NHFS Intro to Moths and Butterflies 2024

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NHFS Intro to Moths and Butterflies 2024

NATH7268 1.5 CEUs

*Class night and time: Mondays, 7-9 pm
*Class meetings: May 6-June 17
*No Class May 27, no field trip May 25 (Memorial Day Weekend)

Lectures in person at Woodend, no Zoom will be offered

Lepidoptera in the economy

On the one hand:

- Important pests of foods in storage/pantry pests
- Important pests of food and agricultural crops

On the other hand:

- Important pollinators of food and agricultural crops
- Moths carry more diverse pollen than the bees during the midsummer, accounting for a third of all plant-pollinator visits studied.

Lepidoptera in the environment

Base of the animal food chain

Critical food source for birds, especially during migration

Important pollinators of wild plants – probably more important than bees, especially for night-blooming plant guilds

ANIMALS NEWS

Discovery reveals secrets about how ghost orchids reproduce

Incredible photos show multiple species pollinate the rare and enigmatic flower, which is good news for the endangered species.


©Jim McCormac

Lepidoptera in popular culture

- Frequently seen as metaphors for growth and change (metamorphosis)
- In some cultures, associated with spirits of the dead
- As with birds, butterflies especially are associated with flight and freedom
- Many moths (e.g., Black Witch and Death's-head Sphinx) associated with death
- Butterflies often symbolize good luck when represented in jewelry or clothing


What do you want to know about Moths and Butterflies?

Housekeeping

- Identification emphasis is at the FAMILY, not the species, level
- Class participation and discussion is expected
- Civility and collaboration are expected – you aren't competing with each other
- I will be posting each week's slides for review to LepLog
- I will be adding auxiliary material to LepLog—check it regularly
- Classes will be two hours long with a 10 minute break mid-way

Housekeeping – Field Trips

- May 11 US National Arboretum, DC
- May 18 Patuxent North Tract, MD
- June 1 Adkins BioBlitz
- May 8 TBD (HoCo Conservancy)

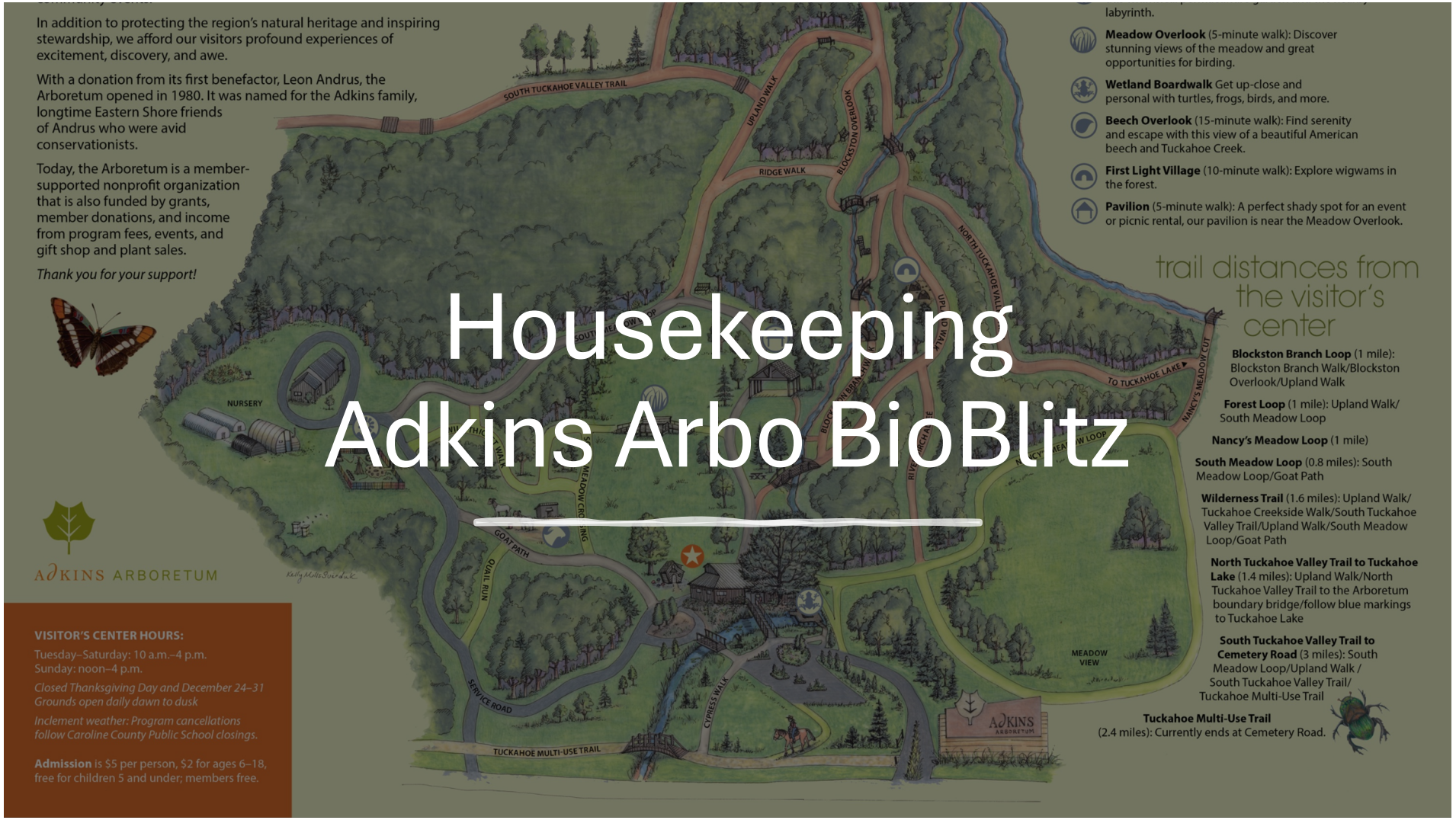
Plan to be in the field 10-2 with a half-hour break midway through for lunch (except for the BioBlitz)

Rain dates are the next day (Sunday)

