
Building an anatomical ontology for Hymenoptera
Andy Deans
(NCSU)
Matt Yoder
(OSU)
John Hallmén

# Acknowledgments

**funding:**

- Morphbank (*NSF DBI-0446224*)
- HymAToL (*NSF EF-0337220*)
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**intellect and enthusiasm:**

- Fredrik Ronquist (NRM)
- Jim Balhoff, Hilmar Lapp, Todd Vision (NESCent)
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- István Mikó (NSCU)
- Katja Seltmann (Morphbank)
- All you contributors! (especially the International Society of Hymenopterists)

**Hymenoptera images:**

http://www.flickr.com/photos/orionmystery/1777817613
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# Hymenoptera

>115,000 spp.

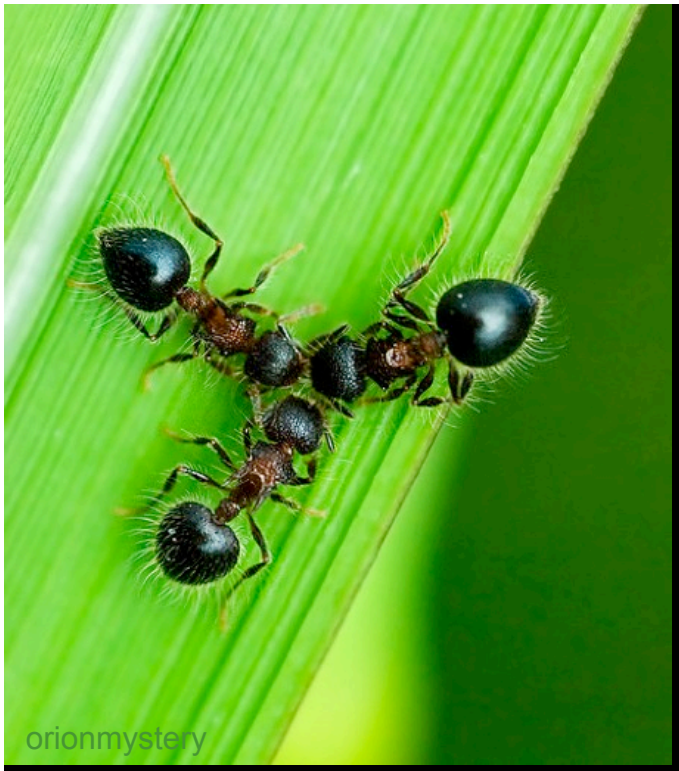
sawflies

ants

bees

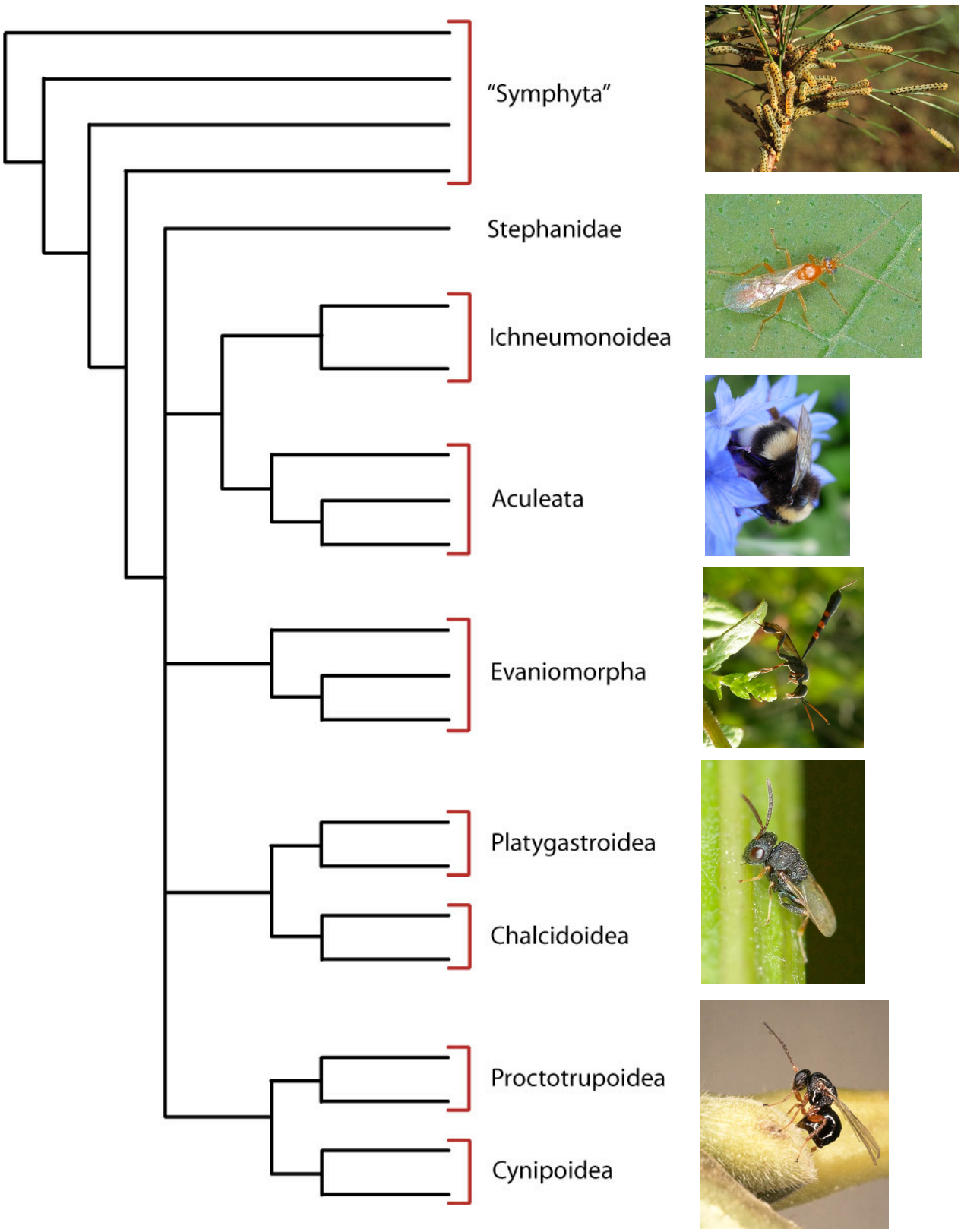
social wasps

parasitic wasps





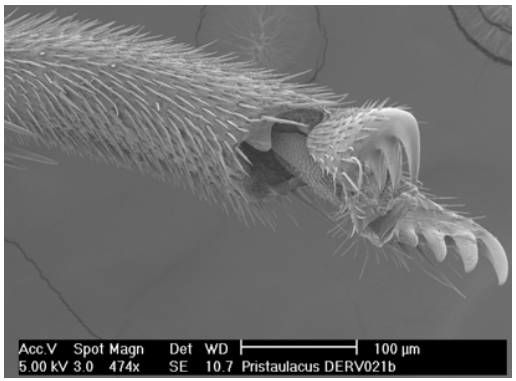


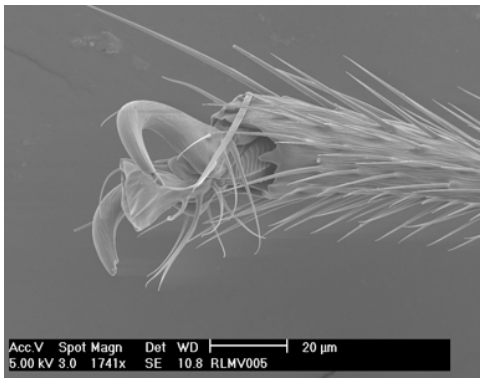

"Symphyta"
Stephanidae
Ichneumonoidea
Aculeata
Evaniomorpha
Platygastroidea
Chalcidoidea
Proctotrupoidea
Cynipoidea

# **HymAToL** - Assembling the Tree of Life for Hymenoptera

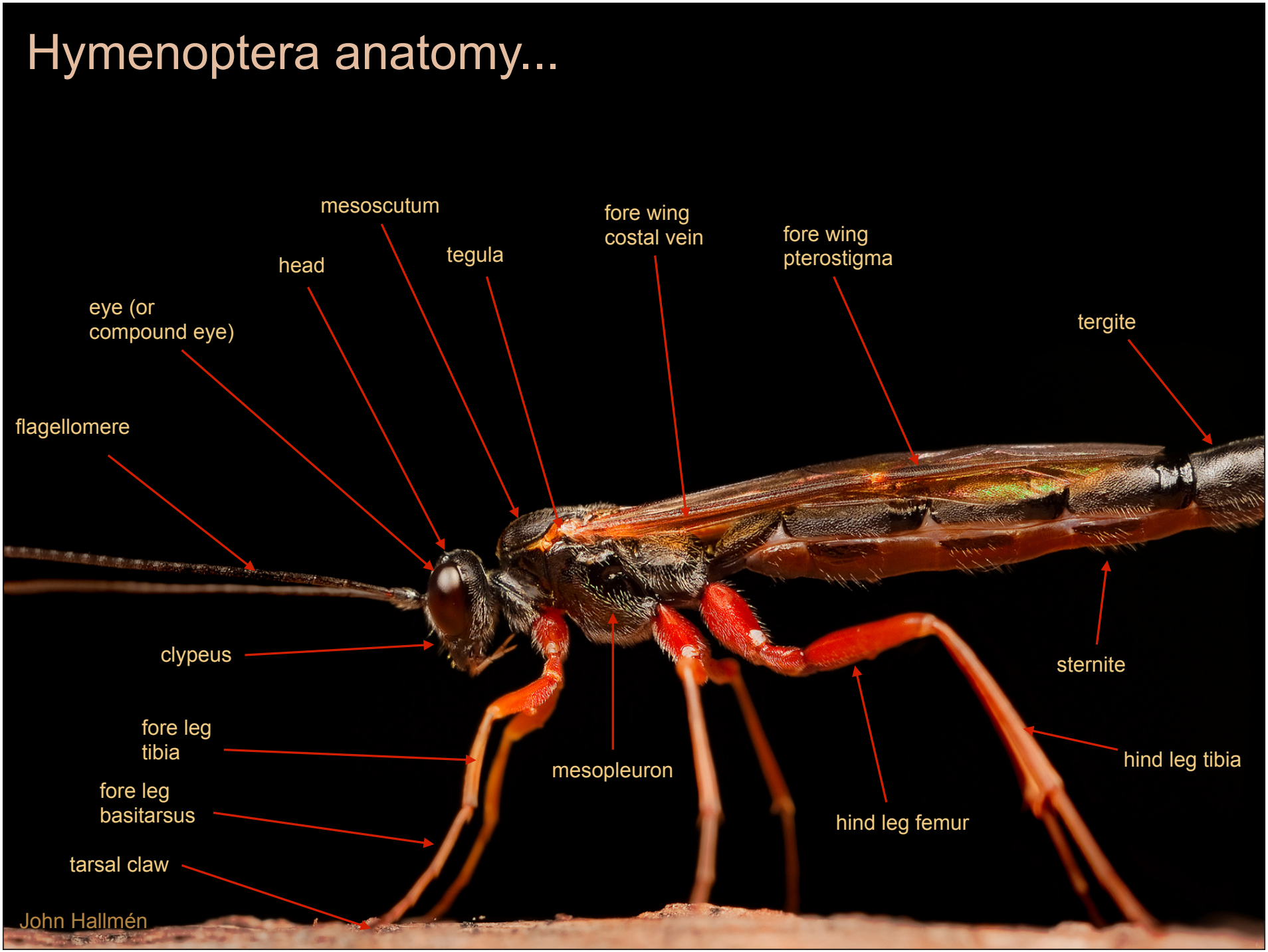
>30 people collaborating to resolve relationships between the major lineages of Hymenoptera

Morphology

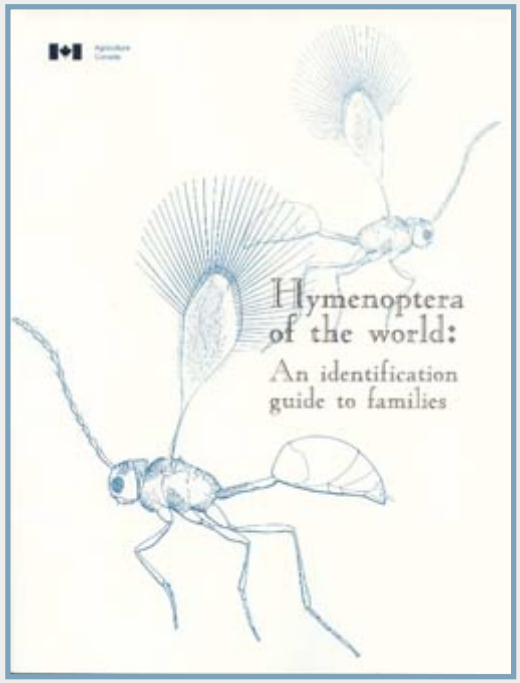


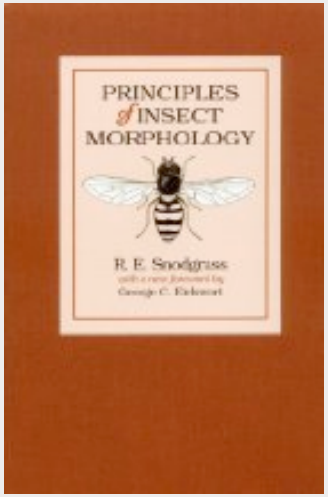
# Hymenoptera anatomy...

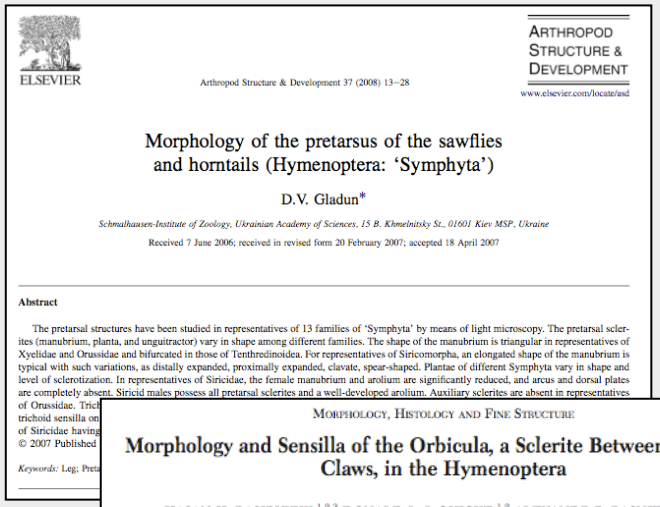


# We have **NO** single anatomical reference




202 terms





ELSEVIER

Arthropod Structure & Development 37 (2008) 13–28

ARTHROPOD STRUCTURE & DEVELOPMENT

www.elsevier.com/locate/asd

Morphology of the pretarsus of the sawflies and horntails (Hymenoptera: 'Symphyta')

D.V. Gladun*

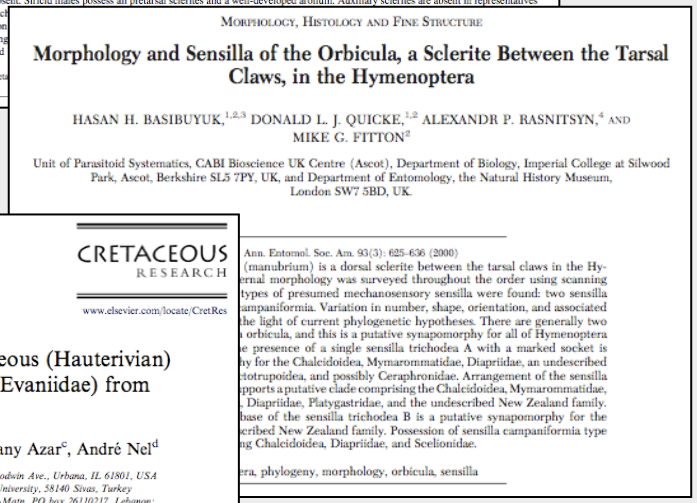
*Schmalhausen-Institute of Zoology, Ukrainian Academy of Sciences, 15 B. Khmelnitsky St., 01601 Kiev MSP, Ukraine*

