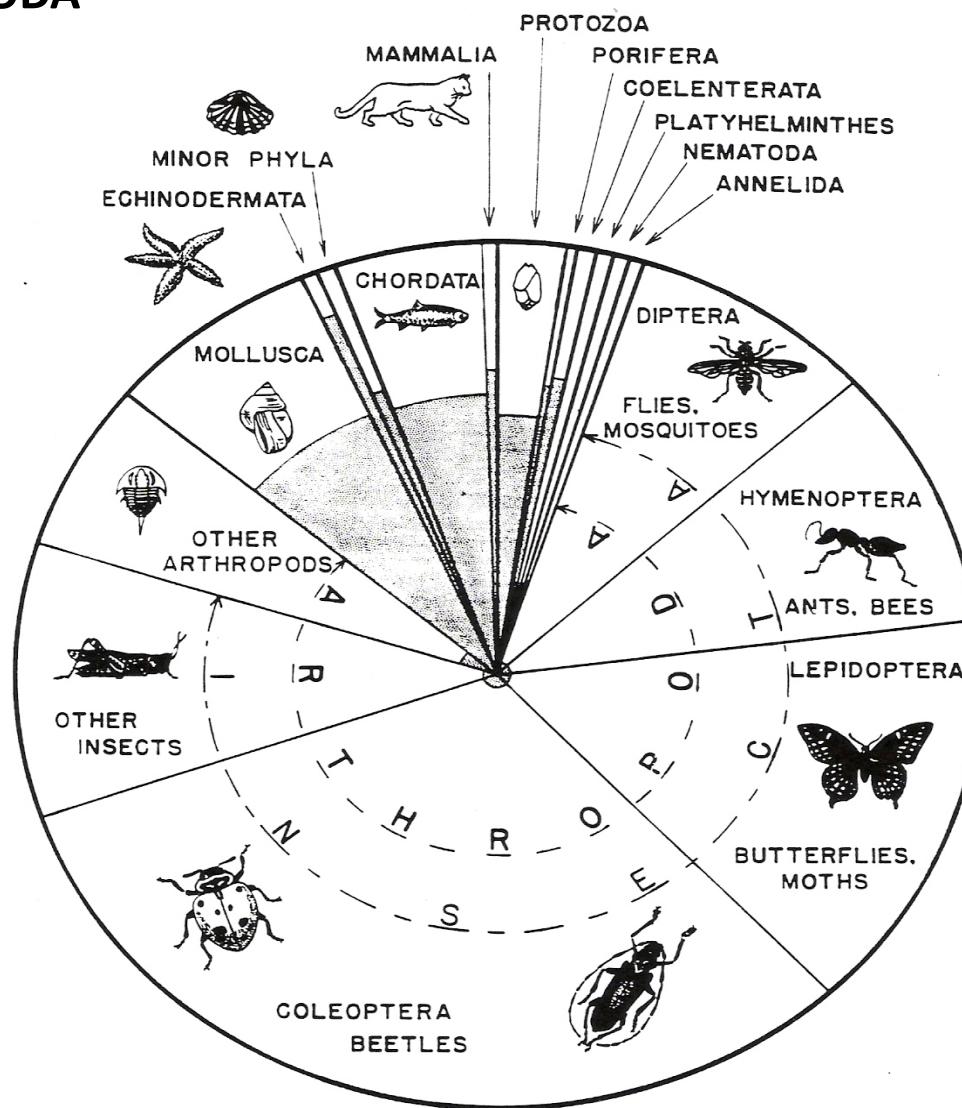


# Why Insects?

- Most numerous and diverse animals
- Live in all habitats
- Most important (good and bad) for humans
- They rock and it's fun...

# Kingdom ANIMAL Phylum ARTHROPODA



# Orders

- Collembola
- Thysanura
- Ephemeroptera
- Odanata
- Phasmatodea
- Orthoptera
- Mantodea
- Blattodea
- Isoptera
- Dermaptera
- Plecoptera
- Psocoptera
- Phthiraptera
- Hemiptera
- Thysanoptera
- Neuroptera
- Coleoptera
- Mecoptera
- Siphonaptera
- Diptera
- Trichoptera
- Lepidoptera
- Hymenoptera

# Orders

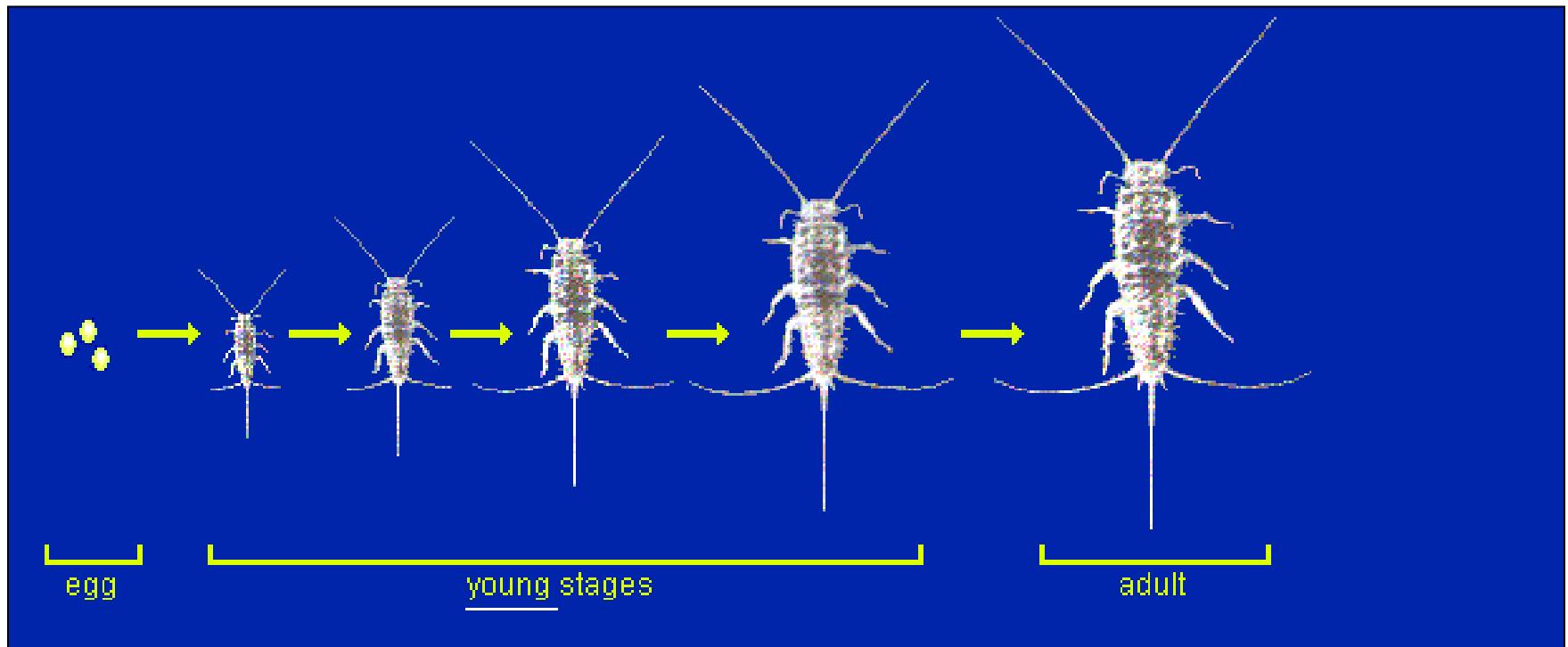
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- Mecoptera
- Siphonaptera
- Diptera
- Trichoptera
- Lepidoptera
- Hymenoptera
- NON-Insects