See LepLog notes for field etiquette

Carpooling encouraged

Housekeeping
Adkins Arbo BioBlitz

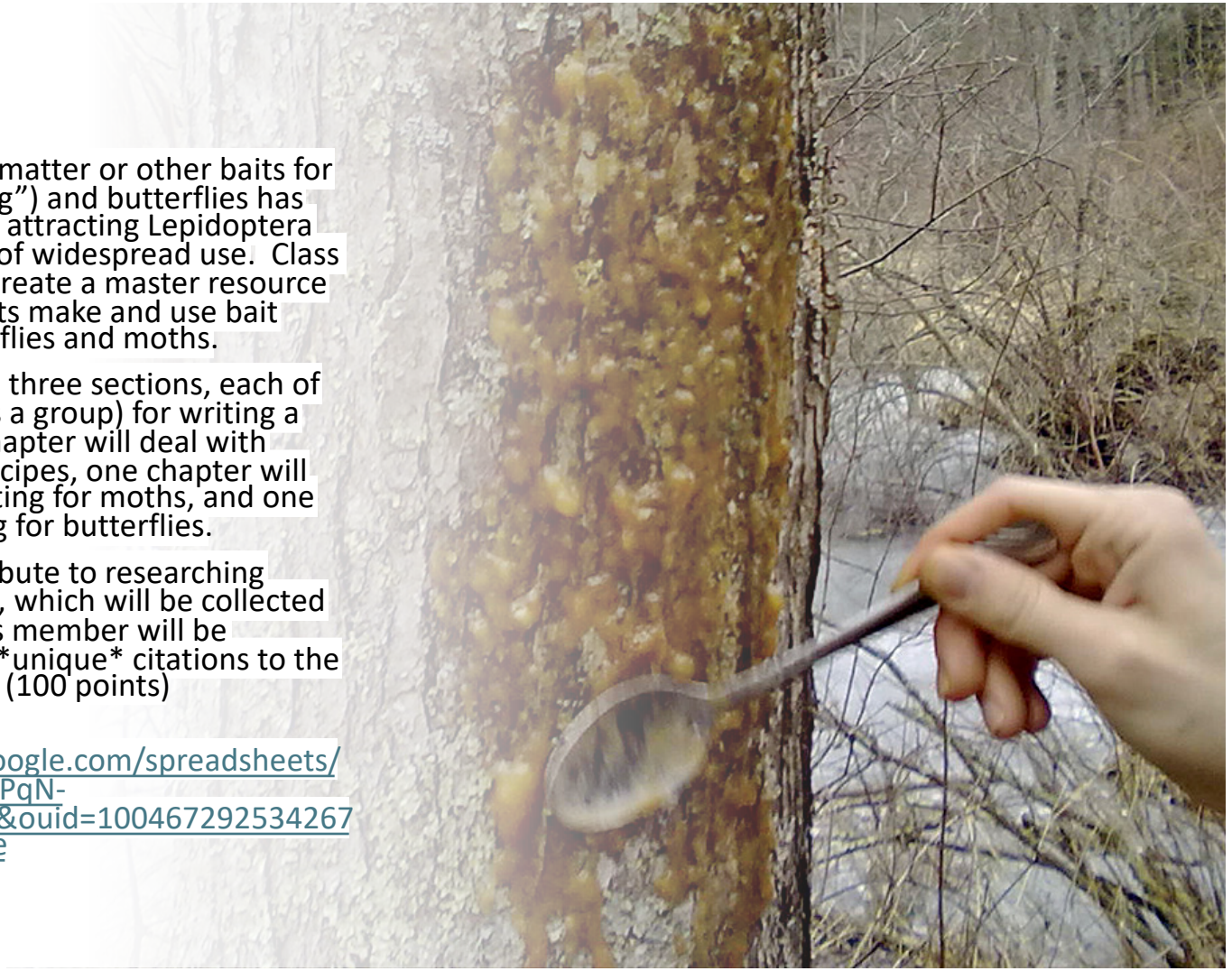


Housekeeping – Class Projects -- Caterpillars

- I have set up a class project in iNat for the collection of identifiable caterpillars. Your goal will be to photodocument (any pic as long as the caterpillar can be ID'd from it) TWENTY FAMILIES of Lepidoptera caterpillars worth 5 points each, from mines to borers to herbivores proper.
- You can mix and match butterflies and moths.
- When you submit to iNat, please code your submission to our class project. Bonus points (10 points) for any caterpillar you post to iNat that isn't already in the iNat library. (100 points)
- Our class project is https://www.inaturalist.org/projects/nhfs-caterpillars-2024; please join the group project

Housekeeping – Class Projects – Baits and Traps

- Putting out fruit fermenting matter or other baits for moths (often called “sugaring”) and butterflies has been a time-honored way of attracting Lepidoptera for study that has fallen out of widespread use. Class members are going to help create a master resource for helping new lepidopterists make and use bait stations for observing butterflies and moths.
- The class will be divided into three sections, each of which will be responsible (as a group) for writing a chapter of our guide. One chapter will deal with historically used baits and recipes, one chapter will deal with techniques for baiting for moths, and one chapter will deal with baiting for butterflies.
- All class members will contribute to researching information for the chapters, which will be collected in a Google Drive. Each class member will be expected to contribute four *unique* citations to the class spreadsheet in Google. (100 points)
- Class spreadsheet: https://docs.google.com/spreadsheets/d/1JuDRcK3Xi1WtNQX7tS09PqN-O1shQ6BI/edit?usp=sharing&ouid=100467292534267170965&rtpof=true&sd=true