Received 7 June 2006; received in revised form 20 February 2007; accepted 18 April 2007

**Abstract**

The pretarsal structures have been studied in representatives of 13 families of 'Symphyta' by means of light microscopy. The pretarsal sclerites (manubrium, planta, and unguitractor) vary in shape among different families. The shape of the manubrium is triangular in representatives of Xyelidae and Orussidae and bifurcated in those of Tenthredinoidea. For representatives of Siricomorpha, an elongated shape of the manubrium is typical with such variations, as distally expanded, proximally expanded, clavate, spear-shaped. Plantae of different Symphyta vary in shape and level of sclerotization. In representatives of Siricidae, the female manubrium and arolium are significantly reduced, and arcus and dorsal plates are completely absent. Siricid males possess all pretarsal sclerites and a well-developed arolium. Auxiliary sclerites are absent in representatives of Orussidae. Trich
trichoid sensilla on
of Siricidae having
© 2007 Published

*Keywords:* Leg; Preta


MORPHOLOGY, HISTOLOGY AND FINE STRUCTURE

**Morphology and Sensilla of the Orbicula, a Sclerite Between the Tarsal Claws, in the Hymenoptera**

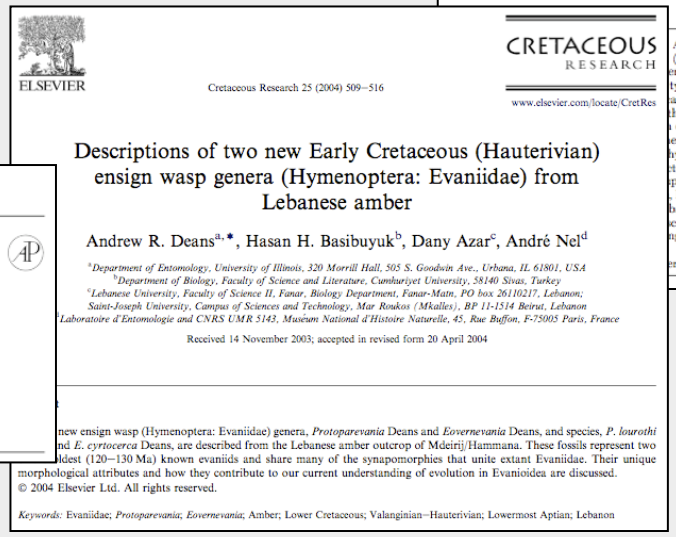
HASAN H. BASIBUYUK,[1,2,3] DONALD L. J. QUICKE,[1,2] ALEXANDR P. RASNITSYN,[4] AND MIKE G. FITTON[2]

Unit of Parasitoid Systematics, CABI Bioscience UK Centre (Ascot), Department of Biology, Imperial College at Silwood Park, Ascot, Berkshire SL5 7PY, UK, and Department of Entomology, the Natural History Museum, London SW7 5BD, UK.

Ann. Entomol. Soc. Am. 93(3): 625–636 (2000)

(manubrium) is a dorsal sclerite between the tarsal claws in the Hy-
ernal morphology was surveyed throughout the order using scanning
types of presumed mechanosensory sensilla were found: two sensilla
ampaniformia. Variation in number, shape, orientation, and associated
he light of current phylogenetic hypotheses. There are generally two
orbicula, and this is a putative synapomorphy for all of Hymenoptera
e presence of a single sensilla trichodea A with a marked socket is
hy for the Chaleidoidea, Mymarommatidae, Diapriidae, an undescribed
totrupoidea, and possibly Ceraphronidae. Arrangement of the sensilla
pports a putative clade comprising the Chaleidoidea, Mymarommatidae,
, Diapriidae, Platygastridae, and the undescribed New Zealand family.
base of the sensilla trichodea B is a putative synapomorphy for the
cribed New Zealand family. Possession of sensilla campaniformia type
ng Chaleidoidea, Diapriidae, and Scelionidae.

ra, phylogeny, morphology, orbicula, sensilla


ELSEVIER

Cretaceous Research 25 (2004) 509–516

CRETACEOUS RESEARCH

www.elsevier.com/locate/CretRes

Descriptions of two new Early Cretaceous (Hauterivian) ensign wasp genera (Hymenoptera: Evaniidae) from Lebanese amber

Andrew R. Deans[a,*], Hasan H. Basibuyuk[b], Dany Azar[c], André Nel[d]

[a]*Department of Entomology, University of Illinois, 320 Morrill Hall, 505 S. Goodwin Ave., Urbana, IL 61801, USA*
[b]*Department of Biology, Faculty of Science and Literature, Cumhuriyet University, 58140 Sivas, Turkey*
[c]*Lebanese University, Faculty of Science II, Fanar, Biology Department, Fanar-Matn, PO box 26110217, Lebanon; Saint-Joseph University, Campus of Sciences and Technology, Mar Roukos (Mkalles), BP 11-1514 Beirut, Lebanon*
[d]*Laboratoire d'Entomologie and CNRS UMR 5143, Muséum National d'Histoire Naturelle, 45, Rue Buffon, F-75005 Paris, France*

Received 14 November 2003; accepted in revised form 20 April 2004

new ensign wasp (Hymenoptera: Evaniidae) genera, *Protoparevania* Deans and *Eovernevania* Deans, and species, *P. lourothi* nd *E. cyrtocerca* Deans, are described from the Lebanese amber outcrop of Mdeirij/Hammana. These fossils represent two ldest (120–130 Ma) known evaniids and share many of the synapomorphies that unite extant Evaniidae. Their unique morphological attributes and how they contribute to our current understanding of evolution in Evanioidea are discussed.
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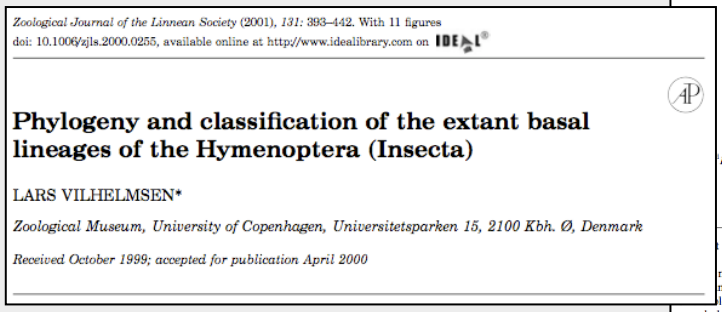
*Keywords:* Evaniidae; *Protoparevania*; *Eovernevania*; Amber; Lower Cretaceous; Valanginian–Hauterivian; Lowermost Aptian; Lebanon


*Zoological Journal of the Linnean Society* (2001), *131*: 393–442. With 11 figures
doi: 10.1006/zjls.2000.0255, available online at http://www.idealibrary.com on IDEAL®

**Phylogeny and classification of the extant basal lineages of the Hymenoptera (Insecta)**

LARS VILHELMSEN*

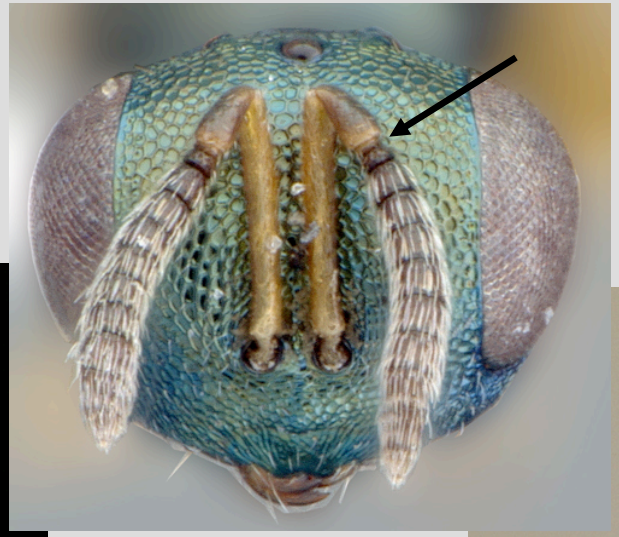
*Zoological Museum, University of Copenhagen, Universitetsparken 15, 2100 Kbh. Ø, Denmark*

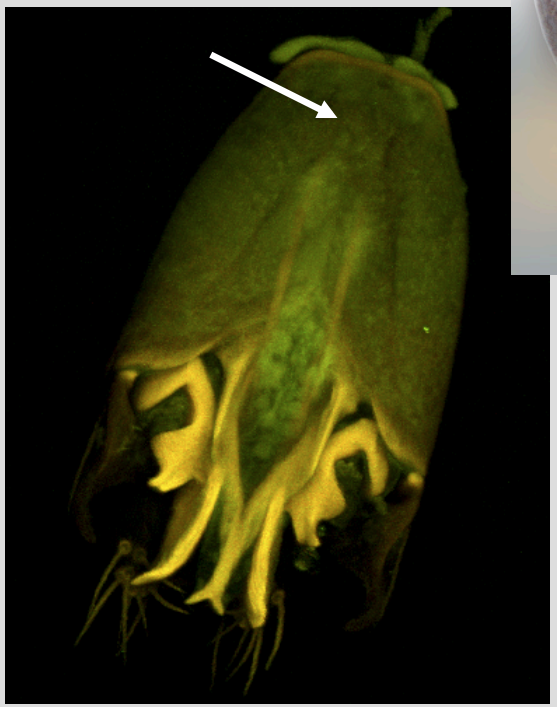
*Received October 1999; accepted for publication April 2000*

*ad hoc*
glossaries

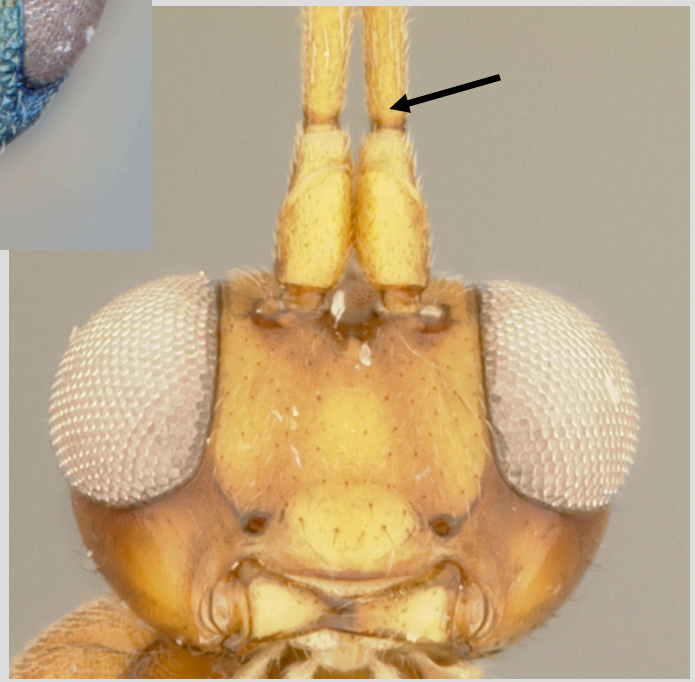
# Terminological Problems - Homonyms

same spelling but different structure





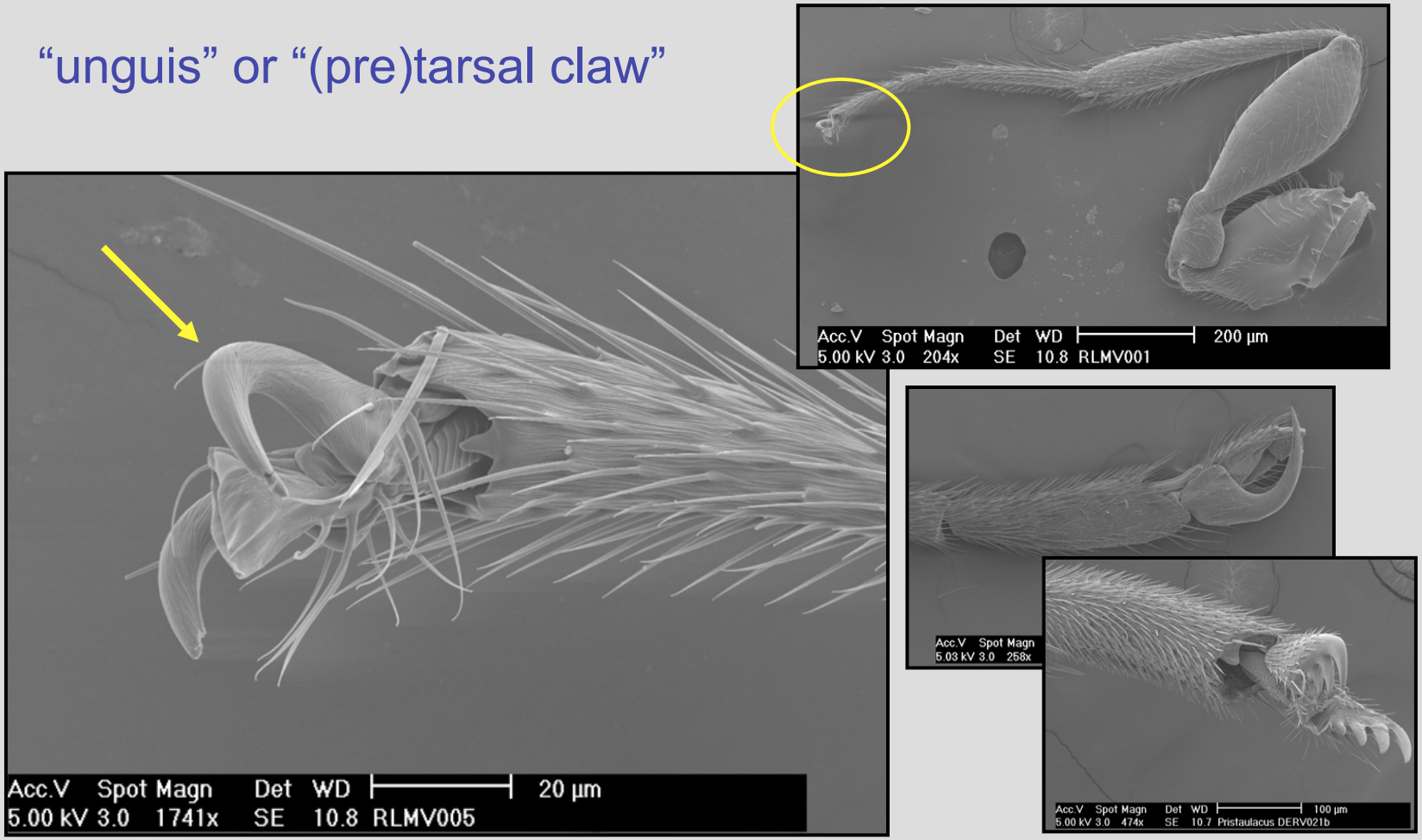
“anellus”



# Terminological Problems - Synonyms

same structure but different spelling

“unguis” or “(pre)tarsal claw”



# Terminological Problems - Other

uninformative terms
(=to be discouraged?)

and

taxon-specific terms


"lost" terms

thigmomere
thigmus
thigmochore

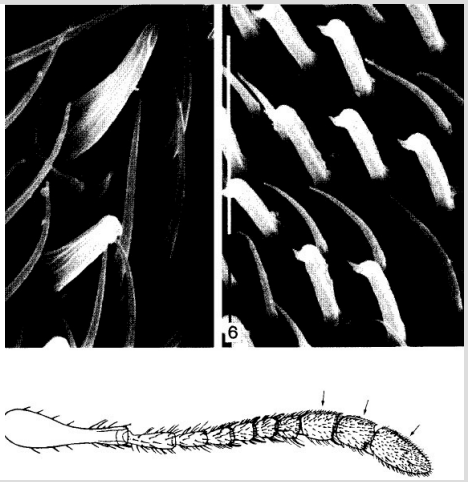
**Proposition de trois nouveaux termes de morphologie antennaire**

par Paul DESSART

Institut royal des Sciences naturelles de Belgique, Section Insectes et Arachnomorphes, rue Vautier 29, B-1040 Bruxelles.

