Pollinator Partnership — Lepidoptera

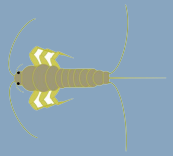
With Steve Sass and Amanda Smith from Indiana Nature LLC

IN NATURE

POLLINATOR PARTNERSHIP

Protect their lives. Preserve ours.

Insect Order *Lepidoptera*



Zygentoma
Silverfish

Microcoryphia
Bristletails

Odonata
Dragon, Damselflies

Zoraptera

Dermaptera
Earwigs

Lepidoptera
Butterflies, Moths

Neuroptera
Antlions, Lacewings, etc.

Ephemeroptera
Mayflies

Plecoptera
Stoneflies

Orthoptera
Grasshoppers, Crickets, etc.

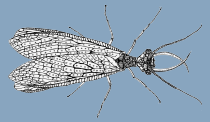
Phasmida
Walking Sticks

Mantodea
Mantids

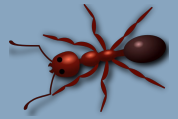
Blattodea
Roaches, Termites

Diptera
Flies

Hemiptera
True Bugs



Megaloptera
Dobsonflies & Fishflies



Hymenoptera
Ants, Bees, Wasps, Sawflies

Trichoptera
Caddisflies

Mecoptera
Scorpionflies

Coleoptera
Beetles

Siphonaptera
Fleas

Order Lepidoptera

Papilionoidea (Butterflies & Skippers)

Adeloidea (Fairy Moths)

Aclucitoidea (Many Plumed Moths)

Bombycoidea (Silkworms, Sphinx & Royals)

Choreutoidea (Metalmark Moths)

Copromorphoidea (Fruitworm Moths)

Cossoidea (Carpenter and Leopard Moths)

Drepanoidea (Hooktips and False Owlets)

Epermenioidea (Fringe-tufted Moths)

Eriocranioidea (Eriocraniid Moths)

Galacticoidea (Galacticid Moths)

Gelechioidea (Twirler Moths)

Geometroidea (Geometrids and Swallowtails)

Gracillarioidea (Ribbon Cocoon & Leaf Blotch Miners)

Hepialoidea (Ghost Moths)

Hyblaeoidea (Teak Moths)

Lasiocampoidea (Tent Caterpillars)

Micropterigoidea (Mandibulate Archaic Moths)

Mimallonoidea (Sack-bearer Moths)

Neopseustoidea (Archaic Sun Moths)

Nepticuloidea (Pygmy Leafmining Moths)

Noctuoidea (Owlets and Kin)

Pterophoroidea (Plume Moths)

Pyraloidea (Pyralid and Crambid Moths)

Schreckensteinioidea (Bristle-legged Moths)

Sesioidea (Clearwing Moths)

Thyridoidea (Window-winged Moths)

Tineoidea (Tubeworm and Bagworm Moths)

Tischerioidea (Trumpet Leafminer Moths)

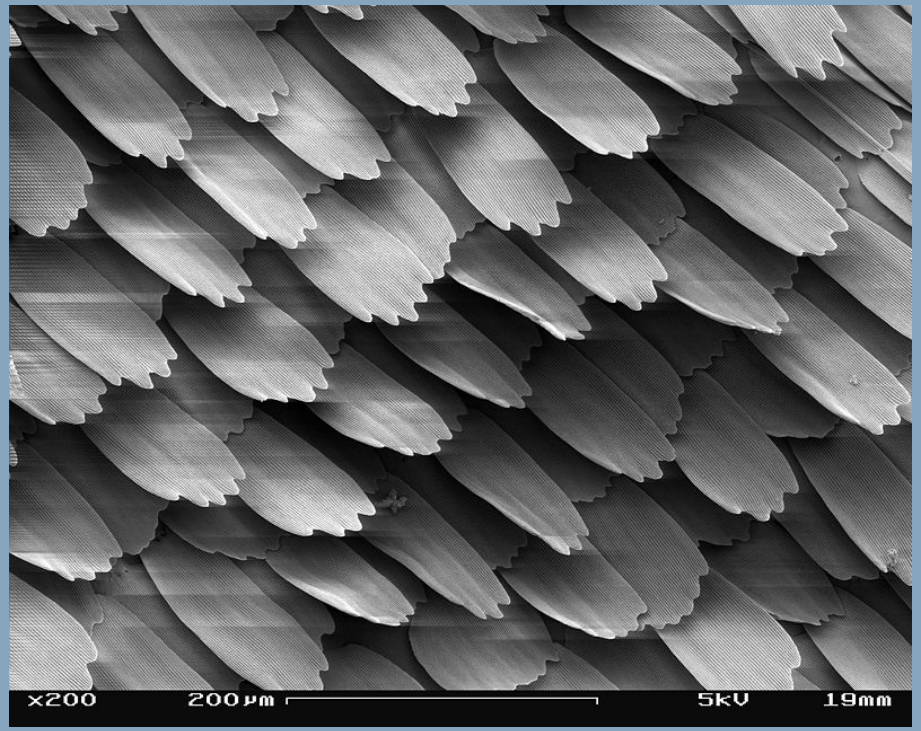
Urodoidea (False Burnett Moths)

Yponomeutoidea (Ermine Moths)

Zygaenoidea (Flannel, Slug and Leaf Skeletonizers)

The Order *Lepidoptera*

- *Lepidoptera* from Greek words *lepis* meaning "scales," and *pteron* meaning "wings"
- Wings covered by millions of tiny scales that overlap like roof shingles
- Scales are tiny, flattened hairs that are powdery when crushed
- Wings are transparent

