

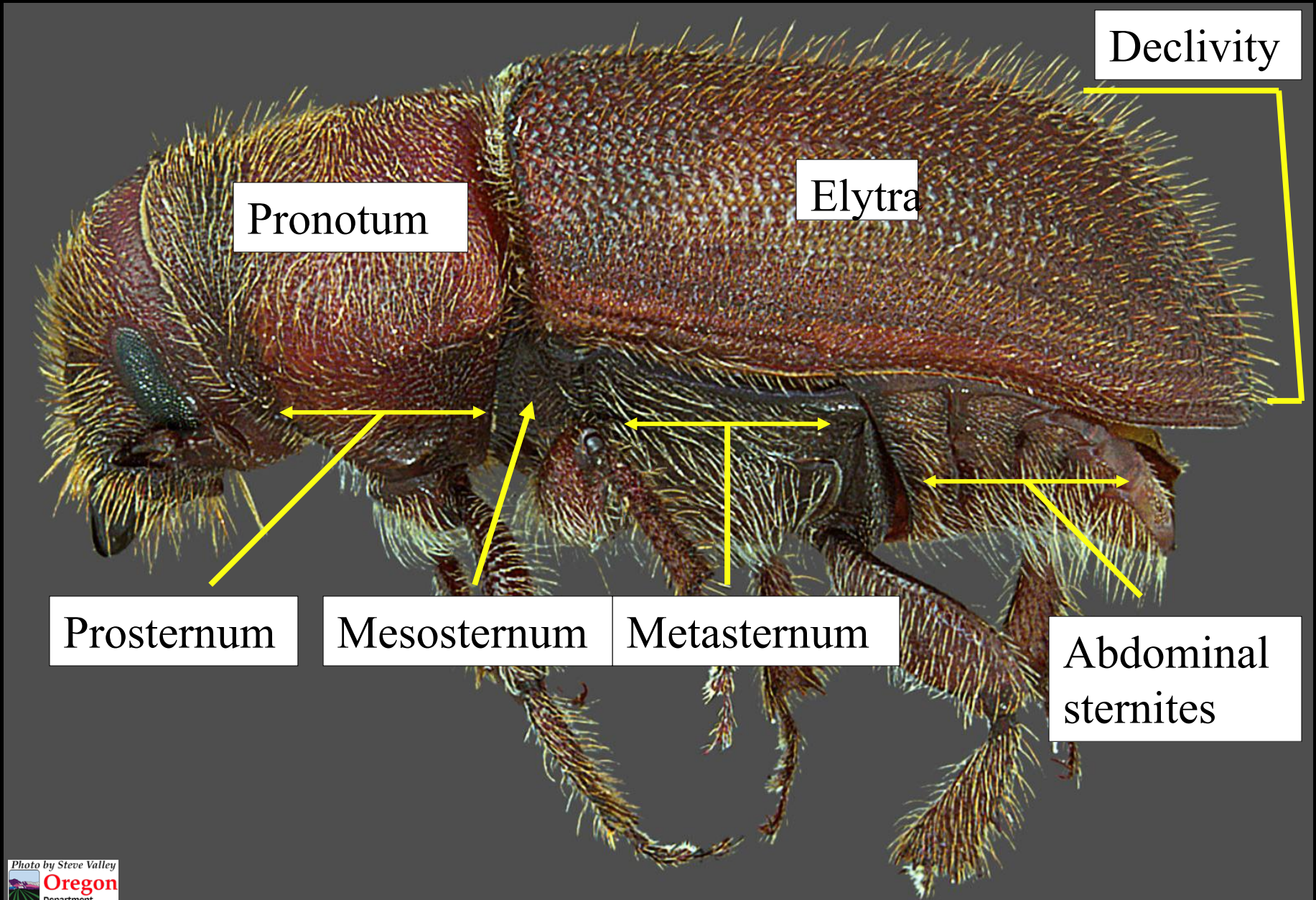
Scolytinae

Basic morphology, characters and tribes

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Rick Hoebeke – U. of Georgia