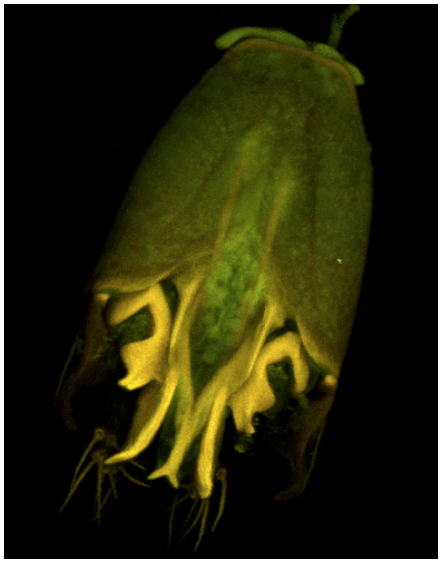
**Summary**

*The author proposes three new terms for antennal morphology: «thigmochore» for an area clearly distinct by its special sensilla from the general (sensorial) surface of an antennal joint, «thigmomere» for any flagellomere provided with such an area, and «thigmus» for the ensemble (continuous or discontinuous) of such thigmomeres. The three terms are illustrated by examples in Hymenoptera Ceraphronoidea.*



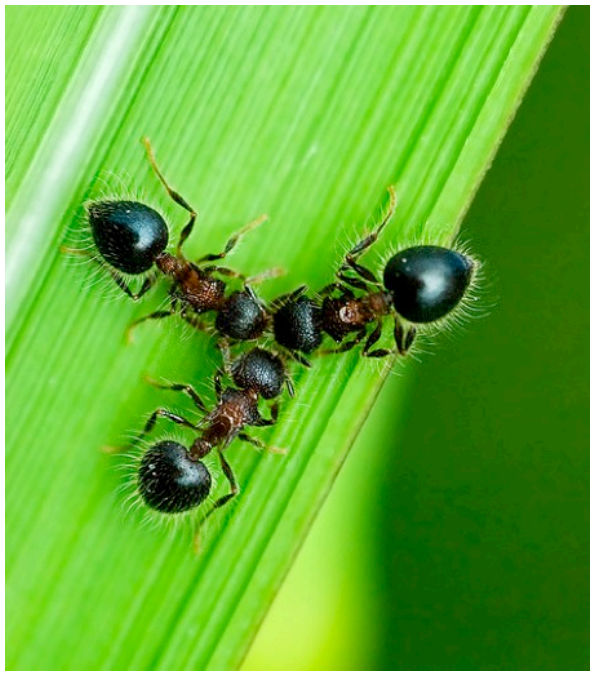
# Serious Implications for *Systematics*

1. non-homologous characters
2. duplicated characters
3. miscommunication
4. wasted effort



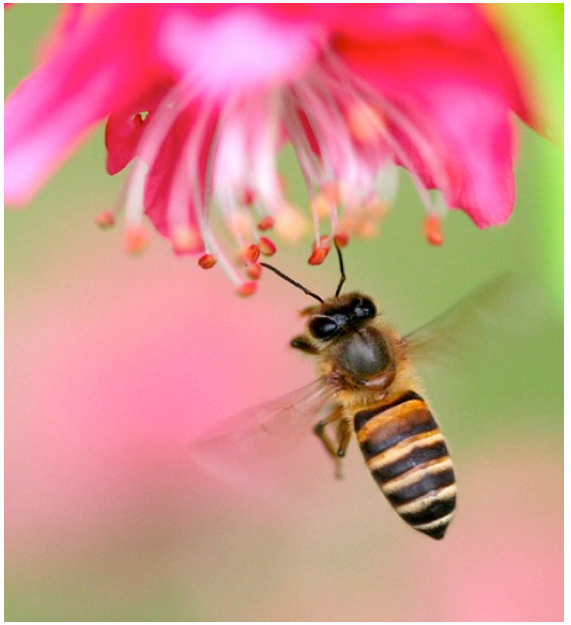
# **Serious** Implications for *Genomics*

1. mutant phenotype description
2. gene expression annotation (with GO)



3 Formicidae spp.

3 *Nasonia* spp.



*Apis mellifera*

## Solution: Hymenoptera Anatomical Ontology

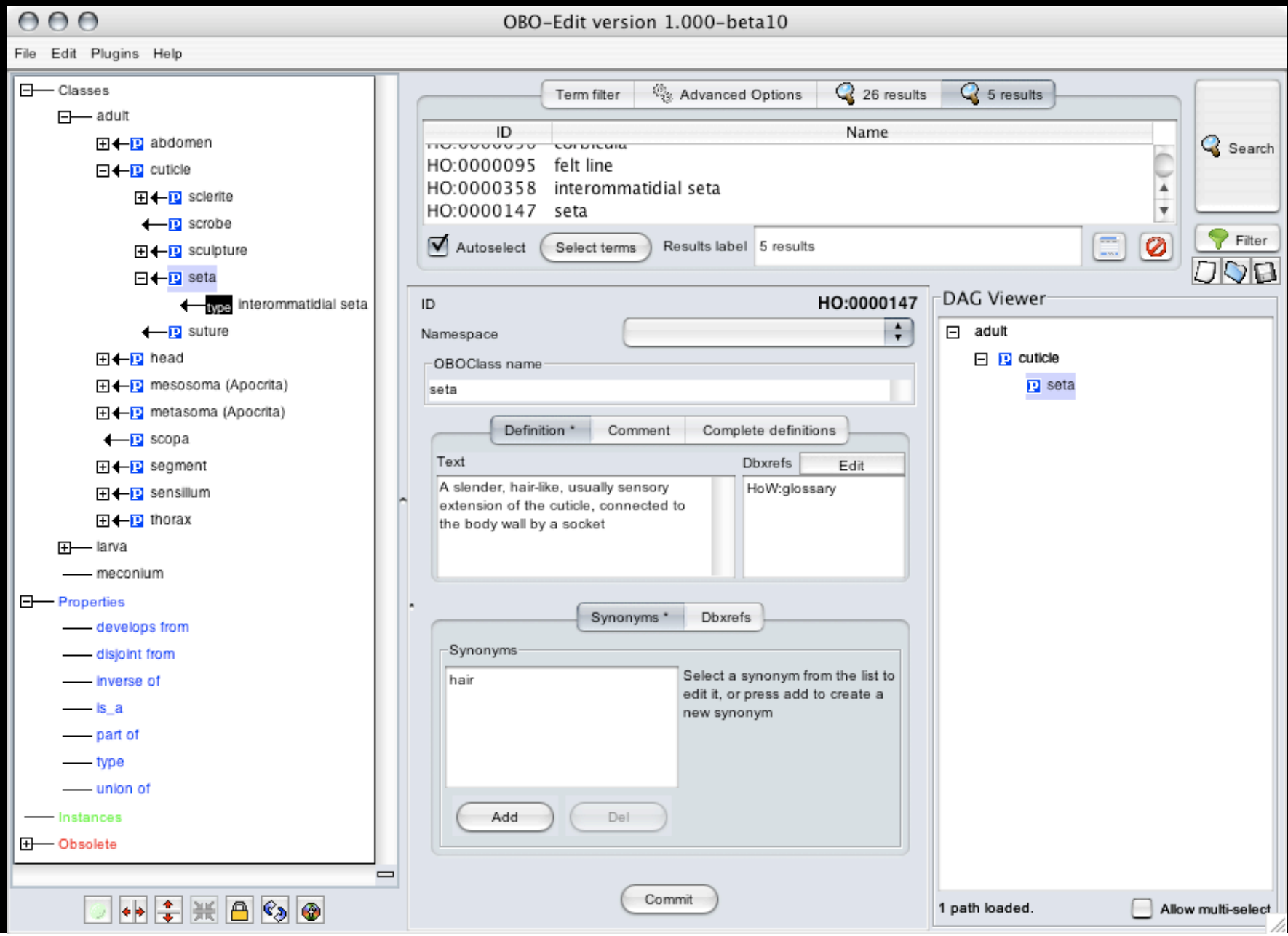
- community built (iterative) consensus lexicon
- comprehensive
- terms textually defined and typified
- terms related

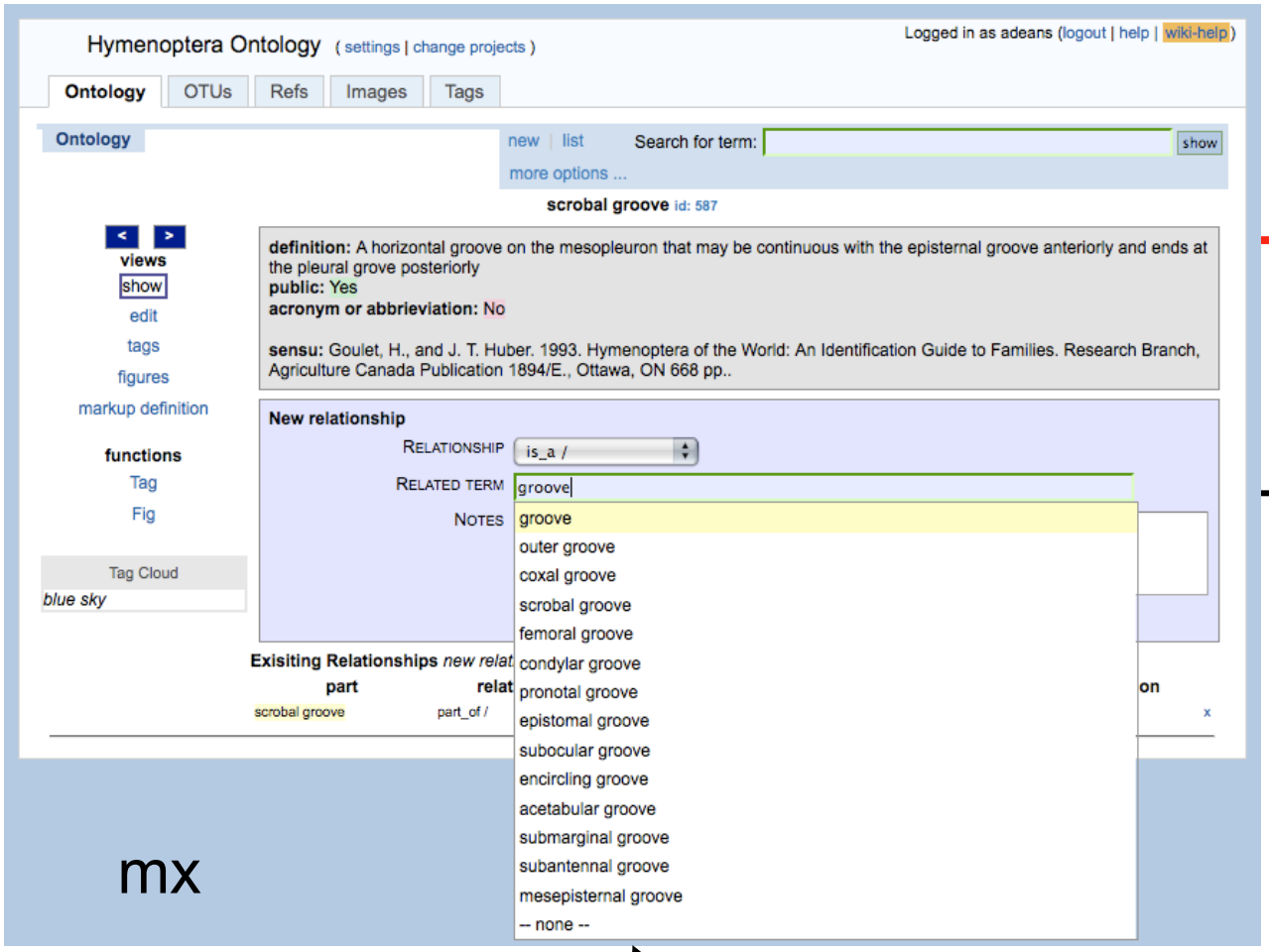
  *is_a*
  *part_of*
  *exact_synonym*
  *obsolete_synonym*

