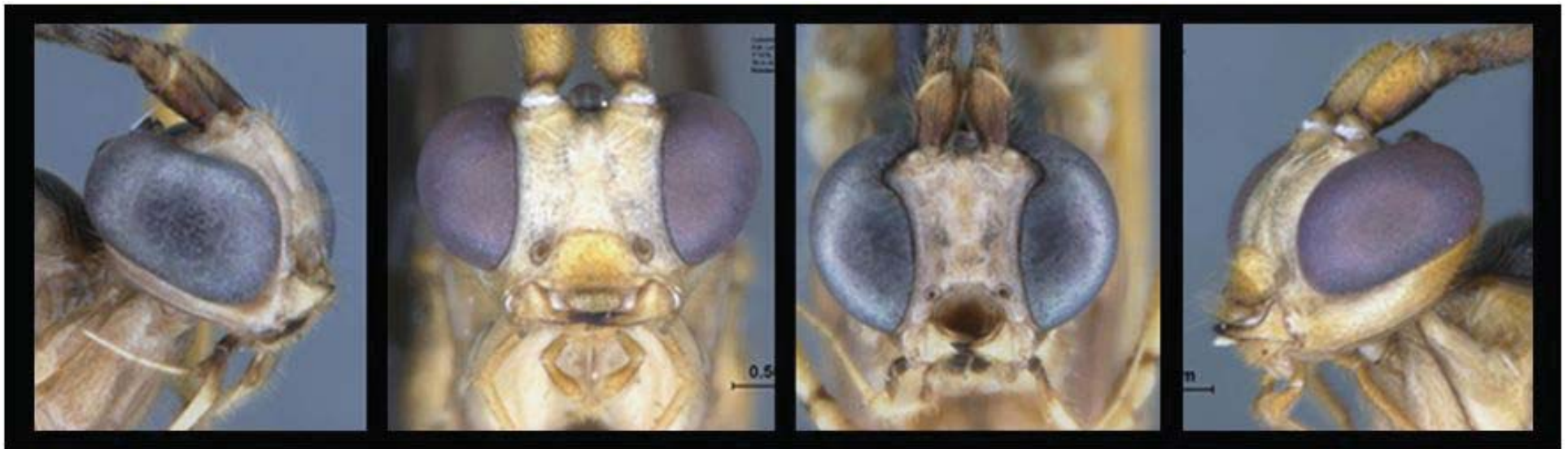




Biodiversity for Everyone: Perspectives on Accessibility



Barb Sharanowski
Department of Entomology





Biodiversity information

- Who benefits?
 - Who should benefit?
- Who is taxonomy for?
 - Who should it be for?



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Forensic Science International 179 (2008) 219–240

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Forensic
Science
International

www.elsevier.com/locate/forensiint

Insect succession and decomposition patterns on shaded and sunlit carrion in Saskatchewan in three different seasons

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Biodiversity Informatics

- the application of IT tools and technology to biodiversity information
 - Taxonomy →
 - Identification
 - Biogeography
 - Ecology
 - Phylogeny
 - Paleontology
 - Molecular Biology
 - Climate
 - Habitat
- “provides a skeleton for generalized scientific information infrastructure in biology” Berendsohn (2001)



✱ADAM.



Scientific names for information management



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Yu *et al.*, (2005)

axapad 2006 [Master version] C:\Users\barb\Desktop\Taxapad

ICHNEUMONOIDEA

GENUS (V37501)

Local taxonomic index - Ichneumonoidea

helcon

Helconini *Helcon* Nees, 1812

Taxonomy Biology Morphology Distribution

IDENTIFIER
Helcon Nees 1812[];

TYPE
Helcon tardator;

TAXONOMY
catalogue; description;
description in a key [Canada, Caucasus, China-Taiwan, Europe, Japan, Russian Far East, U.S.S.R.];
genetics;
key to species [Caucasus, Europe, Japan, North America, Oriental, Palearctic, Russian Far East, U.S.S.R.];
key to subgenera [Japan]; original description; phylogenetics;

HIGHER GROUP
Braconidae; Helconidae; Helconinae; Helconini;

SYNONYM HISTORY
Coelostephanus; *Edytia*; *Gymnoscelus*; *Helconidea*; *Wroughtonia*;

Local taxonomic index - Ichneumonoidea

helcon	Nees, 1812
Helcon abbreviator	Schiodte, 1839
Helcon adulterator	Villers, 1789
Helcon aequator	Nees, 1812
Helcon aino	Watanabe, 1931
Helcon albitarsis	Cresson, 1873
Helcon albiterebra	Watanabe, 1931
Helcon albus	Chou & Hsu, 1998
Helcon ambiguus	Nees, 1816
Helcon americanus	Cresson, 1873
Helcon angustator	Nees, 1812
Helcon annulicornis	Cameron, 1905
Helcon annulicornis	Nees, 1834
Helcon anuphrievi	Tobias, 1967
Helcon armator	Marshall, 1898
Helcon australianus	Kokujev, 1901
Helcon borealis	Cresson, 1873
Helcon borealis	Thomson, 1892
Helcon carinator	Nees, 1812
Helcon carinatus	Nees, 1816
Helcon castaneae	Viereck, 1912
Helcon caudatus	Nees, 1816
Helcon chlorophthalmus	Spinola, 1808
Helcon claviventris	Wesmael, 1835
Helcon clerodendroni	Sharma, 1984
Helcon collaris	Spinola, 1808
Helcon cornutus	Cameron, 1886
Helcon coxalis	Nees, 1834
Helcon cylindricus	Wesmael, 1835
Helcon dentator	Fabricius, 1804
Helcon dentator	Nees, 1812
Helcon dentipes	Brullé, 1846
Helcon distensor	Thunberg, 1822
Helcon fasciatus	Nees, 1816
Helcon femoralis	Thomson, 1892

Valid Name : *Helcon* Nees, 1812

Helcon Nees, 1812 selected



HYMENOPTERA ONLINE DATABASE

The order Hymenoptera contains some 115,000 species and literally millions of specimens in collections around the world. Some parts of this database have extensive information available (e.g., [Proctotrupoidea](#), [Platygastridae](#), [Ceraphronoidea](#), [Apoidea](#)), even to the level of specimens (see [Platygastridae](#), [Pelecinidae](#), [Monomachidae](#), [Stephanidae](#)). These data have been gathered with the collaboration of a number of colleagues. Other taxa still need work. If you would like to contribute to the further development and enhancement of this resource, please contact [Norman F. Johnson](#) or [Luciana Musetti](#). For technical assistance related to Hymenoptera Online services, please contact [Joe Cora](#).

