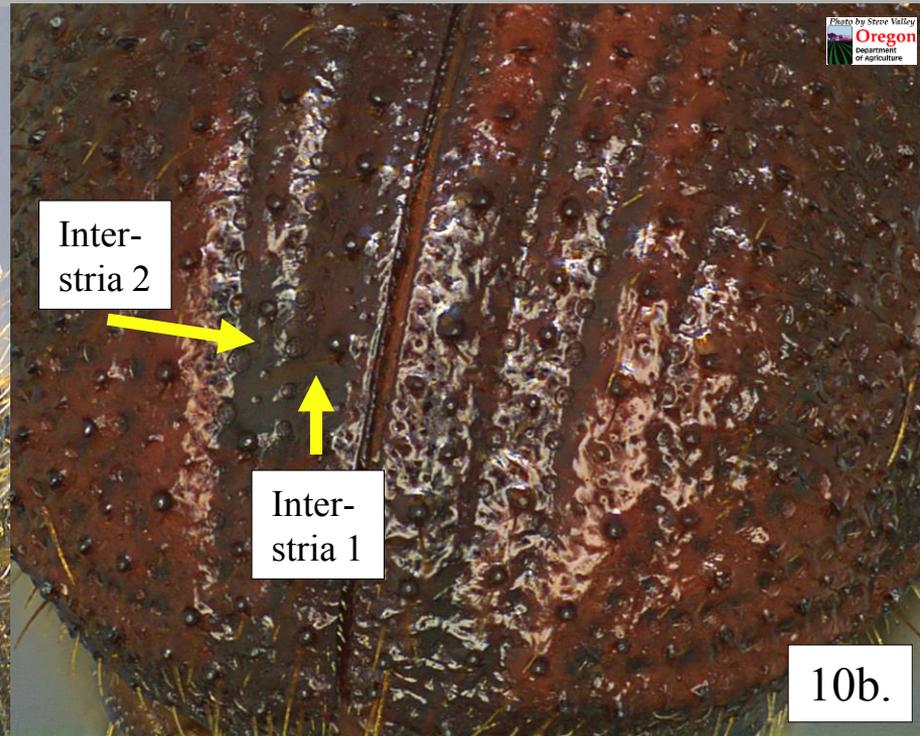
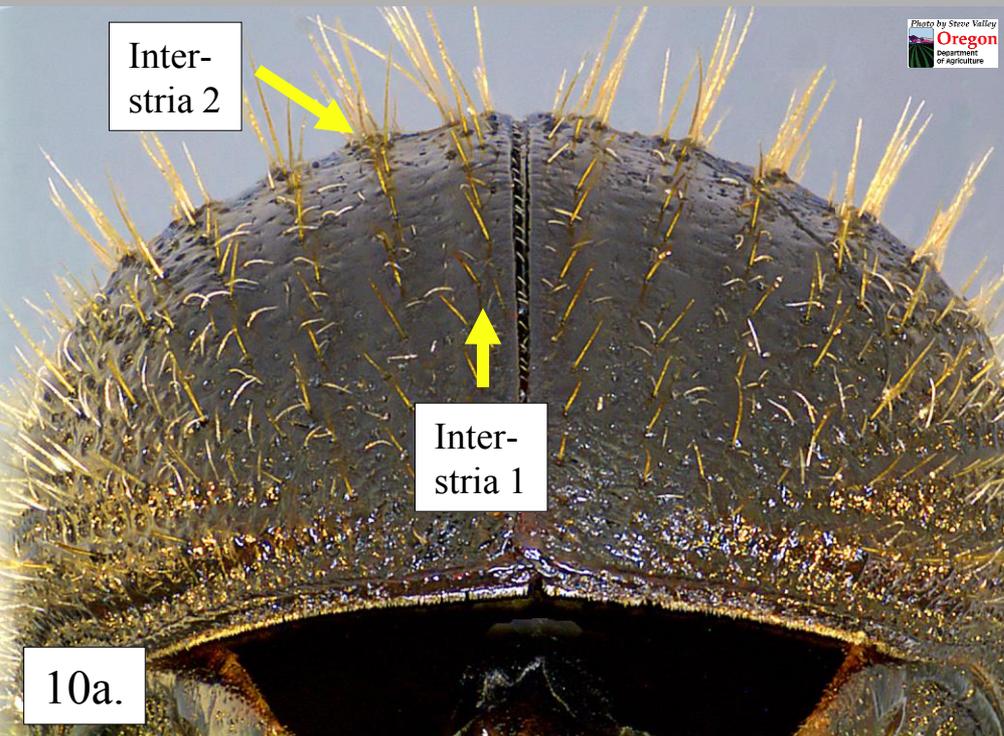
9h.

