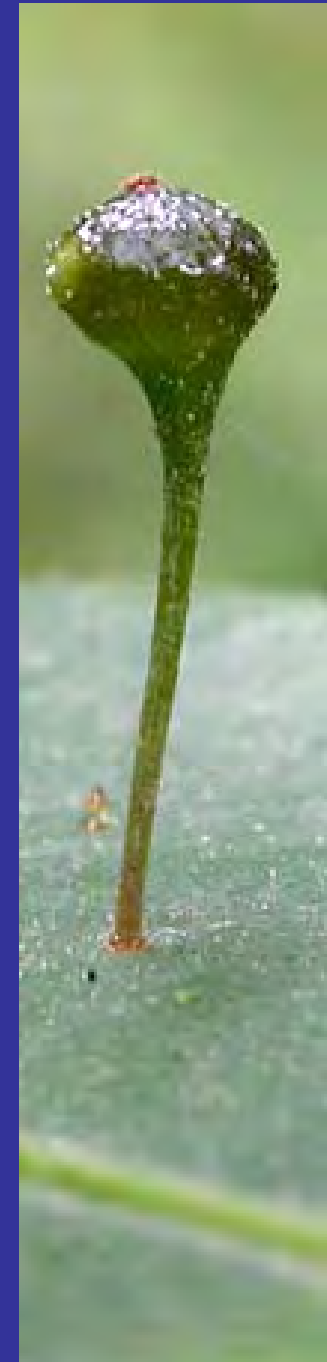


**Gall-inducing insects of  
Costa Rica:  
diversity, host plants and  
parasitoids**

**Paul Hanson, Kenji Nishida  
& Jorge Gómez Laurito  
Escuela de Biología  
Universidad de Costa Rica**



## Number of gall-inducing cecidomyiid species/area: Costa Rica vs temperate regions

Region	Area (km <sup>2</sup> )	Number of cecidomyiid species	Number of cecidomyiid species per 1,000 km <sup>2</sup>
Costa Rica	51,000	774	290
Japan	372,000	628	143
Switzerland	41,000	206	81
North America	19,285,000	891	76
Italy	301,000	275	66

Costa Rica: 3,368 plant species/1,000 km<sup>2</sup>

N. America: 1,527 plant species/1,000 km<sup>2</sup>

Hanson & Gómez-Laurito 2005,  
in Raman et al. (eds)

# Major groups of gall-inducing insects in Costa Rica

<b>ORDER</b>	<b># SPP.</b>	<b>COMMENTS</b>
Thysanoptera	7	
Hemiptera	80	72 Psylloidea
Coleoptera	26	23 Curculionidae
Lepidoptera	100	50 Momphidae
Diptera	868	850 Cecidomyiidae
Hymenoptera	78	excluding Agaonidae

**Total = 1159**

# Thysanoptera



*Sarcaulus brasiliensis* (Sapotaceae)



*Drimys granadensis* (Winteraceae)

Other hosts: Araliaceae, Euphorbiaceae,  
Gesneriaceae, Lauraceae

# Gall-forming Psylloidea

\* = plant families with more than one genus of gall-formers

FAMILY	GENUS	HOST PLANTS
Calophyidae	<i>Calophya</i>	<i>Mauria</i> (Anacardiaceae), Rutaceae*
Phacopteronidae	<i>Pseudophacopteron</i>	<i>Protium</i> (Burseraceae)
Psyllidae		
Euphalerinae	<i>Euphalerus</i>	<i>Lonchocarpus</i> (Fabaceae)
Aphalarinae	<i>Gryopsylla</i>	<i>Ilex</i> (Aquifoliaceae)
Aphalaroidinae	<i>Telmapsylla</i>	<i>Avicennia</i> (Avicenniaceae)
Diaphorininae	<i>Tuthillia</i>	<i>Myrcianthes</i> , <i>Calyptranthes</i> (Myrtaceae*)
Triozidae	<i>Kuwayama</i>	<i>Beilschmiedia</i> (Lauraceae*)
	<i>Leuronota</i>	Cunoniaceae, Juglandaceae, Rutaceae*
	<i>Neolithus</i>	Clusiaceae, <i>Sapium</i> (Euphorbiaceae)
	<i>Trichohermes</i>	<i>Pseudolmedia</i> , <i>Sorocea</i> (Moraceae*)
	<i>Triozza</i>	Araliaceae, Clethraceae, Ebenaceae, Lauraceae*, <i>Brosimum</i> (Moraceae*)
	<i>Triozoida</i>	<i>Psidium</i> (Myrtaceae*)

Other hosts: Meliaceae, Sapindaceae, Sapotaceae, Simaroubaceae



# Psylloidea

*Pseudophacopteron* on  
*Protium* (Burseraceae)



*Calophya* on *Zanthoxylum* (Rutaceae)