Search for taxa, collections, authors, collectors and specimens by typing your simple query in the text box below. Taxon name searches are case-sensitive and a wildcard (%) will automatically be appended to the end of your query (e.g. [Telenomus](#)); the same applies to collectors and authors (e.g. [Johnson](#)), collections (e.g. [CNC](#)), places (e.g. [Bahia](#)), journals (e.g. [Memoirs](#)), and specimen searches by specimen ID (e.g. [ANIC DB 32](#)).


If you would like to see a list of new features, recent changes and recent additions to OSUC online resources, visit the [updates page](#). Visit the [collection page](#) for the C.A. Triplehorn Insect Collection at the Ohio State University for information on its primary and secondary type holdings as well as databased taxa in the collection.

Search: 

Hierarchy: [Hymenoptera](#)

General Information


Order: **Hymenoptera**
Author:
Status: **Valid, Original name/combination**
Rank: **Order**

Generate taxon checklist: 

Valid Subordinate Taxa

Family: **115**
Subfamily: **355**
Genus: **7,731**
Species: **116,836**
Subspecies: **5,839**

Specimens: **224,321**

Included Taxa (61)  show invalid: show fossils: show specimen count:

Collections (202)

Map (58) show all specimens: [view large map](#) [export map data](#)

Literature (3) show synonyms: show all annotations:

Types (0) show all types:

Associations (2251) [show options](#)

Habitat (1712)

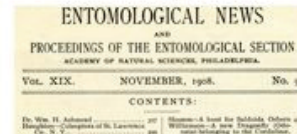


Evanioidea Online

catalog of information about evanioid wasps

explore:

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



Introduction

Evanioidea includes three families with disparate biologies: Evaniidae (ensign or hatchet wasps), Aulacidae, and Gasteruptiidae. Evaniids develop as solitary egg predators within the egg cases (oothecae) of cockroaches (Dyctioptera: Blattaria), aulacids are parasitoids of woodboring sawflies and beetles, and gasteruptiids are predator-inquilines within the nests of solitary bees and wasps. Despite numerous fascinating biological attributes these insects have largely been neglected by the entomological community - until recently. Many problems regarding evanioid classification (especially species-level taxonomy) remain unresolved, however, and it is our hope that this catalog of information stimulates an interest in pursuing species-level revision and other research (e.g., ootheca rearing, ecological studies, and biodiversity projects). The catalog is complete for Evaniidae and Aulacidae. Gasteruptiidae is currently being cataloged (to be added soon) and many "Evanioidea *incertae sedis*" fossils are still missing.

How to Use

• [Browse](#) - Clicking the links above will allow you to browse alphabetical and chronological lists of authors, references, taxa. You can also browse the



antbase.org

Taxon search

[Help](#)

Author search

[Help](#)



Home / Databases /

● Distribution Database

Hymenoptera Name Server	<h3>Search for Ant Taxa by Country or Region</h3> <p>This database allows to retrieve lists of species of any country in the world. The list contains at the moment records of type specimen, plus select specimen databases so far integrated.</p> <p>Select the name of a country from the following list and press the submit button.</p> <div style="border: 1px solid gray; padding: 5px; display: inline-block;"> Afghanistan Africa Albania Algeria America Meridionali Andorra Angola Antigua Antilles Argentina </div> <input type="button" value="Submit"/> <input type="button" value="Clear"/>
Primary Taxonomic Publications	
Hymenoptera Online Database	
Ground Living Ants Database	
Distribution Database	
Directory of World's Ants Taxonomists	
ITIS	
FORMIS Bibliography	
IUCN Red List of Ants	
Glossary	



antbase.net

Available Subfamilies

- Aenictinae
- Amblyoponinae
- Cerapachyinae
- Dolichoderinae
- Dorylinae
- Ectatomminae
- Formicinae
- Leptanillinae
- Myrmicinae
- Ponerinae
- Proceratiinae
- Pseudomyrmecinae



Available Regions

- Australis
- Neotropis
- Orientalis
- Palaearktis

Ants of Southeast Asia:

- Home
- Ecology
- Identification Keys
- Aenictinae
- Amblyoponinae
- Cerapachyinae
- Dolichoderinae

Update/Set up your homepage at www.antbase.net

Many researchers have provided a [homepage](#) to www.antbase.net. Now as we have moved we have recognized that much of the information is outdated. Two of us have already updated their data ([Tom Fayle](#) and [Martin Pfeiffer](#)), the other's are asked to do so, too. Those who want to take the chance to set up a homepage or update their stuff are kindly asked to contact the webmaster: [Dr. Martin Pfeiffer](#). The quickest way to setup a new page is to download our [questionnaire](#) and return it to us (don't forget photos), but you may send any html file and we try to load it up. Welcome!

New: AntBase.Net has moved to Mongolia

Some of you may have been wondering why our website was a little bit delayed with its updates. NOW it is time to reveal one of the reasons: the editorial office of AntBase.Net has been moved from Ulm to the National University of Mongolia in Ulaanbaatar, where Martin Pfeiffer has become a Professor in the Department of

Newest links on antbase.net:

- Tom Fayle's homepage updated
- Martin Pfeiffer's homepage updated
- Elisabeth Kalko passed away in Africa
- AntCat: Barry Bolton's new ant catalog (ext)
- Ants from INDIA, provided by Dr. Himender Bharti!
- ASIAN MYRMECOLOGY has got its first Impact Factor ! CONGRATULATION!!
- New *Polyrhachis* species from the collection of Rudy Kohout!
- More pictures of Iranian Ants, collected by Omid Paknia
- New Identification Key for the philippine *Myrmoteras* ants
- New pictures of *Camponotus* ants from the collection of Seiki Yamane
- An introduction to a few of the 1500 species of ant that live in Borneo, with Carsten Brühl
- Army Ant week at Myrmecos - have a look Barry Bolton's latest Ant Catalogue



Hymenoptera Genome Database

[HYMENOPTERA HOME](#)

[BEEBASE](#)

[NASONIABASE](#)

[ANT GENOMES PORTAL](#)

[ABOUT US](#)

Welcome to HGD

Project Information

With over 115,000 described species, the order Hymenoptera comprises approximately 10% of the species diversity on Earth. The largest described family in the order, Icheumonidae, contains more species than all species of birds and mammals combined! This group of 'membrane-winged' insects includes sawflies, bees, ants and wasps, which directly affect human health and agriculture through diverse roles such as pollinators, pests and parasitoids.

The Hymenoptera Genome Database (HGD) is an informatics resource supporting genomics of insect species of this order. HGD provides access to the genomes of bees *Apis mellifera*, *Bombus terrestris* and *B. impatiens*, the parasitoid wasp *Nasonia vitripennis*, and six species of ants available through the [Ant Genomes Portal](#). It will soon incorporate genome databases for additional species of bees and ants. Combining these species into a single resource allows biologists to leverage the genome information, and enhances the value of genomic data for each species by facilitating cross-species comparisons.