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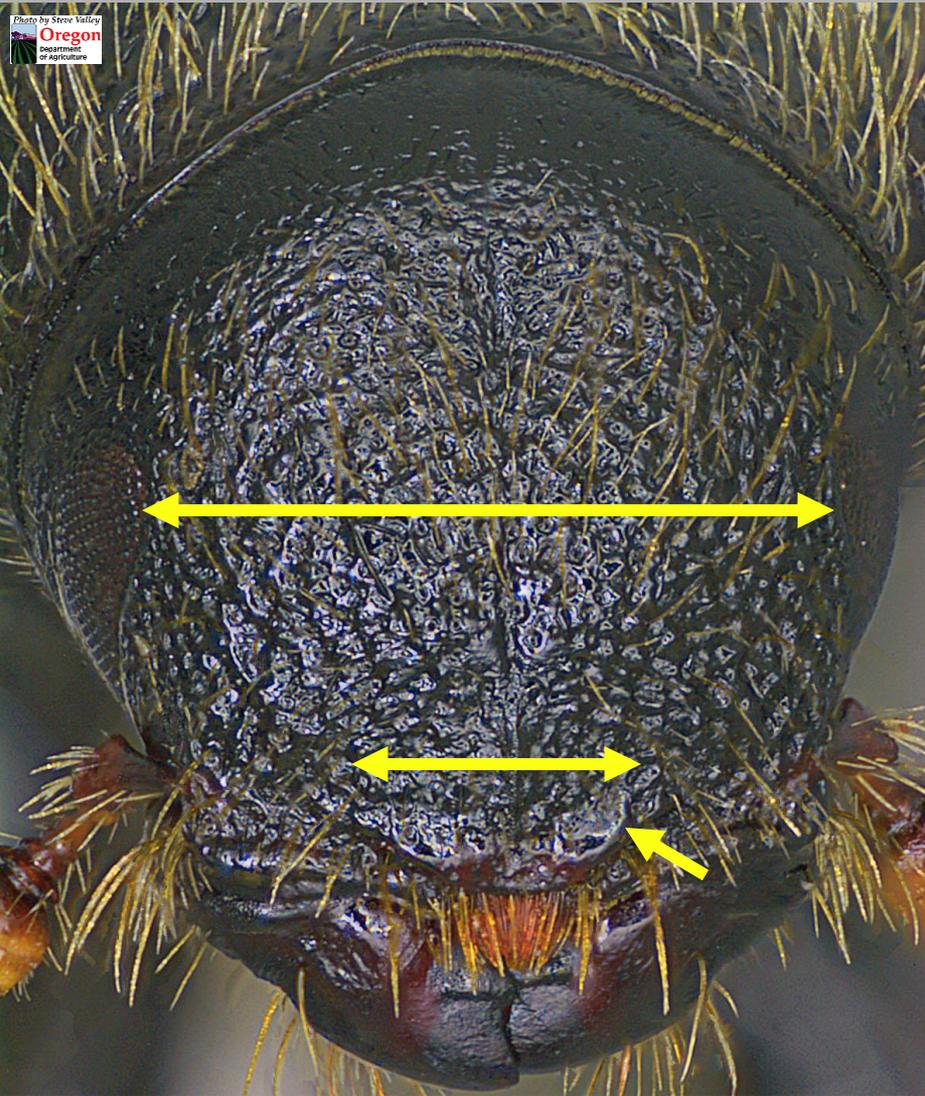
10 (6): Part I

Elytral declivital striae at most weakly impressed, declivital interstriae 1 at most feebly elevated, declivital striae 2 as wide or wider than 1 or 3 (a); epistomal process transversely concave, broad, with moderately oblique lateral margins (anterior angles at $\sim 55^\circ$) (c).....11

Elytral declivital striae strongly impressed, declivital interstriae 1 strongly elevated, declivital striae 2 narrower than 1 or 3 (b); epistomal process flat, narrow, lateral margins strongly oblique (anterior angles at $\sim 80^\circ$) (d).....13



10 (6): Part II



10c: Epistomal process concave, broad, sides moderately oblique.



10d: Epistomal process flat, narrow, sides sharply oblique.

