

# Entomology 340

## Introduction to Arthropod Groups

# What is Entomology?

The study of insects  
(and their near relatives).

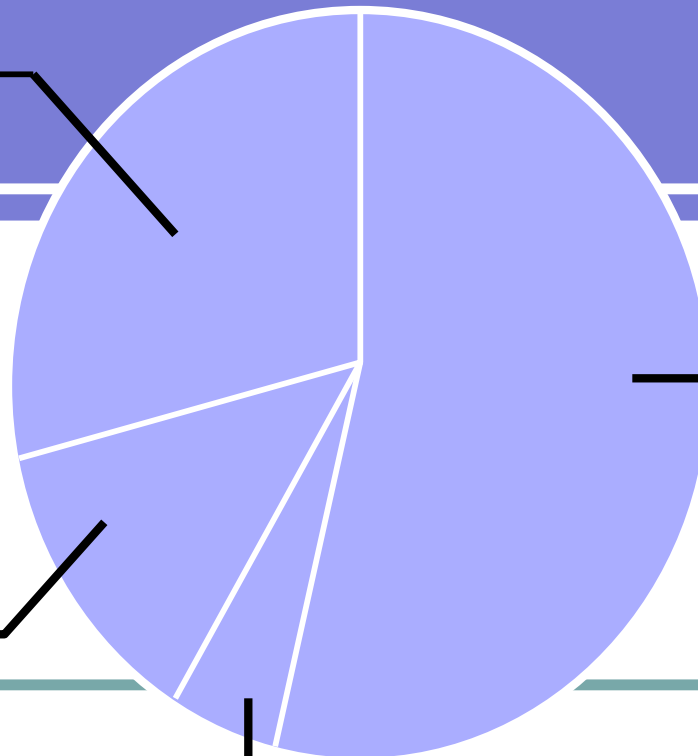
# Species Diversity

**PLANTS**

**INSECTS**

**OTHER  
ANIMALS**

**OTHER  
ARTHROPODS**



# How many kinds of insects are there in the world?

- **1,000,000** species known
- Possibly **3,000,000** unidentified species

# Insects & Relatives

- 100,000 species in N America
- 1,000 in a typical backyard
- Mostly beneficial or harmless
  - Pollination
  - Food for birds and fish
  - Produce honey, wax, shellac, silk
- Less than 3% are pests
  - Destroy food crops, ornamentals
  - Attack humans and pets
  - Transmit disease

# Classification of Japanese Beetle

- Kingdom **Animalia**
- Phylum **Arthropoda**
- Class **Insecta**
- Order **Coleoptera**
- Family **Scarabaeidae**
- Genus **Popillia**
- Species **japonica**



# Arthropoda (jointed foot)

- Arachnida - Spiders, Ticks, Mites, Scorpions
- Xiphosura - Horseshoe crabs
- Crustacea - Sowbugs, Pillbugs, Crabs, Shrimp
- Diplopoda - Millipedes
- Chilopoda - Centipedes
- Symphyla - Symphylans
- **Insecta - Insects**

# Shared Characteristics of Phylum Arthropoda

- Segmented bodies are arranged into regions, called **tagmata** (in insects = head, thorax, abdomen).
- Paired appendages (e.g., legs, antennae) are **jointed**.
- Possess chitinous **exoskeleton** that must be shed during growth.
- Have bilateral symmetry.
- Nervous system is ventral (belly) and the circulatory system is open and dorsal (back).