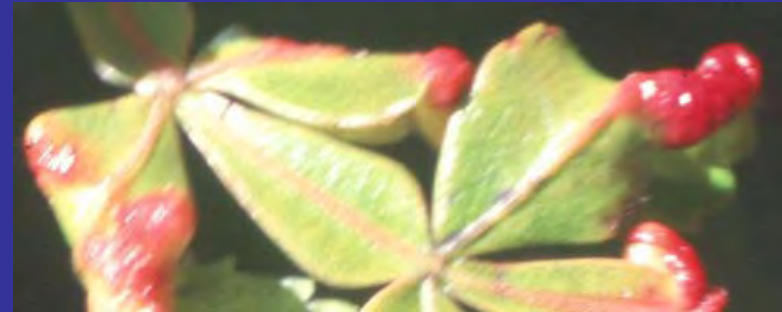
*Euphalerus* on  
*Lonchocarpus*  
(Fabaceae)

## Psyllidae



*Telmapsylla* on *Avicennia* (Avicenniaceae)

## Triozidae



*Leuronota* on *Weinmannia*  
(Cunoniaceae)



*Neolithus* on *Sapium*  
(Euphorbiaceae)



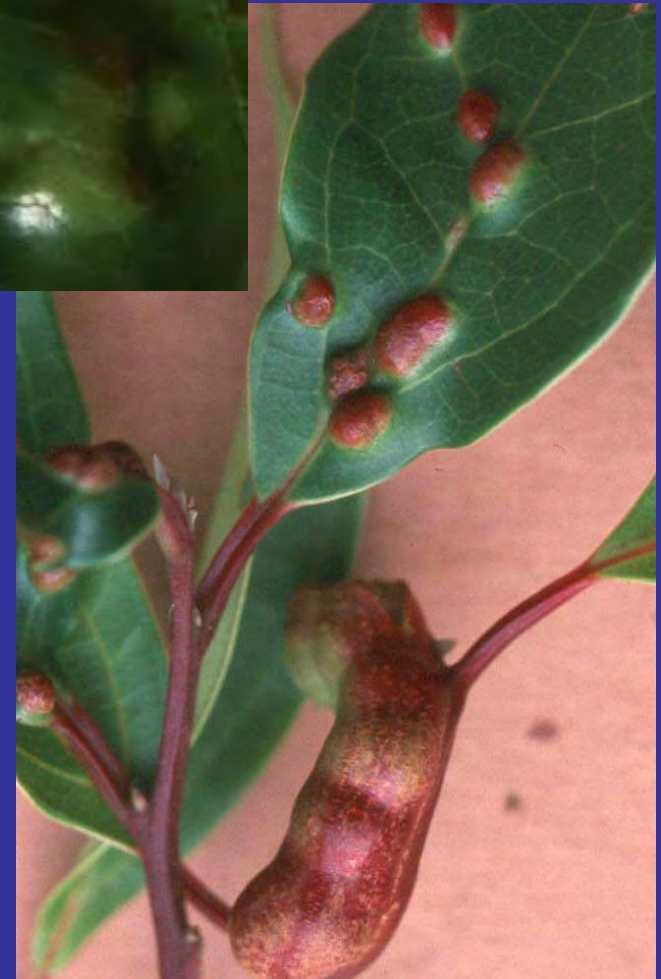
# **Trioziidae**



*Trioza* on  
*Dendropanax*  
(Araliaceae)

*Trichoermes* on  
*Sorocea* (Moraceae)

*Trioza* on  
*Cinnamomum*  
(Lauraceae)





# Pseudococcidae



*Ceiba pentandra* (Bombacaceae)



*Quadrigallicoccus  
lauracearum*  
(Pseudococcidae) on  
*Aiouea* & *Nectandra*  
(Lauraceae)

# Other homopterans



*Viteus* (Phylloxeridae) on *Vitis*



Aphids on *Niphidium ob lanceolatum* (Polypodiaceae)



Idiocerinae (Cicadellidae) on *Myrcia splendens* Myrtaceae





# Coleoptera

<b>FAMILY- # spp.</b>	<b>GENUS</b>	<b>HOST PLANT</b>
Buprestidae-1	<i>Hylaeogena</i>	<i>Tabebuia</i> (Bignoniaceae)
Apionidae-2	undetermined	<i>Aiouea</i> (Laur.), <i>Nissolia</i> (Fabaceae)
Curculionidae-24		
Baridinae	<i>Baris</i>	<i>Bauhinia</i> (Fabaceae)
	<i>Eurhinus</i>	<i>Cissus</i> (Vitaceae)
	<i>Geraeus</i>	<i>Montanoa</i> (Asteraceae)
	<i>Peridenitus</i>	<i>Peperomia</i> (Piperaceae)
	<i>Thanius</i>	<i>Psychotria</i> (Rubiaceae)
Conoderinae	undetermined	<i>Philodendron</i> (Araceae), <i>Ocotea</i> (Lauraceae)
Curculioninae	<i>Camptocheirus</i>	<i>Cinnamomum</i> (Lauraceae)
	<i>Myrmex</i>	<i>Struthanthus</i> (Loranthaceae)
Scolytinae	<i>Scolytodes</i>	<i>Ageratina</i> (Asteraceae)