Please cite the use of this database as: Hymenoptera Genome Database: integrated community resources for insect species of the order Hymenoptera. Munoz-Torres MC, Reese JT, Childers CP, Bennett AK, Sundaram JP, Childs KL, Anzola JM, Milshina N, Elsiek CG. *Nucleic Acids Research* (2011) 39(suppl 1): D658-D662 doi: 10.1093/nar/gkq1145

What's new in HGD?



Nasonia vitripennis. ©Oliver Niehuis

New Honey Bee Assembly!

Honey bee genome sequence improvement efforts implemented Next Generation Sequencing technologies to significantly increase sequence coverage of the *Apis mellifera* genome. As a result, Assembly Version 4.5 has been released. Please visit the BeeBase home page to learn more.

The Ants join HGD.

Many aspects of their natural history make ant genomes ideal systems to study questions about foraging, caste determination, evolution of social behavior and mutualism, among many others. Please check back to access genomic resources for these species as data for *Atta cephalotes*, *Camponotus floridanus*, *Harpegnathos saltator*, *Linepithema humile*, *Pogonomyrmex barbatus* and *Solenopsis incivta* become available. To read more about these projects, please visit the Ant Genomes Portal.



Biodiversity Informatics

- “The current challenge for biodiversity informatics lies in the creation of descriptive systems (and identification tools based on these), which are useful also for the non-specialist”
 - Berendsohn (2001)



Who is taxonomy for?

Taxonomists

- Language is overly specialized



Van Achterberg and Guerrero, 2003

2. Hind femur comparatively robust and dark brown (fig. 18); first discal cell of fore wing squarish (fig. 16); no crenulate groove between precoxal sulcus and episternal scrobe; occipital carina widely absent dorsally; hind coxa and pterostigma of ♀ dark brown; third and fourth antennal segments of ♀ yellowish-brown *P. gloriae* spec. nov.
- Hind femur comparatively slender and usually yellowish-brown (fig. 3); first discal cell of fore wing more transverse, much wider basally than distally (fig. 1); with a crenulate groove between precoxal sulcus and episternal scrobe; occipital carina less widely reduced dorsally, carina reaching level of stemmaticum (figs 11, 15); hind coxa and pterostigma of ♀ yellowish-brown; fourth, and usually third, antennal segment of ♀ dark brown or infuscate 3



Glossaries and Ontologies

N

1. **nebulous vein**

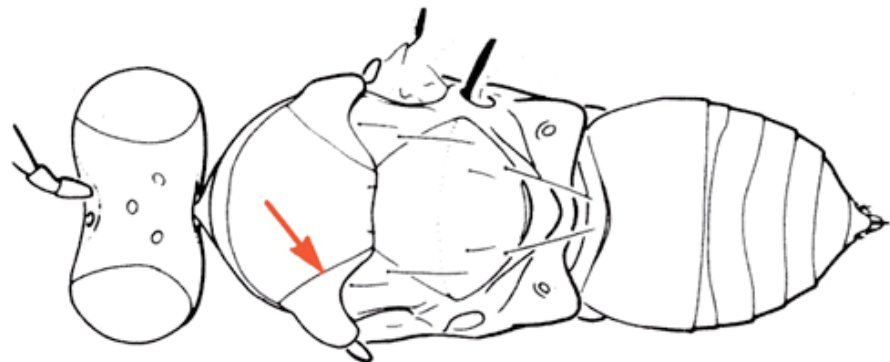
A wing vein that is uniformly pigmented (not darker on its margins), without a tubular structure; it can be seen with both reflected and transmitted light (cf. spectral tubular veins).

2. **notaulus** (*pl., notauli*)

The usually oblique longitudinal groove on the mesoscutum, often dividing the mesoscutum into medial and lateral parts.

3. **notopleural suture**

A groove separating the mesonotum from mesopleuron.





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Glossaries and Ontologies

Hymenoptera Glossary



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Search the Ontology

Search

You must select a result from the list before clicking show

I'll get there quicker [at random](#).

This glossary is a project of the Hymenoptera Anatomy Ontology in conjunction with Morphbank and the International Society of Hymenopterists and was initially funded in part by NSF grants BDI-0446224, EF-0337220, and DEB-0328922. Current funding is from DBI-0850223; ideas and opinions expressed here are those of the authors and not the NSF.

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Glossaries and Ontologies

Hymenoptera Glossary



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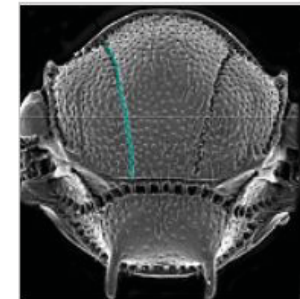
Result

URI: http://purl.obolibrary.org/obo/HAO_0000647

notaulus synonyms: [notaular line](#), [notaulix](#)

The **line** that extends submedially along the **mesoscutum** and corresponds to the median border of the site of origin of the **first mesopleuro-mesonotal muscle**.

written by: Miko, I. 2009. Curator. Hymenoptera Anatomy Ontology.



- [click for more detail](#) -



Glossaries and Ontologies

Logical relations

Is a: **line**
Part of: **integument**, **mesoscutum**
A **notaulus** is attached to: **none**

Label usage (sensu)

notaulus by Gibson, G. A. P. 1985. Some pro- and mesothoracic structures important for phylogenetic analysis of Hymenoptera, with a review of the terms used for the structures. Canadian Entomologist 117:1395-1443.
notaulix by Curators, H. A. O. 2009. The Hymenoptera Anatomy Ontology Curation Team. Hymenoptera Anatomy Ontology.
notaular line by Gibson, G. A. P., J. D. Read, and R. Fairchild. 1998. Chalcid wasps (Chalcidoidea): illustrated glossary of positional and morphological terms ..
notaulix by Snodgrass, R. E. 1935. Principles of insect morphology. McGraw-Hill Book Co., Inc., New York & London 667 pp.
notaulus by Miko, I. 2009. Curator. Hymenoptera Anatomy Ontology.

Comments and tags

review definition added over 2 years ago by Istvan Miko

Notaulus is a line, because it could be manifested as a carina, sulcus, row of setae or even the border between two differently colored areas.

Reference: *None provided.*
Cross reference: *None provided.*

alternative definition added almost 2 years ago by Istvan Miko

Paired structure of the mesoscutum, ranging from a deep, continuous or slightly punctate line to a very shallow, mere indication of a line extending from the anterior to the posterior margin of the mesoscutum. In taxa with a reduced notauli, only the anterior and posterior ends are visible. Notauli have also been referred to as parapsidal grooves (e.g. Weld, 1952). Absent in Zaeucoilini, notauli are common within the Diglyphosemini.

Reference: Buffington, M. L. 2009. Description, circumscription and phylogenetics of the new tribe Zaeucoilini (Hymenoptera: Figitidae: Eucoilinae), including a description of a new genus. Systematic Entomology 34:162-187.



