









SCREENING AID FOR

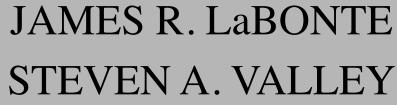












OREGON DEPARTMENT OF AGRICULTURE









KEY

Introduction

This screening aid does not replace a full course in the identification of Scolytinae nor is it a comprehensive treatment of the scolytines of the western USA. It is intended to enable the rapid and efficient identification of the most common species trapped in bark and ambrosia beetle surveys, especially the sorting of large volumes of such samples. It is most applicable to material from the Pacific Northwest, and, to a lesser extent, the West in general. Specimens from other areas, especially those from Alaska, the East and Southwest, may not be addressed. Common exotic species and some exotic target species are treated as well as common indigenous species. This aid is designed to be used by individuals with a wide range of taxonomic expertise. It will be most effective with the support of a cooperating taxonomist.

Using the Screening Aid: I

THIS IS VERY IMPORTANT!

This aid should be used in conjunction with the services of a taxonomist responsible for the identification of any specimens thought to be other than the "common" species treated. The aid is designed so that any species other than the targets for screening will end at a couplet with "STOP, which equals "STOP, submit specimen to taxonomist". "STOP" specimens are NOT unimportant or to be discarded - quite the opposite! Any specimen that does not, in the judgment of the user, appear to be a screening target should be forwarded to a cooperating taxonomist for further identification. Furthermore, any specimen keying to an exotic species of regulatory concern should be promptly submitted to a cooperating taxonomist for verification.

Using the Screening Aid: II

With few exceptions, bark and ambrosia beetles are very small. The characters used in their identification are often portions of body parts and are thus even smaller. Effective identification of these insects cannot be conducted without access to a good quality, high powered (preferably with up to 90X) dissecting microscope. Good illumination is also essential. Ring lights are particularly good for assessing punctation, surface texture and features, and vestiture. Many features are best viewed at an oblique angle or with oblique lighting.

It is also important to maintain a reference collection of identified specimens (hopefully confirmed by a cooperating taxonomist) to ensure correct understanding of the necessary characters. Although the images within this screening aid are of very high quality, there is no substitute for actual specimens.

Using the Screening Aid: III

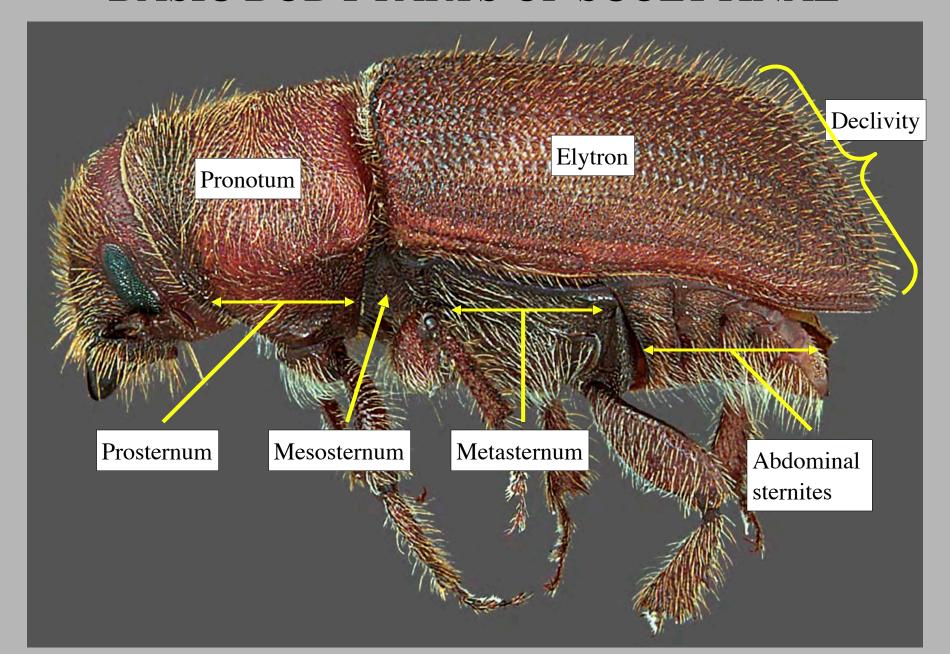
This screening aid functions much like traditional dichotomous keys, with couplets. However, buttons linking non-sequential couplets and enabling return to the originating couplet have been utilized. The images in the indices of exotic and indigenous species treated in the screening aid enable "picture-booking" as these are also action buttons linked to the portraits of the respective species.

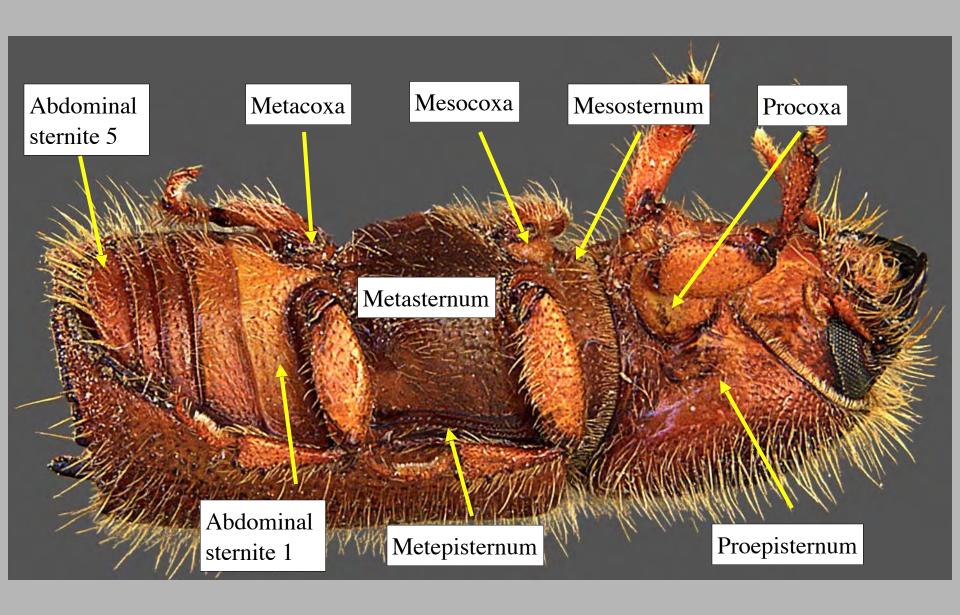
Images of all character states are provided. In general, the most obvious or reliable characters come first in a couplet half, followed by those that are less so.

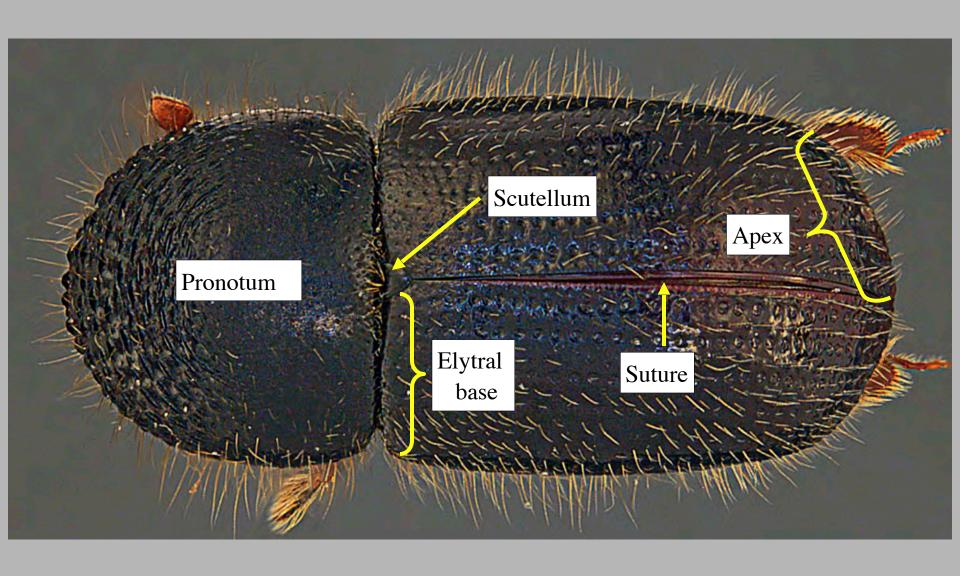
Names of exotic species are in white and are followed by the symbol.

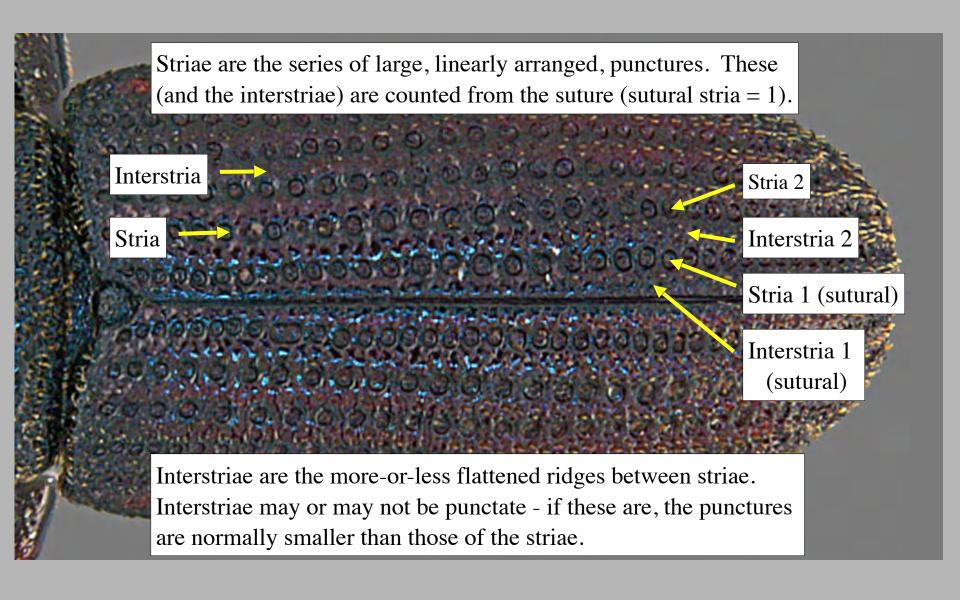
Using the Screening Aid: IV

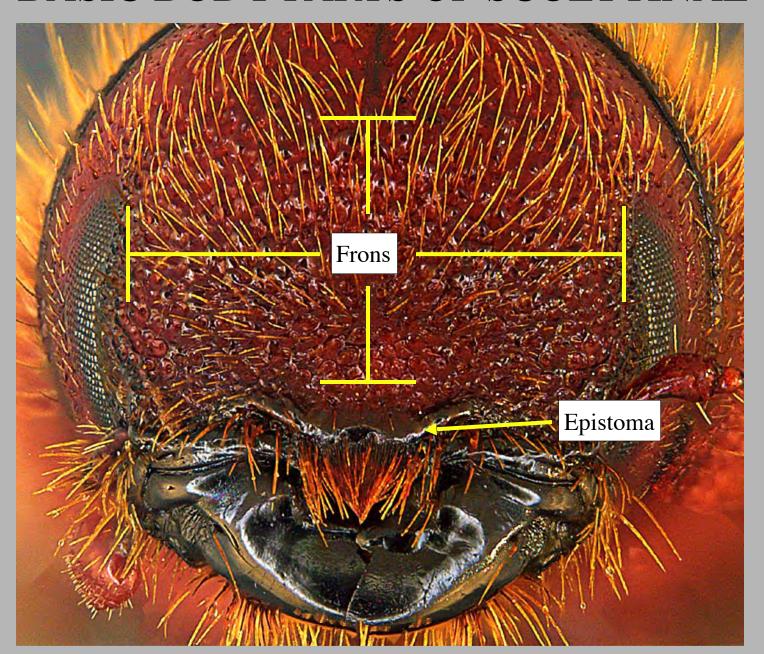
Where possible and efficient, taxonomic jargon has been kept to a minimum. Unfamiliar terms and character states should be explained via the images and associated labels. The first several slides following the introduction illustrate the basic body parts of Scolytinae and the terms applied to them. A single slide explaining a few technical terms follows those.





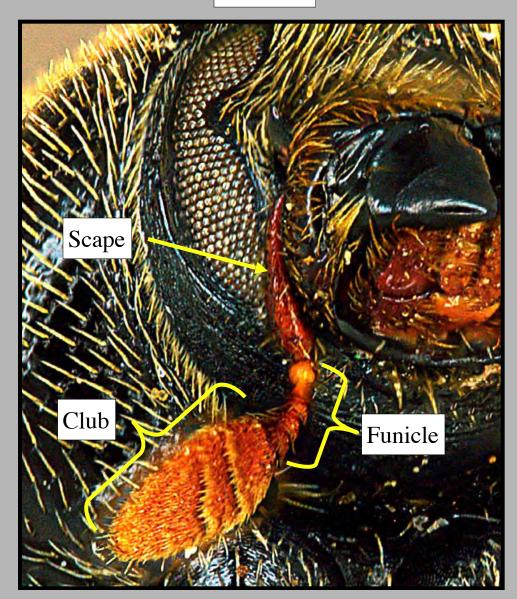


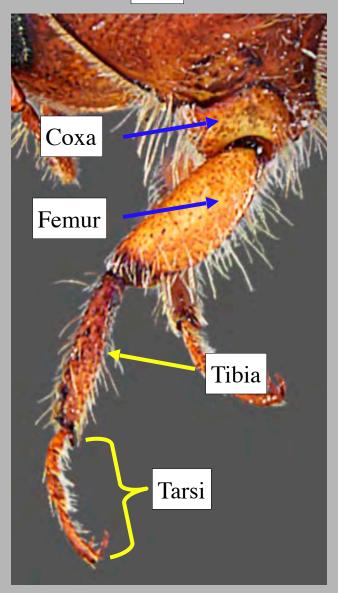




Antenna

Leg





A Few Technical Terms

Acuminate: strongly and abruptly tapered to a narrow apex

Asperities: small, sharp elevations or teeth

Contiguous: touching or in contact

Corneous: of a hard, smooth texture

Crenulations: blunt, rounded teeth or scallops

Procurved: curving anteriorly

Recurved: curving posteriorly

Setose: covered with setae

Spine: a thorn-shaped, generally pointed process emerging

from a surface, normally longer than wide

Sulcate: channeled or grooved

Tubercle: a bump, a generally rounded process emerging

from a surface, generally no longer than wide

Vestiture: a clothing of hairs or scales

Index of Species Exotic to the USA: Select Image of Desired Species







































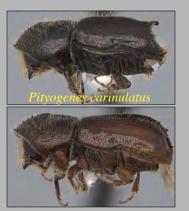


Index of Species Indigenous to the Western USA: Select Image of Desired Species





























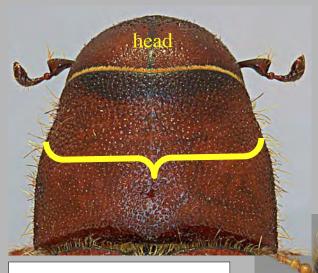


1

Head visible from above; anterior margin and anterior 1/3 of pronotum usually without granules or asperities (a-b)......2

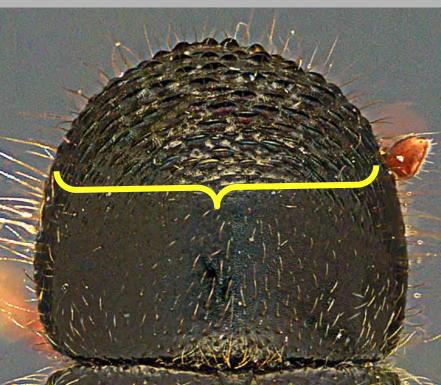
Head <u>usually</u> concealed from above; anterior margin of pronotum <u>often</u> armed by granules or asperities on at least anterior 1/3 (c)......34





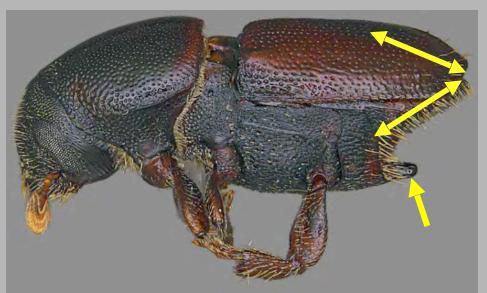
1a-b: Head visible; anterior margin and anterior 1/3 of pronotum without granules or asperities.





1c: Head concealed; anterior margin and at least anterior 1/3 of pronotum with granules or asperities.

2 (1): Part I

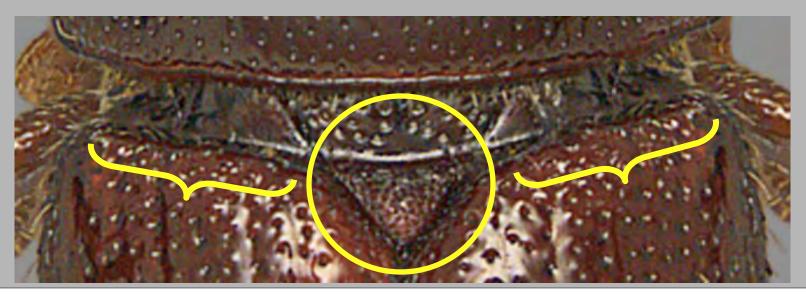


2a: Abdomen with spine; elytra slightly declivous, abdomen ascending.

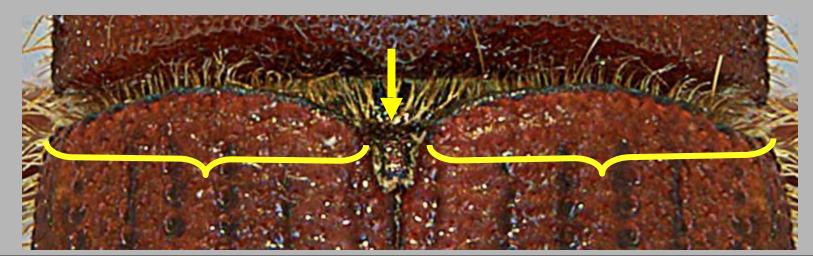


2b: Abdomen without spine; elytra steeply declivous, descending to meet horizontal abdomen.

2: Part II

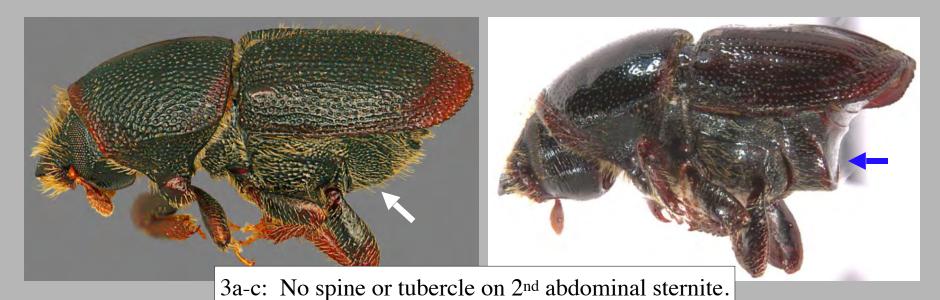


2c: Scutellum large, in depression; anterior elytral margins truncate, without crenulations.



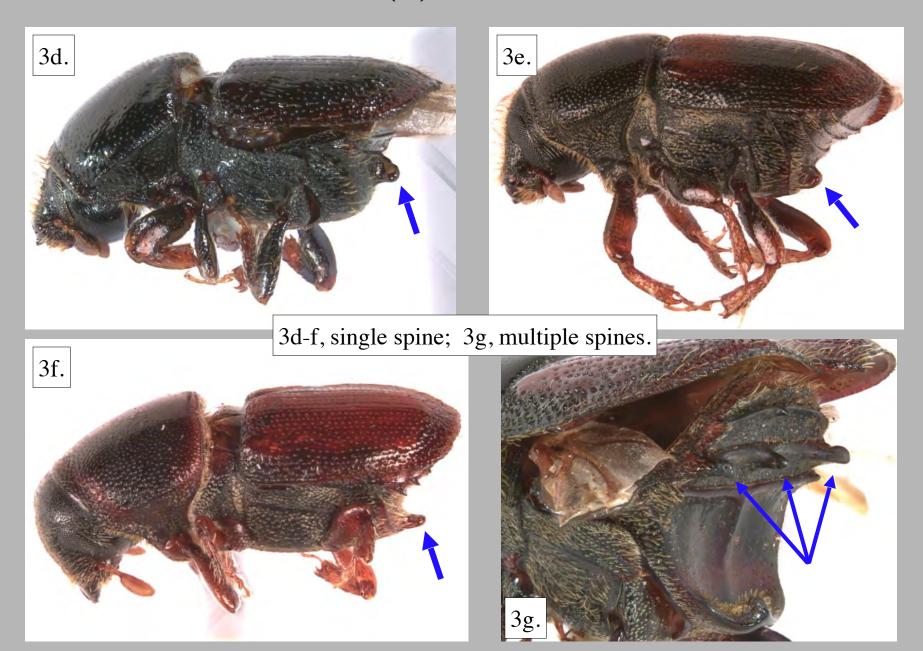
2d: Scutellum small, not in depression; anterior elytral margins procurved, with crenulations.