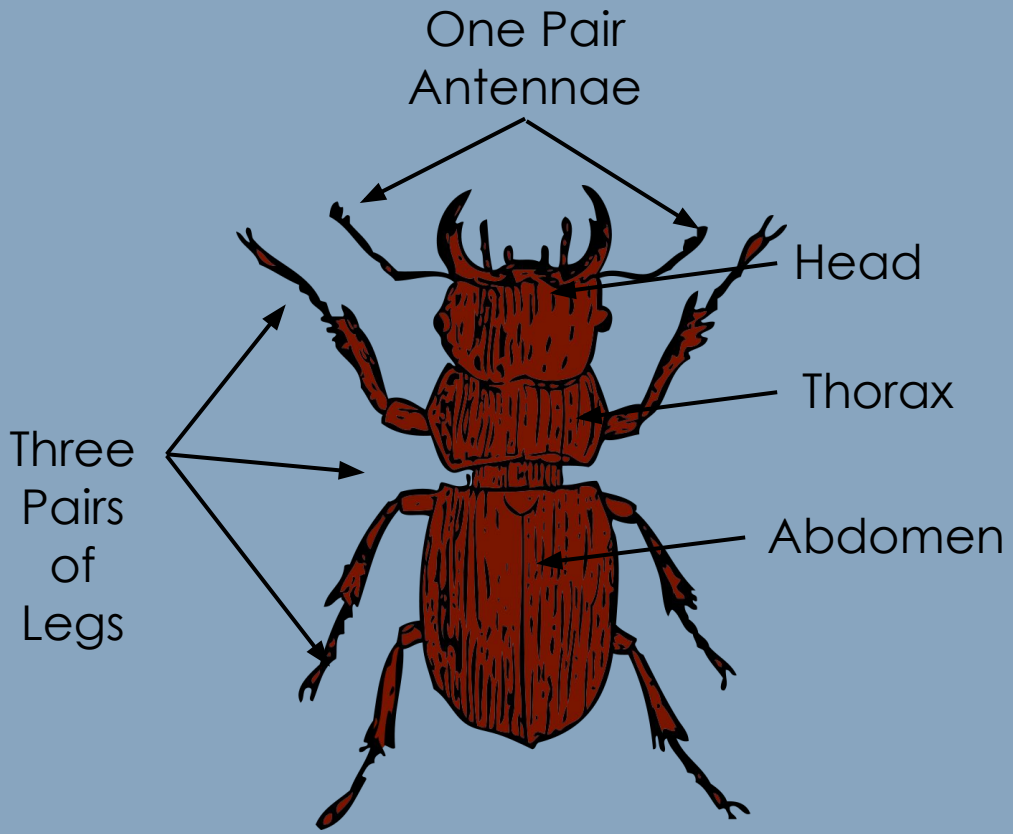


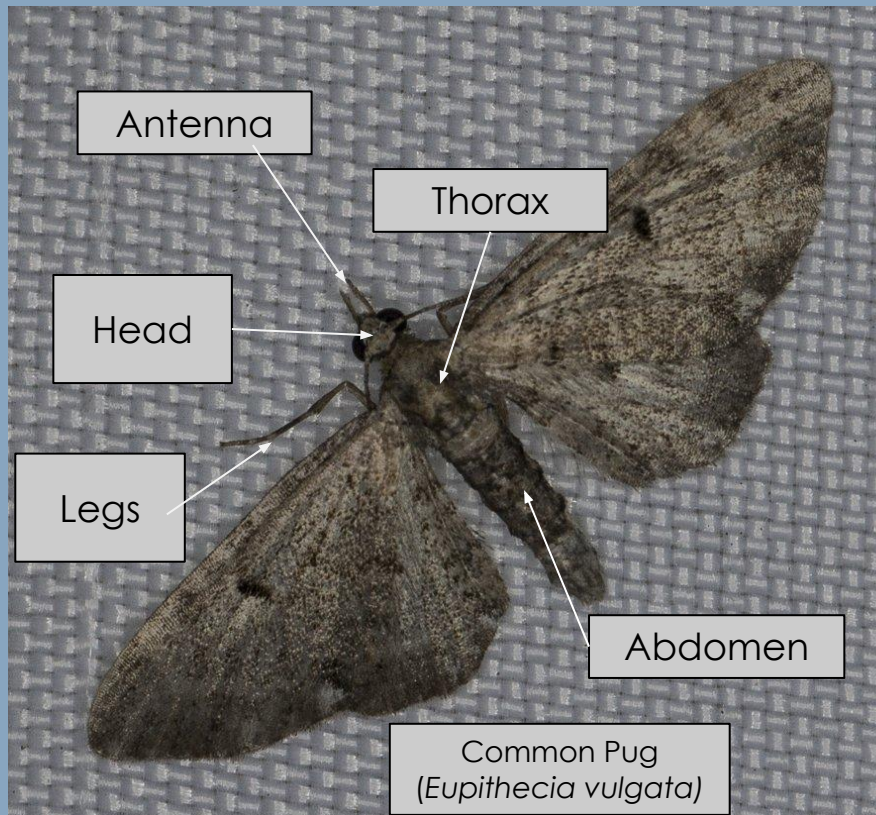

Brian Lowry

Why are they called Butterflies

Witches, dairy-lovers, and parking tickets

Insect Morphology

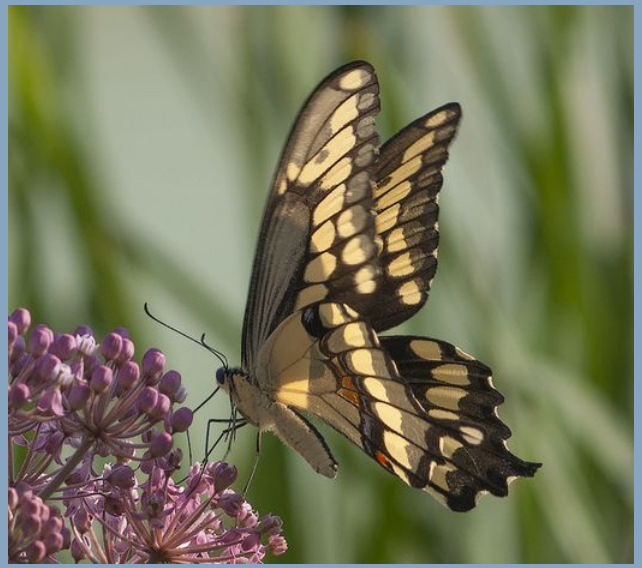




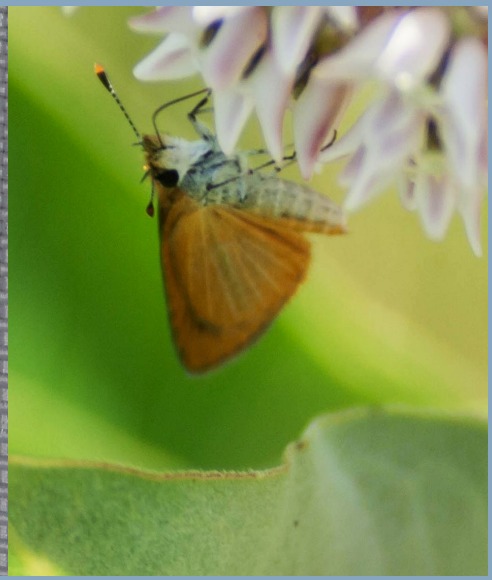
Butterflies vs. Moths vs. Skippers

Body Size vs. Wing Size

Butterflies: Tend to have relatively small bodies and large wings



Moths and Skippers: Tend to have relatively large bodies and small wings

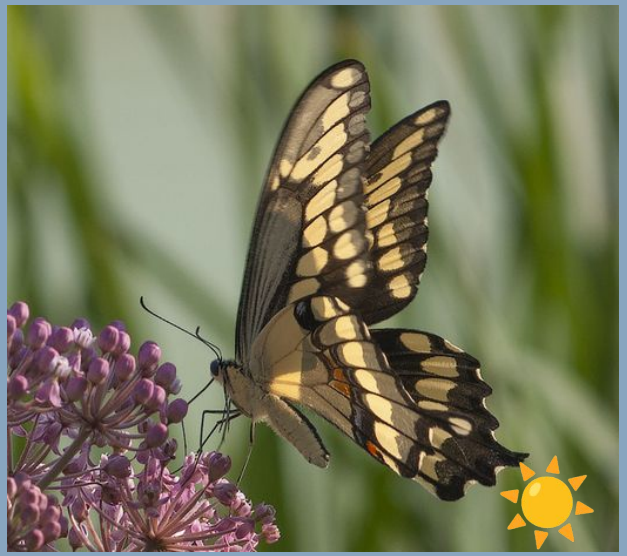


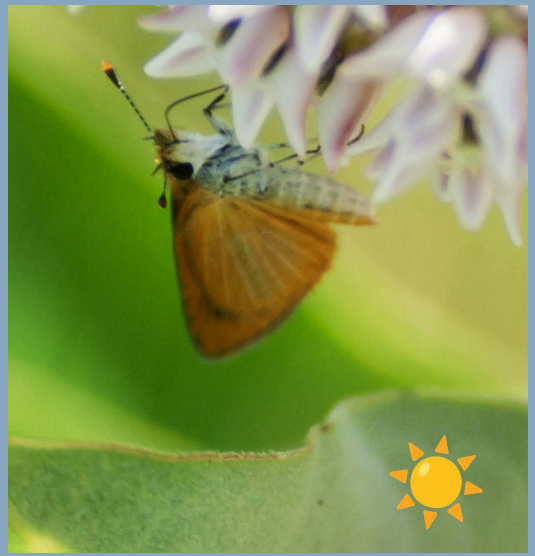
Antennae

Butterfly:
Clubbed

Skipper:
Clubbed

Moth:
Not Clubbed

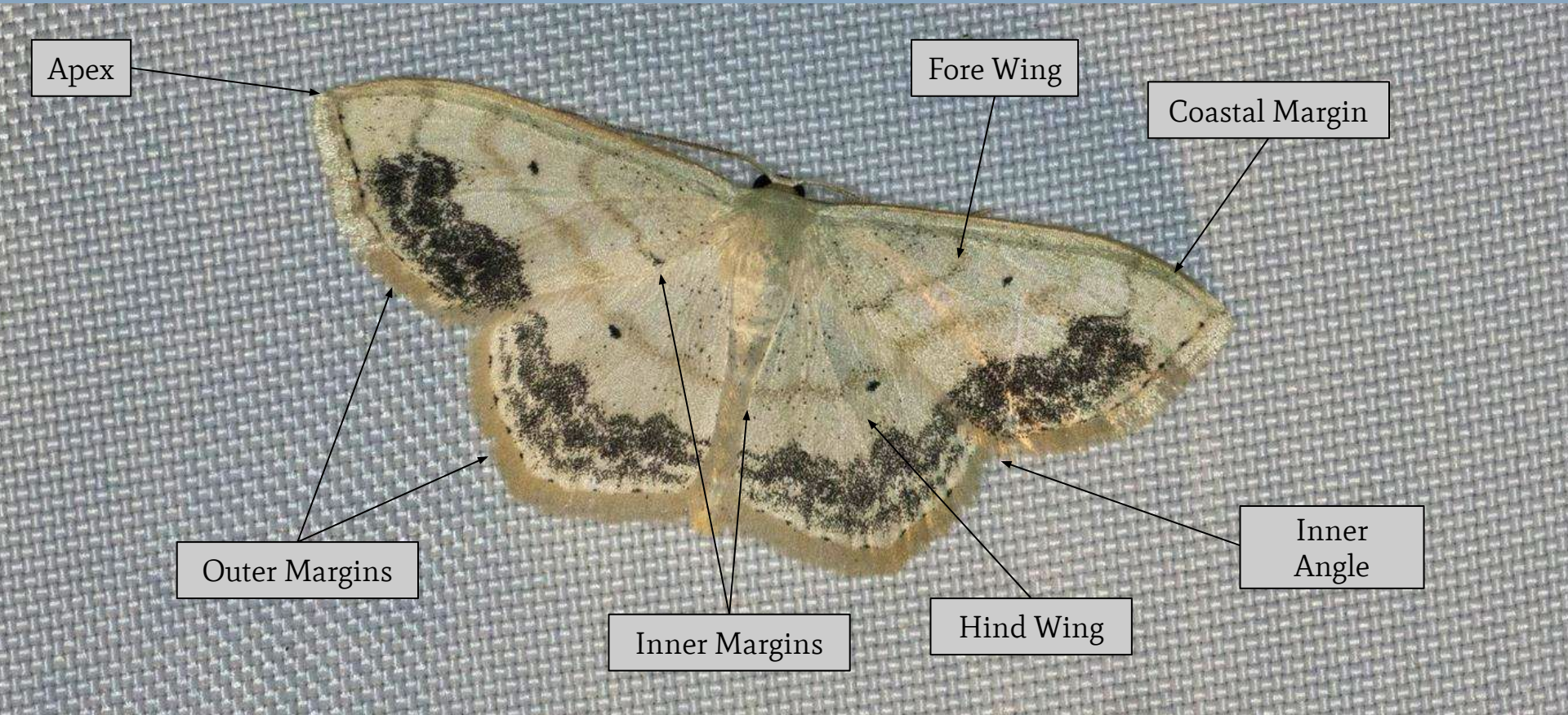




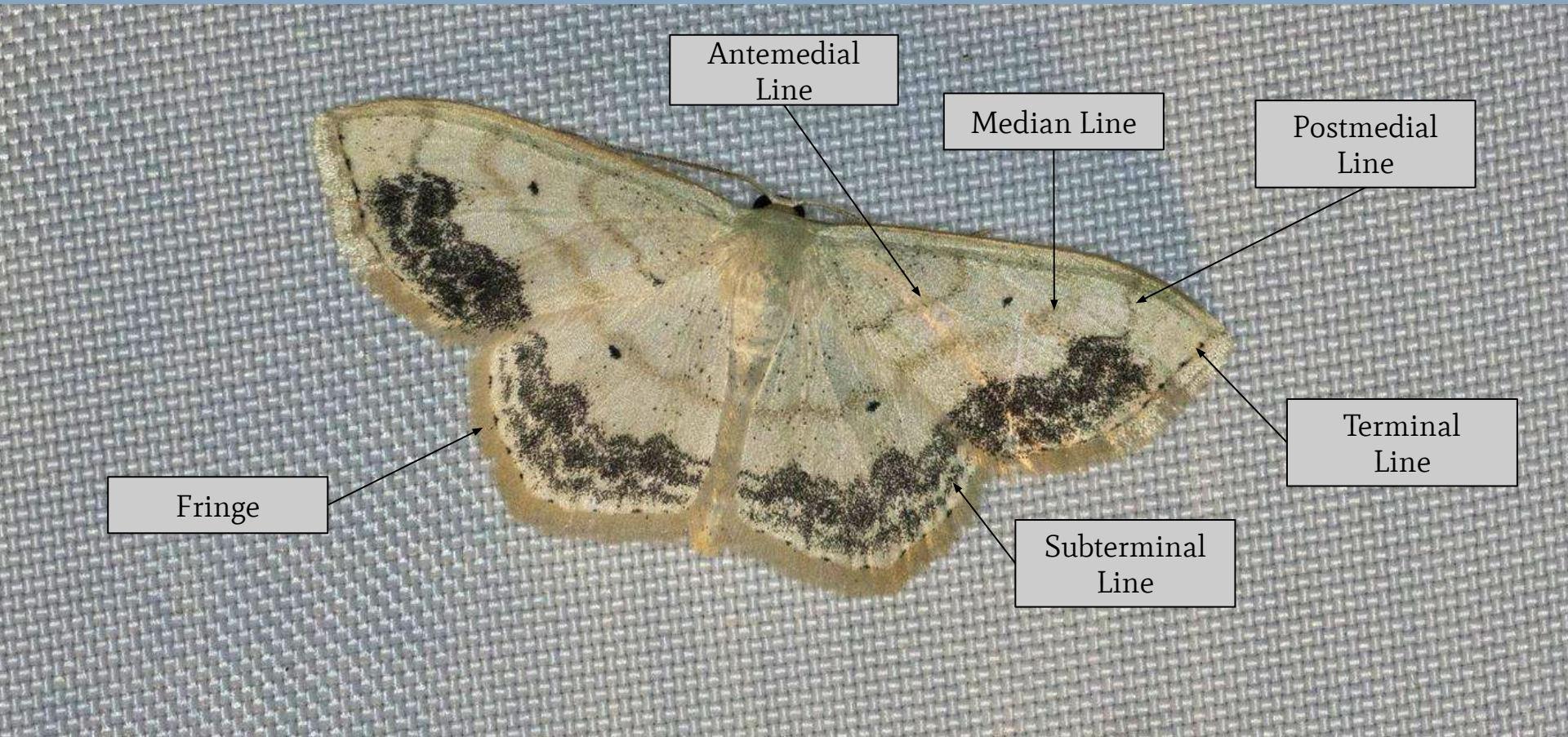
Antennae


Filiform Antennae
Bipectinate Antennae
Pectinate Antennae
Quadripectinate Antennae