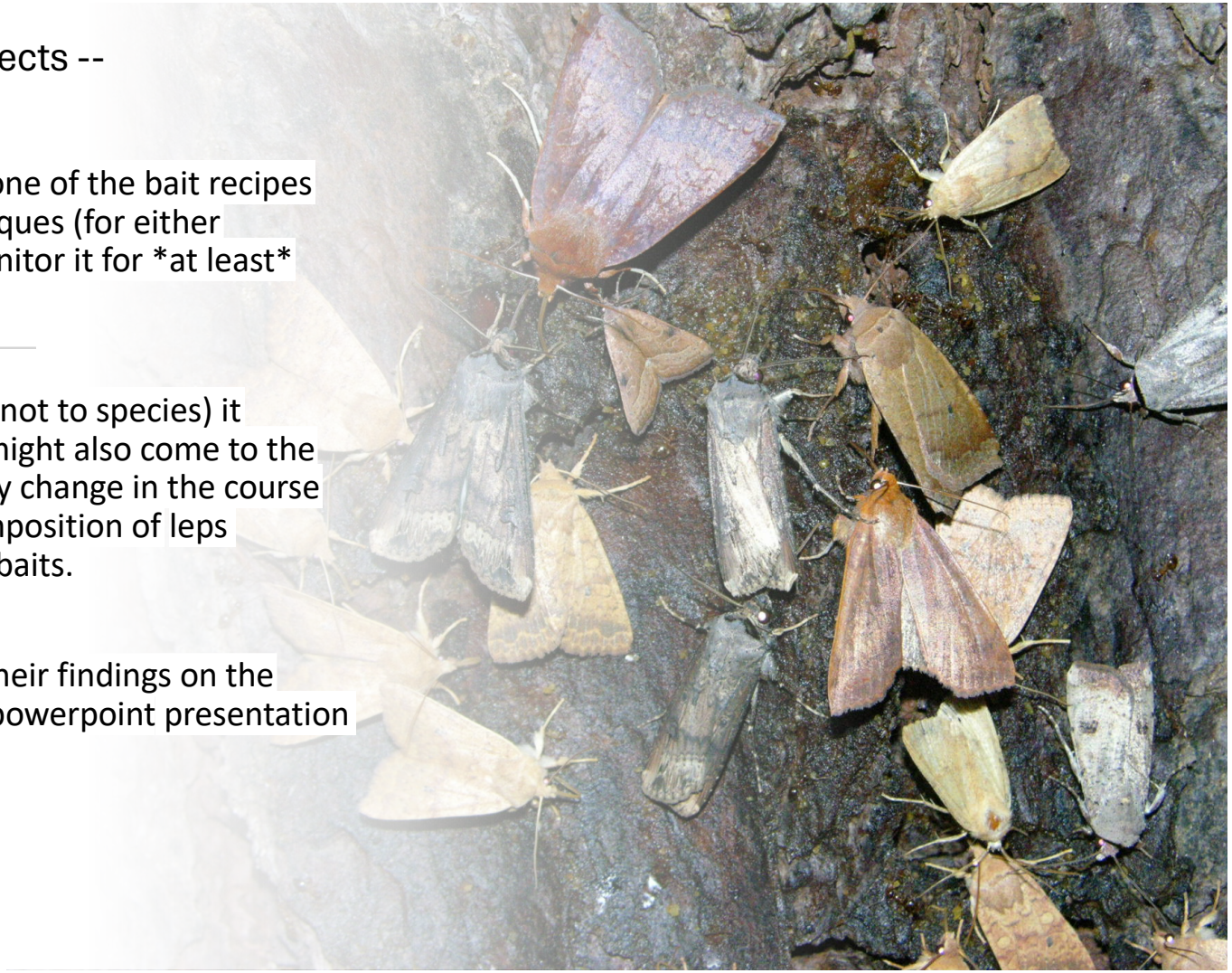


Housekeeping – Class Projects -- Observation

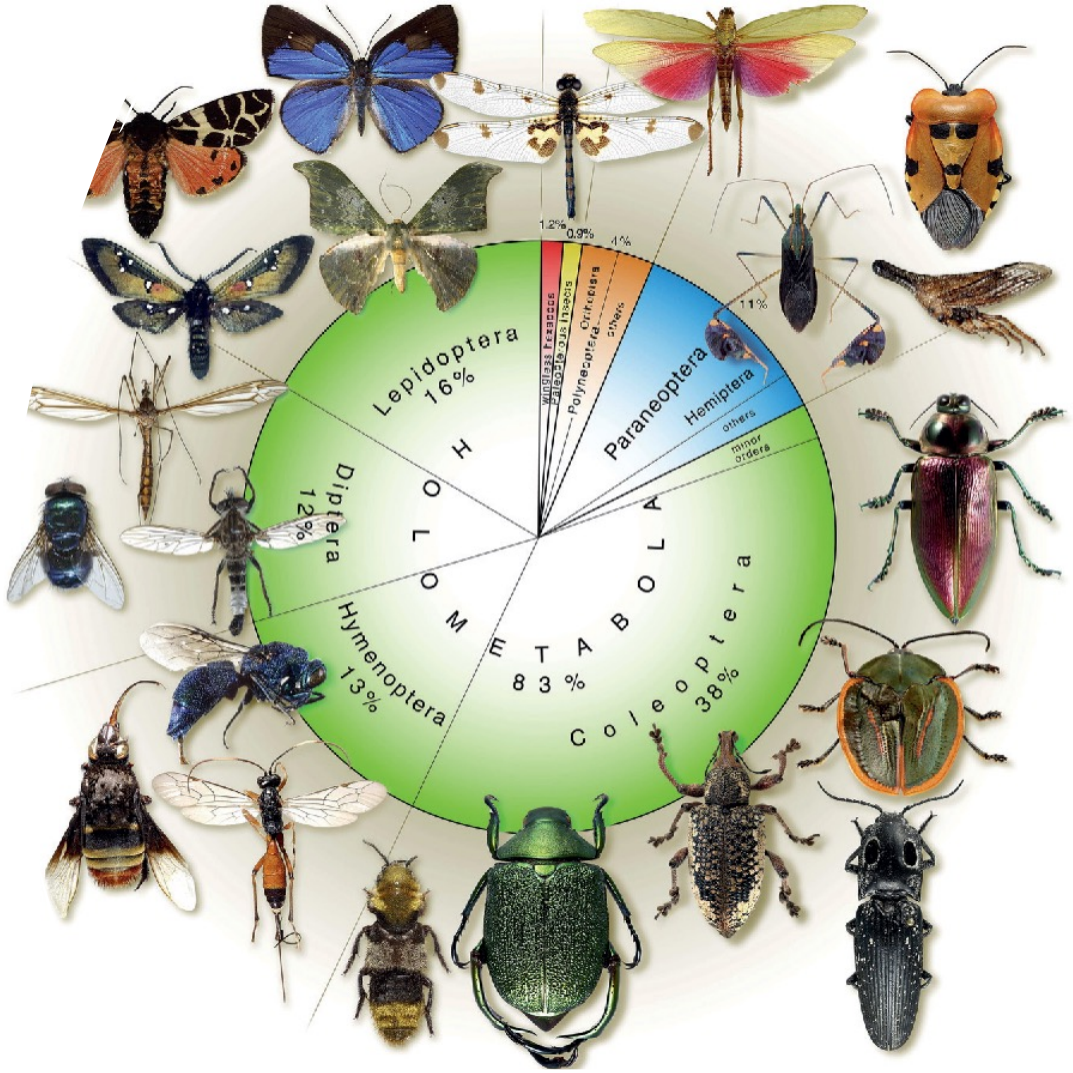
Each class member will pick one of the bait recipes and one of the baiting techniques (for either butterflies or moths) and monitor it for *at least* one week during the class.

Note the species (to family if not to species) it attracts, what other insects might also come to the bait, and whether there is any change in the course of the day or night in the composition of leps attracted, or behavior at the baits.

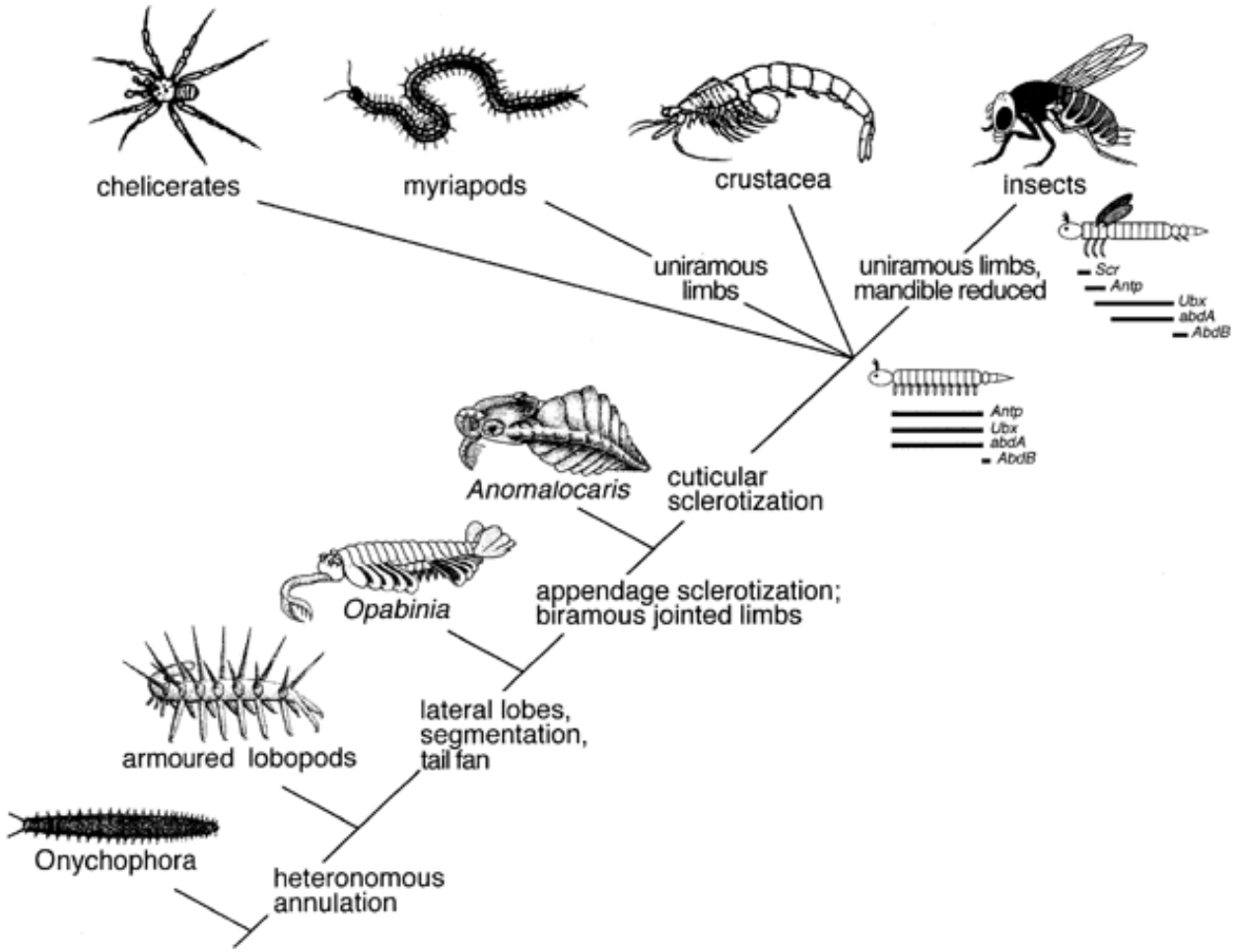
Class members will present their findings on the night of the last class with a powerpoint presentation to the class. (100 points)