Marc DiGirolomo – US Forest Service



Declivity

Pronotum

Elytra

Prosternum

Mesosternum

Metasternum

Abdominal
sternites

Abdominal
sternite 5

Metacoxa

Mesocoxa

Mesosternum

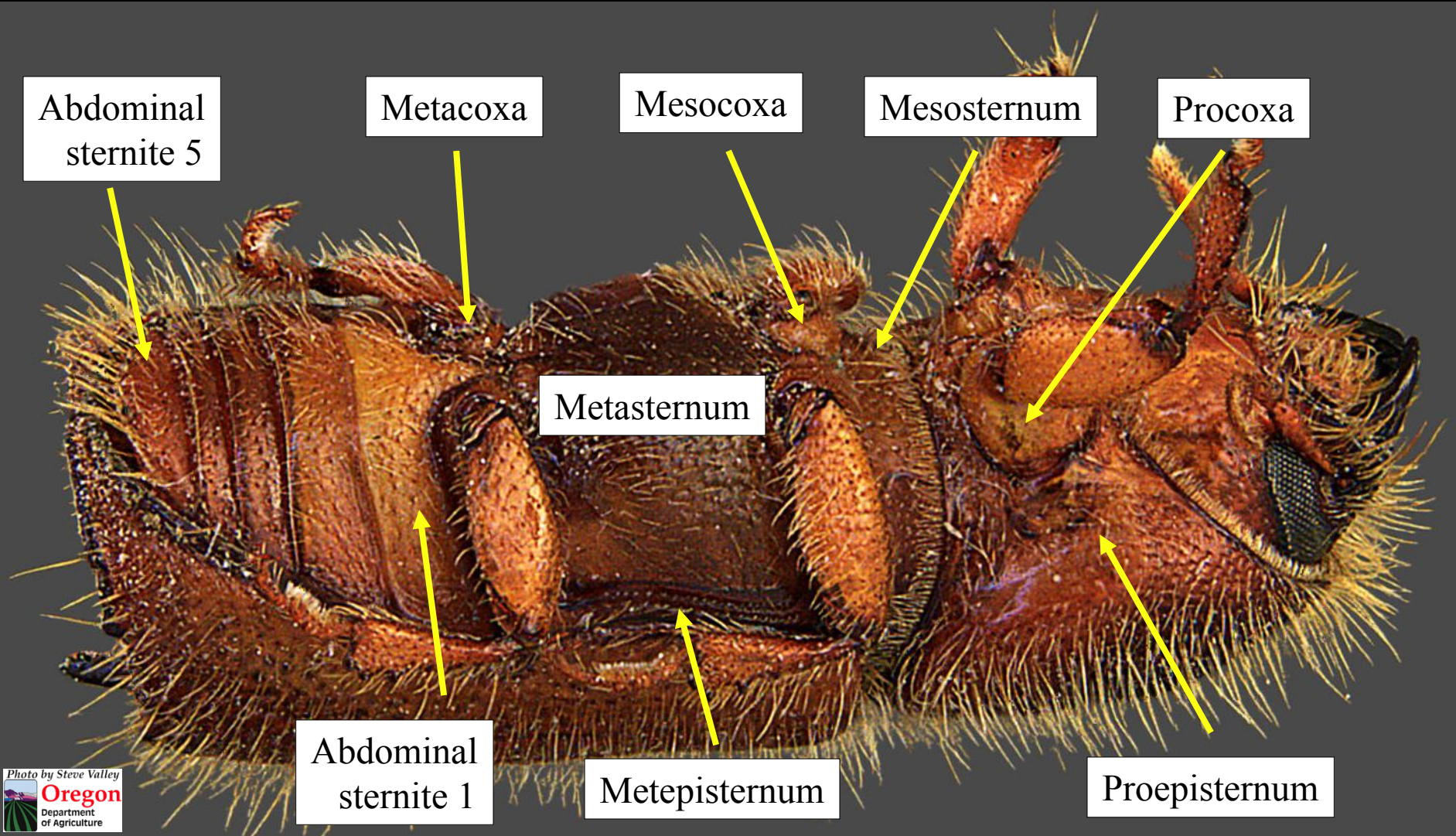
Procoxa

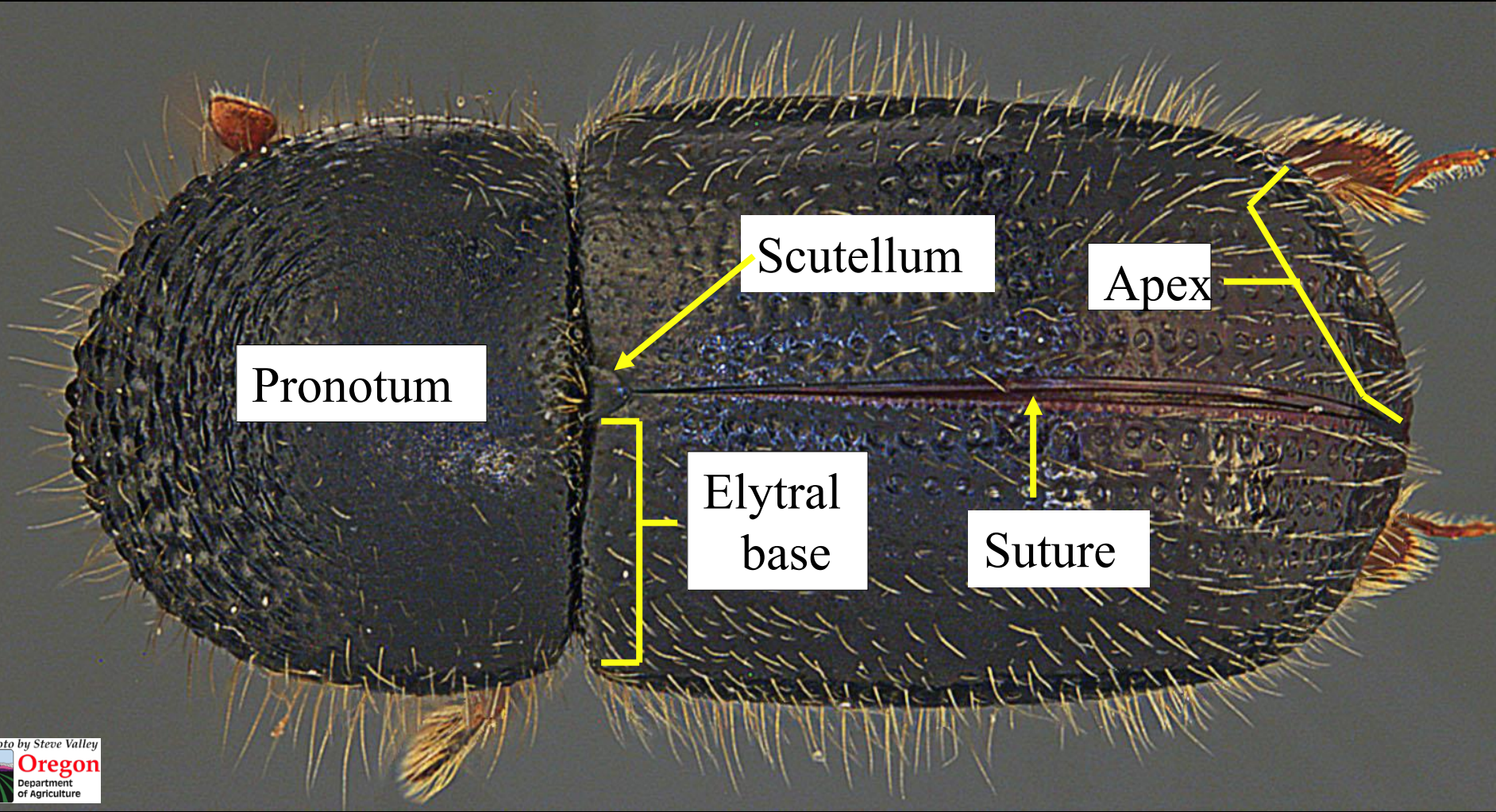
Metasternum

Abdominal
sternite 1

Metepisternum

Proepisternum





Pronotum

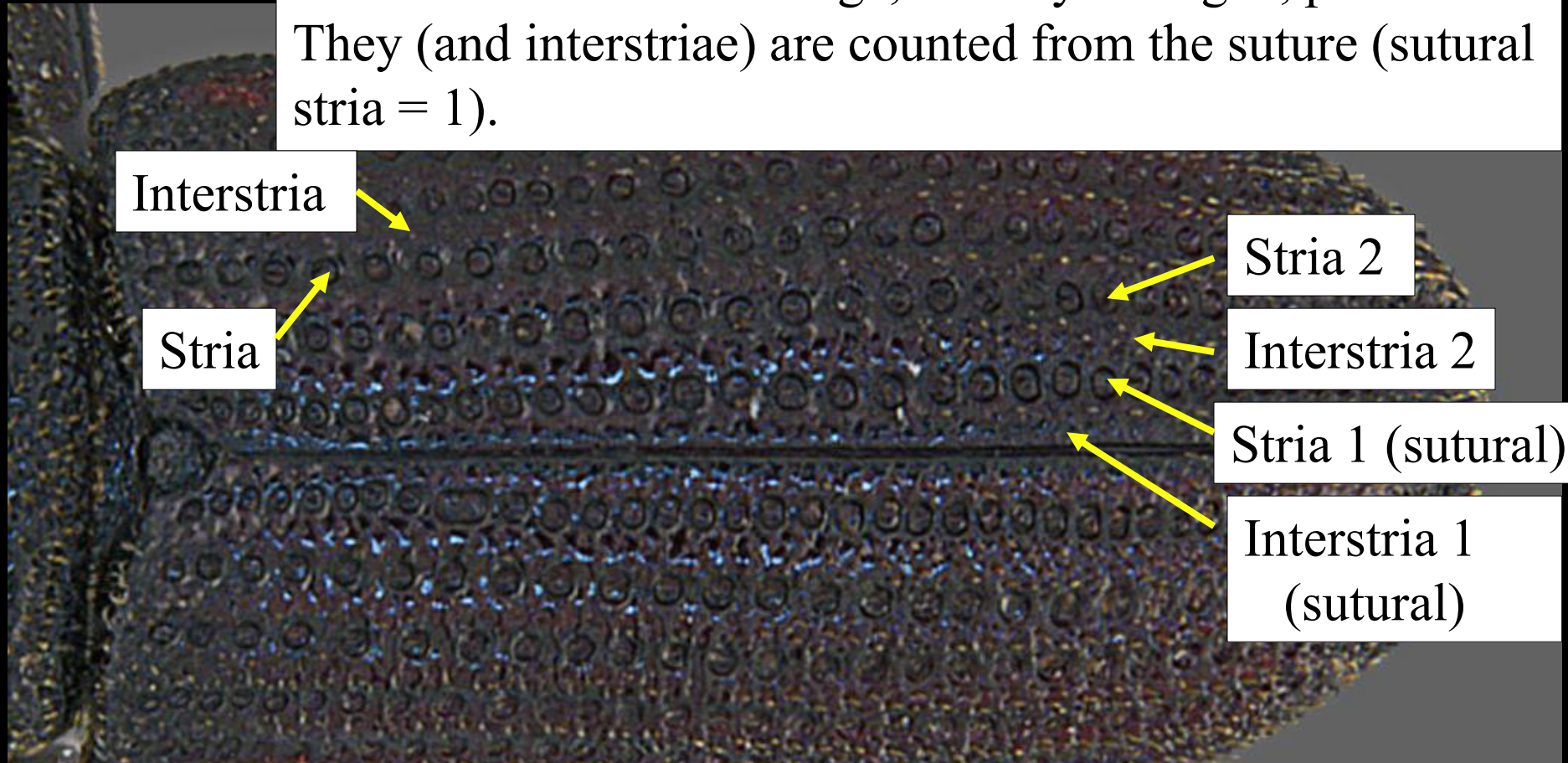