- complements existing ontologies

**Several ways to implement and benefit...but how do we build this resource?**

# getting started...






mx

backend

data dump

.obo

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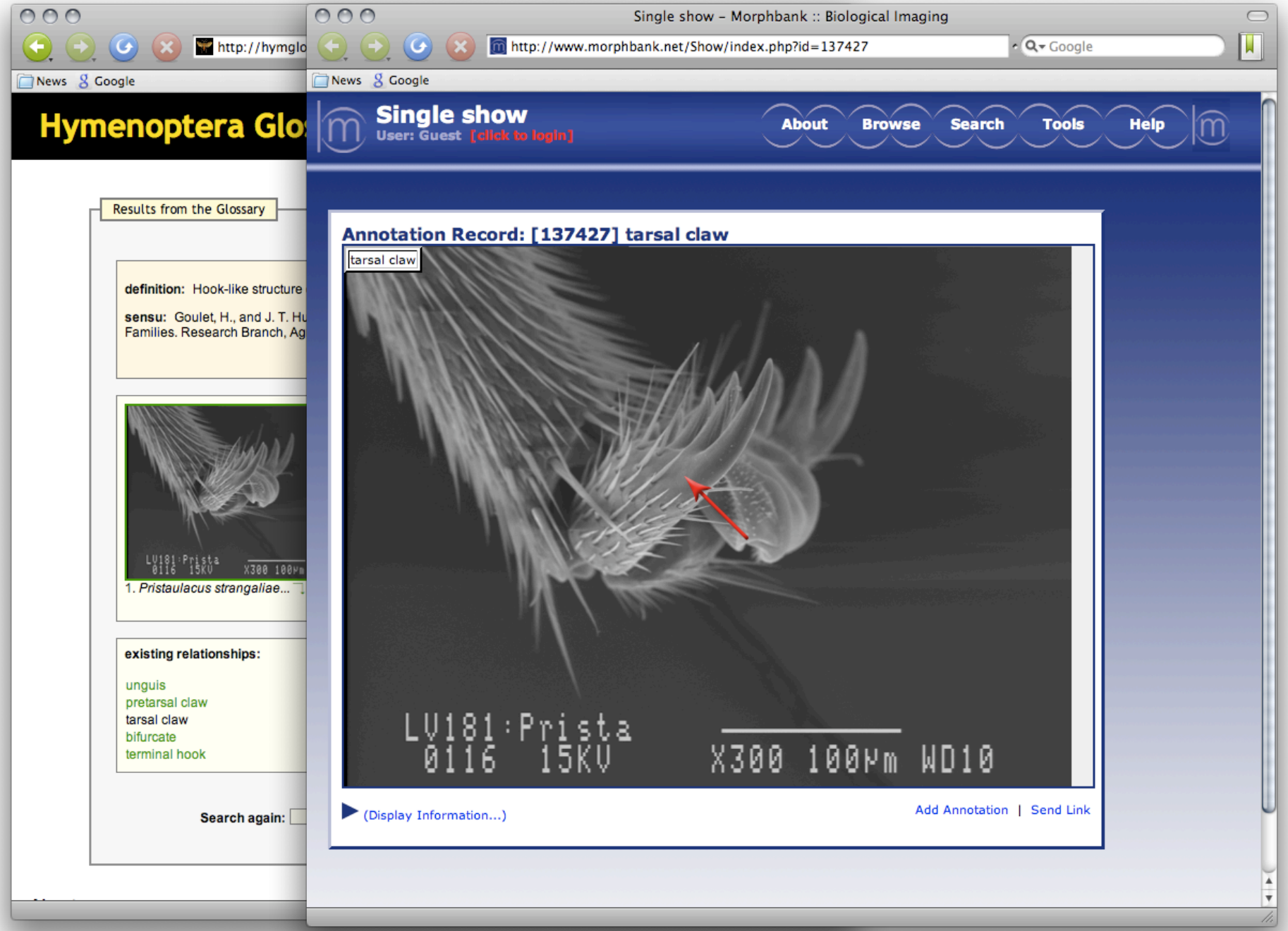
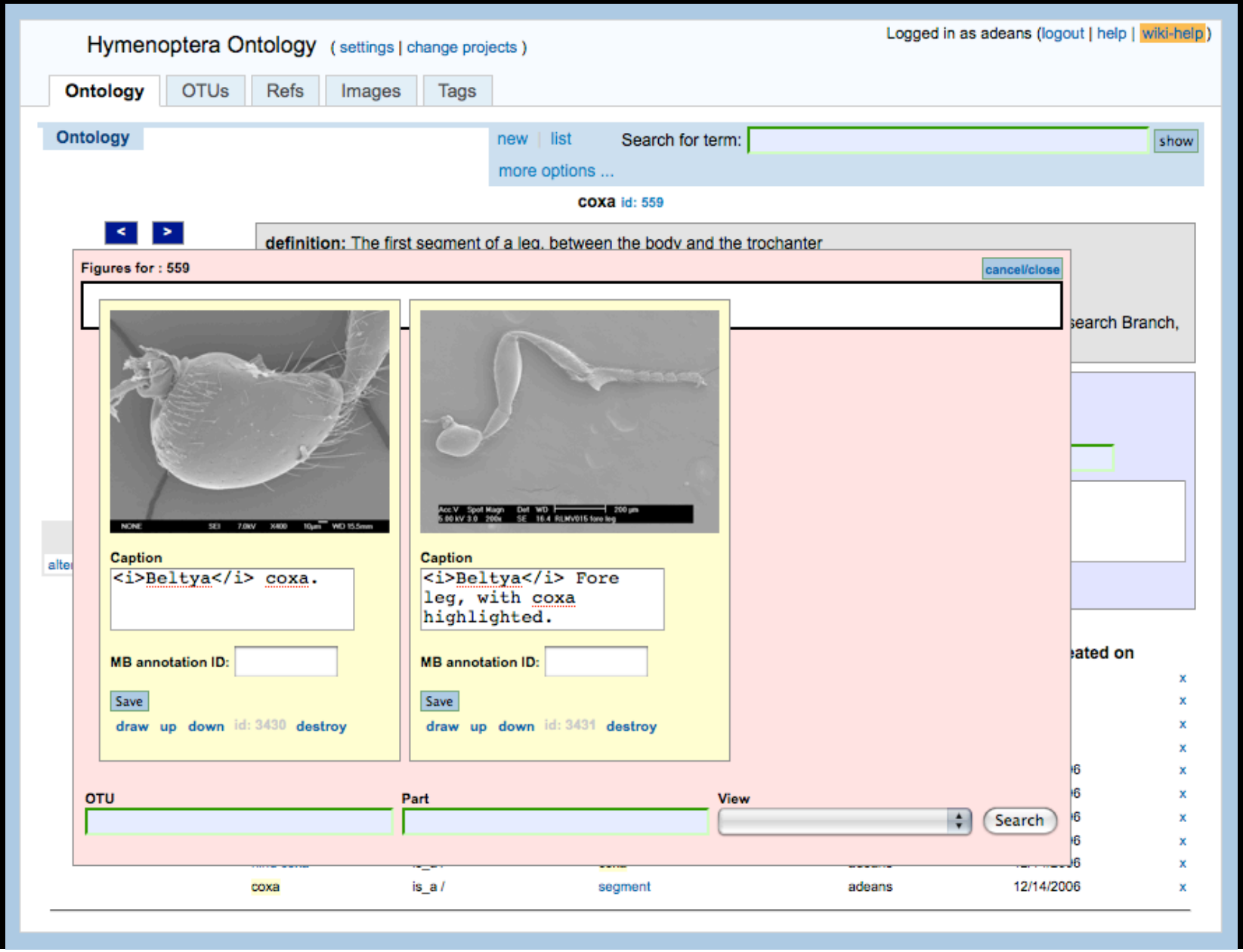
[Term]
id: 587
name: scrobal groove
def: "A horizontal groove on the mesopleuron that
may be continuous with the episternal groove
anteriorly and ends at the pleural grove
posteriorly"
ref: "Goulet H, Huber JT, 1993. Hymenoptera of
the World: An Identification Guide to Families.
Research Branch, Agriculture Canada Publication
1894/E., Ottawa, ON. 668 pp."
relationship: part_of 157 ! mesopleuron
relationship: is_a 138 ! groove
```

CS colleagues:
- unsupervised machine learning
- semantic image searching

OBO Foundry


Hymenoptera Glo
Results from the Glossary
definition: Hook-like structure
sensu: Goulet, H., and J. T. Hu
Families. Research Branch, Ag
1. Pristaulacus strangaliae...
existing relationships:
unguis
pretarsal claw
tarsal claw
bifurcate
terminal hook
Search again:
Single show – Morphbank :: Biological Imaging
http://www.morphbank.net/Show/index.php?id=137427
Google
News
Google
Single show
User: Guest [click to login]
About
Browse
Search
Tools
Help
Annotation Record: [137427] tarsal claw
tarsal claw
LV181:Prista
0116 15KV
X300 100µm WD10
(Display Information...)
Add Annotation | Send Link

# Accessioning data - manually



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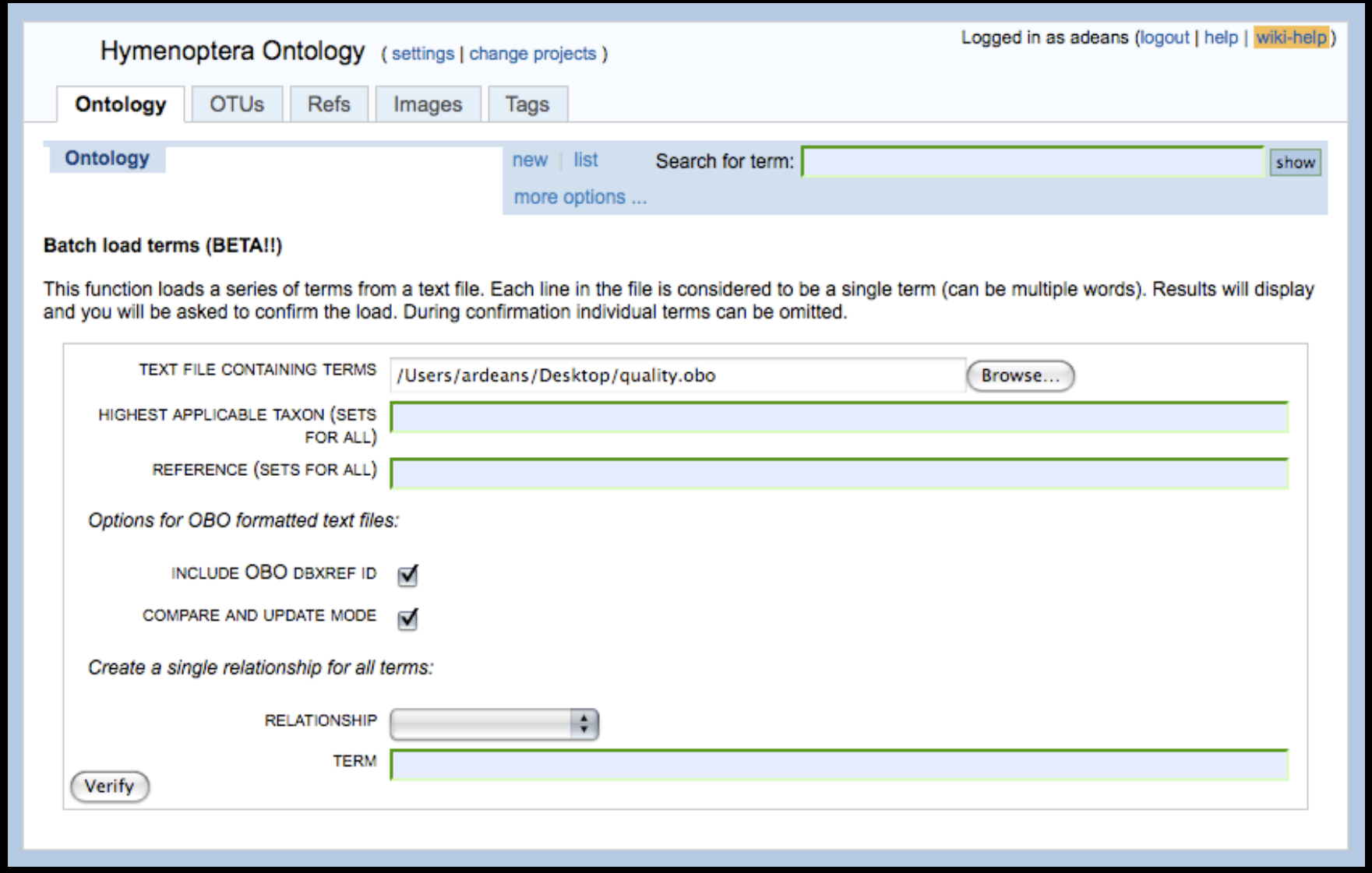

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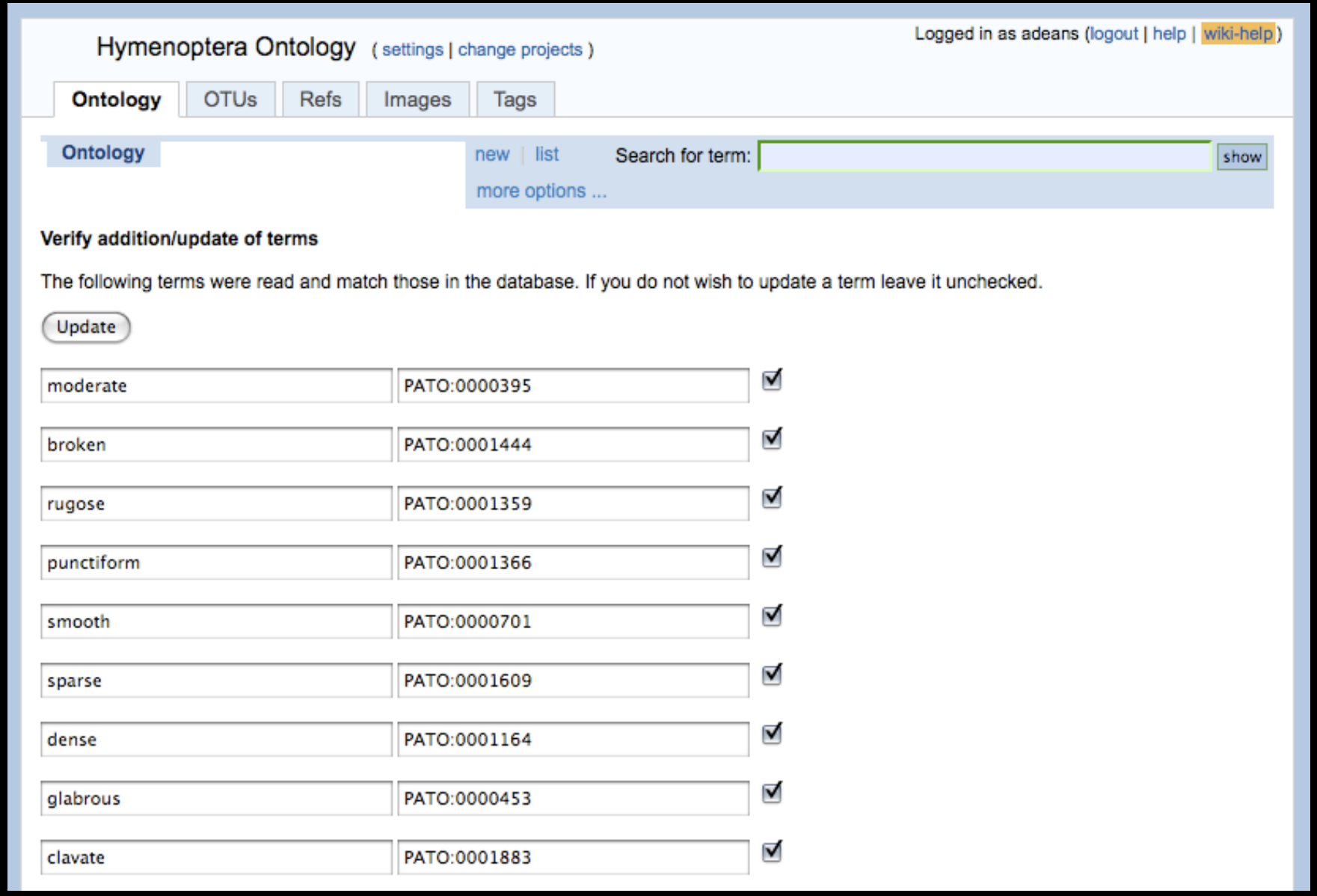
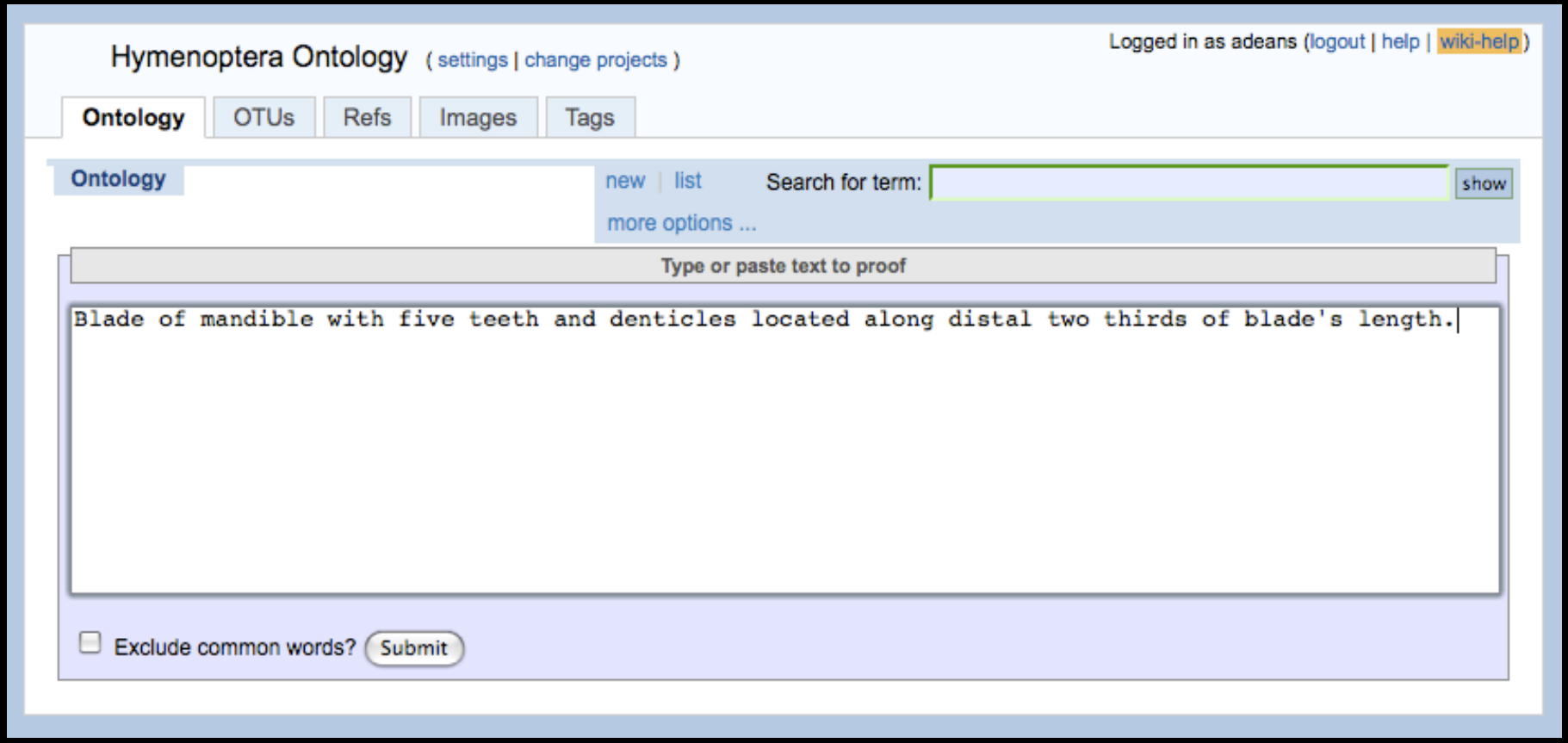


# Accessioning data - text mining and extraction




**Fisher BL, Smith MA. 2008.** A revision of Malagasy species of *Anochetus* Mayr and *Odontomachus* Latreille (Hymenoptera: Formicidae). *PLoS ONE* 3(5): e1787 doi:10.1371/journal.pone.0001787

Hymenoptera Ontology ( settings | change projects )

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Ontology | OTUs | Refs | Images | Tags

Ontology

new | list Search for term: show

more options ...

Type or paste text to proof

Blade of mandible with five teeth and denticles located along distal two thirds of blade's length.

Exclude common words? Submit

Parsed text (may be truncated)

Blade of mandible with five teeth and denticles located along distal two thirds of blade's length.

Add words (12 total)

*Check terms to add then click* Add

HIGHEST APPLICABLE TAXON (SETS FOR ALL)

REFERENCE (SETS FOR ALL)

| | | | |
|---|---|---|---|
| ☑ blade | ☐ blade mandible | ☐ blades | ☑ denticles |
