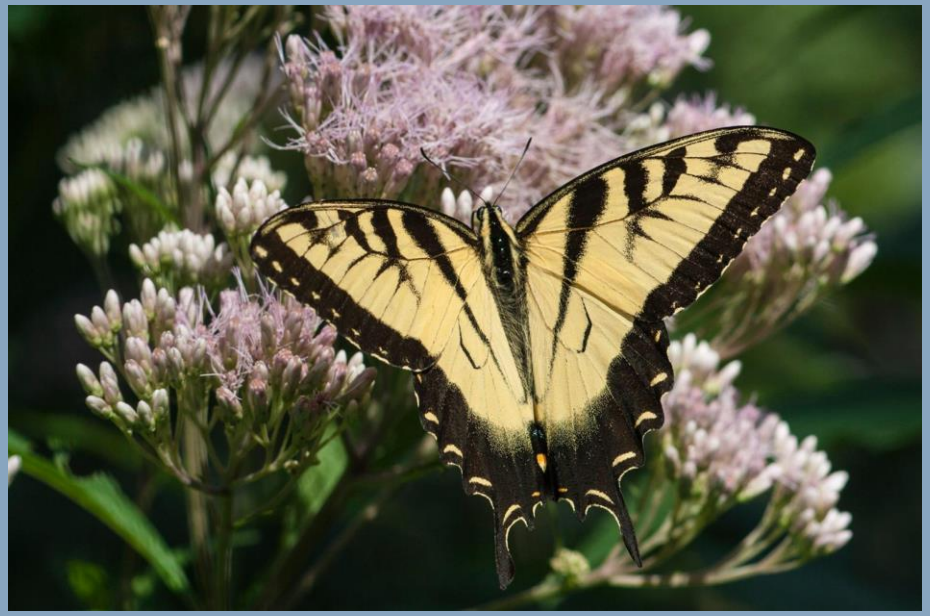
Pollinator Partnership — Lepidoptera



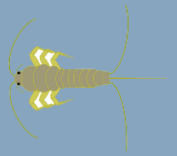
With Steve Sass and Amanda Smith from Indiana Nature LLC

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
Mantids

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)

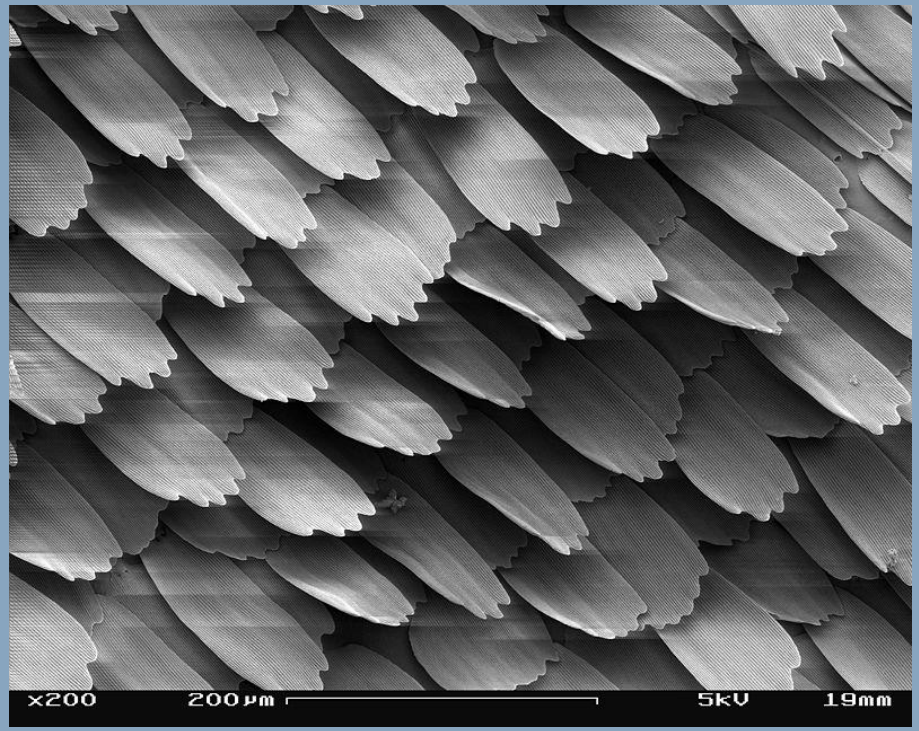
Urodoidea (False Burnett Moths)

Yponomeutoidea (Ermine Moths)

Zygaenoidea (Flannel, Slug and Leaf Skeletonizers)

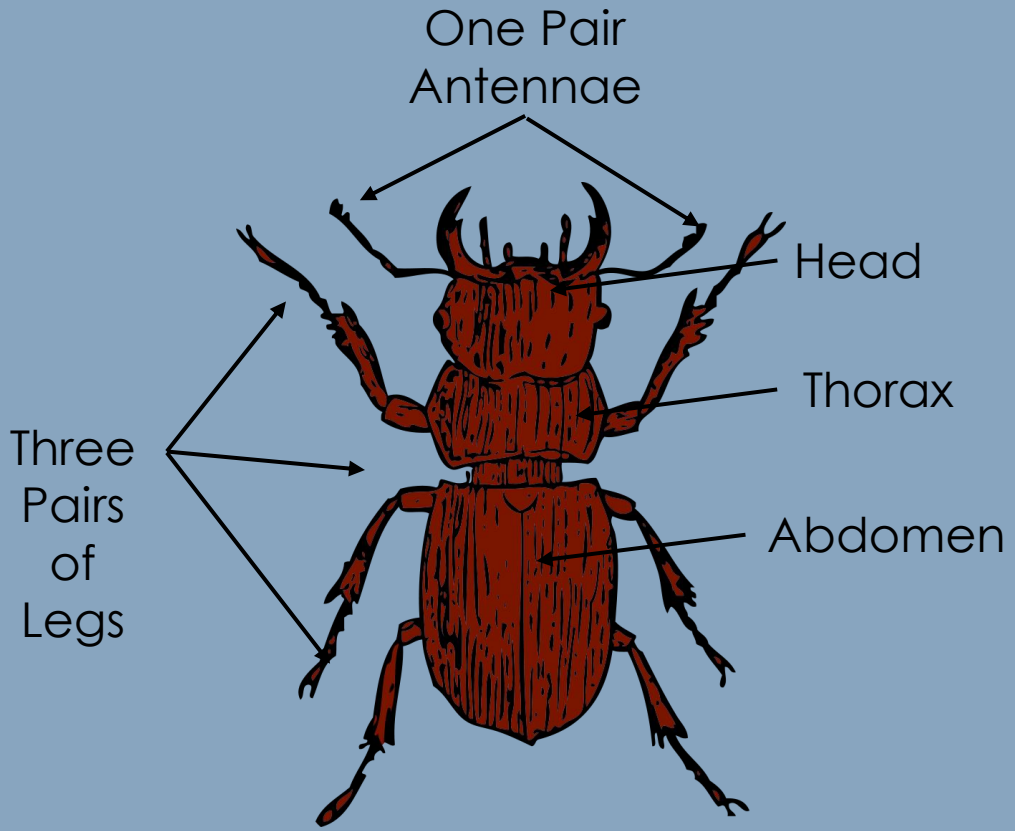
The Order *Lepidoptera*

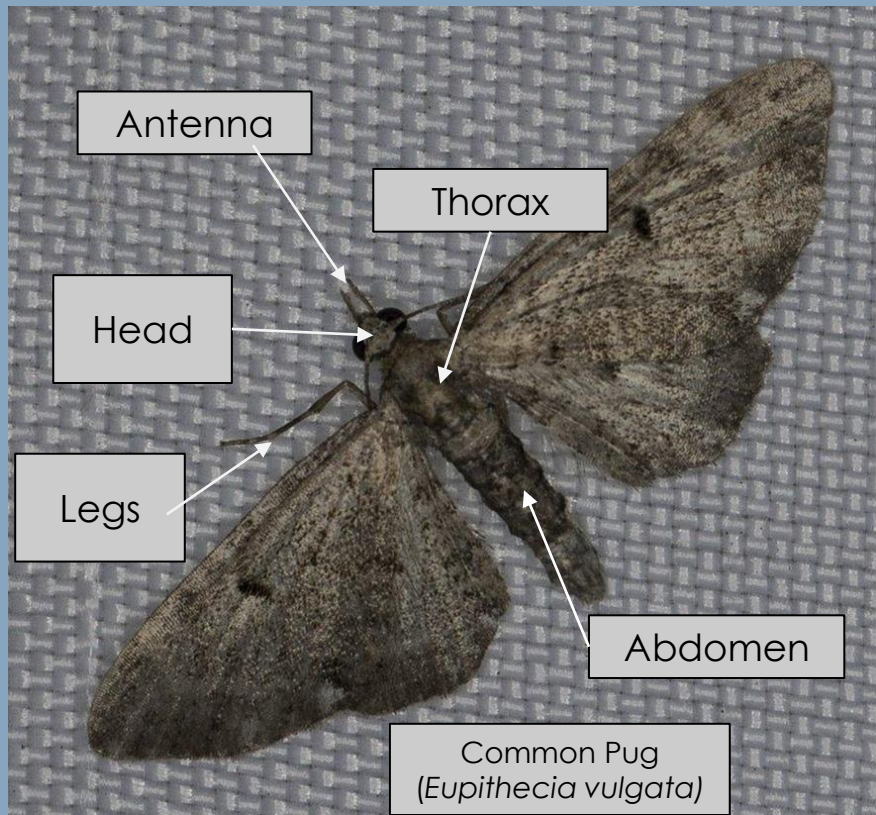
- *Lepidoptera* from Greek words *lepis* meaning "scales," and *pteron* meaning "wings"
- Wings covered by millions of tiny scales that overlap like roof shingles
- Scales are tiny, flattened hairs that are powdery when crushed
- Wings are transparent




Brian Lowry

Insects Physiology

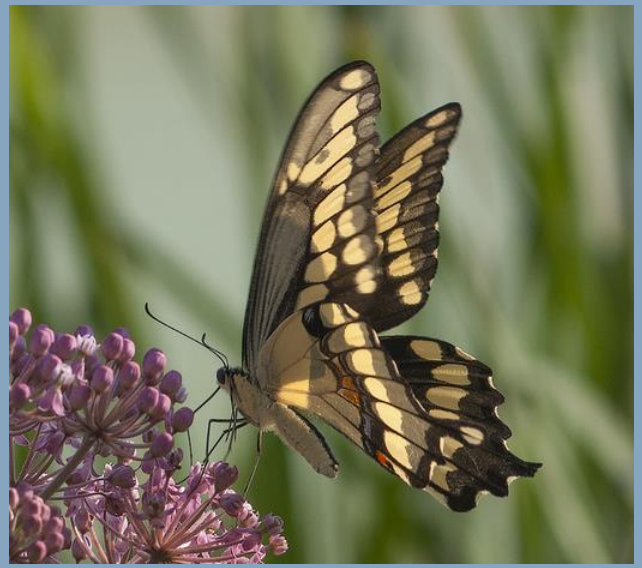




Butterflies vs. Moths vs. Skippers

Body Size vs. Wing Size

Butterflies: Tend to have relatively small bodies and large wings



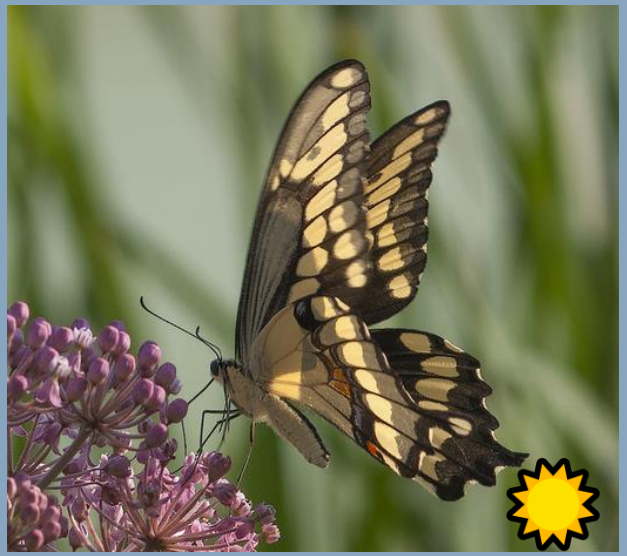
Moths and Skippers: Tend to have relatively large bodies and small wings