11 (10): Part I

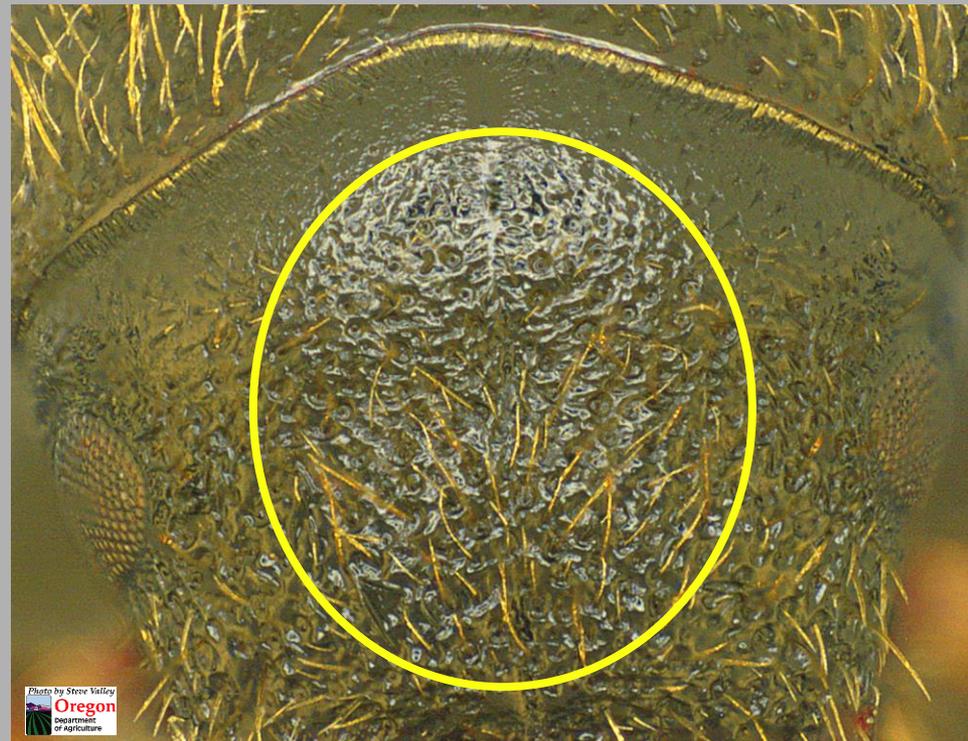
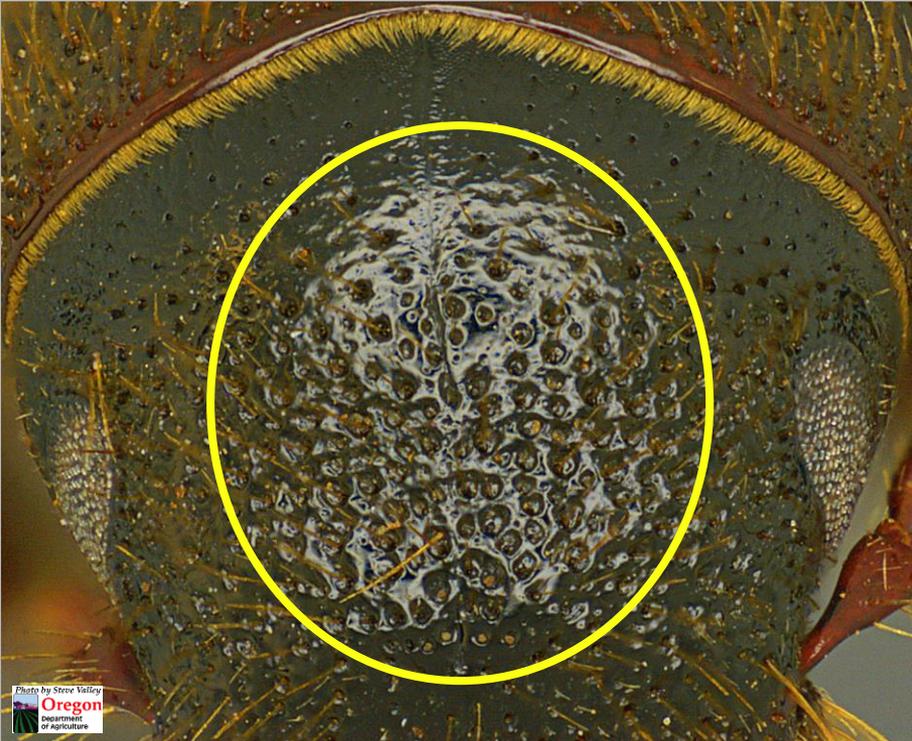
Frons smooth, polished between punctures (a); strial punctures 3X or more as large as interstitial punctures (c); portraits (e-f)..... *Dendroctonus punctatus* LeConte*

*A Eurasian species, *D. micans* (Kugelann), not yet known from N. America, is almost indistinguishable from *D. punctatus*.

