



Diversity and biology of gall-inducing Lepidoptera in Costa Rica

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Galls induced by Lepidoptera

range from simple inconspicuous swellings to complex tissue and organ modifications, including abnormal internal cyst growths without external swelling and organ regrowth.

Gall tissues

By dissecting the galls, one can find highly differentiated tissue layers or simply no differentiation.

Gall induction

Usually, Lep. galls are induced by the larva hatching from an egg laid on host plant surface. The mechanism remains unknown.



Possible general mechanisms, from observations:

1. Mechanical damages made by feeding
2. Silk spun in chamber
3. Liquid secreted from the spinneret and injected in surrounding tissue
4. Frass (fecal excrement)

Methodology

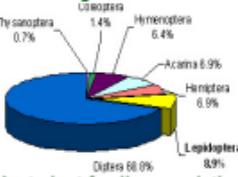
For the past five years, galls induced by Lepidoptera were collected across Costa Rica. Some of the major investigation sites are listed in the table.

Sites	Elevation	Habitat type	sp. #
La Selva OTS Station	0-500m	lowland rainforest	4
ACG Santa Rosa Station	0-500m	lowland dryforest	3
El Ceibo Station, San Ramón	500-1000m	low to mid-premountain rainforest	29
San José, El Zurqui	1000-1500m	mid to high premountain rainforest	21
Monteverde, Vara Blanca	1500-2500m	mid-elevation cloud forest	30
Cuericí, Villa Mills	2500-3200m	high elevation cloud forest	16
Torre, Chirripó	3200-3800m	"paramo"	0

Diversity

In Costa Rica, approximately 9% of galls are induced by Lepidoptera. In Costa Rica approximately 1100 arthropod-induced galls have been recorded (Hanson & Gómez-Laurito 2004).

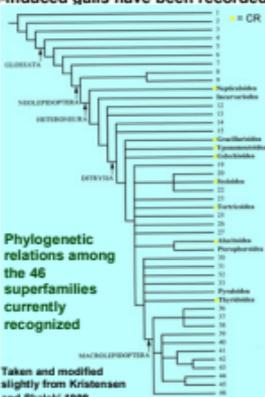
Distribution of arthropod-induced galls in Costa Rica



In Costa Rica, approximately 100 species of gall-inducing Lepidoptera belonging to at least 10 families and 8 superfamilies have been found.

Miller (2004) reports some 323 (176 identified) belonging to at least 20 families from the world, including two species from Costa Rica.

They were found on ca. 80 species belonging to 21 plant families, all dicots.



Taken and modified slightly from Kristensen and Skalski 1995

Galling is unknown in butterflies or any other lineage of Macrolepidoptera.

The galls were found primary on stems, leaf veins, and leaf petioles. Others were found on flowers, fruits, and roots.

Species number among families in Costa Rica

Family	# sp.
Nepticulidae	1
Gracillariidae	3
Glyphipterigidae	1
Elachistidae	4
Coleophoridae	50+
Cosmopterigidae	10
Sesilidae	5
Tortricidae	5
Alucitidae	3
Thyrididae	1
unknown	12

More than half of these lepidopterans are undescribed species of *Mompha* HÜBNER (Coleophoridae: Momphinae) nearly all of which occur on Melastomataceae.

Host plant family association

Plant Fam.	All leps	Only Mompha	Sterculiaceae	2	0
Melastomataceae	50	47	Asteraceae	1	0
Myrsinaceae	12	0	Boraginaceae	1	0
Gesneriaceae	5	0	Curcubitaceae	2	0
Malvaceae	4	0	Lamiaceae	1	0
Fabaceae	4	0	Lythraceae	1	1
Clusiaceae	3	0	Polygalaceae	1	0
Solanaceae	3	0	Rosaceae	1	0
Amaranthaceae	2	2	Sapindaceae	1	0
Moraceae	2	0	Urticaceae	1	0
Rubiaceae	2	1	Vernaceae	1	0

Biology

Many inducers spend their entire larval and pupal stages inside their galls, while others pupate away from the gall.

As in general, all of these gallers are mono- or stenophagous, and some could be potential biological control agents for invasive weeds.

