The Cynipoid Families

*The Hym Course*

*Portal AZ*

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Cynipoidea

Macrocynipoids
• Rarely collected, relatively few species
• Large, heavily sclerotized
• Elongate body (pupation in elongate chamber)
• Parasitoids of wood-boring insect larvae
• Adaptations to exit tunnels in wood
• Long ovipositors

Microcynipoids
• Common, species-rich
• Small, less heavily sclerotized
• Short and high body (pupation in round chamber)
• Parasitoids of insect larvae in various microhabitats or associated with galls
• Lack adaptations for exiting wood tunnels
• Long or short ovipositors
Cynipoidea

Macrocynipoids
• Austrocynipidae (1 species)
• Ibaliidae (20 spp)
• Liopteridae (200 spp)

Microcynipoids
• Figitidae (1400 spp)
• Cynipidae (1300 spp)
Some characters of Cynipoidea

- Unique wing veination (microcynipoids)
- Modified basal flagellar segments in males
- Laterally flattened metasoma
- Compact, stout appearance, esp. mesosoma
Austrocynipidae

- Only one species, *Austrocynips mirabilis*
- Only cynipoid with a pterostigma
- Reared in three specimens from *Araucaria* cones in tropical Queensland (Australia)
- Presumably parasitoids of cone-boring moth larvae
Ibaliidae

**Taxonomy**
- up to 15 mm, ovipositor concealed.
- female with 13 antennal segments, male with 15.
- large spur on hind tarsomere II in male and female.
- compressed gaster, tergum VI largest.

**Biology**
- 1 genus in northern hemisphere.
- solitary egg-larval parasite of Siricidae and Anxyelidae.
- oviposits into egg, late-instar ectoparasitic (koinobiont).
- fourth instar with large mandibles but does not feed.
- pupation in host tunnel.

**Biocontrol**
- imported to Australasia for control of Siricidae in pine.
Liopteridae

- Mainly tropical but occurs world-wide (except Europe)
- Parasitoids of cerambycid and buprestid larvae

Obertheauella  
Liopteron  
Pseudibalia
Cynipidae

Taxonomy
• female with 13-14 antennal segments, male with 14-15.
• most macropterous, some brachypterous or apterous.
• mesosoma and face sculptured.
• hypopygium usually with spine.
• tarsal claw often with preapical tooth.
• gena usually with ridge.

Biology
• 1312 species.
• phytophagous gall formers.
• Synergini are inquilines that kill the host gall former.
Cynipidae (Gall Wasps)

- Phytophagous gall inducers or inquilines
- Gall inducers initiate galls in which larvae develop. Many associated with woody rosids, some on herbs.
- Inquilines have larvae that develop in the galls induced by other cynipids or occasionally other insects, usually on woody rosids.
**Figitidae**

**Taxonomy**
- metasomal tergum III the largest.
- scutellum usually with spines, pits or ridges.
- hypopygium without spine.
- head and mesosoma usually strongly sculptured.

**Biology**
- 9 subfamilies and 1411 species.
- parasitic on Diptera, Hymenoptera and Neuroptera.
  - Neuroptera - egg in haemocoel, external in host cocoon (Anacharitinae)
  - Diptera - solitary internal parasitoids, emerging from puparium (several subfamilies).
  - Hyperparasitic on Hymenoptera (Charipinae).
Examples of Figitidae

Charipinae
Aspicerinae
Eucoilinae
Emargininae
Thrasorinae
Anacharitinae
Figitinae
Pycnostigminae
Host Preference

- Thrasorinae
- Anacharitinae
- Charipinae
- Aspicerinae
- Figitinae
- Eucoilinae
- Unknown: Emargininae
- Pycnostigmina
Divergence time estimation: Results
Ovipositor Morphology

Ronquist & Nordlander (1989)

van Lenteren (1998)

Lower valve

Upper valve

van Lenteren (1998)

van Lenteren (1998)

van Lenteren (1998)
Ovipositor clip in action

1. Pinching of host cuticle between lobe and teeth on unpaired valve
2. Injection of venom
3. Deposition of egg(s)
Ovipositor clip in action

4. Further insertion followed by ‘jerking’ action
Ovipositor clip in action

5. Removal
Summary Tree: Parsimony

- Liopteridae
- Cynipidae
- Parnipinae
  - Thrasorinae
  - Anacharitinae
  - Figitinae
  - Aspicerinae
    - Melanips
    - Charipinae
      - Emargininae
      - Eucoilinae

Trischiza

= ovipositor clip present
Clip Examples-SEM

**Figitinae**

![Image of Figitinae example with labels: 1vlv, Ser, S, 2vlv, L]

**Eucoilinae**

![Image of Eucoilinae example with labels: L, 2vlv, Se, LL]

*Neralsia* sp.  
*Trybliographa rapae*
A Few Clip Examples

**Figitinae**
- Neralsia
- Trischiza
- Xyalophora

**Eucoilinae**
- Ganaspidea
- Glauraspidea
- Odonteucoila
Host Preference Spectrum

less concealment

absent
aphid mummies

Clip present
fruit flies

absent
leafmining flies

more concealment
Overview of Figitid sub-families that you will encounter around the Portal area
Charipinae

Taxonomy

- lack of sculpture (and other characters).
- hypopygium without spine.
- genal carina weak or absent.
- mesotibia and metatibia often with spur, tarsal claw without tooth.