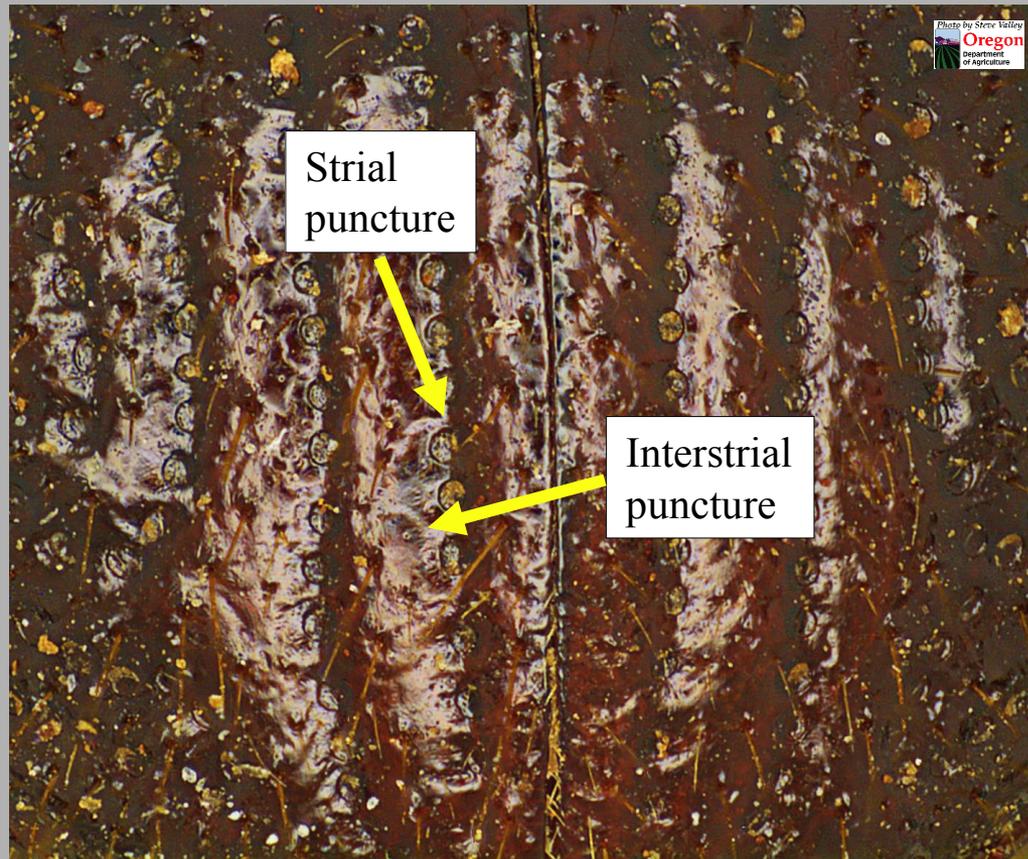
Frons finely granulate between punctures (b); strial punctures on elytral declivity no more than 2X as large as interstitial punctures (d).....12

11a. *Dendroctonus punctatus*:
frons smooth between punctures.

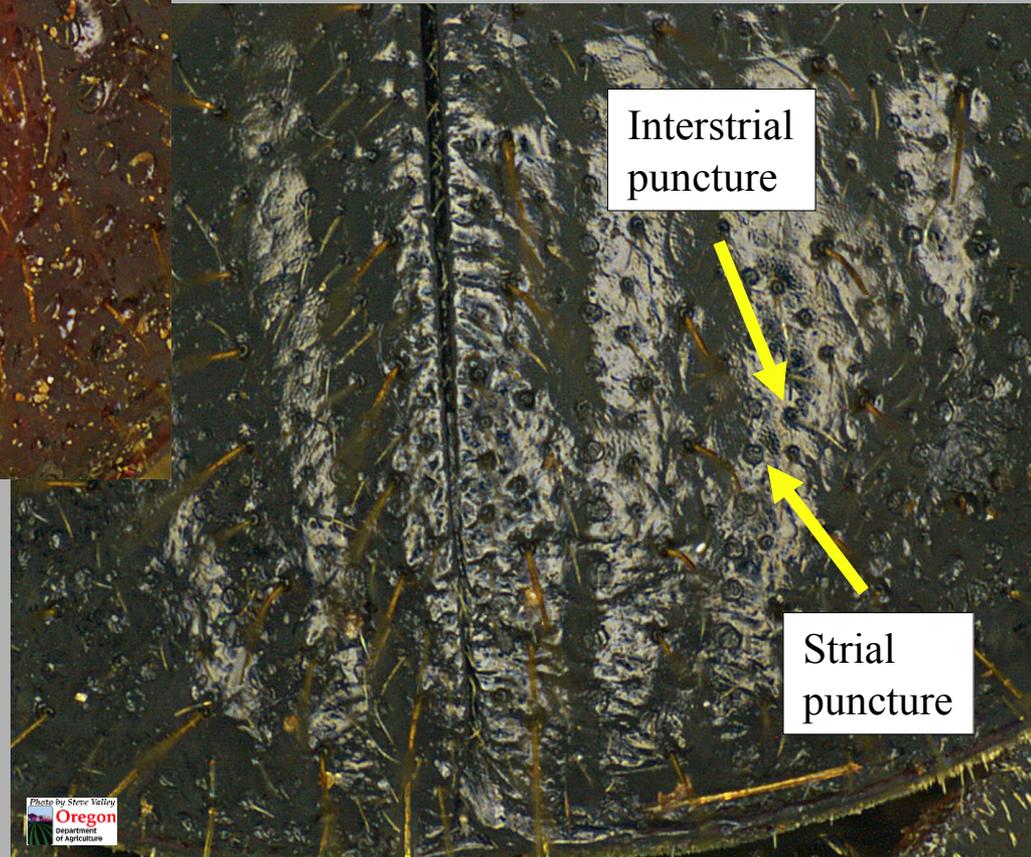
11b. Frons granulate between punctures.