Wings and Edges

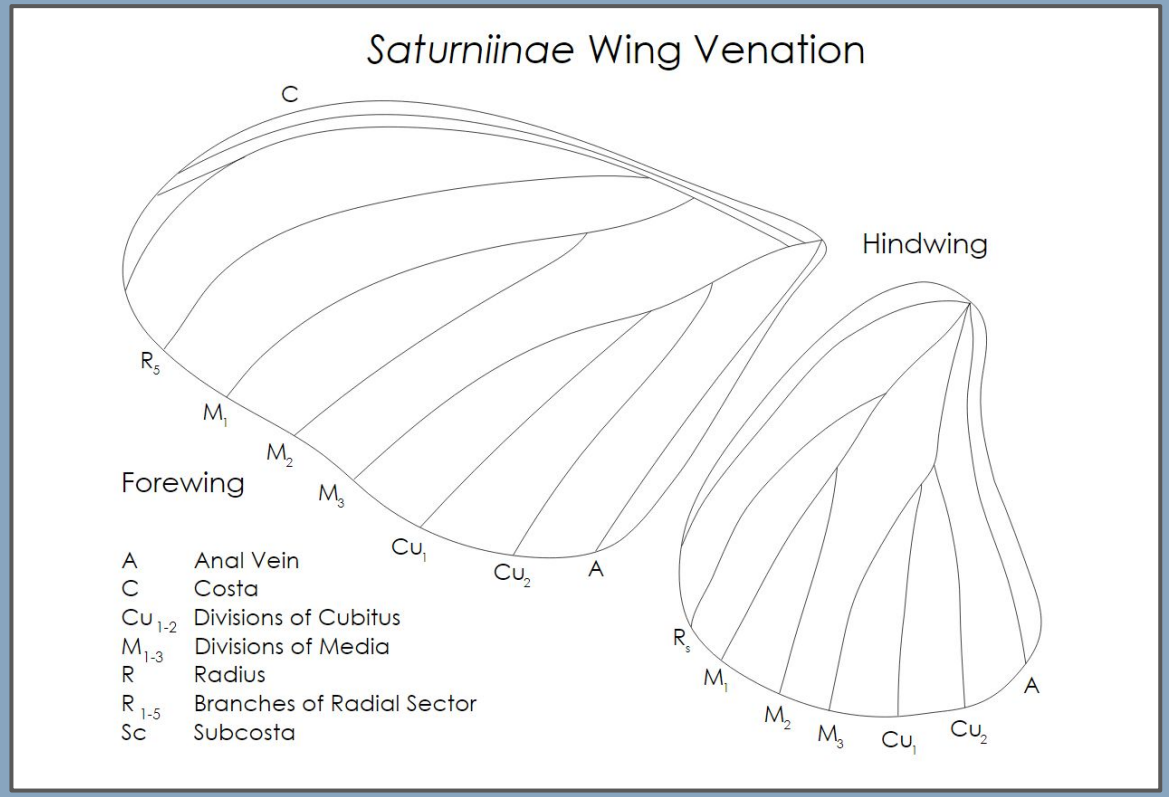


Wing Lines

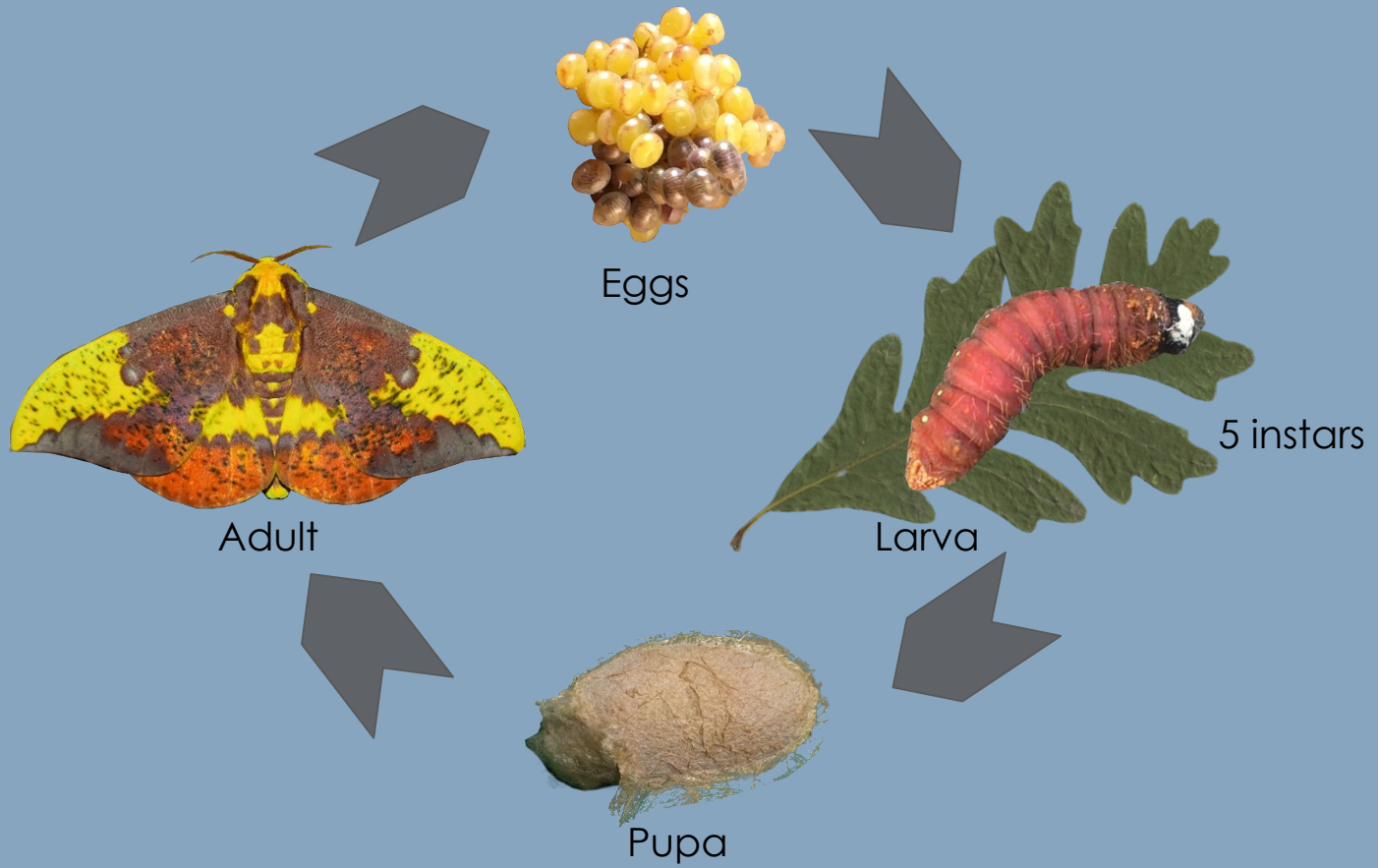

Antemedial Line
Median Line
Postmedial Line
Terminal Line
Fringe
Subterminal Line

Wing Venation

"Comstock–Needham System"



Life Cycle — Complete Metamorphosis



Dietary Specialization and Host Plants

Monarch
(*Danaus plexippus*)

Host Plants

Black Cherry
(*Prunus serotina*)

Hydrogen Cyanide
(HCN)

+

=

Generalist

+

Specialist

=


Virginia Creeper Sphinx
(*Darapsa myron*)
Chris Joll Photo


Showy Emerald
(*Dichorda iridaria*)


Basswood Leafroller
(*Pantographa limata*)


Canadian Sphinx
(*Sphinx canadensis*)

Degrees of Specialization (*Bombycoidea*)

(#) Number of host genera found in Indiana

Least at Risk

Most at Risk

Specialists — Extreme Specialists

Cecropia (74)

Io (60)

Polyphemus (41)

White-lined Sphinx (38)

Imperial (26)

Luna (26)

Blinded Sphinx (25)

Promethea (25)

Regal Moth (19)

Spotted Apatelodes (19)

Laurel Sphinx (13)

Carolina Sphinx (13)

Two-spotted Sphinx (12)

Orange-tipped Oakworm (9)

Snowberry Clearwing (8)

Hummingbird Clearwing (5)

Rosy Maple Moth (4)

Pawpaw Sphinx (4)

Lettered Sphinx (4)

Virginia Creeper Sphinx (3)

Pandora Sphinx (3)

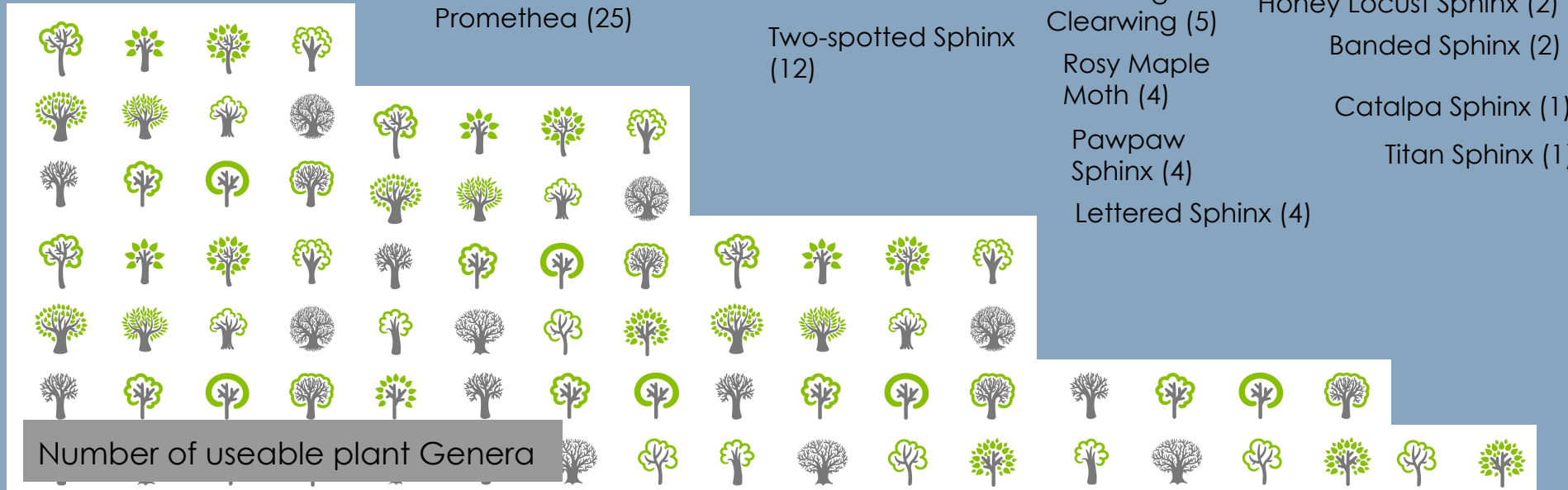
Ash Sphinx (2)

Honey Locust Sphinx (2)

Banded Sphinx (2)

