

# Economically Important Insect Orders

- Insect Feeding Guilds
- Characteristics and examples of economically important insects

Teaching Objective:

- Sight recognition of insect orders
- Laboratory exercise to follow

Link to more extensive information on orders from NC-State compiled by John Meyer:

<http://www.cals.ncsu.edu/course/ent425/tutorial/taxons.html>

# Insect Feeding Guilds

- What is a feeding guild?

A guild describes where an insect must go to find, eat, and process food.

A guild sets the stage for understanding ecological relationships.

Individual orders can have insects in one or many feeding guilds.

# Insect Guild Categories

- **Pest**
  - Bugs that bother us
- **Beneficial**
  - Bugs that help us

# Insect Pest Guilds

- Insects that discolor or disfigure leaves (spider mite, plant bug).
- Producers of liquid excrement (honeydew), or wax (aphid, scales)
- Gall makers - Live in specialized habitats (tumors) produced by plants.
- Defoliators – Remove leaf tissue
- Leaf miners – Live between the upper and lower surface of plants.
- Stem and trunk borers. –Live inside plant stems and trunks.
- Root feeders –feed in the soil on plant roots.
- Disease vectors– Transmit disease (Mosquitoes Malaria, elm bark beetles- Dutch Elm Disease)

# Beneficial Insect Guilds

- Insects that eat pests
  - Parasites- Insects complete their life inside a pests ( parasitic wasp)
  - Predators – Insects that consume other insects (lady beetles)
- Pollinators – Insects that move pollen between plants (wasps, bees and flies)
- Decomposers - Insects that feed on dead and decaying plant and animal matter. (Carpenter Ants, Termites, Bark lice, Collembolla, flies).

# Insect Phylogeny

Ametabolous Apterygota

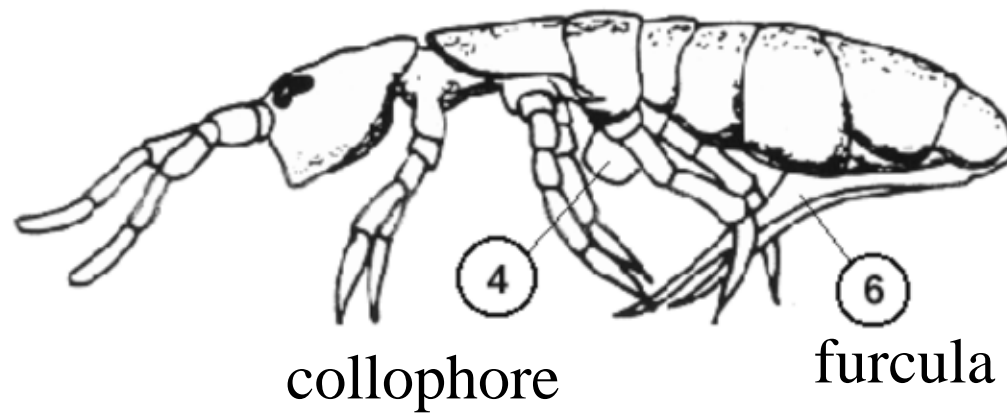
Hemimetabolous Exopterygota

- Paleoptera (ancient winged)
- Neoptera (newer winged)
- Orthopteroid orders -Chewers
- Hemipteroid orders –Mostly suckers