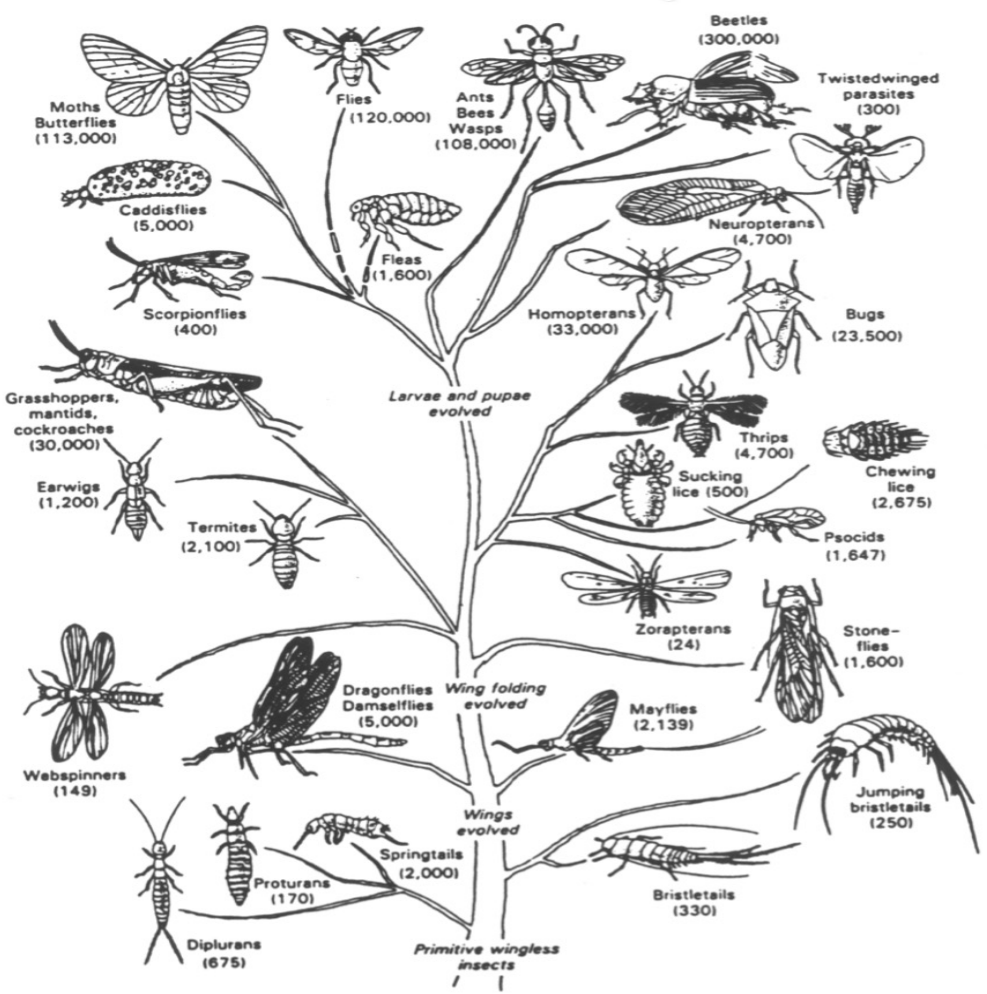
Leps as part of the Class Insecta

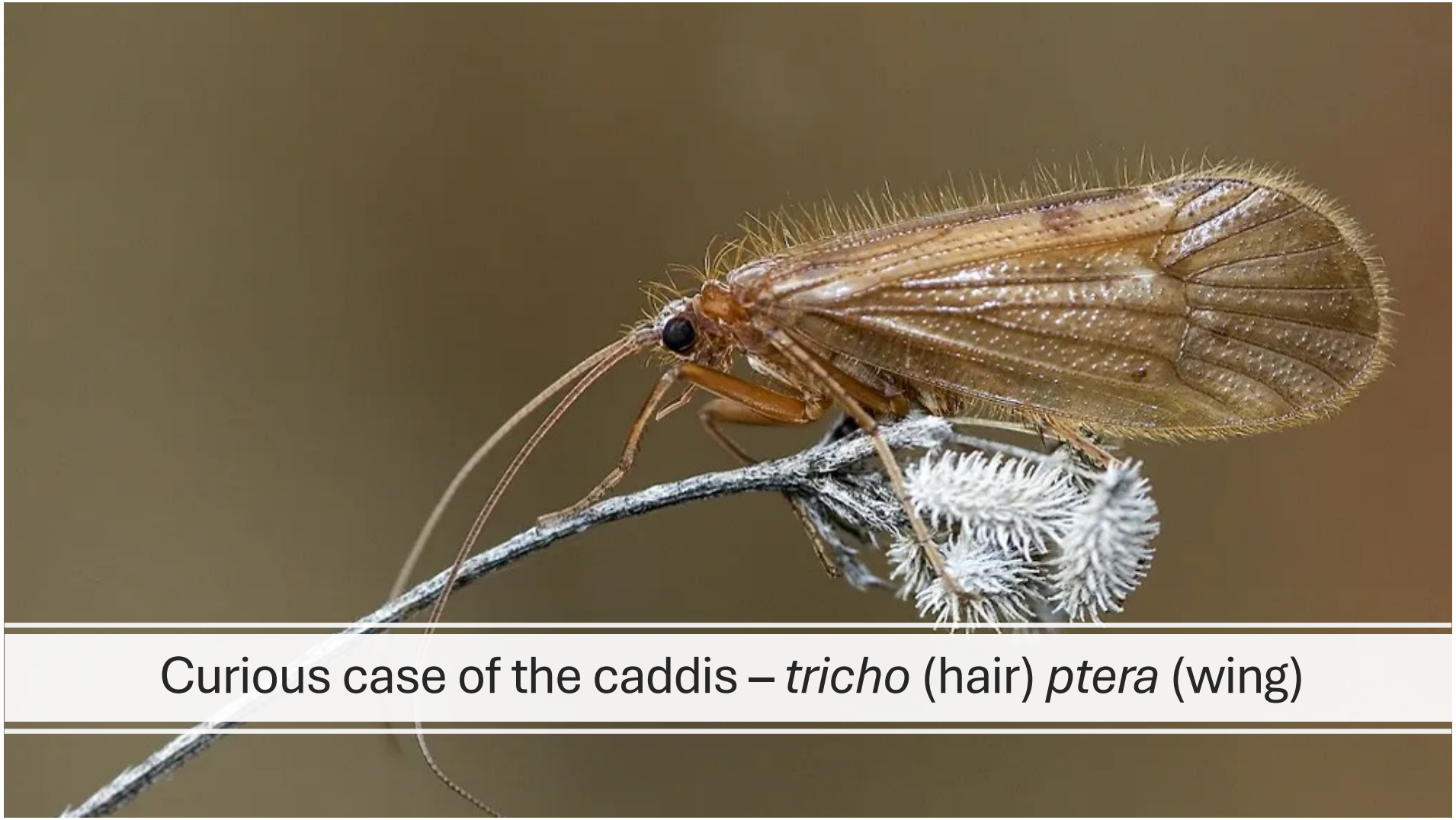


How did insects evolve?



Evolution of Insect Orders





Curious case of the caddis – *tricho* (hair) *ptera* (wing)

Lepidoptera – Overview

About 180,000 species of Lepidoptera have been described

Represent 10% of the total described species of living organisms, making it the second largest insect order (behind Coleoptera) with 126 families and 46 superfamilies.

One of the most widespread and widely recognizable insect orders in the world.[4]

Lepidoptera -- Overview

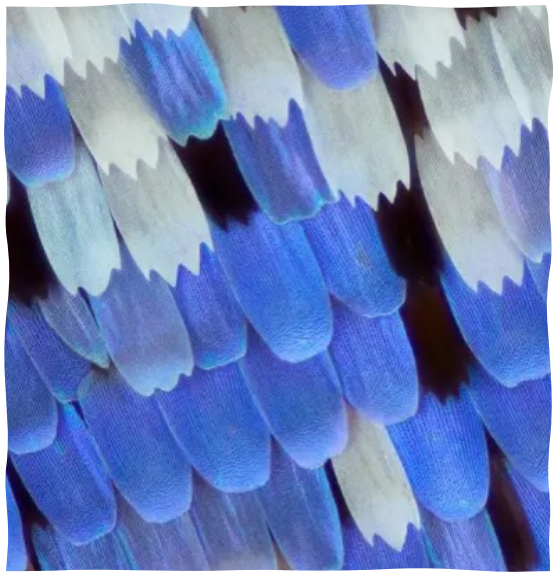
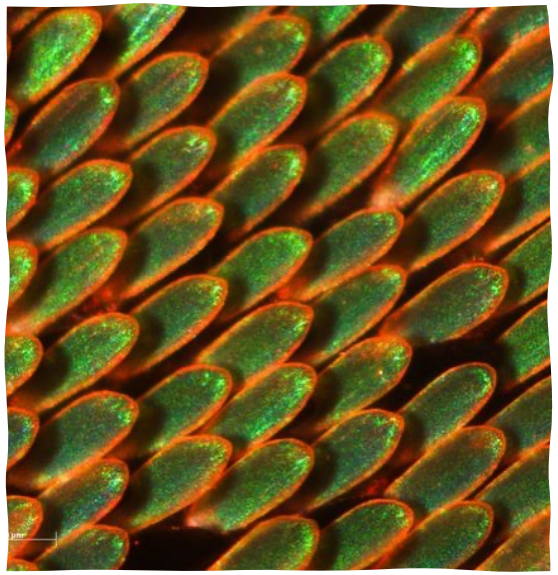