# Arthropod Groups

Mouthpart characteristics are divided arthropods into two large groups

- Chelicerates (Scissors-like)
- Mandibulates (Pliers-like)

# Arthropod Groups

## Chelicerate

- Arachnida - Spiders, Ticks, Mites, Scorpions
- Xiphosura - Horseshoe crabs

## Mandibulate

- Crustacea - Sowbugs, Pillbugs, Crabs, Shrimp
- Diplopoda - Millipedes
- Chilopoda - Centipedes
- Symphyla - Symphylans
- **Insecta - Insects**

# Chelicerate Arthropod Characteristics

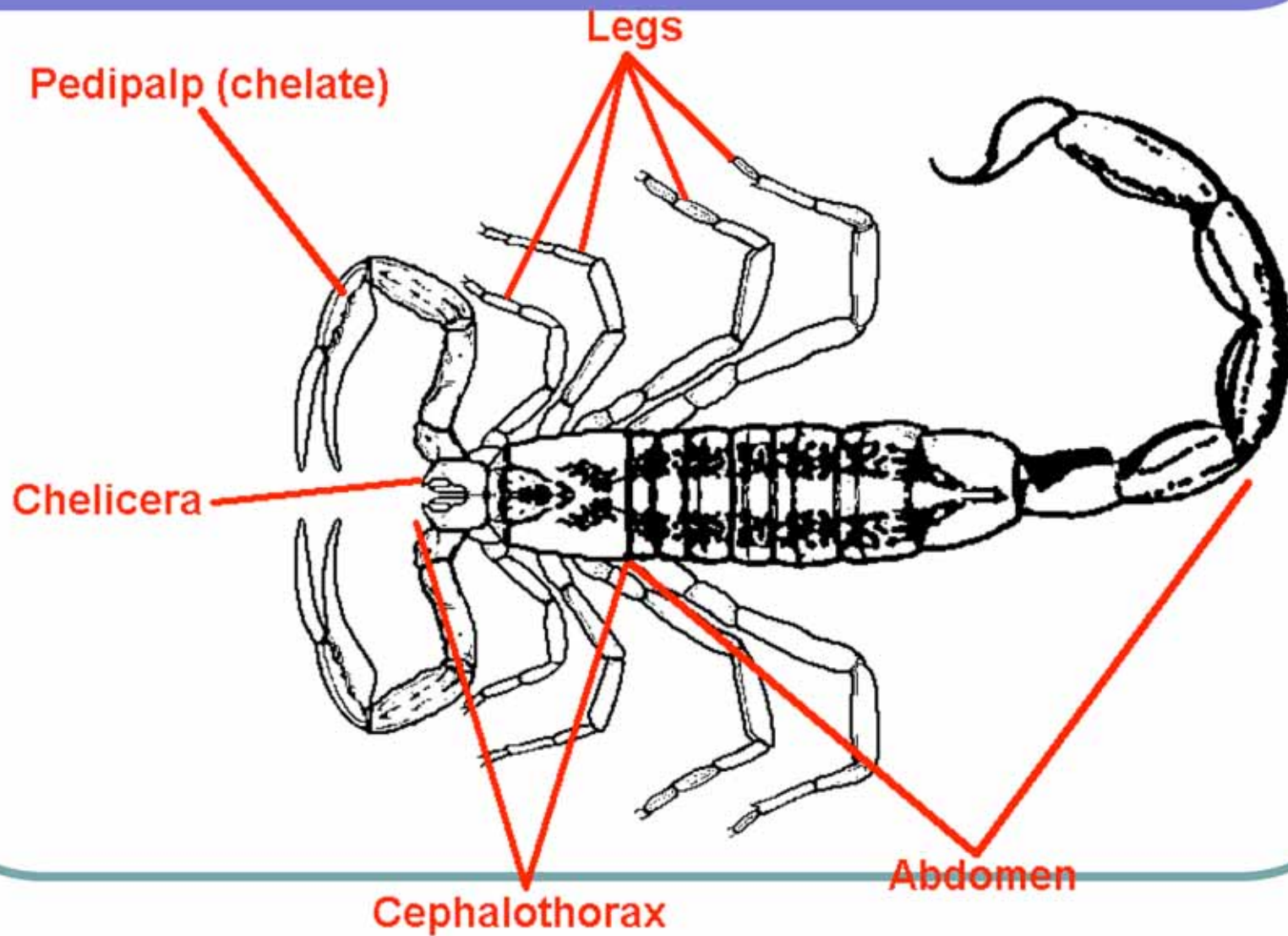
- Scissors or Pincher-like mouthparts - chelicerae - and pedipalps
- NO antennae
- Two body regions
  - usually - cephalothorax & abdomen
- Four pairs of legs
- Horseshoe crabs and Arachnids (extant)
  - Trilobites, and Eurypterids (extinct)

