

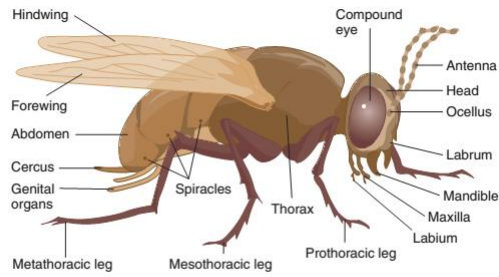
## **Subphylum Uniramia**

### **Class: Insecta**

- Distribution
- Adaptation

- External form and function

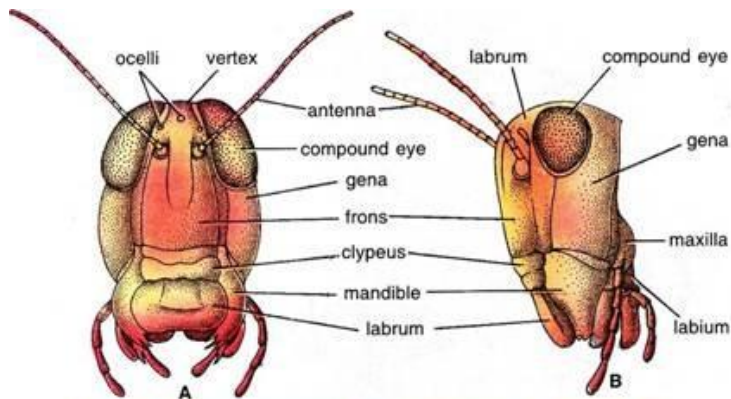
## Anatomy



**FIGURE 15.4**

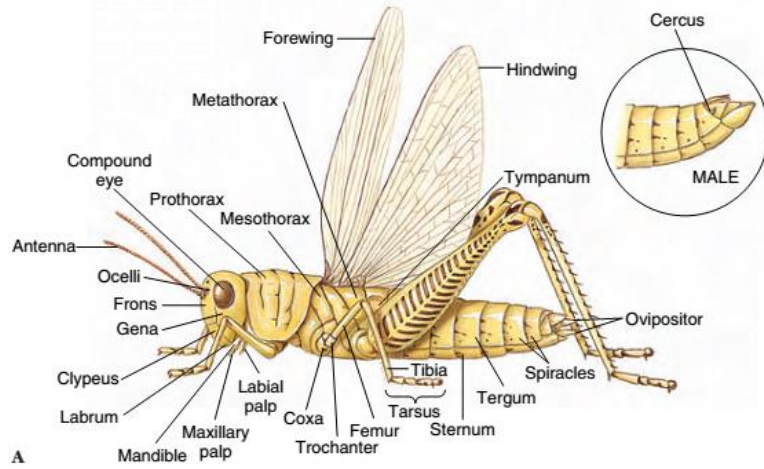
**External Structure of a Generalized Insect.** Insects are characterized by a body divided into head, thorax, and abdomen; three pairs of legs; and two pairs of wings.