11 (10): Part II



11d. Strial punctures no more than 2X as large as interstitial punctures.



11c. *Dendroctonus punctatus*: strial punctures 3X or more as large as interstitial punctures.

11 (10): Part III

Dendroctonus punctatus LeConte



11e.

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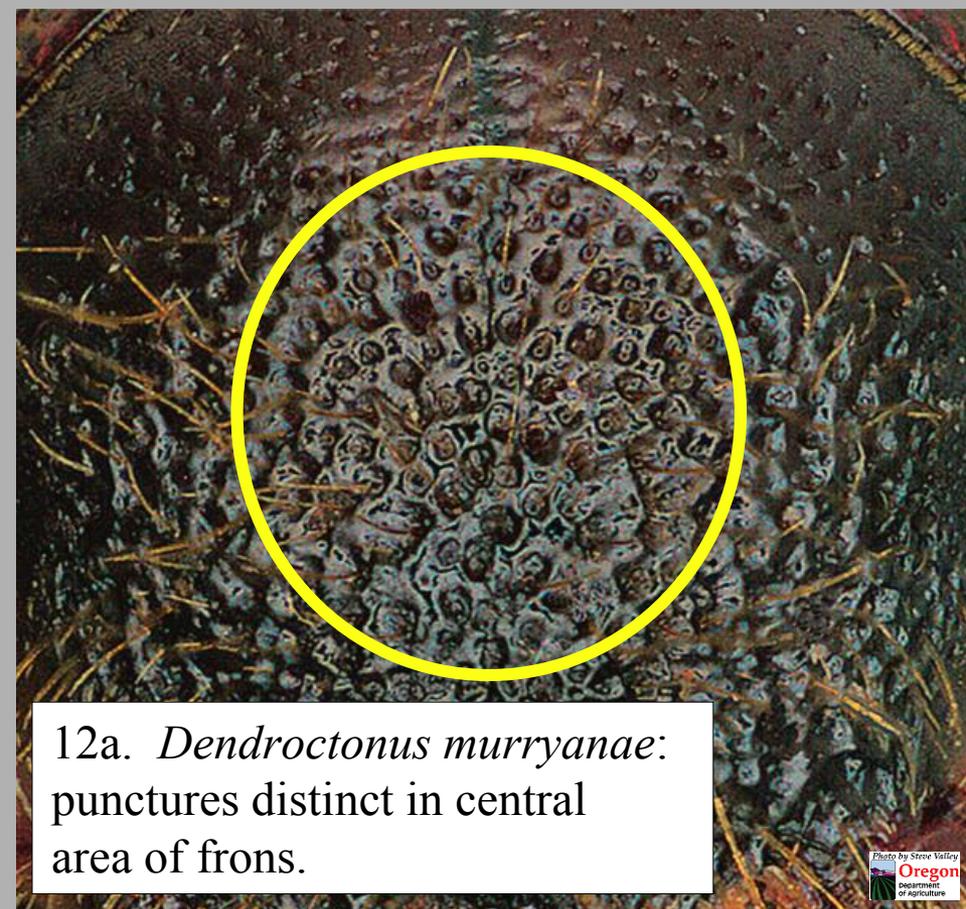
11f.