Scutellum

Apex

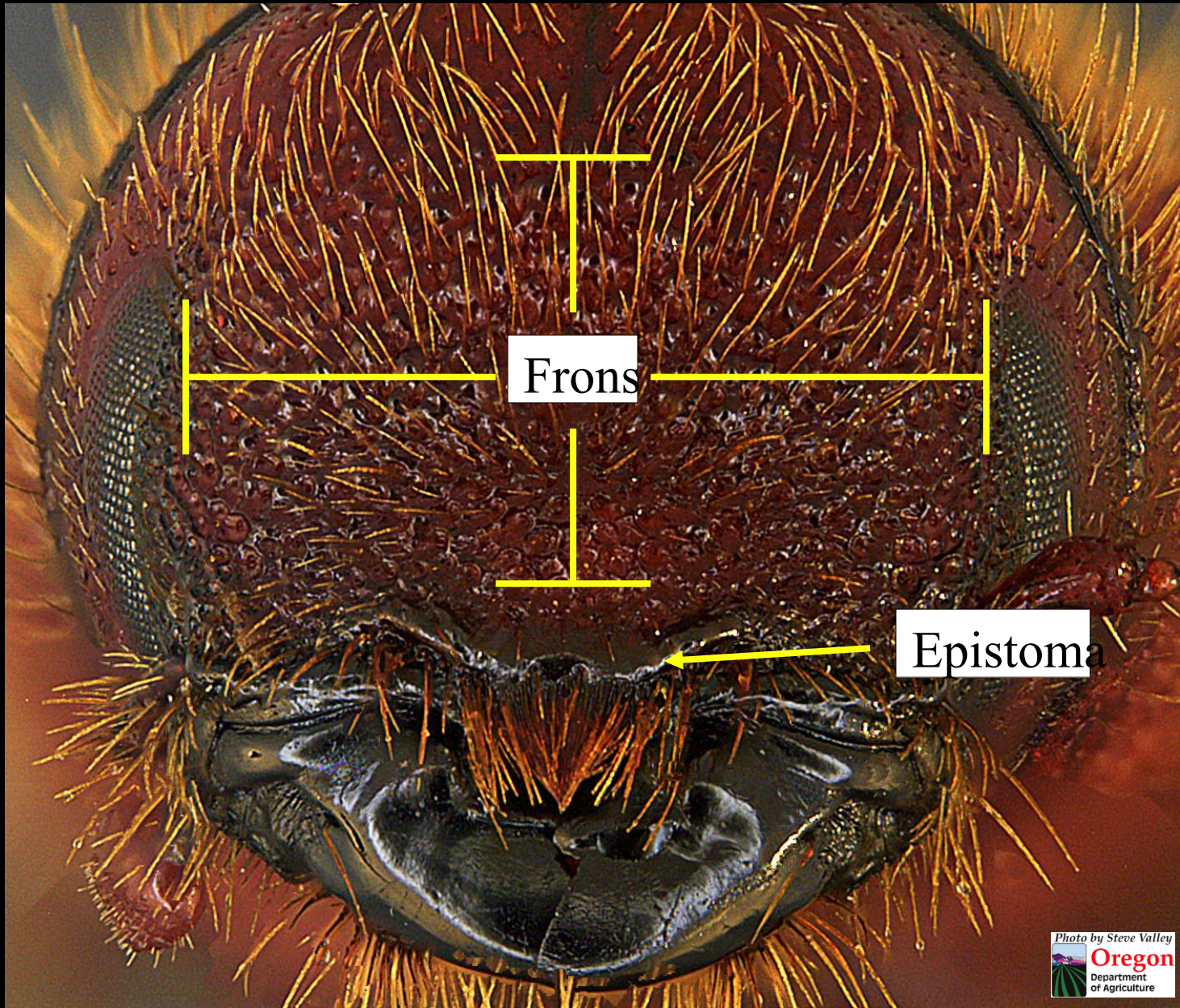
Elytral
base

Suture

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



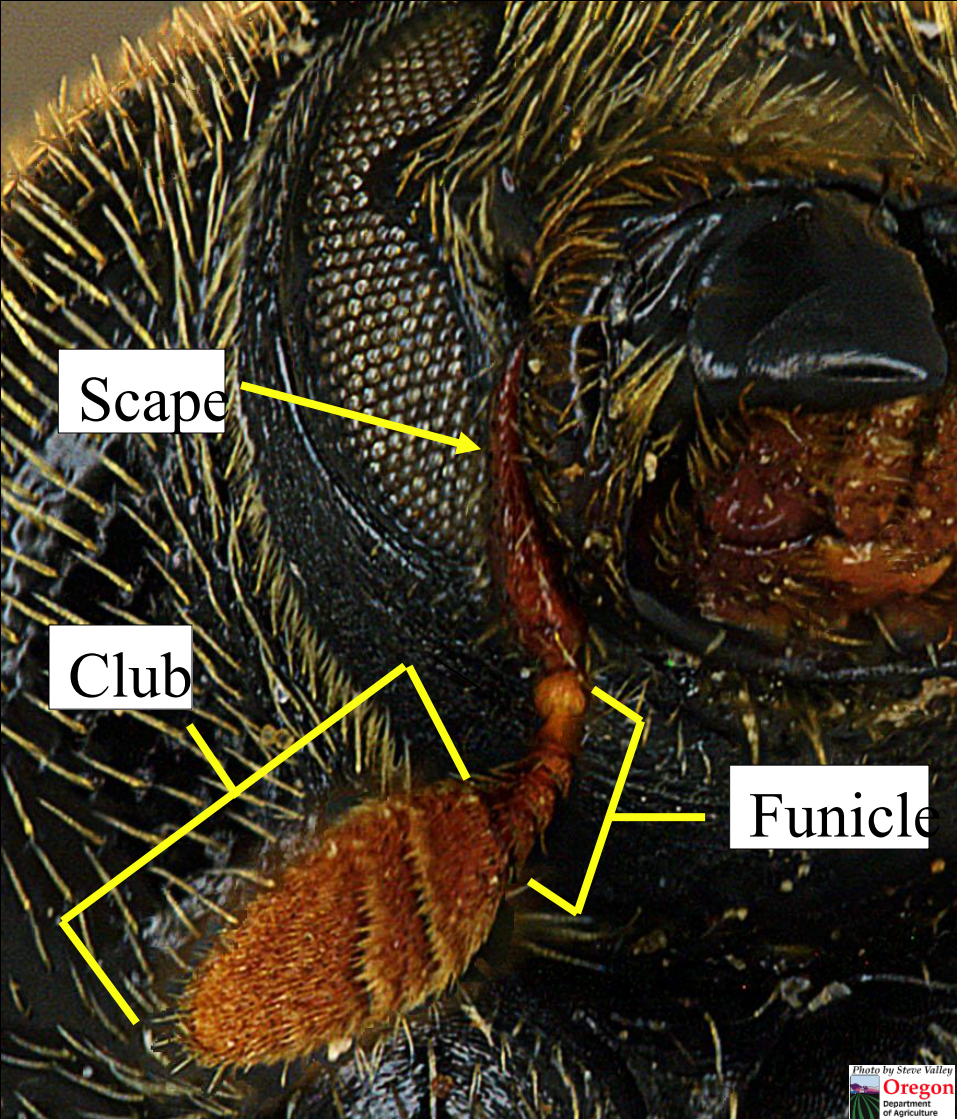
Interstriae are the more-or-less flattened ridges between striae. Interstriae may or may not be punctate - if so, the punctures are normally smaller than those of the striae.