## head



**Fig. 74.2.** Grasshopper. Head. A—Dorsal view; B—Lateral view.

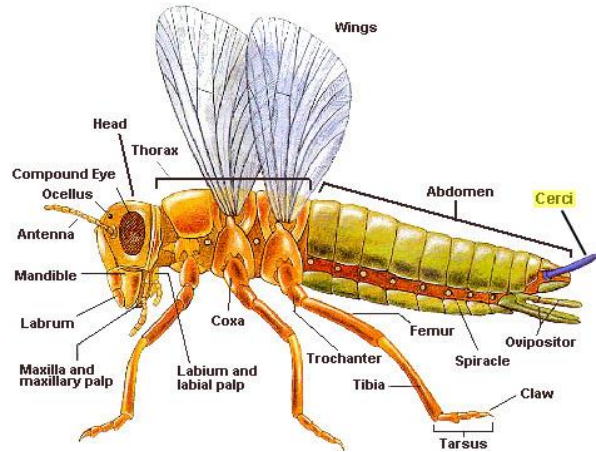
# Thorax



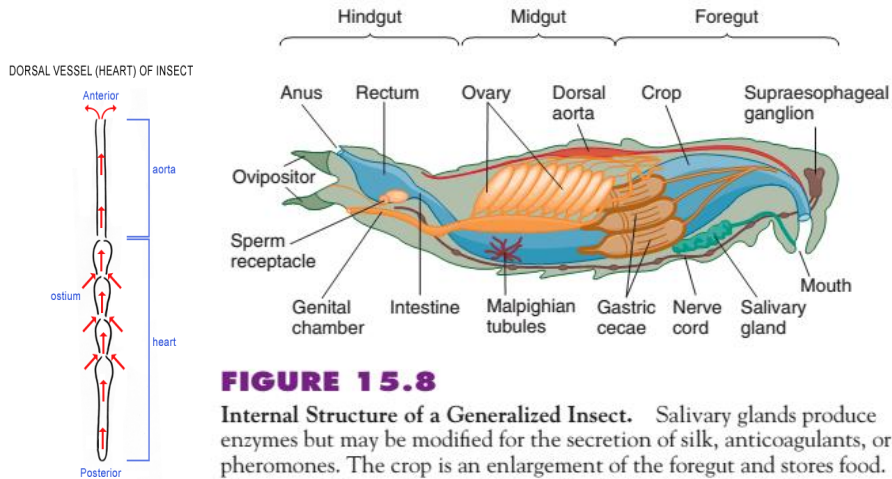
Movies

Movies

# Abdomen

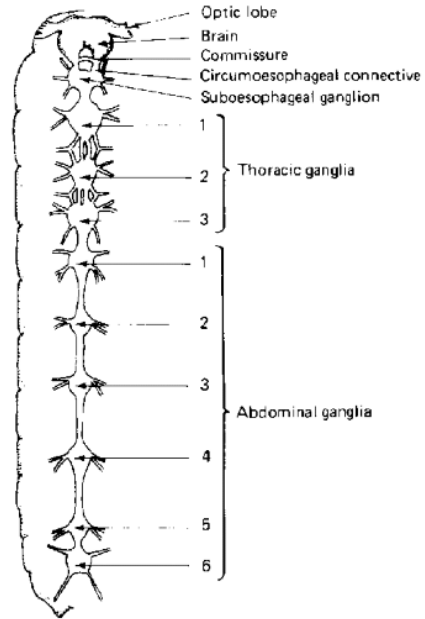


# Internal anatomy

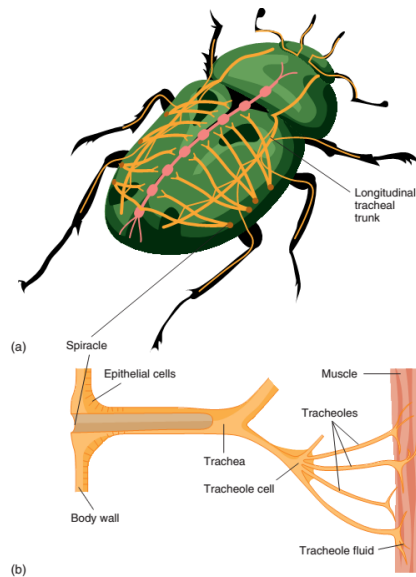


**FIGURE 15.8**  
**Internal Structure of a Generalized Insect.** Salivary glands produce enzymes but may be modified for the secretion of silk, anticoagulants, or pheromones. The crop is an enlargement of the foregut and stores food. The proventriculus is a grinding and/or straining structure at the junction of the midgut and hindgut. Gastric caecae secrete digestive enzymes. The intestine and the rectum are modifications of the hindgut that absorb water and the products of digestion.

