Aliens among us: insect development and life-cycles
How insects grow

• The insect cuticle, growth, and the molting cycle

• All insects molt, but not all molts are the same....
How insects grow

• The insect cuticle, growth, and the molting cycle

• All insects molt, but not all molts are the same....
Types of metamorphosis: ametabolous development ("no" metamorphosis)

Example: silverfish (Thysanura)
Types of metamorphosis: hemimetabolous development (“incomplete” metamorphosis)

Example: green vegetable bug *Nezara viridula* (Hemiptera)
Types of metamorphosis: holometabolous development ("complete" metamorphosis)

Example: bark beetle (*Ips grandicollis*)
Types of metamorphosis: holometabolous development ("complete" metamorphosis)

Example: monarch butterfly (*Danaus plexippus*)
Overview

(1) How do we know what we know about the regulation of insect development?

(2) A hands-on exercise on insect life cycles
1909 Stefan Kopec

*Lymantria dispar*, gypsy moth
1930 Sir Vincent Wigglesworth

*Rhodnius prolixus*
1930  Sir Vincent Wigglesworth

*Rhodnius prolixus – Parabiosis experiment*
1940  Carrol Williams

*Hyalophora cecropia*
1940  Carrol Williams

Hyalophora cecropia

one month later...
1940  Carrol Williams

Hyalophora cecropia
1940  Carrol Williams

Hyalophora cecropia
Overview

(1) How do we know what we know about the regulation of insect development?

(2) A hands-on exercise on insect life cycles
Your task: correctly identify and assign the different life stages of 6 common Indiana insects

Types of metamorphosis:
- Hemimetabolous development ("incomplete" metamorphosis)
  - Please identify nymphs and corresponding adults -

- Holometabolous development ("complete" metamorphosis)
  - Please identify larva, corresponding pupa, and adult -
The idea behind this exercise

• You can make this as easy or challenging as you want

• You are independent of actual live insects, but.....

• You can supplement it with live insects as circumstances such as seasons permit

• You can even turn this into a puzzle with only those parts fitting together that are part of the same life-cycle.....
The insects we chose...

- Mosquito
- Hissing Cockroach
- Monarch butterfly
- ant-lion
- Dragonfly
- locust