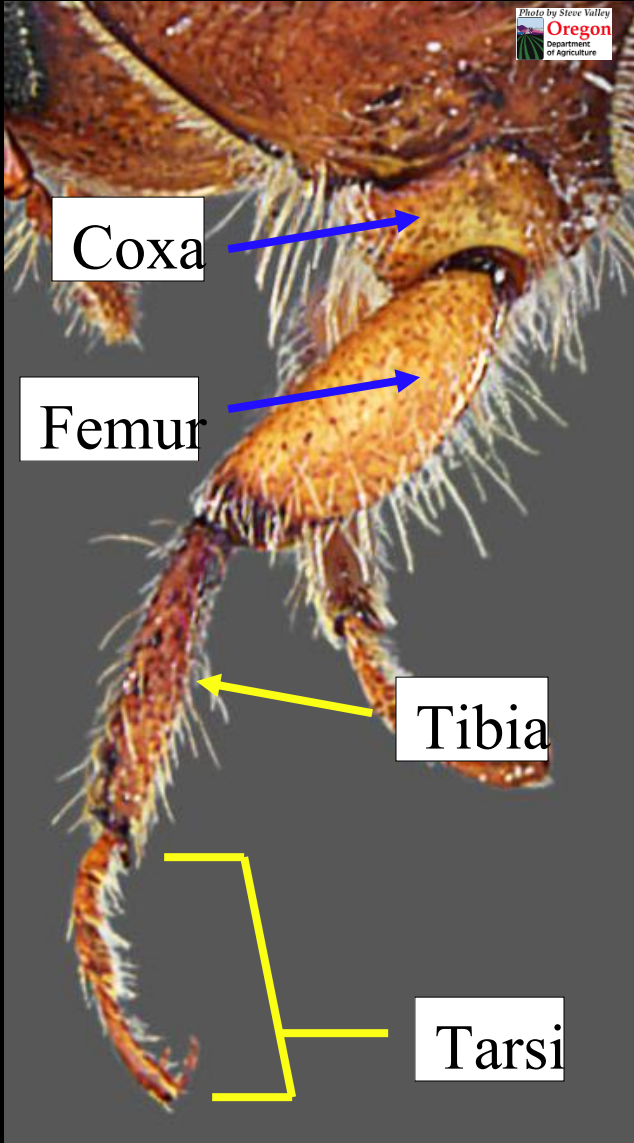
Frons

Epistoma

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

Scolytidae

Hylesininae

Hylastini

Hylesinini

Tomicini

Bothrosternini

Phloeotribini

Phloeosinini

Hypoborini

Polygraphini

Scolytinae

Scolytini

Ctenophorini

Micracini

Cactopinini

Ipini

Dryocoetini

Crypturgini

Xyleborini

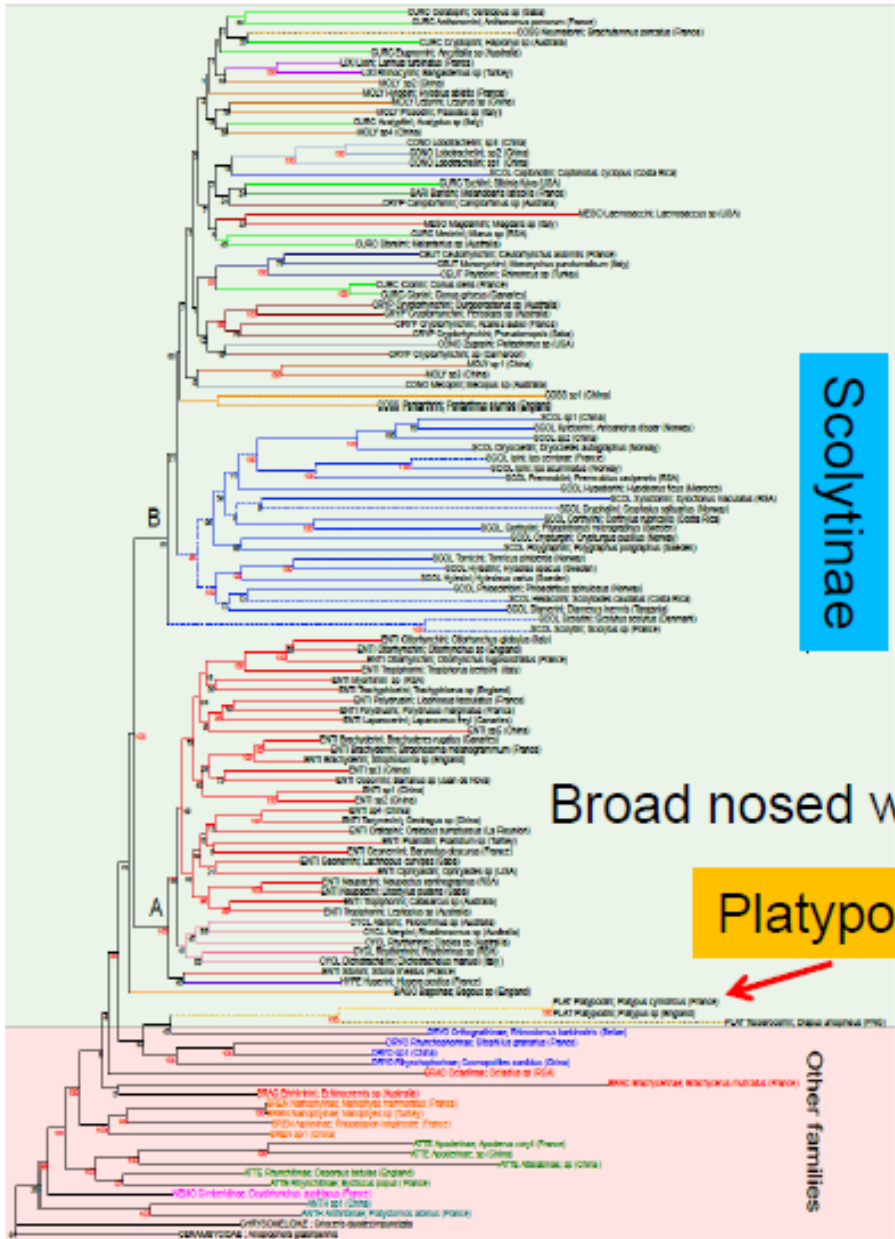
Xyloterini

Cryphalini

Corthylini

Pityophthorina

Classification: «things are changing»



- Mitochondrial genomes
- 23 Scolytinae, most tribes
- 2 Platypodinae
- *Coptonotus*
- 4 Cossoninae
- Wood borers not monophyletic

Gillett CPDT, Crampton-Platt A, Timmermans MJTN, Jordal BH, Emerson BC & Vogler AP. 2014. Bulk *de novo* mitogenome assembly from pooled total DNA elucidates the phylogeny of weevils (Coleoptera: Curculionoidea). *Molecular Biology and Evolution*, in press

Cossoninae

- Rounded eyes
- Long procoxal part of prosternum
- Hypostomal spine
- Terminal curved uncus, inner grooming comb



Hypostomal spine

Cossoninae © Ken Walker

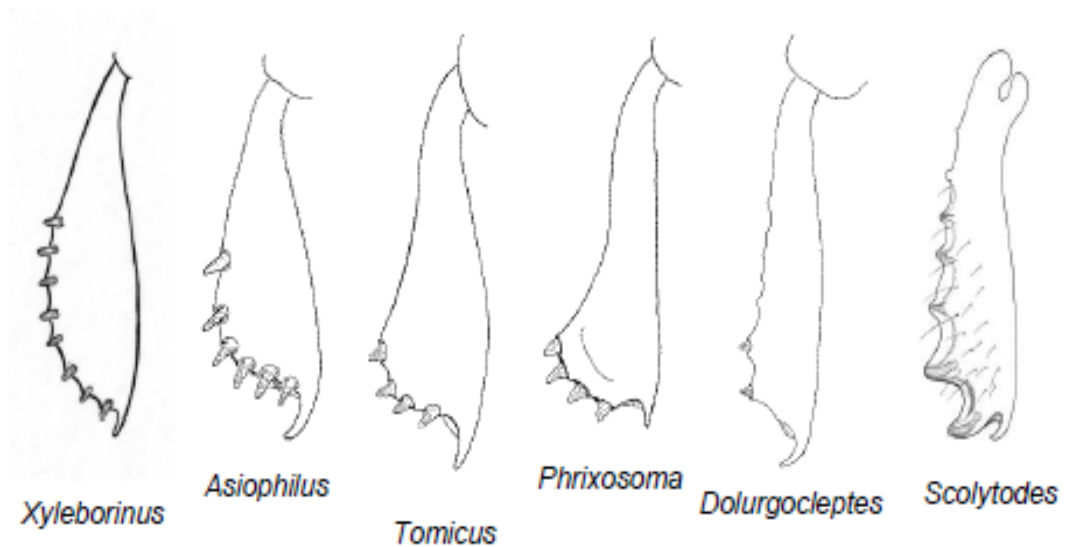


uib.no

Legs: coxae and tibiae

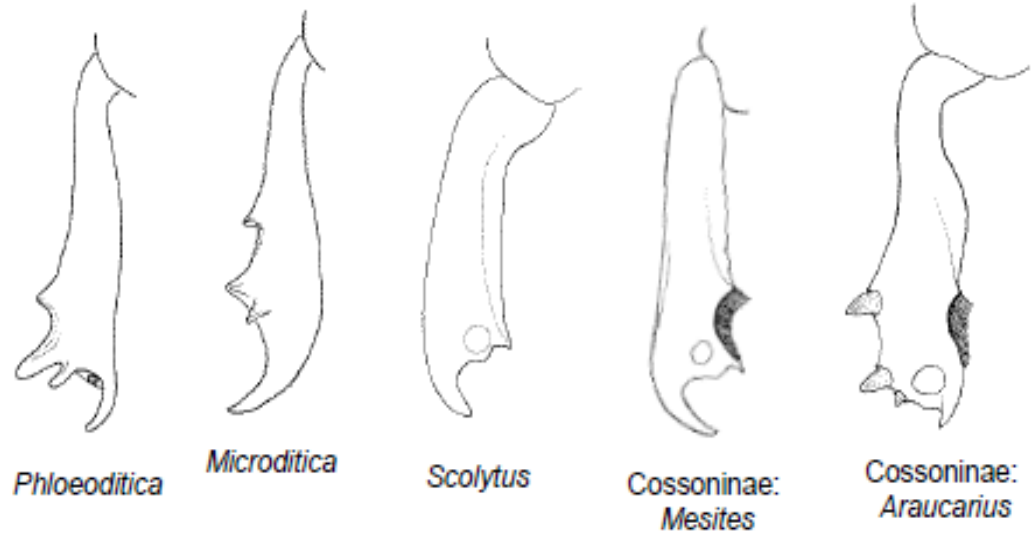
Protibiae:

- One of the major taxonomic structure in scolytines
- Unsocketed spines
- Socketed lateral denticles
- Mesal teeth
- Rugae and rugosities
- Inflation
- Bowl-shape