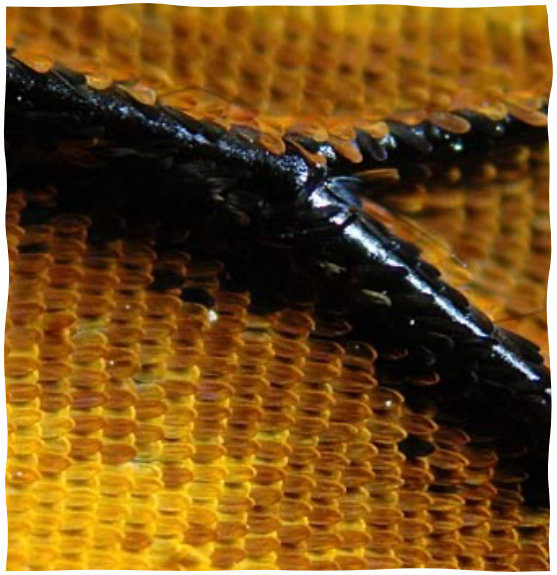
Lepidoptera are characterized by:

Large, triangular wings

Wing scales (*lepido* “scaled” *ptera* “wings”)

A coiled proboscis as adults (except for very primitive moths and leps where the proboscis has atrophied)

Lepidoptera – Scales and Color

Lepidoptera -- Distribution

Diversity of Lepidoptera in each faunal region

	Palearctic	Nearctic	Neotropic	Afrotropic	Indo-Australian (comprising Indomalayan, Australasian, and Oceanian realms)
Estimated number of species	22,465	11,532	44,791	20,491	47,287

Lepidoptera -- Distribution

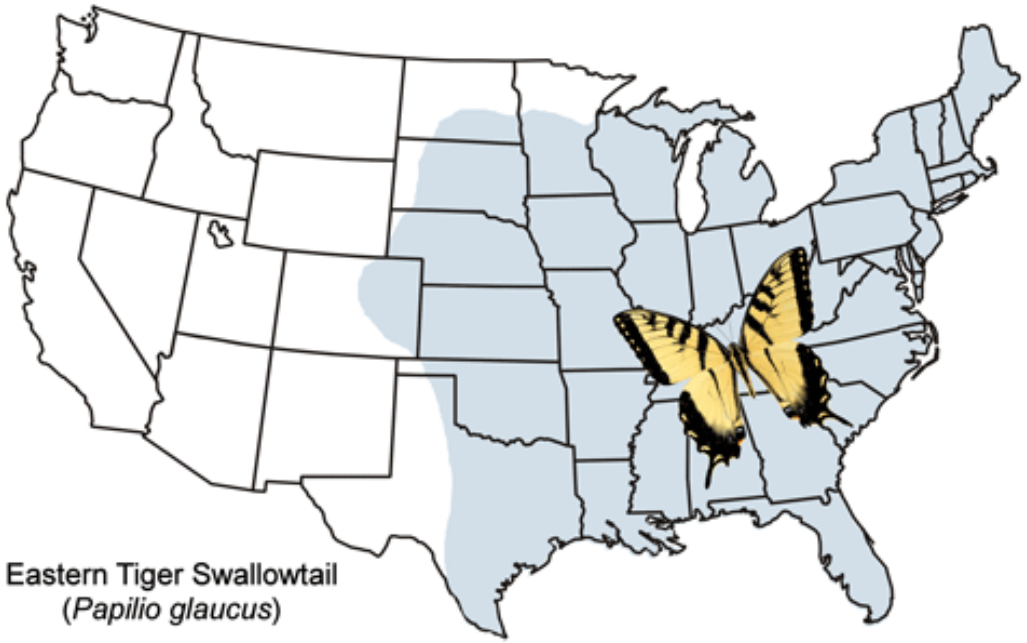
North America has more than 700 species of butterflies and over 11,000 species of moths