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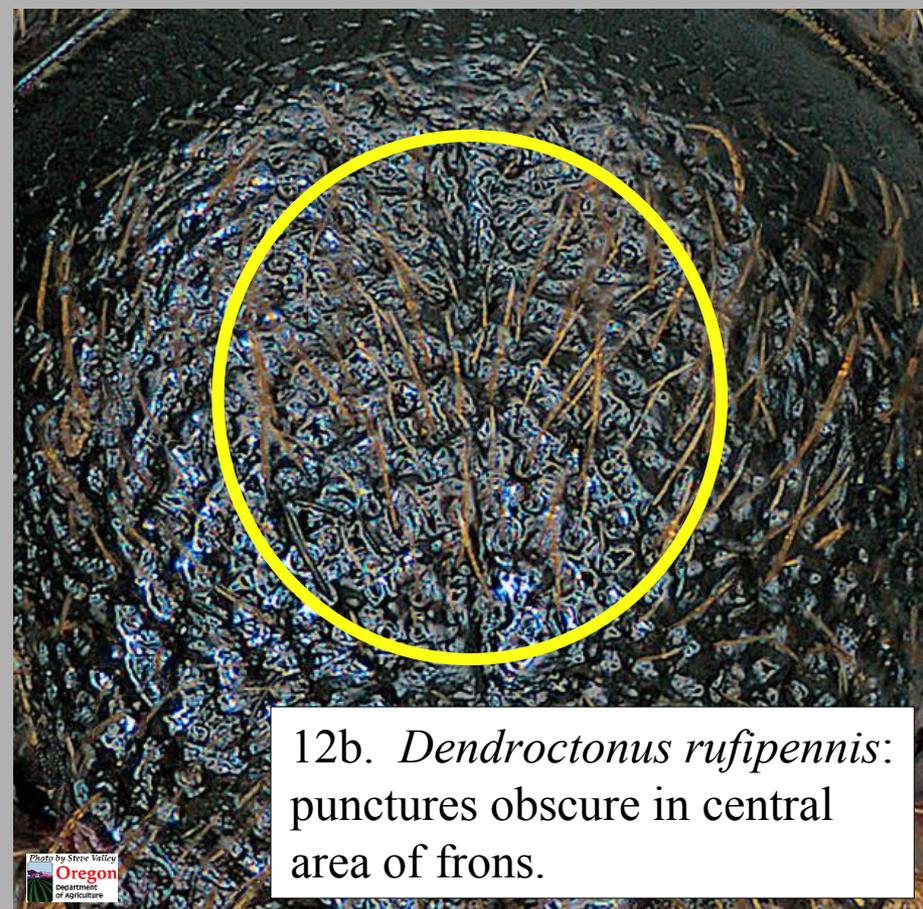
12 (11): Part I ■

Punctures of frons distinct in central area, granules between punctures isolated and often very sparse (a); portraits (c, d).....*Dendroctonus murryanae* Hopkins

Punctures of frons usually obscure in central area, granules between punctures very close, more numerous (b); portraits (e, f).....*Dendroctonus rufipennis* (Kirby)



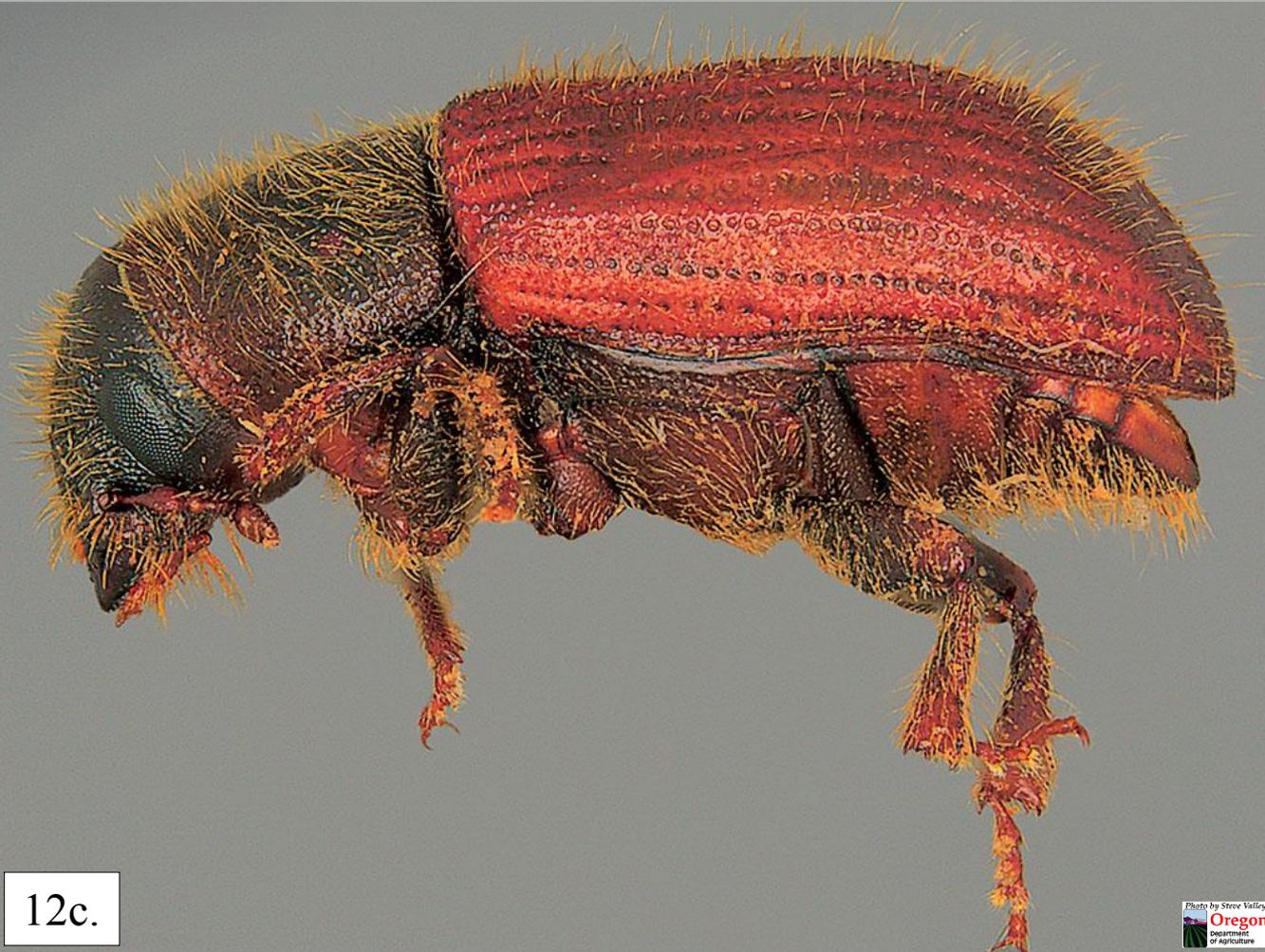
12a. *Dendroctonus murryanae*: punctures distinct in central area of frons.