Platypodinae

Coptonotinae:
Coptonotus



Curculionidae: Scolytinae

Hylesinini

Hylastina

Hylesinina

Tomicina

Bothrosternina

Phloeotribina

Phloeosinina

Hypoborina

Polygraphina

Scolytini

Scolytina

Ctenophorina

Micracina

Cactopinina

Ipina

Dryocoetina

Crypturgina

Xyleborina

Xyloterina

Cryphalina

Pityophthorina

Corthylina

Scolytinae

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Crypturgini

Xyleborini

Xyloterini

Cryphalini

Pityophthorini

Corthylini

Scolytinae (540)

Hylastini (24)	Scolytini (23)	Xyloterini (7)
Hylesinini (10)	Ctenophorini (2)	Cryphalini (41)
Hylurgini (27)	Micracidini (50)	Pityophthorini (133)
Bothrosternini (2)	Cactopinini (6)	Corthylini (16)
Phloeotribini (9)	Ipini (43)	
Phloeosinini (35)	Dryocoetini (22)	
Hypoborini (12)	Crypturgini (4)	
Polygraphini (24)	Xyleborini (50)	

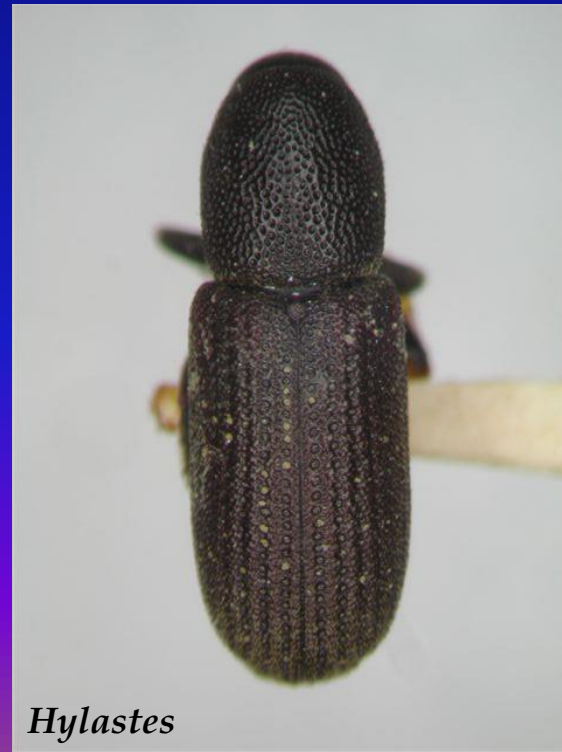
Hylastini

Hylurgops: 7 spp. - throughout N.A. (1 introduced sp., *palliatus*);

Pachysquamus: 1 sp – native in W. US (formerly *Hylurgops*);

Hylastes: 14 spp. - throughout N.A. (1 introduced sp., *opacus*)

Scierus: 2 spp. - N & W N.A.;



Hylastini

Hylurgops, Pachysquamus, Hylastes, Scierus

- Head visible from above
- All tibiae bearing several teeth, none extending beyond tarsal insertion
- Crenulations of elytral bases obsolete



Hylastes salebrosus Eichhoff

Hylesinini

Hylastinus: 1 sp. (*obscurus*, introduced), across N.A.;

Alniphagus: 2 spp. - W N.A.;

Hylesinus: 7 spp. - across N.A.



Hylastinus



Alniphagus



Hylesinus

Hylesinini

Hylastinus, Alniphagus, Hylesinus

- Anterior margin of elytra procurved, bearing series of crenulations
- Pronotum asperate on anterolateral areas



Hylesinus



Hylastinus

Hylurgini

Hylurgopinus: 1 sp. (*rufipes*) - E N.A.;

Pseudohylesinus: 9 spp. - W N.A.;

Xylechinus: 2 spp. - N & W N.A.;

Hylurgus: 1 sp. (*ligniperda*, introduced) – NY, CA;

Tomicus: 1 sp. (*piniperda*, introduced) - NE N.A.;

Dendroctonus: 13 spp. - throughout N.A.



Hylurgopinus



Xylechinus



Hylurgus



Tomicus



Dendroctonus

Hylurgini

Hylurgopinus, Pseudohylesinus, Xylechinus, Hylurgus, Tomicus, Dendroctonus

- Anterior margin of elytra procurved, bearing series of crenulations
- Prothoracic precoxal area short; lateral precoxal ridge present or absent
- Anterolateral areas of pronotum unarmed
- Eyes entire to feebly marginate
- Antennal funicle 5-7 segmented



Bothrosternini

Cnesinus: 1 sp. (*strigicollis*) - SE U.S. & Mexico;

Pagiocerus: 1 sp. (*frontalis*) - NC to Mexico



Cnesinus

Bothrosternini

Cnesinus, Pagiocerus

- Anterior margins of elytra procurved, armed by series of crenulations
- Prothorax longitudinally strigose



Phloeotribini

Phloeotribus: 9 spp. - transcontinental in U.S. (2 in W U.S., 7 in E U.S.)

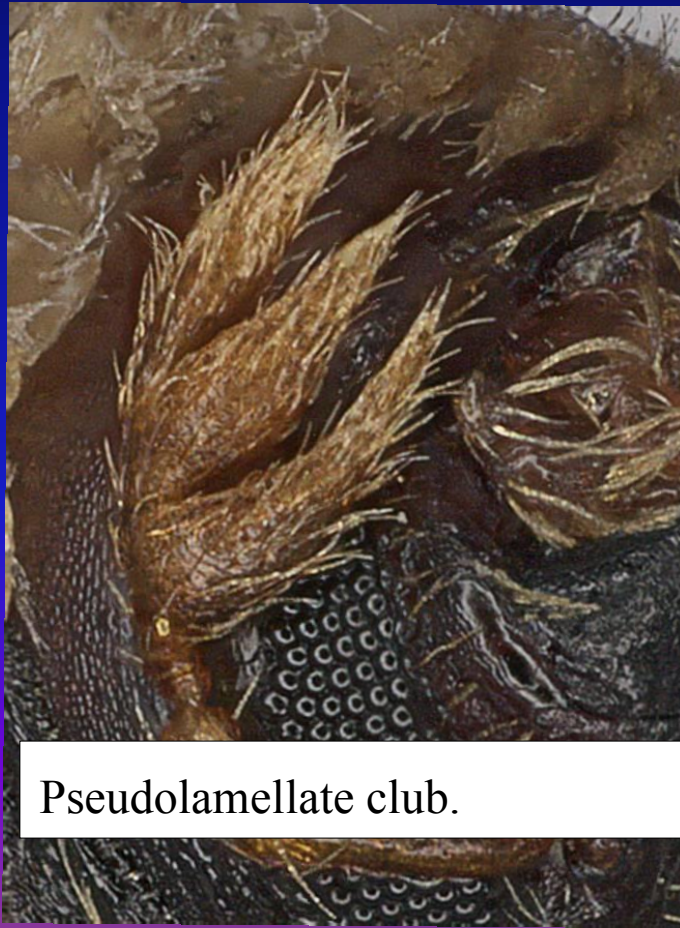


Phloeotribus

Phloeotribini

Phloeotribus

- Antennal club pseudolamellate, club divided into 3 movable segmental units



Pseudolamellate club.

Phloeosinini

Dendrosinus: 1 sp. (*bouerreriae*) - Florida Keys;

Phloeosinus: 25 spp. - 3 in E U.S., remainder in W U.S.;

Chramesus: 9 spp. - transcontinental in U.S.



Phloeosinini

Dendrosinus, Phloeosinus, Chramesus

- Anterior margins of elytra procurved, armed by series of crenulations
- Antennal club fused at sutures, sutures oblique, or partly or entirely obsolete



Hypoborini

Chaetophloeus: 10 spp. - mostly W N.A.;

Liparthrum: 2 spp. - AZ & MS, IN



Hypoborini

Chaetophloeus, Liparthrum

- Anterior margins of elytra procurved, armed by series of crenulations (from suture to interstriae 5 prominent)
- Scutellum not visible, elytral bases straight



Polygraphini

Polygraphus: 3 spp. - throughout U.S.;

Carphoborus: 20 spp. - throughout U.S.;

Carphobius: 1 sp. (*arizonicus*) - Arizona



Polygraphus



Carphoborus

Polygraphini

Polygraphus, Carphoborus, Carphobius

- Anterior margins of elytra procurved, armed by series of crenulations
- Scutellum not visible
- Eyes emarginate or completely divided



Scolytini

Scolytus: 21 spp. - across N.A. ; 4 spp introduced

Loganius: 2 spp. - Florida Keys (formerly *Cnemonyx*)