Who is taxonomy for?

Taxonomists

- Language is overly specialized
- Identification keys are often very difficult to use
 - Not illustrated
 - Character states utilized are difficult to interpret

Subfamily VI, HELCONINÆ.

Tribe I, *Helconini*. 38565

TABLE OF GENERA.

- Abdomen attached to the metathorax far above the hind coxæ 1.
Abdomen attached normally.
Hind femora beneath *unarmed* 2.
Hind femora beneath *armed* with one or more teeth.
Hind femora armed with many small teeth beneath ; recurrent nerv-
ure joining the second cubital cell (Sarawac).
(1) **Euscelinus** Westw.
Hind femora armed with one tooth beneath ; recurrent nervure join-
ing the first cubital cell (2) **Helcon** Nees.*
2. Recurrent nervure joining the first cubital cell.
Second cubital cell not longer than wide, usually *wider* than long ;
clypeus at apex rounded 3.
Second cubital cell always longer than wide ; clypeus at apex truncate.
Basal joint of hind tarsi *not* longer than joints 2-4 united ; median
cell in hind wings *not* or scarcely shorter than the costal cell.
(3) **Gymnoscelis** Först.
Basal joint of hind tarsi longer than joints 2-4 united ; median cell
in hind wings much shorter than the costal cell . (4) **Eumacro-**
centrus Ashm., n. g. (type *H. americanus* Cr.).
3. Submedian and median cells in front wings of an equal length ; second
cubital cell petiolate, *not* longer along the radius than along
the cubitus, if anything a little shorter . (5) **Aspicolpus** Wesm.

* Mr. Peter Cameron has recently rechristened this well-known genus under the name *Wroughtonia*, vide Mem. and Proc. Manchester Lit. and Phil. Soc., vol. 43, 1899, p. 56.

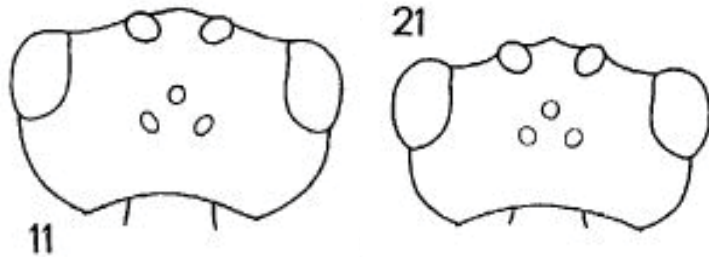


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Ashmead, 1900



Papp, 1995



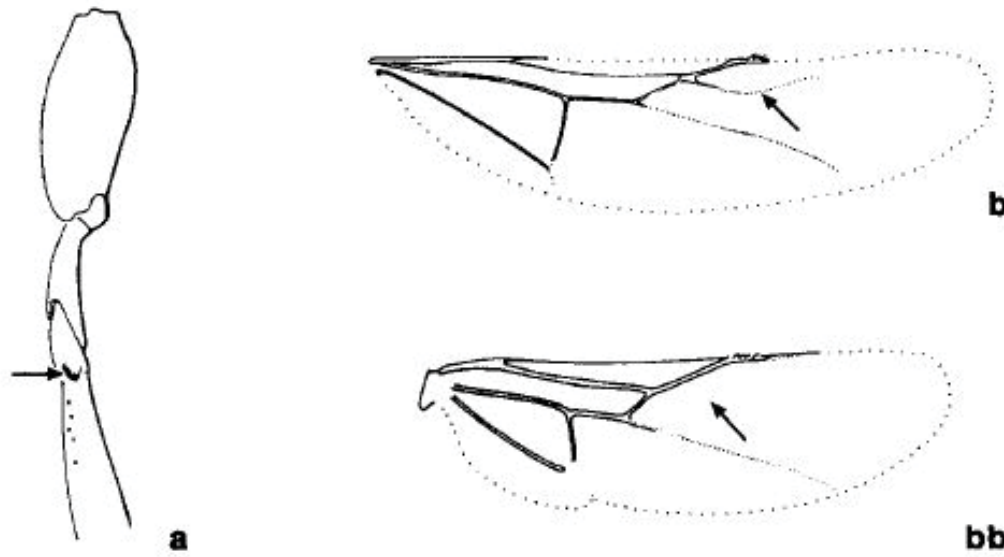
1 (2) Head in dorsal view (Fig. 11) less transverse, 1.78 times as broad as long, eye not protruding. Distal ten flagellomeres 1.4–1.6 times as long as broad. Face and clypeus dispersely subpunctate, interspaces smooth and shiny. Propodeum with a median pentagonal area, laterally areolated, surface of propodeum smooth to uneven, shiny (Fig. 13). First tergite slightly shorter than broad behind, pair of keels reaching hind end of tergite, hind half of tergite longitudinally striate (Fig. 17). Posterior end of ovipositor straight (Fig. 18). Legs yellow. ♀ : 3.3 mm **D. podobe** sp. n.

2 (1) Head in dorsal view (Fig. 21) transverse, twice as broad as long, eye protruding. Distal ten flagellomeres cubic. Face below antennal sockets and clypeus entirely aciculo-punctate. Propodeum postero-medially with a pair of weak longitudinal carinae, its surface rugose-rugulose. First tergite 1.2 times as long as broad behind, its hind half rugose, pair of keels extending to basal half of tergite. Posterior end of ovipositor somewhat downcurved (Fig. 22). Legs straw yellow. ♀ : 3–4 mm, ♂ : 2.8–3.5 mm

D. fomitis MASON, 1968



Sharkey, 1993



- 24(23)
- a. Metatrochantellus with spines.
 - b. Hind wing with vein Rs some **Macrocentrinae** (p. 390)
 - aa. Metatrochantellus without spines.
 - bb. Hind wing without vein Rs (*Ichneutes*) **Ichneutinae** (p. 390)



Interactive Keys

INTKEY : Beetle Larvae of the World

File Window Help

Best Characters (172)

- ratio of antennal length to head width
- number of segments in maxillary palp
- hypostomal rods (presence)
- number of antennal segments
- mesal surface of mandibular base (whether simple)
- maxilla (number and articulation of lobes)
- thoracic spiracles (type)
- anterior abdominal spiracles (type)
- ligula (relative length)
- abdominal tergum 9 (whether extending onto ventral surface)
- abdominal tergum 9 (whether with paired processes or urogomphi)
- hypopharyngeal sclerome

Remaining Taxa (390)

- ADERIDAE
- AGYRTIDAE
- ALEXIIDAE
- AMPHIZOIDAE
- ANOBIIDAE (major part)
- Dorcatominae ANOBIIDAE
- Cryptorama ANOBIIDAE
- Ptininae ANOBIIDAE
- Anthicinae ANTHICIDAE
- Cotes ANTHICIDAE
- Eurygeniinae ANTHICIDAE