| ☐ denticles located | ☐ located | ☐ located thirds | ☐ mandible teeth |
| ☐ teeth | ☐ teeth denticles | ☐ thirds | ☐ thirds blades |

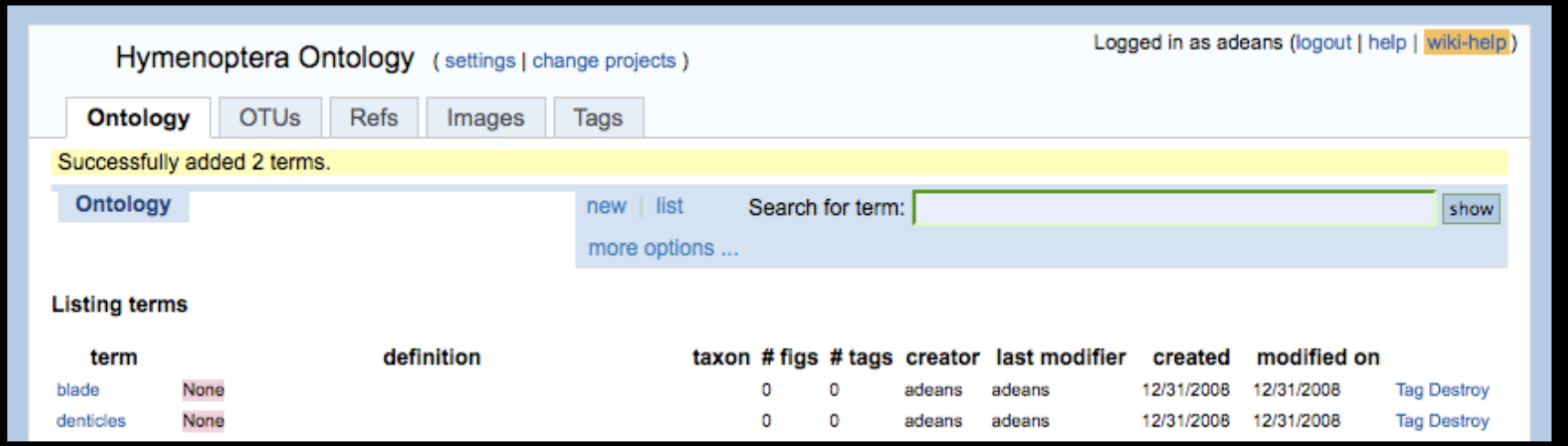
Add

Words already in the database

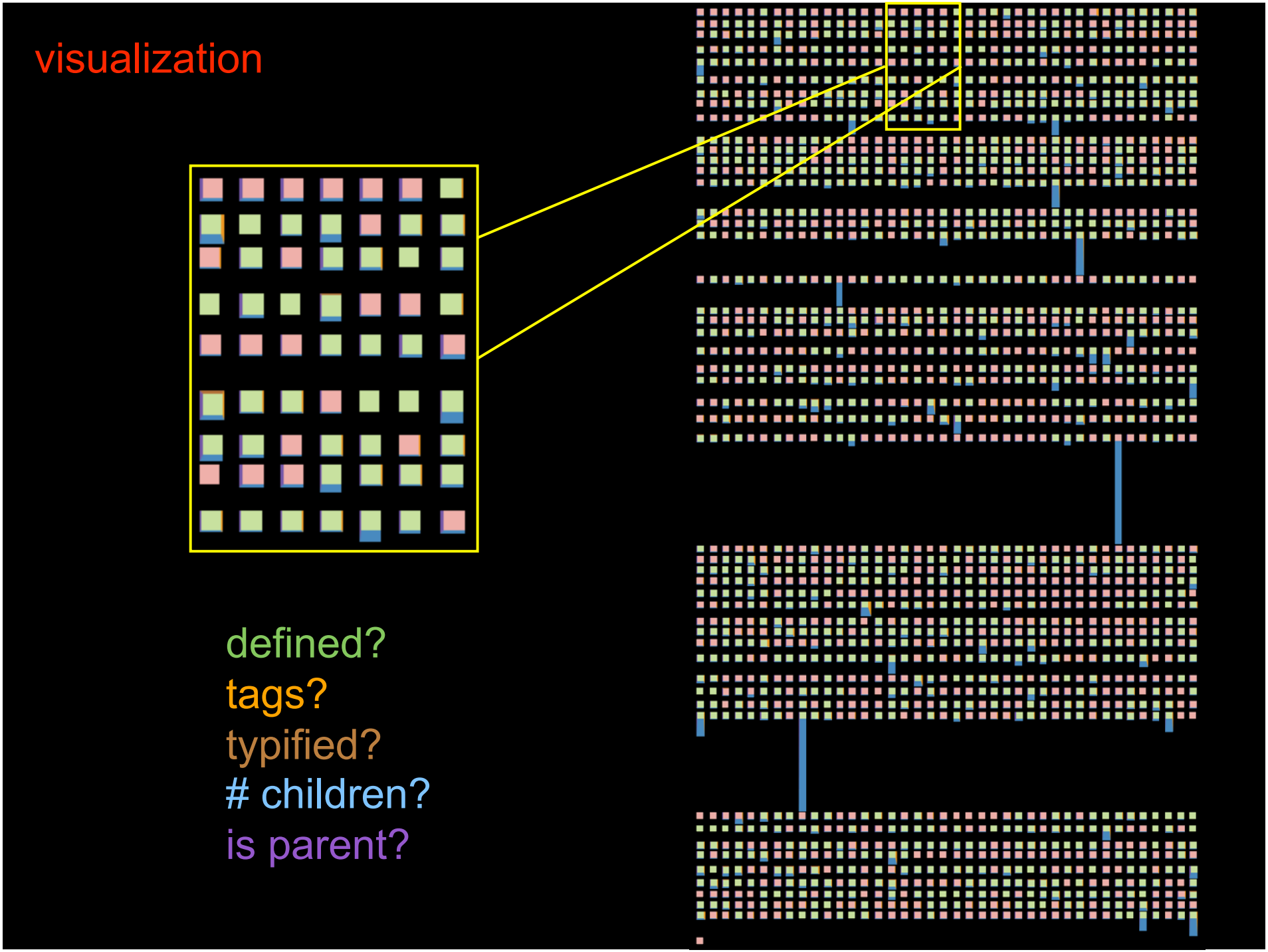
Click to view.

mandible

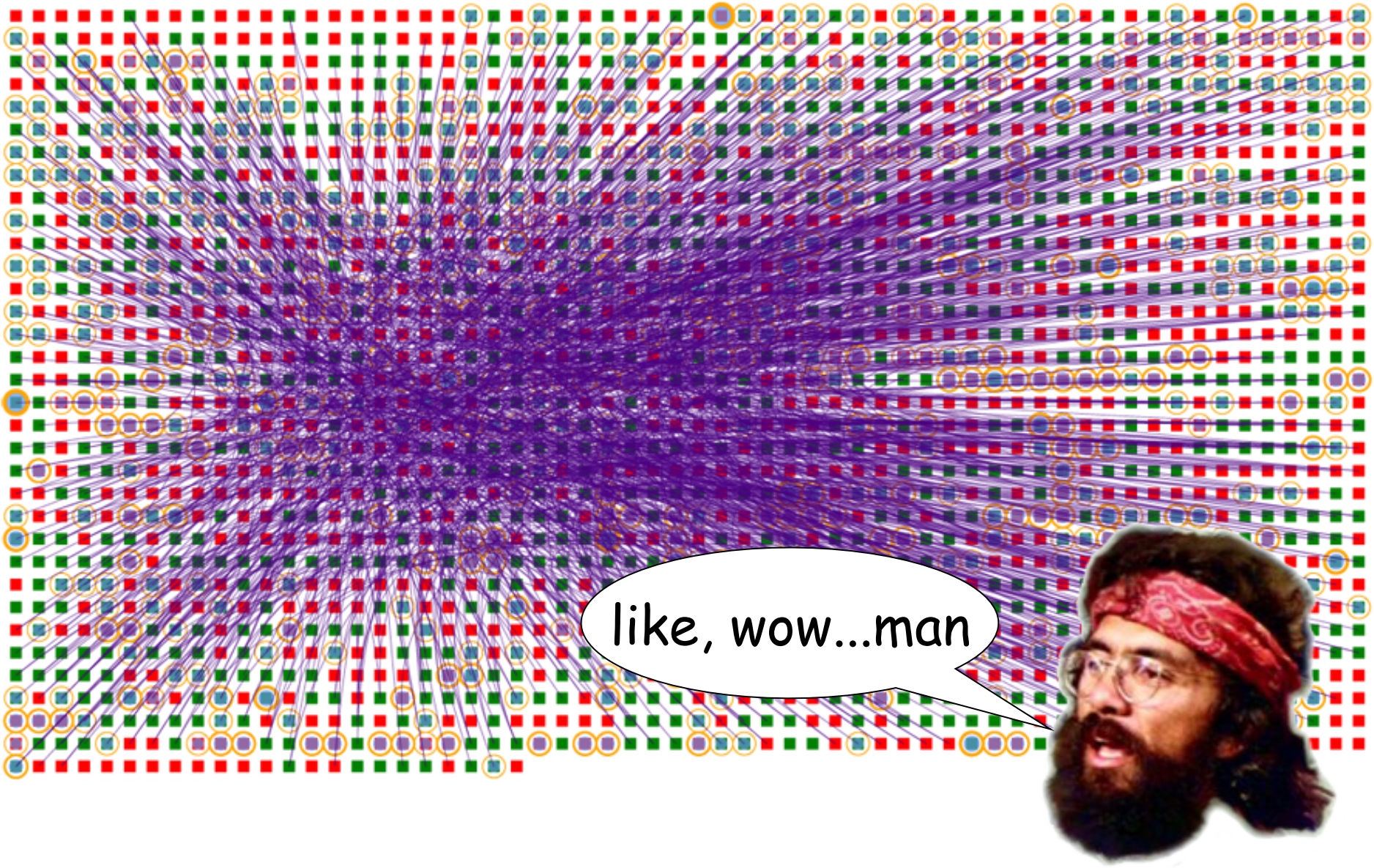
# Accessioning data - text mining and extraction



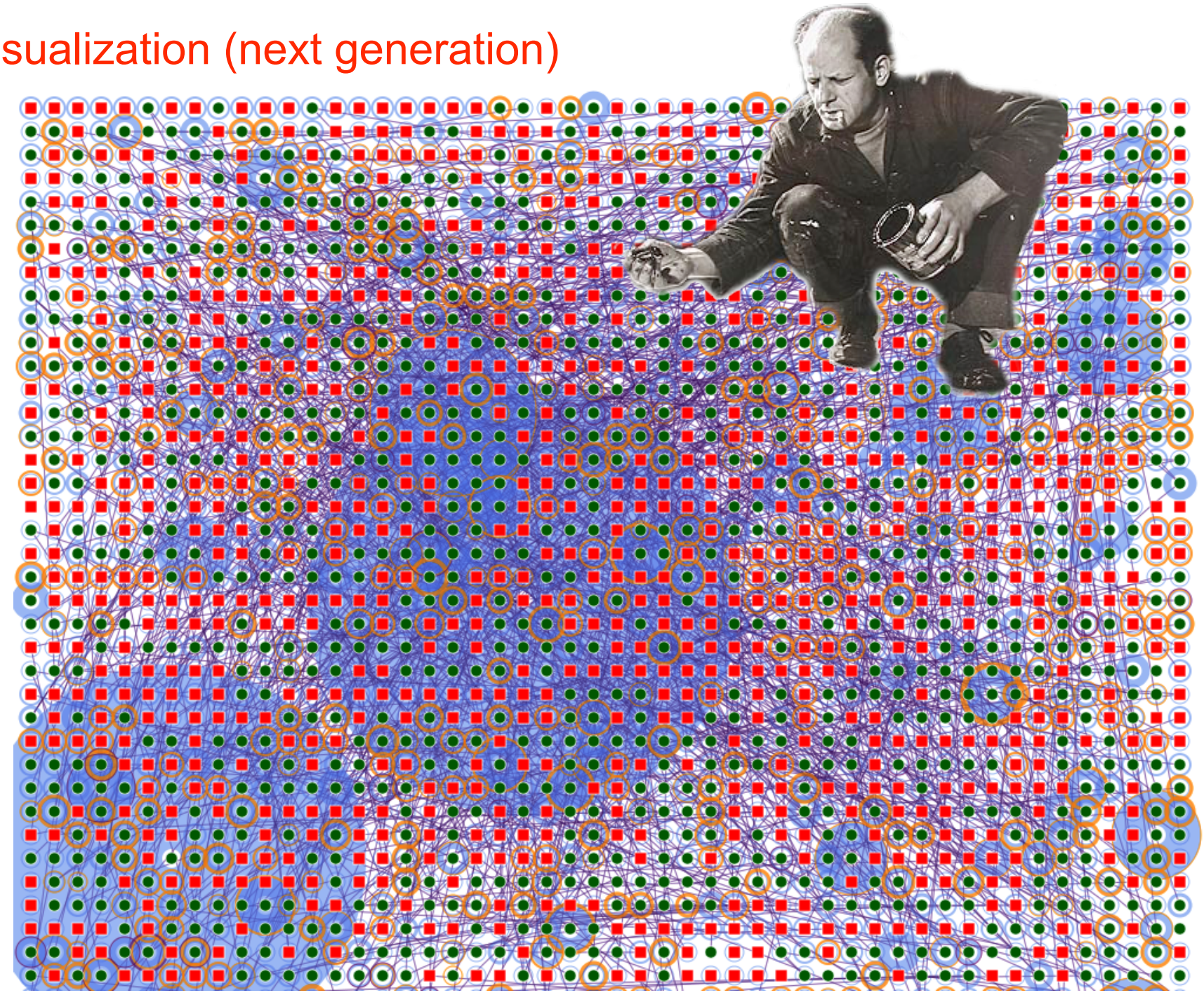
visualization



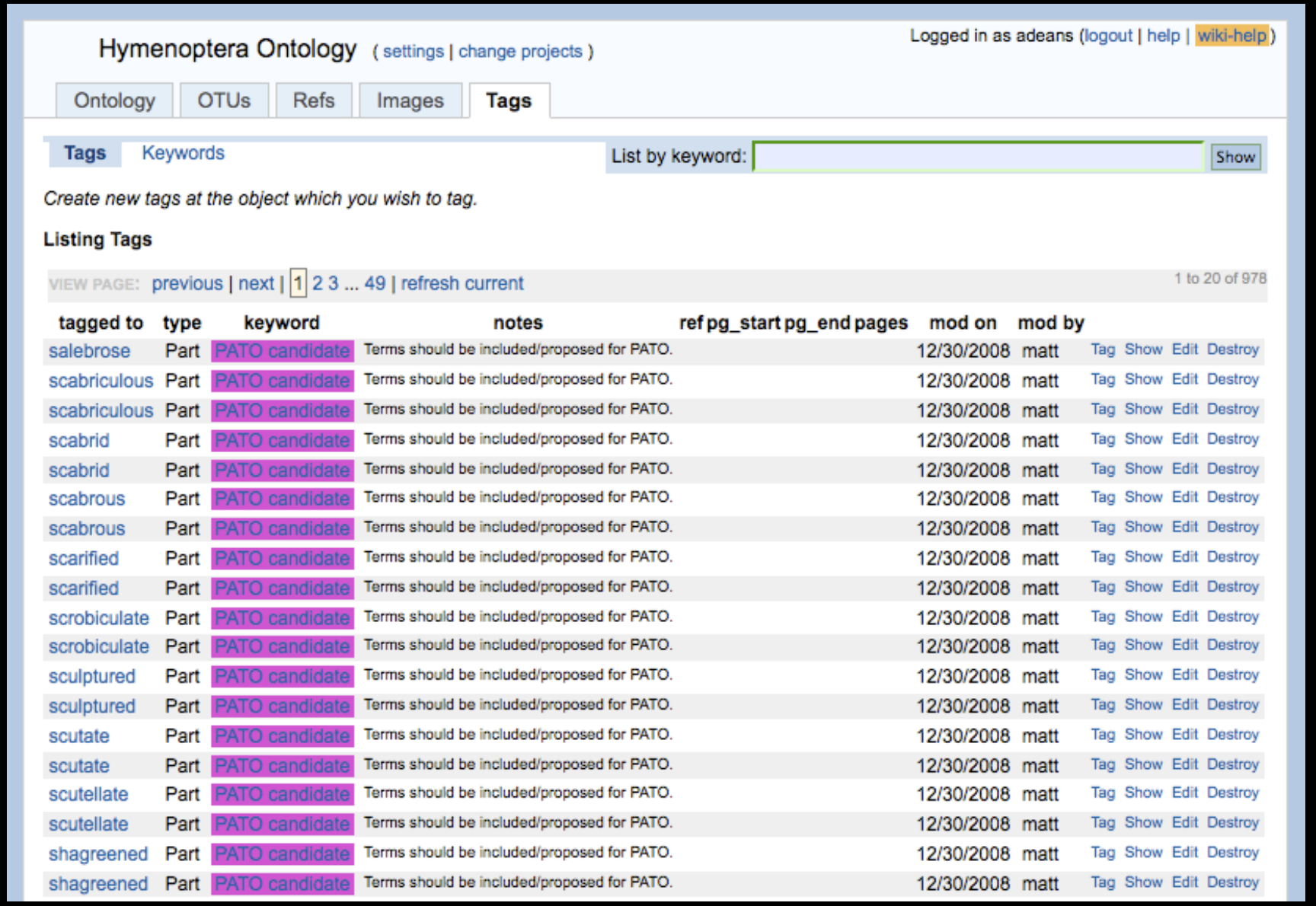
# visualization (next generation)



# visualization (next generation)



# Reaccessioning data - tagging



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Ontology | OTUs | Refs | Images | **Tags**

**Tags** | Keywords

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*Create new tags at the object which you wish to tag.*

**Listing Tags**

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1 to 20 of 978

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| scutellate | Part | PATO candidate | Terms should be included/proposed for PATO. | | | | | 12/30/2008 | matt | Tag Show Edit Destroy |
| scutellate | Part | PATO candidate | Terms should be included/proposed for PATO. | | | | | 12/30/2008 | matt | Tag Show Edit Destroy |
| shagreened | Part | PATO candidate | Terms should be included/proposed for PATO. | | | | | 12/30/2008 | matt | Tag Show Edit Destroy |
| shagreened | Part | PATO candidate | Terms should be included/proposed for PATO. | | | | | 12/30/2008 | matt | Tag Show Edit Destroy |

## Where we are now...

**2,003 terms**

**1,956 relationships**

**13 contributors** (of 40 added to the project)

**homonyms:**

e.g., anellus, speculum, pedicel, gaster, face, stigma, disc, metapleural triangle

**chaotic character systems:**

e.g., propodeal ridges, pronotal ridges, glands, occipital carinae, cuticular patches, male and female genitalia, thoracic musculature

# How are we using the HAO?

# 1. Text Mark-up

- quality control
- provide definitions

# proofing tool

http://hymglossary.tamu.edu/

Proof text

lower face uniformly brown, setose medially, sparsely setose laterally. torulus at midline of eye. area between toruli without carina but raised as smooth, convex area. eye 0.4 times head height. epistomal declivity of clypeus short, diverging slightly. gena nitid, denudate. malar space 0.67 times eye height. clypeal process evenly round, not pinched in appearance. vertex defined by slight, irregular surface [828 1614] sculpture. scape and pedicel [541 1470] light brown to yellow. flagellomere evenly brown. mandible light brown, with 3 reddish teeth on anterior face [828 1614] (4 teeth total).