Antennae

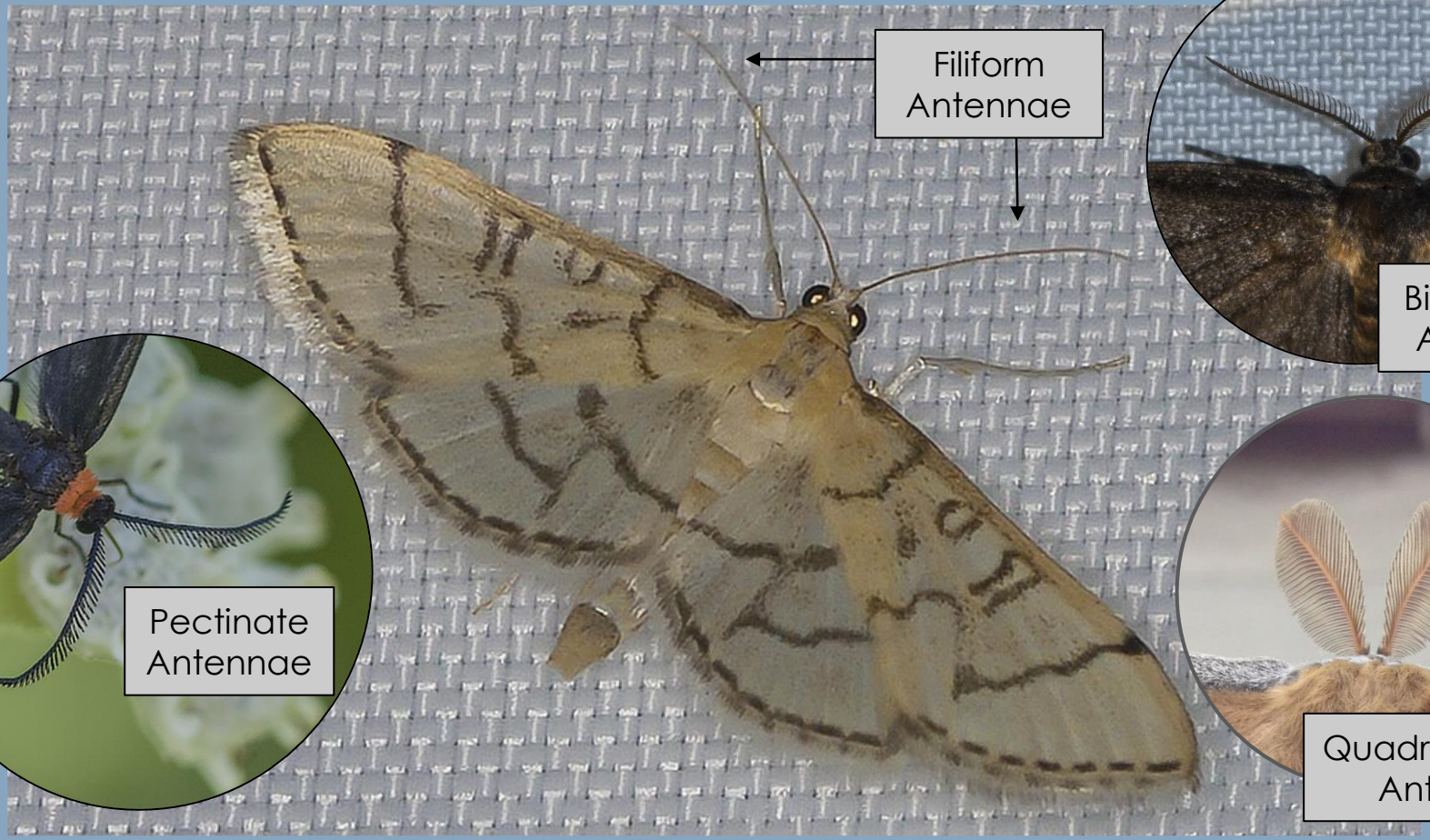
Butterfly:
Clubbed

Skipper:
Clubbed

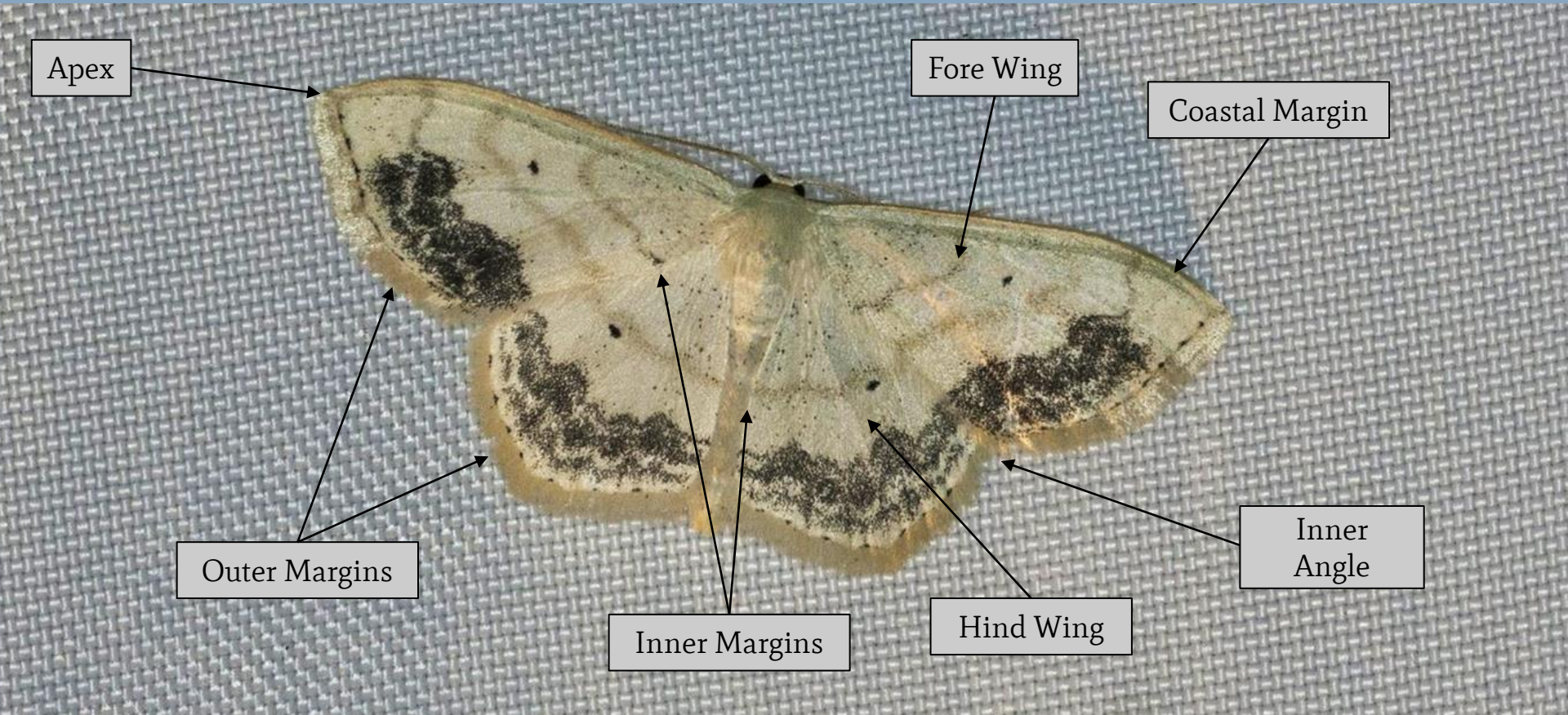
Moth:
Not Clubbed



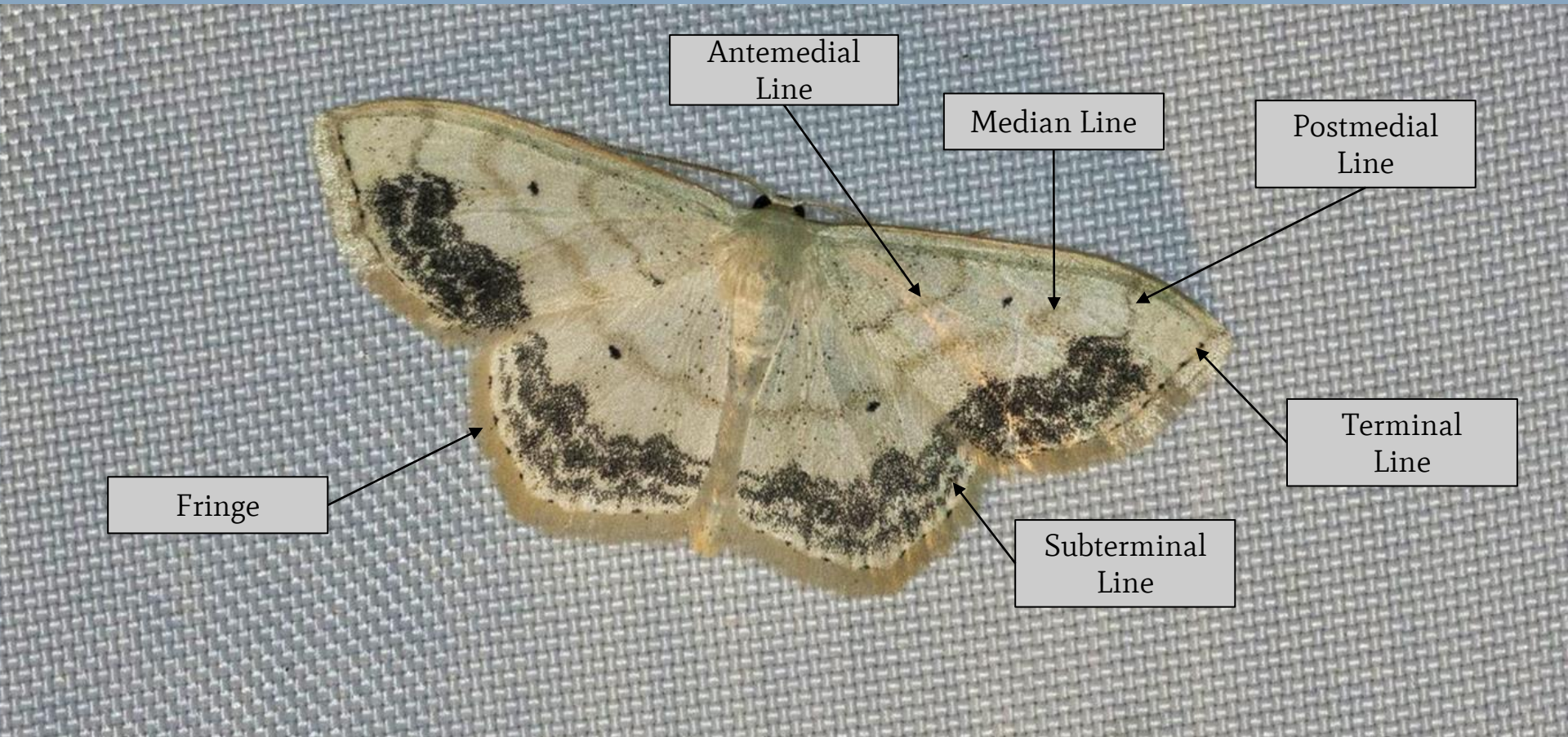
Physiology — Antennae



Physiology-Wings and Edges

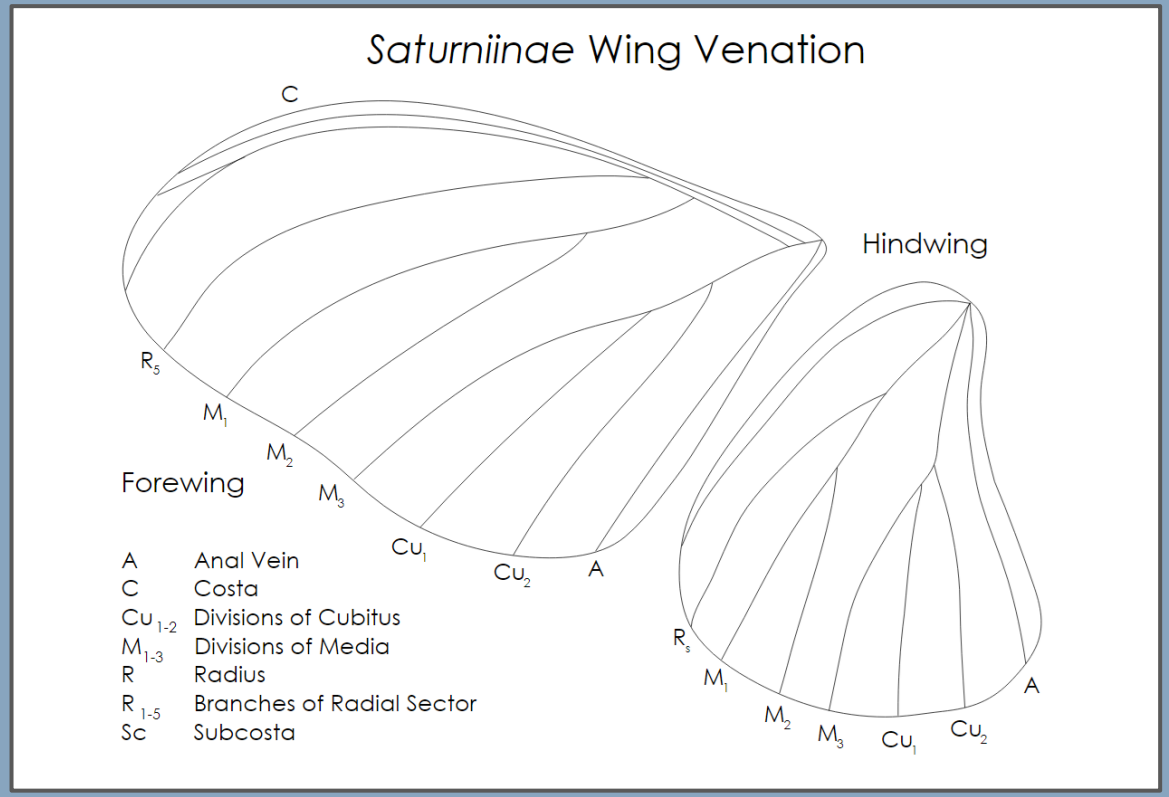


Physiology-Wing Lines

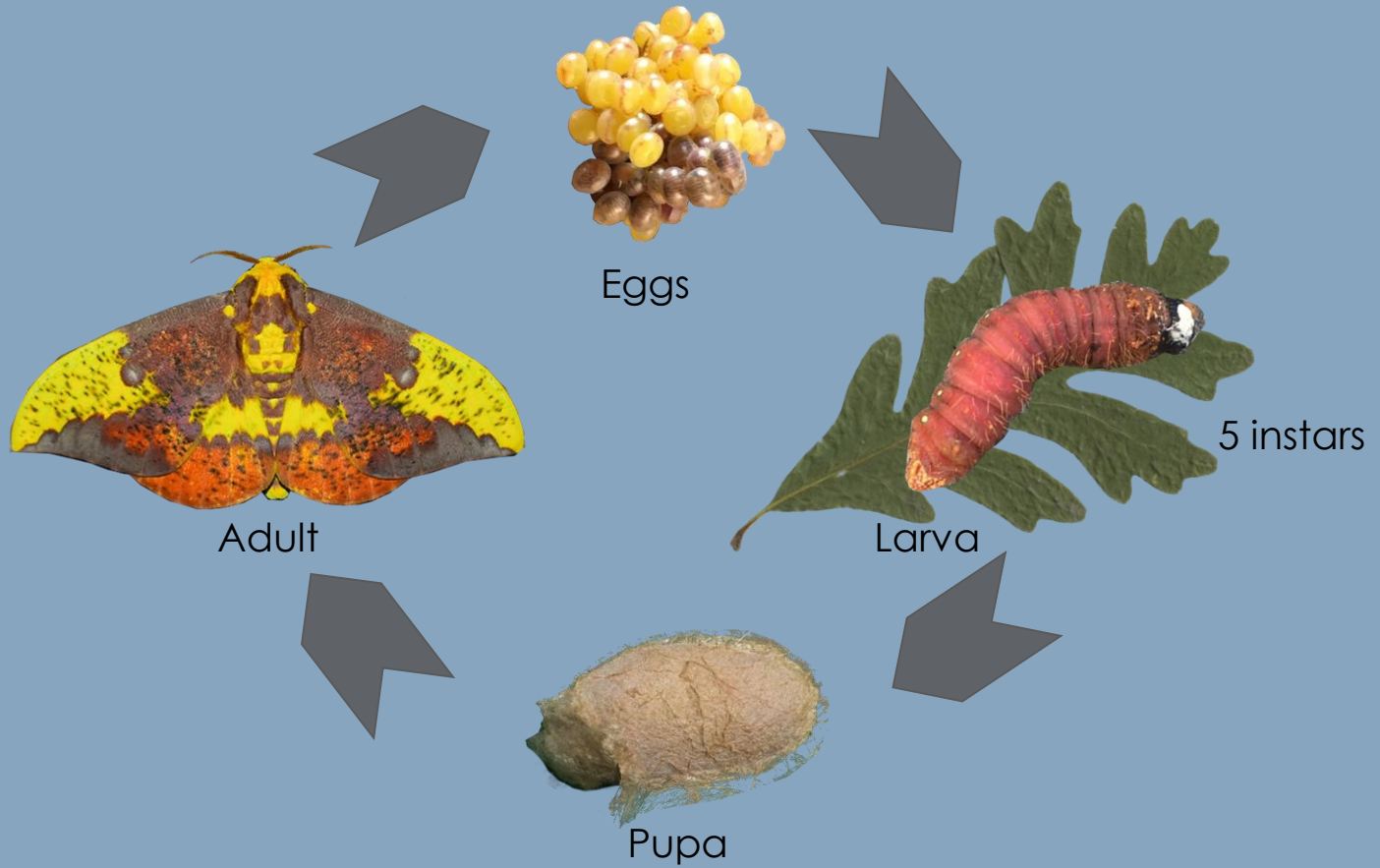


Physiology-Wing Venation

"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)

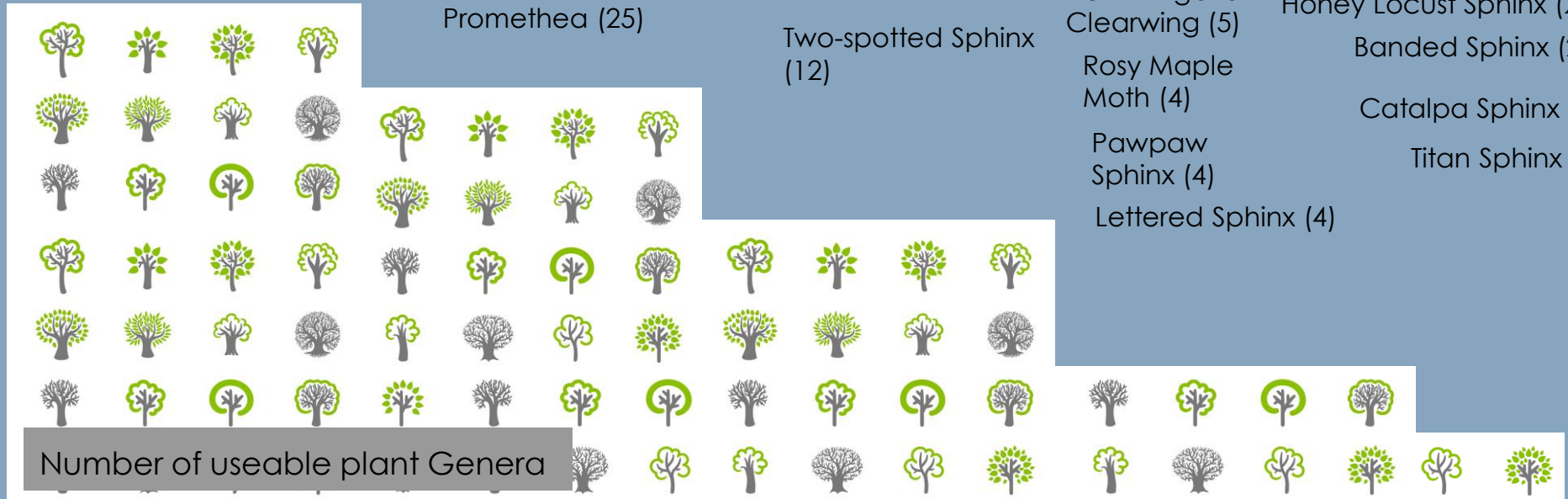
Ash Sphinx (2)

Honey Locust Sphinx (2)

Banded Sphinx (2)

Catalpa Sphinx (1)

Titan Sphinx (1)

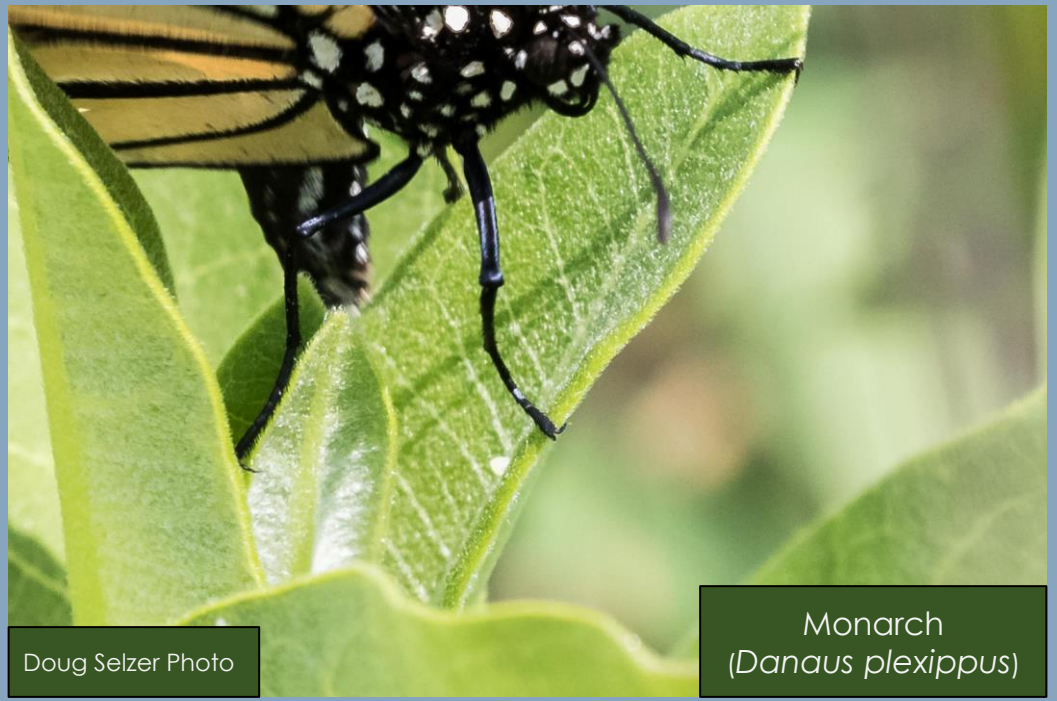


Number of useable plant Genera

How do they find Host Plants?

Salt-and-Pepper Skipper
(*Amblyscirtes hegon*)

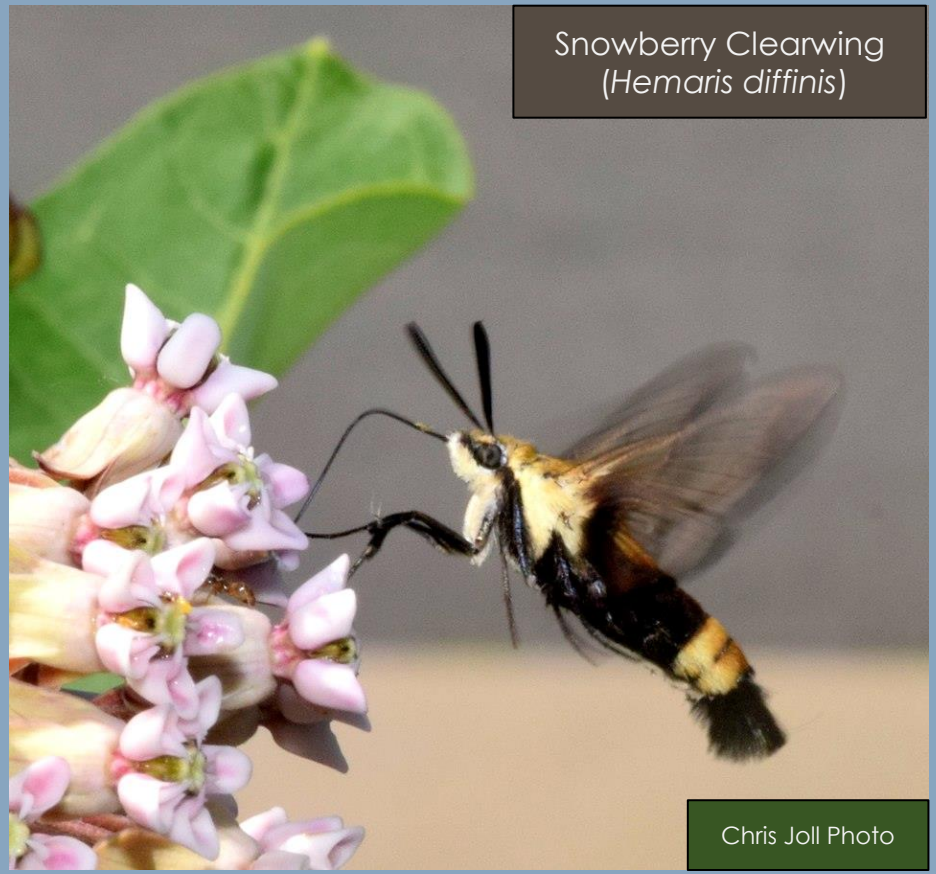
Brian Lowry Photo



Doug Selzer Photo

Monarch
(*Danaus plexippus*)

Pollination



Pollination Syndromes

- Darwin suggested — Morgan's Sphinx moth and Darwin's Orchid
- Pollination Syndromes — co-evolution for suites of flowers

Pollinator syndromes can help predict what type of insect may pollinate a particular plant.