# Types of Metamorphosis

- Ametabolous (most primitive)
- Hemimetabolous
- Paurometabolous
- Holometabolous (most advanced)

# Insect Metamorphosis

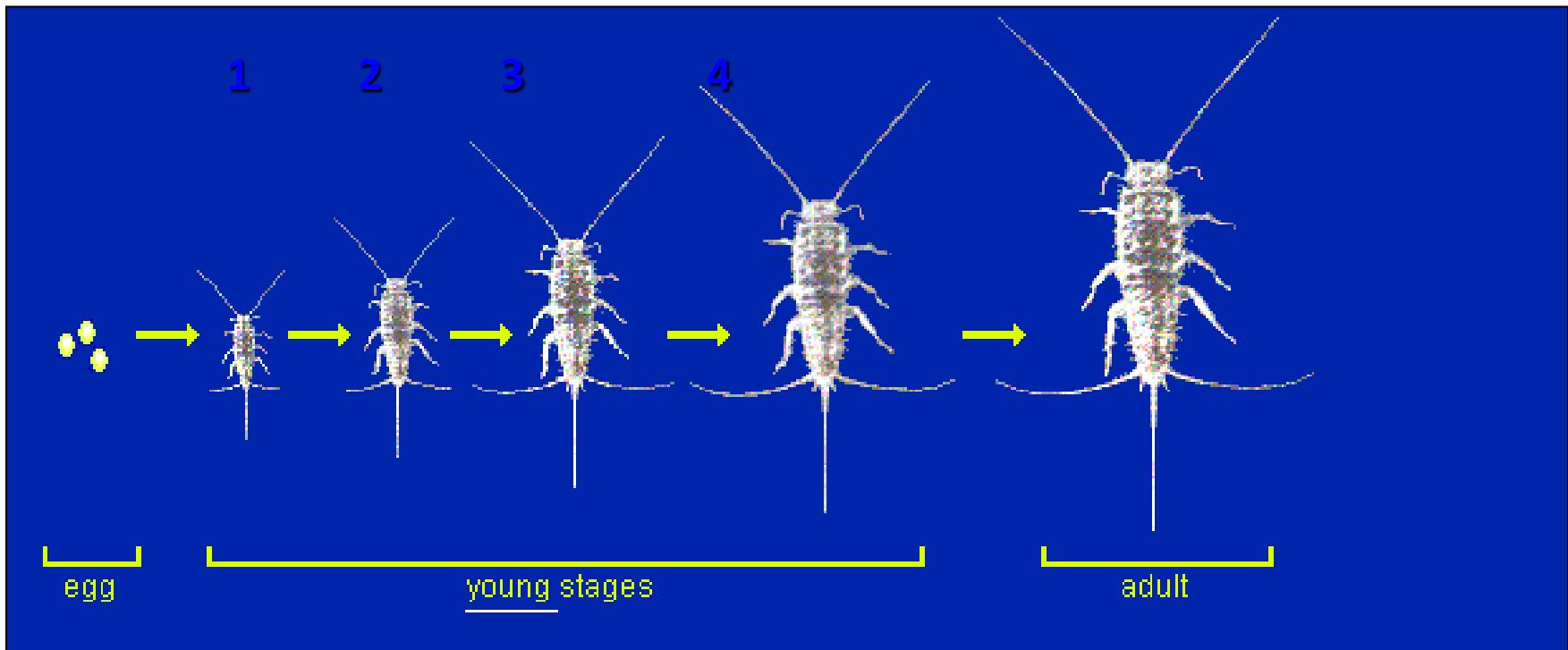
Ametabolous – no metamorphosis



**Young = nymphs**

# Insect Metamorphosis

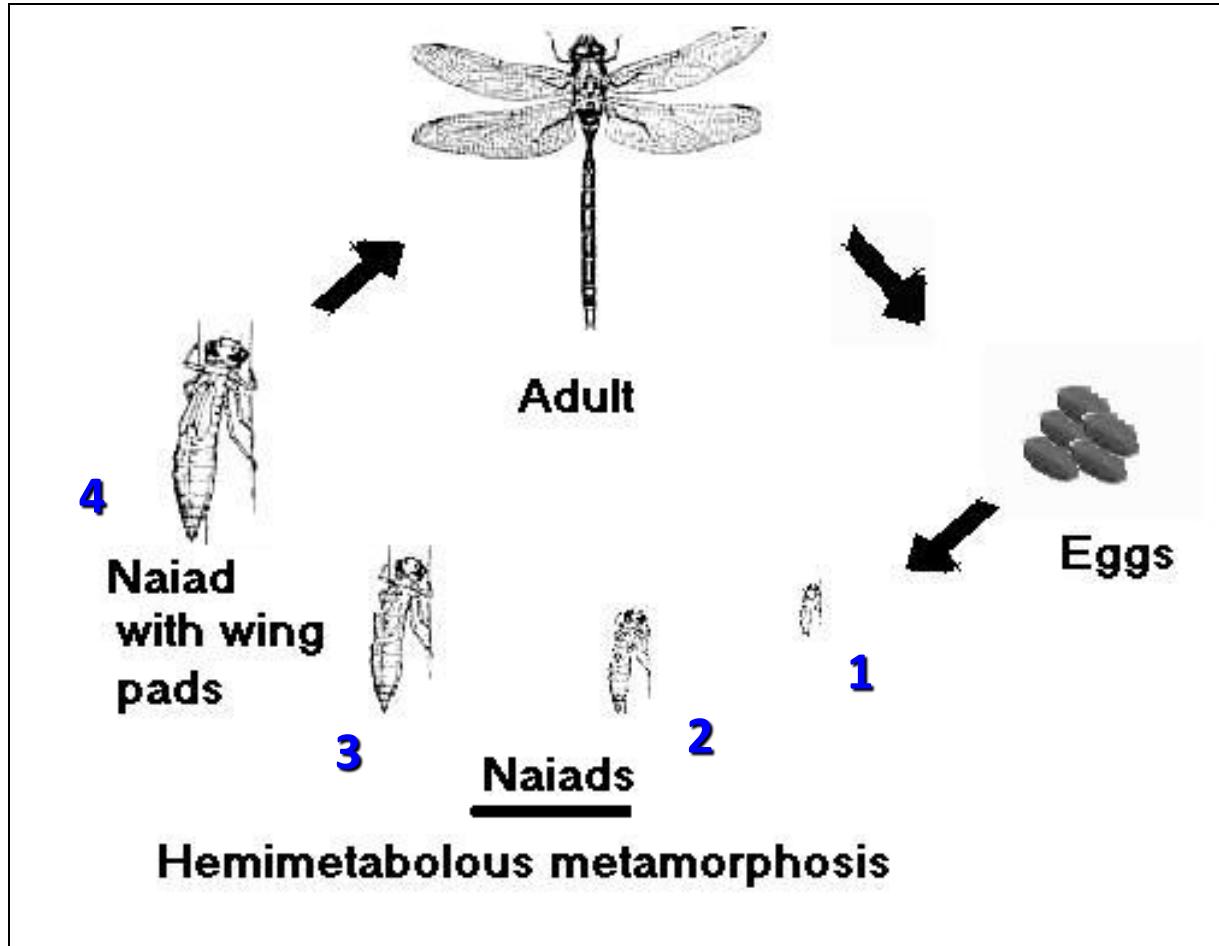
Ametabolous – no metamorphosis



\* The stages of immature insects are called **instars**

# Insect Metamorphosis

Hemimetabolous – incomplete metamorphosis

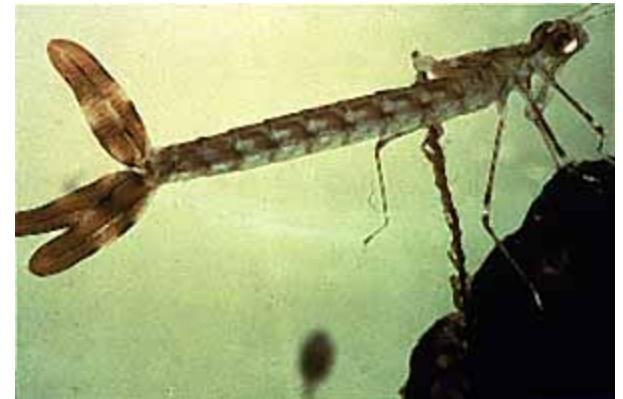


# Insect Metamorphosis

Hemimetabolous – incomplete metamorphosis