3 (2): Part I





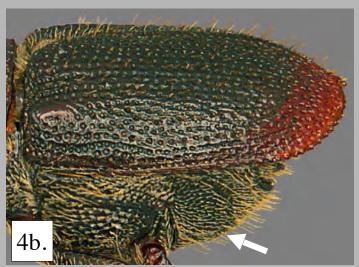
3 (2): Part II

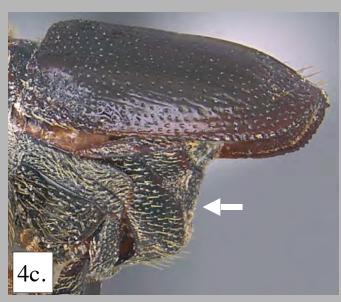


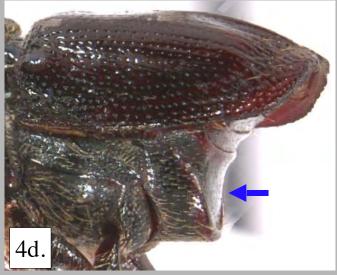
4 (3)

2nd abdominal sternite oblique (**a**) or convex (**b**) in lateral view...... **4a** 2nd abdominal sternite vertical or concave in lateral view (**c-d**)...STOP

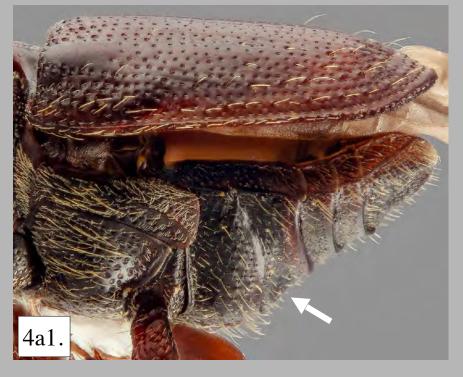


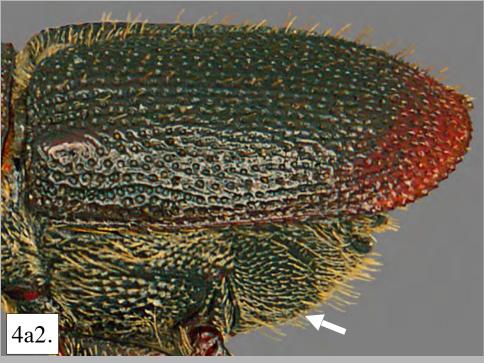






4a (4): Part I





4a (4): Part II



4a3. Elytra

with only a

few setae.



4a4. Elytra with many setae.

4a (4): Part III Scolytus mali Bechstein

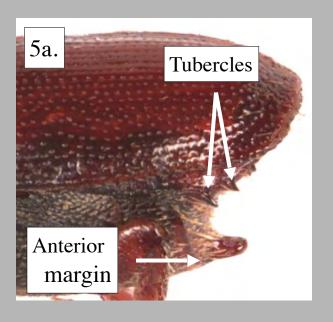


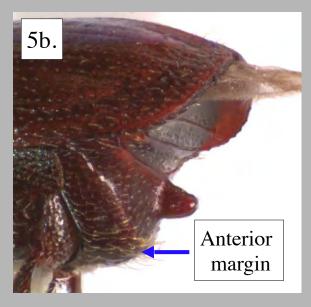
4a (4): Part IV

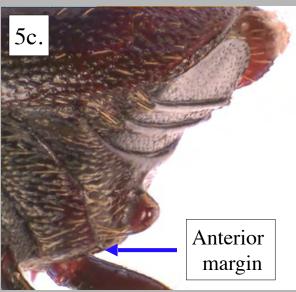
Scolytus rugulosus (Muller)



5 (3): Part I

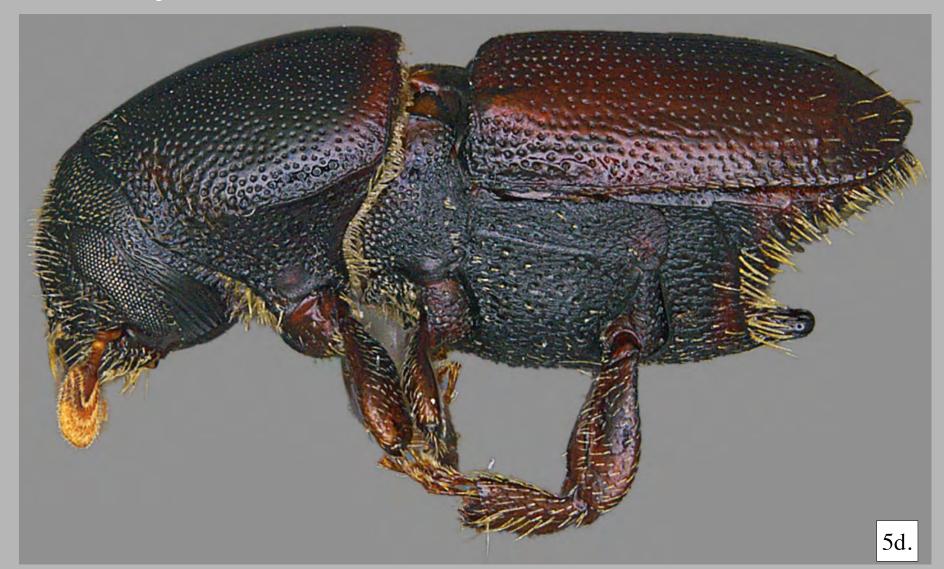






5 (3): Part II

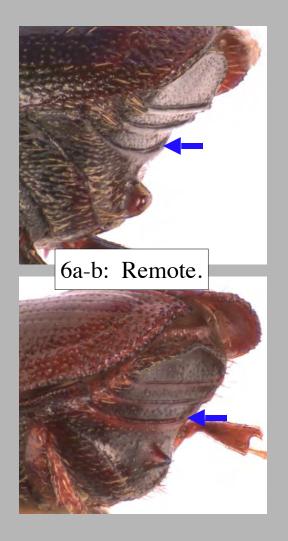
Scolytus multistriatus (Marsham) 🙁



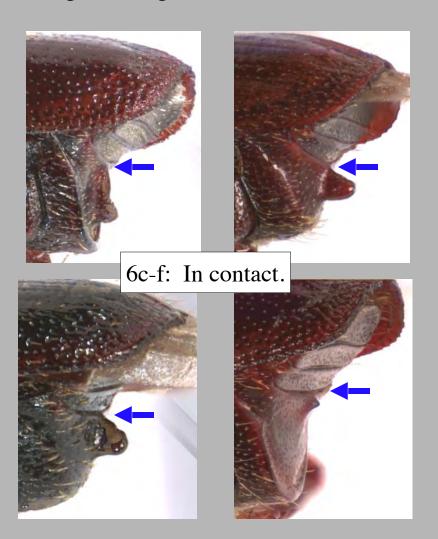
6(5)

Spine on sternite 2 with base remote from posterior margin of segment (**a-b**)...7

Spine on sternite 2 in contact with posterior margin of segment (**c-f**)......STOP



Posterior margin of sternite 2 indicated with arrow



7 (6): Part I

Spine on sternite 2 variable, from almost absent to strongly developed, most often broadly conical and blunt at apex in lateral view (\mathbf{a}, \mathbf{b}) , apex often broader than base in ventral and apical views (\mathbf{c}, \mathbf{d}) ; elytra most often with a variable, dark, median band, with bases and apices pale (\mathbf{g}, \mathbf{i}) ; portrait (\mathbf{j})

.....Scolytus schevyrewi Semanov 😕

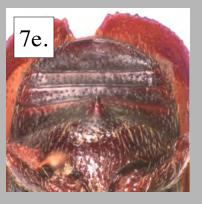
Spine on sternite 2 narrowly conical and pointed at apex in ventral (e), lateral (f), and apical views; elytra unicolorous brown (h)......STOP













7 (6): Part II





7 (6): Part III



7 (6): Part IV

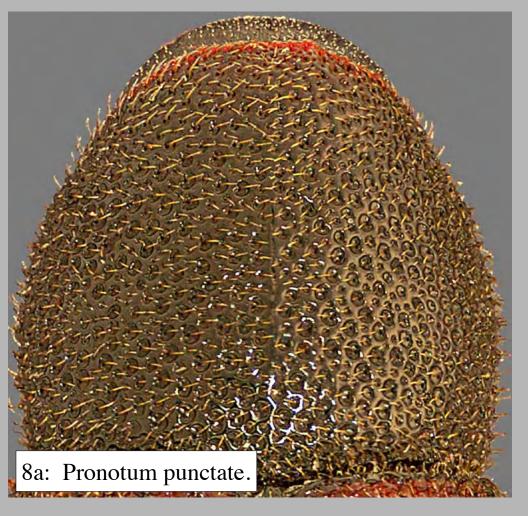
Scolytus schevyrewi Semanov 🙁



8 (2)

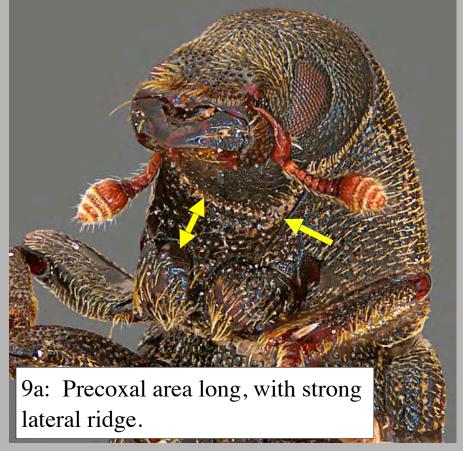
Dorsum of pronotum punctate (a).....9

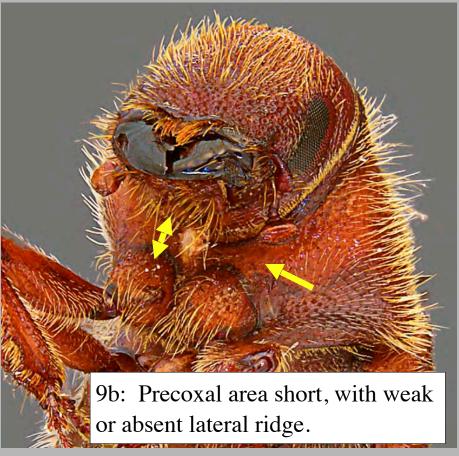
Dorsum of pronotum longitudinally strigose (b)......STOP



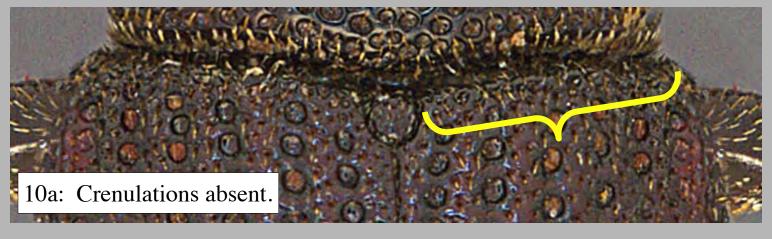


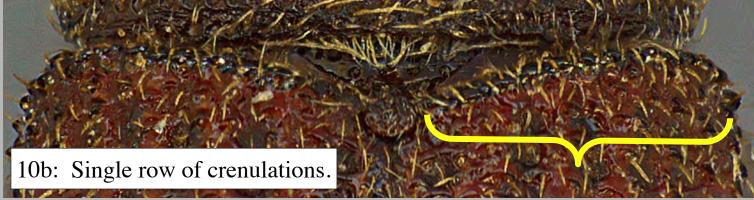
9 (8)



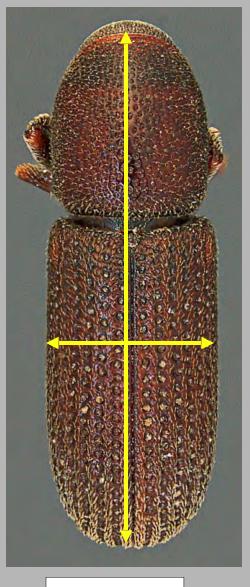


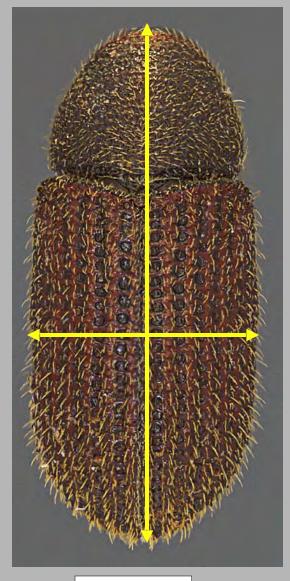
10 (9): Part I





10 (9): Part II



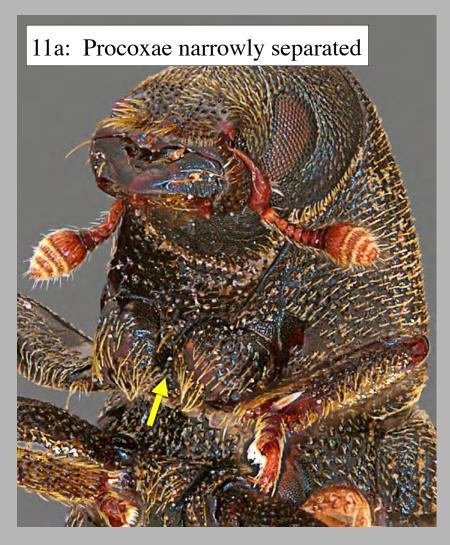


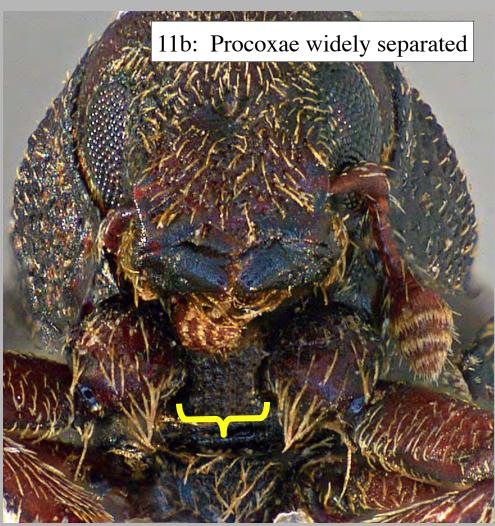
10c: Slender

10d: Stout

11 (10)

Procoxae narrowly separated, almost contiguous (a)......12
Procoxae widely separated (b)................STOP





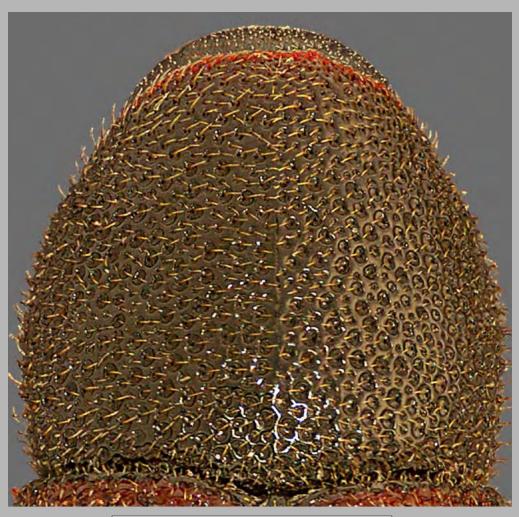
12 (11): Part I

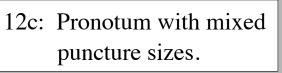
Elytra with erect setae in posterior half as long or longer than elytral
intervals (a); pronotal disc with about equal numbers of small and large
punctures (c)

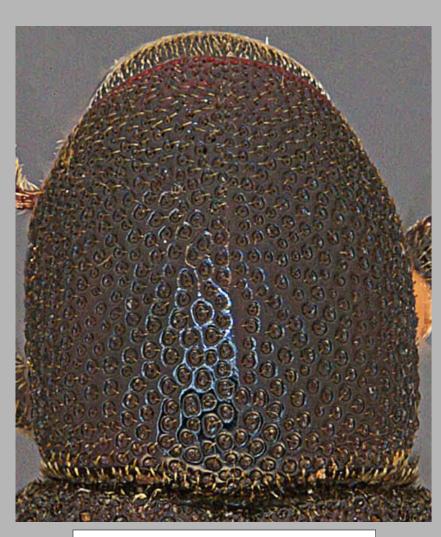




12 (11): Part II





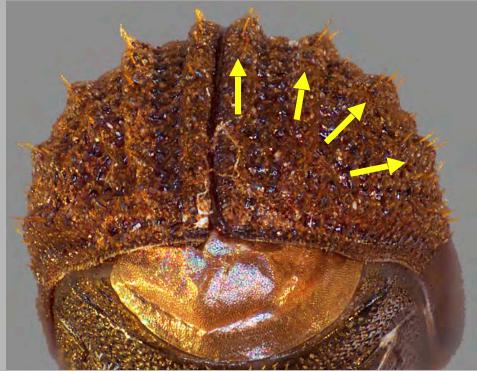


12d: Pronotum with (mostly) uniform-size punctures.

13 (12)



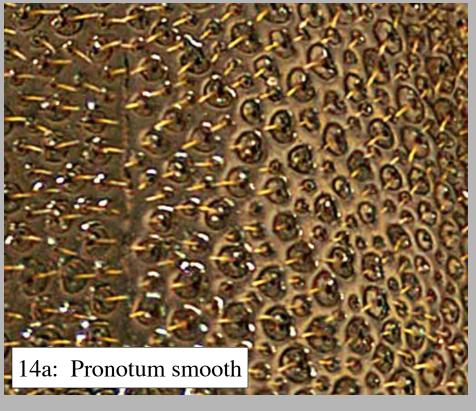
13a: Equally elevated intervals

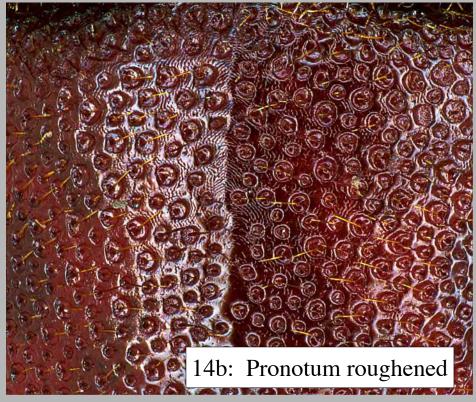


13b: Odd intervals elevated

14 (13): Part I

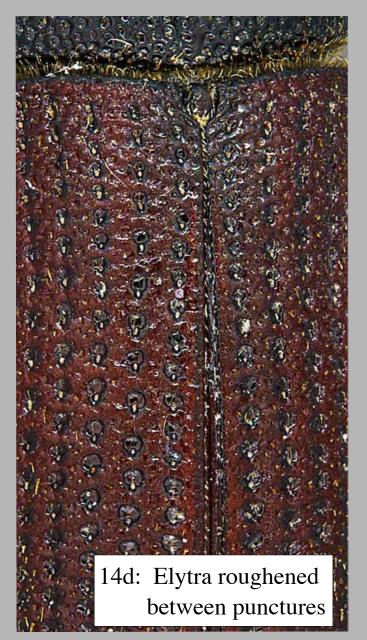
Pronotum AND elytra between punctures smooth, glossy (**a**, **c**).....**15**Pronotum OR elytra minutely roughened and somewhat dull between punctures (**b**, **d**)........................STOP



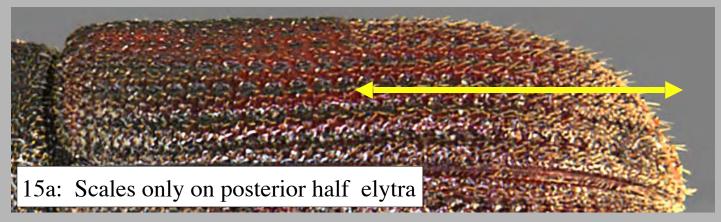


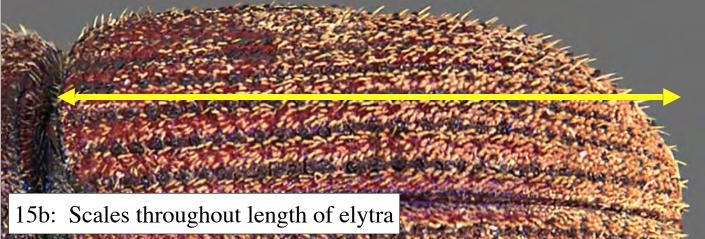
14 (13): Part II





15 (14): Part I





15 (14): Part II

Hylurgops porosus (LeConte)



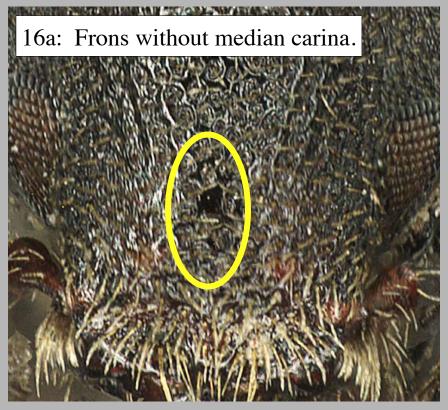
15 (14): Part III

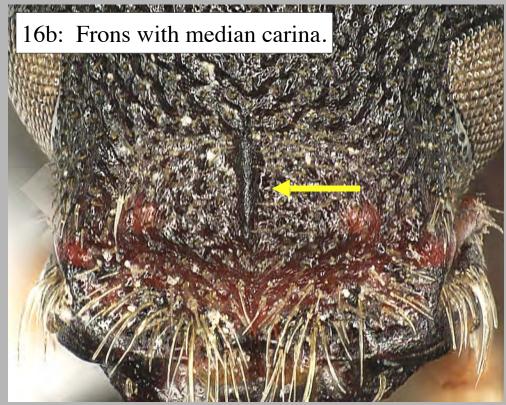
Hylurgops palliatus (Gyllenhal)





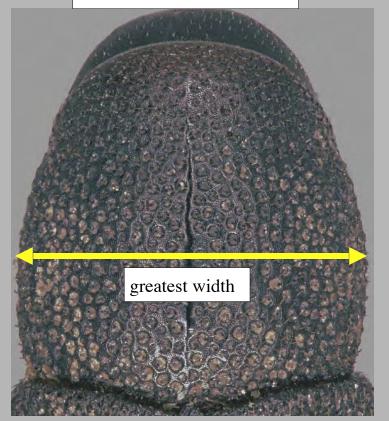
16 (12)



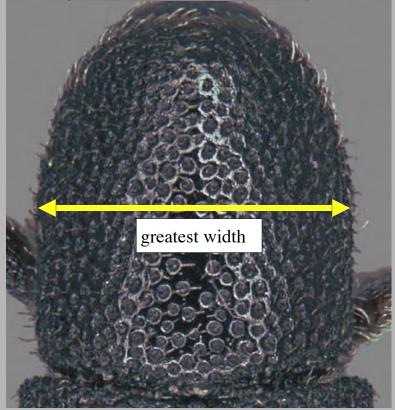


17 (16): Part I

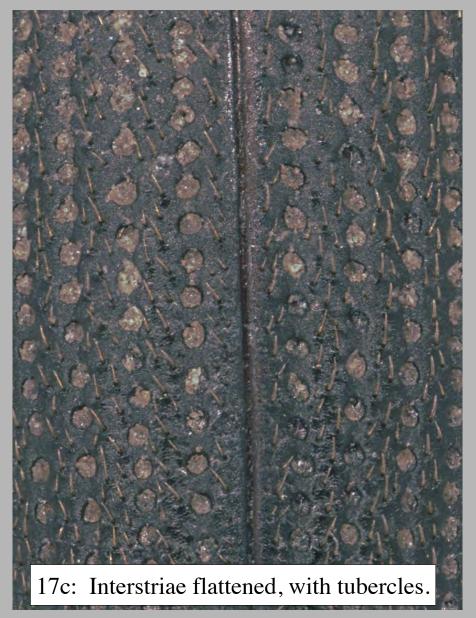
17a: Pronotum broad.