In Maryland, ~150 species of butterflies

In Maryland, ~2,600 species of moth (recorded)

In Virginia, ~150 species of butterflies

In Virginia, ~1,400 species of moth (recorded)



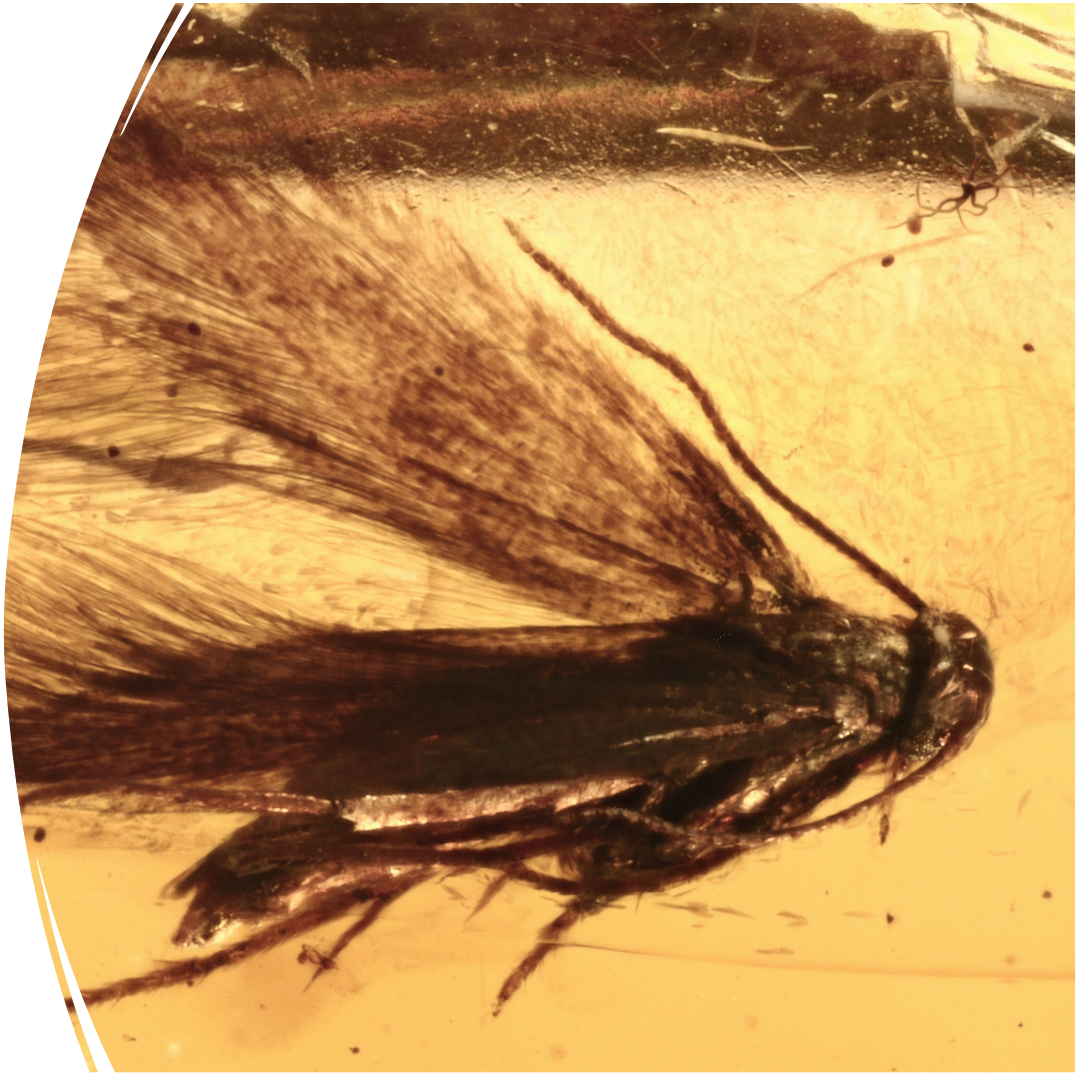
Eastern Tiger Swallowtail
(*Papilio glaucus*)

Lepidoptera Systematics & Evolution

Earliest fossils are from the Jurassic period (c. 190M years ago)

Glossate leps date from c. 70M years ago)

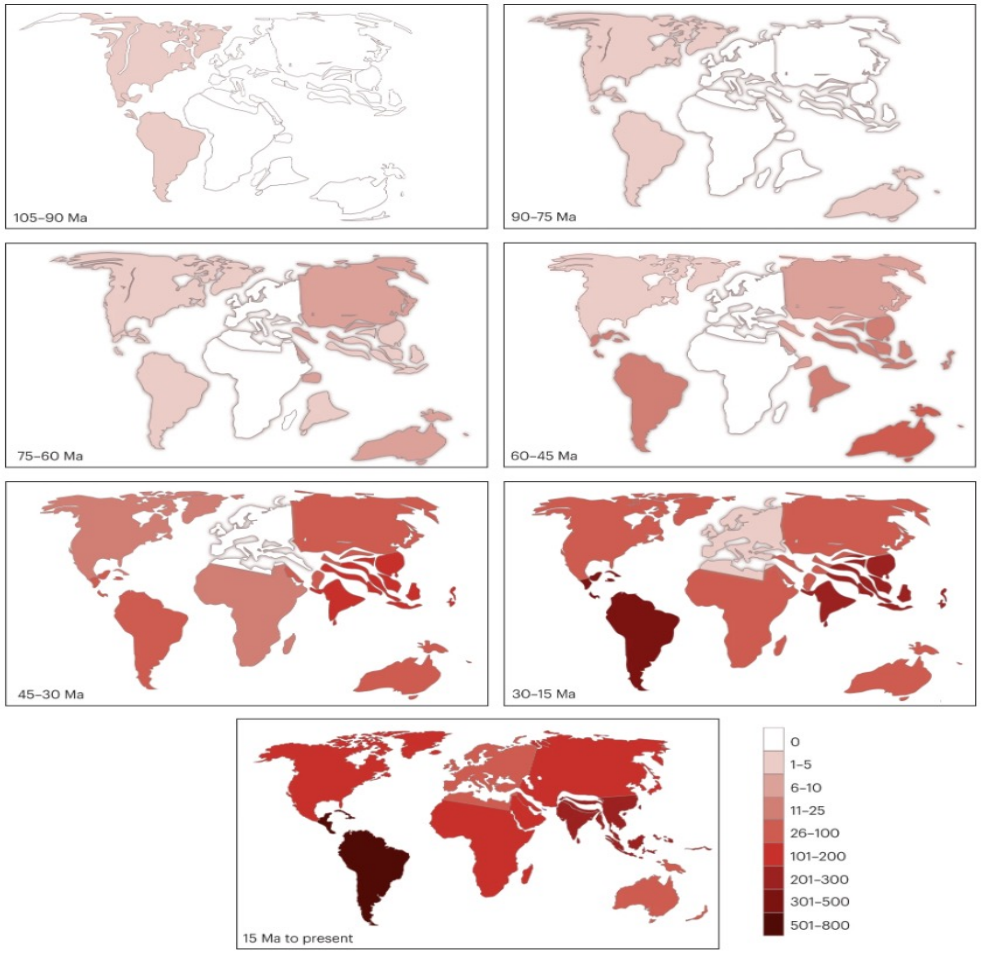
So, some 120M years where all leps had chewing mouthparts; a coiled proboscis is a relatively recent acquisition



Butterflies – Made in the USA

Fig. 2: Distribution of butterflies over time.