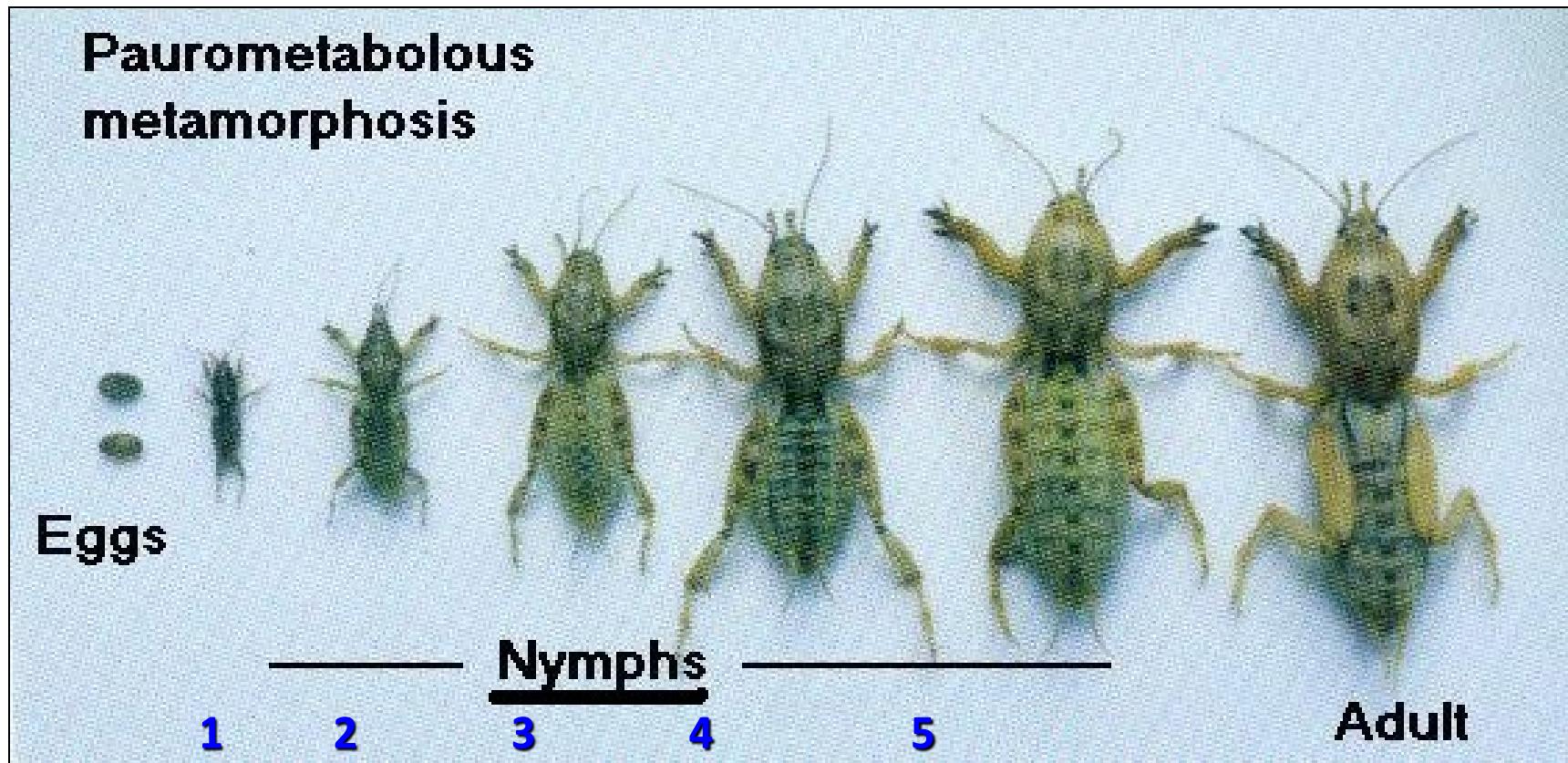


Naiad – aquatic nymph



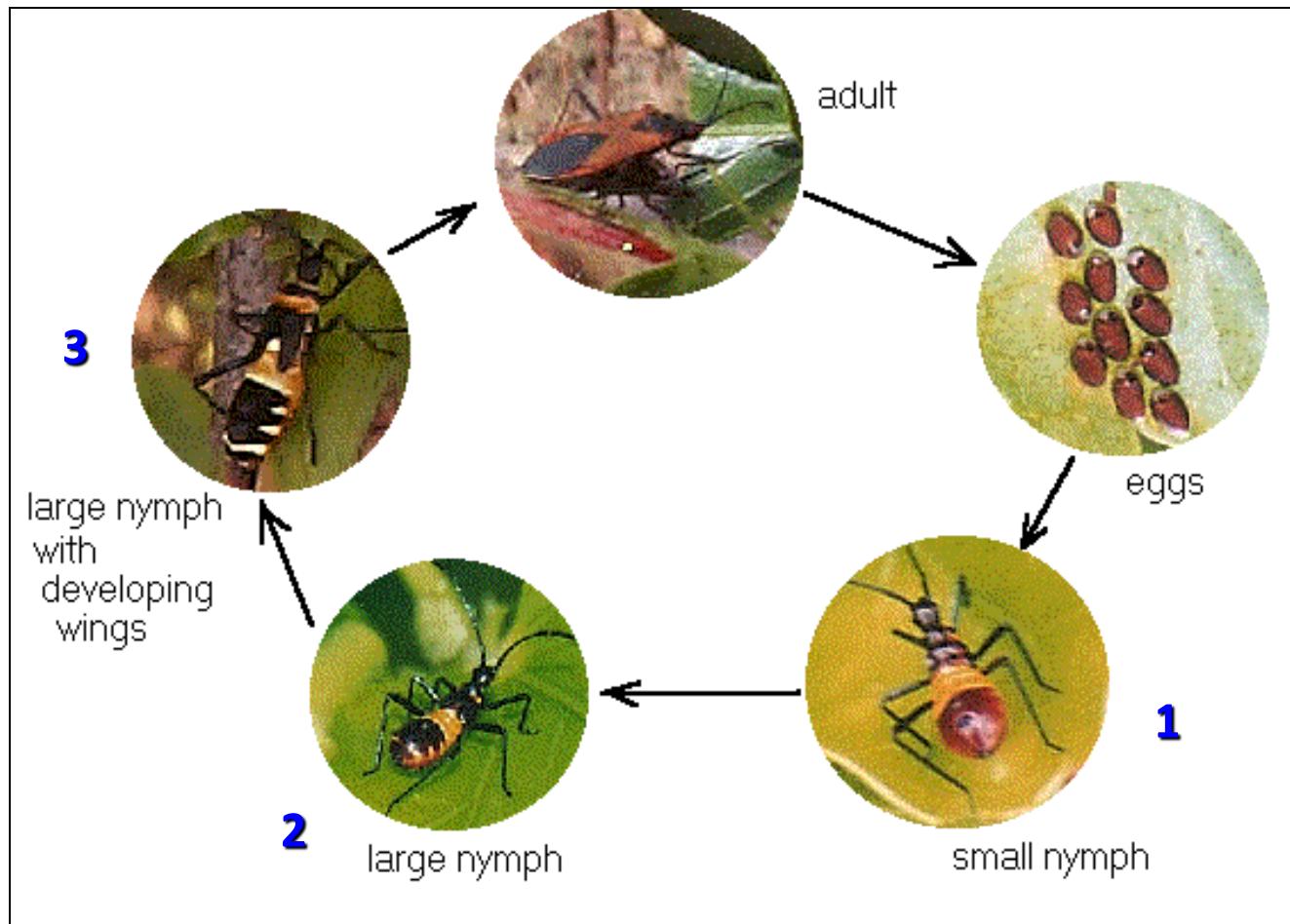
# Insect Metamorphosis

Paurometabolous – gradual metamorphosis



# Insect Metamorphosis

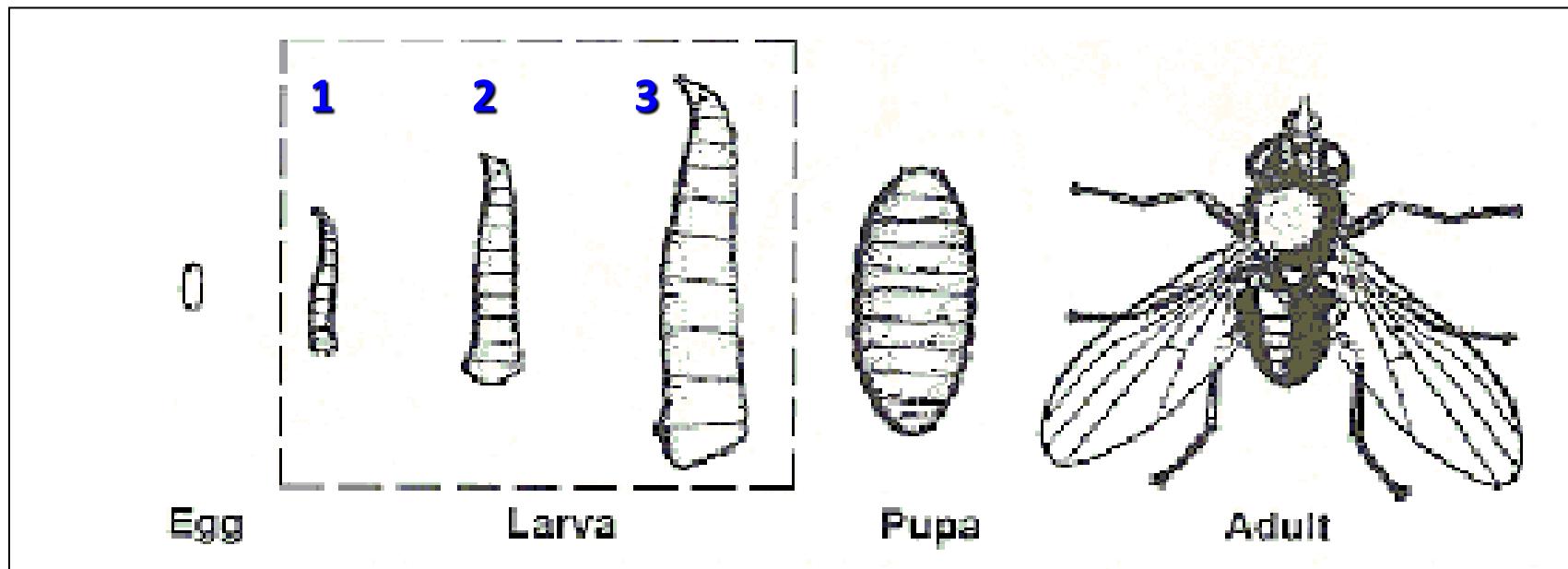
Paurometabolous – gradual metamorphosis



“Nymph”

# Insect Metamorphosis

Holometabolous – complete metamorphosis



instars

Adults and young look **completely** different

# Insect Metamorphosis

Vermiform: e.g., flies

- maggot, worm-like shaped body
- feeding apparatus either mouth hooks or mandibles
- no legs



# Insect Metamorphosis

Elateriform: e.g., mealworms

- Slightly flattened body
- mandibulate feeding apparatus
- 3 pairs of thoracic legs



# Insect Metamorphosis

Eruciform: e.g., butterflies

- caterpillar-like shaped body
- mandibulate feeding apparatus
- 3 pairs of thoracic legs and 5-7 pairs of abdominal prolegs





Fall Armyworm

# Important Questions

- Wings or no wings?
  - How many?
- Kind of Mouthparts?
- Where did I find it?
- Any special adaptations?
  - Raptorial legs, swimming legs
  - Camouflage?