# Scorpion

Scorpionida



# Scorpion Anatomy



# Scorpion Head



chelicerae

eyes

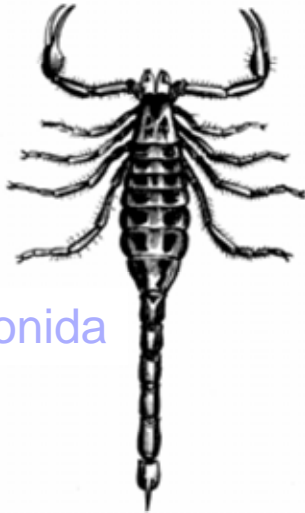
pedipalp

# Orders of Arachnids

- **Scorpionida** - scorpions
- **Pseudoscorpionida** - false scorpions
- **Phalangida** - daddy-long-legs or harvestmen
- **Acari** - mites & ticks
- **Araneida** - spiders

# Orders of Arachnids

Scorpio



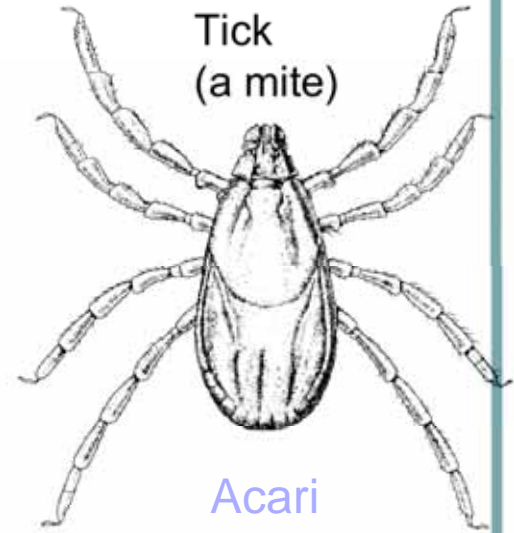
Scorpionida

Pseudoscorpion



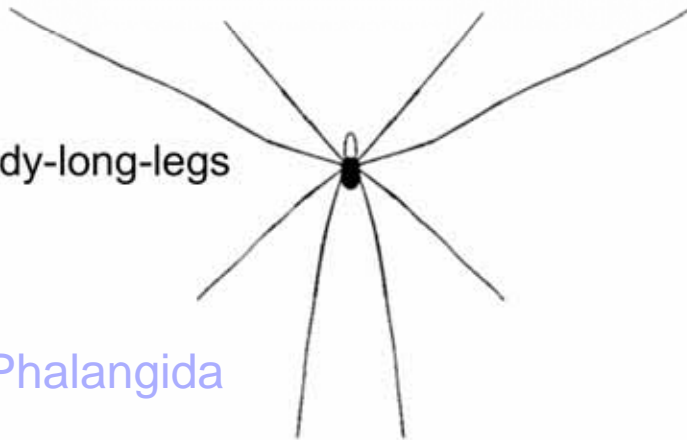
Pseudoscorpionida

Tick  
(a mite)