# Coleoptera





# Baridinae



*Geraeus* on  
*Montanoa*  
(Asteraceae)



*Eurhinus* on *Cissus* (Vitaceae)



*Thanius biennis*

*Psychotria*



*Peridinetus sanguinolentus*  
on *Peperomia* (Piperaceae)



*Hoffmannia*  
(Rubiaceae)



# Curculioninae



*Camptocheirus* (Camarotini)  
on *Cinnamomum* (Lauraceae)



*Myrmex* (Otidocephalini) on  
*Struthanthus* (Loranthaceae)



# Cecidomyiidae



*Acalypha diversifolia*  
(Euphorbiaceae)



*Otopappus*  
(Asteraceae)



*Inga vera* (Fabaceae)



*Struthanthus*  
(Loranthaceae)



*Nectandra membranacea* (Lauraceae)



# Cecidomyiidae



*Palicourea adusta* (Rubiaceae)



*Psychotria monteverdensis* (Rub.)



*Schlegelia* (Scrophulariaceae)



*Theobroma* (Sterculiaceae)



# Cecidomyiidae



*Cleyera theioides* (Theaceae)



Gall in domatia of *Cornus* (Cornaceae)



*Avicennia germinans*





# Chironomidae



*Marathrum*  
(Podostemaceae)



*Iresine diffusa* (Amaranthaceae)



# Tephritidae



*Diplostephium*  
(Asteraceae)



*Buddleja*



*Eutreta on Citharexylum*  
(Verbenaceae)



## Tephritinae

Acrotaeniini: *Tomoplagia*

Dithrycini: *Procecidochoares*, etc.

Eutretini: *Eutreta*

Myopitini: *Neomyopites*



# Agromyzidae



*Iresine* (Amaranthaceae)



*Japanagromyza* on  
*Lonchocarpus* (Fabaceae)

*Schultesianthus* (Solanaceae)



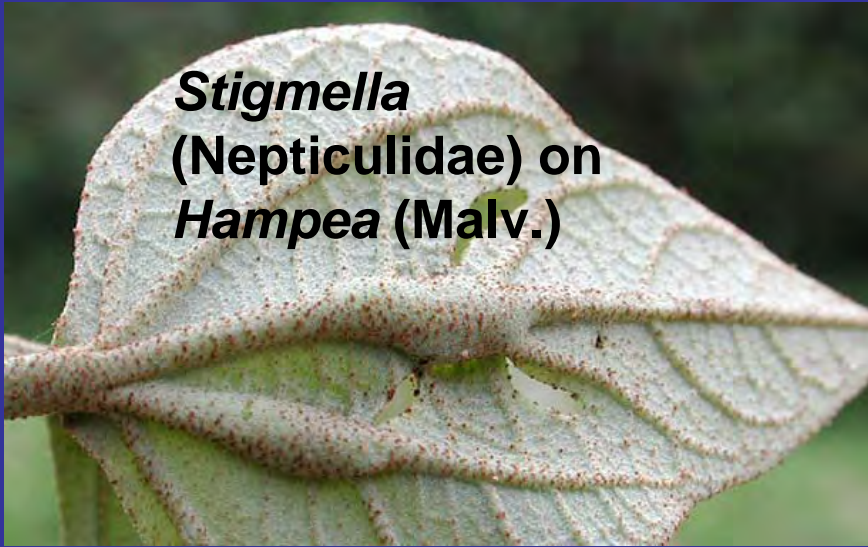
# Lepidoptera

<b>FAMILY</b>	<b># SPP.</b>	<b>HOST PLANTS</b>
Nepticulidae	1	<i>Hampea</i> (Malv.)
Gracillariidae	4	<i>Aegiphila</i> (Verben.), <i>Clusia</i> , <i>Pithecoctenium</i> (Bignon.)
<b>Heliodinidae</b>	1	<i>Iresine</i> (Amaranth.)
Glyphipterigidae	1	<i>Hyptis</i> (Lam.)
Momphidae	50	Primarily Melastomataceae; also <i>Croton</i> (Euphorb.), <i>Cuphea</i> (Lythr.), <i>Hoffmannia</i> (Rub.)
Agonoxeniidae	4	Melastomataceae, <i>Ficus</i>
Cosmopterigid.	11	Primarily Myrsinaceae; also <i>Cupania</i> (Sapind.), <i>Guazuma</i> (Stercul.), <i>Lonchocarpus</i> (Fab.)
Sesiidae	4	<i>Coussarea</i> (Rub.), <i>Curcubitaceae</i> , <i>Phaseolus</i> (Fab.)
Tortricidae	4	<i>Ageratina</i> (Aster.), <i>Monnina</i> (Polygal.), <i>Phaseolus</i> , <i>Rubus</i> (Ros.)
Alucitidae	2	Gesneriaceae
Crambidae	2	<i>Ipomoea</i> (Convol.), <i>Podandrogyne</i> (Cappar.)
Thyrididae	2	<i>Hampea</i> , <i>Sida</i> (Malv.)