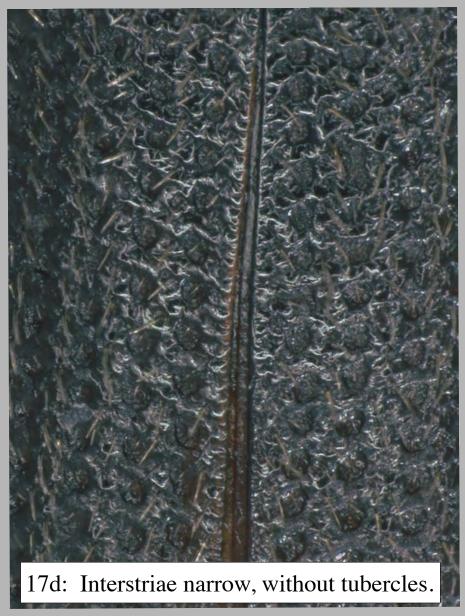


17b: Pronotum narrow.



17 (16): Part II



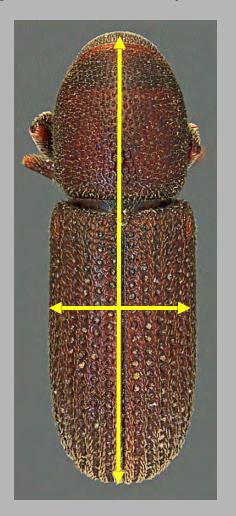


17 (16): Part III

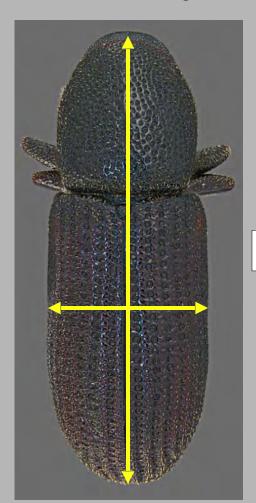
Hylastes opacus Erichson 😕



18 (16): Part I



18a: Body slender



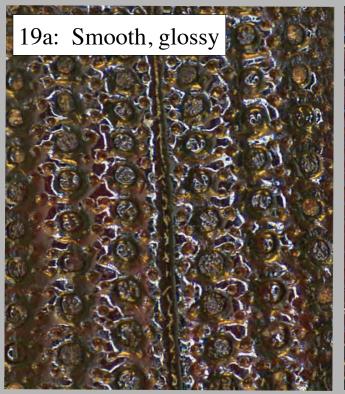
18b: Body stout

18 (16): Part II *Hylastes gracilis* LeConte

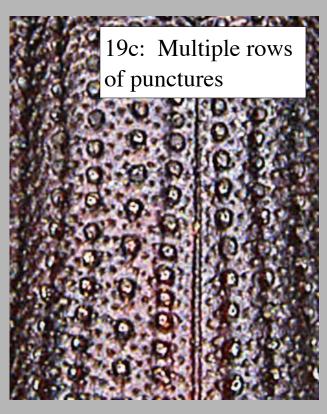


19 (18): Part I

Elytral intervals between punctures dull and minutely roughened (b) AND/OR more than one row of punctures on discal elytral intervals (c)......STOP





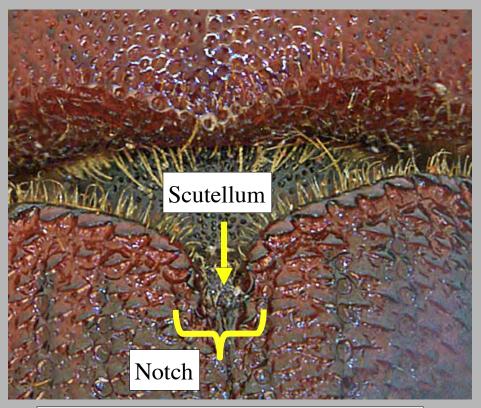


19 (18): Part II

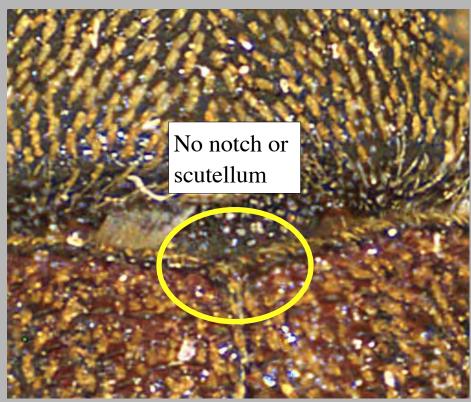
Hylastes nigrinus (Mannerheim)



20 (9)



20a: Scutellum visible, elytra notched.

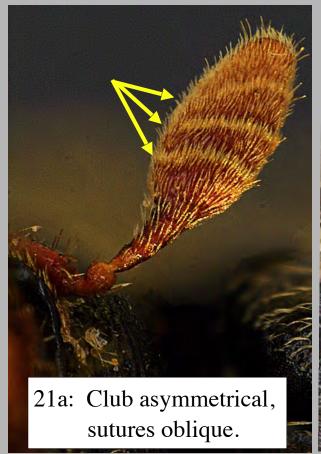


20b: Scutellum not visible, elytra not notched.

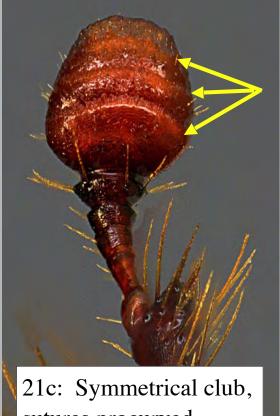
21 (20)

Antennal club asymmetrical with oblique sutures (a) or composed of flattened plates without sutures (b)......22 Antennal club symmetrical in broadest view, sutures transverse









sutures procurved.

22 (21): Part I



22a: Pronotum without asperities.

22b: Pronotum with asperities.



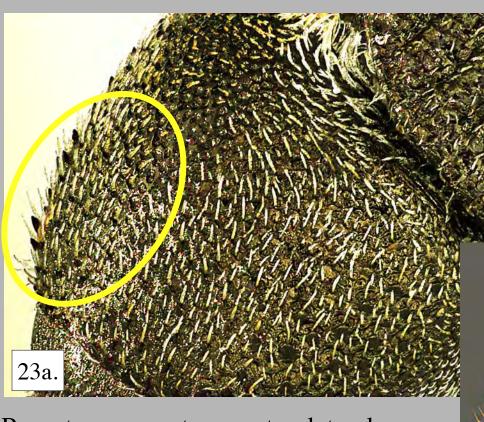
22 (21): Part II Phloeosinus spp.





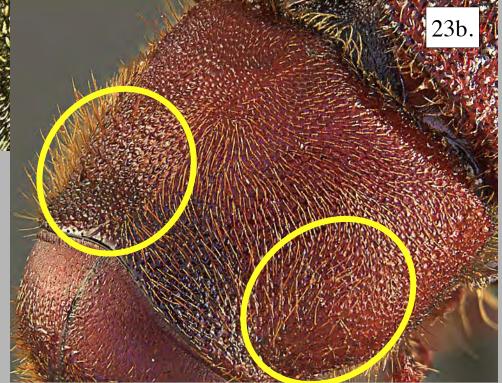


23 (21)



Pronotum asperate on anterolateral areas (a).....24

Pronotum not asperate anterolaterally (b).....27



24 (23)





25 (24)

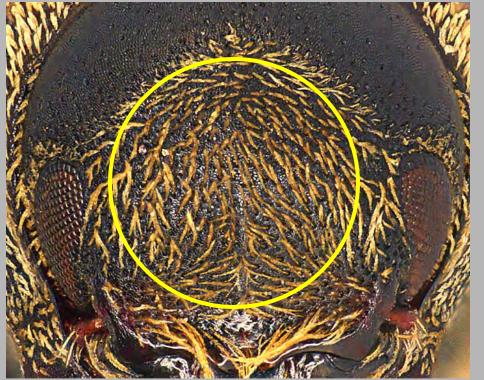
Propleural setae slender, <u>usually</u> not divided into more than 2 filaments (**a**).....**26** Propleural setae broad, <u>usually</u> divided into 3 or more filaments (**b**)......STOP

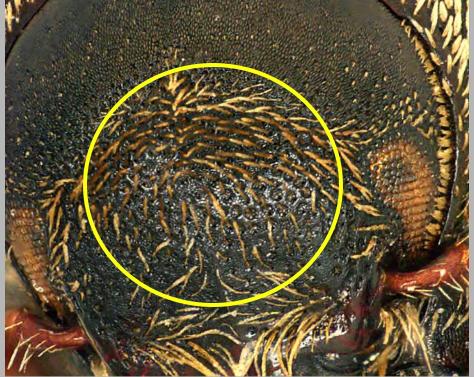


26 (25): Part I

26a: Fine, shallow, punctures

26b: Coarse, deep, punctures





26 (25): Part II



26d: Elytral scales 1/3 as wide as interstriae

26c: Elytral scales 1/4 as wide as interstriae



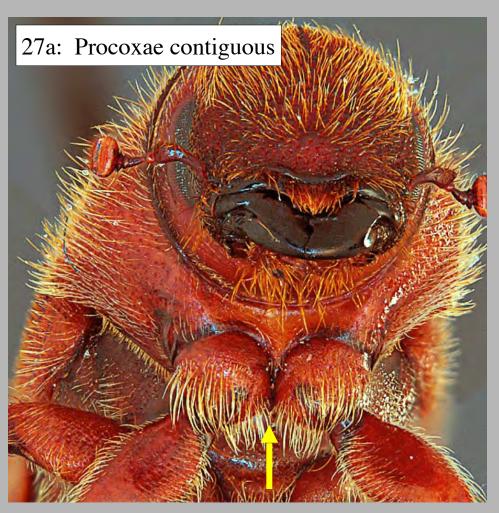
26 (25): Part III Hylesinus aculeatus Say

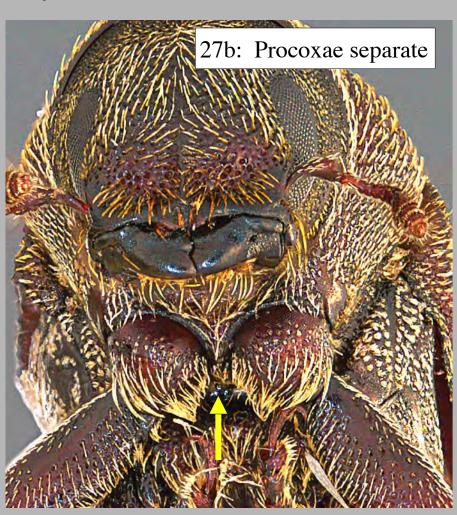


27 (23): Part I

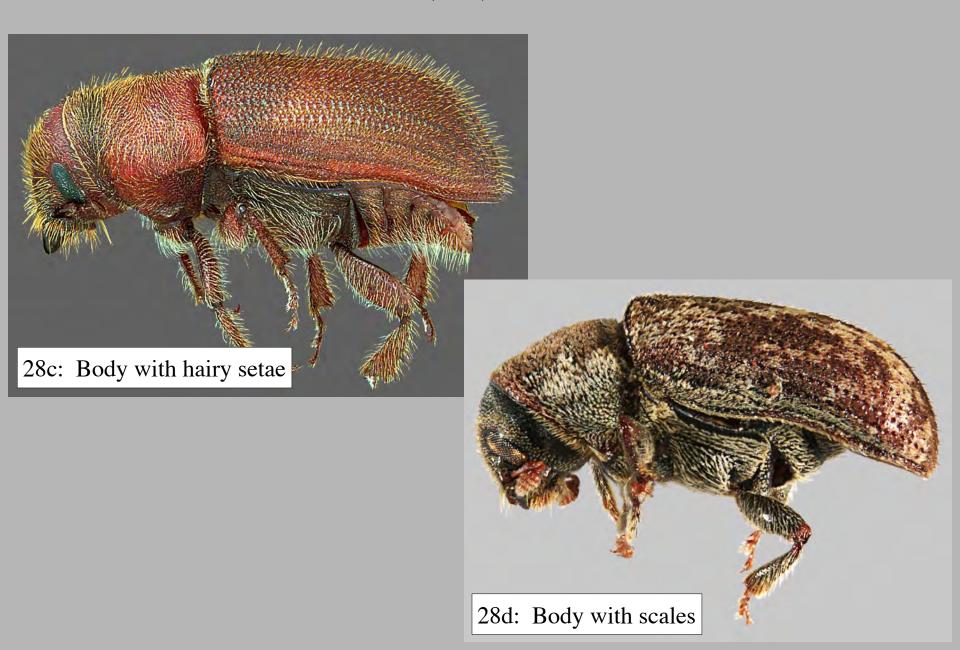
Procoxae contiguous or at most very narrowly separate (a); body with hairy setae, not scales (c)......28

Procoxae distinctly separate (b); body with scales (d)...STOP





27 (23): Part II

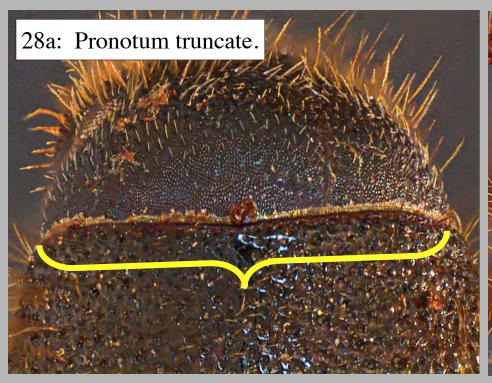


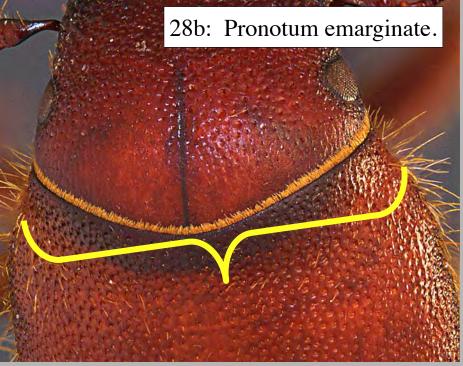
28 (27): Part I

Anterior margin of pronotum truncate (a); antennal funicle with 6 segments (c); antennal club sutures transverse (c)......29

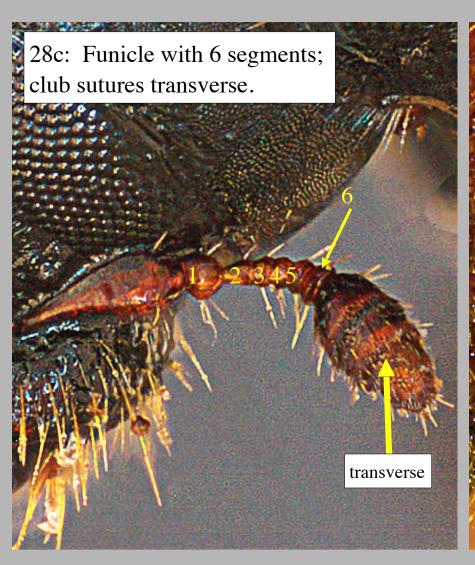
Anterior margin of pronotum distinctly emarginate (b); antennal funicle with 5 segments (d); antennal club sutures slightly procurved (d).....30

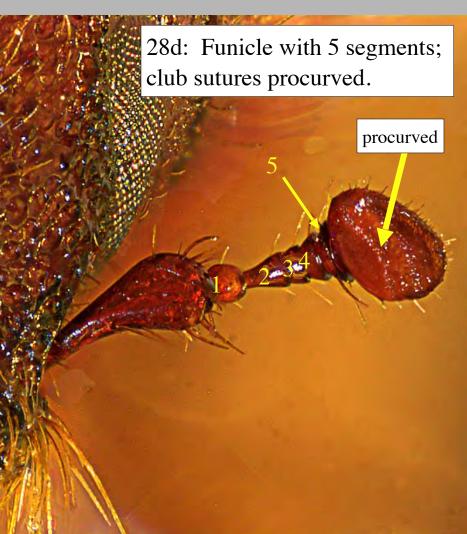




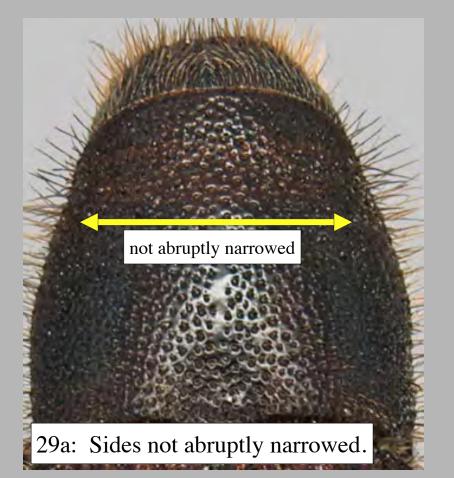


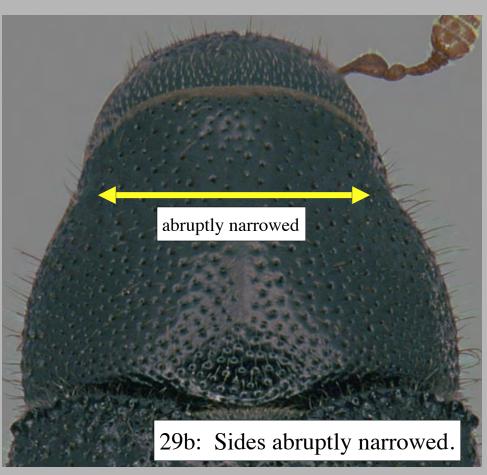
28 (27): Part II





29 (28): Part I





29 (28): Part II





29 (28): Part III

Hylurgus ligniperda (Fabricius) 😕



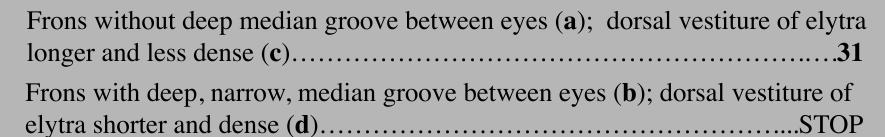
29 (28): Part IV







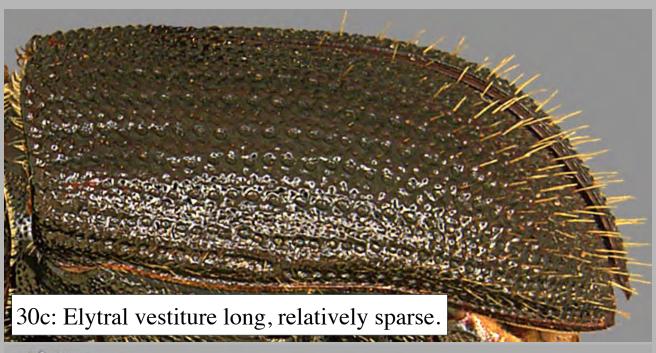
30 (28): Part I

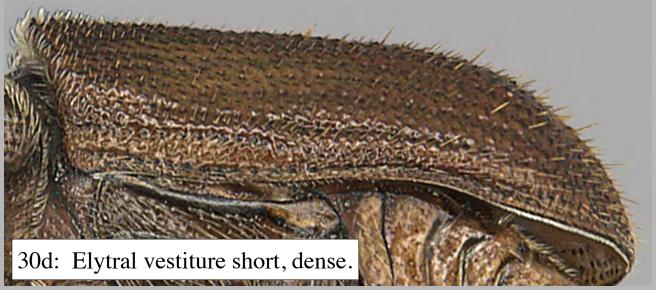


30b: Frons with median groove (dorsal view).