Holometabolous Endopterygota

# Ametabolous apterygota

## Collembola (Springtails)

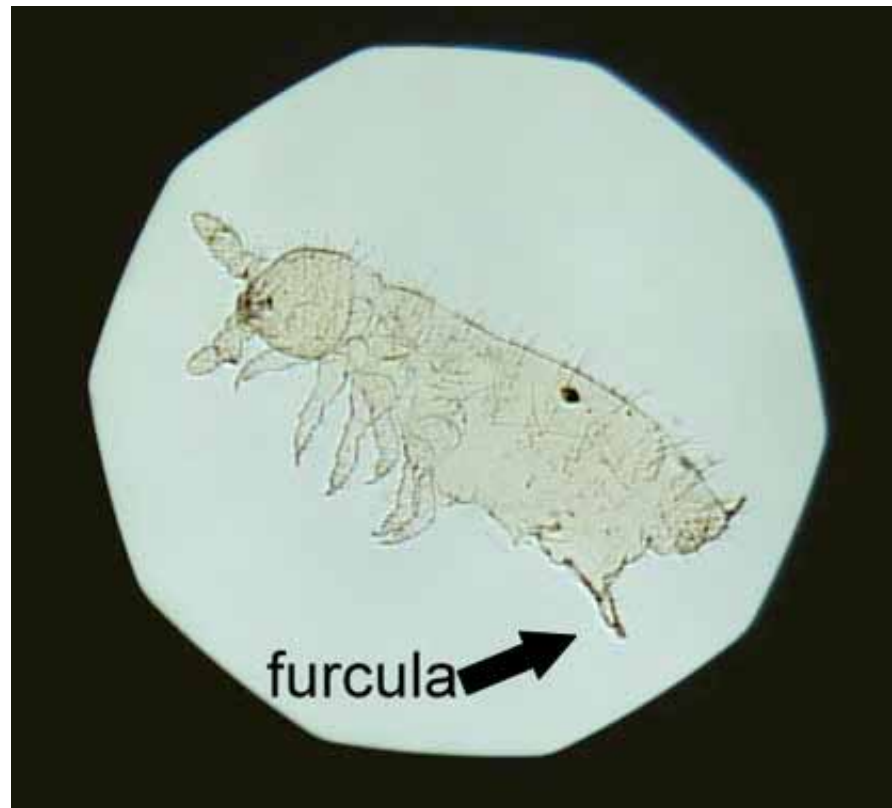


# Collembola Image

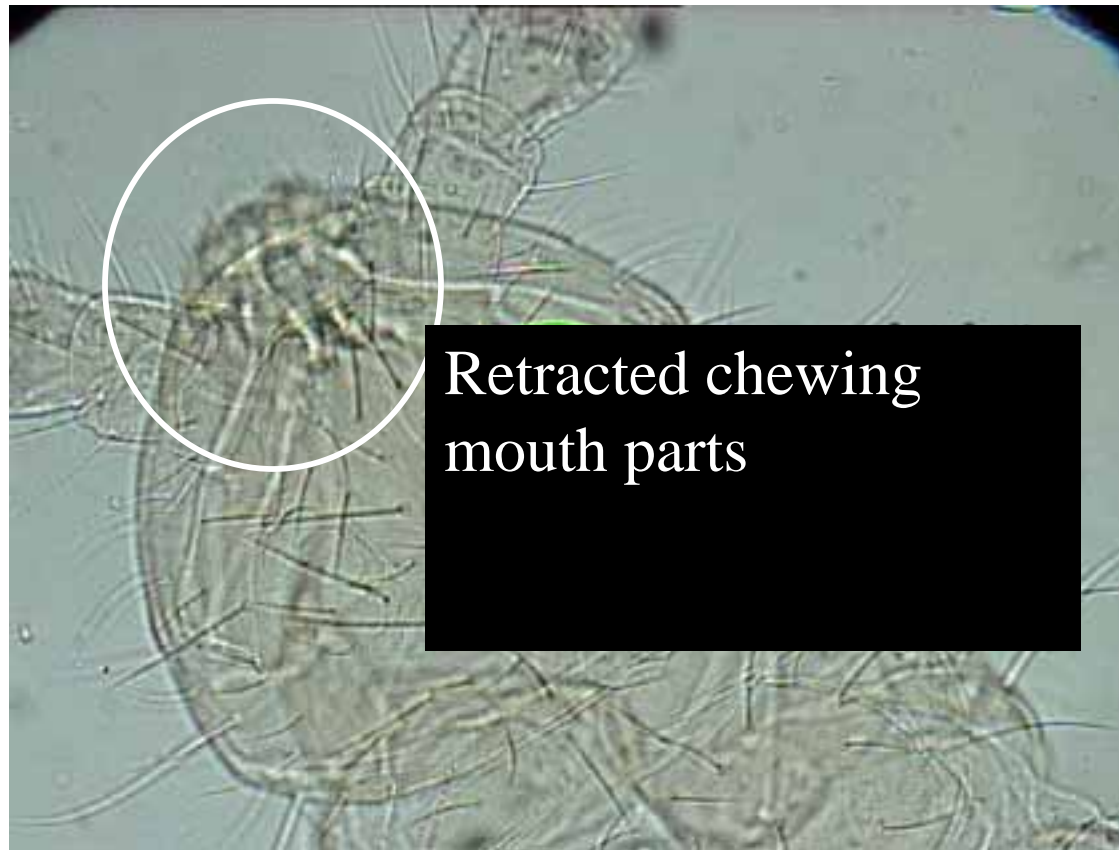