## Neural system sensory organs



## Respiratory system

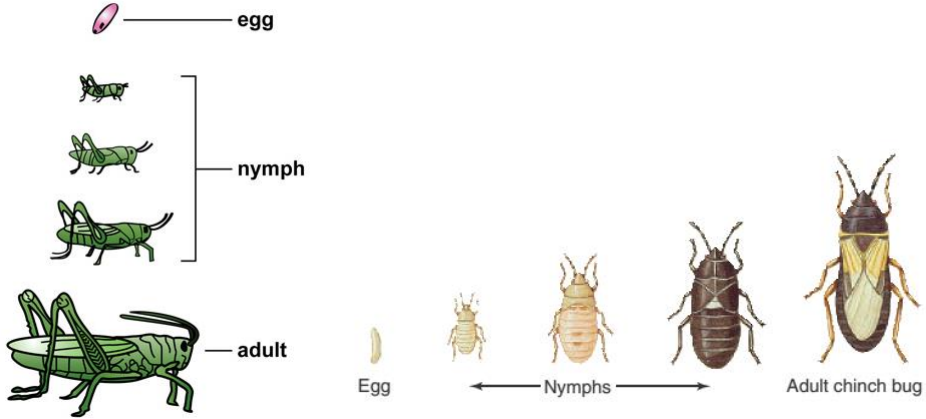


**FIGURE 15.9**  
Tracheal System of an Insect. (a) Major tracheal trunks. (b) Tracheoles end in cells, and the terminal portions of tracheoles are fluid filled.

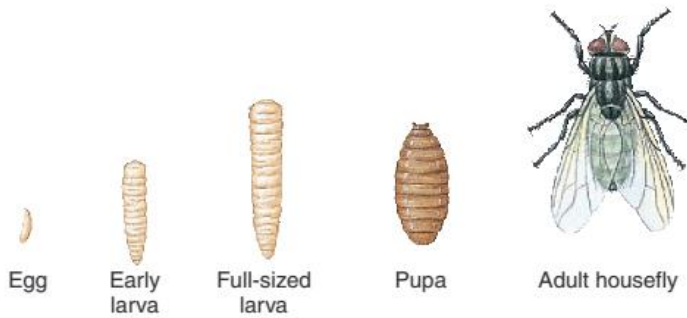
[Movie](#)

## تولید مثل

### Incomplete Metamorphosis



## تولید مثل



**FIGURE 15.13**

Holometabolous Development of the Housefly, *Musca domestica* (Order Diptera). The egg hatches into a larva that is different in form and habitat from the adult. After a certain number of larval instars, the insect pupates. During the pupal stage, all adult characteristics form.

[Movie](#)

# Wing

- Coleoptera



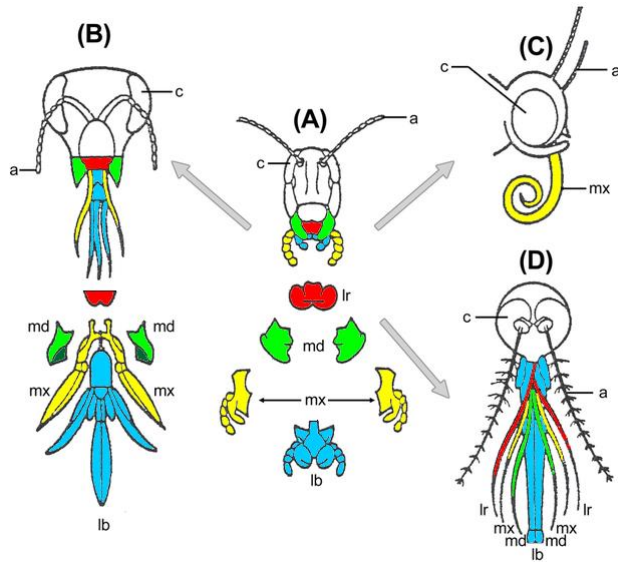
# Hymenoptera



# Diptera



## Mouth parts





## Hexapod Orders

### Entognathous Hexapods –

Order Protura

Order Collembola

Order Diplura

### Ectognathous apterygote Hexapods –

Order Microcoryphia

Order Thysanura

### Pterygote Hexapods –

(simple metamorphosis)

Order Ephemeroptera

Order Odonata

Order Orthoptera

Order Phasmatodea

Order Dermaptera

Order Plecoptera

Order Isoptera

## Orders of Insects

(no metamorphosis)

- Some consider these groups insect-like and place in different class or subclass.
- Adults do not have wings and may molt after becoming mature
- Thysanura - silverfish, firebrats
- Collembola - springtails

## Thysanura

(silverfish, firebrats)