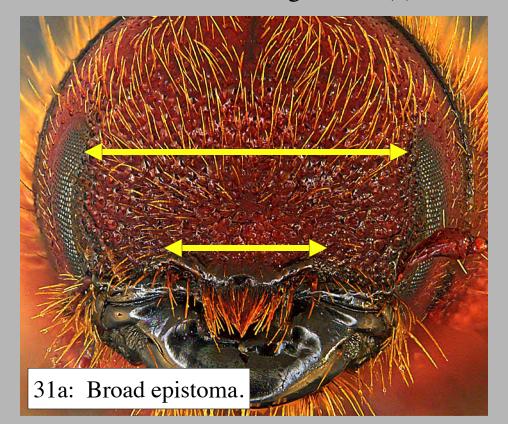
30a: Frons without median groove (dorsal view).

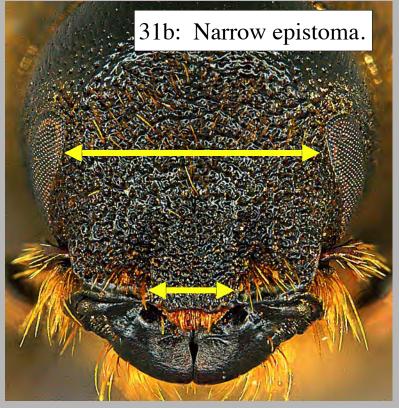
30 (28): Part II





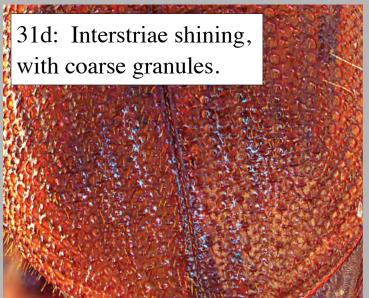
31 (30): Part I

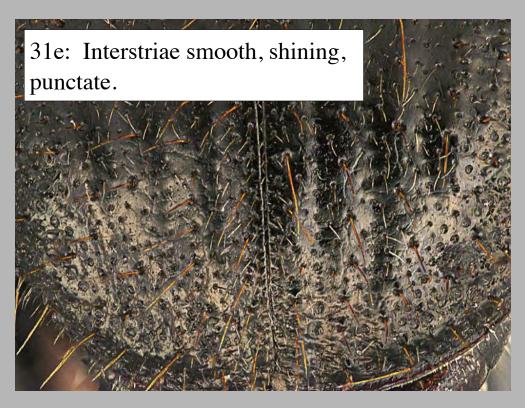




31 (30): Part II

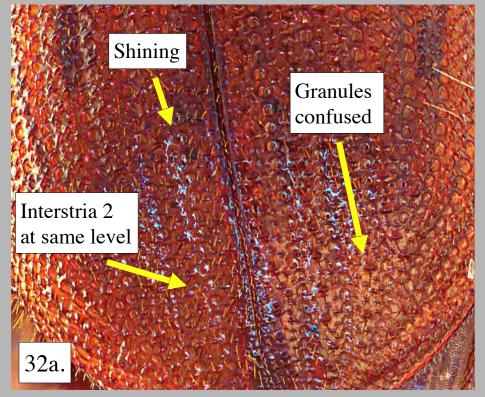


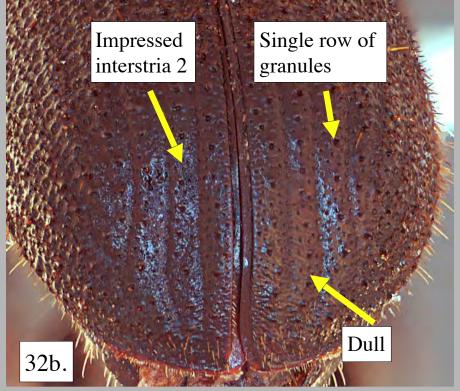




32 (31)

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





33 (32): Part I



33a: Color reddish brown.

33b: Color black or dark brown.



33 (32): Part II



33 (32): Part III

Dendroctonus valens LeConte



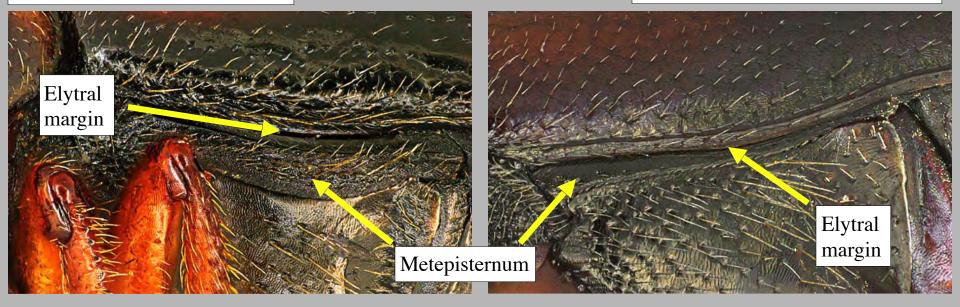
34 (1): Part I

Metepisternum fully visible throughout its length (if the elytra are slightly displaced, this character may be difficult to assess) (a); antennal club varying from flattened on one side (c, d) to obliquely truncate (e) - sutures on posterior face either not visible (g) or strongly displaced toward apex (h)......35

Metepisternum largely covered by elytra, <u>fully</u> visible only in its anterior

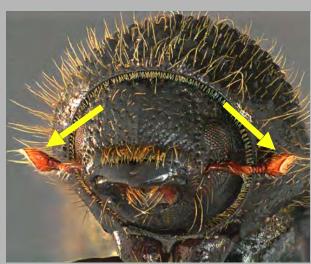
34a: Metepisternum visible.

34b: Metepisternum obscured.

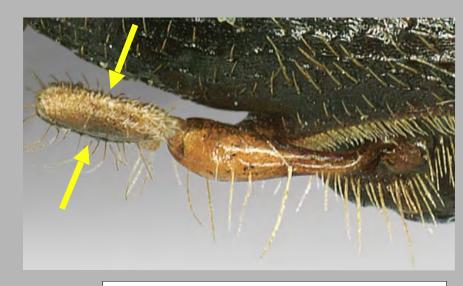


34 (1): Part II





34e: Antennal club obliquely truncate.

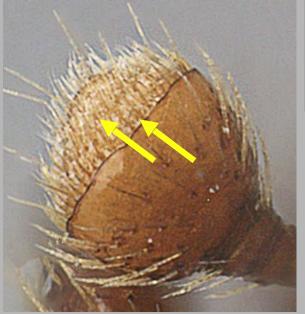


34f: Antennal club strongly flattened, equally so on both sides.

34 (1): Part III



34g: Posterior face of antennal club without visible sutures.

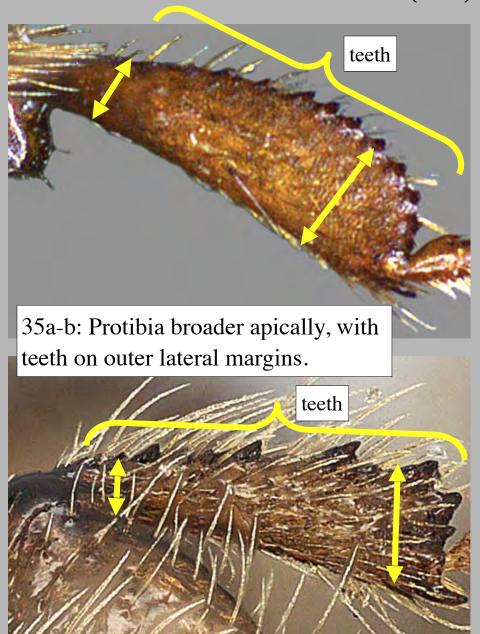


34h: Posterior face of antennal club with anteriorly displaced sutures.



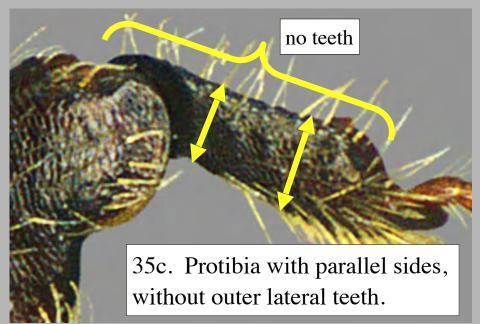
34i. Posterior face of antennal club with visible sutures that are not apically displaced.

35 (34): Part I

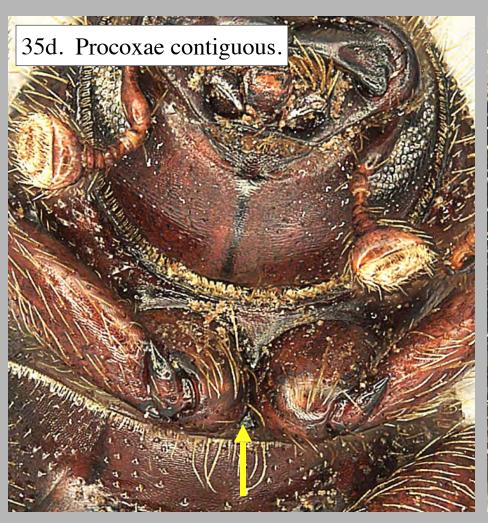


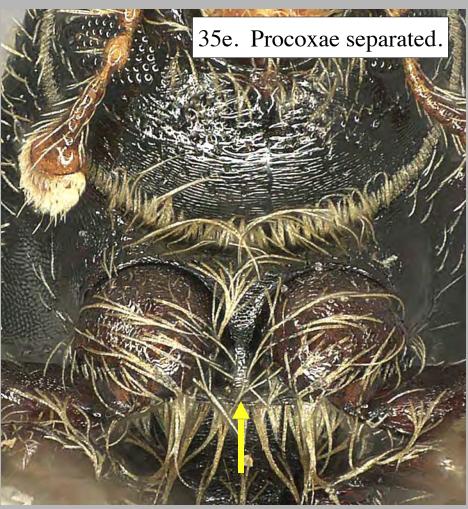
Protibiae broader apically, with teeth on outer lateral margins (a-b); procoxae contiguous (EXCEPT *Cnestus* & *Xylosandrus*) (d)......36

Protibiae with parallel sides, without outer lateral teeth (c); procoxae separated (e)....STOP



35 (34): Part II





36 (35): Part I

Antennal club obliquely truncate (a) or with sutures of posterior face restricted to less than apical 1/4 (b) or with no sutures on either face (f-i); costal margins of elytra descending posteriorly and vestiture setose (j); usually more than 2.0 mm in total length.

Antennal club more strongly flattened (c), with sutures on neither face displaced to

apical 1/4 (**d-e**); costal margins of elytra slightly ascending posteriorly and vestiture

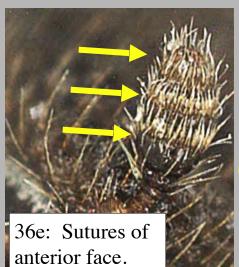
scale-like (**k**); usually less than 2.0 mm in total length......STOP

36a: Antennal club obliquely truncate.

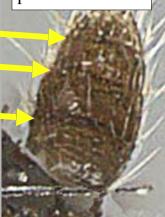


36b: Posterior face with anteriorly displaced sutures.





36d: Sutures of posterior face.



36 (35): Part II

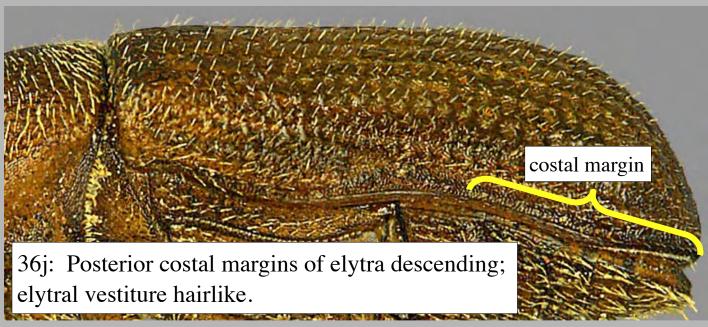


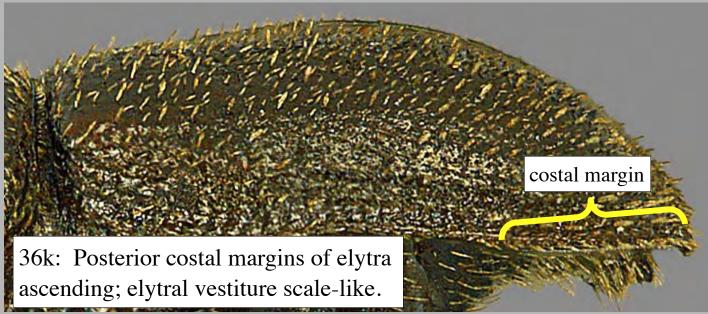
36f, g: No sutures visible on anterior face of antennal club.

36h, i: No sutures visible on posterior face of antennal club.



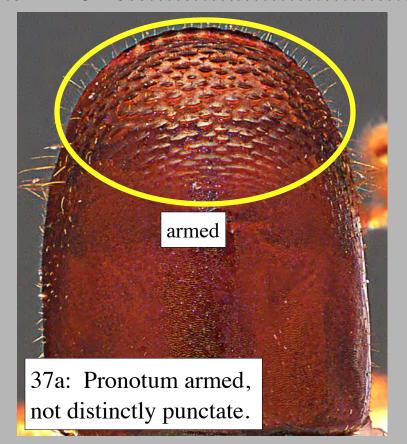
36 (35): Part III

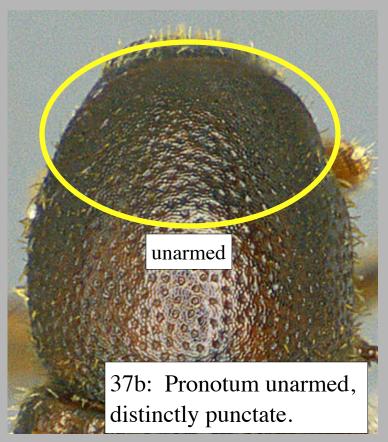




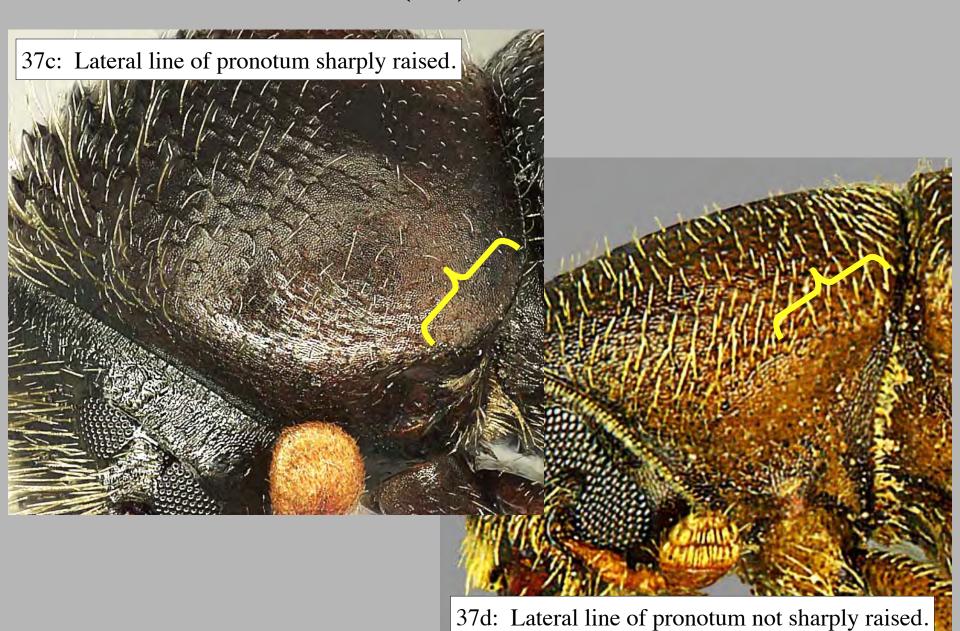
37 (36): Part I

Pronotum usually armed anteriorly with granules or asperities (**a**), if unarmed, lateral line sharply raised (**c**), at most finely punctate on unarmed surface; antennal funicle 4- (**e**) or 5-segmented (**f**); length usually over 2.0 mm.....38

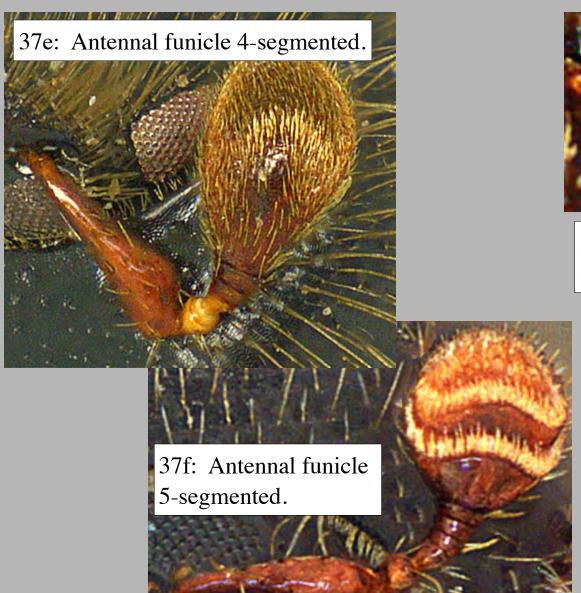




37 (36): Part II



37 (36): Part III





37g: Antennal funicle 3-segmented (2-segmented not illustrated).

38 (37): Part I

Eye completely divided into two halves (a); anterior face of antennal club without distinct sutures (other than at apex of basal segment) (c, d)......39

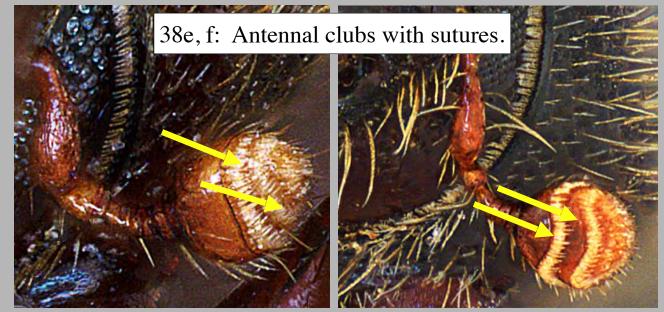
Anterior margin of eye sinuate or emarginate, never completely divided (b); anterior face of antennal club usually with distinct sutures (e, f)...........49





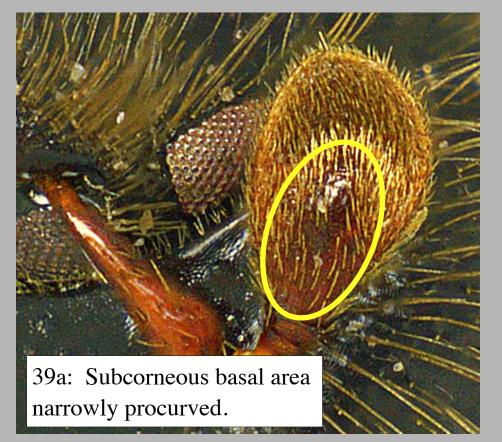
38 (37): Part II

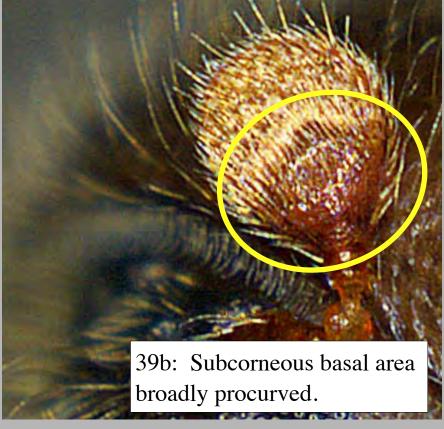




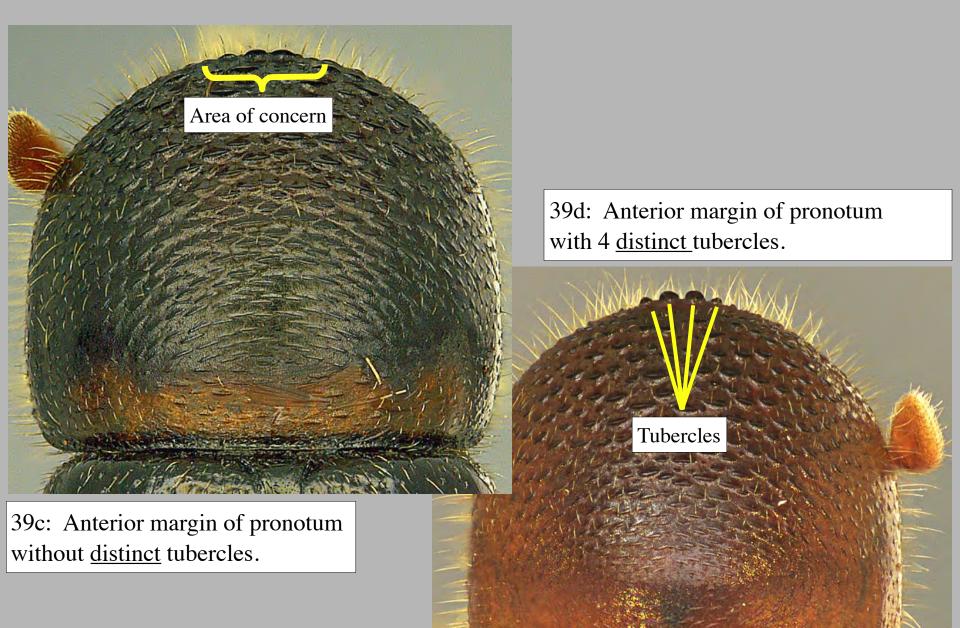
39 (38): Part I

Antennal club with subcorneous basal area narrowly procurved (a); anterior margin of pronotum without distinct tubercles (c).....40