Flower Traits	 Bees, wasps	 Beetles	 Butterflies	 Moths	 Flower flies	Filth flies
Color	White, yellow, blue, ultraviolet	White, green	Bright red, purple	Red, purple, pink, white	white, yellow, ultraviolet	Pale, dark brown, purple
Nectar guides	Present	None	Present	None	Present	None
Odor	fresh, mild, pleasant	None, strongly fruity, or foul	Faint but fresh	Strong, sweet; most at night	Fresh, mild, pleasant	Putrid
Nectar	usually present	Sometimes present	Ample; deeply hidden	ample;; deeply hidden	Usually present	Usually absent
Pollen	Limited; often sticky, scented	Ample	Limited	Limited	Limited, often sticky, scented	Modest
Shape	Shallow, with landing platform; tubular	Large, bowl-shaped	Narrow tube with spur; wide landing pad	Regular; tubular without a tip	Shallow, with landing platform	Shallow, funnel-like, or complex with trap

Adapted from USDA-FS https://www.fs.fed.us/wildflowers/pollinators/What_is_pollination/syndromes.shtml

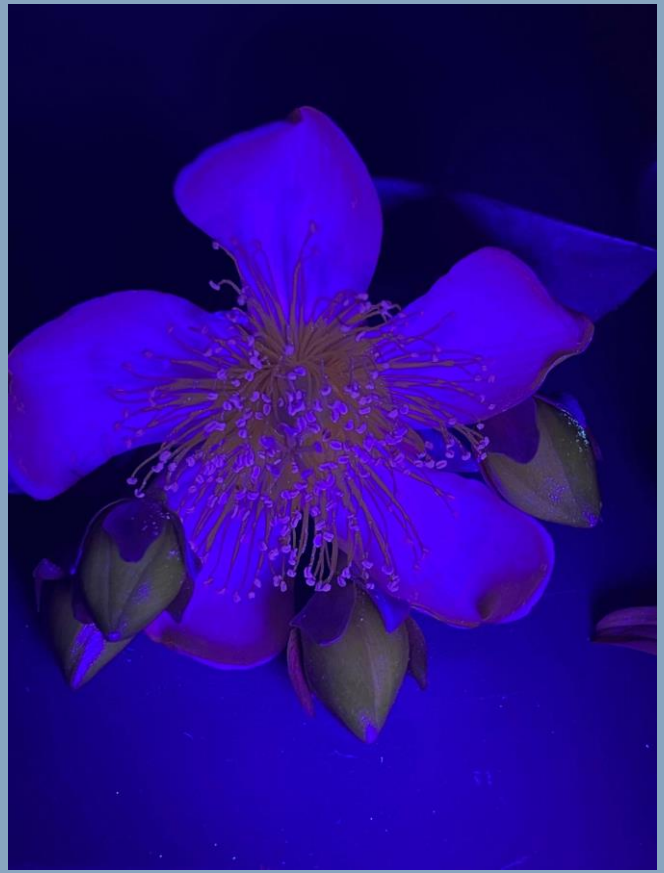
Flower Traits

Red Admiral
(*Vanessa atalanta*)

