Goldenrod Galls and Interspecific Relationships
Ball Gall

• Observed in Lab - size, shape, color, etc.

• Questions:
  • Purpose/Function?
  • Holes?
  • Size/Color Differences?

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Ball Gall

Hypotheses (for purpose):

• Seed production
• Storage of food or water
• Response to disease
• Insect home
Experiment

- Cut Open Gall
- Found Larva Inside
- Conclusion: Gall is insect home.
- Insect home hypothesis supported
- Other hypotheses falsified
Ball Gall Fly Story

1. In spring adult fly lays egg on stem. Secretions from developing larva cause gall to form around it.
Goldenrod Life Cycle

2. Larva lives in gall throughout summer and fall

3. Larva changes to pupa and winters in dead gall.
Small Hole?

4. Adult fly emerges in spring creating small (1-2 mm) round hole.
Parasite-Host Relationship

- One species (parasite) lives in or on another (host)
- Parasite usually smaller than host.
- Parasite usually doesn’t kill host.
- One benefits, one is harmed.
- e.g. ball gall fly and goldenrod
Types of Goldenrod Galls

Other insects cause other galls on goldenrod.

- Elliptical Gall
- Ball Gall
- Bunch Gall

elliptical gall moth

rosette gall midge

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Galls on Other Plants

Galls on Maple Leaf

Oak Leaf Gall
Parasitic Gall Fly Wasp

- Wasp larva eats and kills gall fly larva
- Find an empty, irregular cavity inside gall.
- Thus a parasite can have a parasite.
- In this case, the parasitic gall fly wasp kills the gall fly larva.
Large Hole?

Birds open gall and eat larva.

Carolina chickadee

Downy woodpecker

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Predator-Prey

- One species (predator) kills and eats other species (prey)
- Predator usually larger than prey
- One benefits and one is harmed
- e.g. Bird eating gall fly larva.
Flowers and Plant Sex

Male anther (makes pollen which contains sperm)

Female pistil
Initially contains egg,
When fertilized, egg develops into seed. Thus seeds always found where flowers were.
Pollinators

Transfer pollen from one flower to next.

White Faced Hornet  Paper Wasp  Honey Bee
Mutualism

• Relationship in which both species benefit
• e.g. Bug gets food, plant has pollen transferred
Ambush and Assassin Bugs

Ambush Bug

Assassin Bug

Kill and eat pollinators
Thus predator-prey relationship.
Competition

• 2 or more species use same resource
• Both harmed.
• e.g. Ambush and assassin bug
• e.g. Hornet and paper wasp
• e.g. Ball gall fly and elliptical gall moth
Commensalism

• One species benefits - other unaffected
• e.g. Another bug moves in after gall ball fly leaves. Goldenrod is already dead, ball gall fly has left so only the new species benefits.
Herbivory

- Animal eating plant
- e.g. Aphid sucking plant juices
- e.g. Striped goldenrod beetle eating leaves.