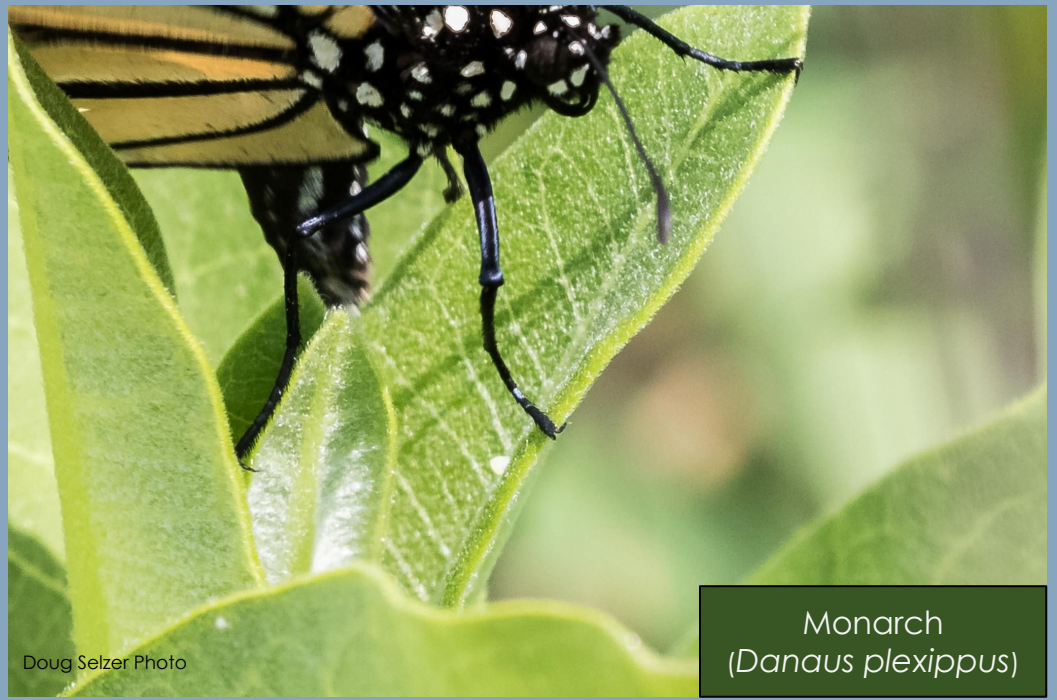
Catalpa Sphinx (1)

Titan Sphinx (1)

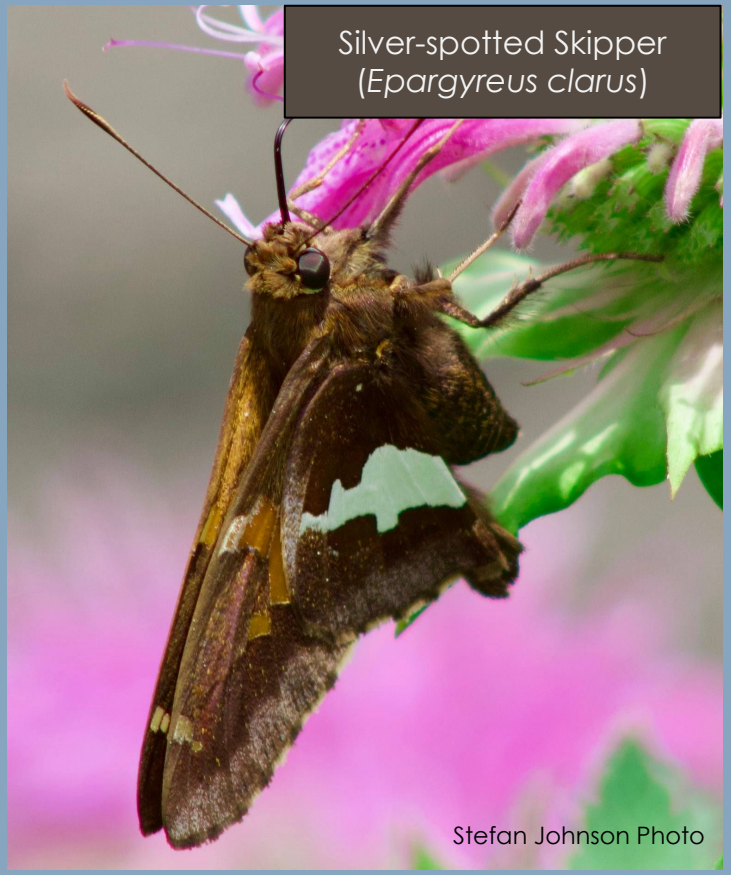


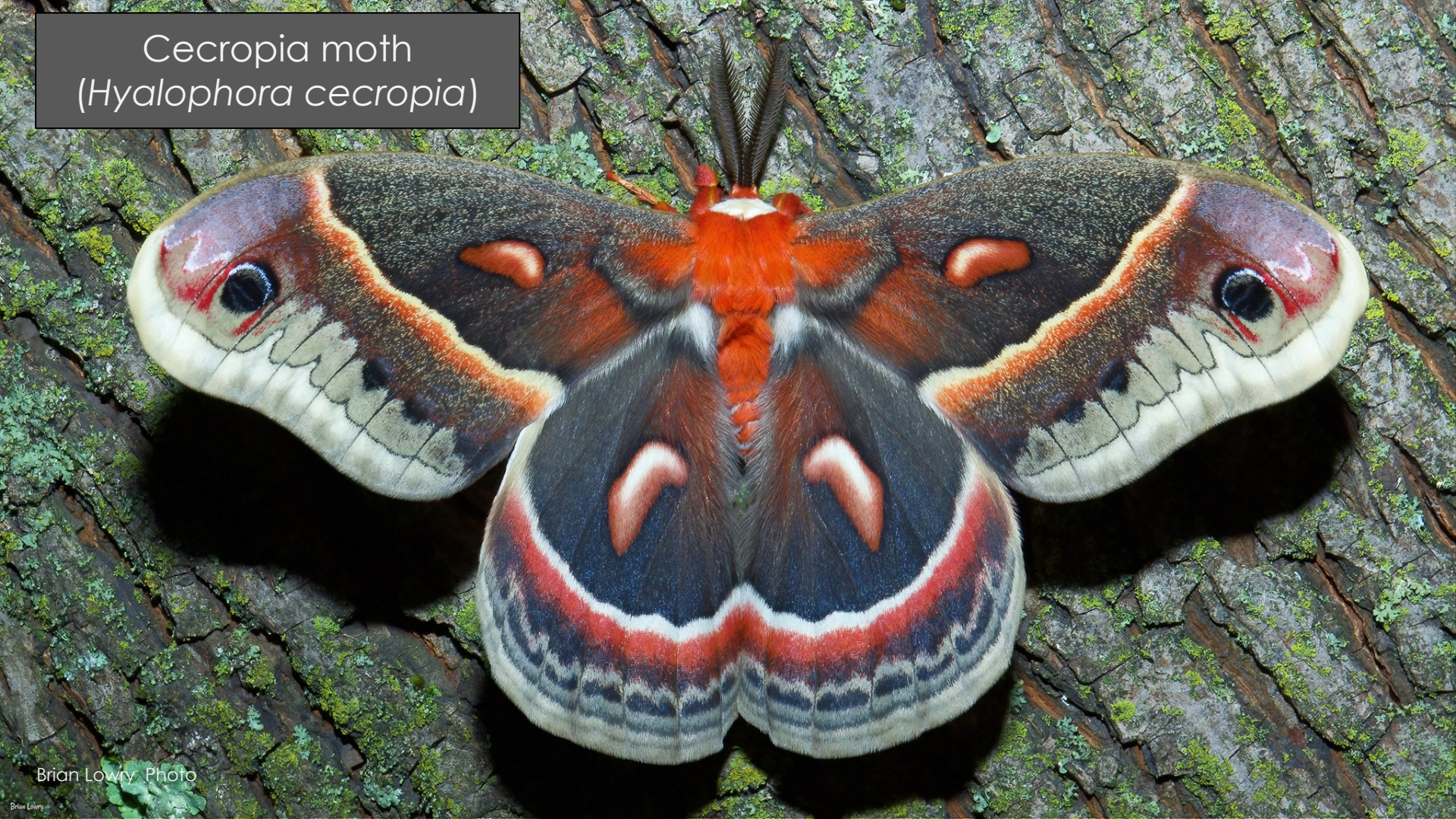
Number of useable plant Genera

How do they find Host Plants?