# Order Collembola: Springtails

Coll = glue

Embola= a bolt or wedge (collophore)



# Springtails: Order Collembola



# Order Thysanura: Silverfish

Thysano= fringed      ura= tail





# Order Ephemeroptera: Mayflies

ephemeros= short lived



# Order Ephemeroptera: Mayflies



# Order Odonata: Dragonfly and Damselfly



dragonflies keep wings out  
when at rest...



...while damselflies keep  
wings back over body at rest

# Order Odonata: Dragonfly and Damselfly

Odonata = toothed jaw



# Order Phasmatodea: Walking sticks and Leaf Insects

Phasm = phantom



© WildMadagascar.org



# Order Orthoptera:

Grasshoppers, Crickets, Locusts & Katydid

Ortho= straight

Ptera= winged



© MARLIN E. RICE



# Order Mantodea

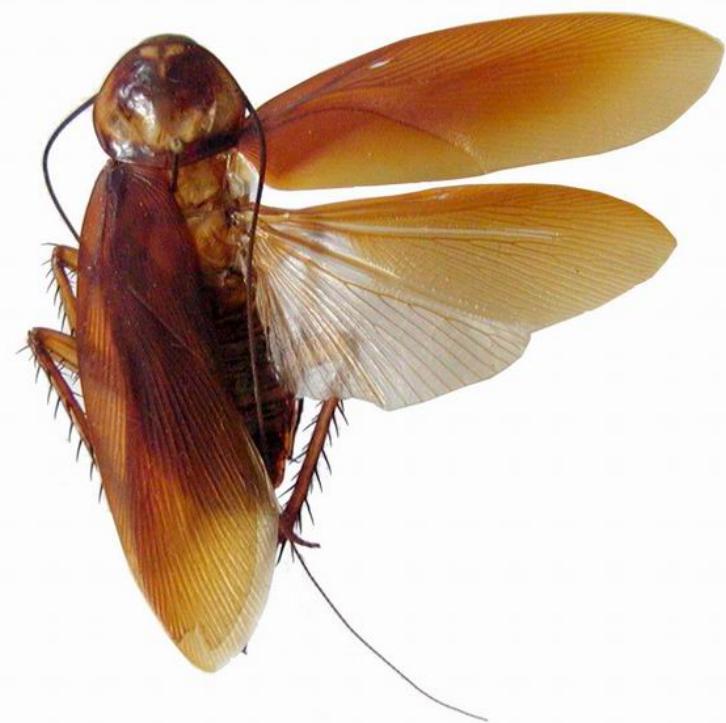


Praying mantids,  
soothsayers



# Order Blattodea: Roaches

Blatta - Greek word for roach





# Order Isoptera: Termites

Iso = even

ptera = wing



# Order Dermaptera: Earwigs

Derm = leather

Ptera = wing



# Order Plecoptera: Stoneflies

Pleco = folded or pleated

Ptera = wing





# Order Psocoptera: Bark & Book lice

Psoco= gnawing

Ptera= wing

Bad Name! Think of them as winged insects that gnaw.