# Lepidoptera

*Stigmella*  
(Nepticulidae) on  
*Hampea* (Malv.)



*Gracillariidae*  
on *Clusia*



*Embola*  
(Heliodinidae)  
on *Iresine*



*Glyphipterix* (Glyphipt.)  
on *Hyptis* (Lamiaceae)



# Lepidoptera: Momphidae

*Conostegia oerstediana*



*Blakea*



*Monochaetum*



*Centradenia*



*Cuphea* (Lythraceae)





# Lepidoptera



*Cosmopterigidae* on *Myrsine*



*Alcathoe*  
(Sessiid.) -  
*Phaseolus*



*Lustrala phaseolana* (Tort.) - *Phaseolus*

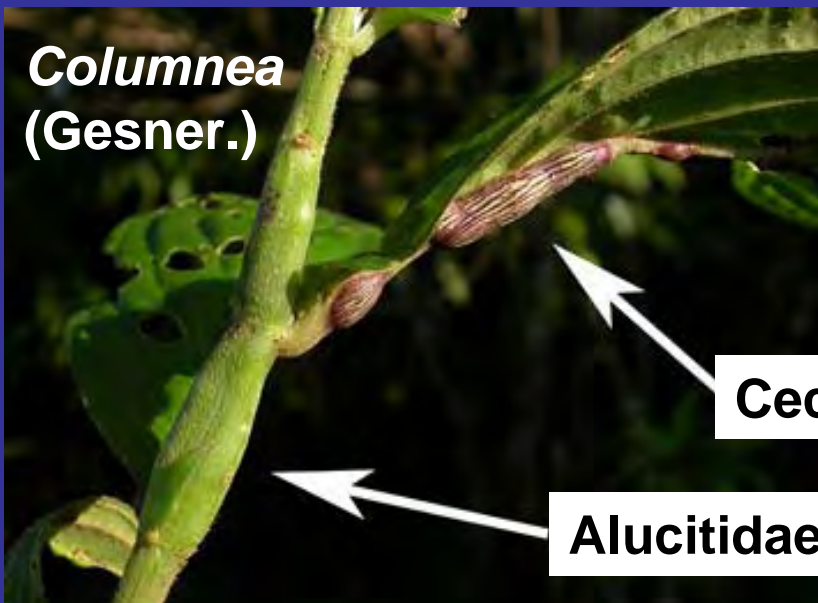


*Seticosta rubicola*  
(Tort.) on *Rubus*



# Lepidoptera

*Columnnea*  
(Gesner.)



Cecidomyiidae

Alucitidae

*Schacontia*  
(Crambid.) on  
*Podandrogyne*  
(Capparid.)



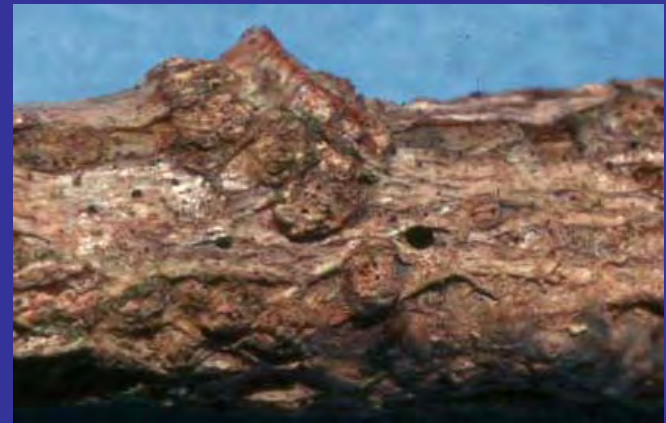
Alucitidae on *Paradrymonia*



*Meskea*  
(Thyrididae)  
on *Sida*  
(Malvaceae)