Scolytus

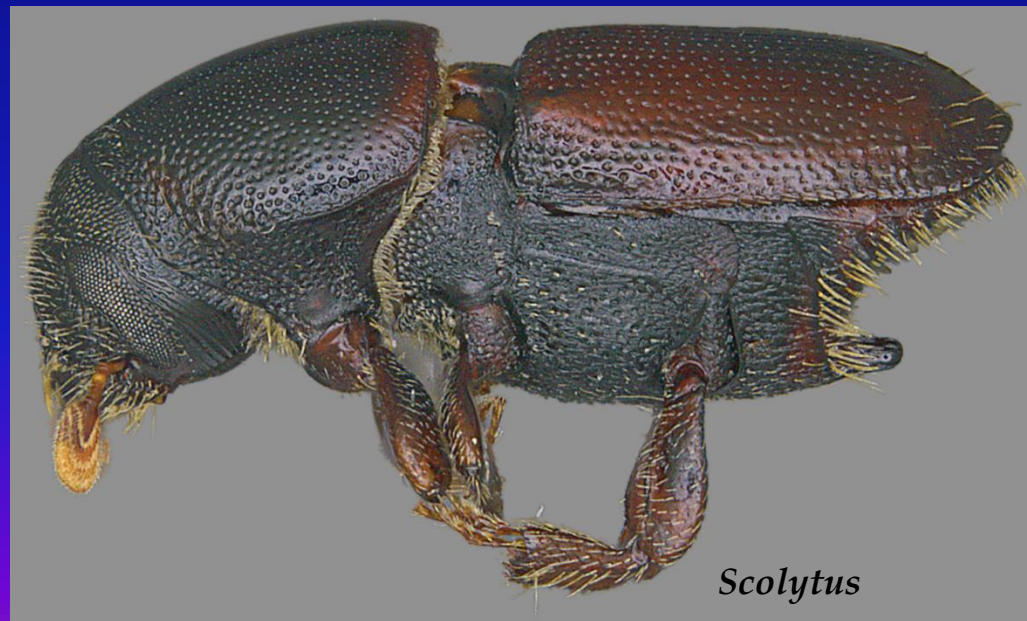
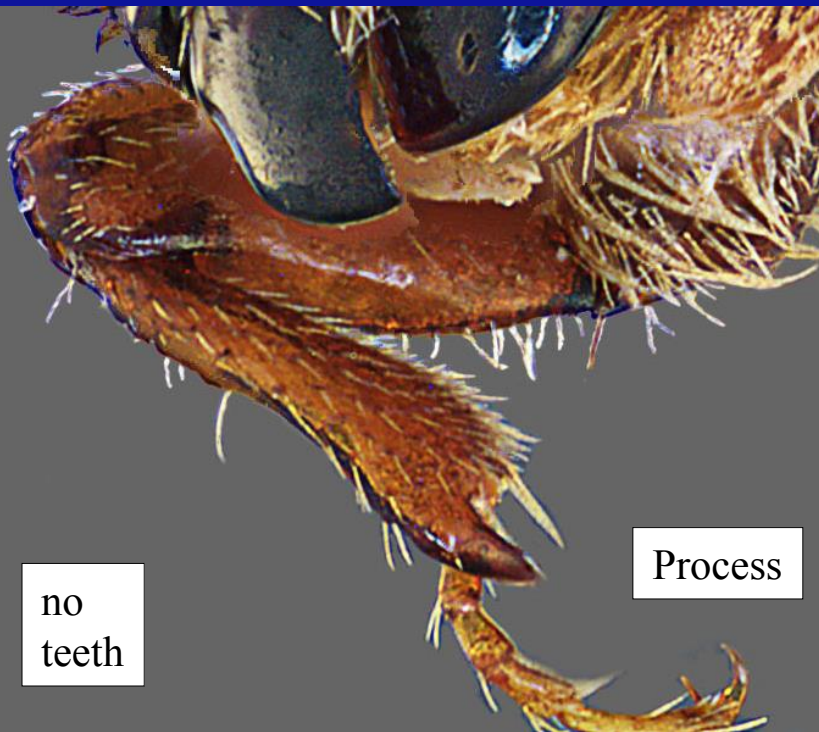


Cnemonyx

Scolytini

Scolytus, Loganius

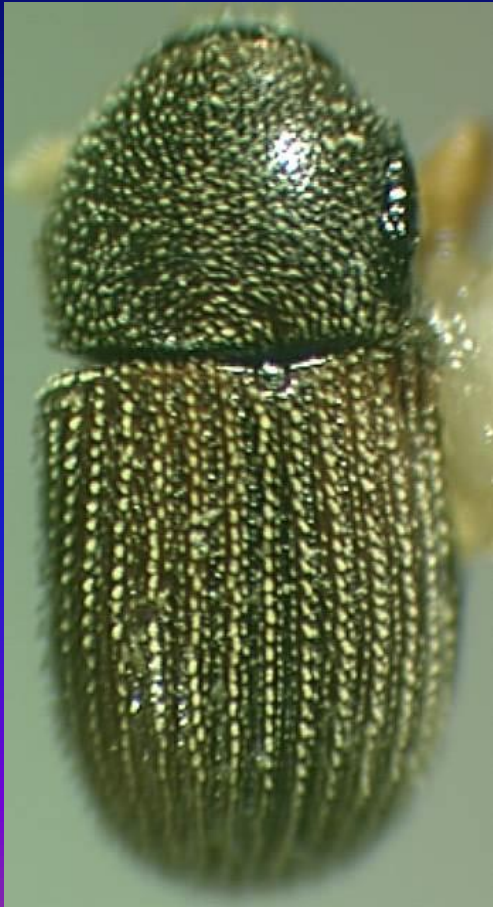
- Lateral margin of anterior and posterior tibia unarmed, except for single curved process at outer apical angle
- Area around scutellum impressed
- Elytra not declivous



Ctenophorini

Pycnarthrum: 1 sp. (*hispidum*) - S FL, TX;

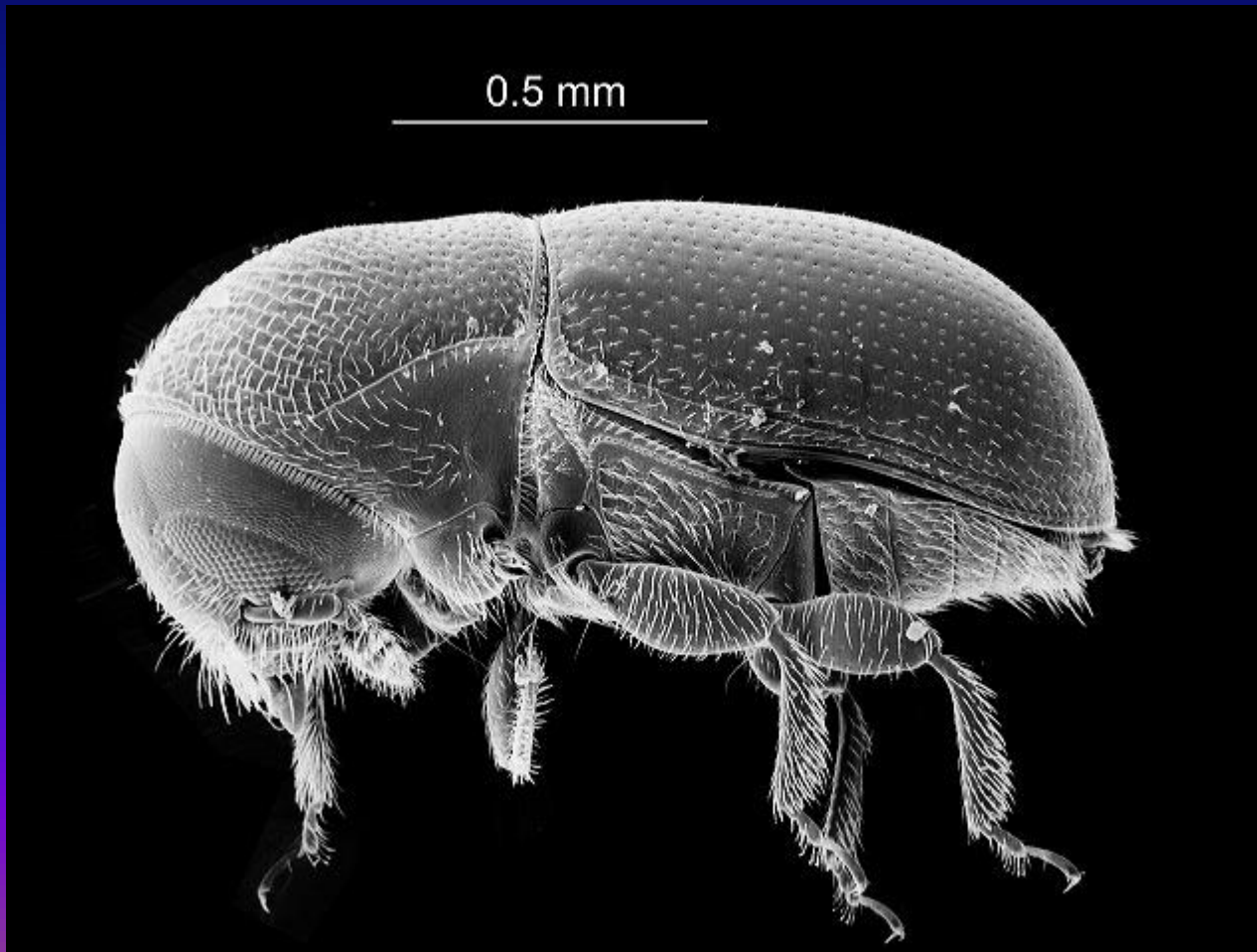
Scolytodes: 1 sp. (*schwarzi*) - S FL (>100 spp. in C. & S.A.)