# Collembola Furcula

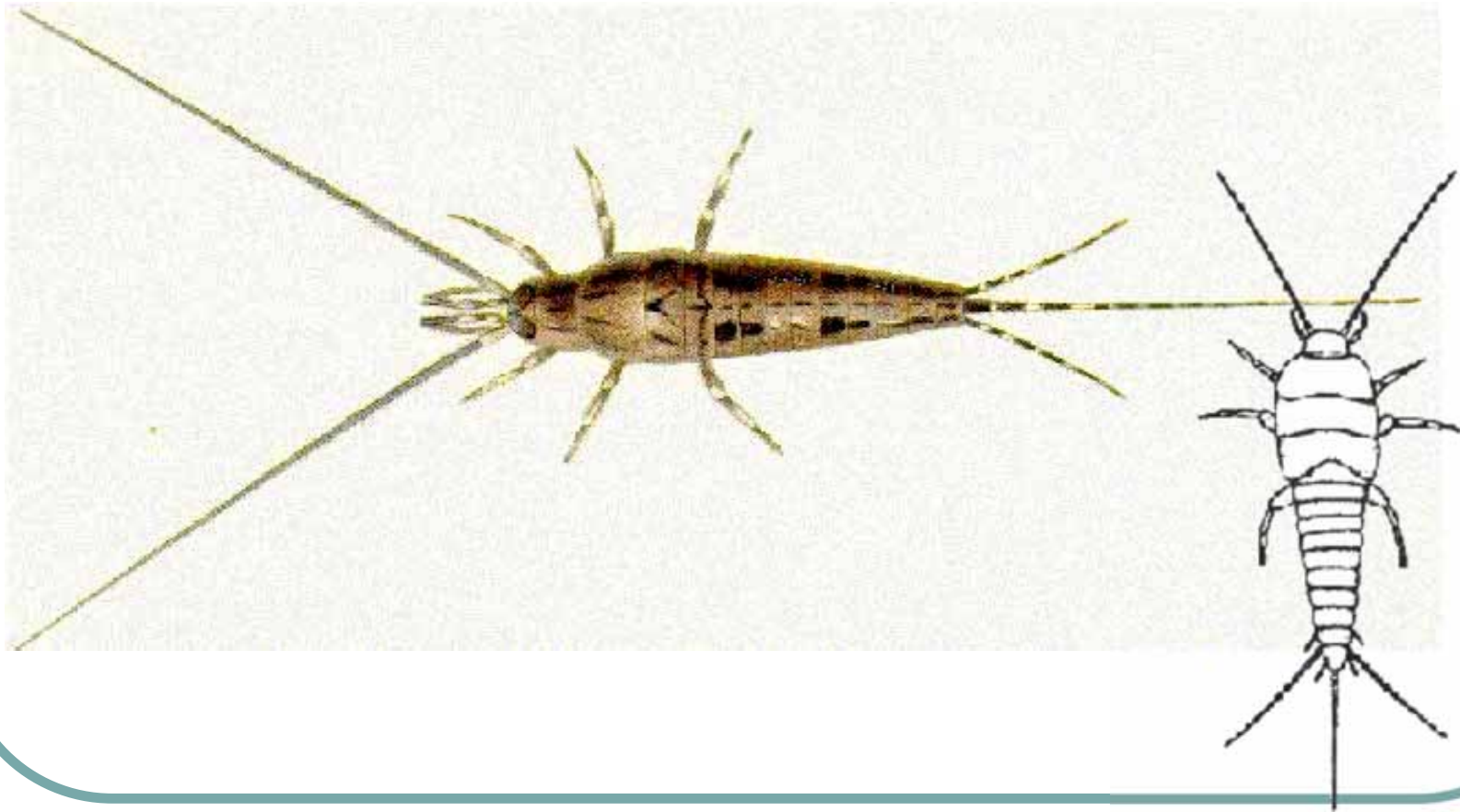


# Collembola Head



Retracted chewing  
mouth parts

# Thysanura (Silverfish/Firebrats)



# Hemimetabolous Exopterygota

Paleoptera (old winged)