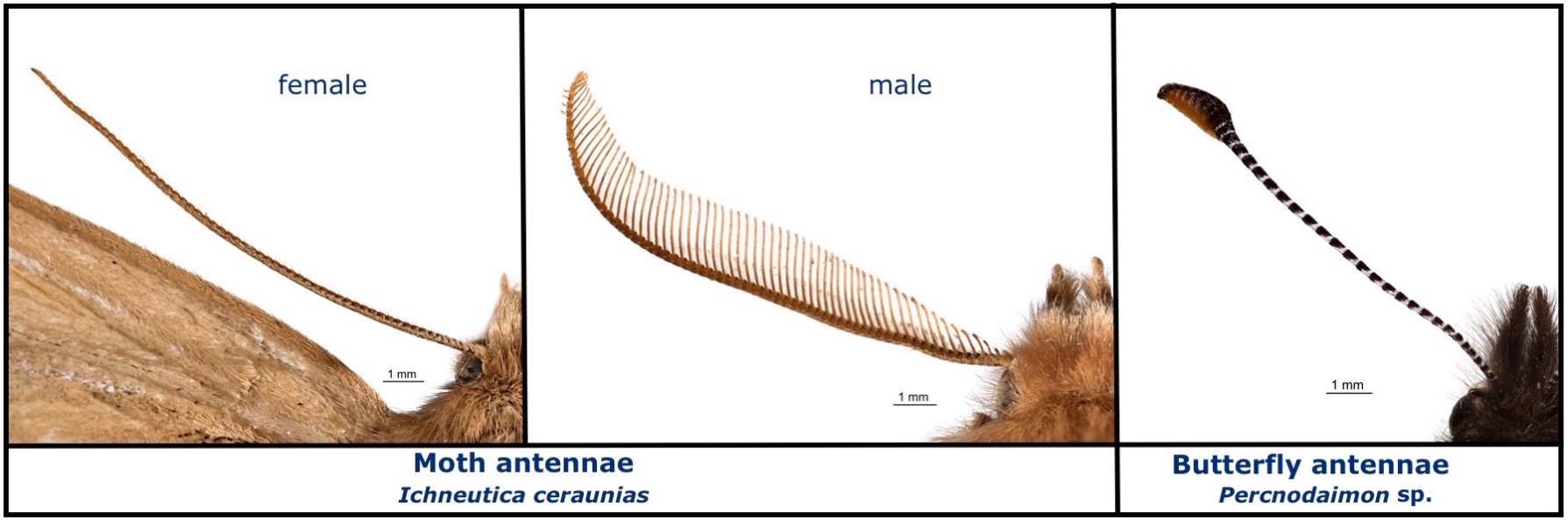
From: A global phylogeny of butterflies reveals their evolutionary history, ancestral hosts and biogeographic origins



Bioregion shading indicates the number of butterfly lineages that were associated with that bioregion during that time period, as determined by BioGeoBEARS ancestral state reconstruction. Each map corresponds to a 15-Ma interval of butterfly evolution. Results are based on data from this study.


Moths
or
Butterflies
?

Butterfly vs Moth -- antennae



Butterfly vs Moth – pupal stage

Butterfly vs Moth – time of flight

MOST butterflies are diurnal

MOST moths are nocturnal

SOME butterflies can be crepuscular

SOME butterflies comes to lights at night

MANY moths fly during the day

Butterflies vs Moths

Lepidoptera Evolution & Systematics

The Ur-moth

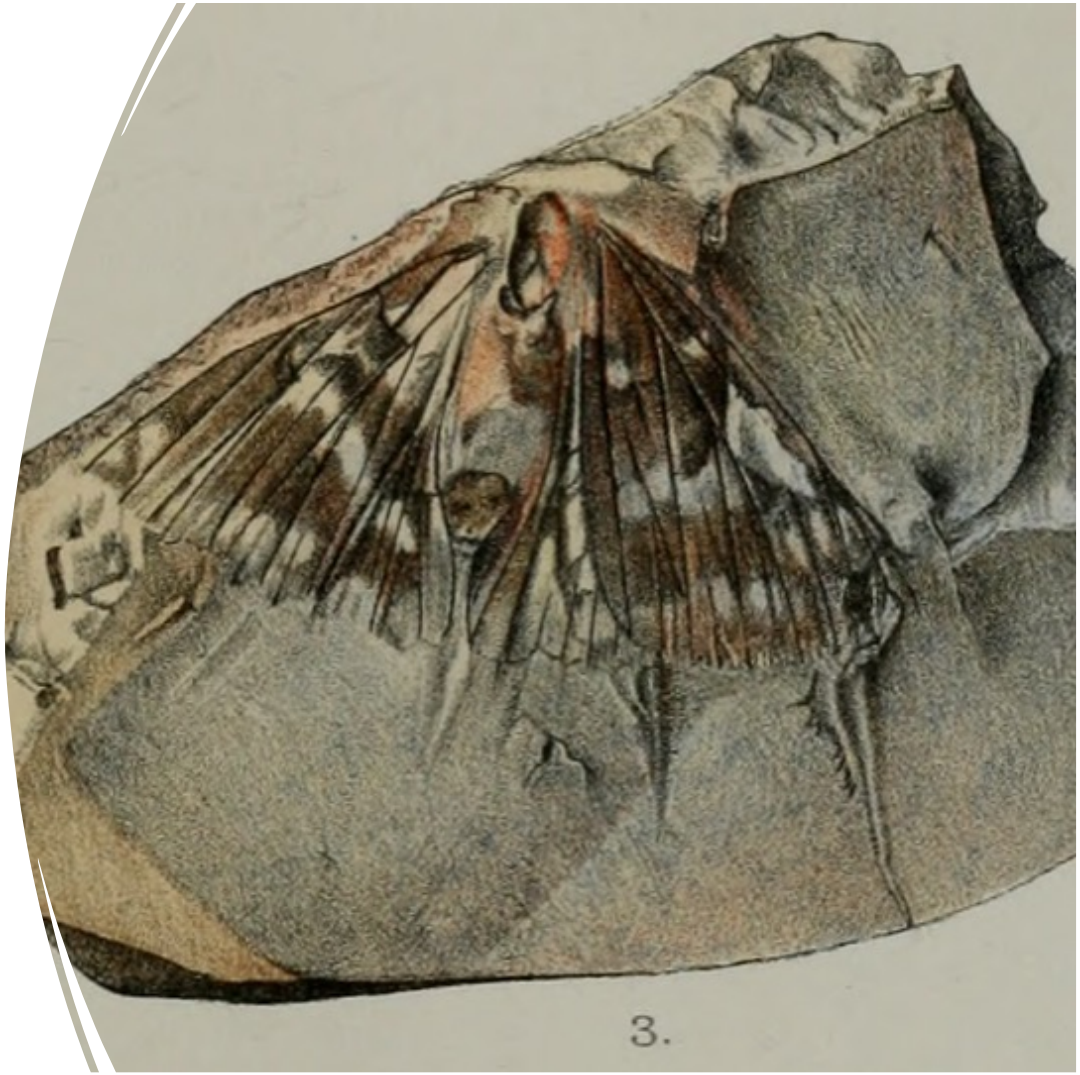
Chewing mandibles as adults

In our fauna, family Micropterigidae

Goldcap Moss-eater Moth (*Epimartyria auricrinella*)