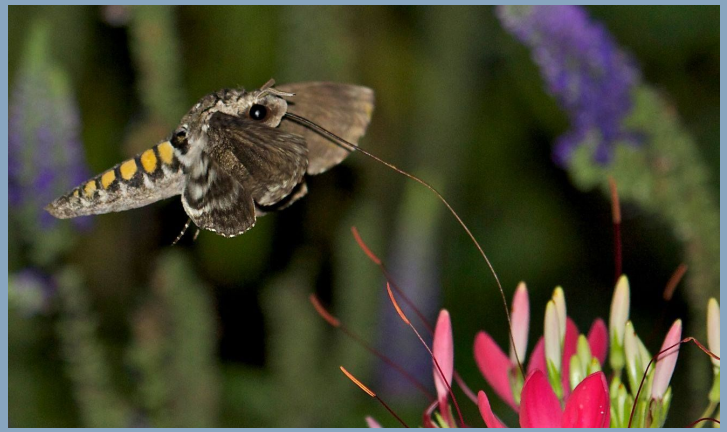


Pollination



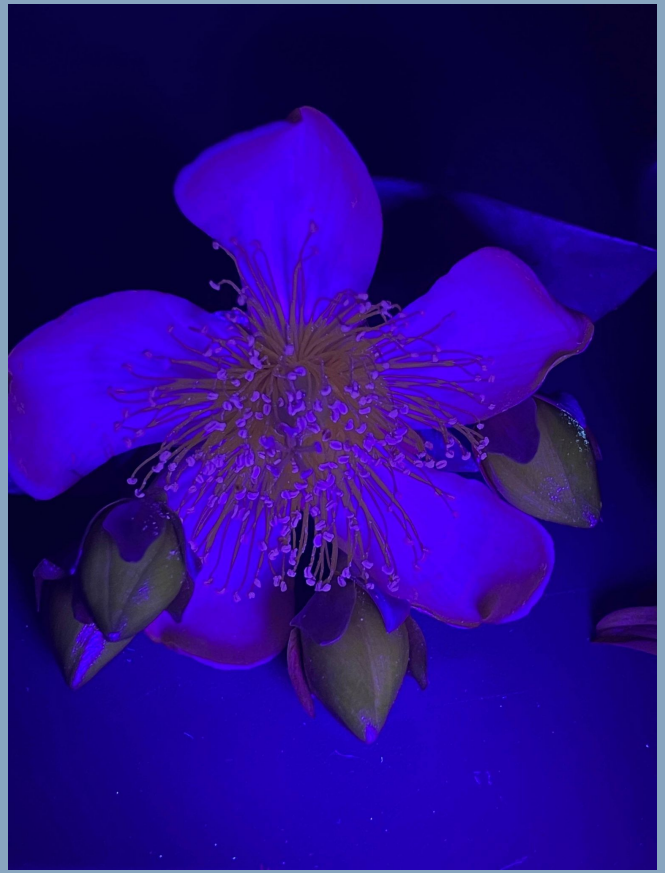

Cecropia moth
(*Hyalophora cecropia*)
Brian Lowry Photo
Brian Lowry

Pollinators

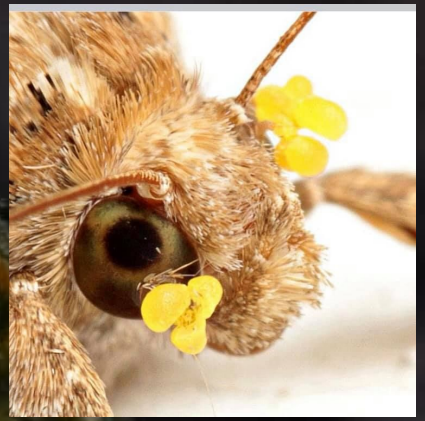


Pollinators

Lepidoptera Vision



Proof of Pollination

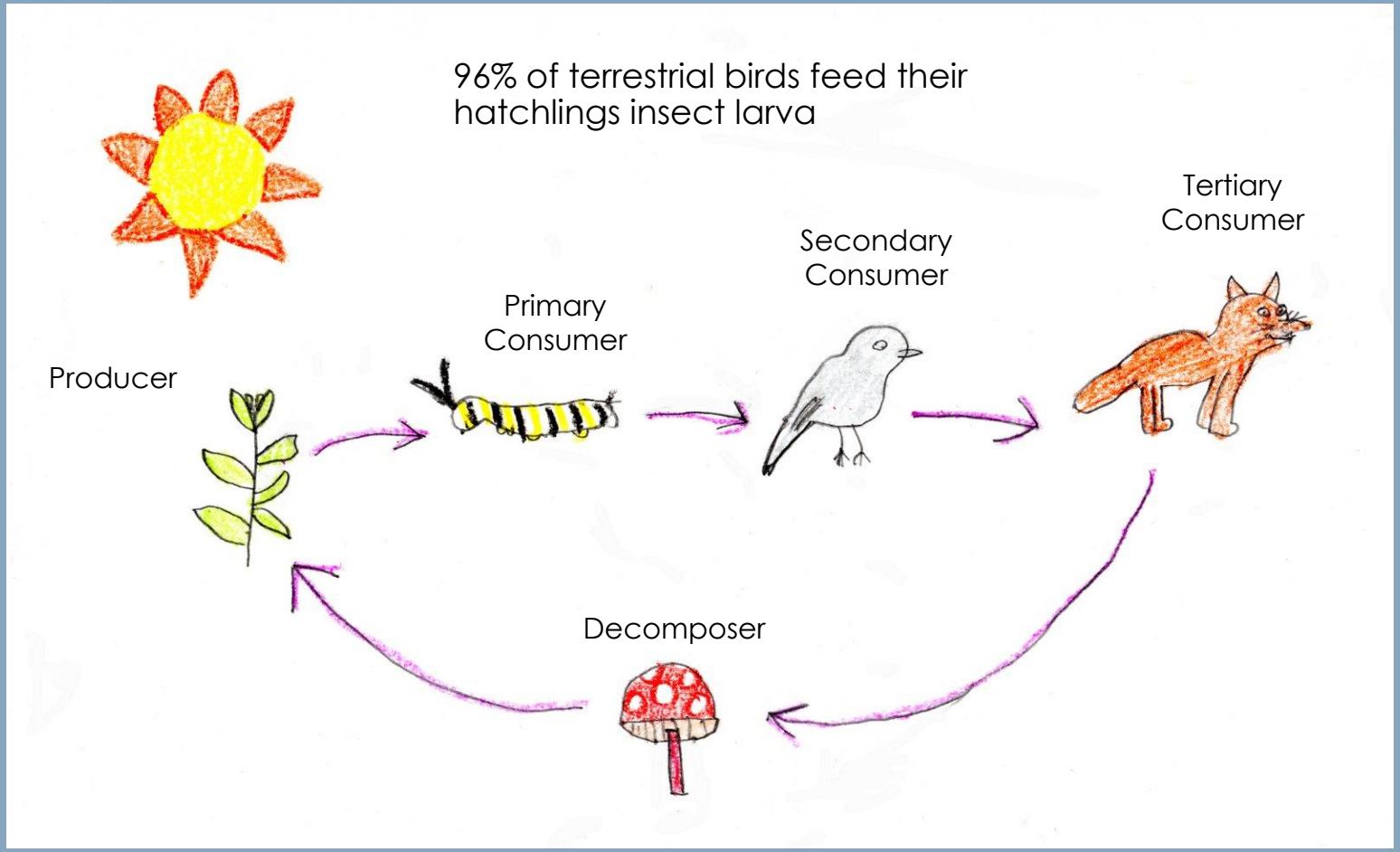


Common Looper
(*Autograph precationis*)

Ronda Byers Photo

Goldenrod Stowaway
(*Cirrhophanus triangulifer*)

Lepidoptera are a Vital Part of the Food Web

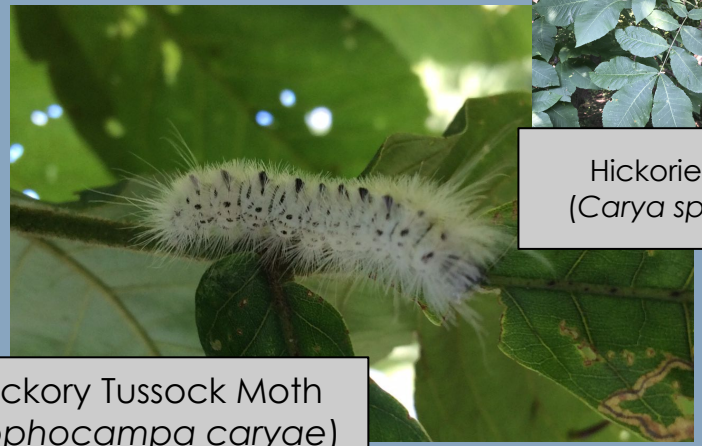


Food Web

Mechanical/Chemical Defense

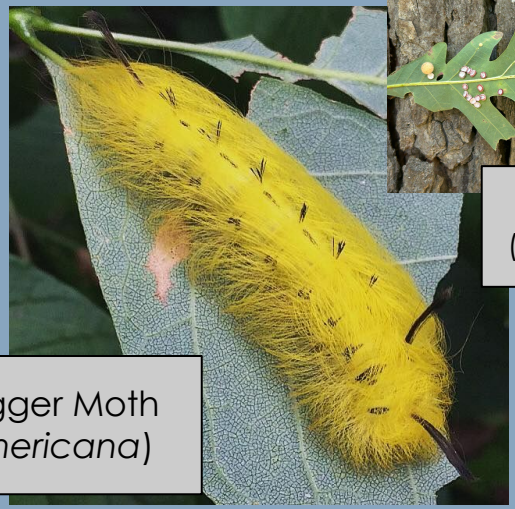
Dogwoods
(*Cornus spp*)

Saddleback Caterpillar Moth
(*Acharia stimulea*)



Hickory Tussock Moth
(*Lophocampa caryae*)

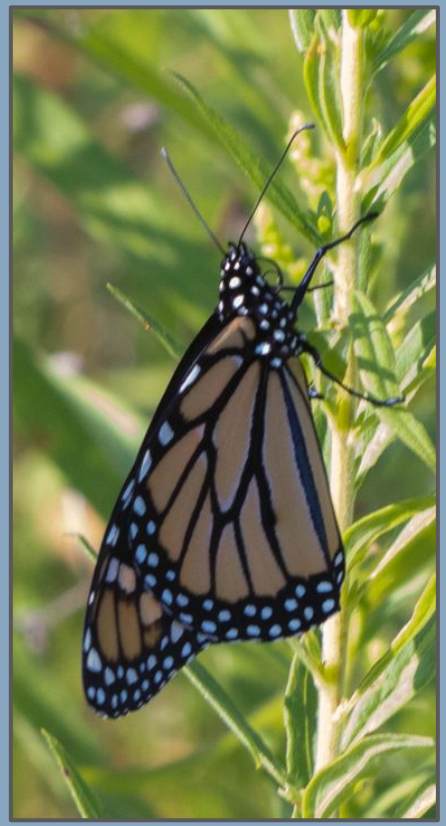
Hickories
(*Carya spp)*

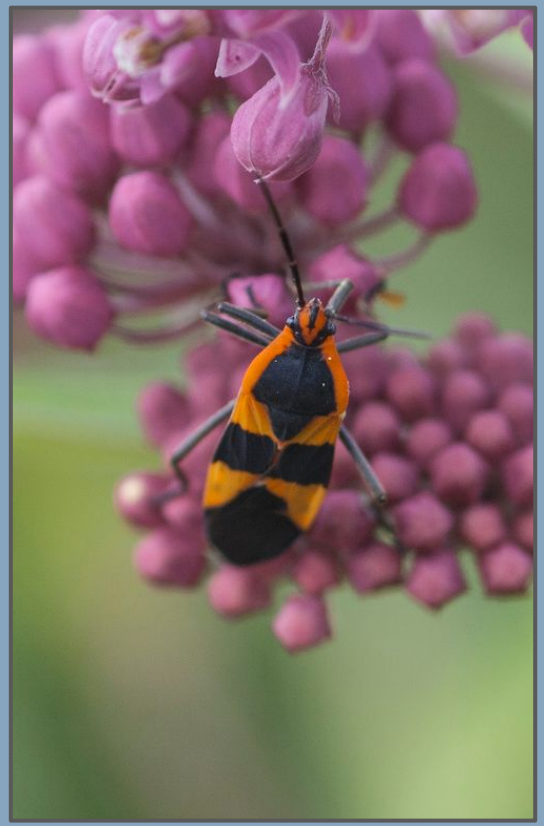


American Dagger Moth
(*Acronicta americana*)

White Oak
(*Quercus alba)*

Chemical Defense and Aposematism



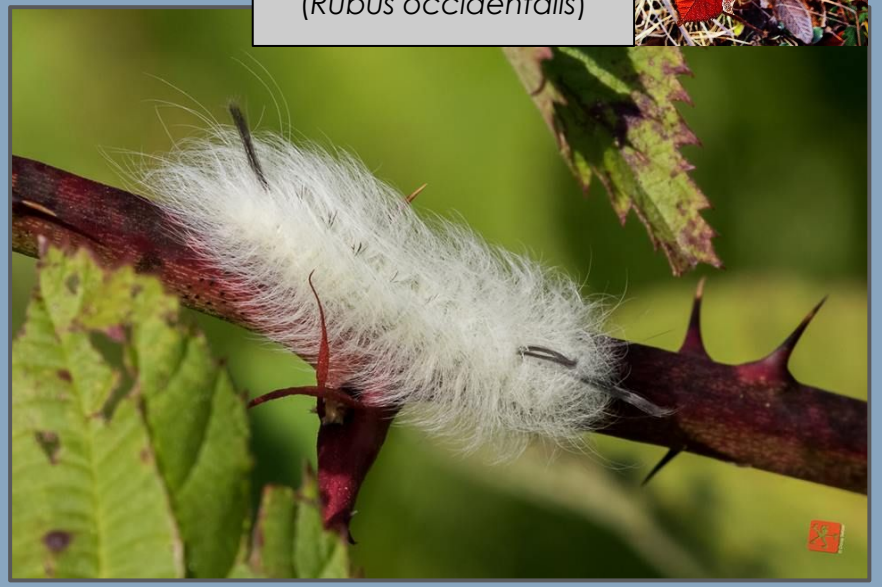


Batesian Mimicry

Willows
(*Salix spp*)

Viceroy
(*Limenitis archippus*)

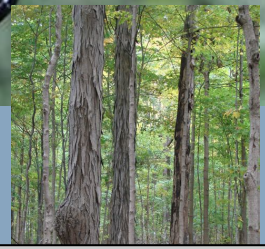
Black Raspberry
(*Rubus occidentalis*)



Spotted Apatelodes
(*Apatelodes torrefacta*)

Batesian Mimicry

Hickory Horned Devil
(*Citheronia regalis*)