Ephemeroptera (Mayflies)



Adult



Naiads (Aquatic juveniles)

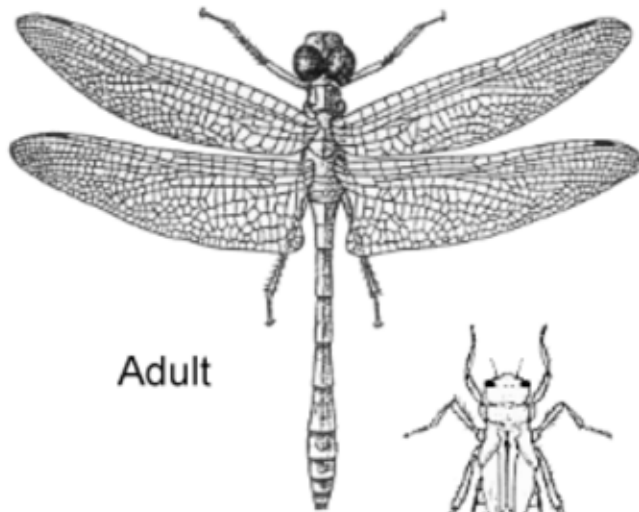
# Hemimetabolous Exopterygota

Paleoptera (old winged)  
Ephemeroptera (Mayflies)



Adult

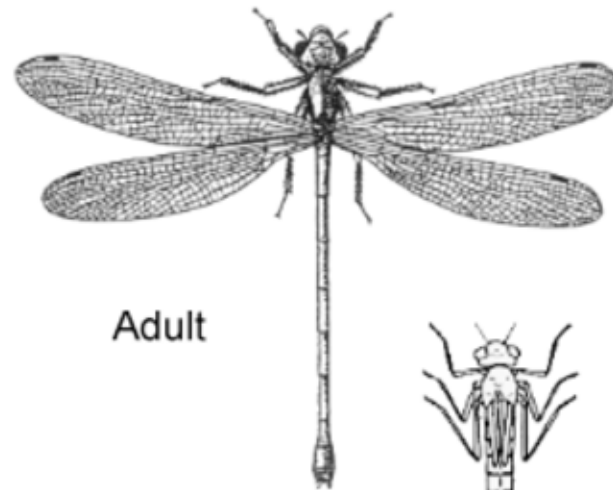
# Odonata



Adult

Naiad

Anisoptera (dragonflies)



Adult

Naiad

Zygoptera (damselflies)

# Odonata



Anisoptera (dragonflies)



Zygoptera (damselflies)

# Hemimetabolous Exopterygota

## Neoptera (new wing)

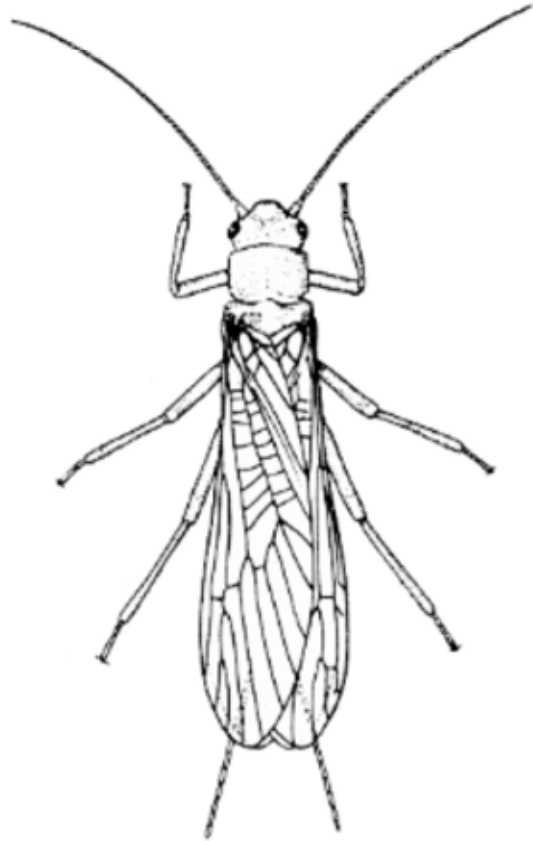
Aquatic ancestral group

- Plecoptera (stone flies)\*
- Embioptera (web spinners)