Acari

Daddy-long-legs



Phalangida

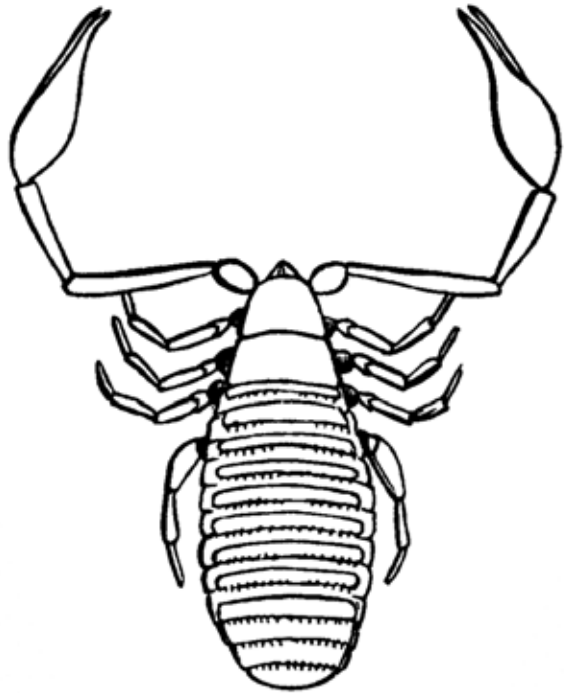
Wolf  
Spider



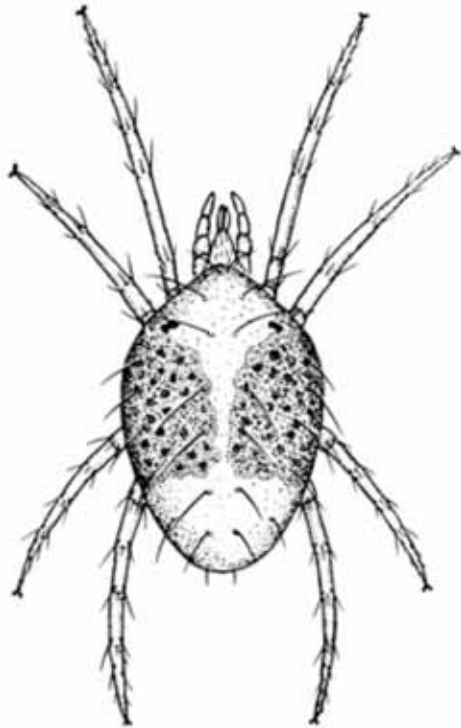
Araneida



# Pseudoscorpion



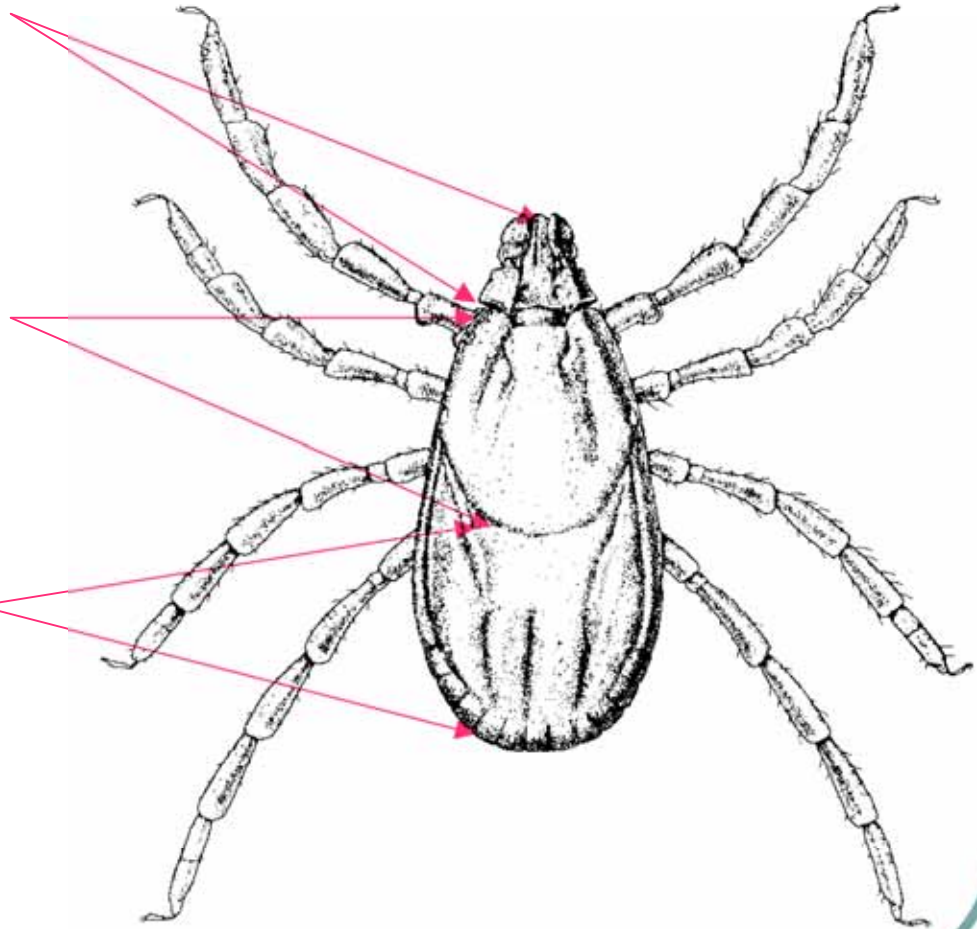
# Mite and Tick Body Regions



pedipalps & chelicerae

cephalothorax

abdomen



# Common ticks



American dog tick male  
-Vectors  
Rocky mountain spotted fever