Ctenophorina

Pycnarthrum, Scolytodes

- Lateral margin of pronotum subacutely elevated, basal margin finely elevated



Micracidini

Stenocleptus: 1 sp. - CA;

Pseudothysanoes: 18 spp. - throughout U.S.;

Thysanoes: 7 spp. - S U.S.;

Hylocurus: 15 spp. - mostly SE U.S.;

Micracis: 4 spp. - throughout U.S.;

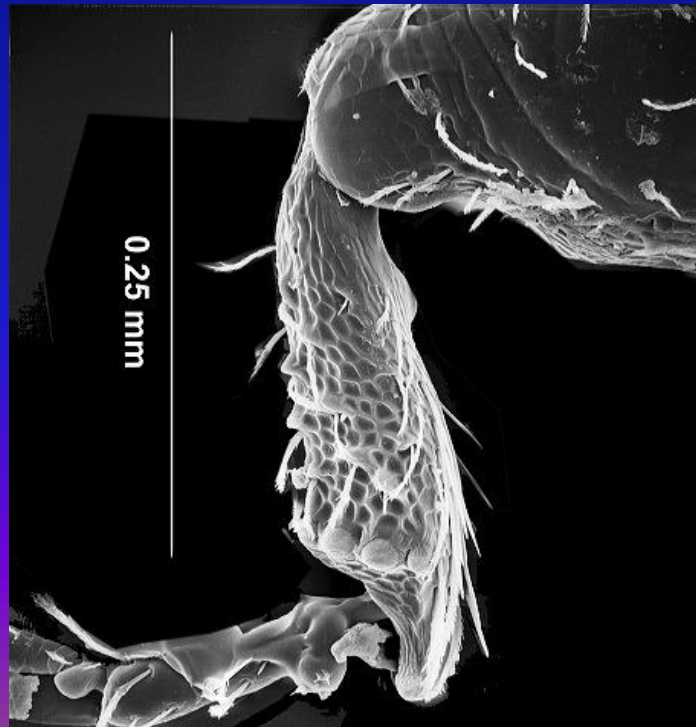
Micracisella: 5 spp. - E & S U.S.



Micracidini

Stenocleptus, Pseudothysanoes, Thysanoes, Hylocurus, Micraxis, Micraxisella

- Lateral margin of anterior tibia armed by several tooth-like processes
 - Procoxae subcontiguous, but separated
 - Foretibia with sides parallel to the apex, apical margin by small teeth
- mostly armed on



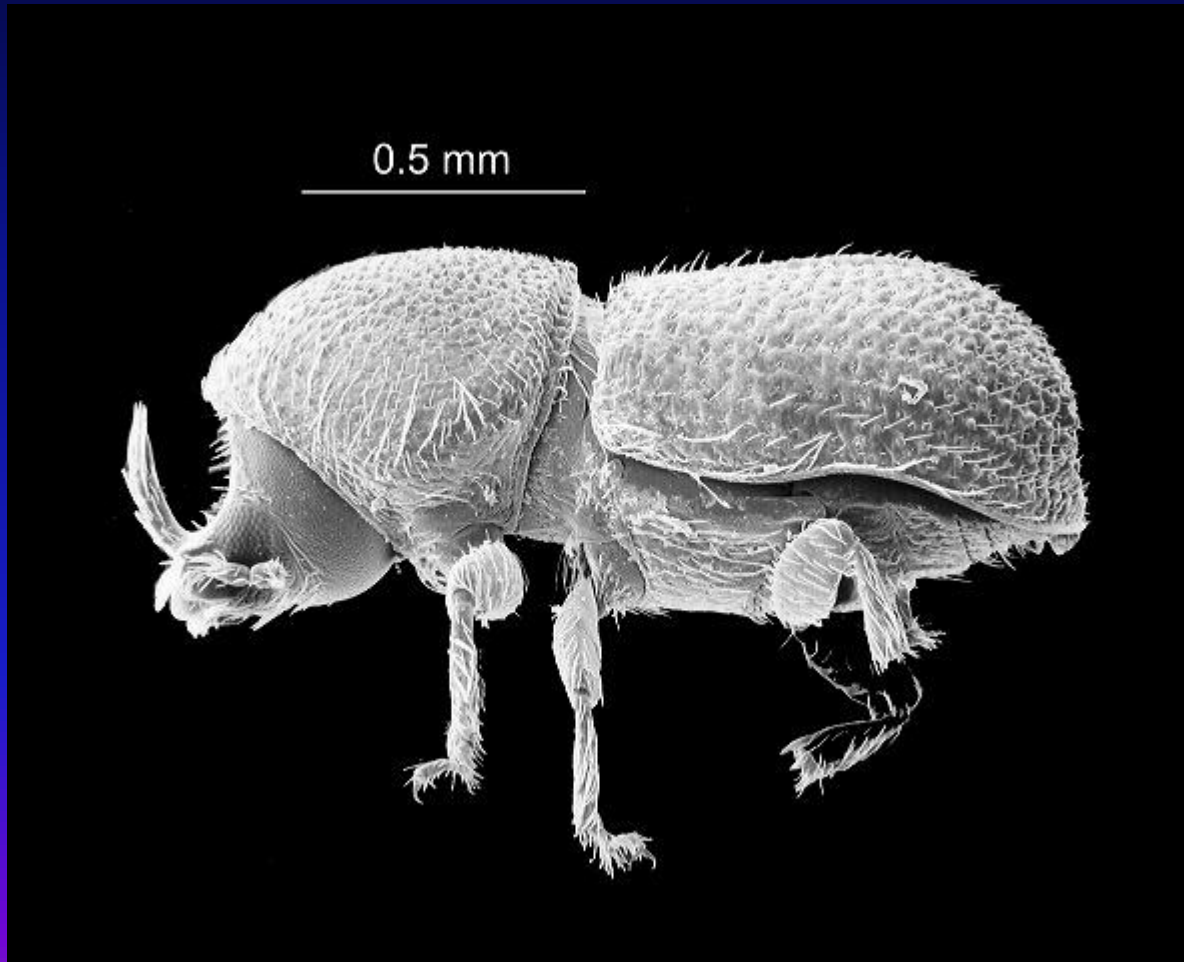
Cactopinini

Cactopinus: 6 spp. - SW U.S. (cactus & pine)



Cactopinini

Cactopinus



Ipini

Pityogenes: 7 spp. – across N.A.; 1 sp. introduced (*bidentatus* NE);

Pityokteines: 6 spp. - across N.A.;

Orthotomicus: 4 sp. - across N.A.; 1 sp. introduced (*erosus* in CA)

Ips: 23 spp. - across N.A.;

Pseudips: 2 spp. - W N.A.