Virginia Creeper Sphinx
(*Darapsa myron*)

Dean Smith Photo

Lepidoptera Vision



Pollination Syndromes

Proof of Pollination

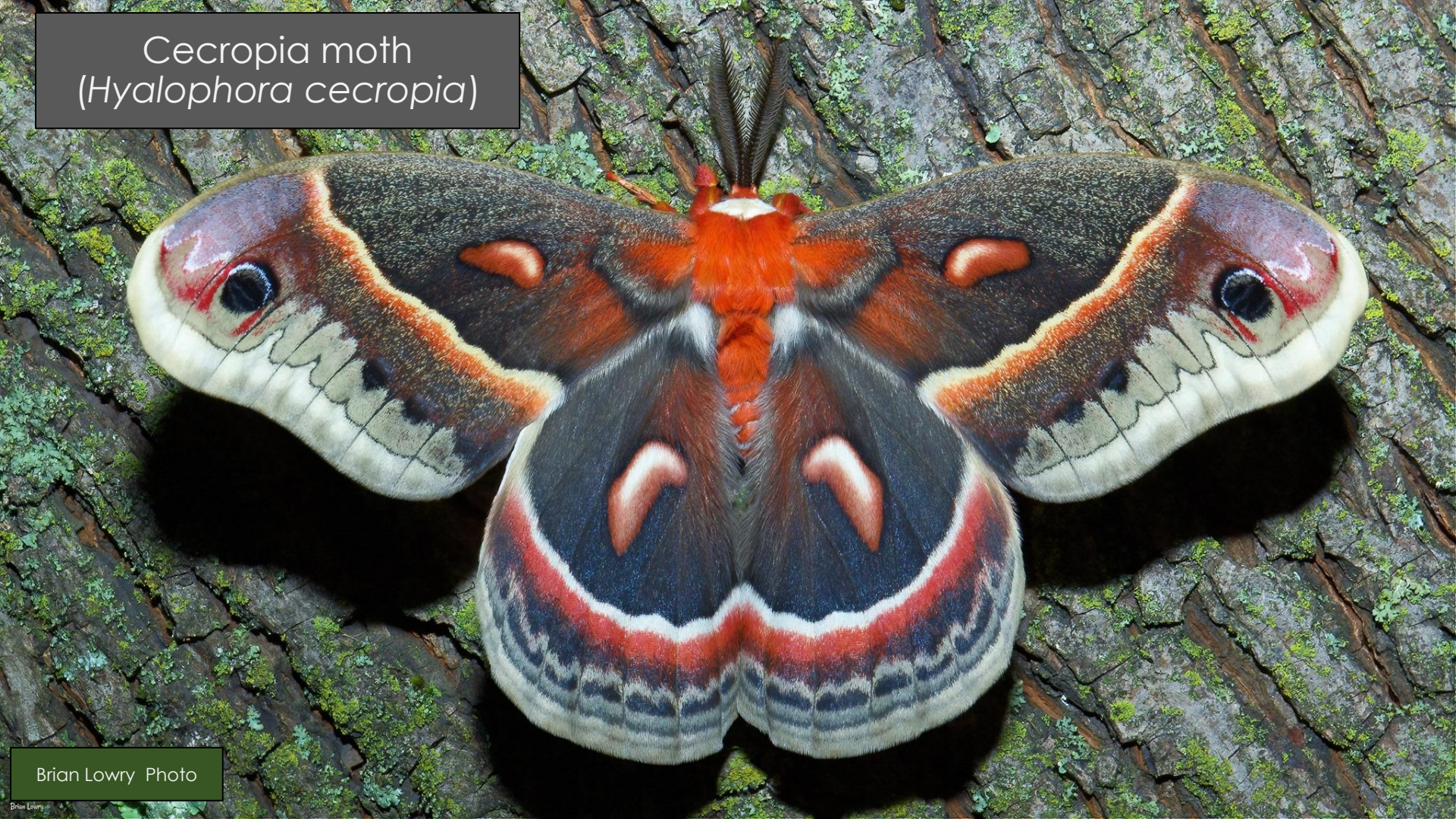
Common Looper
(*Autograph precationis*)

Ronda Byers Photo

Velda Miller Photo

Goldenrod Stowaway
(*Cirrhophanus triangulifer*)

Susan Fletcher Conaway photo


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

Lepidoptera are a Vital Part of the Food Web

Food Web

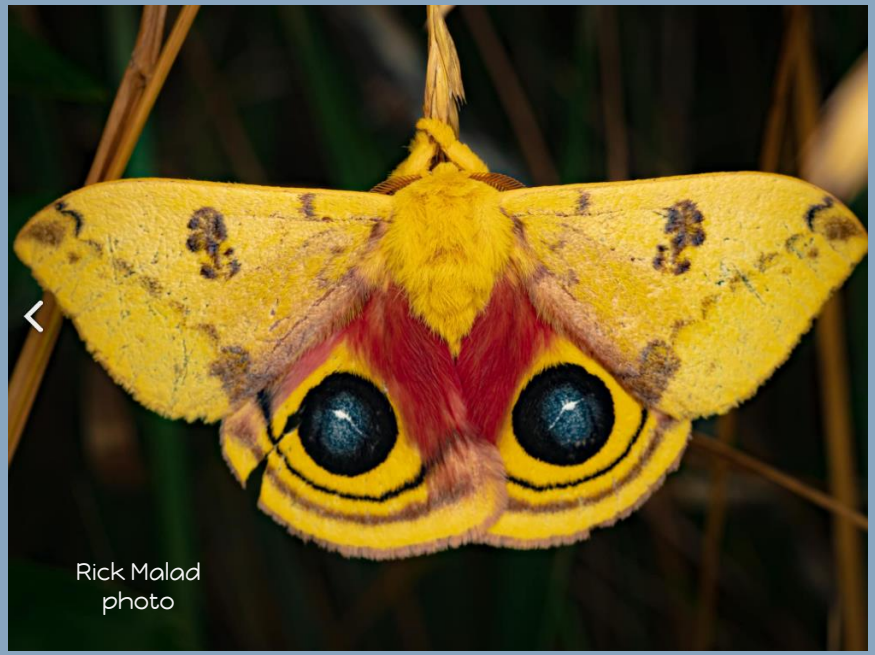
Defense Mechanisms - Crypsis

Fall Cankerworm Moth
(*Alsophila pometaria*)

Giant Swallowtail
(*Papilio cresphontes*)

Defense Mechanisms - Batesian Mimicry

Peachtree Borer Moth
(*Synanthedon pictipes*)



Io Moth
(*Automeris io io*)

Defense Mechanisms - Tails

Luna Moth
(*Actias luna*)

Ronda Byers Photo

Eastern Tiger Swallowtail
(*Papilio glaucus*)

Jaime Fleming Photo

Overwintering Strategies

Larval stage is the most common

Pupa stage is the second most common

Egg stage is the third most common

Adult stage is the fourth most common

Migration - Only the monarch makes a two-way migration. Painted Lady, Red Admiral, White Speck, Black Witch, and Ipsilon moth also migrate.

Golden-crowned Kinglets

One-spotted Variant
(*Hypagyrtis unipunctata*)

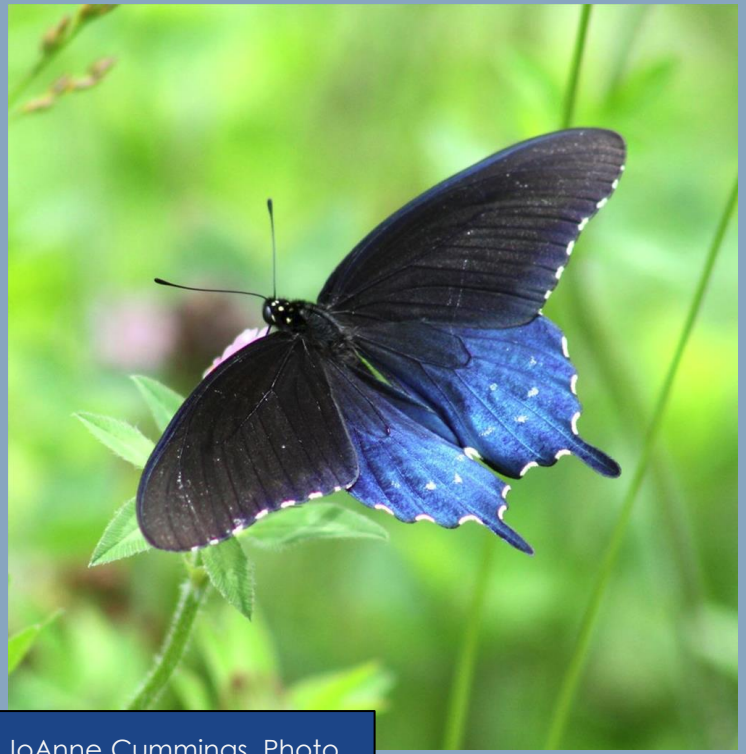
Mourning Cloak (*Nymphalis antiopa*)

Why are they called Butterflies

Witches, dairy-lovers, and parking tickets

Family *Papilionidae* (Swallowtails)

Pipevine Swallowtail
(*Battus philenor*)



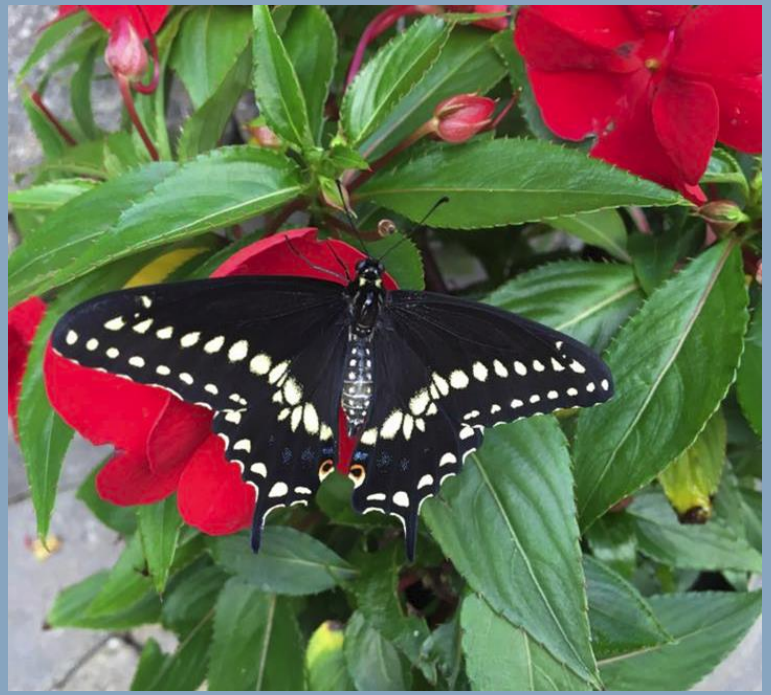
JoAnne Cummings Photo

Spicebush Swallowtail
(*Papilio troilus*)

Family *Papilionidae* (Swallowtails)

Eastern Tiger Swallowtail
(*Papilio glaucus*)

Black Swallowtail
(*Papilio polyxenes*)

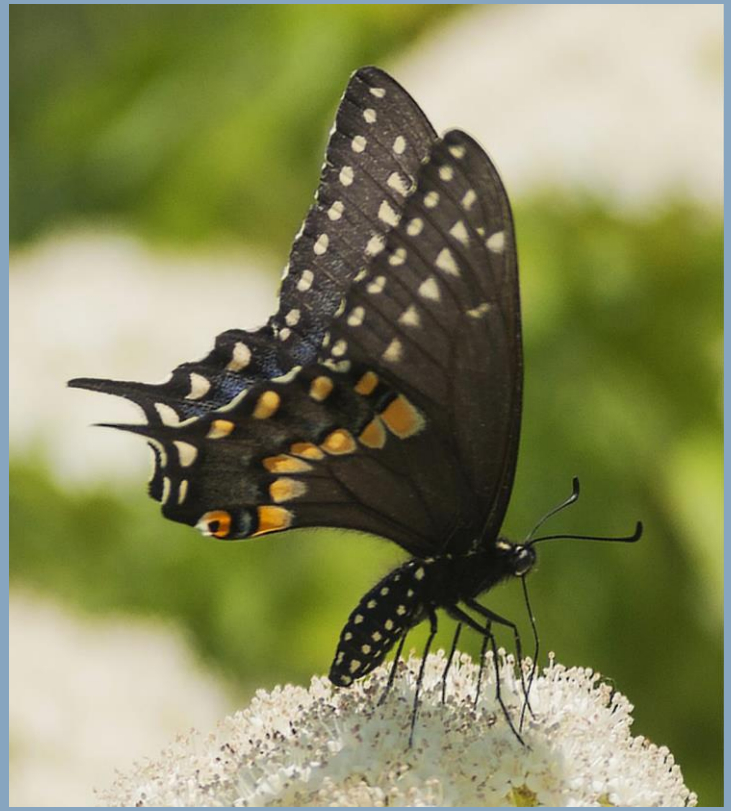


Family *Papilionidae* (Swallowtails)