Blacklegged (deer) tick female  
- Vectors Lyme disease





American dog tick female laying egg mass (1000-2000 eggs!).

# Mites

Clover mites



Twospotted spider mites



Velvet mite



Predatory mite



# Phalangids (daddy-long-legs)



cephalothorax

abdomen



# Spider Anatomy

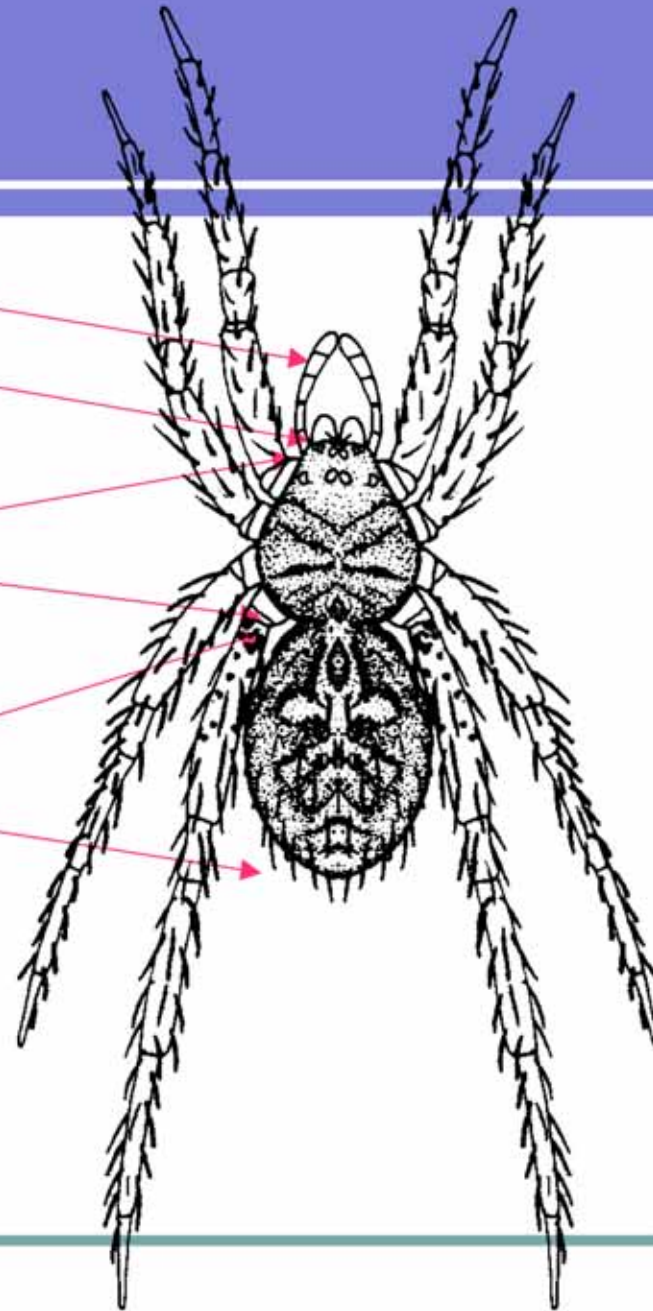
pedipalp

chelicera (fang)