```
Lower face uniformly brown, setose medially, sparsely setose
laterally. Torulus at midline of eye. Area between toruli
without carina but raised as smooth, convex area. Eye 0.4
times head height. Epistomal declivity of clypeus short,
diverging slightly. Gena nitid, denudate. Malar space 0.67
times eye height. Clypeal process evenly round, not pinched
in appearance. Vertex defined by slight, irregular surface
sculpture. Scape and pedicel light brown to yellow.
Flagellomere evenly brown. Mandible light brown, with 3
reddish teeth on anterior face (4 teeth total).
```

Submit

## How to proof:

Paste your text into the text box and click submit. Your text will be returned with matches highlighted and linked back to the hymglossary.

## Proofing caveats:

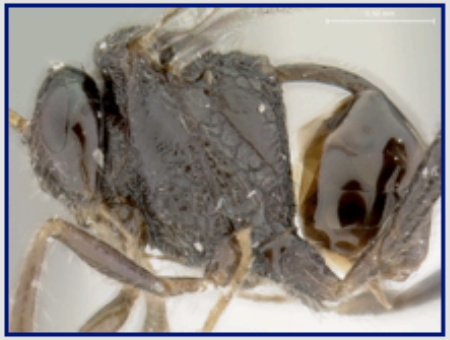
There is a 1000 word limit. Matching is only as good as the present algorithm, which is passable. If you suspect a word should match try it individualy from the main page. At present only single and paired words in the text will be matched against. *Fixed a error where truncated text was not linked. This function is in development, feedback is welcome.*

History
Species of *Alobevania* (*at the start*)

http://evanioidea.info

legs and soma covered in long setae; mesosoma roughly rectangular in lateral view and strongly sculptured; 1st subdiscal cell [3970 1211] enclosed by tubular veins; petiole 6 times longer than wide, evenly wide from anterior end to posterior end; collected in southeastern Brazil

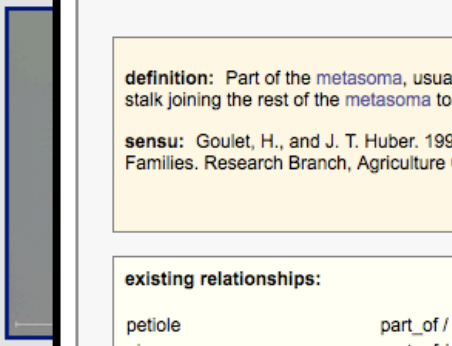
*Alobevania longisaeta*



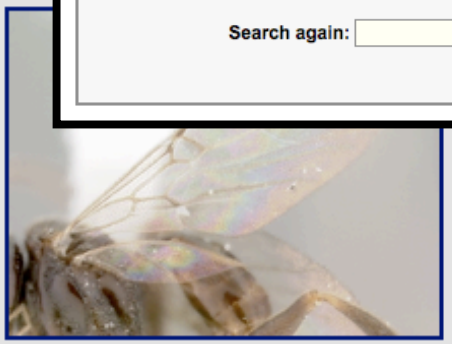
1. long setae on hind leg

2. 1st subdiscal cell closed

legs and soma covered in short setae; mesosoma roughly romboid in lateral view and variably sculptured (usually with many nitid areas); petiole 3-5 times longer than wide, gradually wider posteriorly; 1st subdiscal cell [3970 1211] open;



1. leg



2. 1st subdiscal cell open

Results from the Glossary

**petiole**

id: 509

**definition:** Part of the metasoma, usually metasomal segment 1; the usually narrow, parallel-sided stalk joining the rest of the metasoma to the propodeum

**sensu:** Goulet, H., and J. T. Huber. 1993. Hymenoptera of the World: An Identification Guide to Families. Research Branch, Agriculture Canada Publication 1894/E., Ottawa, ON 668 pp..

search morphbank

**existing relationships:**

| | | |
|---|---|---|
| petiole | part_of / | metasoma |
| glymma | part_of / | petiole |

**Search again:** Show

future couplets

Soma relatively large, ~3 mm from h... ... ***Alobevania tavaresi***

Soma relatively small, ~2 mm from h... ... ***Alobevania gattiae***

go

# Evanioidea Online

catalog of information about evanioid wasps

**explore:**

- taxa
- keys
- bibliography
- repositories
- references
- search
- about
- home

***Alobevania gattiae***

**head** markup

lower face uniformly brown [Morphbank]. torulus slightly dorsal [Morphbank] to midline of eye. No carina present between toruli; area of the frons dorsal to toruli slightly convex. eye 0.75 times head height. epistomal declivity of clypeus divergent. gena nitid [Morphbank], always uniformly brown. malar space punctulate [Morphbank], setose, 0.4 times eye height. Middle third of clypeus expanded ventrally as even, semicircular process [Morphbank]. vertex defined by slight, irregular sculpture. scape and pedicel [541 1470] brown but usually lighter than flagellum. flagellomeres 1-7 yellow to brown; flagellomeres 8-11 dark brown. mandible light brown-yellow medially, reddish on dorsal and ventral margins, with 4 reddish teeth on anterior face [828 1614] of mandible (5 teeth total).

1. female head

2. male head

Web-accessible taxon descriptions

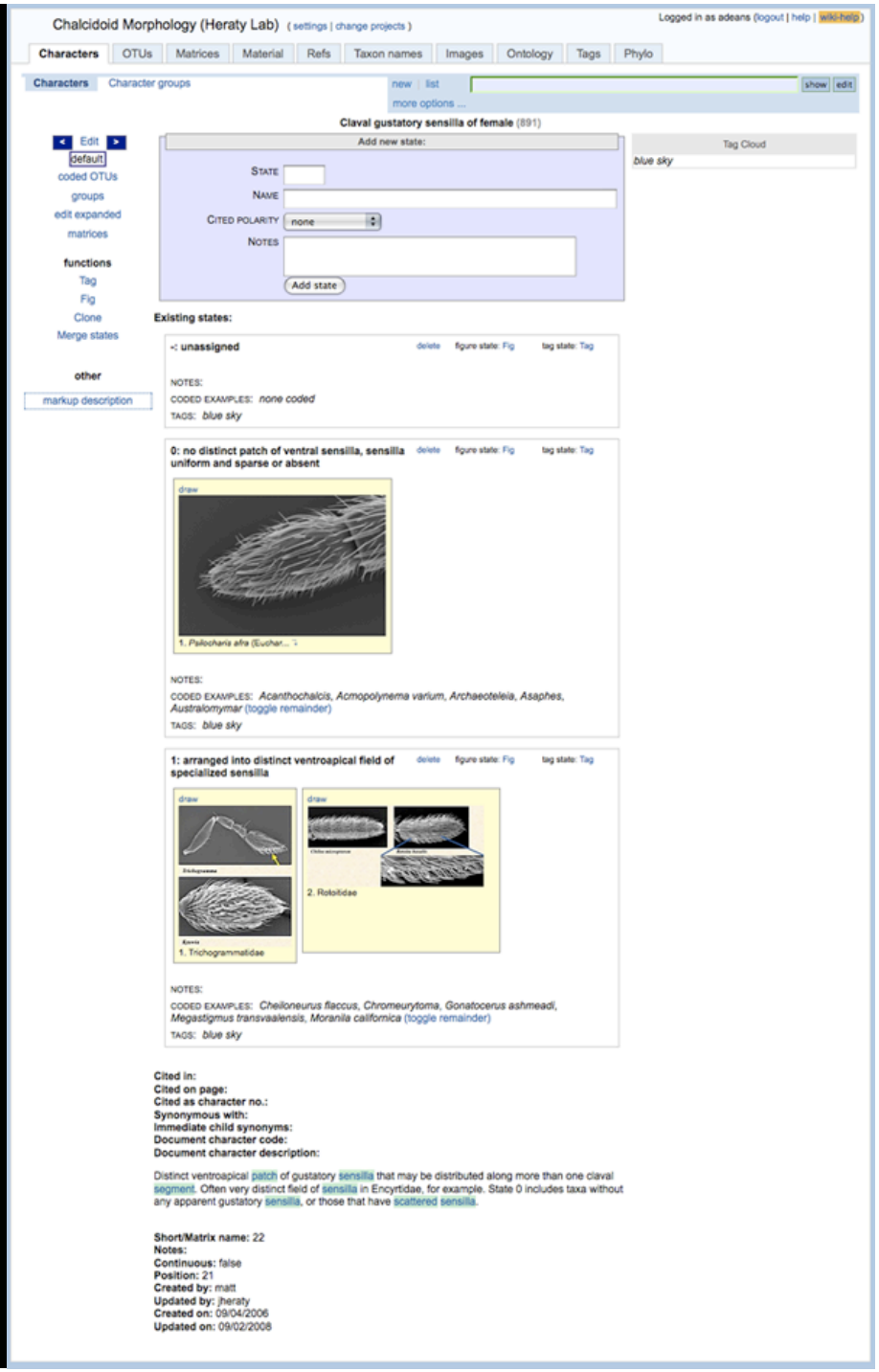
- high-lighting for definitions
- and feedback

## Characters

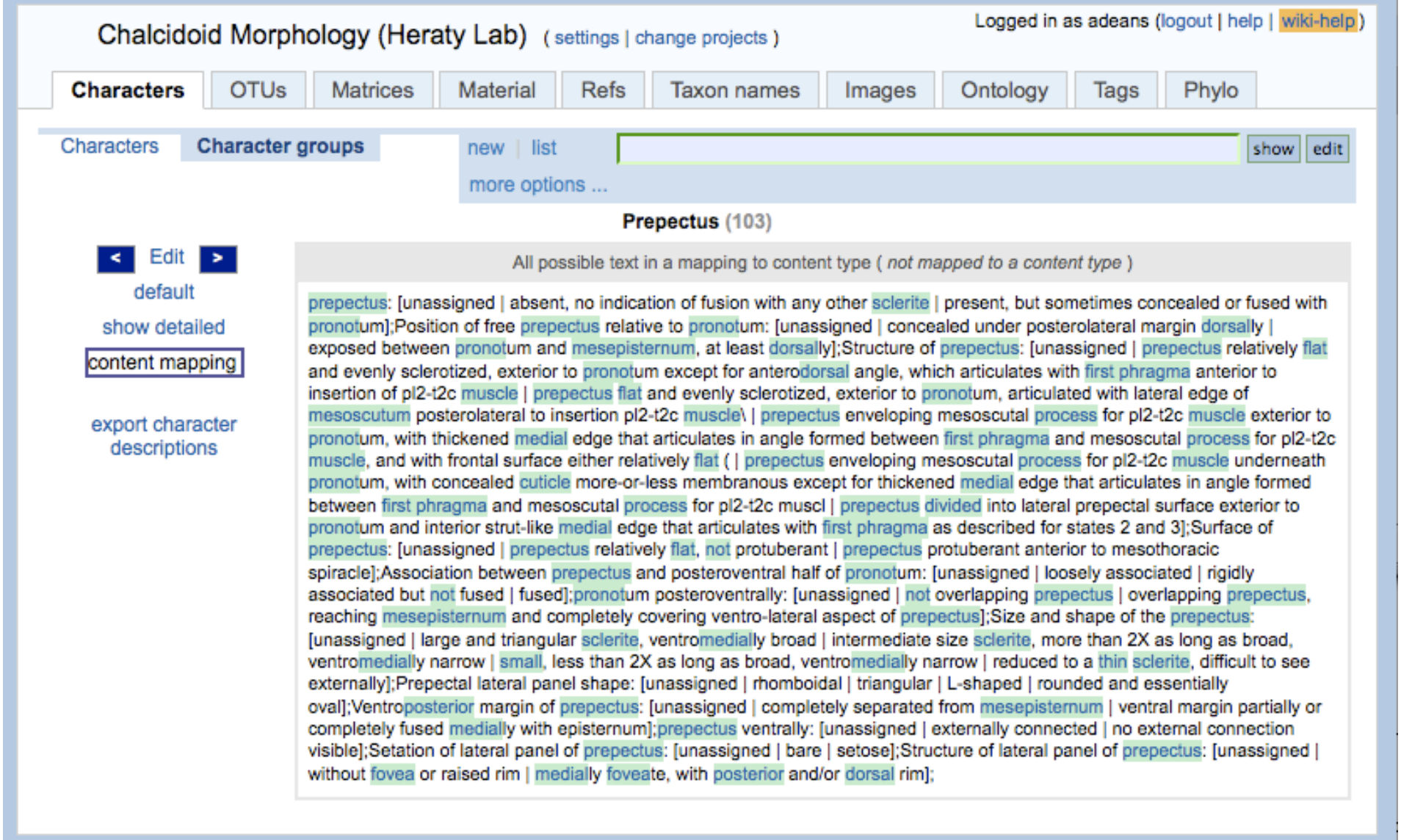
- centralized glossary
- collaborative editing
- feedback
- clarification

planning to implement in

Morphbank

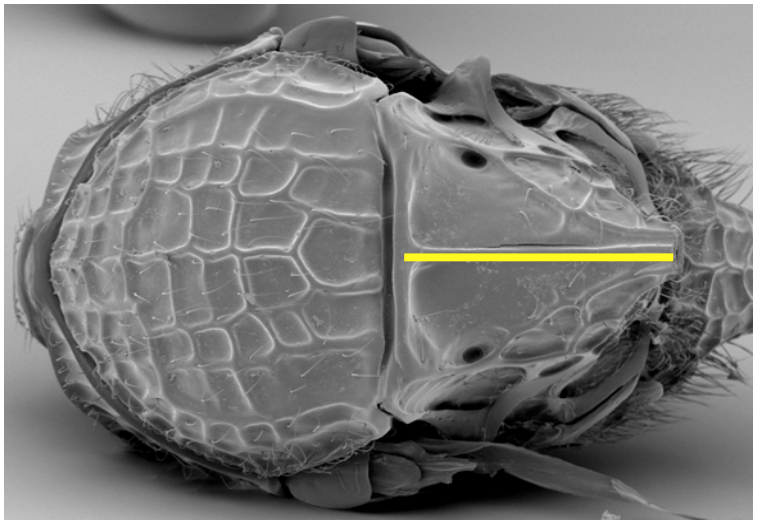


# all characters involving the “prepectus”



# 1. Text Mark-up

- quality control
- provide definitions
- in concert with other ontologies (future)

distance from the carina posterior to the mesoscutellum to the process dorsal to the propodeal foramen = 0.11 mm

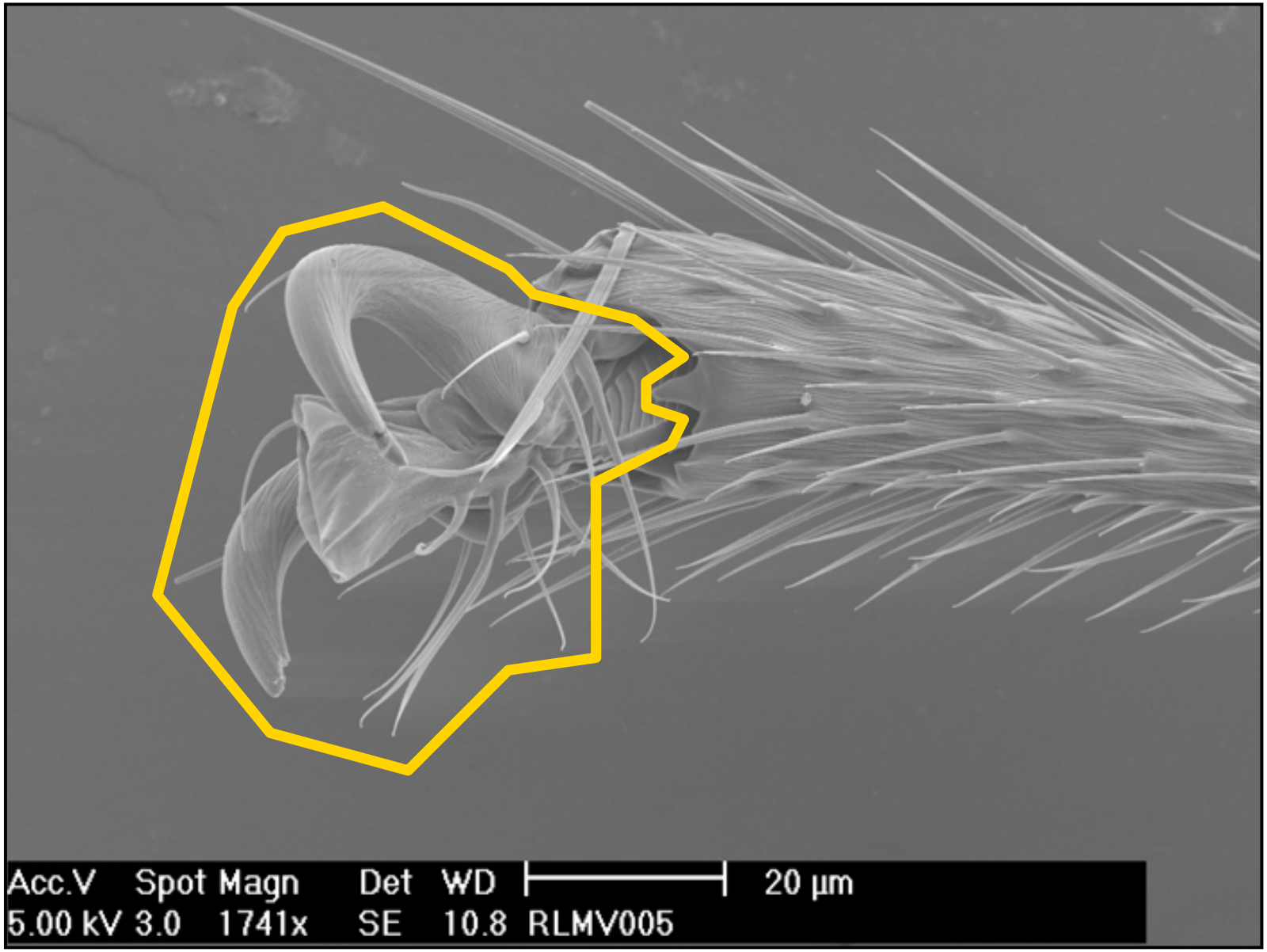
**PATO**
**spatial**
**HAO**
**units of measurement**

(PATO:0000040) (HO:00001088) (BSPO:0000099) (HO:00000622) (HO:00001075) (BSPO:0000098) (HO:00001074) (UO:0000016)

# 2. Search Algorithm

(future)

- exploit the logic for efficient queries
- diagnostic tools


Acc.V Spot Magn Det WD 20 µm
5.00 kV 3.0 1741x SE 10.8 RLMV005

Search for -

“claw”

“pretarsus”

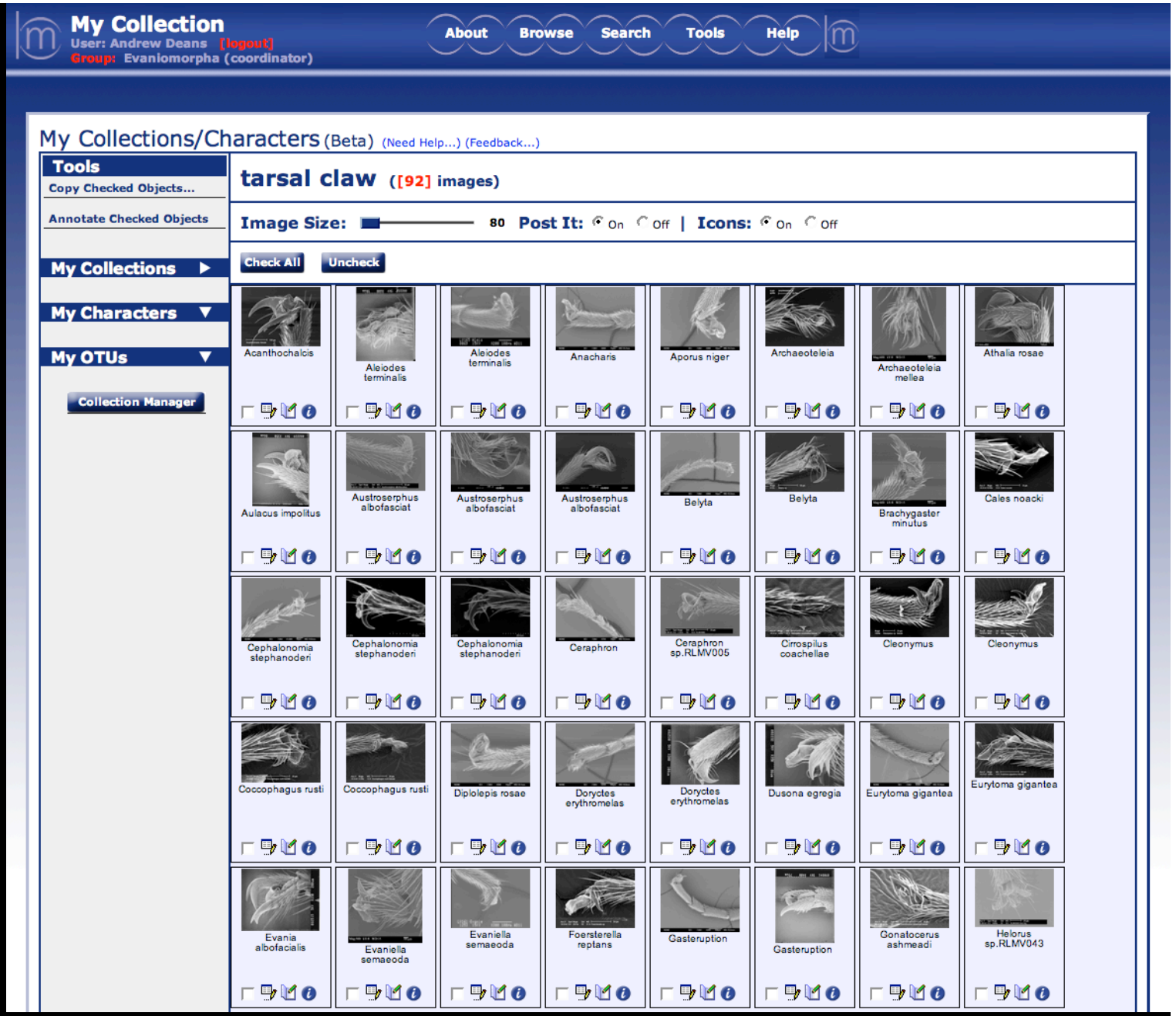
“orbicula”

“arolium”

“manubrium”

“ungues”

“unguis”

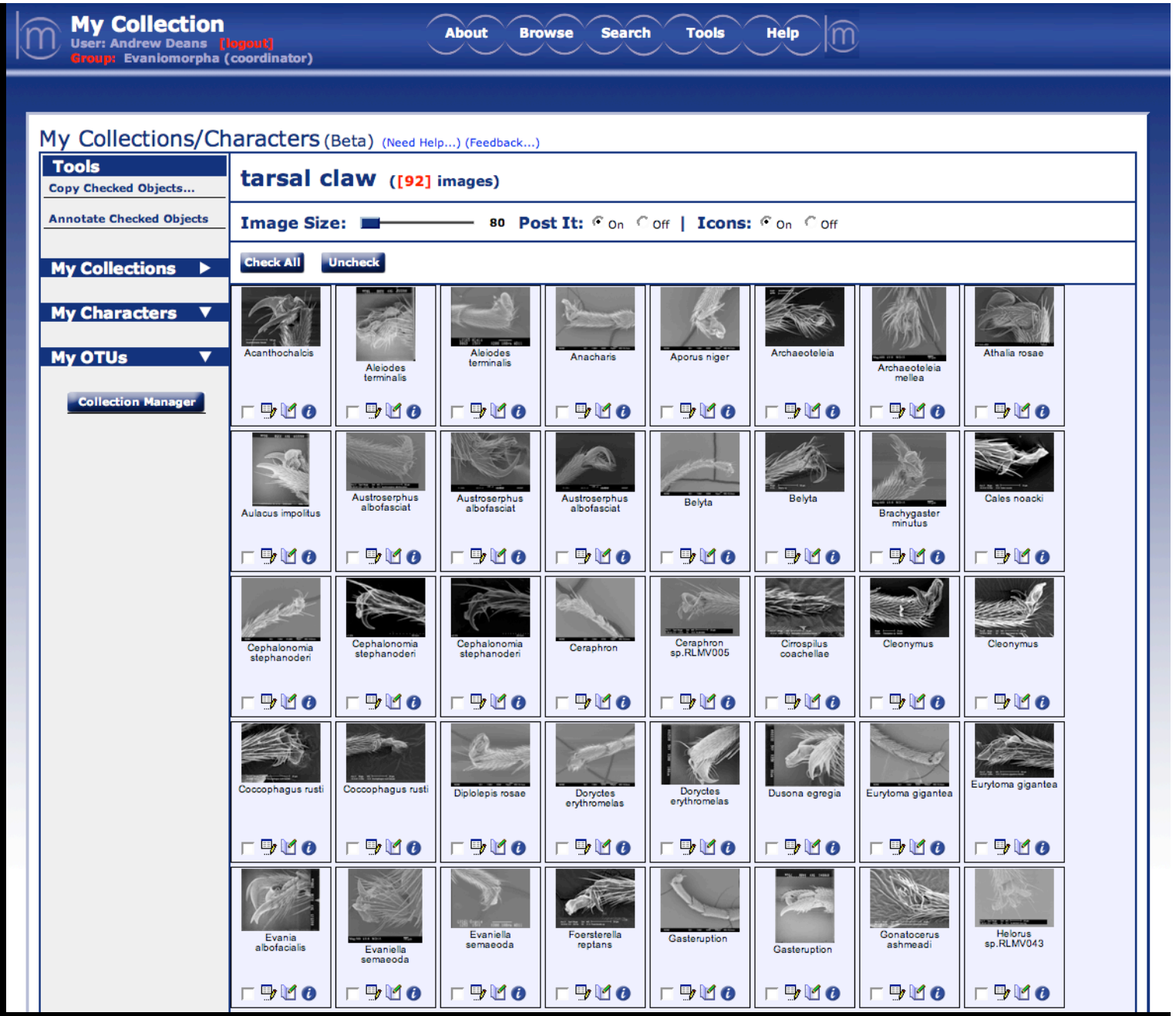


Morphbank

OR

“pretarsus”

[√]
include related terms



Chalcidoid Morphology (Heraty Lab) ( settings | change projects )

Logged in as adeans (logout | help | wiki-help)

Characters | OTUs | **Matrices** | Material | Refs | Taxon names | Images | Ontology | Tags | Phylo

new | list | show | edit

more options ...

**02. Antennae, general**(70)

< Edit >

default
OTUs
characters
grid coding
grid tags
sort characters
sort OTUs
show trees
one-click coding

**output**
nexus
tnt
export character descriptions

**save as file**
tnt

**One click coding (by OTU):**

*Cirrospilus coachellae* (matrix name: Cirrospilus_coachellae) id: 6377

*for*

Flagellomere one sensilla id: 873

-: unassigned
0: without multiporous plate sensilla (MPS)
1: with MPS

include a tag with this coding toggle form

destroy existing codings skip

character description

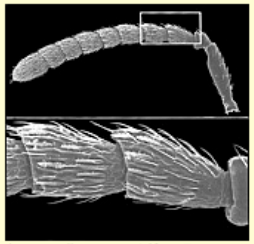
Code as unassigned if F1 is fused with the next segment. Outgroups may or may not have MPS on the true basal flagellomere. In *Aylax* (Cynipidae) MPS are found on the elongate basal flagellomere.

green background - state is already coded, clicking toggles off!

state details and cell tagging

**-: unassigned**

draw



1. no anellus present *Ka...*

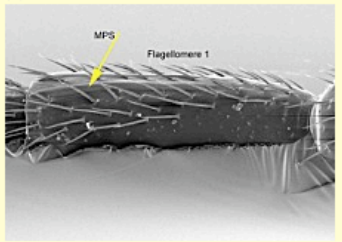
***0: without multiporous plate sensilla (MPS)***

draw


1.

***1: with MPS***

draw




1. *Cynipidae F1 Aylax*