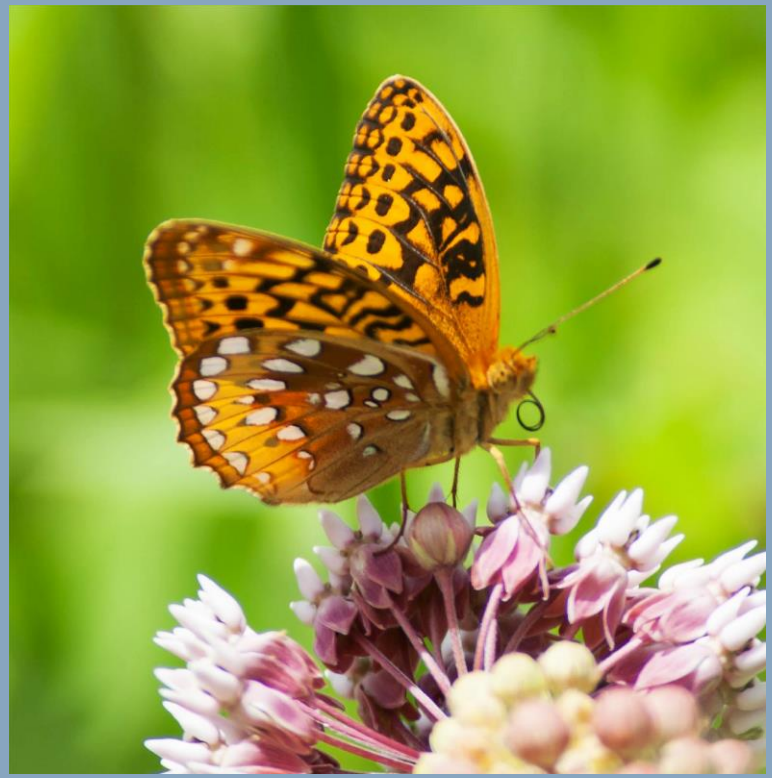
Eastern Tiger Swallowtail (*Papilio glaucus*)

Family *Nymphalidae* (Brush-footed Butterflies)

Black Swallowtail
(*Papilio troilus*)



Great Spangled Fritillary
(*Speyeria cybele*)



Family *Nymphalidae* (Brush-footed Butterflies)

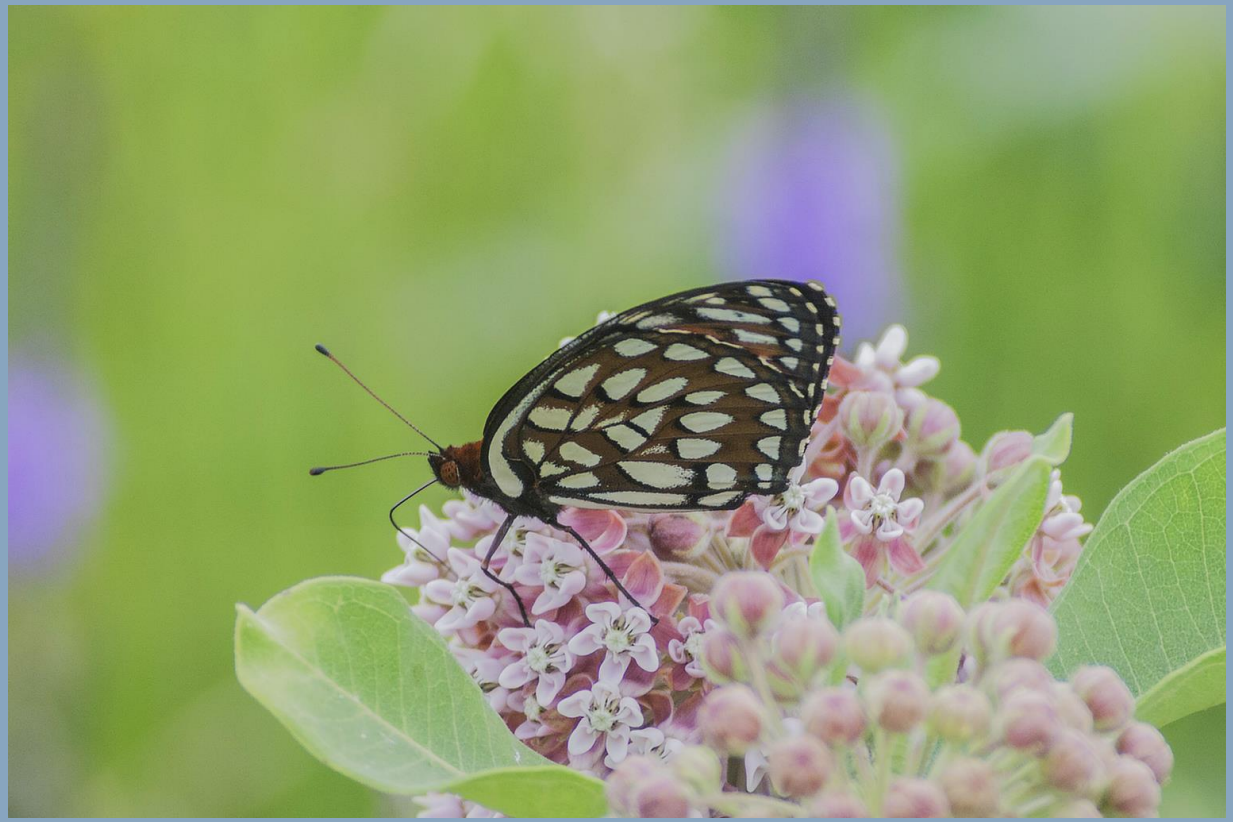
Monarch (*Danaus plexippus*)

Viceroy *(Limenitis archippus)*

John Smith Photo

Family *Nymphalidae* (Brush-footed Butterflies)

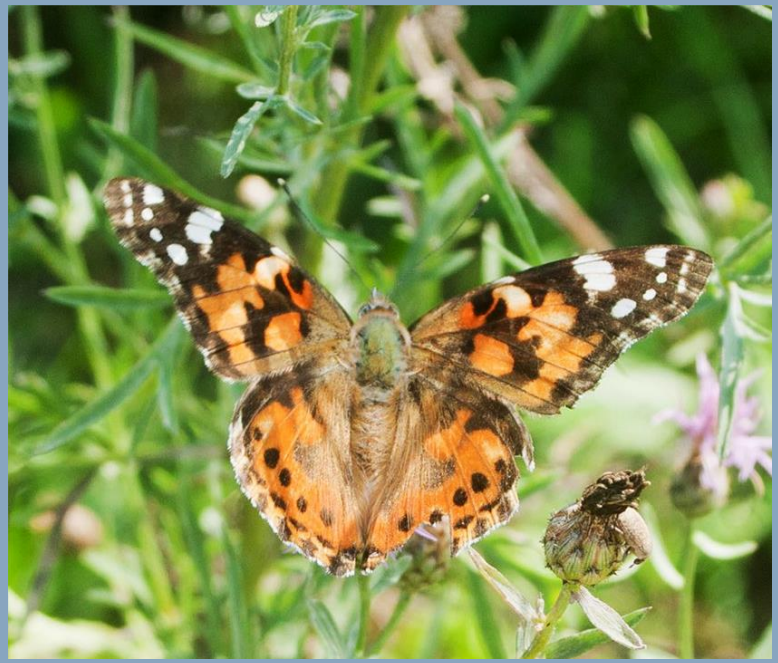
Regal Fritillary (*Speyeria idalia*)



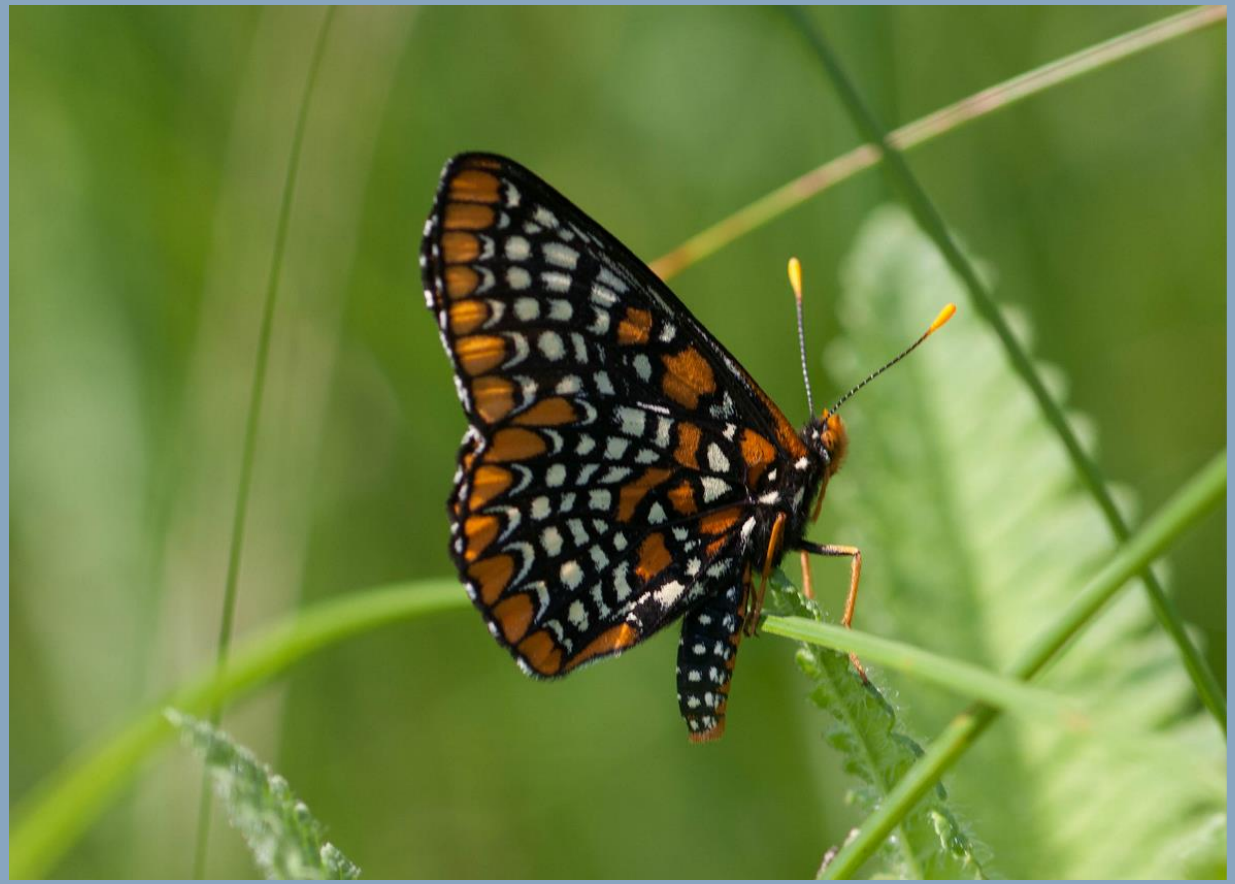
Family *Nymphalidae* (Brush-footed Butterflies)

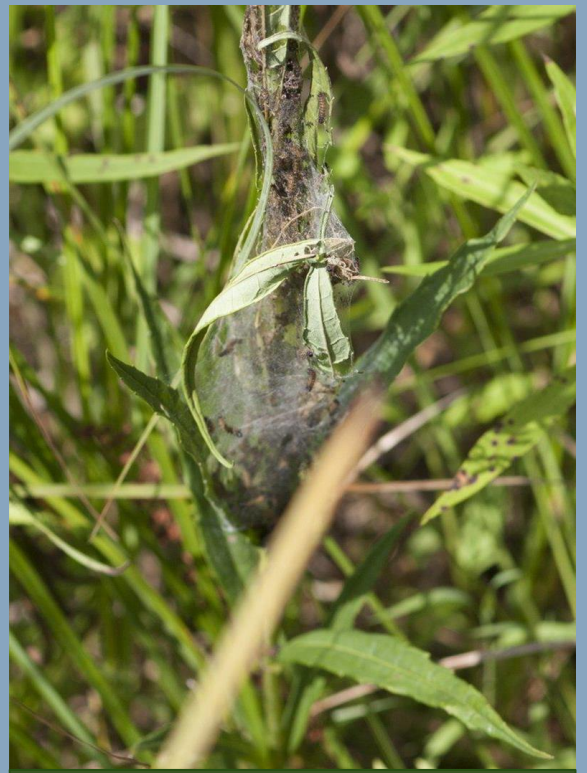
American Lady
(*Vanessa virginiensis*)

Painted Lady
(*Vanessa cardui*)



Baltimore Checkerspot (*Euphydryas phaeton*)





Turtlehead
(*Chelone glabra*)

American Snout (*Libytheana carinenta*)

Carla Frazier
Photo

Subfamily *Satyrinae*

Northern Pearly-eye
(*Lethe anthedon*)

John Lindsey Photo

Little Wood Satyr
(*Megisto cymela*)

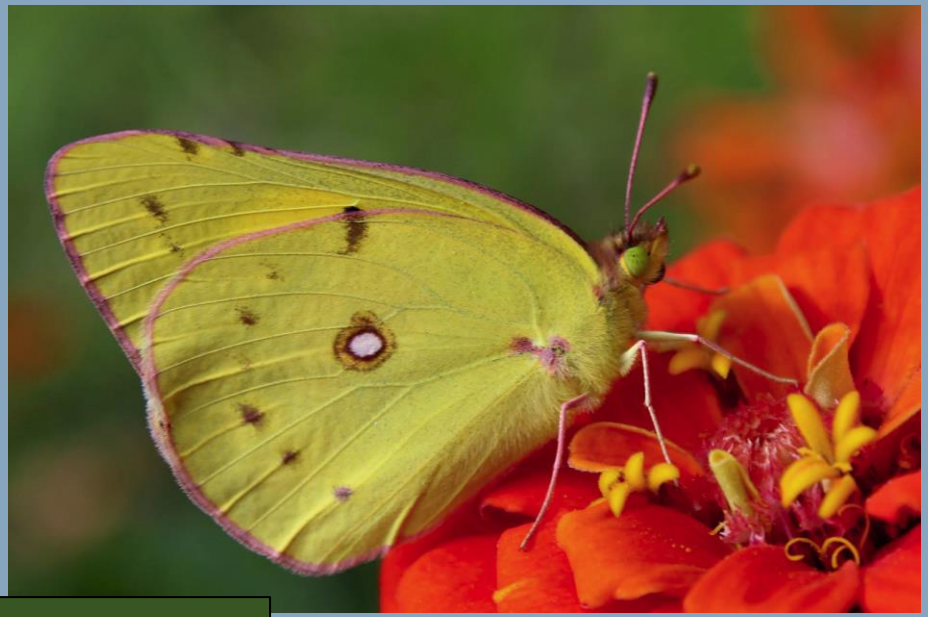
Mitchell's Satyr (*Megisto cymela*)