photo by: E.S. Ross

# Order Pthiraptera: Lice

*pthir* = lice

*aptera* = no wings

- Two Suborders
  - Mallophaga: The chewing lice
  - Anoplura: The sucking lice

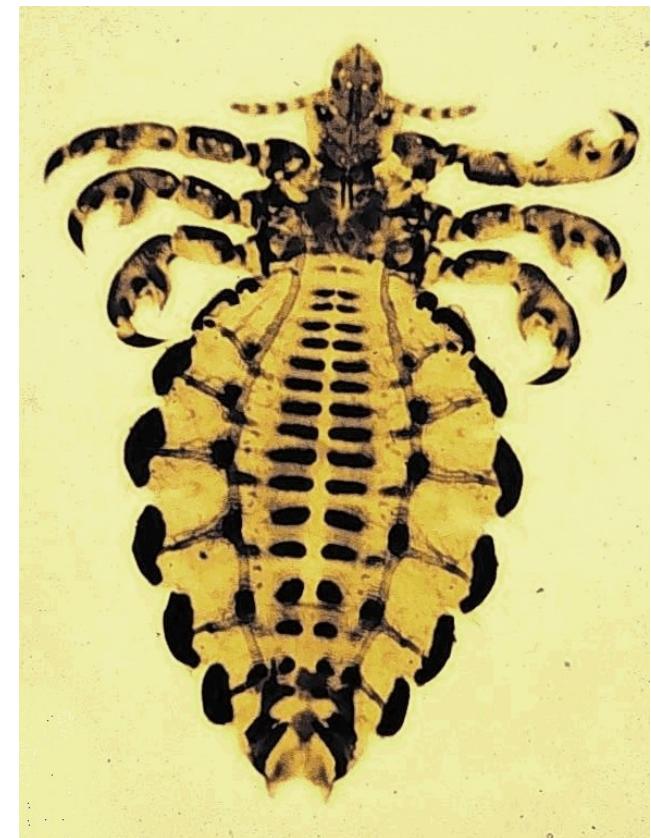
# Suborder Mallophaga



# Mallophaga



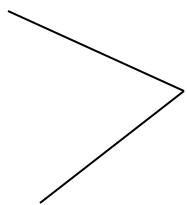
# Anoplura: Sucking Lice



# Order Hemiptera: True Bugs, Scales, Aphids, Hoppers

Etymology: *hemi* = half

*ptera* = winged



Refers to the true bugs

Hemiptera: Order Name

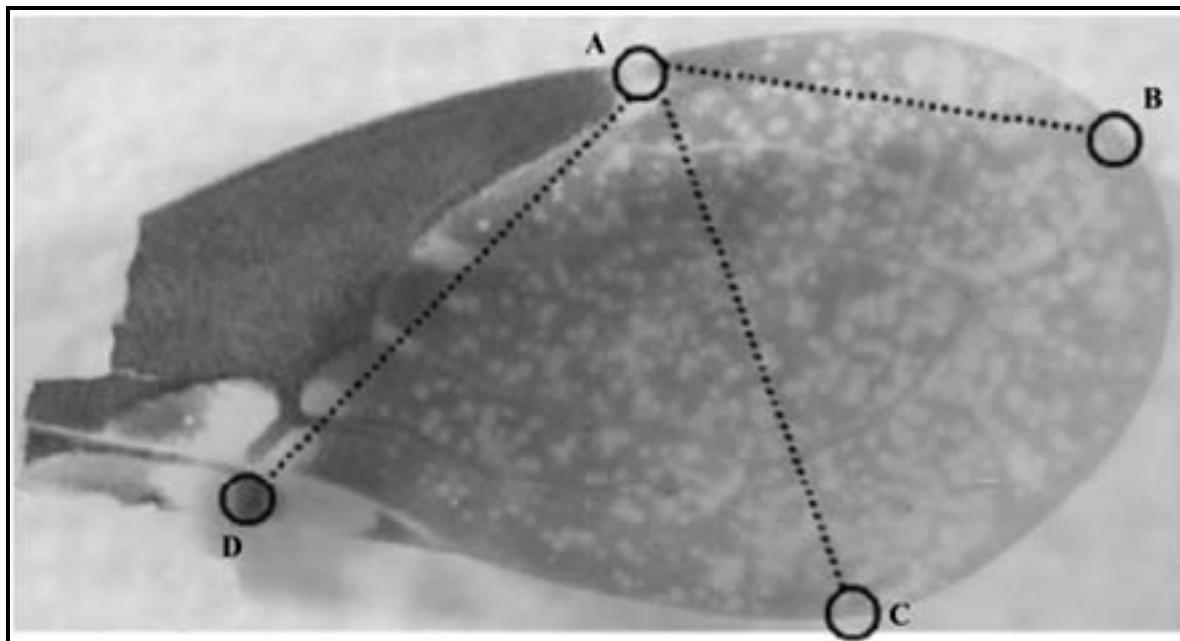
Suborder Heteroptera = true bugs

Suborder Auchenorrhyncha = hoppers and cicadas

Suborder Sternorrhyncha = aphids and allies

# Suborder Heteroptera

- Hemelytra - sclerotized basal portion of wings





# Aphids





**leafhopper**



**treehopper**



**planthopper**

# Order Thysanoptera: Thrips

Thysan= fringed

Ptera= winged



# Thysanoptera



*Thrips palmi*  
(Thysanoptera)  
Dauerpräparat

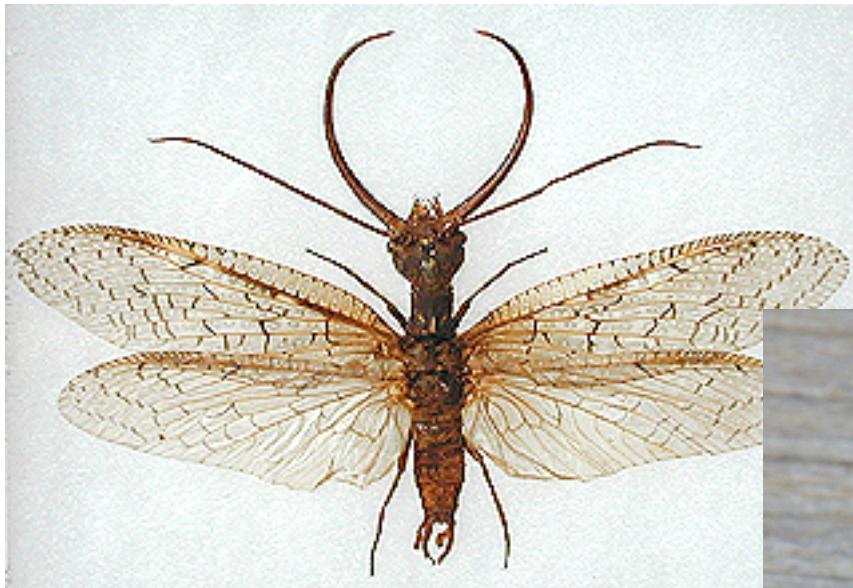
# Order Neuroptera

- Neuro = nerve
- Ptera = wing
- Tons of different insects lumped into this group...

# Lacewings



# Dobsonflies



# Antlions



# Owlflies



# Mantisfly



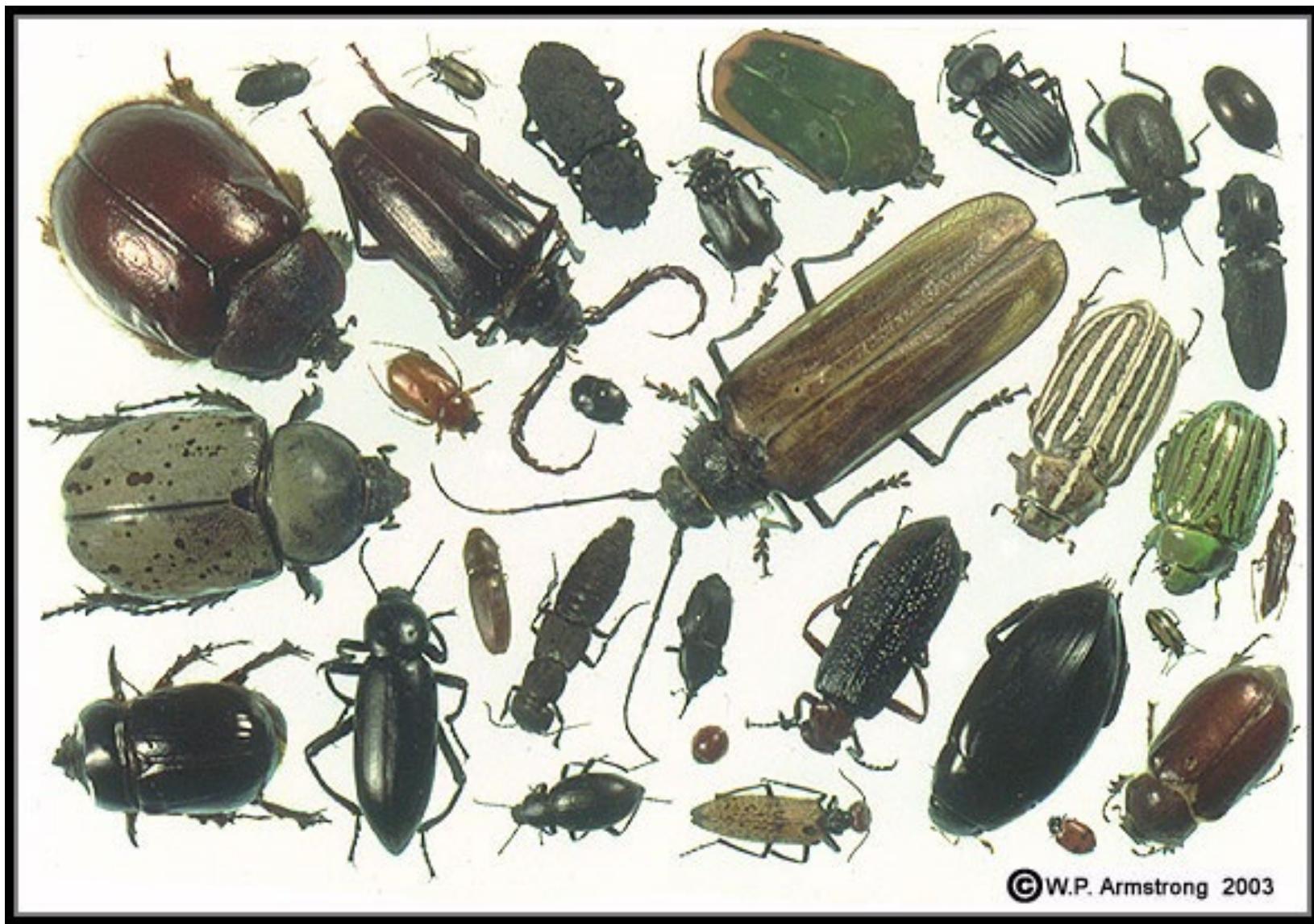
# Order Coleoptera: Beetles



# Coleoptera

- *koleos-* *sheath* (from Aristotle)
- fore wings called elytra
- Serve to protect the membranous hind wings  
(used in flight)

# Beetle diversity



© W.P. Armstrong 2003

# Order Mecoptera: Scorpionflies



# Order Siphonaptera: The Fleas

Siphon: a tube

Aptera: wingless



# Order Diptera: True Flies

Di= two

Ptera= wings

True flies have only one pair of wings

The hind pair = flight stabilizers called halteres.