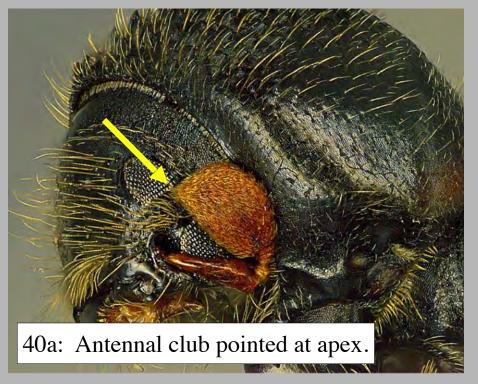


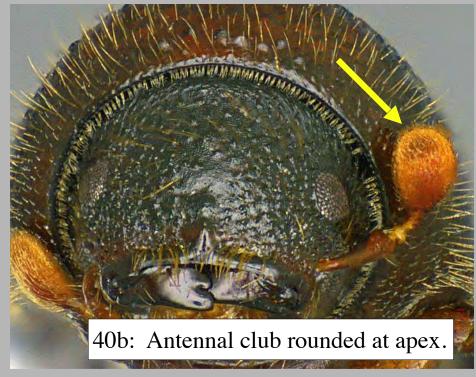


39 (38): Part II



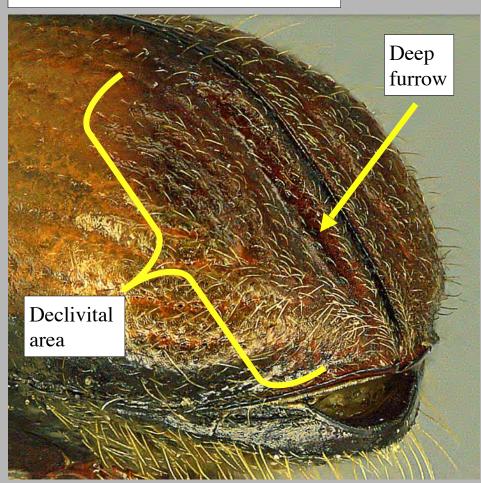
40 (39): Part I



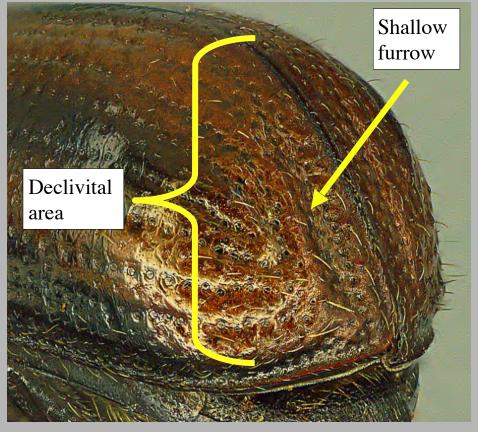


40 (39): Part II

40c: Apical declivity with dense relatively long setae and a deep furrow next to the suture.



40d: Apical declivity with sparse, short setae and a shallow furrow next to the suture.



40 (39): Part III

Trypodendron domesticum Linnaeus 😕

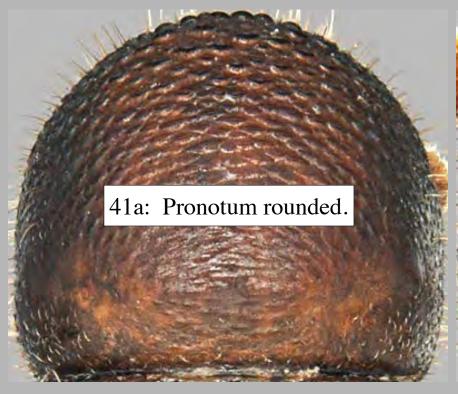


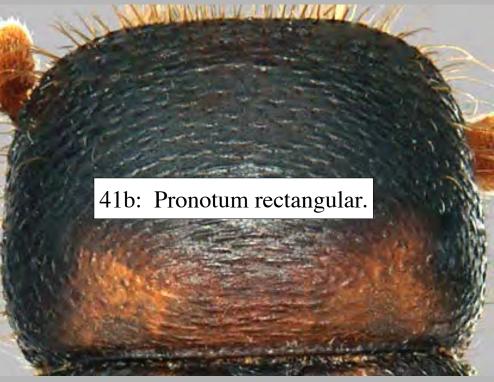




41 (40): Part I

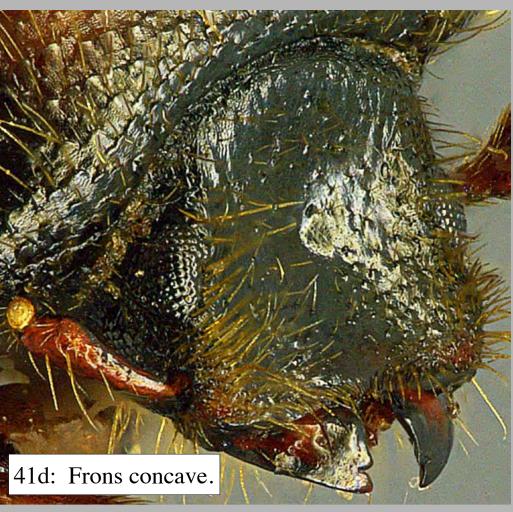
Pronotum in dorsal view rounded, with arcuate anterior margin (a);		
frons convex (c) - females	42	
Pronotum in dorsal view rectangular, with truncate anterior margin (o);	
frons concave (d) - males		





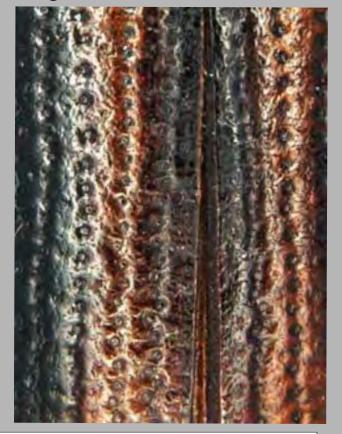
41 (40): Part II





42 (41)

Elytral surface between punctures and elevated areas si	mooth
and shiny (a)	43
Elytral surface between punctures and elevated areas	
roughened, more-or-less dull (b)	.STOP

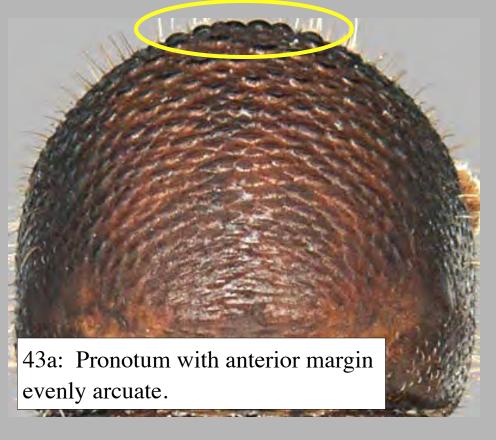


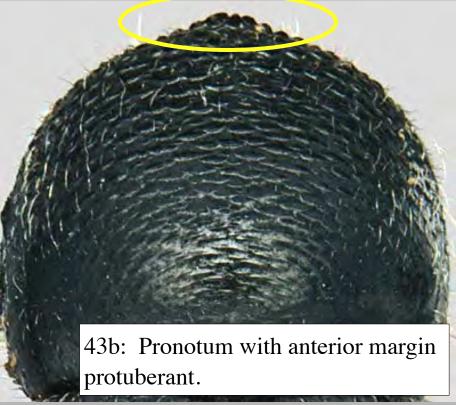


42a: Elytral surface smooth, shiny.

42b: Elytral surface roughened, dull.

43 (42)





44 (43): Part I



44a: Declivital punctures vague.

44b: Declivital punctures distinct.



44 (43): Part II

Trypodendron lineatum (Olivier)

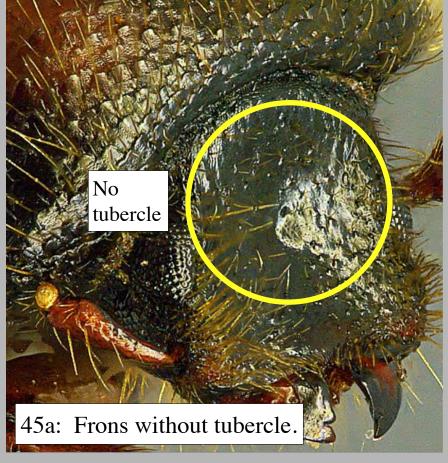
Female

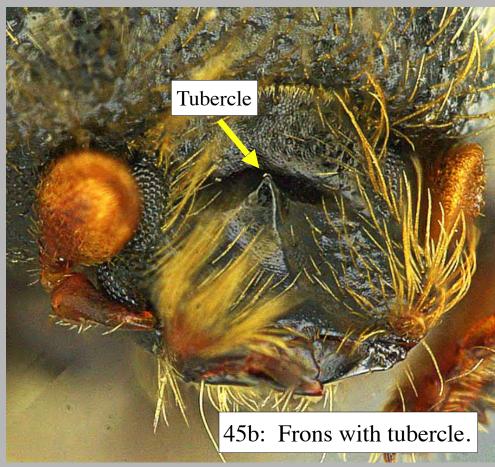




45 (41)

Frons without median tubercle (a)	46
Frons with large, pointed, median tubercle between	
upper halves of eyes (b)ST	'OP

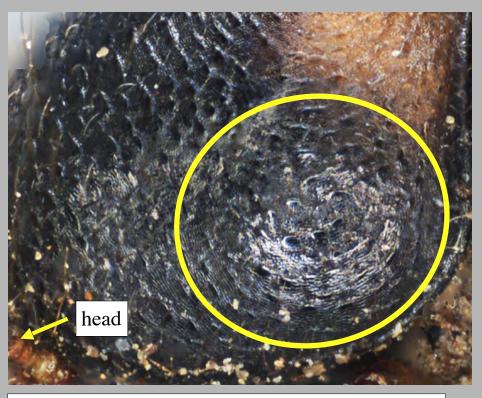




46 (45)

Posterolateral areas of pronotum with distinct asperities (**a**)...............47

Posterolateral areas of pronotum without distinct asperities (**b**)....STOP



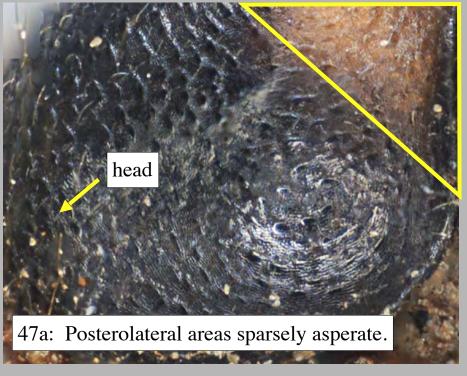
46a: Posterolateral areas distinctly asperate.

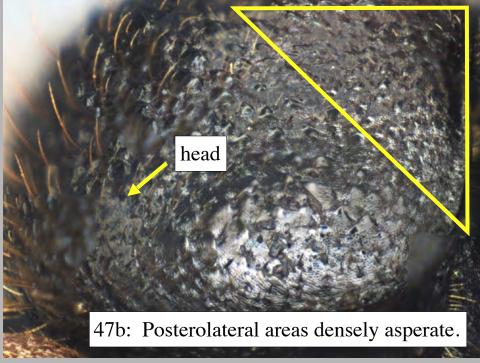


46b: Posterolateral areas <u>indistinctly</u> asperate.

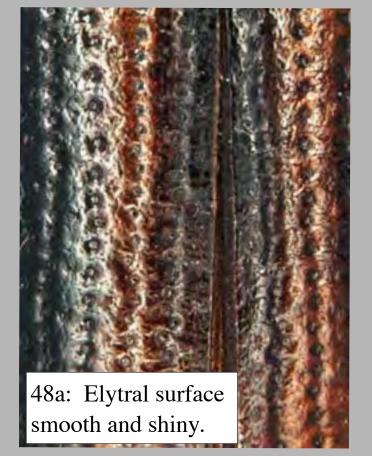
47 (46)

Posterolateral areas of pronotum with sparse, shallow as	perities (a);
total length < 3.3 mm	48
Posterolateral areas of pronotum with dense, coarse aspe	erities (b);
total length > 3.5 mm	STOP





48 (47): Part I





48 (47): Part II





48d: Elytral apex narrowed, transition from pale to dark colors gradual on pronotum.

48c: Elytral apex rounded, transition from pale to dark colors abrupt on pronotum.

48 (47): Part III

Trypodendron lineatum (Olivier)

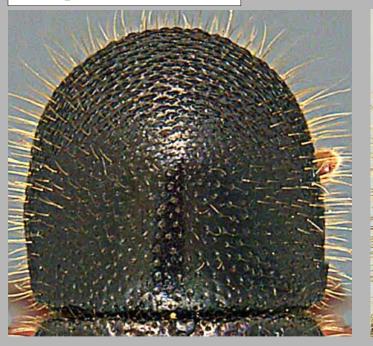
Male





49 (38): Part I

49a: Pronotum granulate AND punctate.



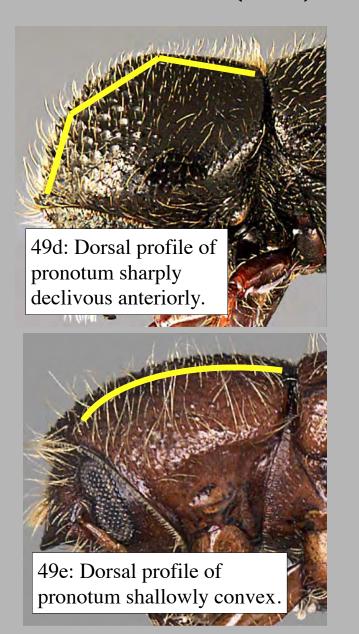
49b: Pronotum punctate.

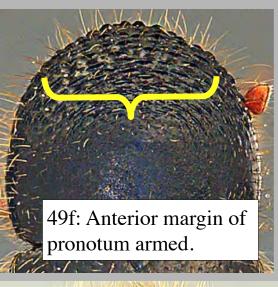


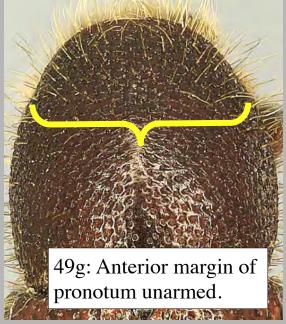
49c: Pronotum granulate.



49 (38): Part II







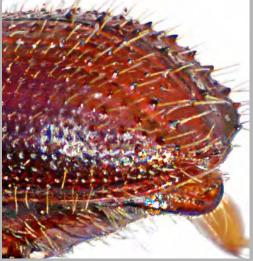
49 (38): Part III





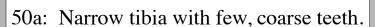
49h-k: Elytral declivity with spines.

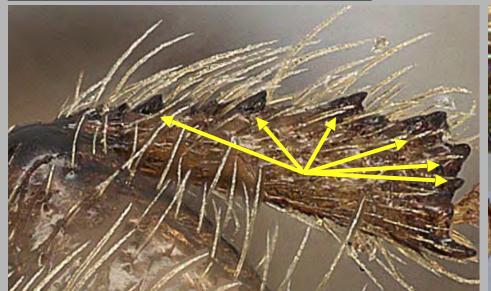


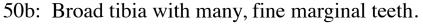


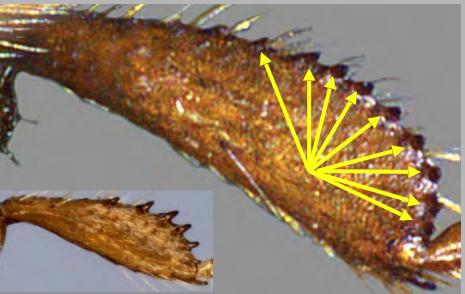


50 (49): Part I

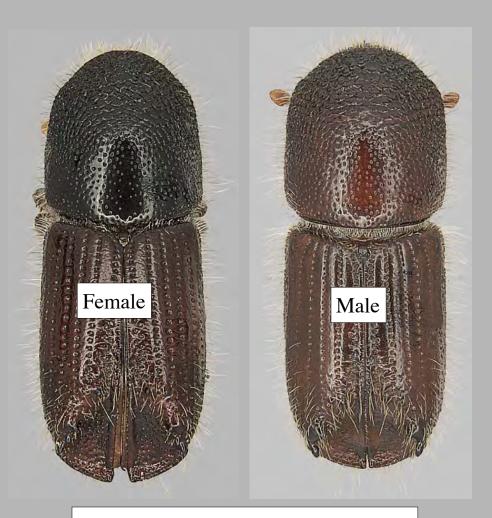








50 (49): Part II



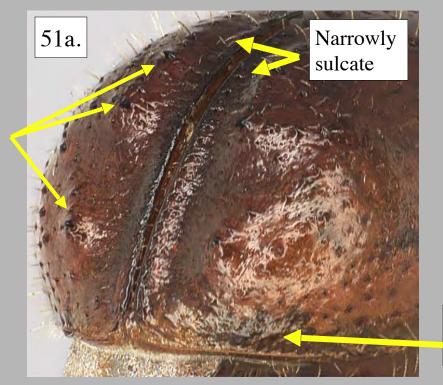
50c-d: Females and males similar in appearance and size.



50e-f: Females and males different in appearance and size.

51 (50)

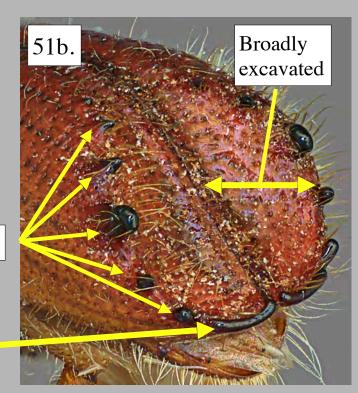




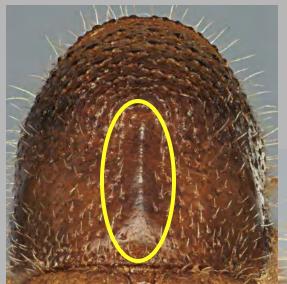
Teeth

Teeth

Lower margin



52 (51): Part I



52a: Posterior half pronotum with raised carina.

52b: Posterior half pronotum without raised carina.



52c: Posterior club face with sutures.

52d: Posterior club face with-out sutures.

52 (51): Part II



52e: Elytral surface between punctures smooth, punctures small, striae not impressed.

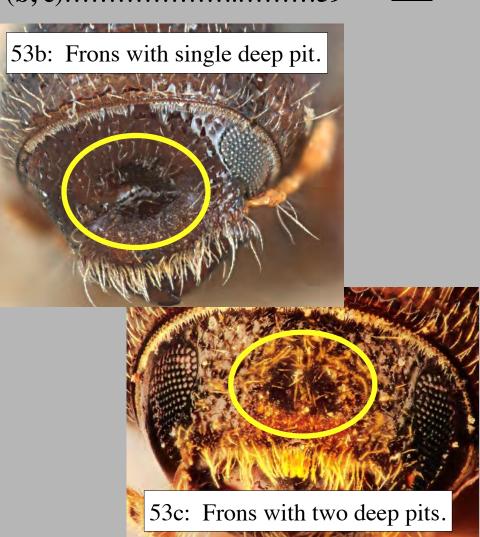


52f: Elytral surface between punctures rough, punctures large, striae impressed.

53 (52)

Frons	without deep pits (a)	54
Frons	with one or two deep pits (b , c)	59





54 (53)

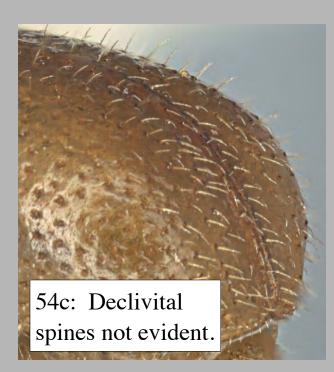
Elytral declivity with evident spines(**a**, **b**).......55

Elytral declivity without easily seen spines (**c**)......STOP



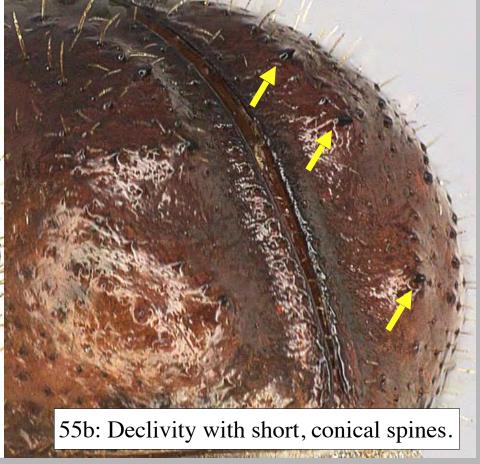
54a: Elytral declivity with dorsal pair of pines long and hooked.

54b: Declivital spines short, conical.