cephalothorax

narrow waist

abdomen



# Jumping Spider



Abdomen

Cephalothorax

Chelicera (fang)

Pedipalp





Wolf spider with egg case



Spitting spider



Tarantula



Orbweaving spider

# Dangerous Spiders

Black widow with  
egg case



Brown Recluse  
(fiddleback)



# Mandibulate Arthropod Characters:

- Mouthparts are mandibles - normally chewing sideways
- One or two pairs of antennae
- Various body region arrangements - cephalothorax & abdomen / head & trunk / head, thorax & abdomen
- Variable leg numbers
- Insects, crustaceans & myriapods

# Myriapods (3-closely related classes)

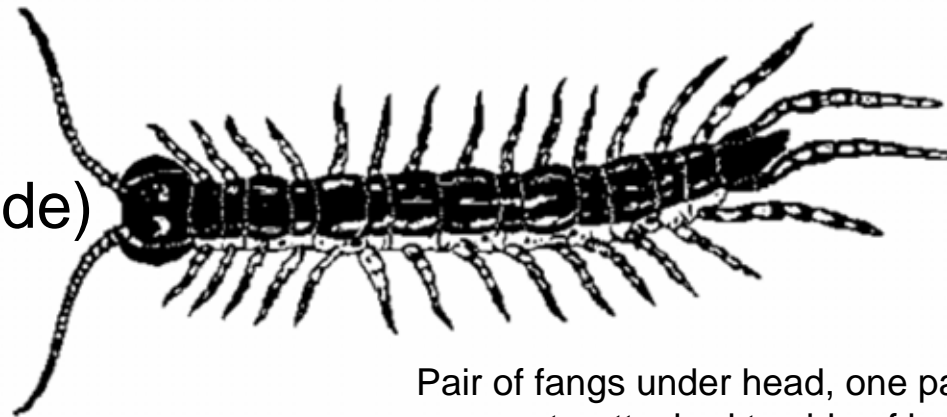
[one pair of antennae, head & trunk regions, trunk with many pairs of legs]

Diplopod (Millipede)

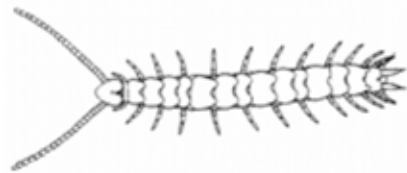


Two pair of legs per visible segment, attached under body.

Chilopod (Centipede)



Pair of fangs under head, one pair legs per visible segment - attached to side of body.



Symphyla (Symphyla)[garden centipede]

No fangs, no eyes, legs attached to side of body.

# Myriapods (3-closely related classes)

Millipede (Diplopoda)



Centipede (Chilopoda)

Garden centipede (Symphyla)



# Classes of Crustacea

- Mostly marine, fresh water, a few terrestrial
- Two pair of antennae, five or more pairs of legs, segmented abdominal appendages, head & trunk or cephalothorax & abdomen body arrangement, have gills
- Isopoda - sowbugs or pillbugs
- Amphipoda - sand fleas, amphipods
- Cirripedia - barnacles
- Decapoda - crabs, lobster, shrimp
- several other minor orders