# Order Trichoptera: Caddisflies

Tricho= hair

Ptera= wings



# Caddisfly larvae

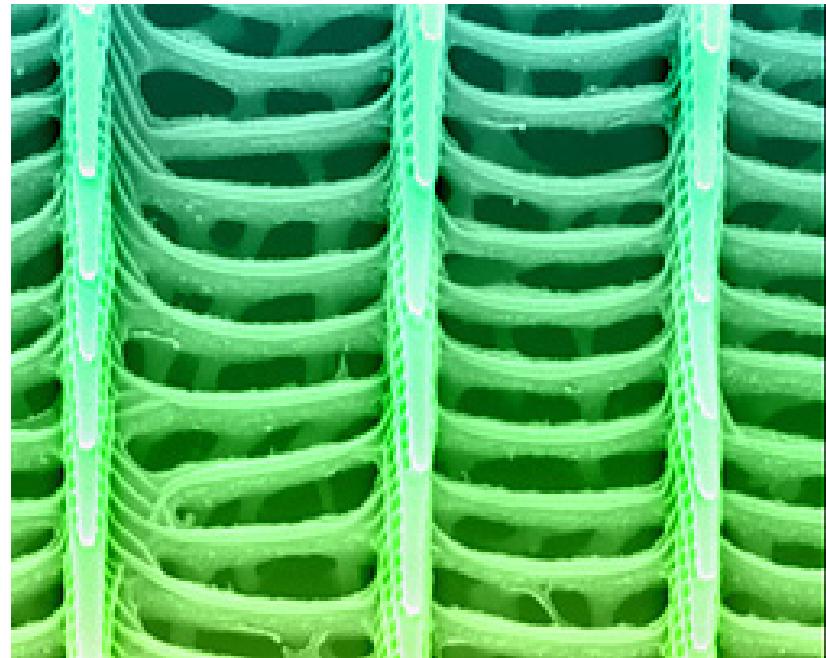


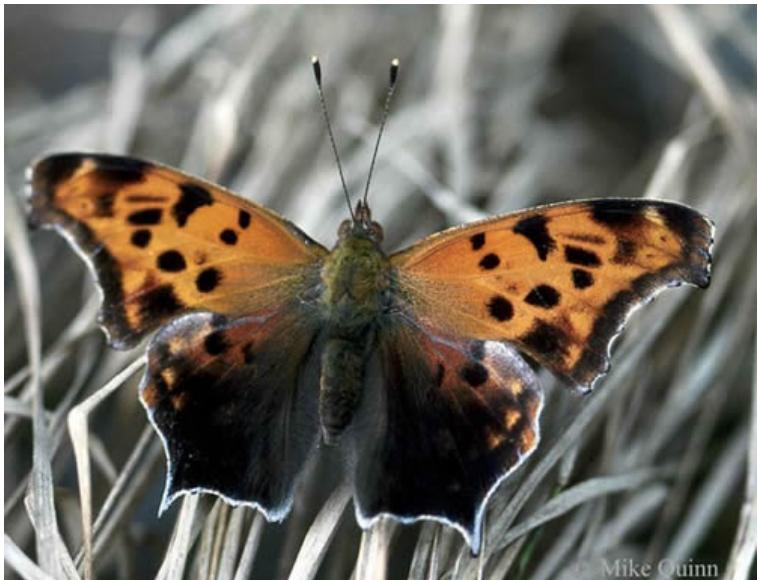
# Order Lepidoptera: Butterflies & Moths