Used Characters (0)




Eliminated Taxa (0)

LucidPlayer - Key to Insect Orders - M:\keys\Insect Orders\Key\Insect Orders.lk4





Key Features Entities View Window Help

Features Available: 16

Wing Number

- Four: 
- Two, hind pair r... Two, fore pair re...: 
- Absent: 

Forelegs
Hind Legs
Tarsomere Number

- five: 
- four: 
- three: 
- two: 

five - Lucid3

five - Lucid3

Entities Remaining: 20

- Archaeognatha ... Bristletails
- Thysanura ... Silverfish
- Blattodea ... Cockroaches - Lucid3
- Ephemeroptera ... Mayflies
- Odonata ... Dragonflies and damselflies
- Plecoptera ... Stoneflies

Entities Discarded: 11

Blattodea ... Cockroaches - Lucid3

A giant burrowing cockroach

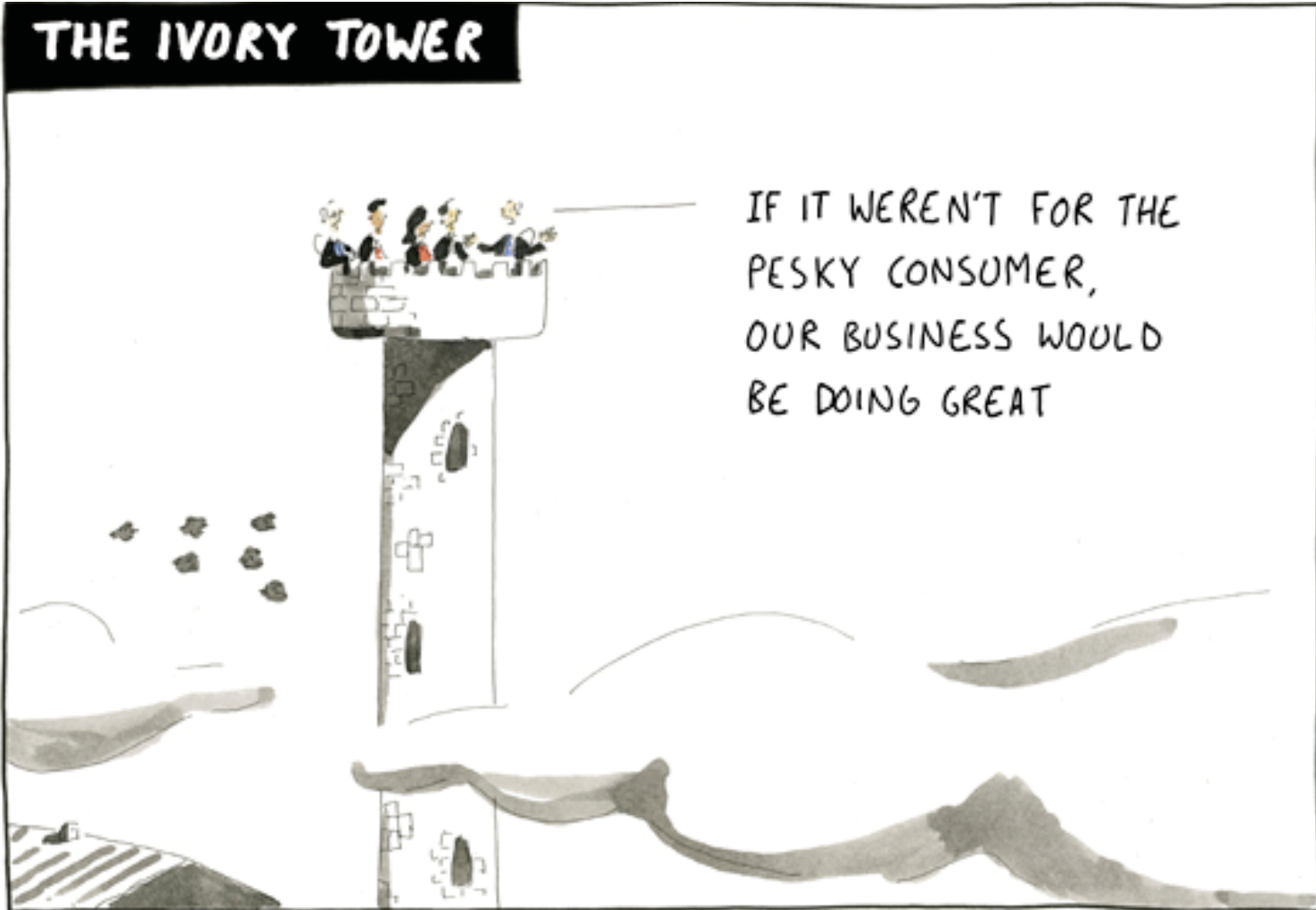
Trees Lists Images

Tarsomere Number/Tarsomere Number Gallery





THE IVORY TOWER



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Where does the BSC fit in?

- Develop a mandate to develop bioinformatic tools for Canadian flora and fauna
- Formatted for end-users



A web-based journal devoted to the publication of works that contribute significantly to the recognition and documentation of Canada's arthropod fauna.

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[Editorial Board](#)

[Editor's Notebook](#)

[Acknowledgements](#)

Recent Issues



A Matrix Key to Families,
Subfamilies and Tribes of
Lepidoptera of Canada
CJAI 17
J. J. Dombroskie



The Fruit Flies
(Tephritidae) of Ontario
CJAI 15
M.D. Jackson, S.A. Marshall,
R. Hanner, and A.L. Norrbom



Tabanidae of Eastern Canada:
Key to Tabaninae



The Fireflies of Ontario
(Coleoptera: Lampyridae)
CJAI 16
S.P.L. Luk, S.A. Marshall,
and M.A. Branham



Key to World Genera and
North American Species of
Clusiidae
CJAI 14
O. Lonsdale, D.K.B. Cheung,
and S.A. Marshall