# >115,000 taxon descriptions


Which taxa have mesoscutellum orange?

Which taxa have tarsal claw pectinate?

Which taxa have fore wing M+CU absent?

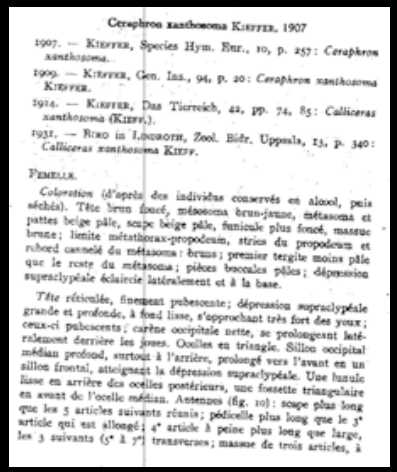
MÉGASPILIDES PARASITES DES SYRPHIDES 411

peut attribuer ce spécimen à *Trichosteresis fuersteri* KIEFFER (à supposer qu'un moment où il avait le matériel de MARSHALL sous les yeux, il ait déjà étudié celui où pour la seule et unique fois il a vu ces traits); comme il a bien noté des carènes métasomatiques basales, il ne peut s'agir non plus de *Trichosteresis egregia* (BOUCHÉ), ni de *Trichosteresis flavicularis* KIEFFER, qu'il a mal observés sur ce point particulier. KIEFFER se faisait sans doute une idée exagérée de ce que THOMSON a décrit comme un radius « épaissi » : il ne peut donc s'agir de *Trichosteresis radialis* (THOMSON), qui n'a d'ailleurs pas les pattes entièrement jaunes, pas plus que *Trichosteresis tortricum* (RATZEBURG) : voici encore deux espèces à éliminer. Il ne restait vraiment plus qu'à en créer une nouvelle...

Les tibias antérieurs (habituellement clairs) de l'holotype font défaut; peut-être en était-il déjà ainsi lors de l'examen par J.-J. KIEFFER : en tout cas, tous les fémurs et les tibias postérieurs sont assombris; le grand axe de l'œil mesure 480 μ, la distance œil-torulus, 165 μ, la distance œil-base de la mandibule, 200 μ; ces deux dernières valeurs représentent 38,8 % et 46,5 % de la première; chez l'exemplaire redécrit plus loin, on a respectivement 42,6 % et 46,6 % ; c'est une similitude plus qu'excellente. Signalons pour mémoire la carène interantennaire composée de deux traits incomplets dirigés vers le bas, et non rejoignant le bord antérieur du clypéus.



FIG. 12. *Trichosteresis globra* (BOUCHÉ, 1832). — Reproduction photographique de la figure de *Trichosteresis nimonigni* YASUMATSU, 1962, (YASUMATSU, 1962, pl. 2). La base des ailes antérieures est anormalement tombée.



**Ceraphron xanthosoma** KIEFFER, 1907

1907. — KIEFFER, Species Hym. Eur., 10, p. 257 : *Ceraphron xanthosoma*.

1909. — KIEFFER, Gen. Ins., 94, p. 20 : *Ceraphron xanthosoma* KIEFFER.

1914. — KIEFFER, Das Tierreich, 42, pp. 74, 85 : *Calliceras xanthosoma* (KIEFF.).

1931. — BIRO in LINDROTH, Zool. Bidr. Uppsala, 13, p. 340 : *Calliceras xanthosoma* KIEFF.

FEMELLE.

*Coloration* (d'après des individus conservés en alcool, puis séchés). Tête brun foncé, mésosoma brun-jaune, métasoma et pattes beige pâle, scape beige pâle, funicule plus foncé, massue brune; limite métathorax-propodeum, stries du propodeum et rebord cannelé du métasoma : brun; premier tergite moins pâle que le reste du métasoma; pièces buccales pâles; dépression supraclypéale éclaircie latéralement et à la base.

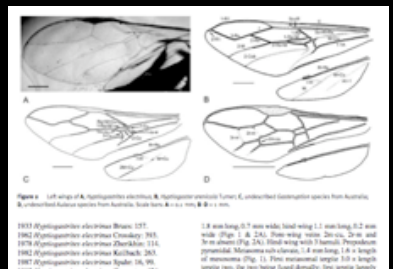
*Tête* réticulée, finement pubescente; dépression supraclypéale grande et profonde, à fond lisse, s'approchant très fort des yeux; ceux-ci pubescents; carène occipitale nette, se prolongeant latéralement derrière les joues. Ocelles en triangle. Sillon occipital médian profond, surtout à l'arrière, prolongé vers l'avant en un sillon frontal, atteignant la dépression supraclypéale. Une fusule lisse en arrière des ocelles postérieurs, une fossette triangulaire en avant de l'ocelle médian. Antennes (fig. 10) : scape plus long que les 5 articles suivants réunis; pédicelle plus long que le 3e article qui est allongé; 4e article à peine plus long que large, les 3 suivants (5e à 7e) transverses; massue de trois articles, à

**Aloheremia Kawada & Deans, n. gen.**
(Figs. 2–16)

**Type species:** *Aloheremia gattiae* Kawada & Deans, n. sp.

**Head:** [Morphbank] Flat in lateral view. Face punctate and sparsely setose. Eye elliptical. Clypeus flat, protruding medially. Epistomal declivity of clypeus usually divergent, arched and short. Gena nitid. Mandible with 4–5 teeth, with 3–4 visible on anterior face of mandible. Area surrounding antennal socket (torulus) slightly raised but not shelf-like. Antenna inserted at or above midline of eye and covered with short setae. Scape long (equal or greater than half eye height). Pedicel usually longer than wide. Flagellum subdivided into 11 meres and articulated with pedicel above the mesosoma. Flagellomeres each longer than wide, widening progressively (female) or evenly wide (male) towards apex of the flagellum. First flagellomere shorter than remaining flagellomeres. Apical flagellomere longest. Subocular groove absent. Frons usually nitid and with few or no setae. Molar space at least 1.5 times greater than basal mandibular width. Gena wide, nitid (female) to punctate (male), and setose. Mandible with 4 teeth on anterior face and a fifth tooth posteroventrally (usually hidden in anterior view). Labial palp short, subdivided into 4 palpomeres. Maxillary palp long, subdivided into 5 palpomeres. Occipital carina present as fine ridge and complete dorsally.

**Mesosoma:** [Morphbank] Higher than long, taller than head, rounded, and usually inconspicuously punctate or nitid dorsally, slightly areolate ventrally. Pronotum obscure medially when viewed dorsally, but with thin shelf that expands laterally, usually with fine, irregular rugae laterally. Mesoscutum raised medially, convex, sitting over the pronotal shelf; lateral carina complete from anterior to posterior margin. Notaulus complete, widening posteriorly, convergent and joined at scutellar groove; parapsidal furrow inconspicuous as a fine line. Scutellar groove scrobiculate laterally. Metanotum scrobiculate, partially covered by scutellum anteriorly. Mesopleuron higher than wide, concave medially (where mid leg femur rests when pharate); anteroderaulus present; scrobiculate; anteriorly nitid; posteriorly with an even scrobiculate line; anteroventral margin finely scrobiculate; usually mostly nitid ventrally. Episternal carina complete. Metapleuron usually with inconspicuous sculpture, mostly areolate, usually nitid ventrally. Mesosternal processes (articulation points with mid coxae) long, conjoined by a carina, and separated from each other by the length of one process. Metasternum with irregular carina raised medially. Metasternal processes (articulation points with hind coxae) long, conjoined by a carina, and separated from each other by half their length. Propodeum short, less than half the length of petiole, not raised to metasternum, dorsally areolate to rugulose; laterally nitid; propodeal area ventral



**Dworaniia striatigena** (Kieffer, 1910)
(Figs.98–104)