\*= commonly encountered or problematic in ornamental systems.



# Plecoptera (stoneflies)



Adult



Naiad

# Plecoptera (stoneflies)

*Alloperla* sp., Fishing Bridge



Adult

*Sweltsa coloradensis*, nymph



Naiad

# Hemimetabolous Exopterygota

## Neoptera (new wing)

### Orthopteroid Orders

- Dermaptera\* (earwigs)
- Grylloblatodea (rock crawlers)
- Phasmotodea\* (walking sticks)
- Orthoptera\* (grasshoppers, crickets and katydids)

Dictyopterous (produce eggs in cases, like mantids and cockroaches)

- Mantodea\* (Mantids)
- Blattodea\* (Cockroaches)
- Isoptera\* (Termites)

\*= commonly encountered or problematic in ornamental systems.

# Dermaptera (Earwigs)



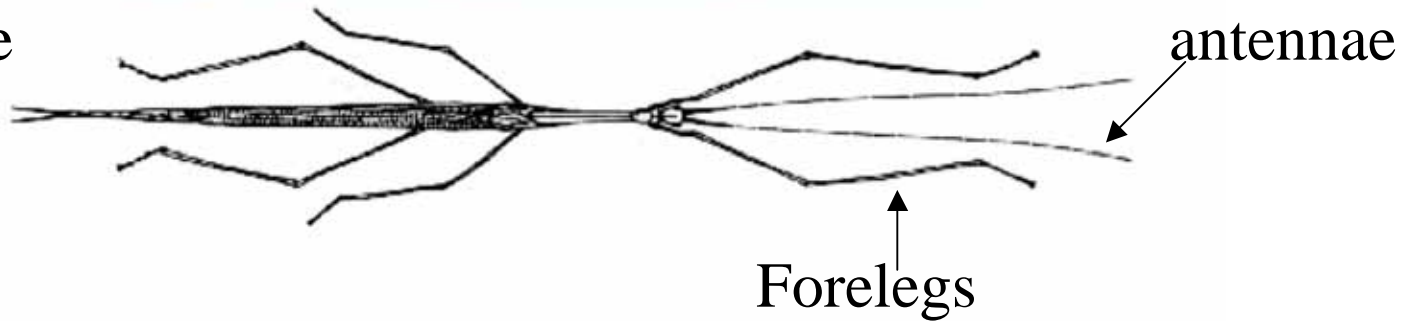
Enlarged cerci

# Phasmatodea (Walking Sticks)

female



male



# Orthoptera (grasshoppers, katydids, crickets, mole crickets)



# Orthopteroid Orders

Dictyopterous (produce eggs in cases),