Tussock Sedge
(*Carex stricta*)

Family *Pieridae*

The Whites and the Sulphurs

Orange Sulphur (*Colias eurytheme*)



Carla Frazier Photo

Cabbage White (*Pieris rapae*)

Family *Lycaenidae*

Banded Hairstreak
(*Satyrium calanus*)

Eastern-tailed Blue
(*Cupido comyntas*)

Karner Blue *(Plebejus samuelis)*

Wikicommons Photo

Abigail Perrino Photo

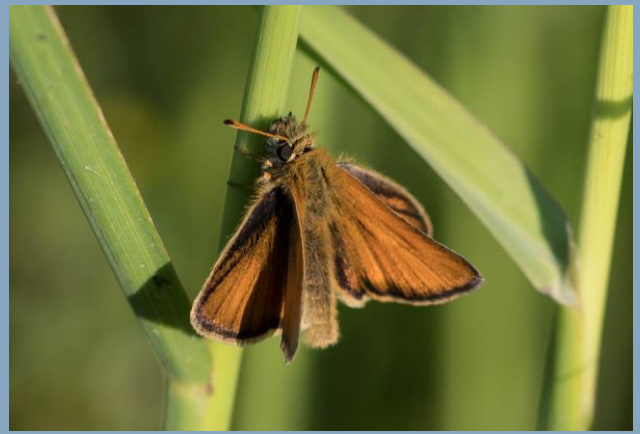
Family *Hesperiidae*

Silver-spotted Skipper (*Epargyreus clarus*)

Peck's Skipper (*Polites peckius*)

Least Skipper (*Ancyloxpha numitor*)

Fiery Skipper (*Hylephila phyleus*)



European Skipper (*Thymelicus lineola*)

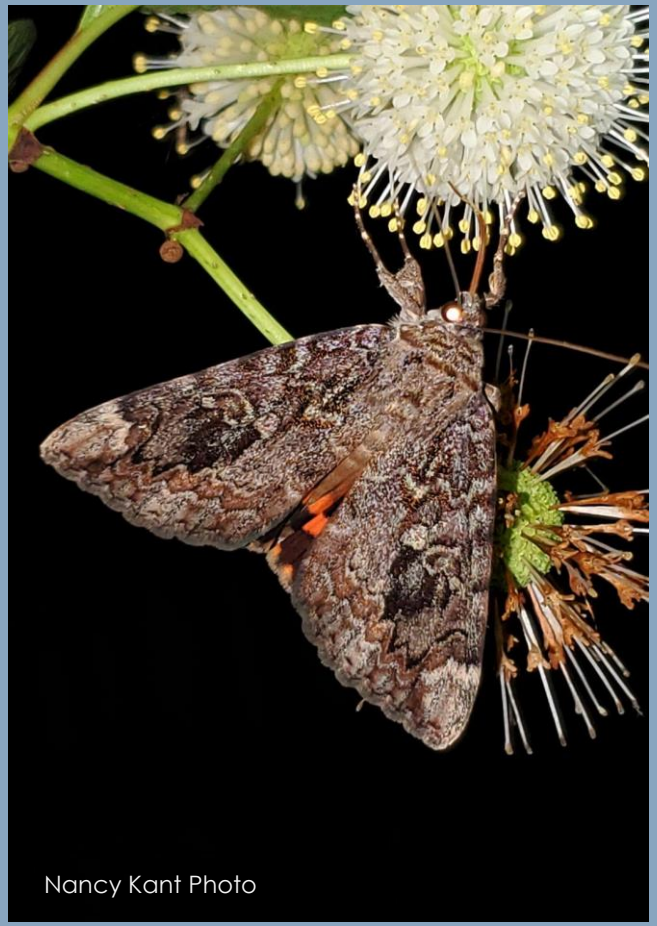
Zabulon Skipper (*Poanes zabulon*)

Virginia creeper sphinx (*Darapsa myron*)

Common Tan Wave (*Pleuroprucha insulsaria*)

White-lined Sphinx (*Hyles lineata*)

Sweetheart Underwing (*Catocala amatrix*)



Carolina Sphinx (*Manduca sexta*)

Butterflies in Decline

- 1.6% annual decline over the past 40 years
- 450 species have declined at 2% year
- 19% of all 800 species of butterflies in the U.S. are currently at risk of extinction (NatureServe)
- Extreme specialists faring worse
- Habitat loss and climate change major factors (warming falls)

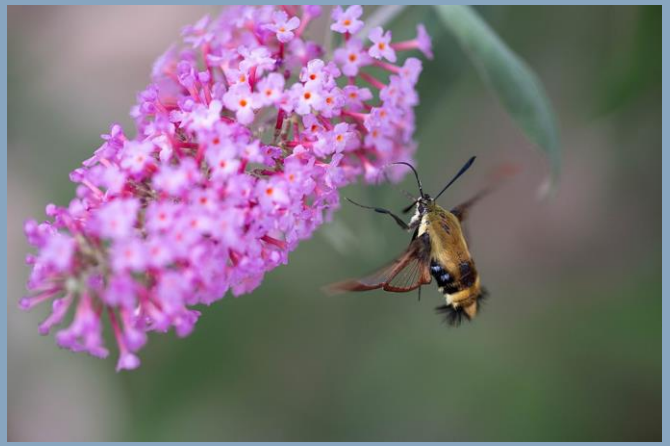



How We Can Each Help

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

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

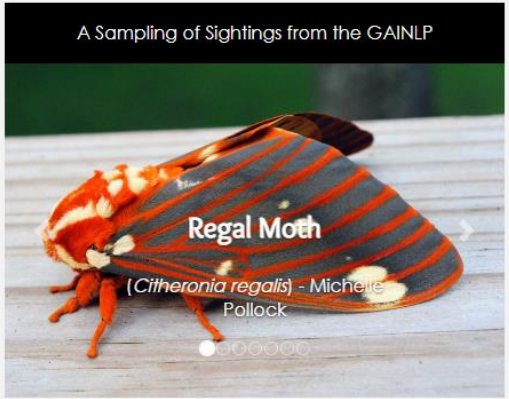


Lepidoptera Project: GAIN LP

The Great American IN Nature Lepidoptera Project (GAIN LP)

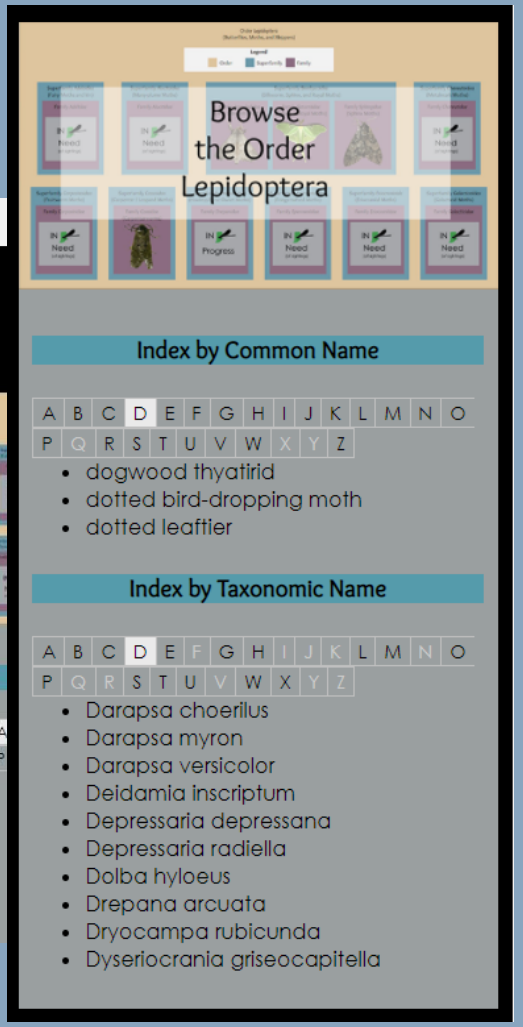
What is the Great American IN Nature Lepidoptera Project?

GAIN LP is a statewide community project, which documents the range and life cycles of Indiana's Lepidoptera while increasing awareness and appreciation of these familiar insects. Through community participation, photographs and data will be used to populate a comprehensive, cost-free resource that will be devoted exclusively to Lepidoptera.

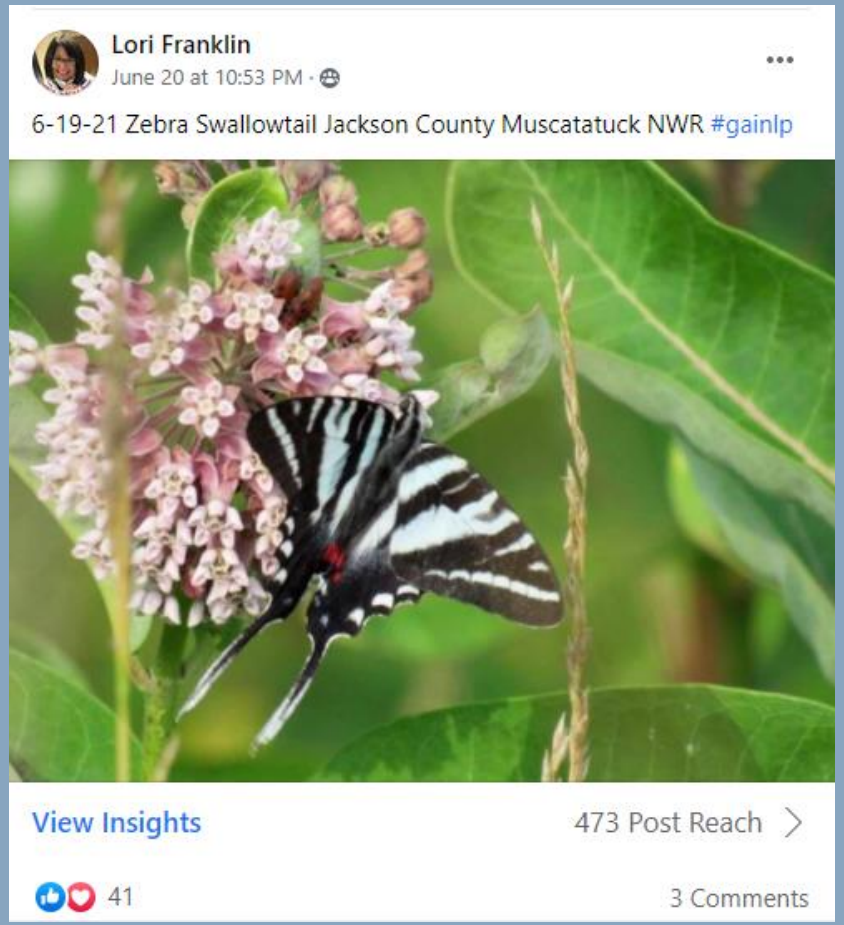


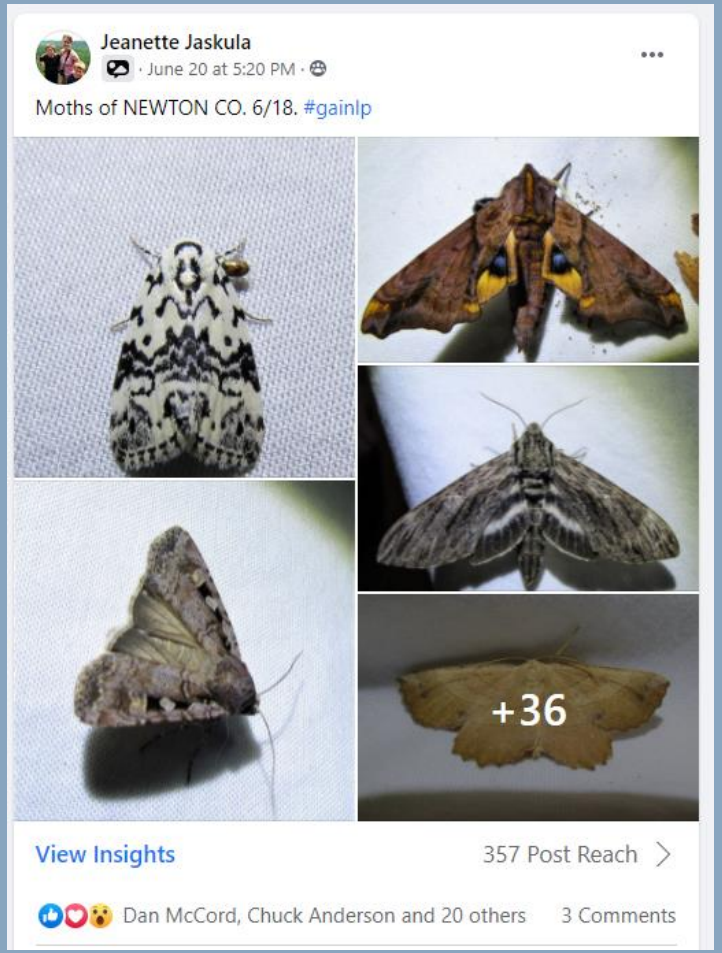
What are Lepidoptera?

Lepidoptera is one of approximately 30 orders within the zoological class of insects. Order *Lepidoptera* consists of the insects commonly known as butterflies, moths, and skippers, and it includes some of the most beautiful and ecologically significant insects in Indiana.