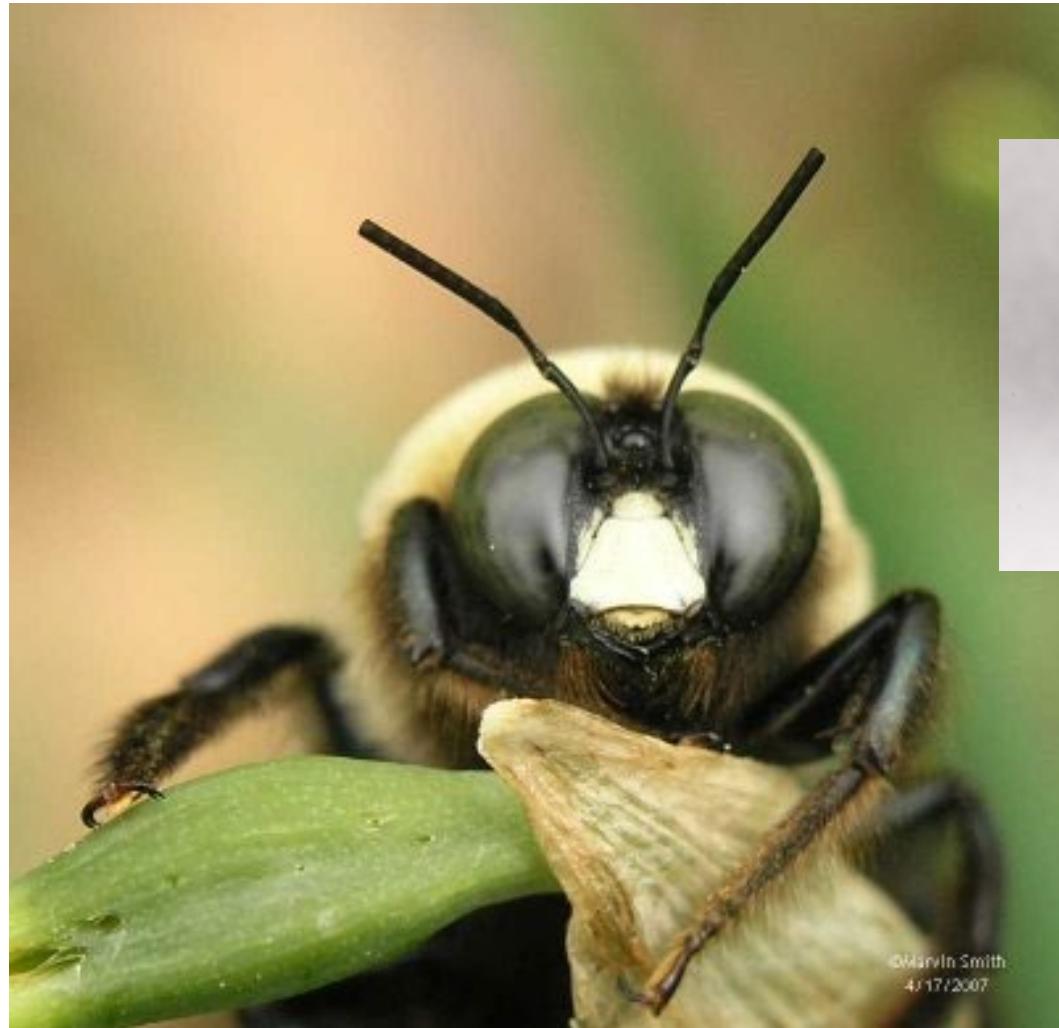
Lepid = scales

Ptera = wings

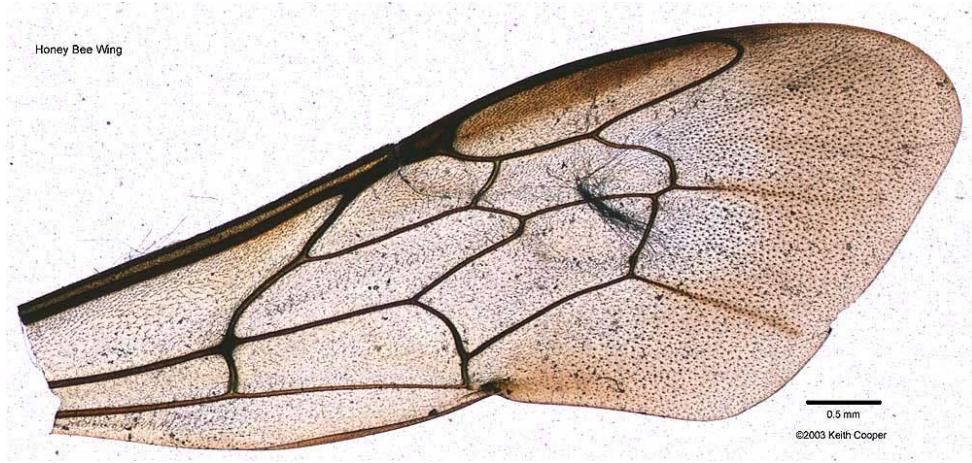




# Order Hymenoptera: Bees, Wasps and Ants



# Hymenoptera (Bees, wasps, ants)



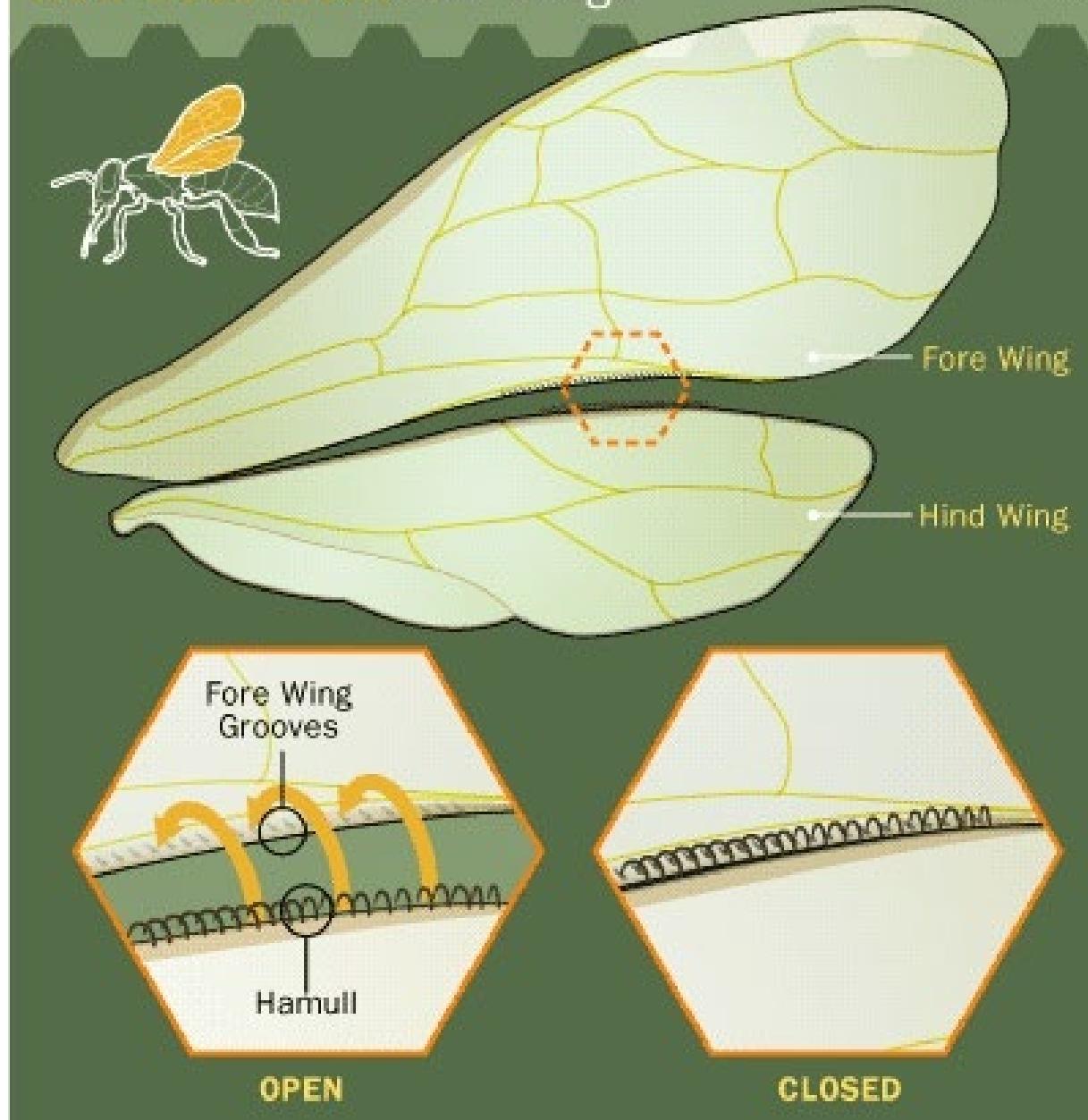
hymen = membrane

Ptera = wings

- Greek Goddess of Marriage: Hymeno
- Goddess of marriage
  - Named for the joining of the wings

# How Bees Work Bee Wings

©2007 HowStuffWorks



Hamuli =

Small row of hooks  
on hind wing

# Tricksters: Assassin Bugs and Ambush Bugs

4



3



Does the beak fit into a groove???

Count the Beak Segments!

# Tricksters: Flesh Flies and House Flies



Flesh Fly



House Fly



Horn fly



Stable fly

Class Arachnida  
Order Solifugae

Camel Spiders!!!!