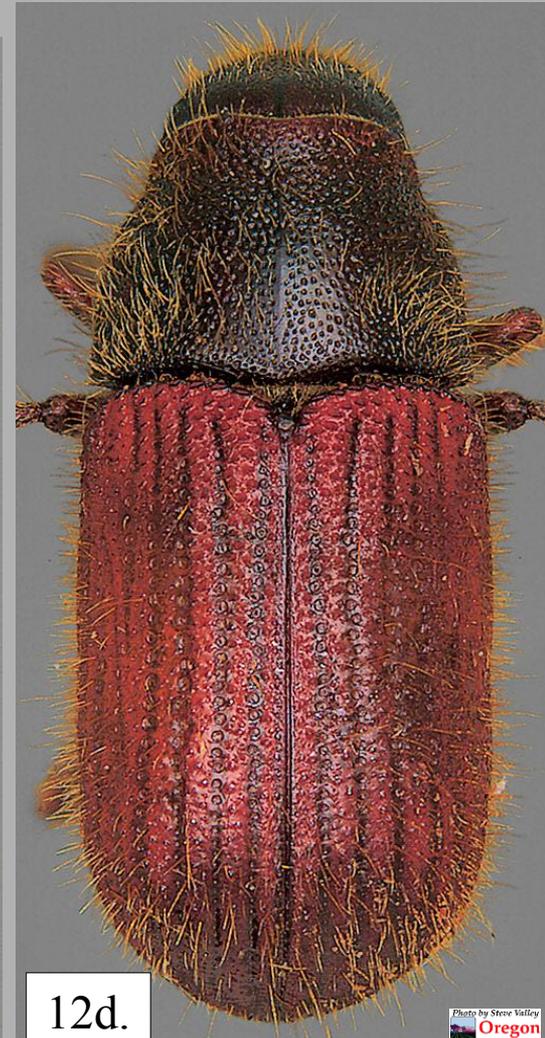
12b. *Dendroctonus rufipennis*: punctures obscure in central area of frons.

12 (11): Part II

Dendroctonus murrayanae Hopkins



12c.



12d.

12 (11): Part III

Dendroctonus rufipennis (Kirby)



12e.

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12f.

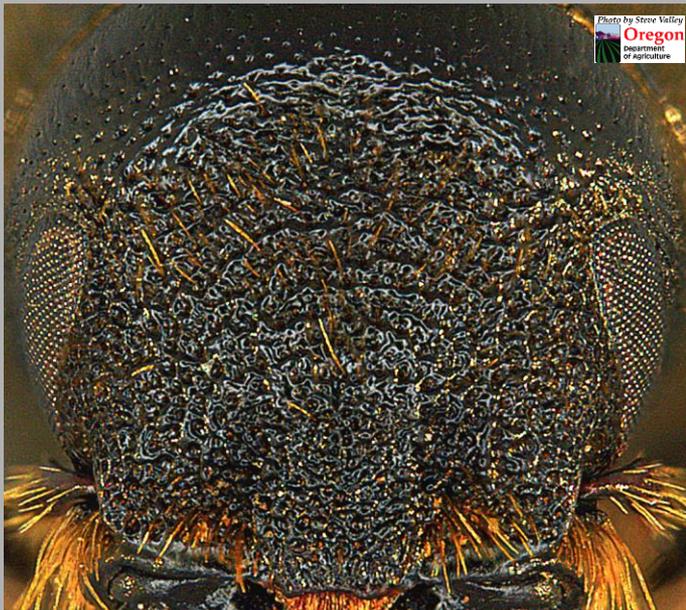
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13 (10): Part I