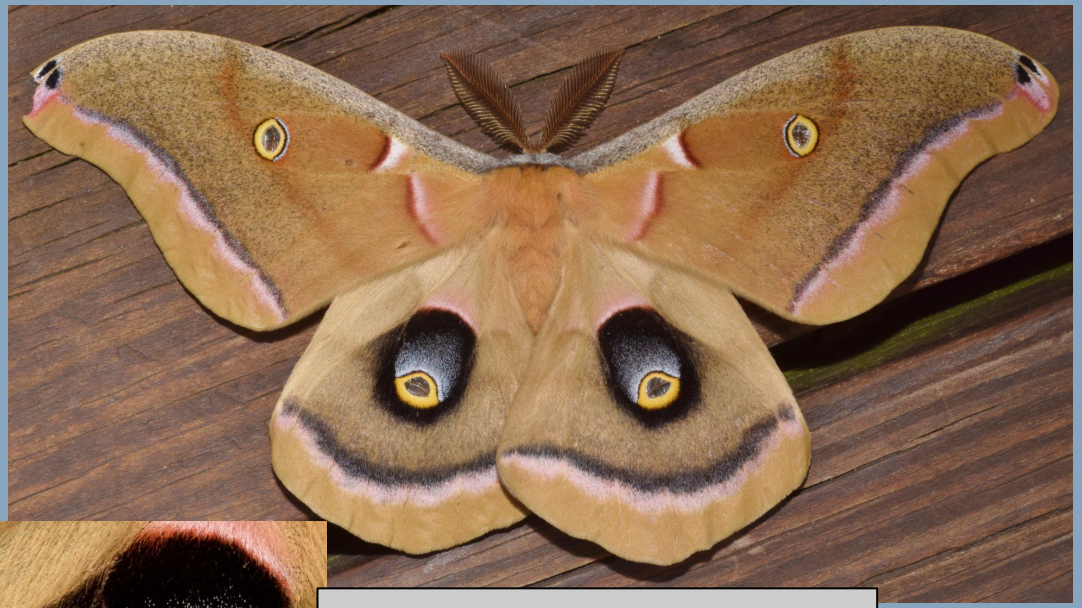
Hickories
(*Carya* spp.)

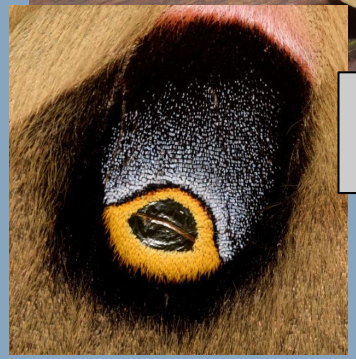
Batesian Mimicry - Snake-like defense posturing

Black Nightshade
(*Solanum americanum*)

Carolina Sphinx
(*Manduca sexta*)

Batesian Mimicry - Eye Spots





Polyphemus Moth
(*Antheraea polyphemus*)

Spicebush Swallowtail
(*Papilio troilus*)

Batesian Mimicry - Other Insect Orders

Lesser Peachtree Borer Moth
(*Synanthedon pictipes*)

Willow Borer
(*Cryptorhynchus lapathi*)

Painted Lichen
(*Hypoprepia fucosa*)

Defense Mechanisms - Crypsis

Sugar Maple
(*Acer saccharum*)

Fall Cankerworm Moth
(*Alsophila pometaria*)

Hop Tree
(*Ptelea trifoliata*)

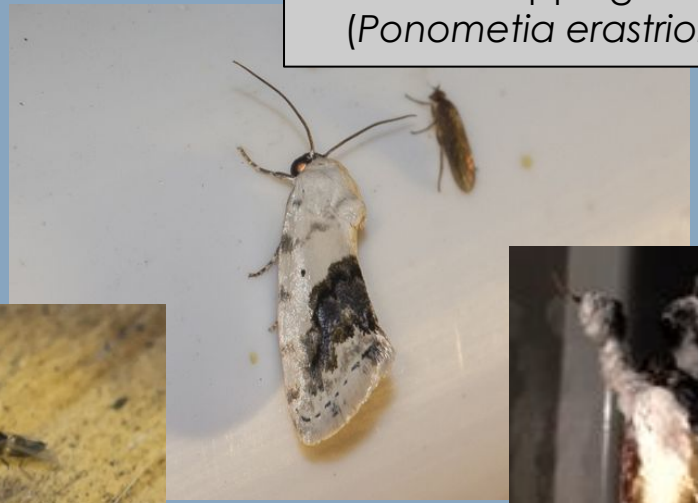
Giant Swallowtail
(*Papilio cresphontes*)

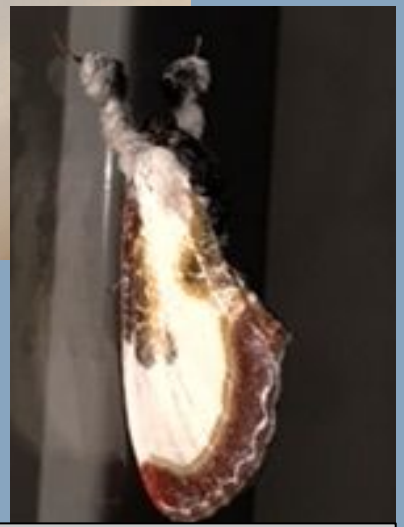
Crypsis - Unpalatable

Tufted Bird-dropping Moth
(*Cerma cerintha*)

Schlaeger's Fruitworm Moth
(*Antaeotricha schlaegeri*)

Bird-dropping Moth
(*Ponometia erastrioides*)





Beautiful Wood-nymph
(*Eudryas grata*)

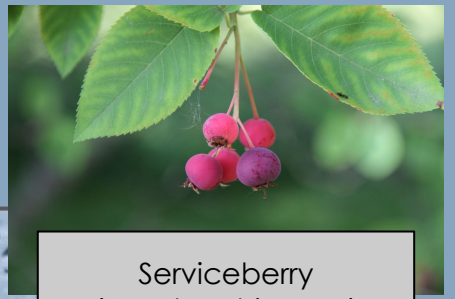
Bird Poop or Moth?

Photos by Doug Selzer

Olive-shaded Bird-dropping Moth
(*Ponometia candefacta*)

Ragweed
(*Ambrosia psilostachya*)

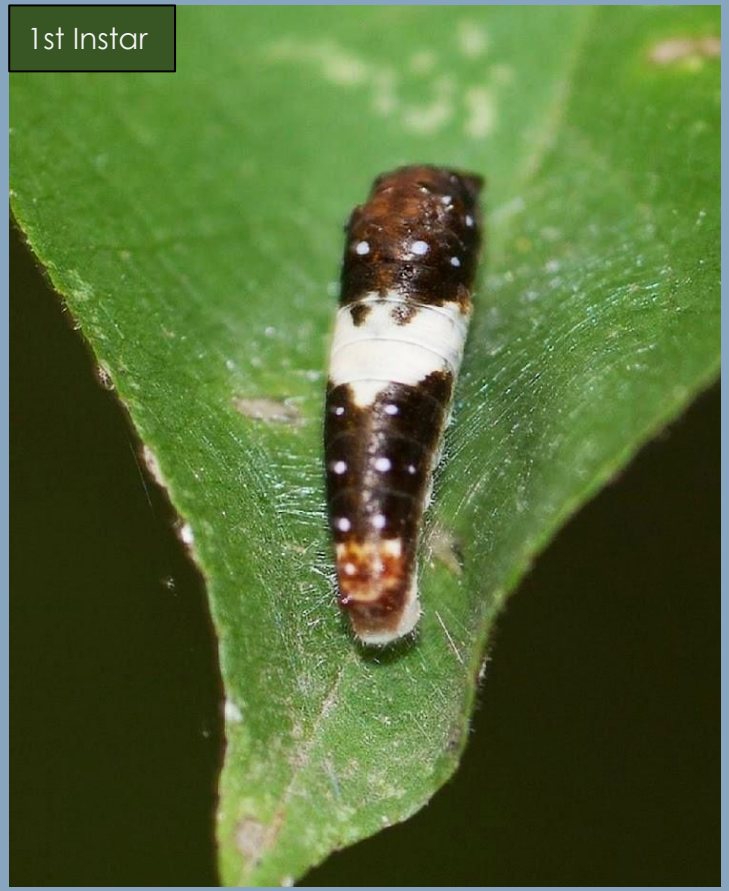
Crypsis and Batesian Mimicry



Serviceberry
(*Amelanchier spp*)

Io Moth
(*Automeris io*)

Eastern Tiger Swallowtail (*Papilio glaucus*)

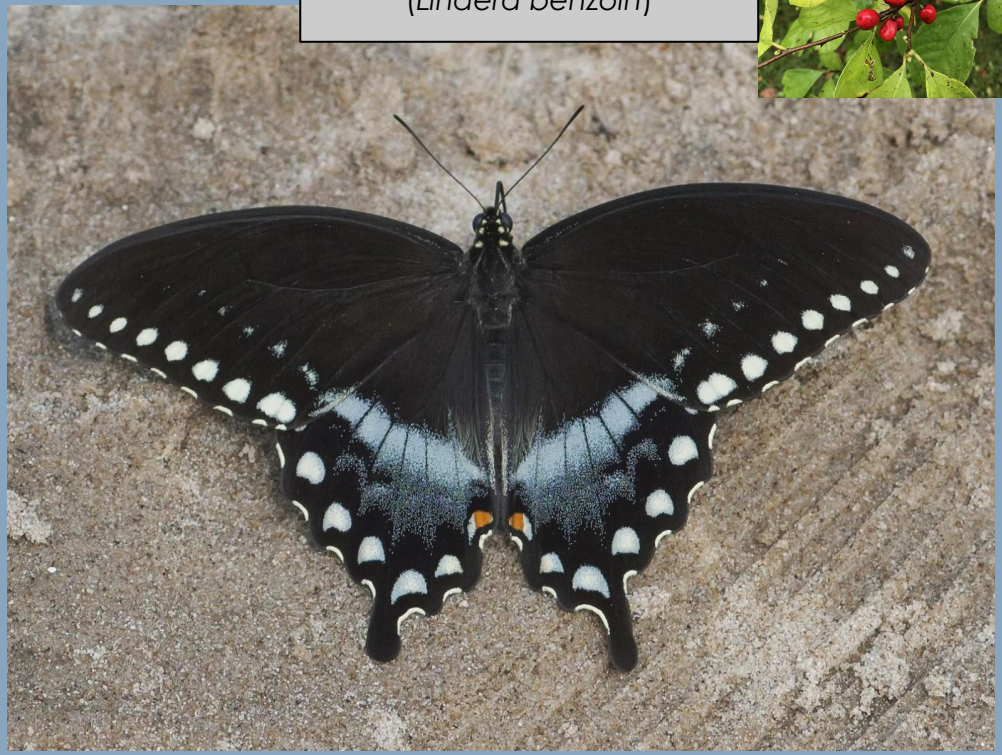


Tulip
(*Liriodendron tulipifera*)

Pipevine
(*Aristolochia tomentosa*)

Pipevine Swallowtail
(*Battus philenor*)