Premnobius: 1 sp. (*cavipennis*), introduced to FL;



Ipini

Pityogenes, Pityokteines, Orthotomicus, Ips, Pseudips, Premnobius

- **Meso- and metathoracic tibiae more abruptly narrowed on apical fourth**
- **Elytral declivity moderately sulcate to elaborately excavated, with lateral margins usually armed by tubercles or spines**



Dryocoetini

Dendrocranulus: 3 spp. - S & W N.A.;

Lymantor: 2 spp. - E U.S. & Canada, Alaska;

Dryocoetes: 7 spp. - across U.S., Canada;

Dactylotrypes: 1 sp - introduced into CA in palm seeds

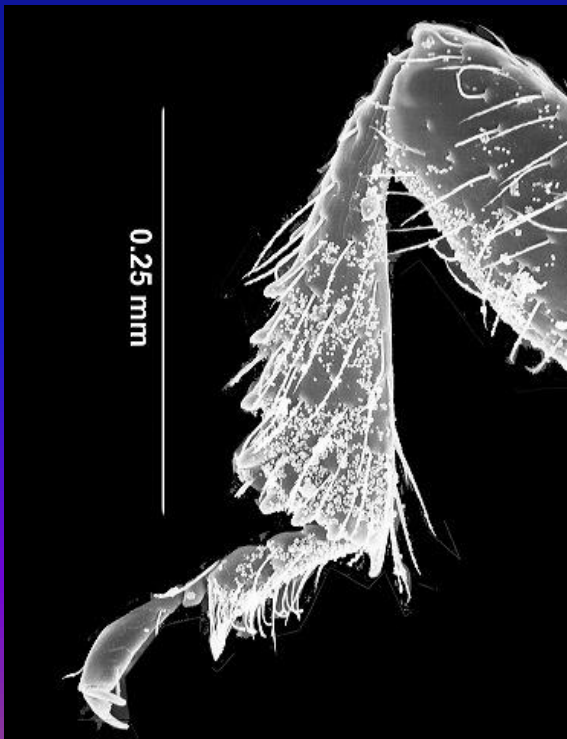
Coccotrypes: 9 spp. - mostly FL & CA



Dryocoetini

Dendrocranulus, Lymanator, Dryocoetes, Coccotrypes

- Meso- and metathoracic tibiae more abruptly narrowed on apical fourth
- Pronotum with sides straight to arcuate, anterior half declivous, usually armed



Crypturgini

Dolurgus: 1 sp. (*pumilus*) - W N.A.;

Crypturgus: 3 spp. – across N.A. 1 sp. introduced (*pusillus*)



Dolurgus



Crypturgus



Crypturgus

Crypturgini

Dolurgus, Crypturgus

- Antennal funicle 2-3 segmented, club with sutures on posterior face about equal to those of anterior face
- Very small beetles!



Xyloterini

Trypodendron: 6 spp. across N.A.; 1 sp. introduced (*domesticum*) WA

Xyloterinus: 1 sp. (*politus*), E & W N.A.



Trypodendron



Xyloterinus

Xyloterini

Trypodendron, Xyloterinus

- Eyes always completely divided into two parts
- Antennal funicle 4-segmented



Xyleborini

Ambrosiodmus: 7 spp. - E U.S. (mostly SE); 2 spp introduced;

Ambrosiophilus: 2 spp. – introduced (*atratus* E US; *peregrinus* GA);

Anisandrus: 4 spp. – 2 spp. Introduced (*dispar* across US; *maiche* E US);

Coptoborus: 1 sp. – native FL;

Cnestus: 1 sp – introduced E. US (*mutilatus* E. US)

Cyclorhipidion: 3 spp – introduced;

Dryoxylon: 1 sp. (*onoharaensum*, introduced);

Dryocoetoides: 1 sp. native FL;

Euwallacea: 3 sp. – introduced (*validus* & *interjectus* E US; *fornicatus*);

Theoborus: 1 sp. native FL;

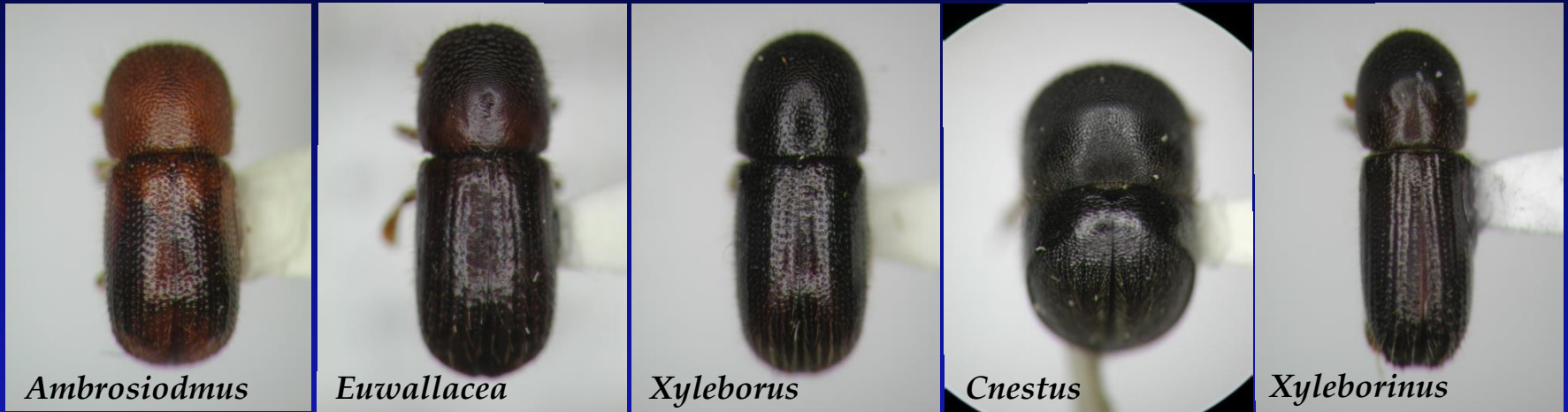
Xyleborus: 17 spp. - across N.A. (3 introduced);

Xylosandrus: 5 spp. - 4 introduced (*germanus* across US;

Xyleborinus: 6 spp. - 5 introduced (*saxesenii* across US)

Xyleborini

Ambrosiodmus, Theoborus, Euwallacea, Ambrosiophilus, Anisandrus, Cnestus, Dryocoetoides, Xyleborus, Xylosandrus, Xyleborinus...



- Eyes emarginate
- Pronotum strongly convex
- Tibia flat and broad, outer edge convex
- Tibial edge possessing numerous socketed denticles
- Antennal funicle 5-segmented
- Mycangium present, variously located

Cryphalini

Trypophloeus: 4 spp. - N & W N.A.;

Procryphalus: 2 spp. - W N.A.;

Ernoporicus: 1 sp. (*kanawhae*), WV;

Scolytogenes: 1 sp. (*knabi*), S FL;

Hypocryphalus: 1 sp. (*mangiferae*), S FL;

Cryphalus: 3 spp. - W N.A.;

Cryptocarenum: 3 spp. - S TX & FL;

Hypothenemus: 21 spp. - across N.A.;

Trischidias: 5 spp. - SE U.S.



Hypothenemus



Cryphalus

Cryphalini

Trypophloeus, Procryphalus, Ernoporicus, Scolytogenes, Hypocryphalus, Cryphalus, Cryptocarenum, Hypothenemus, Trischidias

- **Metepisternum largely covered by elytra**
- **Antennal club strongly flattened**
- **Vestiture commonly includes scales**
- **Pronotum often with large asperities**



Pityophthorini

Dendroterus: 2 spp. (TX, CA);

Araptus: 2 sp. S FL and mid west;

Conophthorus: 8 spp. (2 in E, 6 in W N.A.);

Pityoborus: 2 spp. - SE & SW U.S.;

Pityotrichus: 2 spp. - SW U.S.;

Pseudopityophthorus: 11 spp. - across N.A.;

Pityophthorus: 104 spp. - across N.A.



Pityophthorini

Dendroterus, Araptus, Conophthorus, Pityoborus, Pityotrichus, Pseudopityophthorus, Pityophthorus

- Metepisternum largely covered by elytra
- Antennal funicle 5-segmented, club mostly small, symmetrical
- Pubescence often abundant
- Mostly small to very small bark & twig beetles



Corthylini

Corthylus: 4 spp. - U.S., Canada;

Gnathotrichus: 7 spp. – 1 in E, 6 in W;

Monarthrum: 5 spp. (2 in E, 3 in W)



Corthylini

Corthylus, Gnathotrichus, Monarthrum

- Metepisternum largely covered by elytra
- Antennal funicle 1-, 2-, or 5-segmented, club much larger, asymmetrical in most
- Pubescence rare
- Ambrosia beetles





Ips sexdentatus



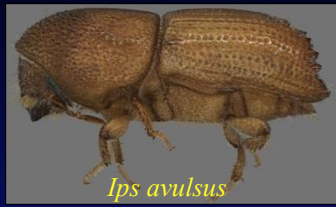
Species



Dendroctonus frontalis



Hylastes salebratus



Ips avulsus



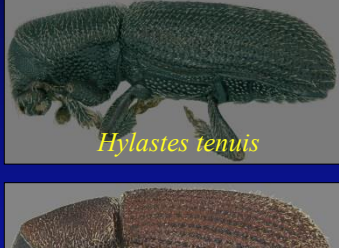
Monarthrum mali



Pityogenes hopkinsi



Dendroctonus terebrans



Hylastes tenuis



Ips calligraphus



Orthotomicus caelatus



Dendroctonus valens



*Hylurgops rugipennis
pinifex*



Ips grandicollis



Pityophthorus spp.



Trypodendron lineatum



Euwallacea validus



Hypothenemus spp.



Ips pini



Pityophthorus spp.



Trypodendron lineatum



Gnathotrichus materiarius



Hylastes porculus



Monarthrum fasciatum



Pityophthorus spp.



Xyloterinus politus

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