# Cynipidae on *Quercus copeyensis*



# Chalcidoidea

- Agaonidae
- Eulophidae - 4
- Eurytomidae - 4
- Tanaostigmatidae - 1

Eurytomidae:  
*Eurytoma* and  
*Prodecatoma*  
on Myrtaceae



Eulophidae (Tetrastichinae):  
*Andira*, *Blakea*, *Eugenia*

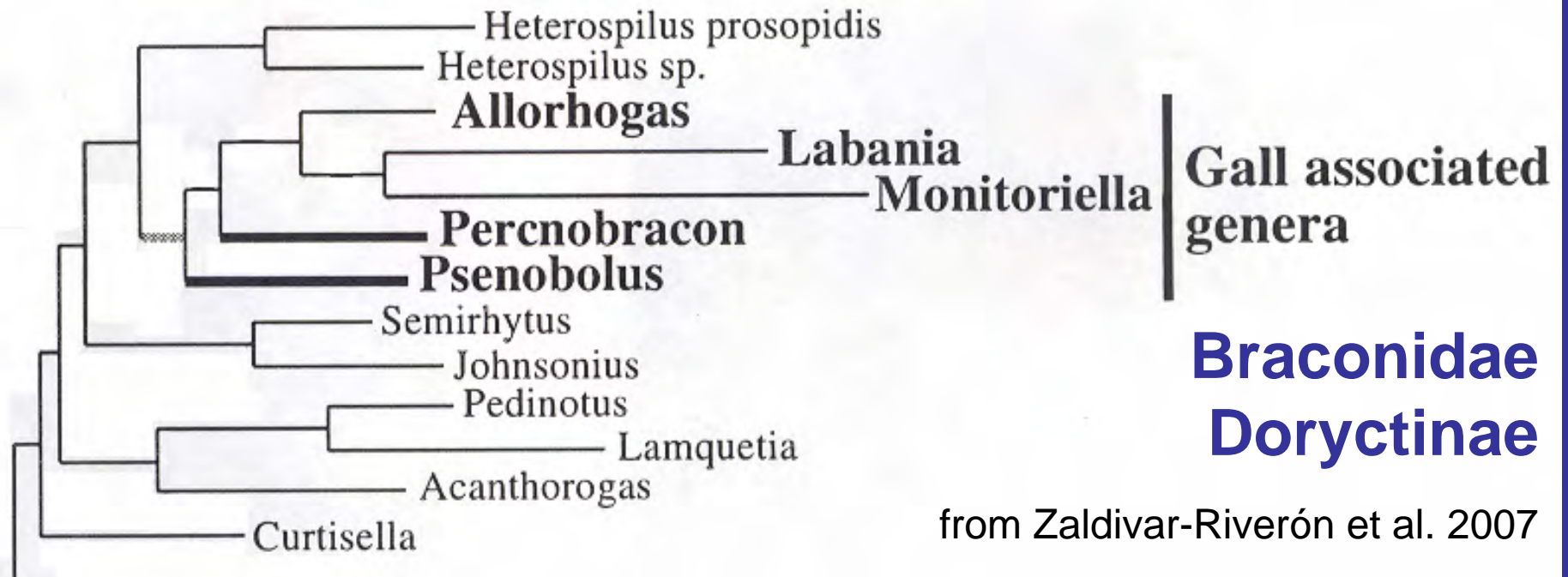


Tanaostigmatidae on  
*Eschweilera neei* (Lecythidaceae)



# Mystery gall on *Psidium guineense*





*Psenobolus:*  
 in fig syconia

*Percnobracon:*  
 Cecidomyiid and  
 eurytomid galls on  
*Prosopis*; bruchids on  
*Caesalpinia*



# Braconidae



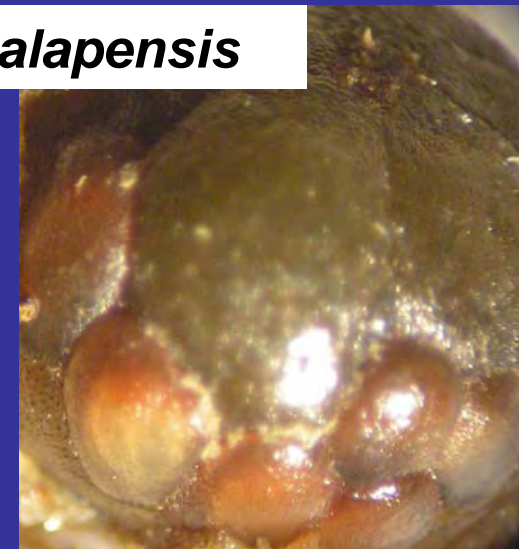
*Monitoriella* on  
*Philodendron*  
(Araceae)



*Labania*  
on *Ficus*



*Conostegia xalapensis*



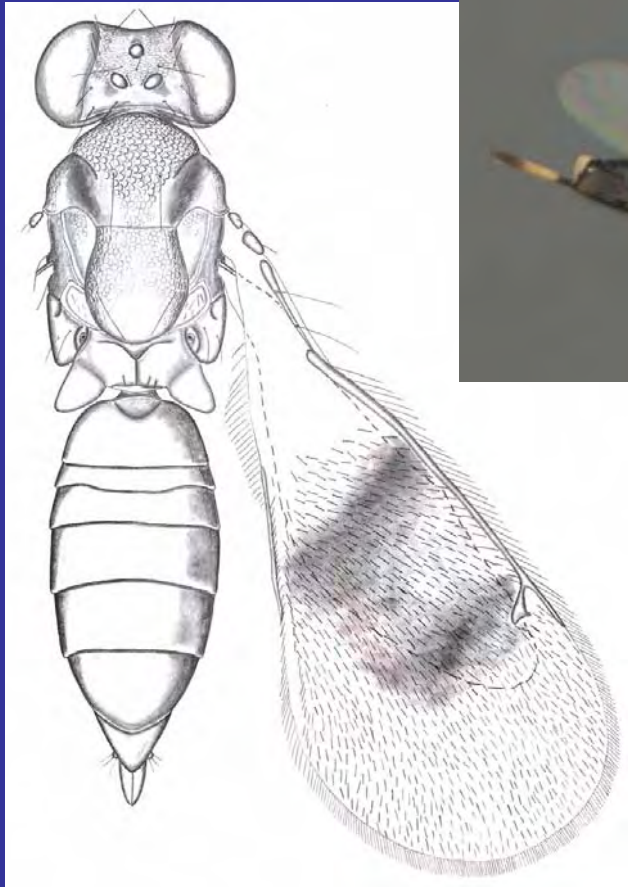
*Allorhogas* on Fabaceae, Melastomataceae, Rubiaceae