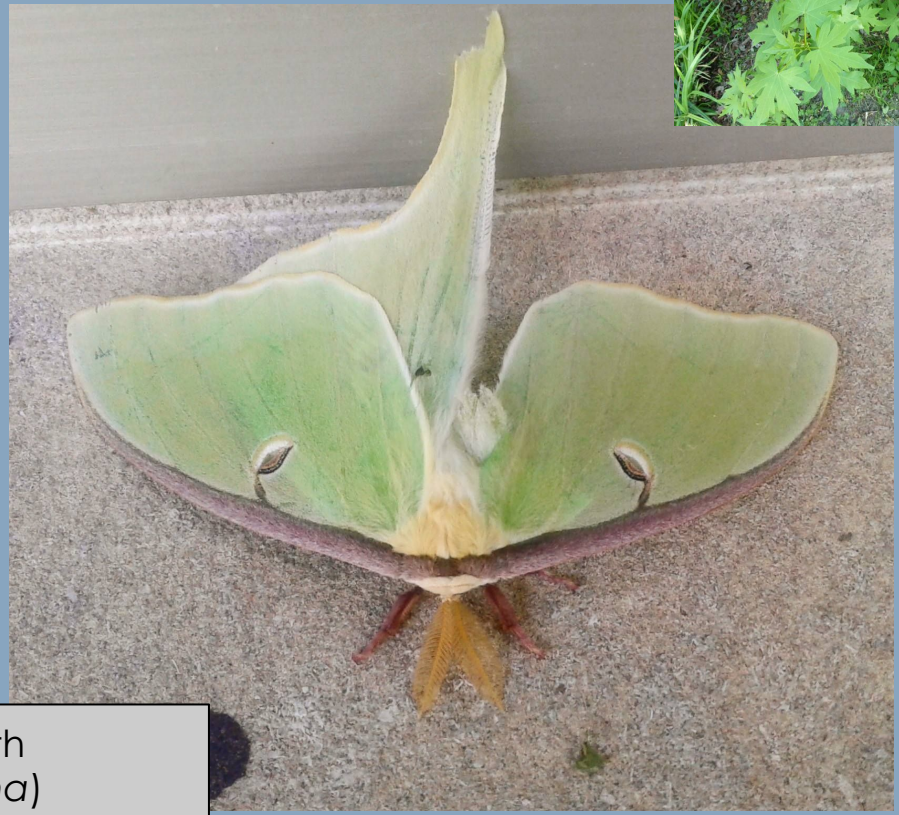
Spicebush
(*Lindera benzoin*)



Spicebush Swallowtail
(*Papilio troilus*)

Mechanical Defense - Tails (and Others)

Luna Moth
(*Actias luna*)



Sweet Gum
(*Liquidambar styraciflua*)

Mechanical Defense - Auditory Organs

River Birch
(*Betula nigra*)

Auditory organ that can hear frequency of bat's echolocation

Morrison's Sallow
(*Eupsilia morrisoni*)

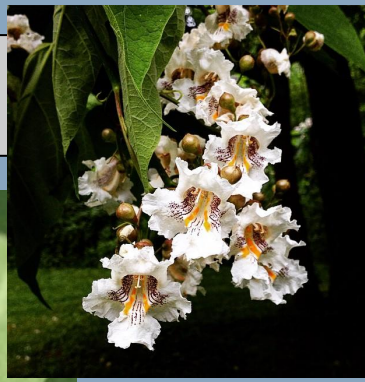
Mechanical Defense - Whistling

Black Walnut
(*Juglans nigra*)

Walnut Sphinx
(*Amorpha juglandis*)

Mimicry - Parasitoid

Northern Catalpa
(*Catalpa speciosa*)

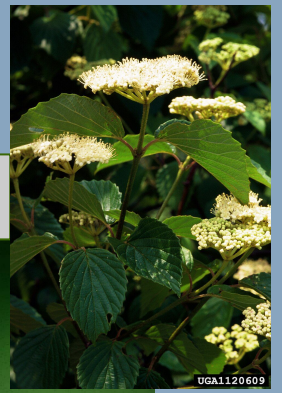


Catalpa Sphinx
(*Ceratomia catalpae*)

Mimicry - Parasitoid

Redbud
(*Cercis canadensis*)

White-marked Tussock moth
(*Orgyia leucostigma*)



Arrowwood Viburnum
(*Viburnum dentatum*)

Cecropia Moth
(*Hyalophora cecropia*)

03/07/2025

Where Have All The Butterflies Gone?

16:04 minutes

RESEARCH

BIODIVERSITY

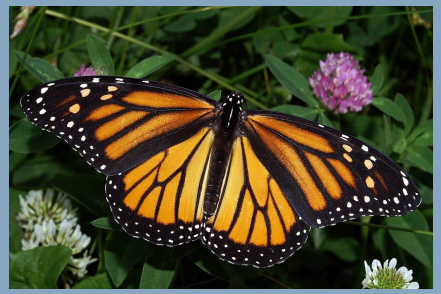
Rapid butterfly declines across the United States during the 21st century

Collin B. Edwards[1,2]*, Elise F. Zipkin[3], Erica H. Henry[1,2], Nick M. Haddad[3,4], Matthew L. Forister[5], Kevin J. Burls[6], Steven P. Campbell[7], Elizabeth E. Crone[8], Jay Diffendorfer[9], Margaret R. Douglas[10], Ryan G. Drum[11], Candace E. Fallon[6], Jeffrey Glassberg[12,13], Eliza M. Grames[14], Rich Hatfield[6], Shiran Hershcovich[15], Scott Hoffman Black[6], Elise A. Larsen[16], Wendy Leuenberger[3], Mary J. Linders[2], Travis Longcore[17,18], Daniel A. Marschalek[19], James Michielini[20], Naresh Neupane[16], Leslie Ries[16], Arthur M. Shapiro[20], Ann B. Swengel†, Scott R. Swengel†, Douglas J. Taron[21], Braeden Van Deynze[2], Jerome Wiedmann[22], Wayne E. Thogmartin[23], Cheryl B. Schultz[1]

Numerous declines have been documented across insect groups, and the potential consequences of insect losses are dire. Butterflies are the most surveyed insect taxa, yet analyses have been limited in geographic scale or rely on data from a single monitoring program. Using records of 12.6 million individual butterflies from >76,000 surveys across 35 monitoring programs, we characterized overall and species-specific butterfly abundance trends across the contiguous United States. Between 2000 and 2020, total butterfly abundance fell by 22% across the 554 recorded species. Species-level declines were widespread, with 13 times as many species declining as increasing. The prevalence of declines throughout all regions in the United States highlights an urgent need to protect butterflies from further losses.

Reasons for Decline

- Habitat Loss
- Pesticide Use
- Invasive Species
- Climate Change
- Light Pollution

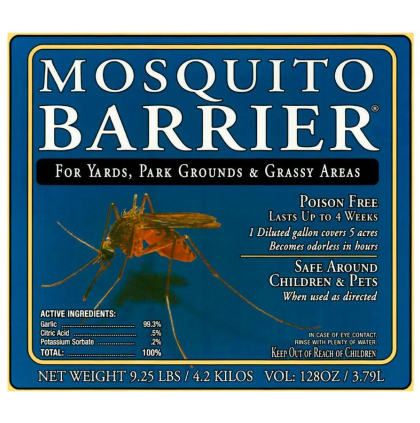



How We Can Each Help

- Provide habitat, advocate for habitat (Globally & Locally)
    - Host plants, shelter plants, and nectar plants
- Advocate for Climate Change solutions & practice them
- Volunteer and donate
- Citizen Science

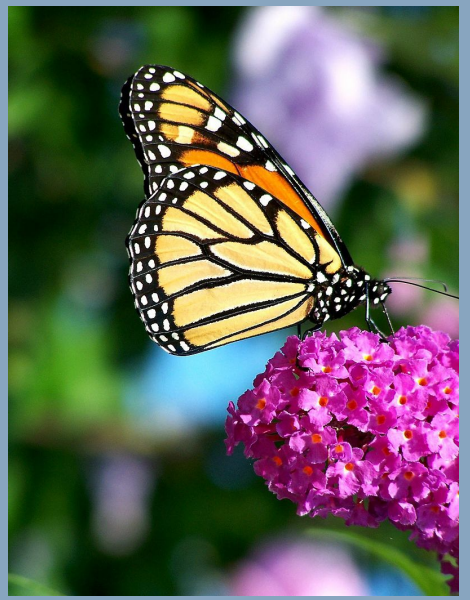
How We Can Each Help

- Reduce pesticide use

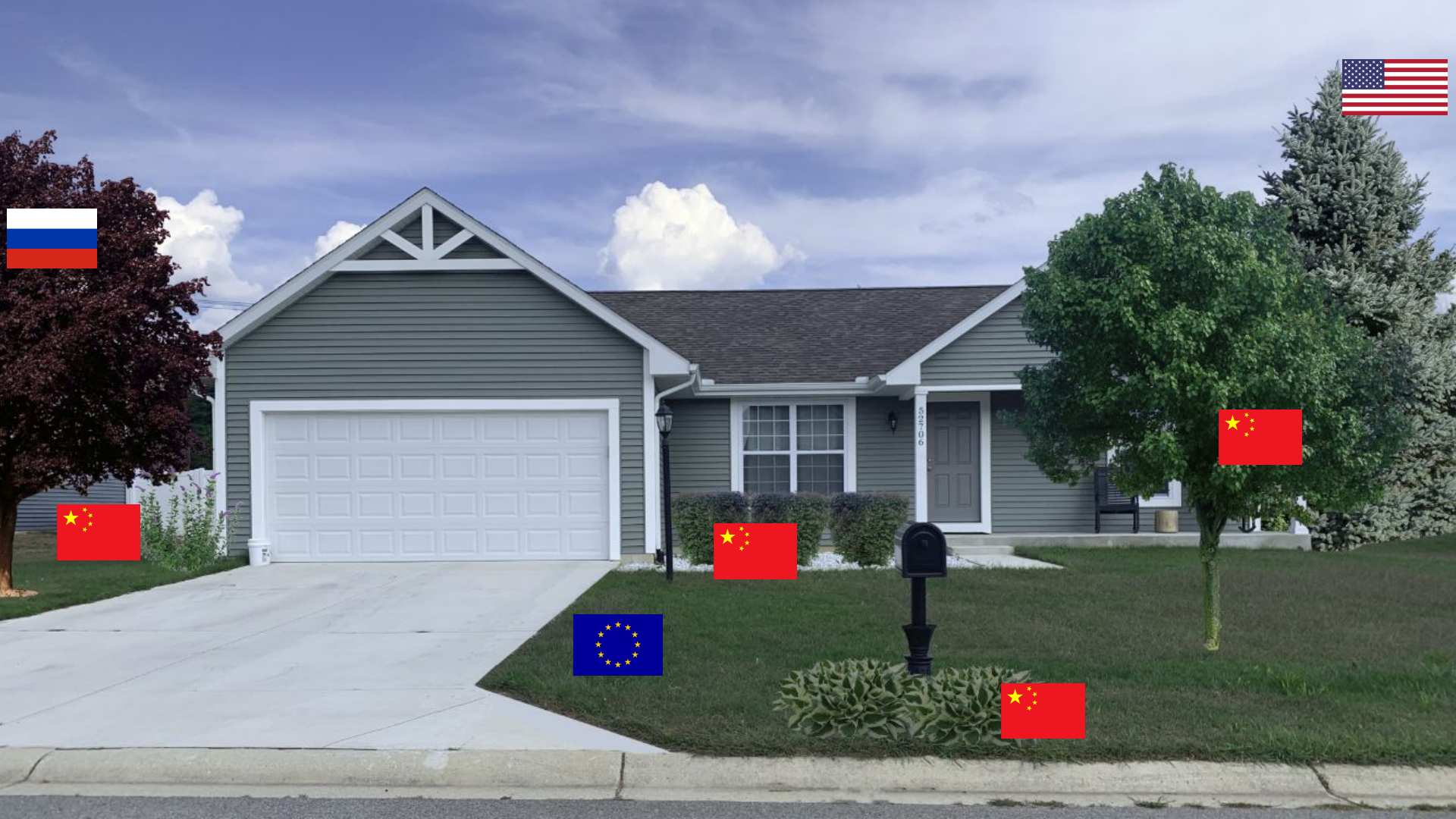


Gardening for Wildlife

- Host plants, shelter plants, and nectar plants
  - Avoid focusing on one lifecycle
    - Larval host species, shelter, nectar, and overwintering
  - Regional indigenous native species
    - Buyer beware



The Importance of Leaf Litter

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Find the best native plants to help wildlife — based on the research of Dr. Doug Tallamy. Want to learn more?

nativeplantfinder.nwf.org

LIGHT POLLUTION HURTS POLLINATORS

Nighttime light pollution is an increasing worldwide problem. Countless flowers are co-dependent on nocturnal pollination. Pollinators are in decline and being harmed by artificial lighting.