Staphylinidae of Eastern Canada
and Adjacent United States

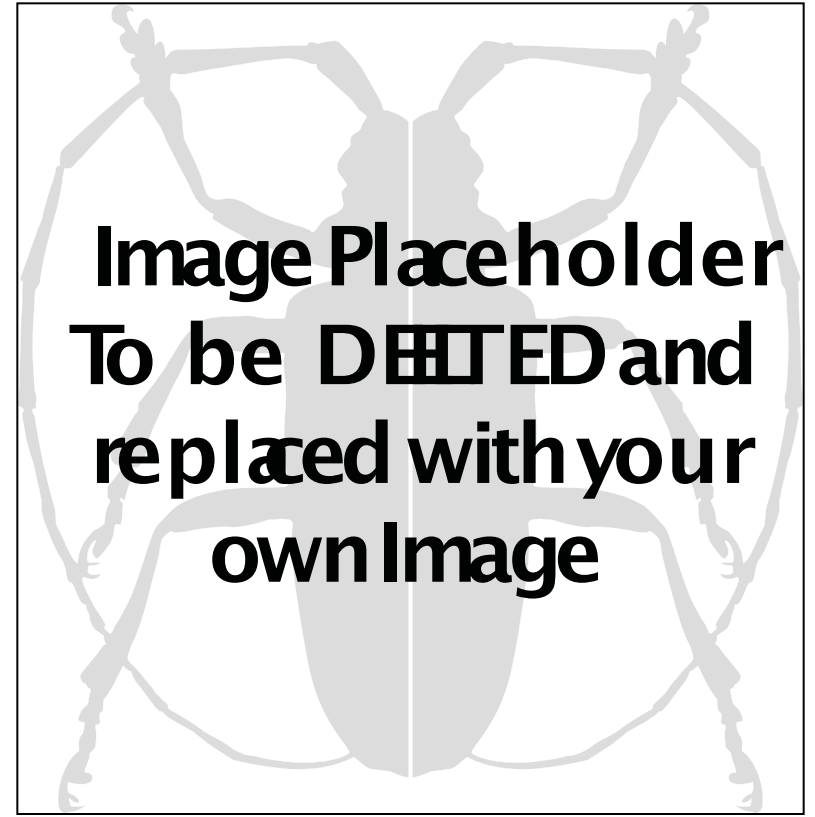
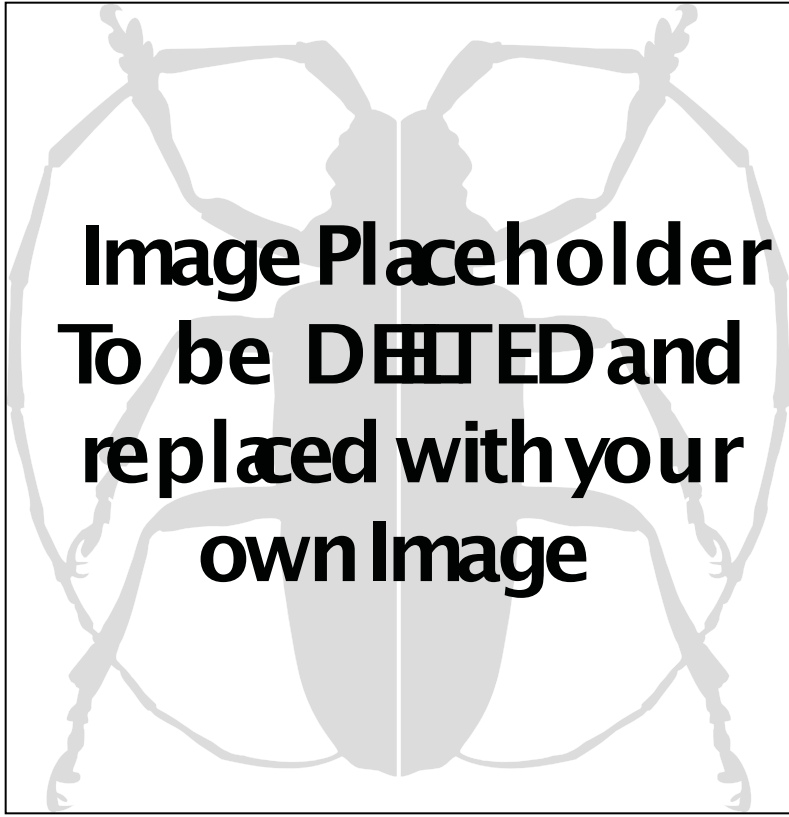


Fig X. Insert caption here.

Fig X. Insert caption here.

XXX (X)	Insert text here.	XXX
XXX'	Insert text here.	XXX

Key to the species of *Helconichia* (Hymenoptera: Braconidae: Ichneutinae)



Fig 1. *Helconichia reina*. A. Head, anterior view. B. forewing



Fig 2. Forewing of *Helconichia trichiops*.

1	Inter-antennal carinae present (Fig. 1A, arrow); (RS+M)b of forewing absent (Fig. 1B)	2
1'	Inter-antennal carinae absent; (RS+M)b of forewing present (Fig. 2, arrow)	3

THE FRUIT FLIES (TEPHRITIDAE) OF ONTARIO

M.D. JACKSON, S.A. MARSHALL, R. HANNER, A.L. NORRBOM



TECHNICAL KEY
TO GENERA
(REQUIRES MICROSCOPE)

FIELD KEY
TO GENERA



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Nearns et al., 2011



A Resource for Wood Boring Beetles of the World

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[IDENTIFY FAMILY](#)

[FAMILY TOOL SEARCH](#)

[GEOGRAPHIC TOOL SEARCH](#)

[SELECT TOOL](#)

[ABOUT THE RESOURCE](#)



A comprehensive resource of identification and screening tools for wood boring beetles of the world.

Getting Started

- [Identify a Wood Boring Beetle Family](#)

Newly Released Tools

- [View a List of the Latest Identification Tools](#)

Upcoming Tools

- [View a List of Tools Currently in Development](#)

SITE LAST MODIFIED: October 3, 2011





Lord *et al.*, 2011

IRONCLAD ID

Tool for Diagnosing Ironclad and Cylindrical Bark Beetles (Coleoptera: Zopheridae) of North America north of Mexico

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Overview

Ironclad ID is designed to aid in the identification of adult Ironclad and Cylindrical Bark Beetles, a large, worldwide group of diverse, subcortical beetles in the family Zopheridae. This group is thought to include both harmful and beneficial species. Some members (*Colobicus*, *Bitoma*, *Synchita*, etc.) have been associated with particular fungi known to harm or kill valuable hardwood trees, while other members (*Colydium*, *Aulonium*, *Nematidium*, etc.) are thought to be predaceous on the larvae and adults of other destructive, wood-boring beetle pests.

This resource includes an interactive [Key to Genera & Species](#), [Genus Fact Sheets](#), species diagnoses, and hundreds of images to aid in the identification of Ironclad and Cylindrical Bark Beetles found in North America north of Mexico. The interactive identification key runs as a Lucid3 Java Applet. Please read the Lucid3 system requirements for information regarding operating systems, web browsers, and other software needed to run the key.