# How the Neotropical region differs from the Holarctic region

- Hemiptera: aphids are less diverse and psyllids are more diverse
- Coleoptera: Ceutorhynchinae are less diverse and Baridinae are more diverse
- Lepidoptera: Momphidae are more diverse
- Hymenoptera: Gall-forming sawflies are absent
- Hymenoptera: Gall-forming braconids are probably more diverse than gall-forming Cynipidae



# Parasitoids found in various types of galls



*Chrysonotomyia* (Eulophidae: Entedoninae)

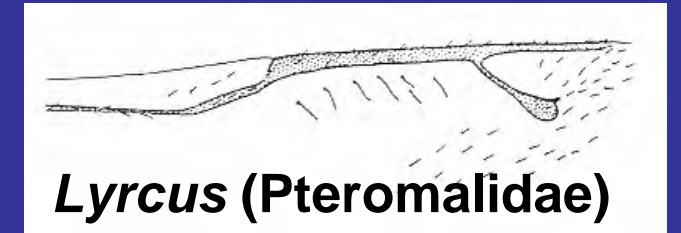


*Eupelmus*

**Tetrastichinae  
(Eulophidae)!**



*“Eurytoma”*



*Lyrcus* (Pteromalidae)



*Torymus*

# Parasitoids restricted to cecidomyiid galls

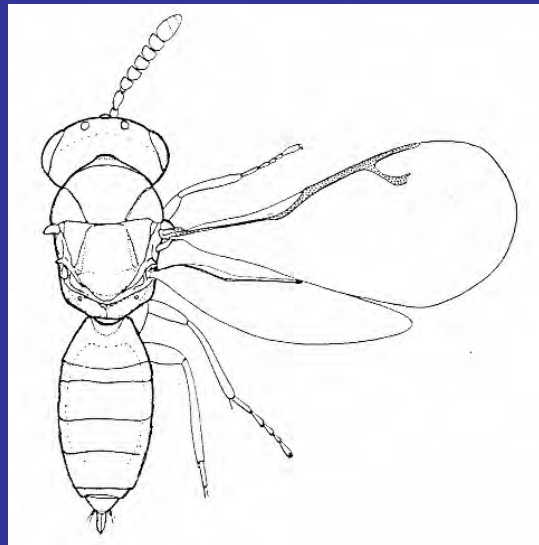


**Ceraphronidae**

*Astichomyia*  
and *Omphale*  
(Eulphidae:  
Entedoninae)