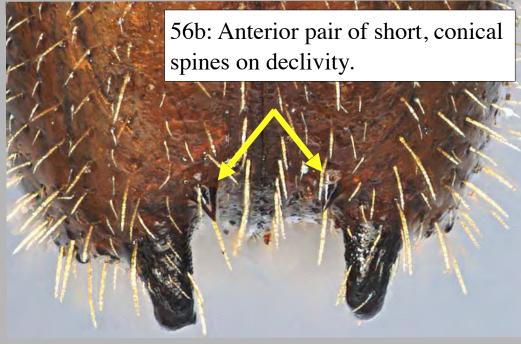
55 (54)



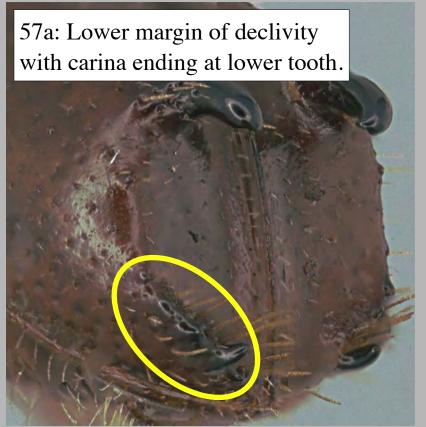


56 (55)





57 (56): Part I



57b: Posterolateral margin of declivity rounded, without carina.

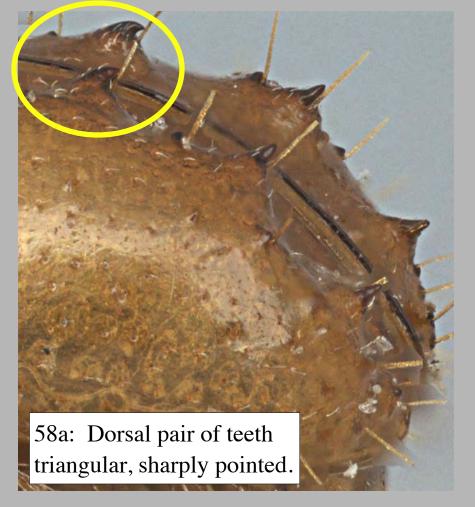


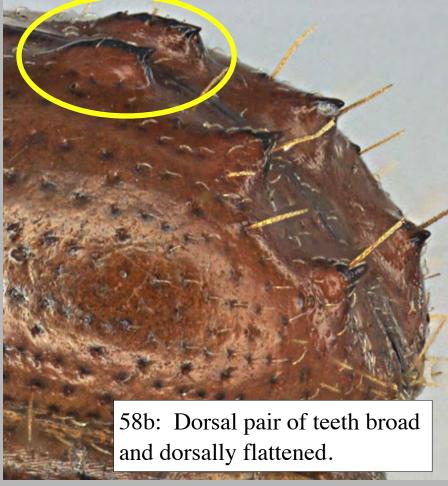
57 (56): Part II Pityogenes carinulatus (LeConte) Male



58 (55): Part I

Dorsal pair of teeth on elytral declivity triangular, sharply hooked in side view (a); portrait (e).....*Pityogenes chalcographus* (Linnaeus) : - male Dorsal pair of teeth broad and dorsally flattened in side view (b).....STOP





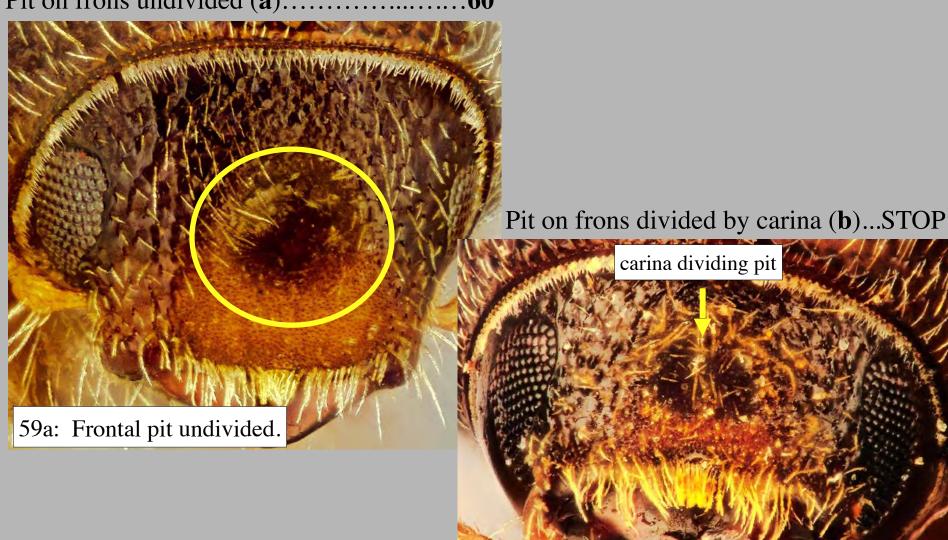
58 (55): Part III



59 (53)

59b: Frontal pit divided.

Pit on frons undivided (a)......60

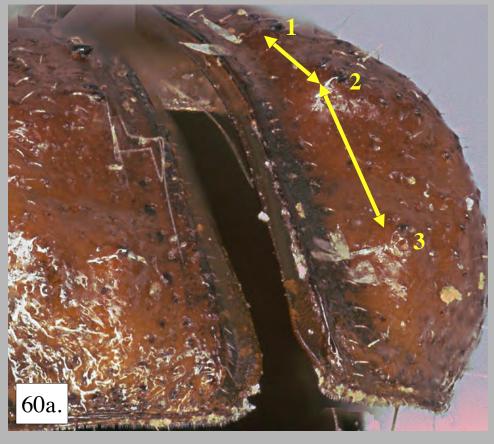


*Numbers denote spine pairs.

60 (59): Part I

Distance between elytral declivital spines 1 and 2 about half that of distance between spines 2 and 3 (a); portrait (c)....

Pityogenes carinulatus (LeConte) – female





60 (59): Part II Pityogenes carinulatus (LeConte) Female

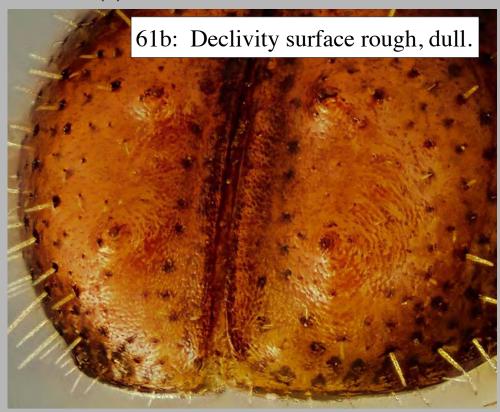


61 (60): Part I

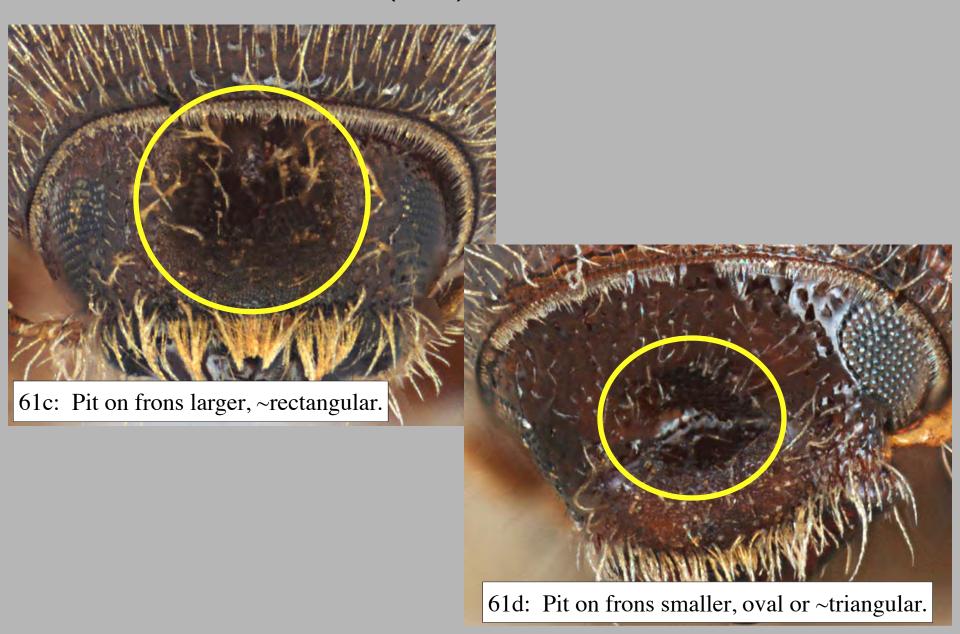
Surface of elytral declivity smooth and polished, with no or little visible microsculpture (a); pit on frons larger and more-or-less rectangular in outline (c); punctures on posterior half of pronotum small and sparse (e); portrait (g).......



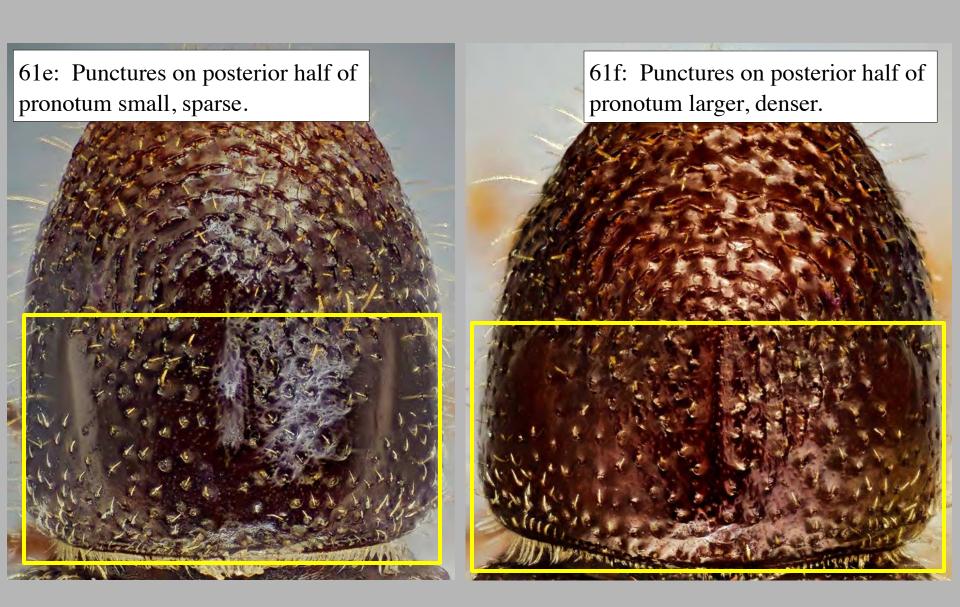
61a: Declivity surface smooth, polished.



61 (60): Part II



61 (60): Part III



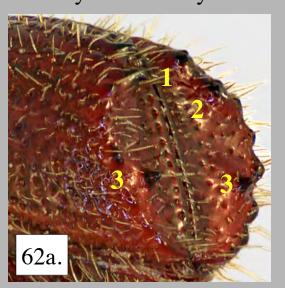
61 (60): Part IV

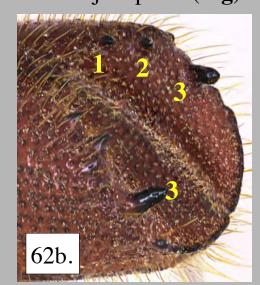
Pityogenes chalcographus (Linnaeus) S Female

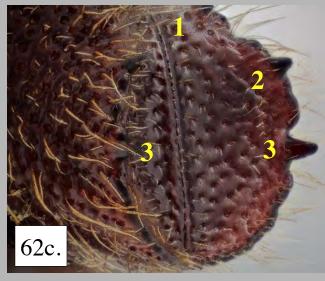


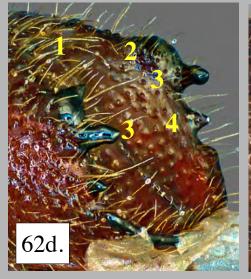
62 (51)

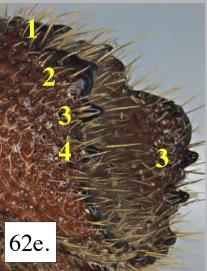
Elytral declivity with 3 pairs of major spines (*numbers on images denote spine

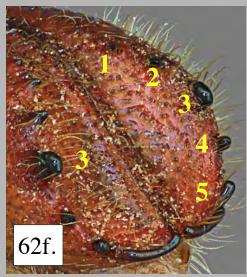


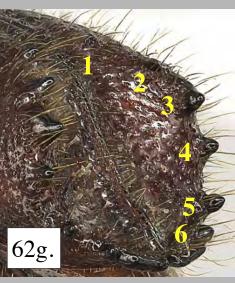






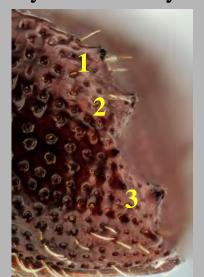


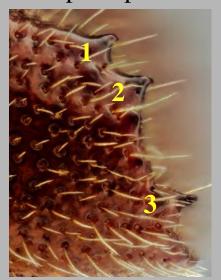


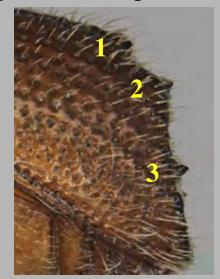


63 (62)

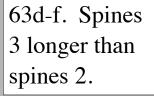
Elytral declivity with 3rd pair spines short, no longer than 2nd pair (**a-c**).....**64** Elytral declivity with 3rd pair spines longer than 2nd pair (**d-f**)......**65**

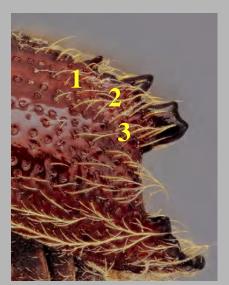


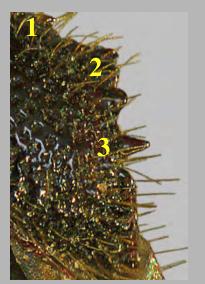




63a-c. Spines 3 no longer than spines 2.









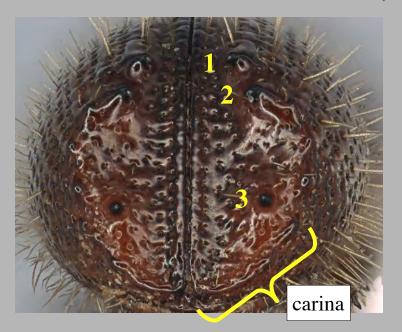
64 (63): Part I

.....<u>female</u> Orthotomicus erosus (Wollaston) 😕

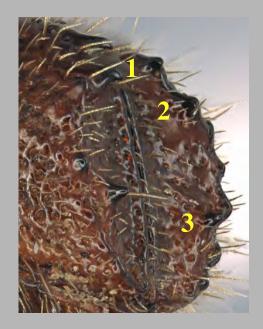


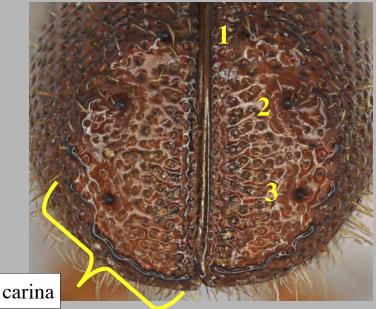


64 (63): Part II

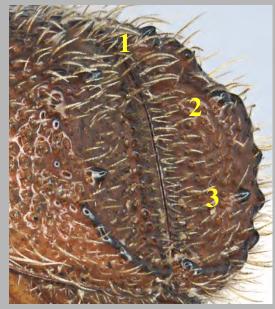


64c, d: Orthotomicus caelatus: declivity narrowly excavate; carina not reaching bottom pair of spines, spines 1 & 2 closer together.





64e, f: Orthtomicus erosus female: declivity broadly excavate; carina extending beyond bottom pair of spines, spines 1 & 2 distant from each other.



64 (63): Part III

Orthotomicus caelatus (Eichhoff)





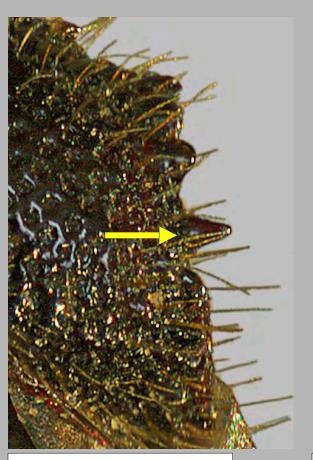
64 (63): Part IV

Orthotomicus erosus (Wollaston) <u>Female</u>

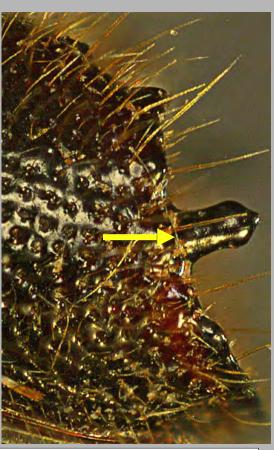


65 (63)

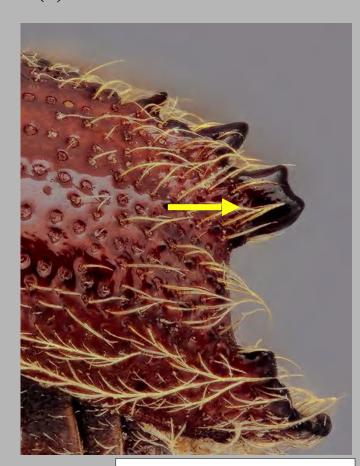
Elytral declivital spine 3 conical or cylindrical, pointed at apex (**a-b**)......**66**Elytral declivital spine 3 flattened, emarginate at apex (**c**)......STOP



65a: Spine 3 conical, pointed.

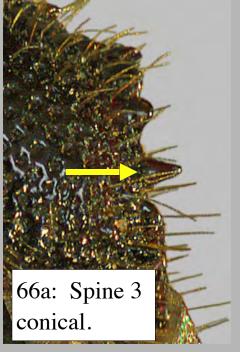


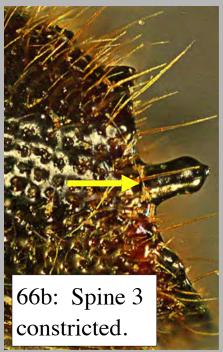
65b: Spine 3 cylindrical, pointed.



65c: Spine 3 flattened and emarginate.

66 (65): Part I









66 (65): Part II

Orthotomicus latidens (LeConte)



66 (65): Part III

Pseudips mexicanus (Hopkins)

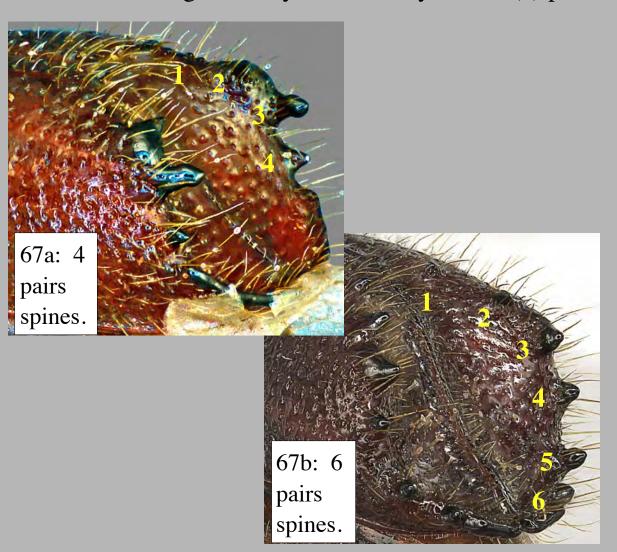


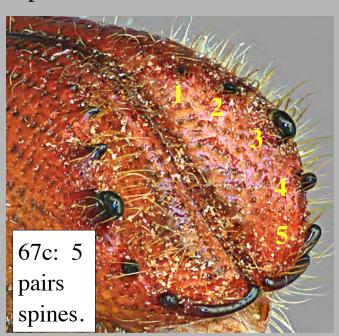
66g. Male.

67 (62)

Lateral margins of elytral declivity with 4 (a) or 6 (b) pairs of spines......68

Lateral margins of elytral declivity with 5 (c) pairs of spines......STOP



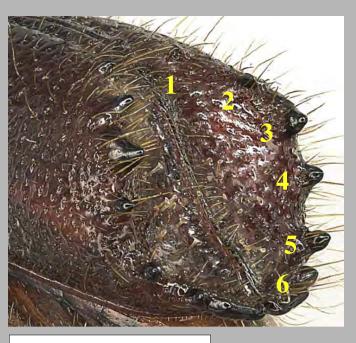


68 (67)

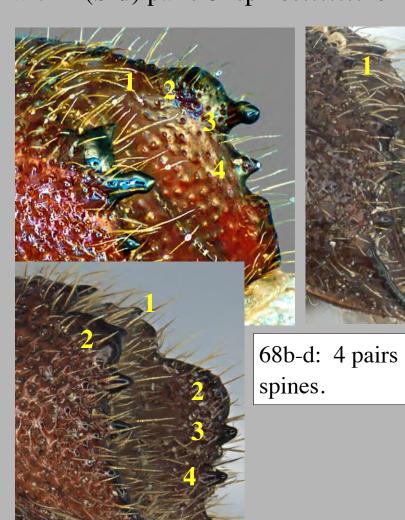
Lateral margins of elytral declivity with 6 (a) pairs of spines.......69

Lateral margins of elytral declivity with 4 (b-d) pairs of spines......70



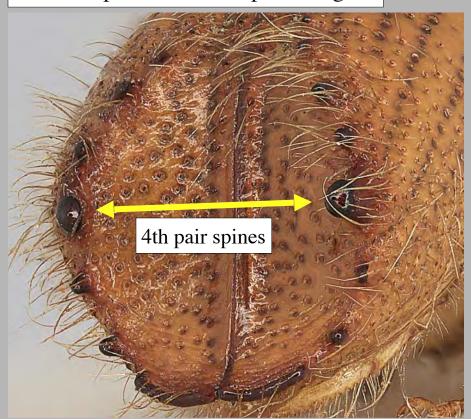


68a: 6 pairs spines.