# Crustaceans

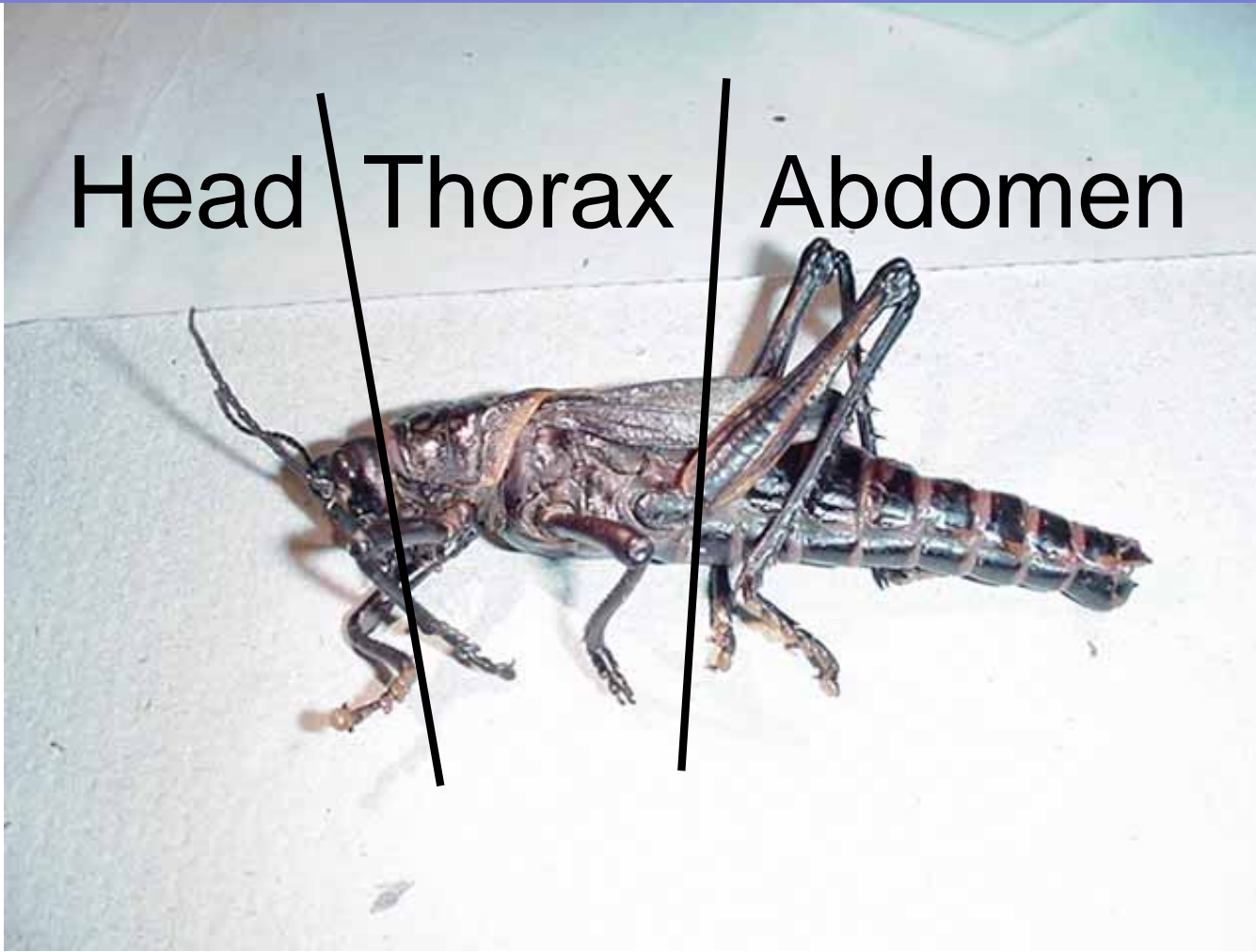
Crayfish cephalothorax  
(Decapoda)

Sowbug (Isopoda),  
a terrestrial crustacean



# Insects

Head Thorax Abdomen





# Acknowledgments

- This presentation was adapted from photographs and slides prepared by Dr. David Shetlar of The Ohio State University