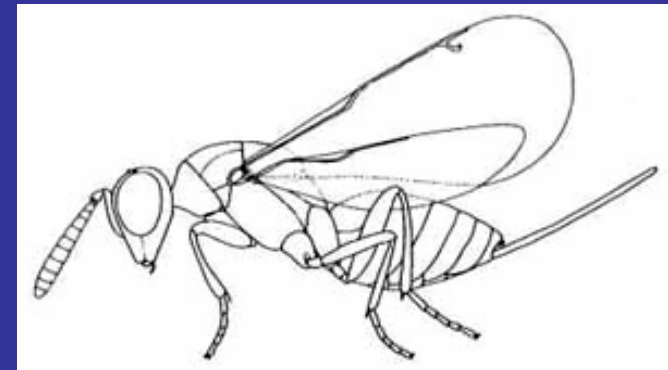
**Platygastriidae**



***Gastracanthus* (Pteromal.)**



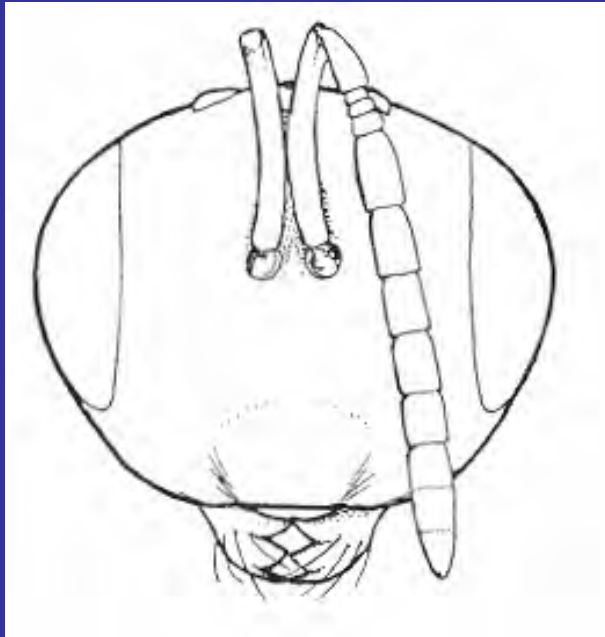
***Rileya* (Eurytomidae)**



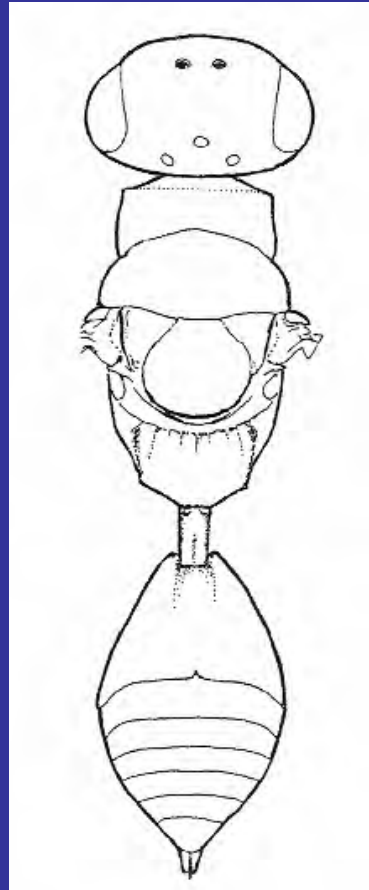
***Torymoides* (Torymidae)**



# Parasitoids (Pteromalidae) restricted to agromyzid and tephritid galls



*Heteroschema*



*Syntomopus*

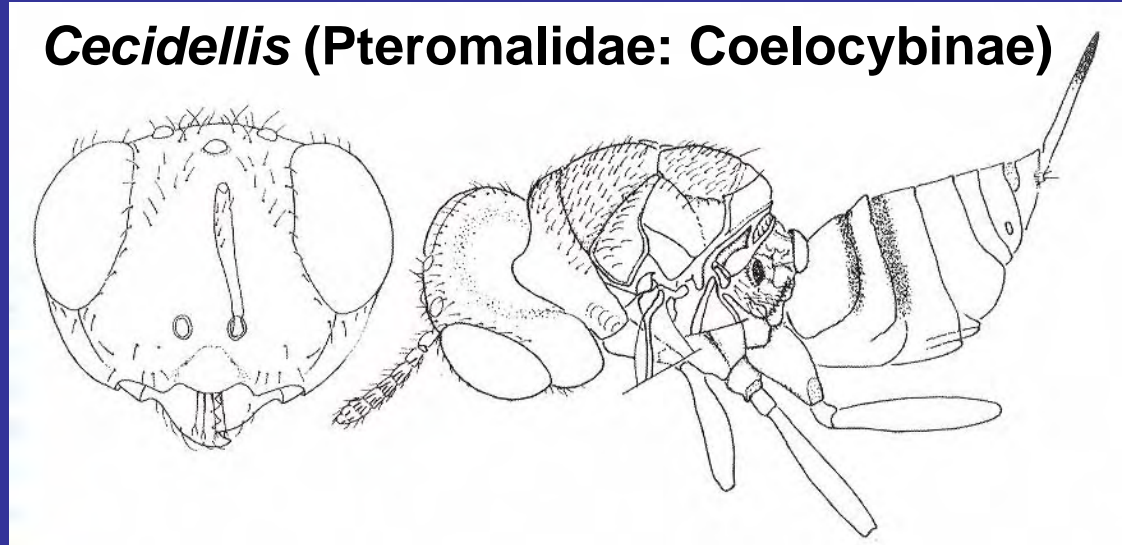
*Thinodytes*

# Parasitoids restricted to hymenopteran galls (or hymenopteran inquilines)

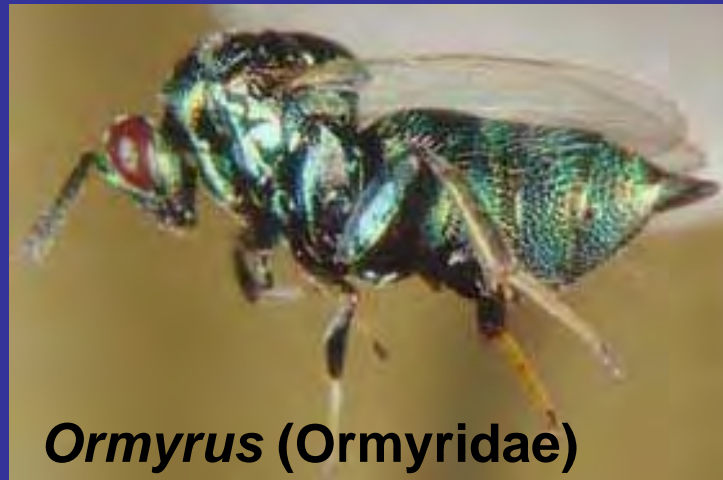
*Sycophila* (Eurytomidae)