Lepidoptera Project: GAIN LP





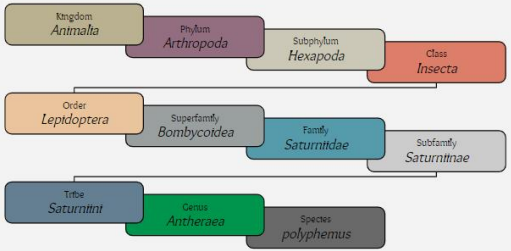
Lepidoptera Project: GAIN LP

Record#	UserID	SpeciesName	CommonName	SightingDate	County	Notes	PhenCode	Gender
37275-2	Fuller, Betti	Hyalophora cecropia	Cecropia Moth	2021-06-20	Greene	Adult	IL	♂
37275	Fuller, Betti	Hyalophora cecropia	Cecropia Moth	2021-06-20	Greene	Adult	IL	♂
37274-2	Schwedler, Kat	Prionoxystus robiniae	Carpenterworm Moth	2021-06-20	Monroe	Adult	IL	*NULL*
37274	Schwedler, Kat	Prionoxystus robiniae	Carpenterworm Moth	2021-06-20	Monroe	Adult	IL	*NULL*
37273-4	Sperka, Linda	Hyalophora cecropia	Cecropia Moth	2021-06-21	Monroe	Adult	IL	♂
37273-3	Sperka, Linda	Hyalophora cecropia	Cecropia Moth	2021-06-21	Monroe	Adult	IL	♂
37273-2	Sperka, Linda	Hyalophora cecropia	Cecropia Moth	2021-06-21	Monroe	Adult	IL	♂
37273	Sperka, Linda	Hyalophora cecropia	Cecropia Moth	2021-06-21	Monroe	Adult	IL	♂
37272	Durkin, Mary	Actias luna	Luna Moth	2021-06-22	Monroe	Adult	AC	*NULL*
37271-2	Jablonski, Barbara	Darapsa myron	Virginia Creeper Sphinx	2021-06-21	Johnson	Adult	IL	*NULL*
37271	Jablonski, Barbara	Darapsa myron	Virginia Creeper Sphinx	2021-06-21	Johnson	Adult	IL	*NULL*
37270	Byers, Ronda	Dryocampa rubicunda	Rosy Maple Moth	2021-06-18	Brown	Adult	IL	*NULL*
37269	Byers, Ronda	Automeris io io	Io Moth	2021-06-18	Brown	Adult	IL	♂
37268	Holbrook, Brenda	Darapsa myron	Virginia Creeper Sphinx	2021-06-22	Scott	Adult	IL	
37267	Lowry, Brian	Automeris io io	Io Moth	2021-06-22	Scott	Adult	IL	♂
37266	Allen, John	Hyalophora cecropia	Cecropia Moth	2021-06-13	Hancock	Adult	IL	*NULL*
37265	McCord, Dan	Agonopterix canadensis	Canadian Agonopterix	2021-06-13	Hamilton	Adult	IL	
37264-2	McCord, Dan	Coleophora deauratella	Coleophora deauratella	2021-06-13	Hamilton	Adult	IL	
37264	McCord, Dan	Coleophora deauratella	Coleophora deauratella	2021-06-13	Hamilton	Adult	IL	
37263-2	Garland, Kelsie	Eacles imperialis imperialis	Rosy Maple Moth	2021-06-20	Switzerland	Adult	IL	♂

GAIN LP- species pages

Antheraea polyphemus — Polyphemus Moth

(Linneaus, 1758)



Adult male (forewings) — OwenCounty (Rick Malad)

Hodges# 7757

Etymology

Antheraea: Origin is New Latin, but most likely derived from Greek *antheros* meaning "brightly colored, brilliant, or flowery."

polyphemus: Named after the cyclopic son of Poseidon in Greek mythology; a reference to the moth's pronounced eyespots.

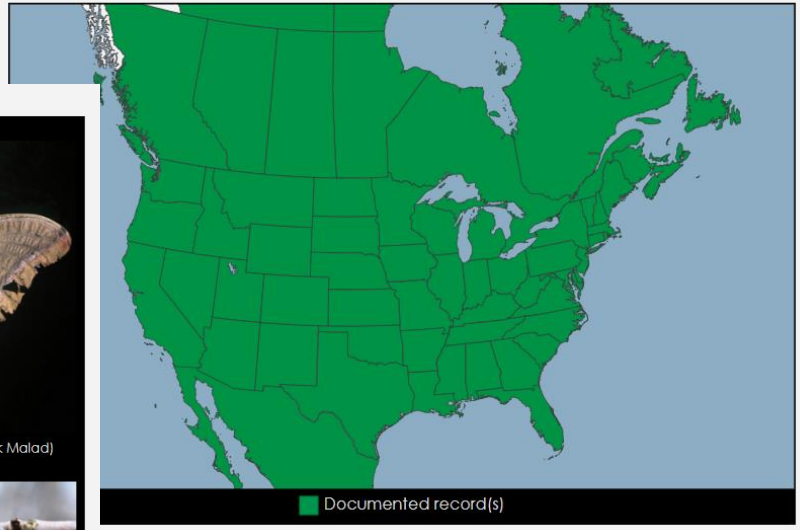
Pronunciation

an-thur-**ee**-uh pah-lee-**fee**-muhs

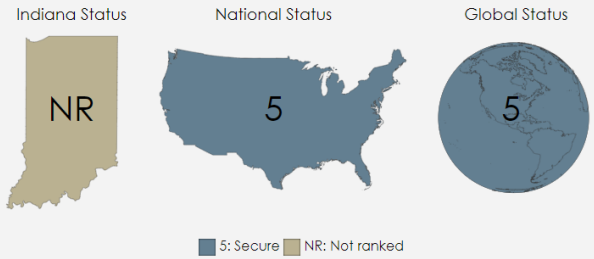
▶ 0:00 / 0:01

Range

This map illustrates documented North American records of *Antheraea polyphemus* as of 31 December 2020.



Conservation Status — NatureServe Rankings



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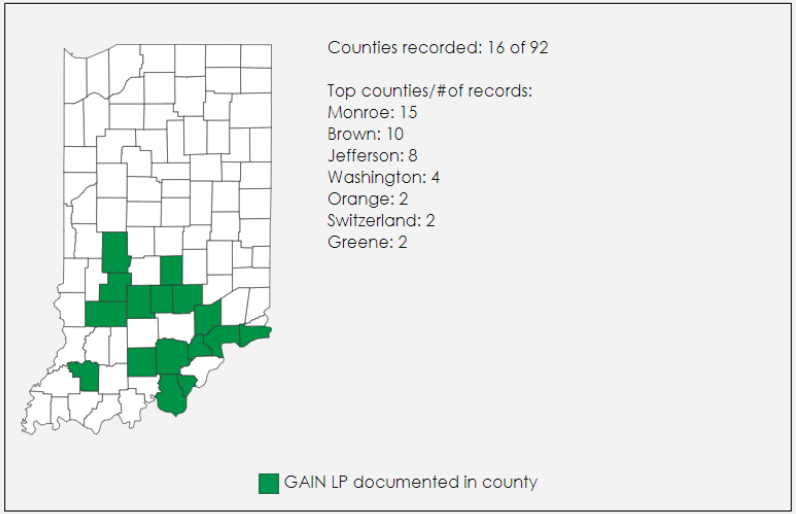
Regal Moth (*Citheronia regalis*) in Indiana

The map, graph(s), and data below represent the Indiana sightings of *Citheronia regalis* as of 23 June 2021, confirmed through photographic evidence by individuals who contributed to the Great American IN Nature Lepidoptera Project (GAIN LP).

Occurrences by County



Known Larval Food Sources in Indiana		
Family	Taxonomic Name	Common Name
	Order: *Cornales*	
Cornaceae	*Cornus* spp.	dogwoods
Nyssaceae	*Nyssa sylvatica*	black gum, aka tupelo
	Order: *Dipsicales*	
Caprifoliaceae	*Diervilla* spp.	honeysuckles
	Order: *Ericales*	
Ebenaceae	*Diospyros virginiana*	persimmon
	Oxydendrum arboreum	sourwood
	Order: *Fagales*	
Betulaceae	*Corylus americana*	American hazelnut
Fagaceae	*Quercus* spp.	oaks
Juglandaceae	*Carya* spp.	hickories
	Juglans spp.	black walnut and butternut
	Order: *Gentianales*	
Rubiaceae	*Cephalanthus occidentalis*	buttonbush
	Order: *Hamamelidales*	
Platanaceae	*Platanus occidentalis*	American sycamore
	Order: *Lamiales*	
Oleaceae	*Fraxinus* spp.	ashes
	Syringa spp.	lilacs
	Order: *Laurales*	
Lauraceae	*Sassafras albidum*	sassafras
	Order: *Myrtales*	
Lythraceae	*Lythrum* spp.	loosestrifes
	Order: *Rosales*	
Rosaceae	*Prunus* spp.	cherries
	Order: *Salicales*	
Salicaceae	*Salix* spp.	willows

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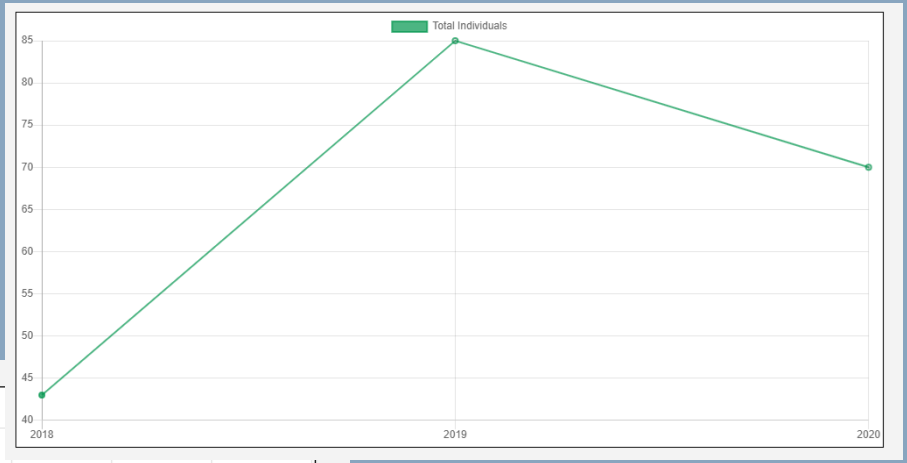
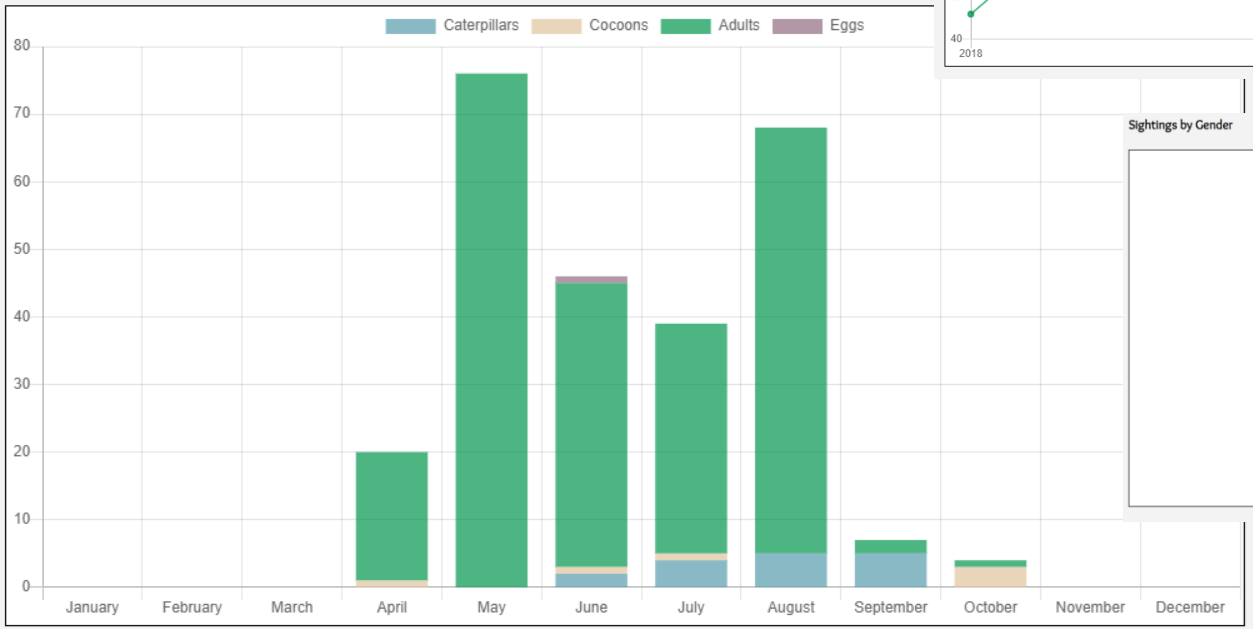
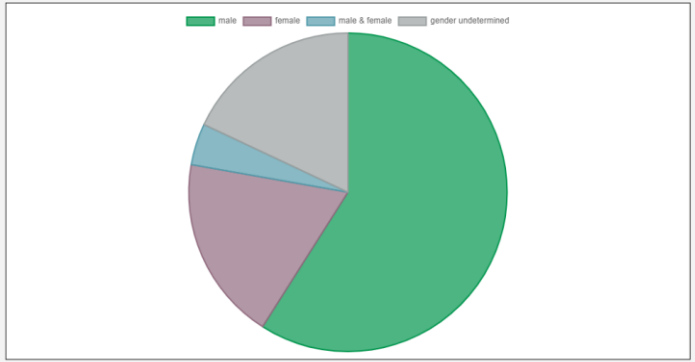
Adult Size and Description

- Wingspan: 75–135 mm (3–5.3 in), but occasionally to 178 mm (7 in)
- Coloration and Patterning:
  - Seasonally dimorphic. Both sets of wings green but vibrantly colored in the spring and pale in the summer.
  - Each wing with a single discal eyespot edged in black.
  - Conspicuous reddish-brown coastal margins on forewings
- Sexual Dimorphism:
  - Male antennae broader than females
  - "Tails" of females usually shorter than males
- Defense Mechanisms:
  - Crypsis — Leaf coloration
  - Batesian Mimicry — Discal eyespots
  - Acoustical diversion — Recent research indicates that the "tails" serve to deflect bat echolocation away from vital body parts (Barber et al. 2015).