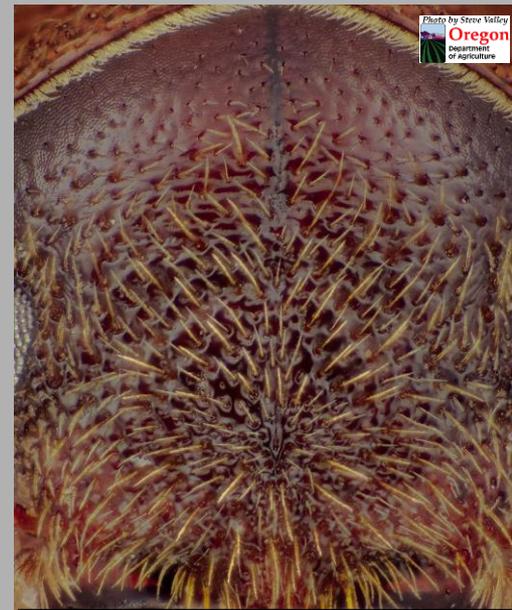
Frons roughly sculptured and granulate, with rather small punctures (a); pronotum with rather small punctures (c); discal elytral interstriae without fine punctures dispersed among the transverse ridges (e); portraits (g, h)...

.....*Dendroctonus pseudotsugae* Hopkins

Frons smooth, with rather large punctures (b); pronotum with rather large punctures (d); discal elytral interstriae with fine punctures dispersed among the transverse ridges (f); portraits (i, j).....*Dendroctonus simplex* LeConte

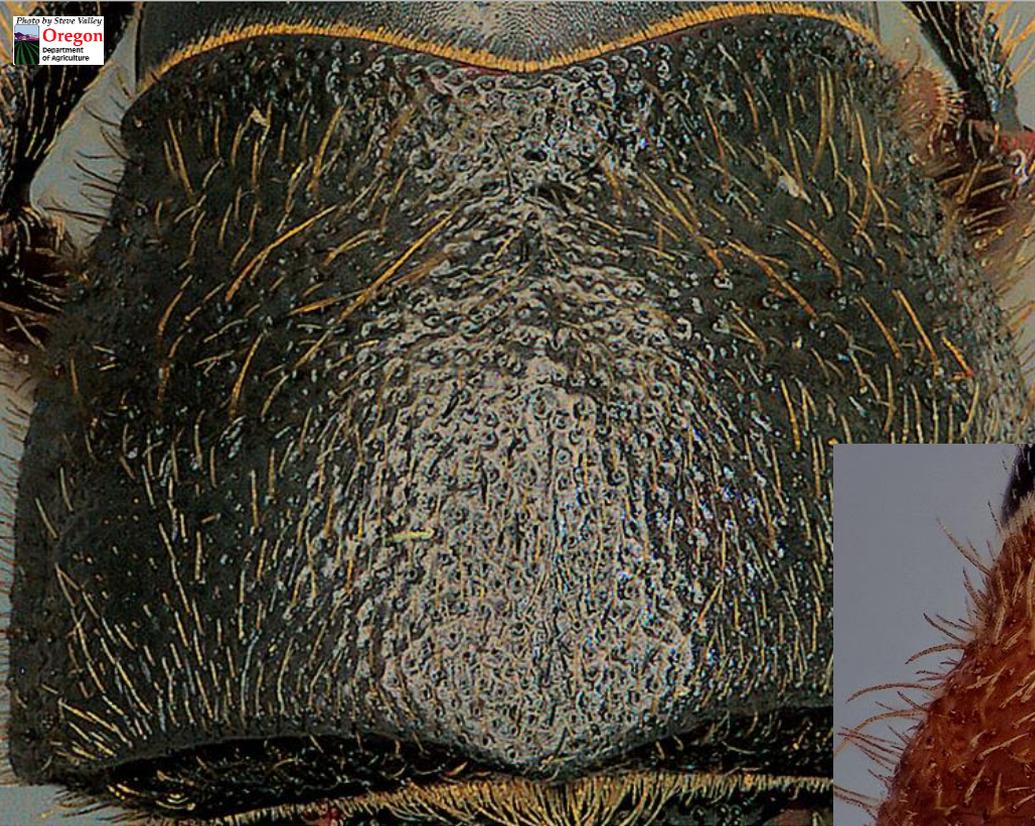


13a. *D. pseudotsugae*: frons roughly sculptured and granulate.



13b. *D. simplex*: frons smooth and punctate.

13 (10): Part II



13c. *Dendroctonus pseudotsugae*:
pronotum with small punctures.

13d. *Dendroctonus simplex*:
pronotum with large punctures.



13 (10): Part III

Dendroctonus pseudotsugae Hopkins

13g.



13h.

13 (10): Part IV

Dendroctonus simplex LeConte



13i.

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13j.

Photo by Steve Valley
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