*Cecidellis* (Pteromalidae: Coelocybinae)



*Ormyrus* (Ormyridae)





# Parasitoids restricted to lepidopteran galls



Momphid gall on  
*Conostegia oerstediana*

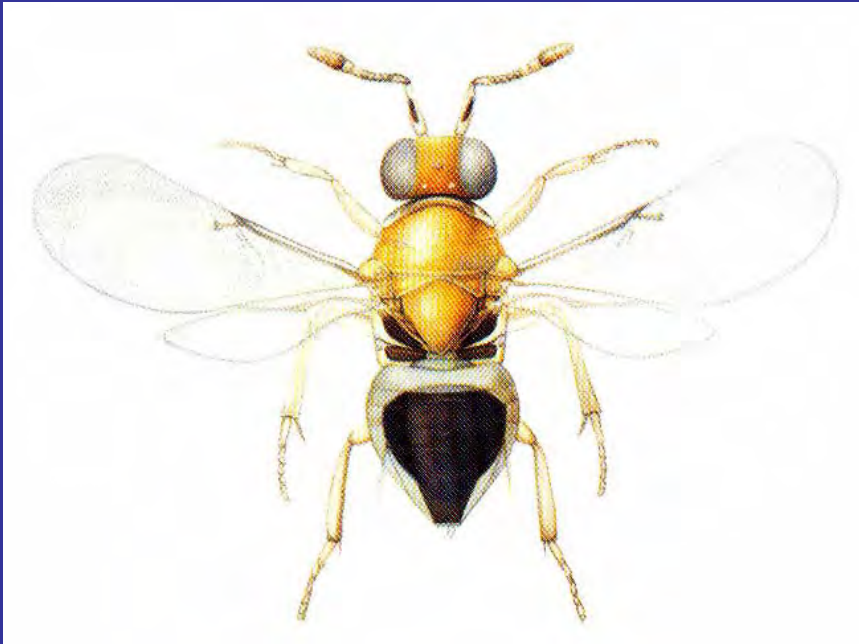
## Ichneumonidae: Pimplinae

*Calephialtes* (also from Curculionidae), *Clydonium*, *Scambus* (also from Tephritidae), *Zonopimpla*

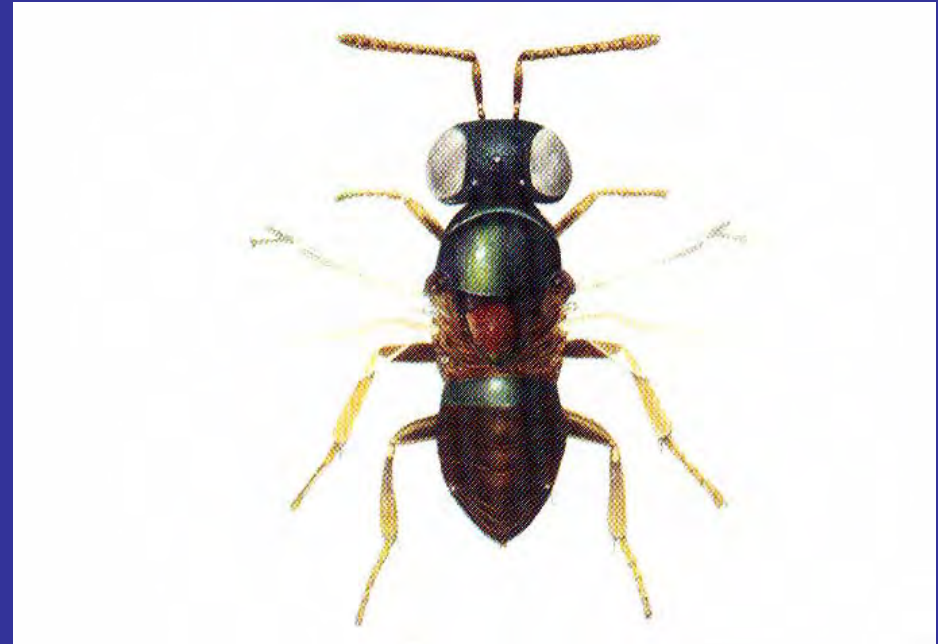
## Others

Copidosomatini (Encyrtidae), Banchinae (Ichneumonidae),  
Cheloninae (Braconidae)

# Parasitoids (Encyrtidae) restricted to psyllid galls



*Metaphycus on Dendropanax*



*Psyllaephagus on various*

*Caldencyrtus on Cinnamomum*  
*Trechnites on Clethra*





**Muito obrigado**