*Hyptia striatigena* Kieffer, 1910: 71–72; Kieffer, 1912: 14; Hedicke, 1939: 44; Deans, 2005: 25, 122.
*Dworaniia striatigena* Deans & Huben, 2003: 870; Deans, 2005: 25, 122.

**MALE. Redescription:** Head punctate (Fig. 98). Mandible with two apical teeth. Eye large, elliptical, HL 1.80 x WE (Fig. 99). Malar space striate (Fig. 98). Face above of clypeus with reduced protuberance (Fig. 99). Gena flat in frontal view, narrow in lateral view, WG 0.50 x WTO, genal carina complete (Fig. 99). Lateral of vertex angularly convex in frontal view (Fig. 98). Ocellus large, DAO 1.00 x WTO; ocellar triangle not raised in frontal view (Fig. 98). Anterior ocellus not aligned in dorsal view of head. Clypeus pinched (Fig. 98). Occipital area wide (Fig. 99). Subocellar groove with conspicuous carina (Fig. 98). Toruli polished around them (Fig. 99). Antenna inserted at above level of midline of eye (Fig. 98). Antennal segments evenly wide; pubescence subappressed, without some setae outstanding; scape short, scape LS 0.76 x HL; flagellomere I long, LF 1.80 x LP (Fig. 102).

**Mesosoma:** Thorax inspiratute dorsally, strongly raised (Fig. 104). Pronotum with conspicuous fovea in anterior corner. Mesonotum aligned (Fig. 104). Mesoscutum wide, anterior depression with short scrobiculate, lateral carina complete; notaulus with circular punctures, straight (Fig. 103). Lateral scutellar regions umbilicated; posterior region of scutellum convex in profile (Fig. 104). Median region of scutellar groove with large fovea. Metanotum inconspicuous medially. Propodeum deeply areolate; posterior region flat in profile; small ridge posterolateral of insertion of petiole large (Fig. 104). Mesepimeron strongly scrobiculate. Mesepisternum narrow; anterior region wholly areolate; posterior margin irregularly areolate; upper region evenly areolate; lower region foveolate, lower region with few foveae, anterior area of lower region with fovea evenly sparse; central region concave (Fig. 100). Metapleuron areolate-umbilicate; mesepimeron bulging. Distal region of metafemur not dilated. Tarsal claw with two teeth. Basitarsal projection of hind leg long; with sharp apex. Basal cell setose. Stigmal vein wide, WST 0.18 x LST, apex of posterior margin convex (Fig. 101). 1R1 vein indented distally. Stigmal + 1R1 long (Fig. 101). Stigmal + 1R1 LST 6.60 x WTO. Set of M+CU, 1CUa, 1CUb and 2CU veins sinuous.

**Metasoma:** Petiole long, polished dorsally. LPE 0.91 x LST.

**Material examined.** HOLOTYPE. Male. '**BOLIVIA**. Magici, Staudinger V.' (ZMHU).

**Comments.** *D. striatigena* differs from the others species by having the head narrow in profile; eye elliptical; surface of face with a weak longitudinal median depression; flagellomere I long; stigmal vein wide and 1R1 vein expanded and reclined distally (Fig. 101).

**Distribution.** Bolivia.

**3. - Evania müggenburgi** ENDERLEIN.

*Evania müggenburgi* ENDERLEIN, Arch. Naturg., LXVII, 1901, p. 188, ♂; KIEFFER, TIETZ., XXX, 1912, pp. 66, 89.

*Dispersion* : CAMEROUN; CONGO BELGE : Wombali, Bas Congo (IX. VII. 1913, R. P. VANDEUSEN); Stanleyville (IV. 1928, VIII. 1929, A. COLLART).

*Observations* : Les spécimens originaires de Wombali ont les antennes rouge testacé, sauf le scape et une enfumure des articles apicaux qui s'étend sur la face supérieure presque jusqu'à la base du flagellum; pattes I et II roussâtre testacé depuis l'extrême apex des fémurs. Ceux de Stanleyville ont le scape et la partie inférieure des trois articles suivants rouge testacé, pattes I et II roussâtre testacé entièrement, sauf les hanches, tarses plus sombres.

**4. - Evania platycephala** n. sp.

♂ : Noir; pattes I depuis l'apex des fémurs, rouge testacé foncé; tarses II, brunâtres; antennes brun rouille, distalement noirâtres (4 articles apicaux); ailes hyalines, à fortes soies sombres; stigma rouge brunâtre dans la partie proximale, marqué d'une petite fenêtre contre la costale, ailleurs brun rougeâtre foncé, nervures comme le stigma, nervures discales un peu plus claires.

♂ : *Tête* : Face plus longue que large, transversalement striée-ponctuée, à stries arquées vers la partie inférieure, réduites à des stries latéralement, ponctuation petite et assez superficielle; rebord frontal assez faible, prolongé sur la face par une carène longitudinale médiane; mandibules bidentées; espace ocello-malaire égal au tiers de la longueur des yeux, striolé-ponctué comme la face, sans suture apparente; yeux à peine plus de 2 fois plus longs que larges, placés plus largement sur la face antérieure que sur la face latérale de la tête (fig. 3) ; vertex à stries semi-concentriques et quelques petits pointillés bien distincts; fosse antennaire divisée par une petite carène non lamelliforme, qui ne s'étend pas sur le vertex; ocelle antérieur dépassant l'alignement des ocelles postérieurs d'environ la moitié de son diamètre; espace ocello-ocellaire 1,5 fois plus court que la distance entre les ocelles postérieurs; tempes brillantes, lisses, sauf quelques très petits pointillés épars; antennes filiformes, plus longues que le corps; scapes un peu plus longs que l'article III, celui-ci environ 4 fois plus long que large, les suivants subégaux, un peu moins longs à partir du VIII, le XIII environ 4,5 fois plus long que large.

*Thorax* : Thorax plus épais que long; pronotum bien visible du dessus, sauf au milieu, largement arrondi latéralement, à bord antérieur faiblement arrondi, sans carène; propleures petitement ponctués en stries; mésonotum plus long que le scutellum, à petite ponctuation

# 3. Auto-scoring characters

(future)

- exploit the logic to score morphology

## Plenty more to discuss...

- how to treat plural/adjectives/etc. (tags)
- how to recruit more contributors
- interaction with other ontology projects
  - shunt terms to other ontologies
- foreign languages (Kopf *exact_synonym* head)
- mapping to DGAO (benefit from *Drosophila*)
  - submitting new terms/relationships/comments
- versioning, security
- expand our array of relationships?