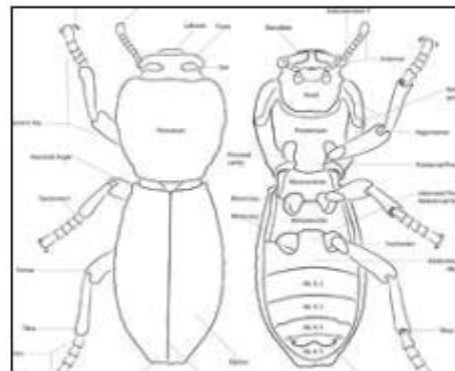
Last updated June 5, 2011



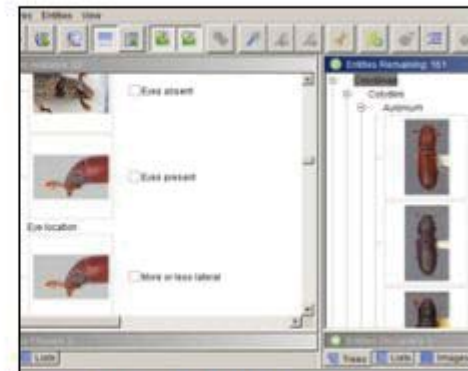
Gallery of photographs and genus fact sheets



Ironclad biology & taxonomy



Morphological atlas



Lucid interactive key to genera & species

Genus Fact Sheets

- [Acolobicus](#)
- [Antilissus](#)
- [Aspathines](#)
- [Aulonium](#)
- [Bitoma](#)
- [Colobicus](#)
- [Colydium](#)
- [Coxelus](#)
- [Denophloeus](#)
- [Endeitoma](#)
- [Eucicones](#)
- [Eudesma](#)
- [Hyporhaqus](#)
- [Lasconotus](#)
- [Loboqestoria](#)
- [Lyreus](#)
- [Megataphrus](#)
- [Microprius](#)
- [Microsicus](#)
- [Monoedus](#)
- [Nahunaria](#)
- [Nematidium](#)
- [Neotrichus](#)
- [Paha](#)
- [Phellopsis](#)
- [Phloeodes](#)

◀ [Previous Genus](#) [Next Genus](#) ▶

Genus: *Colobicus*

Diagnostic Features

- Description: Body distinctly flattened. Antennae 11-segmented with a distinct, 2-segmented club. Antennal setation sparse. Antennomere 3 distinctly elongate (at least twice as long as 4). Subantennal grooves long, reaching posterior margin of eye. Eyes round, well-developed, facets fine. Pronotum simple, with flattened, short, recumbent setae. Pronotal lateral margins smooth, widest basally, distinctly explanate. Procoxal cavities narrowly open. Metacoxae narrowly separated, separation less than metacoxal length. Elytral lateral margins weakly explanate. Elytra with distinct striae composed flattened, short, recumbent setae. Tarsal formula 4-4-4.
- Similar genera: The genus *Colobicus* is superficially similar to the genera *Acolobicus* and *Eucicones*. The smaller size, presence of faint carinae on the pronotal disc, lack of thick, flattened, club-shaped setae and unicolored dorsal surface serve to distinguish *Acolobicus*. The smaller size, variegated elytra, rougher dorsal surface, and distinctly more setose vestiture serve to distinguish *Eucicones*.

Known Distribution

- Hawai'i, and Southeastern (LA) USA.

Biology

- *Colobicus parilis* has been found at UV/MV light and from under the bark of a number of trees. It has been noted that this species has been found on commercial shipments and in stores of sweet potatoes and other crops, where it is suspected to spread fungal disease (Hinton, 1945; Ivie, 2002). Due to the destruction of crops from fungal disease spread by this beetle, it should be considered harmful.
- Abundance: Rare.

North American Species (1)

- *Colobicus parilis* Pascoe, 1860

Discussion

- This genus is found throughout the Australo-Pacific region. It has likely been introduced into the United States, possibly on crop products.



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Gallery



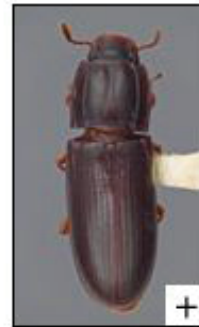
Acolobicus



Antilissus



Aspathines



Aulonium



Bitoma



Colobicus



Colydium



Coxelus



Denophloeus



Endeitoma



Eucicones



Eudesma



Hyporhaqus



Lasconotus



Loboqestoria



Lyreus



Megataphrus



Microprius

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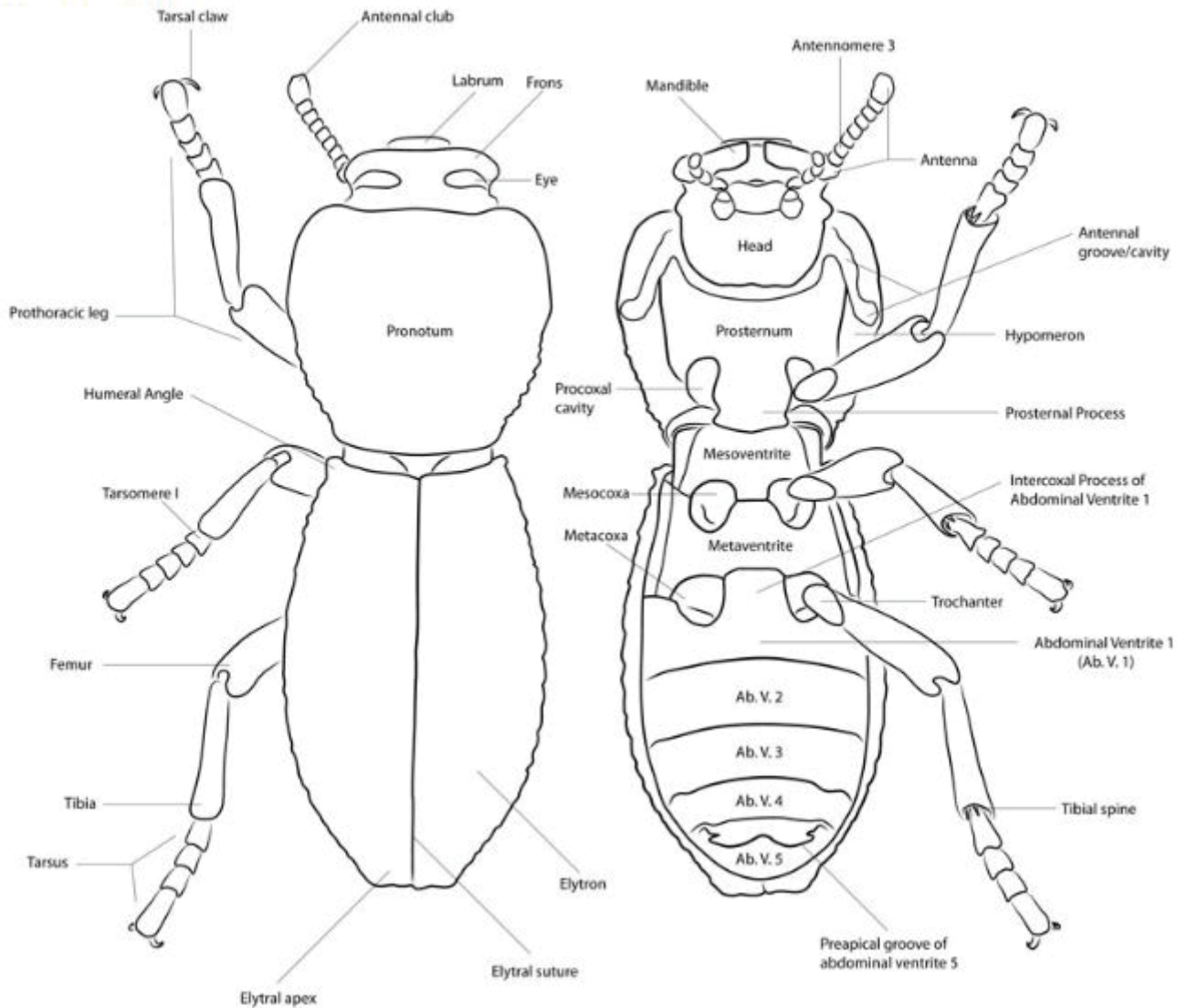
[Morphological Atlas](#)