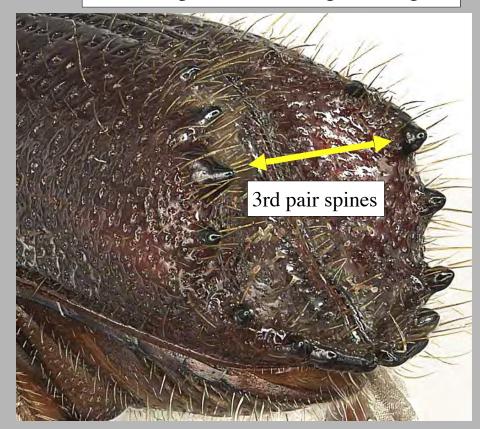


69 (68): Part I

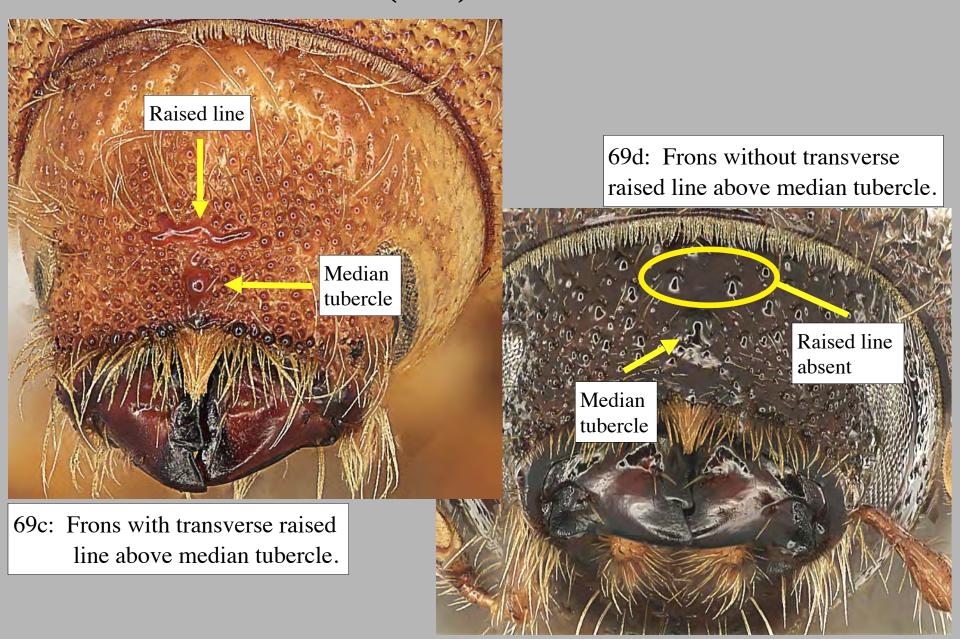
69a: 4th pair declivital spines largest.



69b: 3rd pair declivital spines largest.



69 (68): Part II



69 (68): Part IV

Ips sexdentatus (Boerner) 😕



70 (68)

Surface of elytral declivity dull, roughened between punctures (a-b).....71
Surface of elytral declivity shiny, smooth between punctures (c)......72



70a-b: Declivital surface dull, rough.



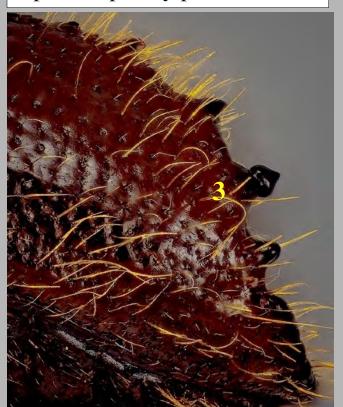


70c: Declivital surface shiny, smooth.



71 (70): Part I

71a: Declivital spine 3 smaller, capitate, apically pointed.



71b-c: Declivital spine 3 large, flattened, apically emarginate.



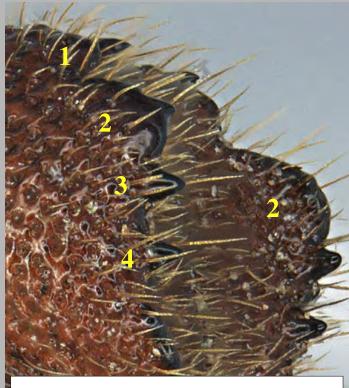


71 (70): Part II

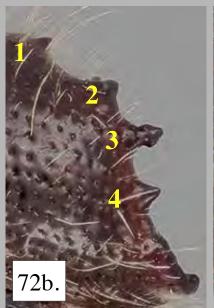
Ips typographus (Linnaeus) 😕

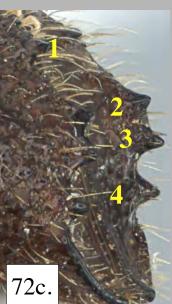


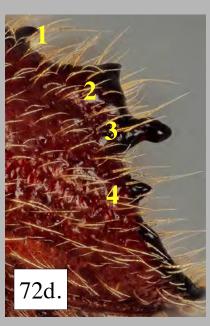
72 (70): Part I



72a: Male Orthotomicus erosus: spine pair 2 largest and lobate.





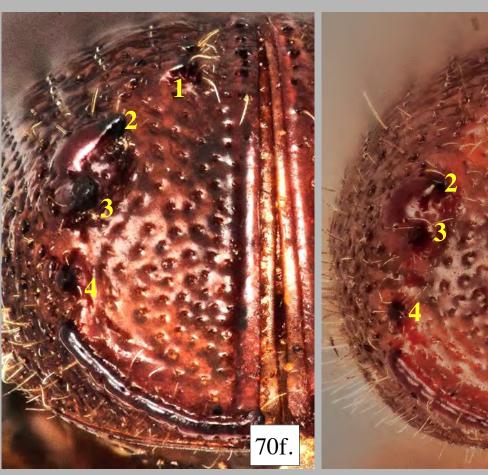


72b-c: Spine pair 2 smaller, not lobate. d. Spine pair 2 lobate, large, but short.

72 (70): Part II



70e. Male Orthotomicus erosus: spine pair 4 displaced toward suture, not on edge of declivity.



70f-g. All spine pairs on edge of declivity.

72 (70): Part III

Orthotomicus erosus (Wollaston) & Male



73 (72)





73a: Discal interstriae impunctate.

73b: Discal interstriae punctate, setose throughout.

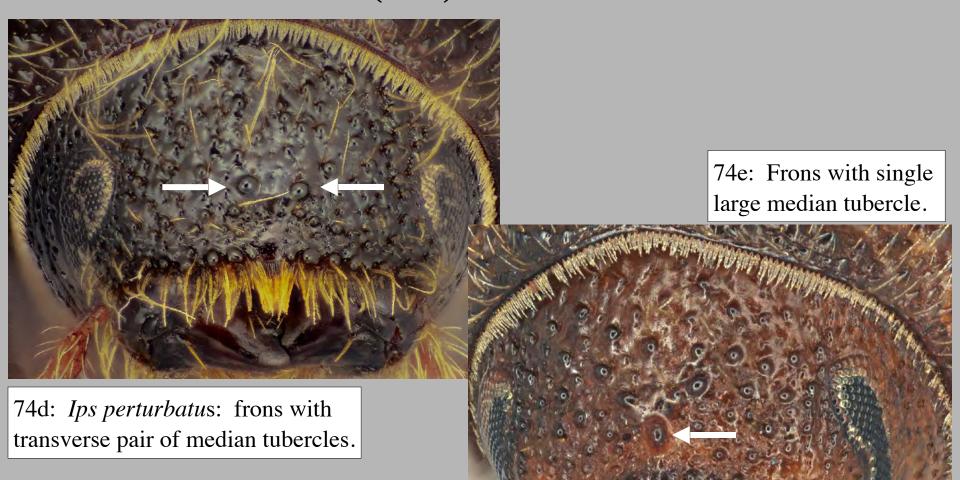
74 (73): Part I







74 (73): Part II



74 (73): Part III *Ips perturbatus* (Eichhoff)



75 (74): Part I

Sutures of antennal club narrowly, strongly bisinuate (the first suture is normally the most distinct and diagnostic) (b); 4.2-5.4 mm in length.....STOP



75a: Sutures broadly bisinuate.

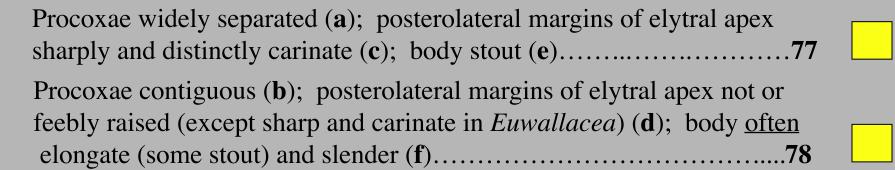
75b: Sutures narrowly bisinuate.



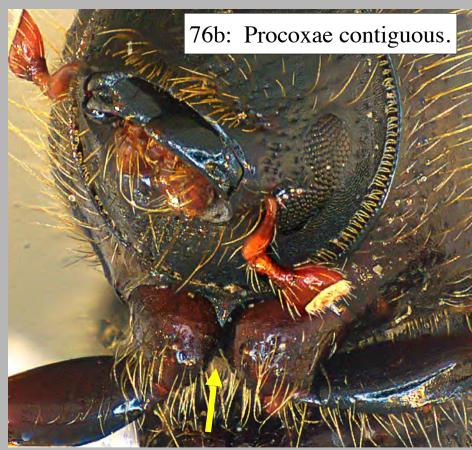
75 (74): Part II _____ *Ips pini* (Say)



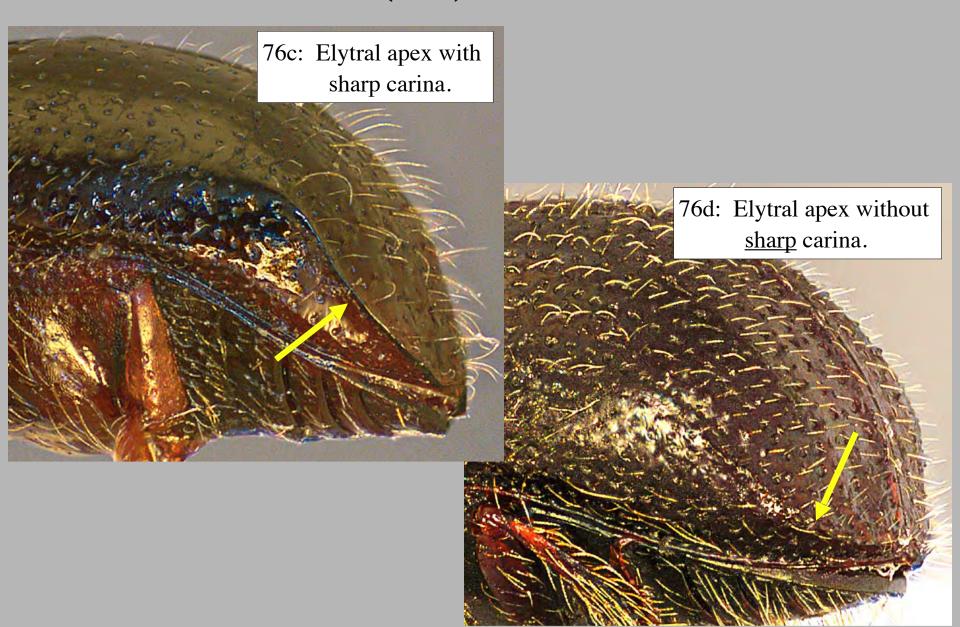
76 (50): Part I



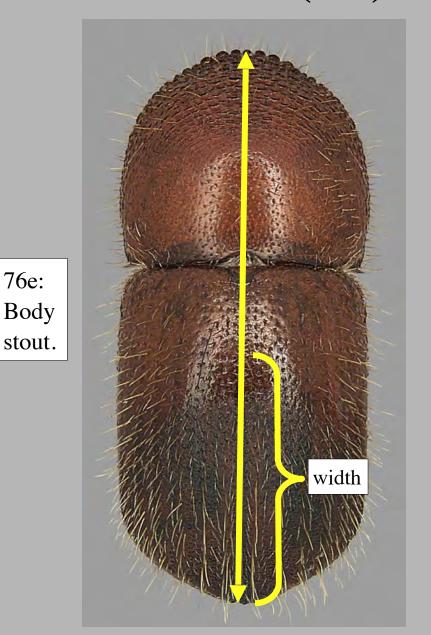




76 (50): Part II

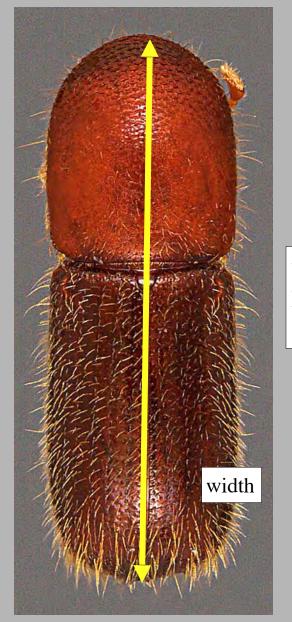


76 (50): Part III



76e:

Body



76f: Body slender.

77 (76): Part I





77 (76): Part II

Xylosandrus crassiusculus (Motschulsky)



77 (76): Part III

Xylosandrus germanus (Blandford) 😊

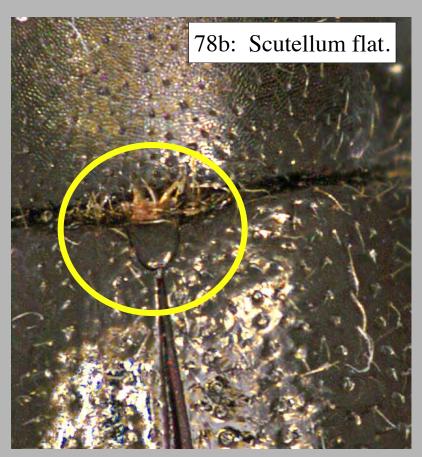




78 (76): Part I

Scutellum flat, in same plane as elytral bases (b); lower margin of elytral declivity without spines (d)......80





78 (76): Part II



78d: Declivital margin without spines.

78c: Declivital margin with spines.

79 (78): Part I

Spines on declivital interstriae 1 and 3 and ventrolateral margin conical, not hooked at apex (a); smaller, 2.0-2.4 mm; portrait (c)....Xyleborinus saxesenii (Ratzeburg) Spines on declivital interstriae 1 and 3 and ventrolateral margin larger, slightly hooked at apex (especially the largest) (b); larger, 2.5-2.8 mm; portrait (d)......

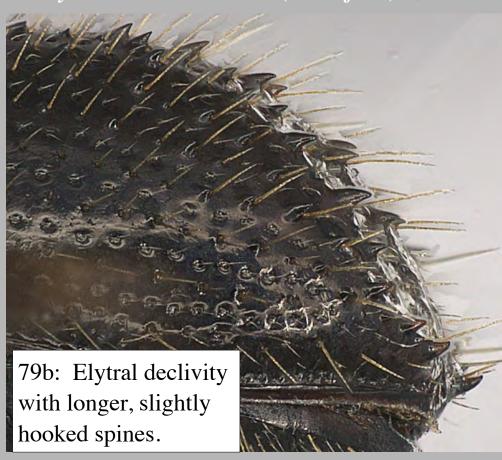
.....Xyleborinus attenuatus (Blandford) 😕



79a: Elytral declivity

with small, conical

spines.



79 (78): Part II

Xyleborinus saxesenii (Ratzeburg)



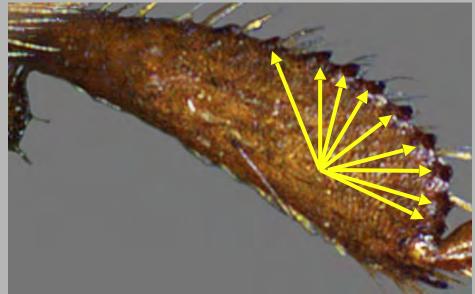


79 (78): Part III

Xyleborinus attenuatus (Blandford) 😕

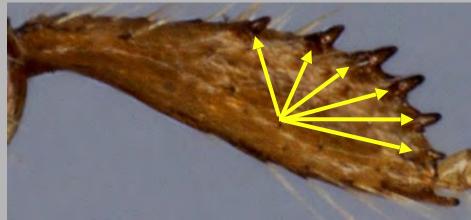


80 (78)



80a: Tibial teeth many, small, short, close together.

80b: Tibial teeth fewer, larger, longer, and far apart.



81 (80): Part I

Several segments of antennal club visible beyond corneous basal segment in lateral view (a) and at apex of posterior face (c); segment one not forming a complete circle enclosing subsequent segments (e)......82

81a: In lateral view, antennal club segments visible beyond basal segment.





81b: In lateral view, no antennal club segments visible beyond basal segment.

81 (80): Part II

81e: 1st segment not enclosing those following.



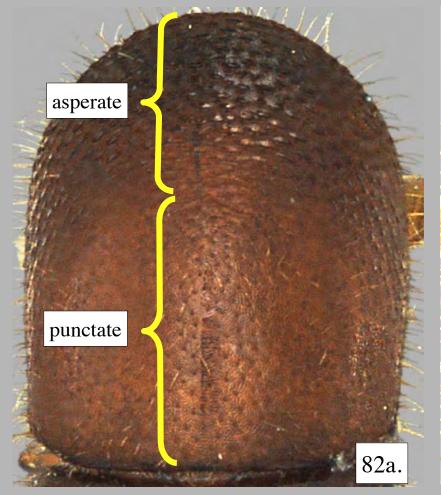
81c: Segments visible at apex posterior face.

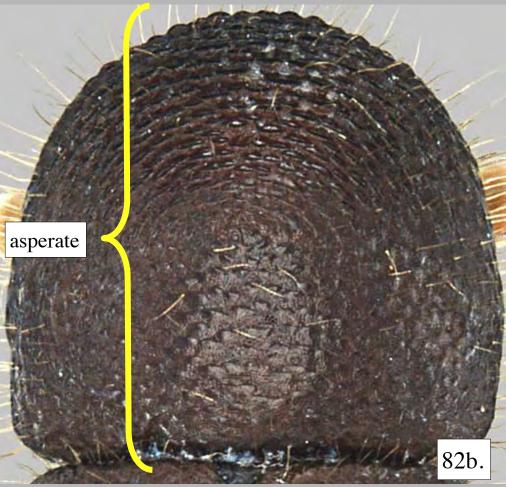


81d: Segments not visible at apex posterior face.

81f: 1st segment enclosing those following.

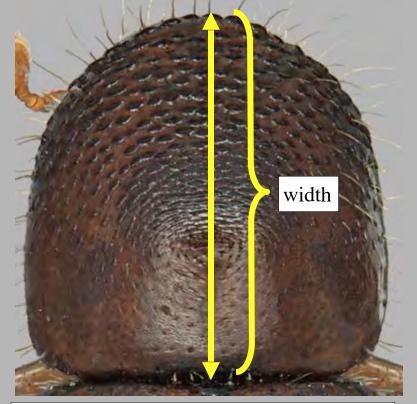
82 (81)



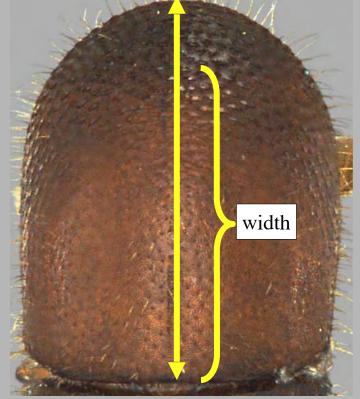


83 (82): Part I

This is the polyphagous shothole borer of California – the identity is uncertain. Pronotum longer than wide (b); posterolateral margin of elytral declivity rounded (d); elytral punctures and vestiture confused, vestiture abundant (f); portrait (h)............



83a: Pronotum wide as long, or wider.



83b: Pronotum longer than wide.