Lepidoptera – Evolution & Systematics

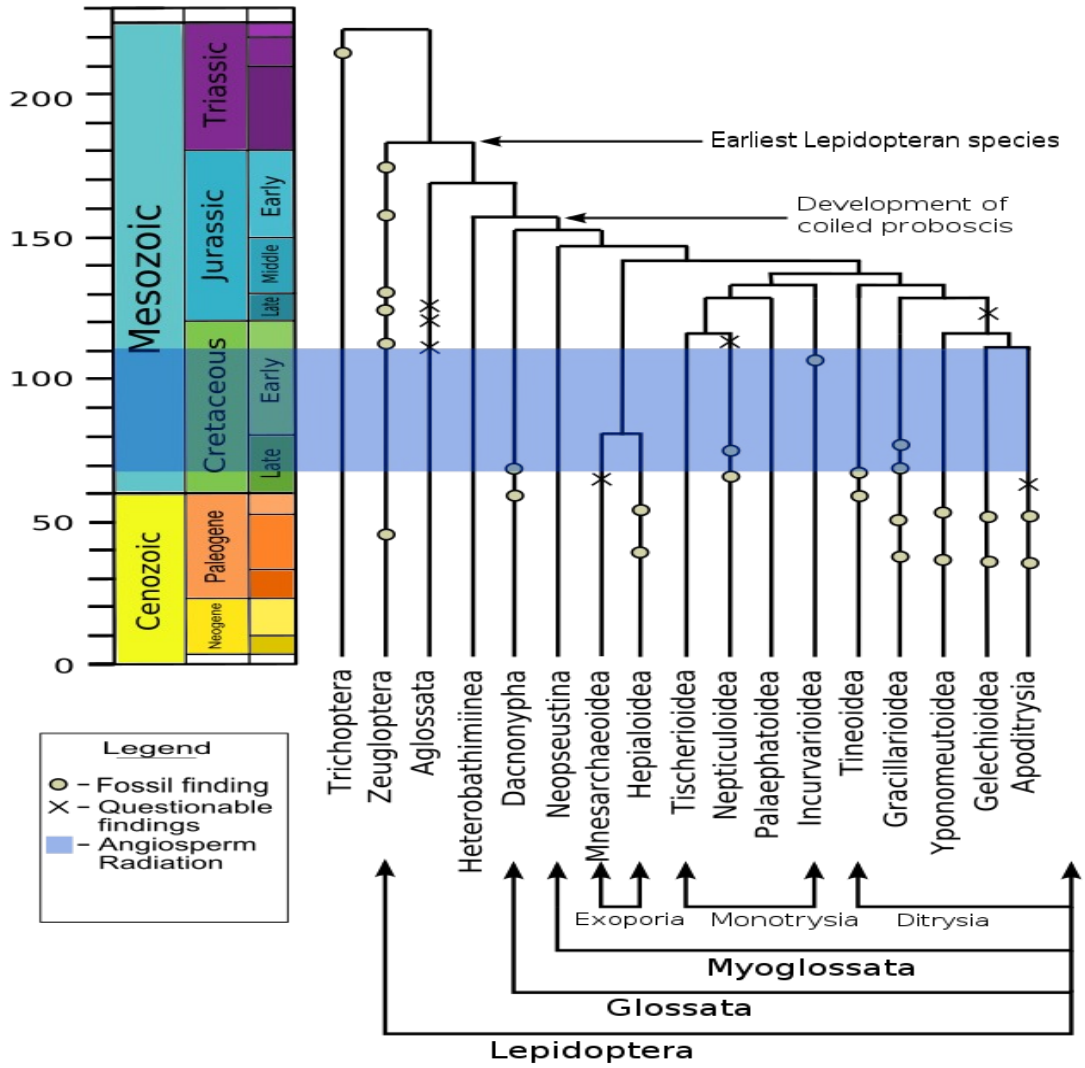
Lithopsyche antiqua, an Early Oligocene butterfly from the Bembridge Marls, Isle of Wight, 1889 engraving



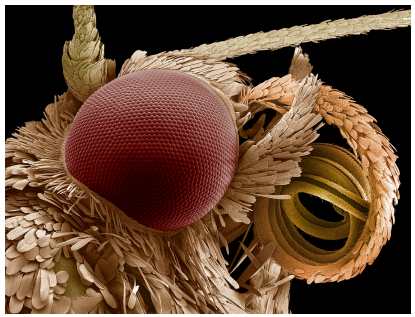
Lepidoptera Systematics & Evolution

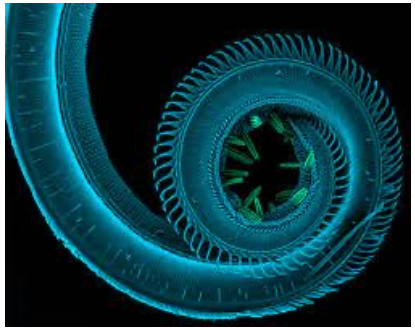
Prodryas persephone, a Late Eocene butterfly from the Florissant Fossil Beds, 1887 engraving

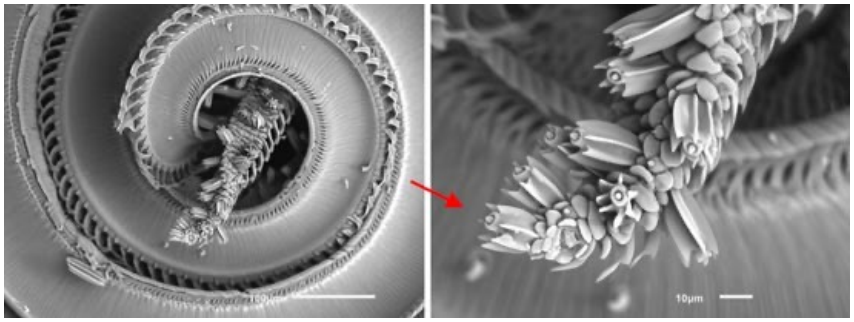
Lepidoptera Systematics & Evolution



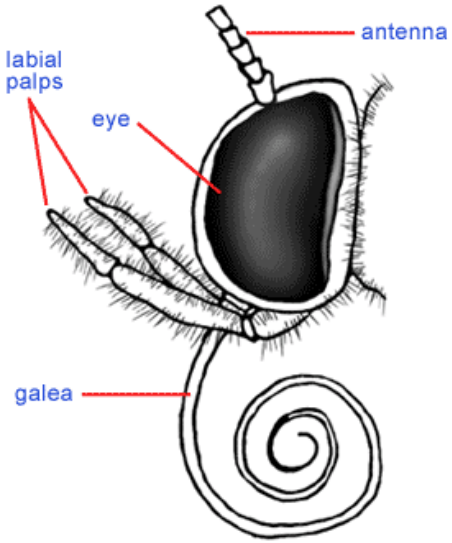
Proboscis Morphology







Proboscis Length



Class Discussion – where did the proboscis come from?