NOCTURNAL POLLINATORS

Moths, including sphinx or hawk moths, are especially common and diverse nocturnal pollinators. There are also many other animals that pollinate flowers at dawn and dusk and into the night, including species of bats, beetles, bees, and other insects.

FLIGHT-TO-LIGHT BEHAVIOR

Nocturnal pollinators use natural light from the stars and moon in the night sky to navigate. This light-seeking behavior draws them to artificial light where they become confused and trapped.

HOW IT HARMS POLLINATORS

Every light becomes a feeding station for predators of pollinators. Artificial light leaves pollinators exposed, making them easier to spot and reducing their ability to see these predators. This risk factor is a major source of decline in population numbers for nocturnal pollinators. For moths, current estimates range from a 30% to 40% decline globally within the past few decades, with light pollution increasing annually.

POLLINATOR PARTNERSHIP

Designed by Hannah J Maier

AT HOME ACTIONS

MOON GARDEN

Fill flower beds with fragrant, regionally appropriate native plants species with white or pale coloration. Select flower varieties that don't close during the night hours. For native plants in your region visit: www.pollinator.org/guides

TURN OFF THE LIGHTS

Turn off unneeded lights whenever possible and shade windows during the twilight hours.
For exterior and interior lights, use low-voltage or energy-efficient LED lightbulbs on the warm temperature color spectrum.
Outdoors, use motion-activated lights that shine downward or timer-limited lights.

NATIVE PLANTS

Choose regionally appropriate Milkweeds (Asclepias), Goldenrods (Solidago), Evening Primroses (Oenothera), and other flowering herbs, shrubs and trees.

SUPPORT POLLINATORS

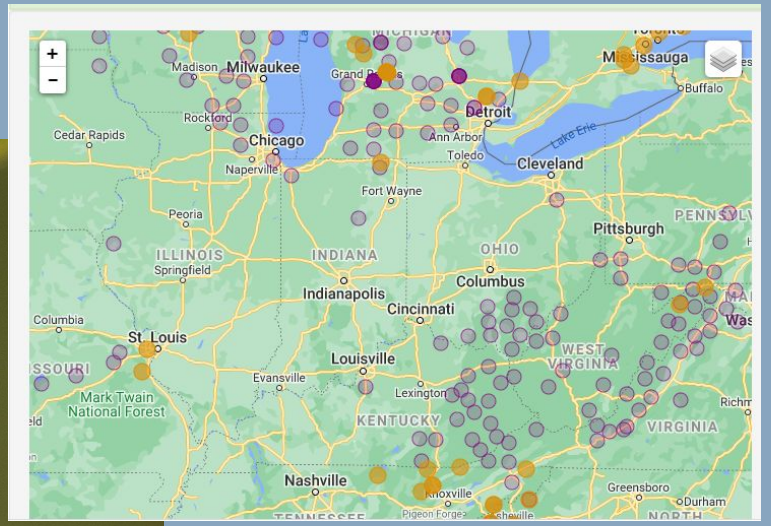
Conserve resource usage and limit use of harmful products such as pesticides and bug zappers.
Support local conservation efforts and organizations dedicated to practical conservation work and scientific research. To learn more about pollinators & what you can do to help visit: www.pollinator.org

This resource was created by the North American Pollinator Protection Campaign (NAPPC) Lepidoptera Task Force. NAPPC is managed by Pollinator Partnership.

GAINLP Highlight Species

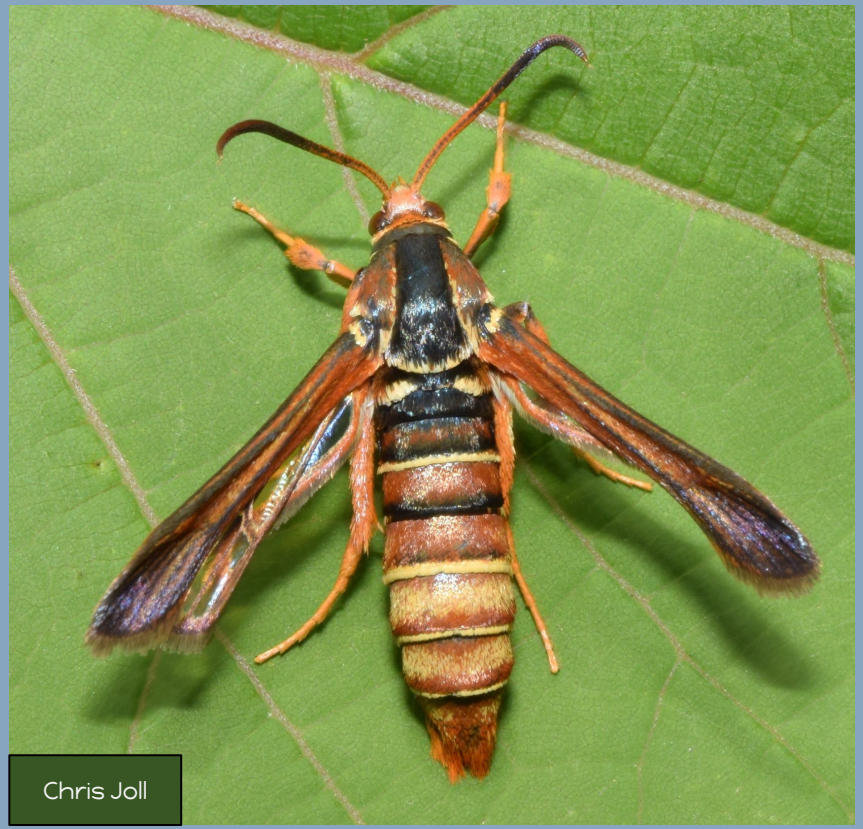
Silvery Blue (*Glaucopsyche lygdamus*)

Doug Selzer

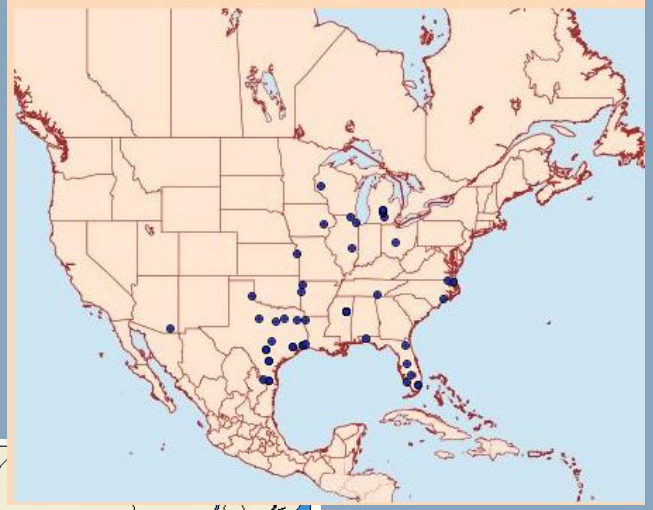


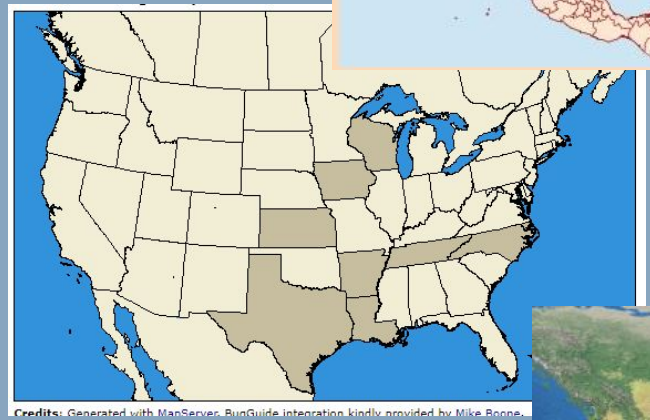
GAINLP Highlight Species

Doll's Clearwing (*Paranthrene dollii*))



Chris Joll



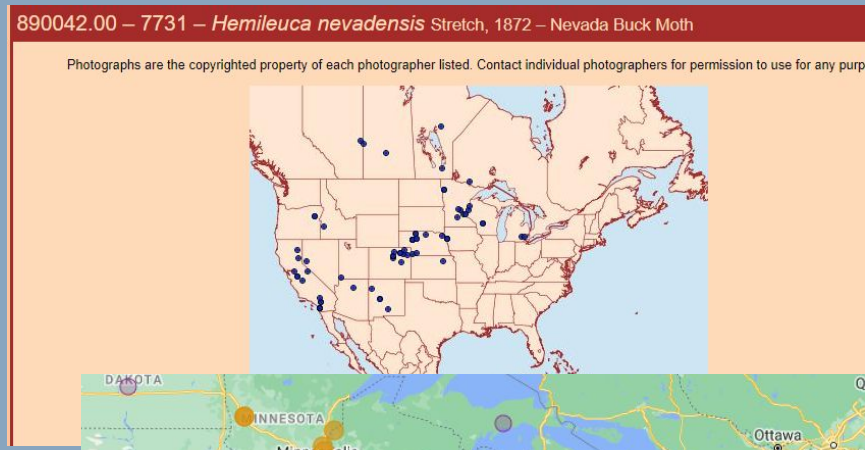


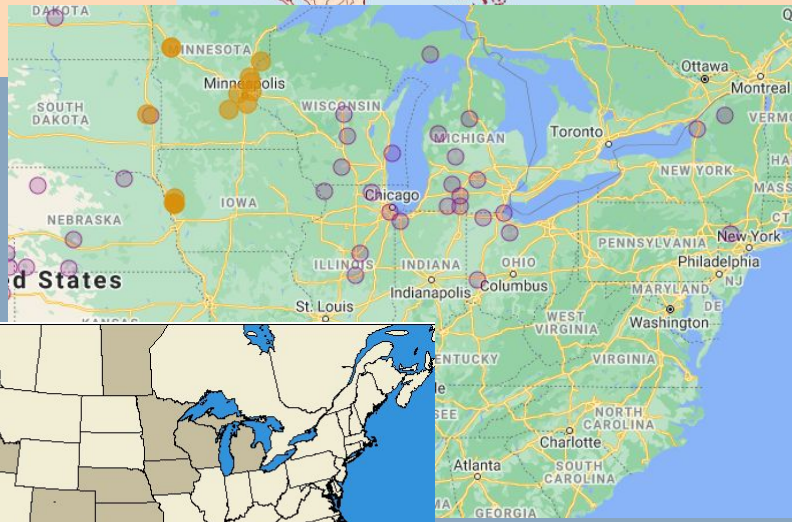
GAINLP Highlight Species

Nevada buckmoth (*Hemileuca nevadensis*)

Found by Trevor Edmonson

Jean Jaskula Photo





GAINLP Highlight Species

Kyoto moth
(*Autosticha kyotensis*)

Kat Schwedler

Drop us a Line

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