83 (82): Part II





83 (82): Part III





83 (82): Part IV

Euwallacea "fornicatus (Eichhoff)" 😕

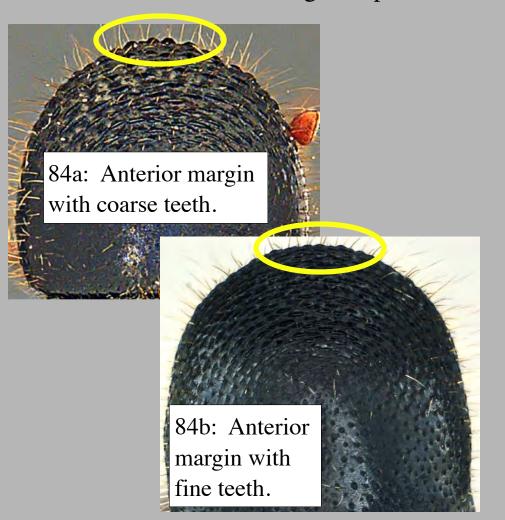


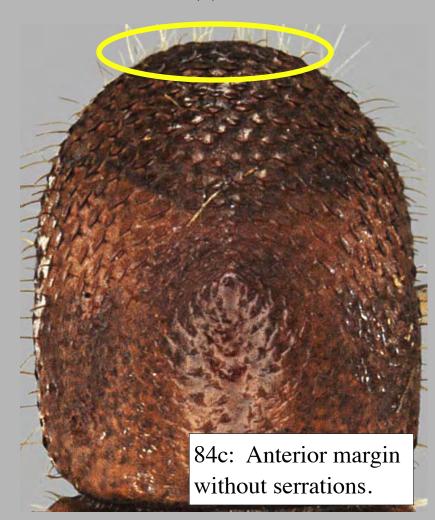
83 (82): Part V

Cyclorhipidion bodoanum (Reitter)



84 (81)

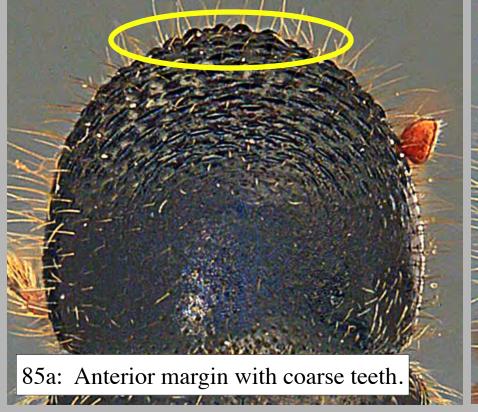


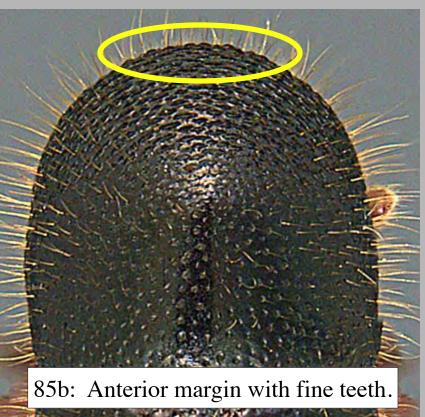


85 (84): Part I

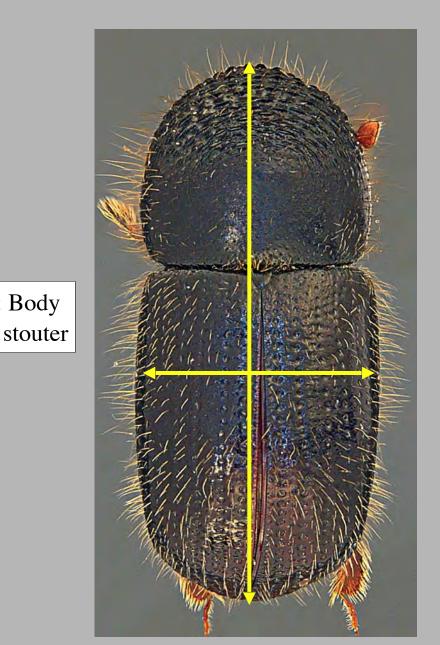
Median anterior margin of pronotum with several coarse teeth larger than the asperities on the anterior slope of the pronotum (a); body stout, < 2.2X as long

Anterior margin of pronotum with fine teeth smaller than the asperities on the anterior slope (b); body more slender, > 2.3X as long as wide (d)....STOP

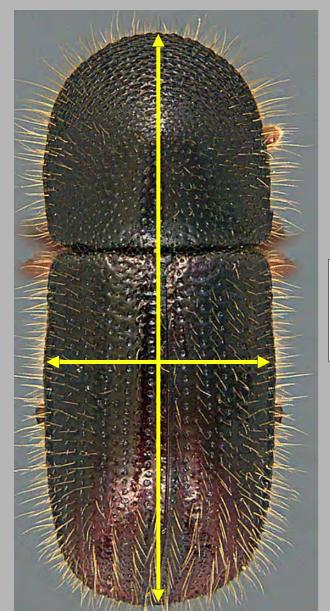




85 (84): Part II



85c: Body



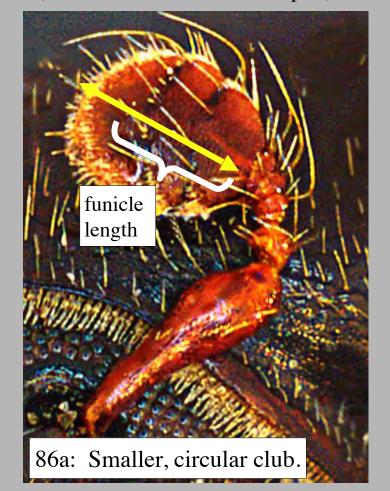
85d: Body more slender

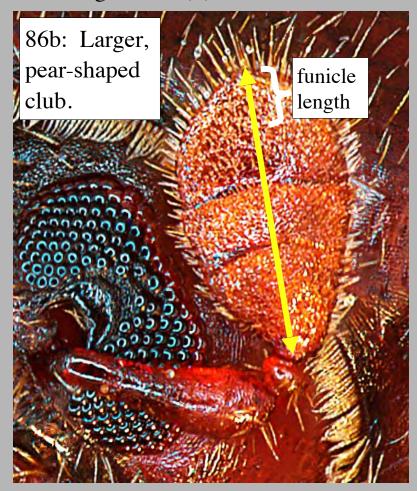
85 (84): Part III

Anisandrus dispar (Fabricius)



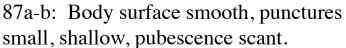
86 (34)

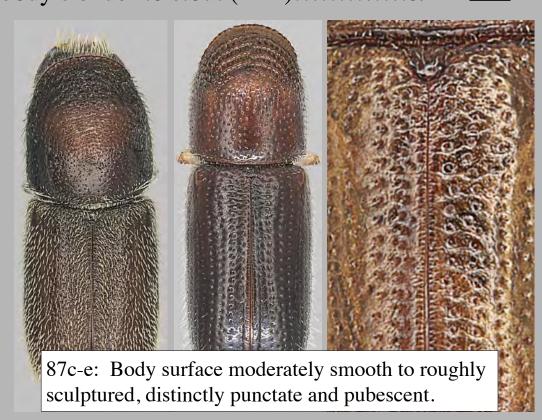




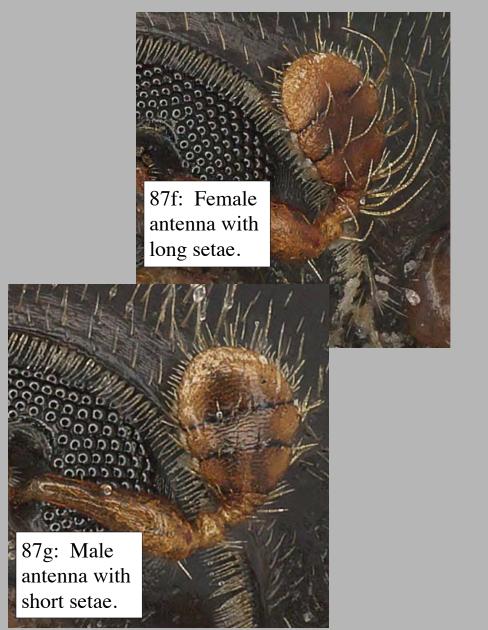
87 (86): Part I

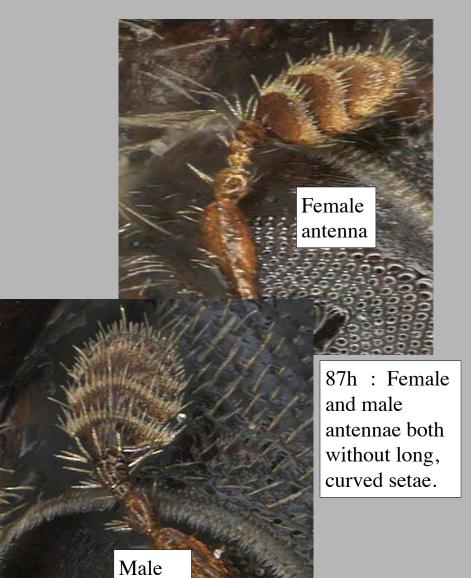






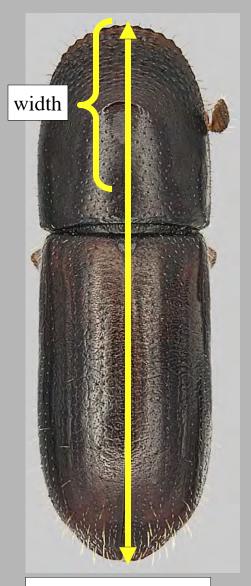
87 (86): Part II



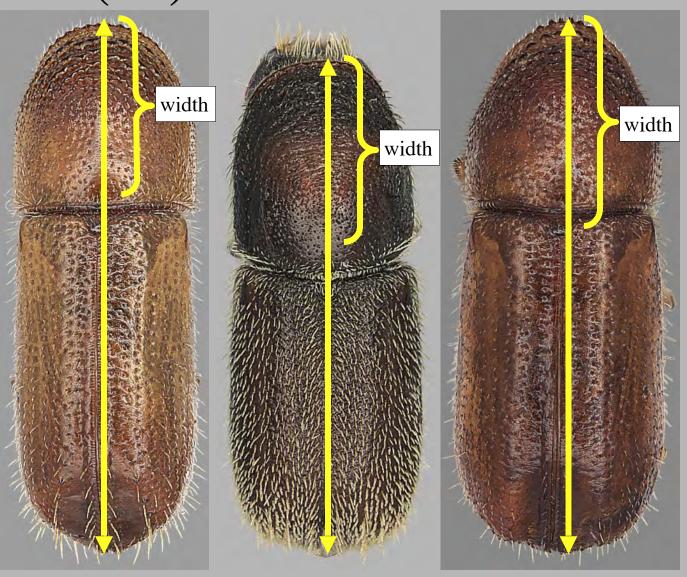


antenna

87 (86): Part III

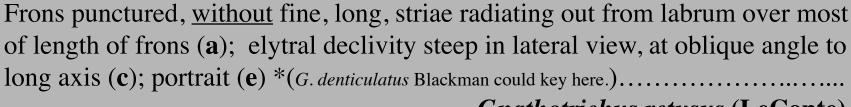


87j: Body always very slender.

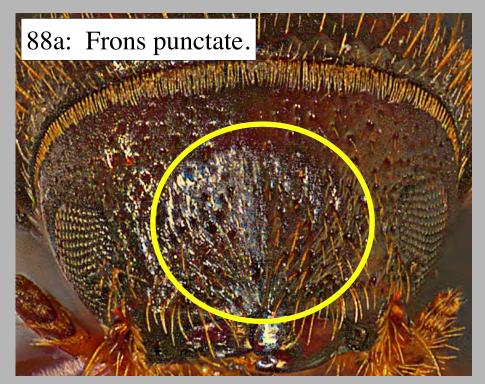


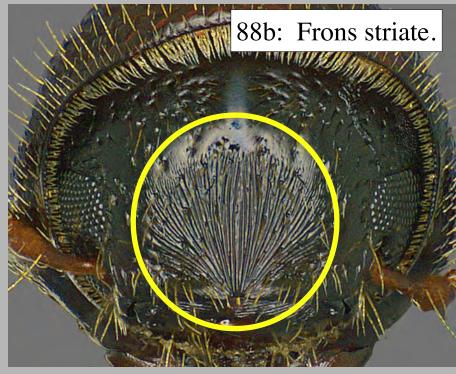
87k-m: Body slender to stout.

88 (87): Part I

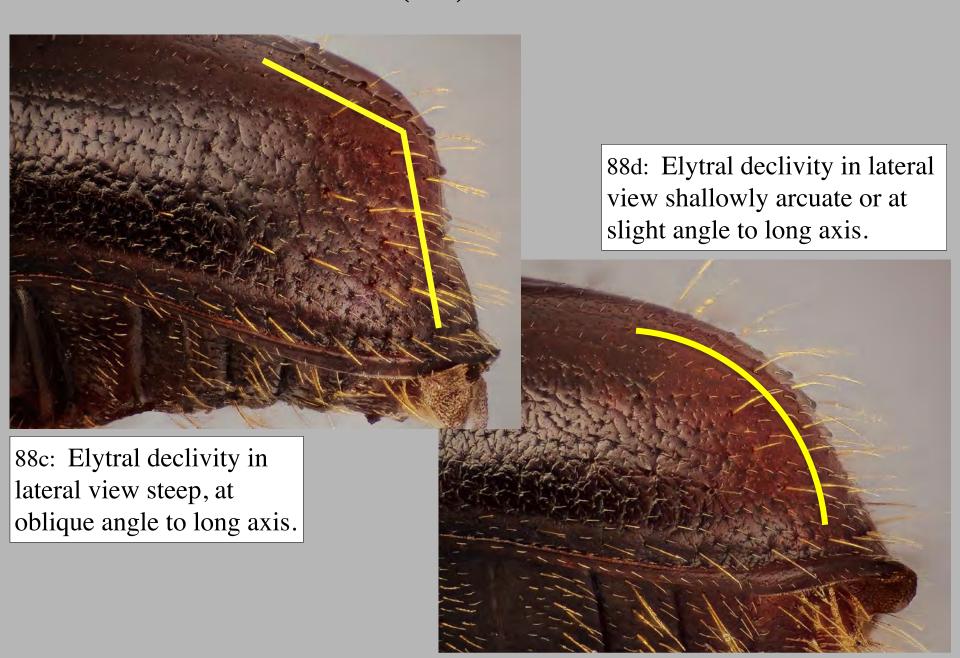


...... Gnathotrichus sulcatus (LeConte)





88 (87): Part II



88 (87): Part III

Gnathotrichus retusus (LeConte)

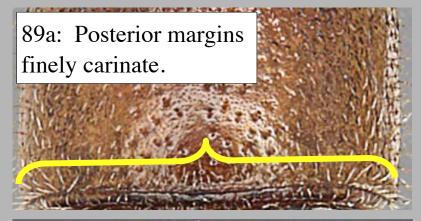


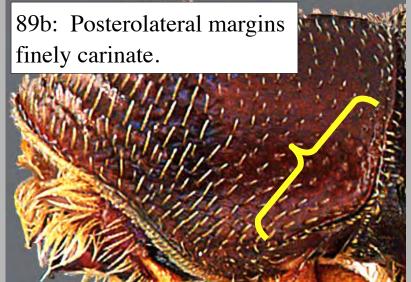
88 (87): Part IV

Gnathotrichus sulcatus (LeConte)

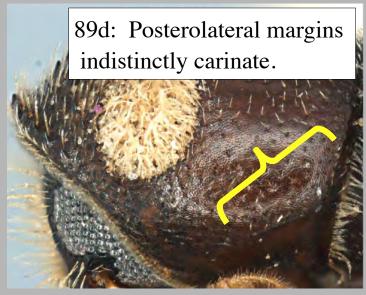


89 (87)



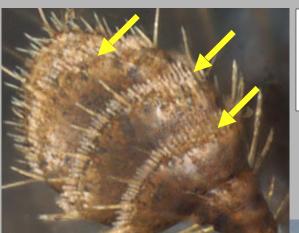




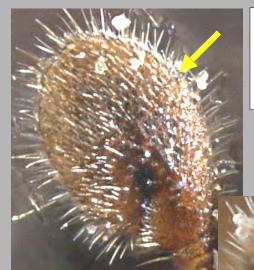


90 (89): Part I

Antennal club with at least 2 complete sutures (on both faces) indicated by setae (**a-b**); anterior dorsum of pronotum more strongly declivous (**e. f**)......91 Antennal club with only one suture on anterior face (**c**) and without sutures on posterior face (**d**); dorsum of pronotum evenly rounded in profile (**g**).....STOP



90a: Anterior face with at least 2 sutures.

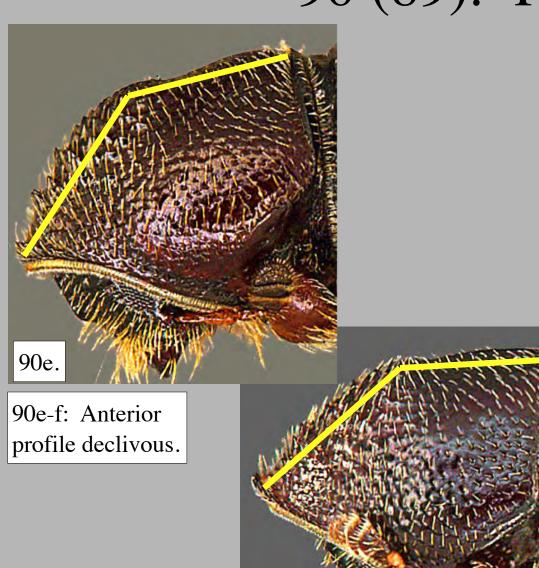


90c: Anterior face with 1 suture.

90b: Posterior face with 2 sutures.

90d: Posterior face with no sutures.

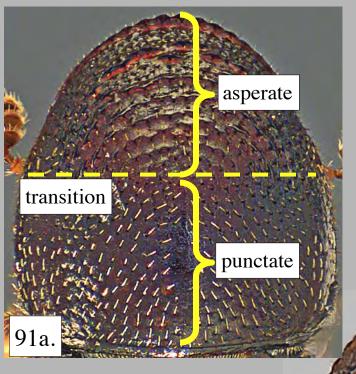
90 (89): Part II



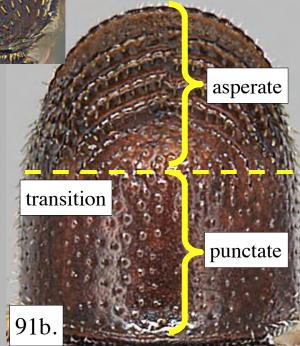
90g: Profile evenly rounded.

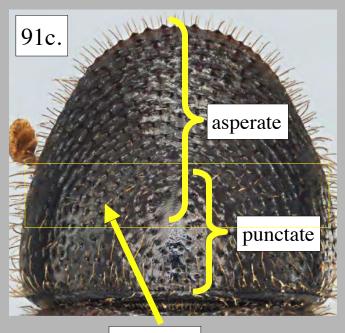


91 (90)



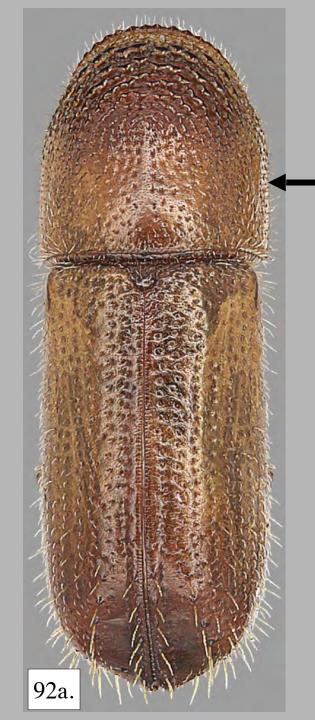
Most pronotal asperities anterior of middle, transition from asperate to punctate surface abrupt (a-b).....92





transition

Lateral pronotal asperities extend posterior of middle, transition from asperate to punctate surface gradual (c).....STOP



92 (91)

Pronotum and elytra more coarsely, less densely punctured; vestiture longer, less dense, always setose (a)......93

 92b.

93 (92): Part I

*Most members of this speciose genus are difficult to identify beyond this point.

Asperities from middle of pronotum to anterior margin arranged into two or more distinct concentric rows, adjacent asperities within rows usually in contact basally (c)......94







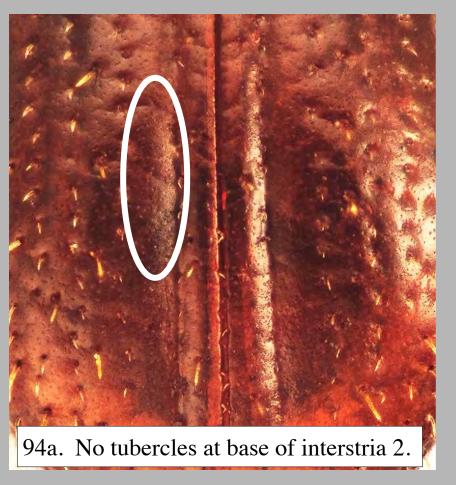
^{**}Species of *Pityotrichus*, a rarely collected genus from the southwestern U.S., may key here.

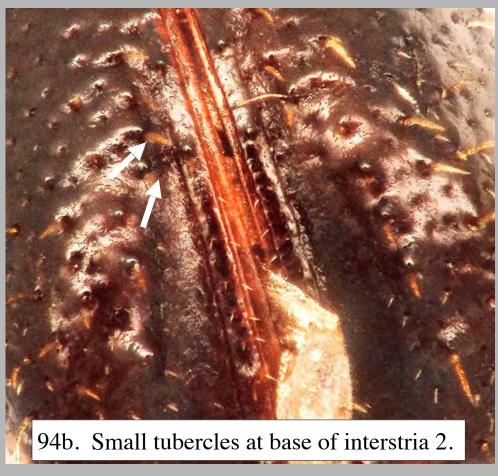
93 (92): Part II Pityophthorus spp.

93e.



94 (93)





95 (94): Part I

Antennal club with sutures transverse (a); anterior margin of pronotum with ~18-20 asperities (c); portraits (e-f)......Pityophthorus juglandis Blackman* *This species, although native to the southwestern USA, has been introduced into other parts of the West and is the vector for the pathogen causing Thousand Cankers Disease.

Antennal club with sutures procurved (b); anterior margin of pronotum with about 10 asperities (**d**)......STOP



95a. Transverse sutures.

95b Procurved sutures.





95d. ~10 asperities on margin.

No image available.

95 (94): Part II

Pityophthorus juglandis Blackman





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