- Mantodea\* (Mantids)
- Blattodea\* (Cockroaches)
- Isoptera\*

# Blattodea (Cockroaches)

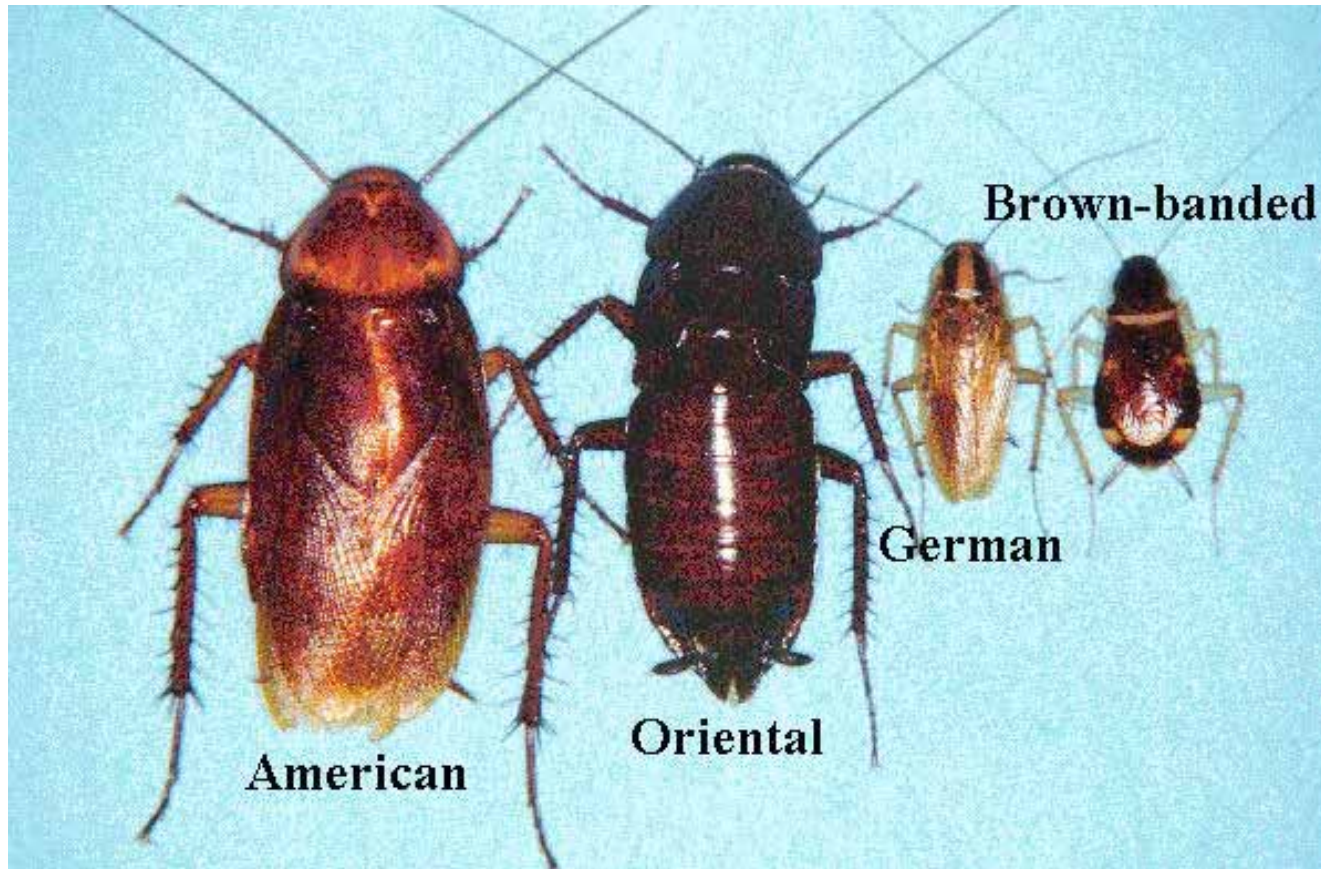
German cockroach life stages





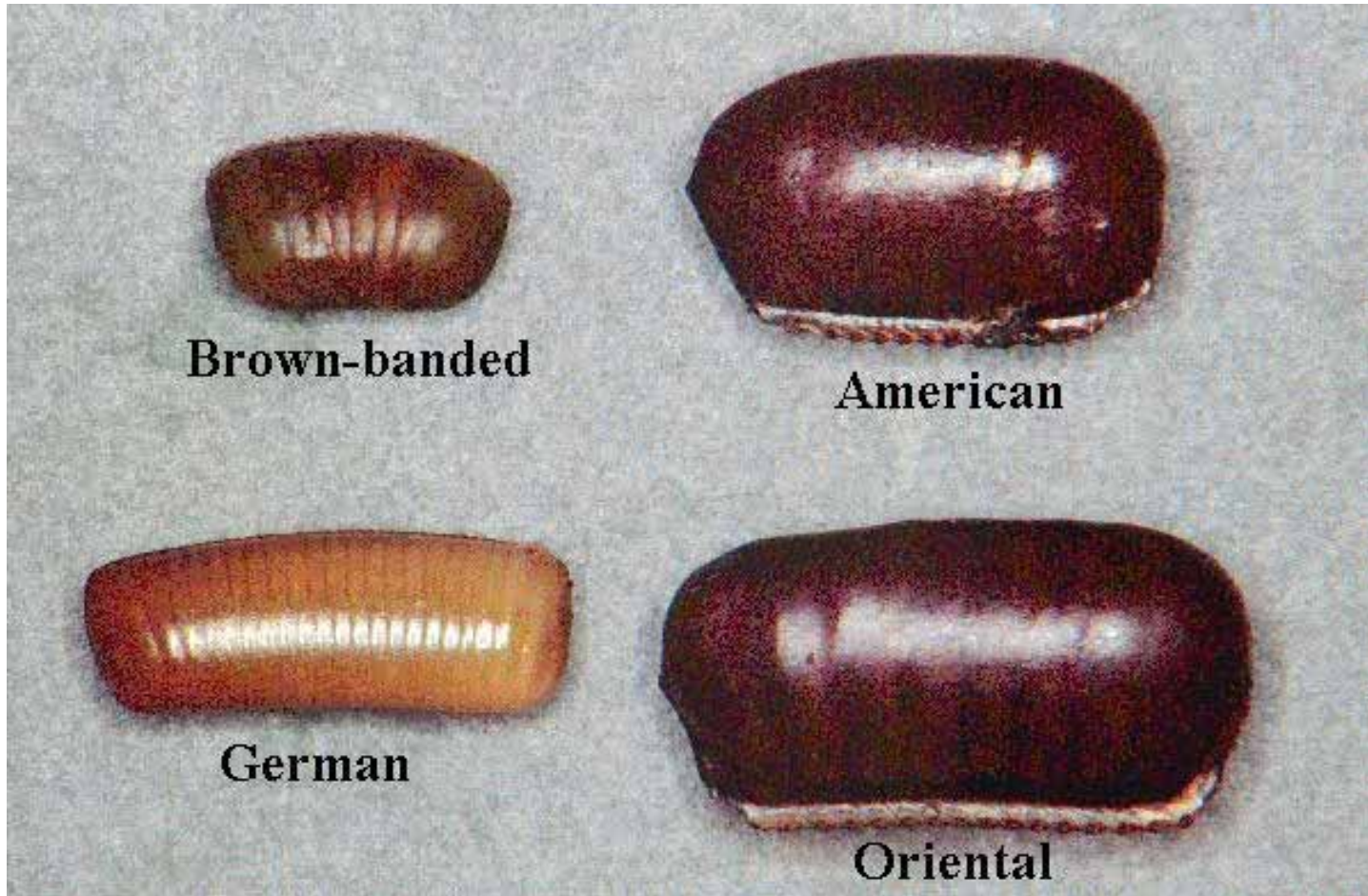
# Blattodea (Cockroaches)

## common adults



# Blattodea (Cockroaches)

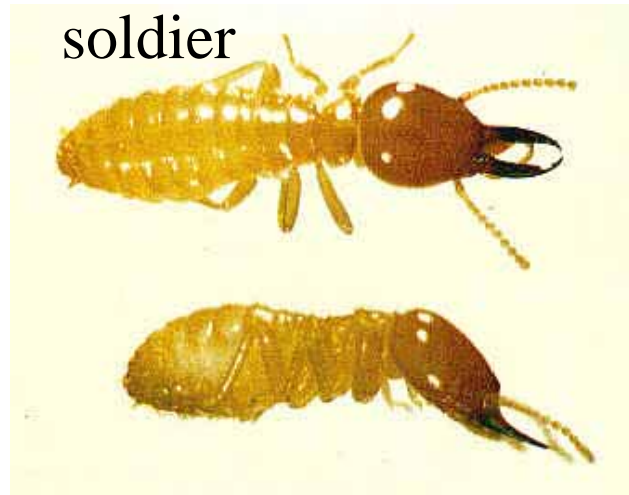
## common egg cases



# Mantodea (Praying Mantids)



# Isoptera (Termites)



Winged reproductives



Mud tubes