Biology

- two tribes, Alloxystini and Charipini
- Alloxystini hyperparasitic on braconids & aphelinids through aphids.
  - early stages in primary host.
  - external after primary parasite pupates.
- Charipini are hypers on encyrtids through Psylloidea.
Alloxysta sp.
Eucoilinae

Taxonomy

• scutellum with round or tear-drop shaped plate or “cup”.

Biology

• 1400 species.
• early instar parasitoids of calypterate Diptera, external in puparia
  • (agromyzids, choropids, anthomyiids and drosophilids.
  • often associated with dung or rotten fruit.

Biocontrol

• *Trybliographa rapae* accidently introduced against onion maggot.
• *Hexacola* imported for control of *Hipplelates*.
• *Ganaspidium utilis* for control of *Liriomyza* in HI
Aganaspis dac i (Weld)

K leidotoma sp.

Trybliographa rapae Westwood

Agrostocynips clavatus Diaz
Agrostocynips clavatus Diaz
Preseucoela imallshookupis Buffington
Gronotoma sp.

Leptopilina sp.
Nordlandiella semirufa (Kieffer)
Ganaspis sp.
Agrostocynips clavatus Diaz

Diecoila sp.
Diecoila sp.

Agrostocynips clavatus Diaz
Results: Comparison of topologies

Bayesian

Core Eucoilinae

Zaeucoila group

Gronotoma group

Kleidotoma group

Zamischus group

Parsimony

Core Eucoilinae

Kleidotoma group

Zamischus group

Zaeucoila group

Gronotoma group
Results: Comparison of topologies, host feeding niche

- Bayesian
  - Core Eucoilinae
    - Zaeucoila group
    - Gronotoma group
    - Kleidotoma group
    - Zamischus group

- Parsimony
  - Core Eucoilinae
    - Kleidotoma group
    - Zamischus group
    - Zaeucoila group
    - Gronotoma group
Results: Comparison of topologies, host feeding niche

Core Eucoilinae

- *Zaeucoila group*
- *Gronotoma group*
- *Kleidotoma group*
- *Zamischus group*

Bayesian

Core Eucoilinae

- *Kleidotoma group*
- *Zamischus group*
- *Zaeucoila group*
- *Gronotoma group*

Parsimony
Figitinae

Taxonomy

More or less a garbage can taxon; notaulices present, scutellar plate absent; wings lacking pubesence

Biology

Koinobiont endoparasitoids of Cyclorrhapha, usually carrion feeding Sarcophagidae, Muscidae, etc., but some attack predatory Diptera (*Melanips*)

Biocontrol

*Neralsia* and *Xyalophora* commonly reared from horn fly and face fly (Muscidae) but never in large numbers
Xyalophora quinquelineata (Say)

Lonchidia sp.

Neralsia sp.

Melanips sp.
Anacharitinae

Taxonomy

Extremely long petiole; head wider than mesosoma when viewed dorsally

Biology

Koinobiont endoparasitoids of Chrysopidae and Hemerobiidae (Neuroptera)

Biocontrol

None, but possibly interfere with predator augmentation in agroecosystems.
Anacharis sp.

Xyalaspis sp.
Aspicerinae

Taxonomy

“Saddle-shaped” T-2 (posterior margin sinuate); scutellar spine often present

Biology

Reared from Syrphidae feeding on Aphididae

Biocontrol

None, but possibly interfere with predator augmentation in agroecosystems.
Paraspicera sp.

Callaspidea sp.

Aspicera sp.

Prosaspicera splendida Ros-Farre
Aspicera sp.
Thrasorinae

Taxonomy

Metacoxa ‘much’ larger than meso and forcoxa; overall look like a synergine cynipidae but with figitid wing veination

Biology

Associated with cynipid and Chalcidoid gall inducers; possibly guests of the inducer, possibly parasites

Biocontrol

*Thrasorus* possibly a control agent for various eulophids that gall *Eucalyptus* sp.
Myrtopsis sp.

Euceroptres montanus Weld
Alfred Kinsey, Cynipoidologist

Kinsey amassed some 7.5 million specimens of Cynipoidea, the Majority which are currently housed at the AMNH, New York.
Kinsey, 1930. The Genus *Cynips*
Kinsey, 1930. The Genus *Cynips*
Jean-Jeaques Kieffer
Abandoned hopes and renewed stagnation are largely the prevailing characteristics of the present taxonomic status of this group [Cynipoidea] in North America.

--L. Masner, 1990