## Collembola

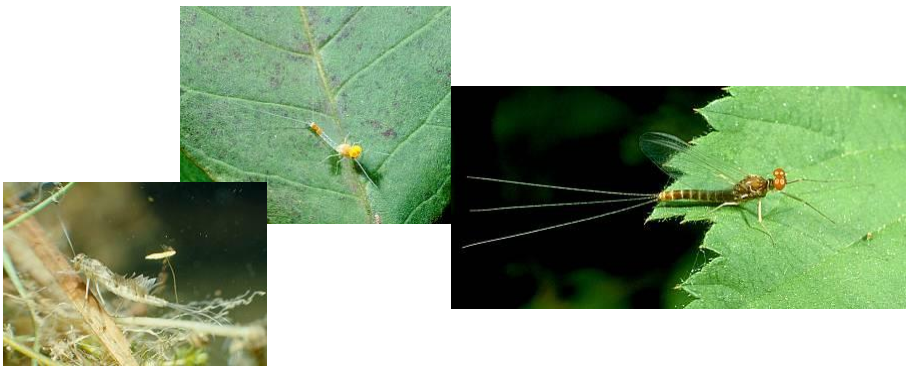
(springtails)



## Orders of Insects (simple metamorphosis)

- Ephemeroptera - mayflies, shadflies
- Odonata - dragonflies, damselflies
- Orthoptera - grasshoppers, crickets, cockroaches, mantids, walking-sticks

### Ephemeroptera (Mayflies, shadflies, Canadian soldiers)



## Odonata

(dragonflies and damselflies)



## Orthoptera

(cockroaches, grasshoppers, crickets, preying mantids, walking-sticks; >28K spp.)



## Dermaptera (earwigs)



## Plecoptera (stoneflies)



# Isoptera

(termites)



## Orders of Insects

(incomplete metamorphosis cont'd)

- 
- 
- 
-

## Hemiptera (*s.o. Heteroptera*)

(true bugs; 23K spp.)



## Hemiptera (*s.o. Auchenorrhyncha*)

(buglike insects: cicadas, leaf, plant & tree hoppers; 33K spp.)



## Hemiptera (*s.o. Sternorrhyncha*) (buglike insects: psyllids, whiteflies, aphids, mealybugs, & scales)



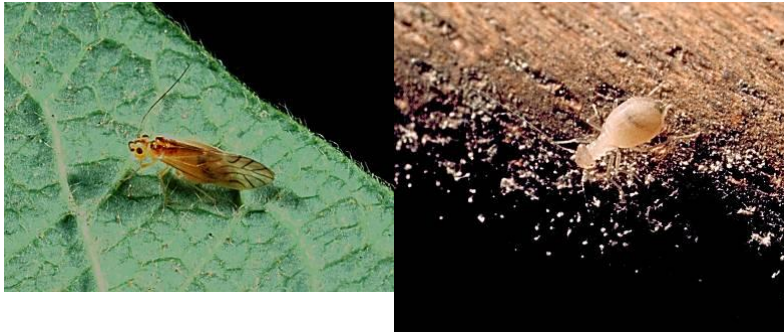
## Thysanoptera (thrips; 4.5K spp.)





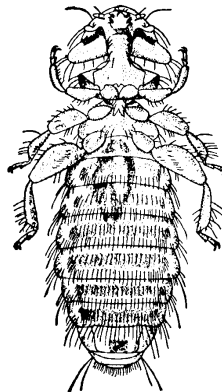
## Psocoptera

(psocids, booklice, barklice; >3K spp.)



## Phthiraptera (*Mallophaga*)

(biting lice; 2.7K spp.)



## Orders of Insects

(complete metamorphosis)

- Coleoptera – beetles
- Neuroptera - dobsonfly, lacewings
- Hymenoptera - sawflies , bees, wasps
- Tricoptera - caddisflies
- Lepidoptera - butterflies & moths
- Siphonaptera - fleas
- Diptera - gnats, mosquitoes, flies

## Coleoptera

(beetles & weevils)



## Coleoptera

(beetles & weevils)



## Neuroptera

(dobsonfly, lacewings, antlions)



# Hymemoptera

(bees, wasps, sawflies)



# Hymemoptera

(bees, wasps, sawflies)



## Trichoptera (caddisflies)



## Lepidoptera (butterflies, moths, caterpillars)



## Lepidoptera

(butterflies, moths, caterpillars)



## Siphonaptera

(fleas)



## Diptera

(flies, midges, mosquitoes)



## Diptera

(flies, midges, mosquitoes)



## گروه هزارپایان

- Class Chilopoda
- Diplopoda
- Symphyla
- Pauropoda

## Chilopoda





# Chilopoda