[Glossary](#)

[References](#)

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Morphological Atlas



Glossary of Morphological Terms

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

The following structures and descriptive terms are found throughout the Ironclad ID resource. The terms below have been defined using the Torre-Bueno Glossary of Entomology (1989), Lawrence et al. (2010), and Lawrence et al. (1999).

A

- **Abdominal process (intercoxal process of abdominal ventrite I):** projection on ventrite 1 which extends anteriorly between metacoxae.
- **Abdominal ventrite:** visible ventral abdominal sclerite. Ventrite number does not correspond to true sternite number except in rare cases where sternite 1 is visible. Also called ventrite.
- **Acute:** pointed; terminating in or forming less than a right angle.
- **Antennae:** paired, segmental appendages, borne one on each side of head, functioning as sense organs and bearing a large number of sensilla.
- **Antennal club:** an enlarged portion of the antennal apex, consisting of a variable number of antennomeres (often 3). In an incrassate, antenna the antennomeres gradually enlarge towards to apex, but if there is an abrupt change in length or width at some point, then the antennomeres beyond this are considered to be part of the club.
- **Antennal cavity:** a prothoracic cavity for housing the whole antenna or a portion of the antenna (usually the club).
- **Antennal insertion:** point of attachment for the antennae, consisting of an opening in the head capsule, sometimes with a reinforced sclerotized ring.
- **Antennomere:** antennal segment; including scape, pedicel and flagellomeres. NOTE: the flagellum is composed of all antennal segments proceeding the scape and pedicel. Any individual antennal segment is commonly called an antennomere.
- **Anterior:** in front; before.



Colydtium lineola
© Ken Karns

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Restart key in full screen mode

Key Features Entities View

The screenshot shows the main interface of the Ironclad ID software. At the top is a toolbar with various icons for navigation and editing. Below the toolbar is a tree view of features available for diagnosis. The tree is expanded to show the 'Mandibles' section, which includes the feature 'Lateral corner of mandibular bases exposed in...'. A small thumbnail image of a beetle's head is visible next to this feature. The 'Features Available: 61' section lists various morphological features such as Antennal length, Frons, Mouthparts, Labial palpi, Maxillary palpi, Head Capsule, Eyes, Thorax, Elytra, Wings, and Legs.

Features Chosen: 1

- Head
 - Antennae
 - Antennal club
 - Structure
 - Compact

Lateral corner of mandibular bases exp...



© Nathan Lord



Where does the BSC fit in?

- Develop a mandate to develop bioinformatic tools for Canadian flora and fauna
- Formatted for end-users
 - Common format
 - Link to CJAI



Biodiversity Informatics Possibilities

- Identification for entomologists
- Identification for non-entomologists
- Resources
 - Biology, distribution ecology, control, conservation
- Searchable pages
- Scrollable photo galleries
- Linked to biological collection data
- Optimizations for mobile devices



Impediments

- Content
 - Time
 - Can we involve students?
 - Recognition



There's a Bee in Your Blossom! The Alfalfa Leaf Cutting Bee

Order: Hymenoptera

Family Name: Megachilidae

Species Name: *Megachile rotundata*

Common Name: Alfalfa leaf cutting bee

History

The Alfalfa leaf cutting bee, *Megachile rotundata*, is also known as the Lucerne leaf cutting bee. It is a beneficial pollinator of alfalfa, carrots and other legumes (Richards, et. al. 2002). The Alfalfa leaf cutting bee was originally introduced to the United States in the 1930's from Europe, but was unable to migrate and survive in the cold Canadian climate. In 1962, it was domesticated in Western Canada to aid the pollination of alfalfa plants and ensure the production and supply of seed. Today, North America stands as the world's largest supplier of alfalfa as a forage crop (Seeds of Diversity Canada, 2008). Unlike the honeybee (*Apis mellifera* L.) and the bumblebee (*Bombus spp.*), alfalfa leaf cutting bees can pollinate alfalfa rapidly, abundantly and successfully without triggering the floral release mechanism. This fertilization method causes the alfalfa plant keel (two bottom petals) to close and hit the bee, shocking it and preventing the full transfer of pollen (Rosalind, R.J. and Pitts-Singer, T.L. 2008). These qualities, in combination with their inexpensive time and management costs, make the Alfalfa leaf cutting bee a valuable species in agriculture.

Identification

Female bees are 8 to 9mm in length. They have a black body with pale coloured bands across the abdomen and black legs. Females collect pollen in their abdomen (scopa) rather than their legs. The scopa is covered in silver/grey hairs. They also have stingers, which are only used



Fact sheets
Species pages
Database student
collections



Impediments

- Content
 - Time
 - Can we involve students?
 - Recognition
- Funding



NSF Funding for Systematics-related Research

- Systematics and Biodiversity Funding Cluster
 - Biodiversity: Discovery & Analysis
 - Phylogenetic Systematics
- Advancing Digitization of Biological Collections (ADBC)
- Dimensions of Biodiversity
 - Transform how we describe and understand the scope and role of life on Earth
- Advances in Biological Informatics (ABI)
- Partnerships for Enhancing Expertise in Taxonomy (PEET)
- Planetary Biodiversity Inventories (PBI)
- Assembling, Visualizing, and Analyzing the Tree of Life (AVAToL)
 - Assembling the Tree of Life (ATOL)



Impediments

- Content
 - Time
 - Can we involve students?
 - Recognition
- Funding
 - Can we lobby for funding?



Biodiversity information

- Who benefits?
 - Who should benefit?
- Who is taxonomy for?
 - Who should it be for?



Thanks and Inspiration

- Past and present mentors
- John Gavloski, Brent Elliott – MAFRI
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- Paul Fields
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