Sightings by Gender



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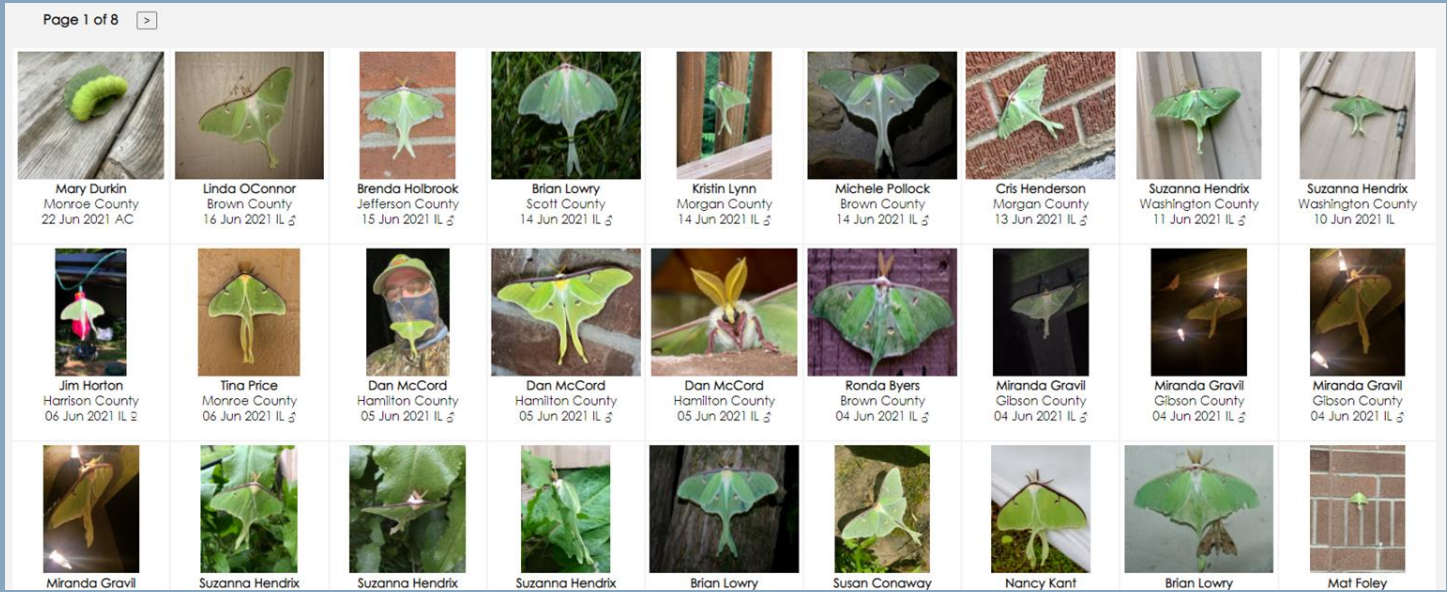
Legend				
Gender	Phenophase Codes			
♂ = male	AA = active adults	AC = active caterpillars	CF = caterpillars feeding	CT = caterpillars in tent
♀ — female	DA = deceased adults	DC = deceased caterpillars	EG = eggs	EC = eclose
⚥ — male and female	FO = female ovipositing	FV = flower visitation	IF = at feeding station	IL = at light
	MT = mating adults	MA = migrating adult	PU = pupae	



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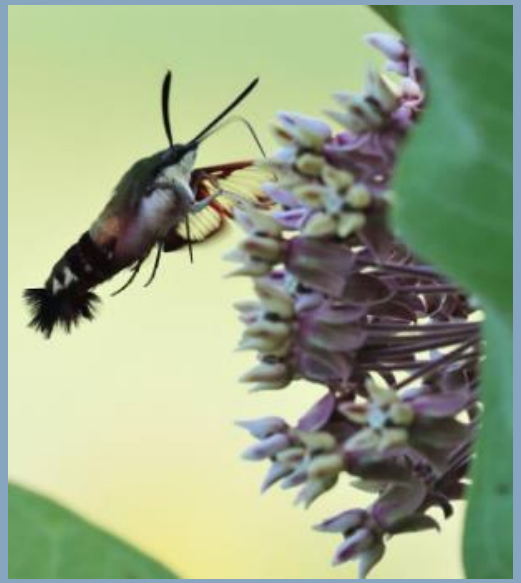


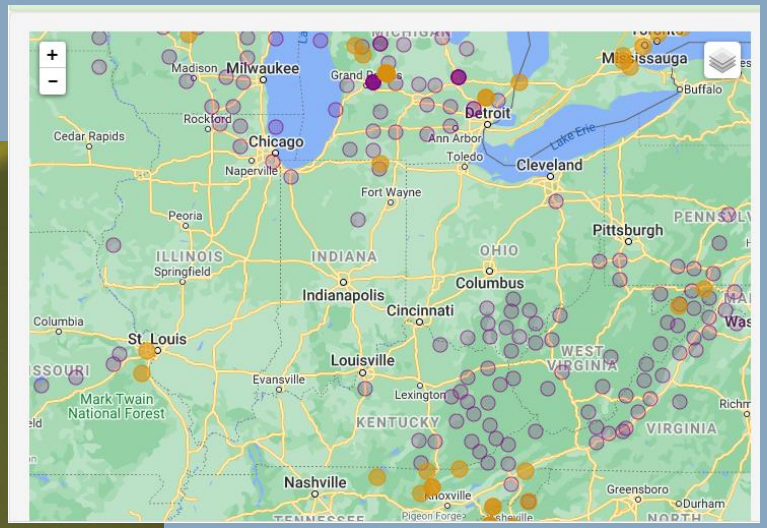
Hummingbird Clearwing (*Hemaris thysbe*)

Sanda Tipton Photo

GAINLP Highlight Species

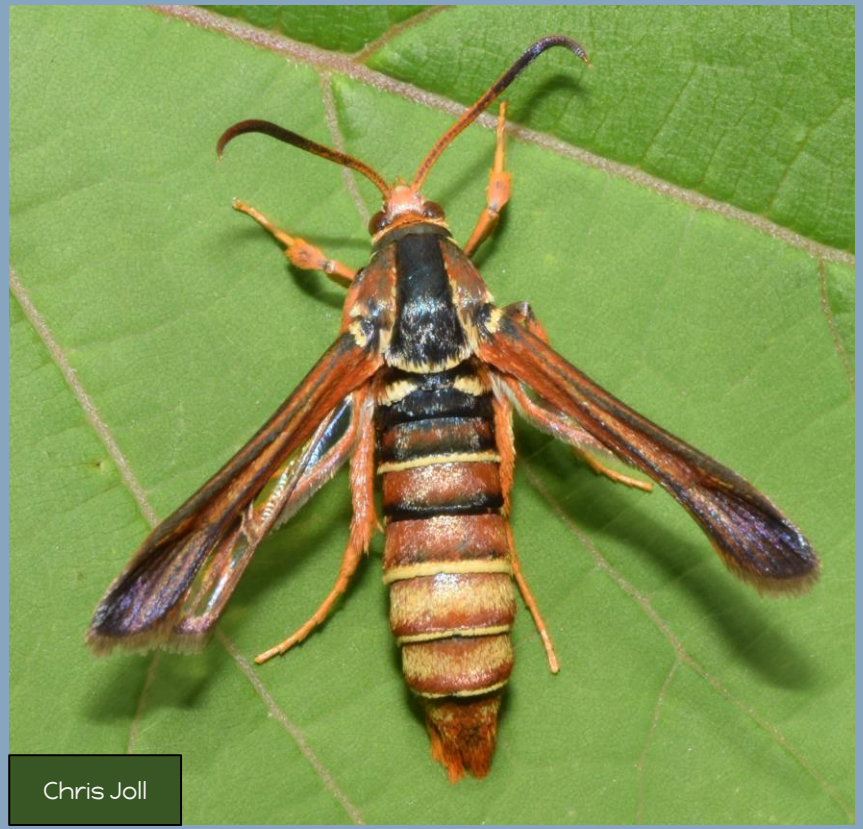
Silvery Blue (*Glaucopsyche lygdamus*)

Doug Selzer

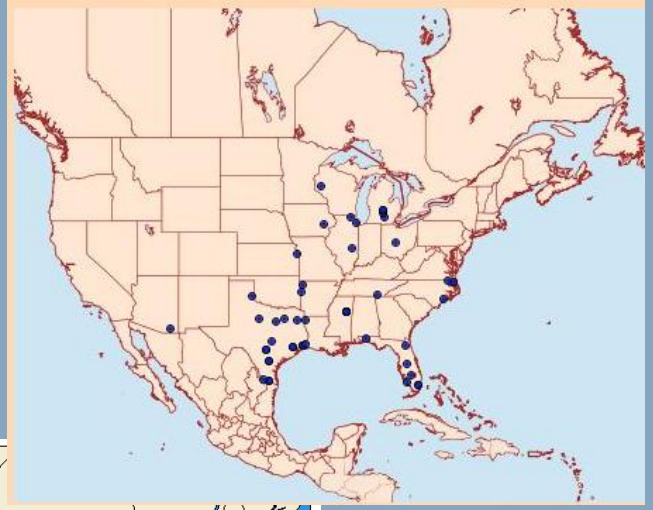


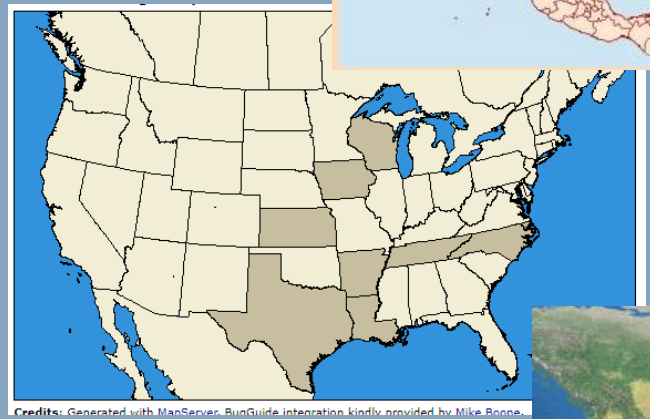
GAINLP Highlight Species

Doll's Clearwing (*Paranthrene dollii*))



Chris Joll





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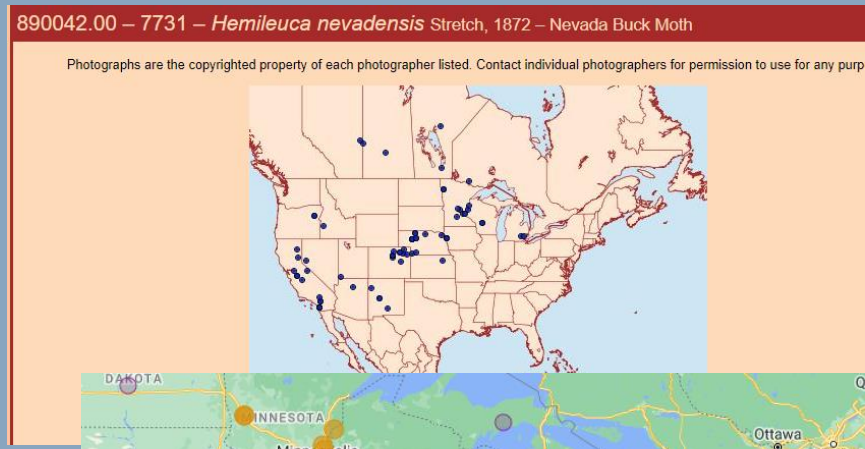
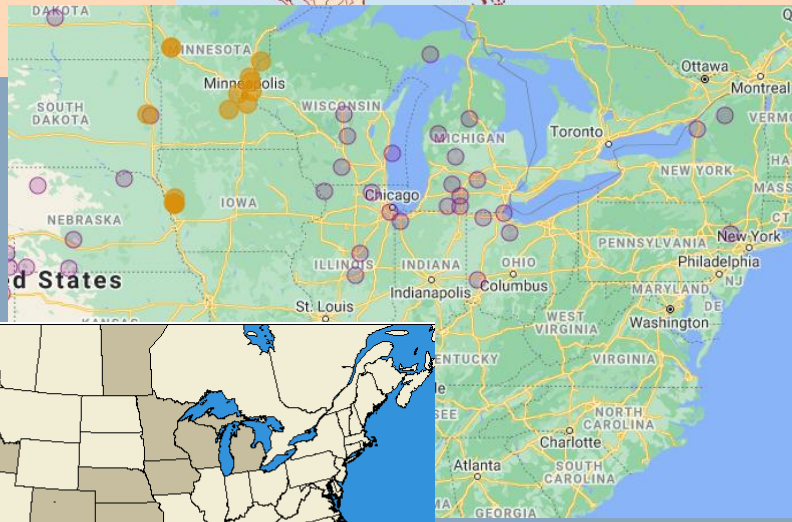
Nevada buckmoth (*Hemileuca nevadensis*)

Found by Trevor Edmonson

Jean Jaskula Photo





GAINLP Highlight Species

Kyoto moth
(*Autosticha kyotensis*)

Drop us a Line

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Amanda Smith

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