

Arthropods

Principle Classes of Arthropods

- Crustacea
- Arachnida
- Myriopoda
- Insecta

Crustaceans — covered last lab

- Two pairs of antennae
- “Mouth field”: feeding appendages
 - Mandibles (jaw)
 - Maxillae (mouth appendages)
 - Maxillipeds (modified legs)
- Gills: lateral thoracic
 - Upper branches of walking legs

Crustacea: Order Isopoda

pillbugs, sowbugs

- 7 pairs of legs; thoracic segments make up most of body
- Most <20 mm and marine; some freshwater and terrestrial; scavengers, omnivores

Arachnids

– includes spiders, scorpions, ticks, and mites

(a) Scorpions have pedipalps that are pincers specialized for defense and the capture of food. The tip of the tail bears a poisonous stinger.

(b) Dust mites are ubiquitous scavengers in human dwellings but are harmless except to those people who are allergic to them (colorized SEM).

(c) Web-building spiders are generally most active during the daytime.

Figure 33.31a–c

Arachnids

- Two tagmata: cephalothorax & abdomen
- six pairs of appendages:
 - 1 pair chelicerae w/ venom fangs or claws
 - 1 pair pedipalps — sensory / food manipulation
 - 4 pairs walking legs

Figure 33.32

Myriopoda

Centipedes & millipedes

- Two tagmata: head & trunk (= thorax + abdomen)
- Head w/ 4 segments & 4 pairs of appendages
- Trunk w/ many segments — 1 pair of legs/segment

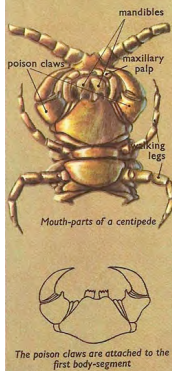
Figure 33.34 Figure 33.33

Arthropods

Myriopoda


Centipedes & millipedes

- Two tagmata: **head & trunk**
- **Head:**
 - 1 pair of **antennae**
 - Mouth parts: 1 pair of **mandibles** (jaws) + 2 pair of **maxillae**
- **Trunk:**
 - Legs of first trunk segment = **maxillipeds**
 - Feeding limbs
 - Venom claws in centipedes
 - Remaining segments have walking legs



Mouth-parts of a centipede

The poison claws are attached to the first body-segment



Insects

- **External anatomy**

The insect body has three tagmata: **head, thorax, and abdomen.**

- The segmentation of the thorax and abdomen are obvious, but the segments that form the head are fused.

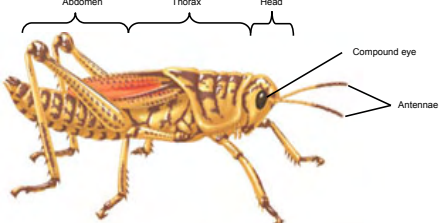
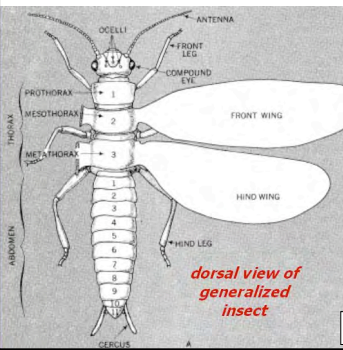


Figure 33.35

Insects

- **External anatomy**

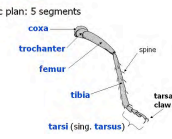


dorsal view of generalized insect

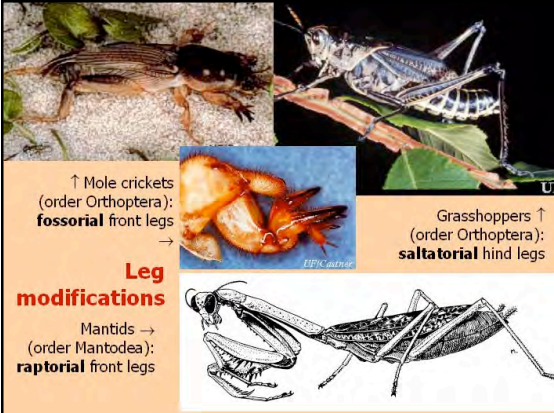
Head: 6 segments
Thorax: 3 segments
Abdomen: 11 segments

Insect Legs

- Basic plan: 5 segments



External morphology of insects
<http://www.insectsexplained.com/>



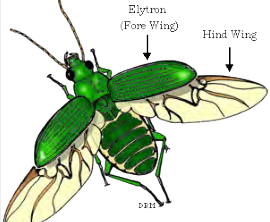
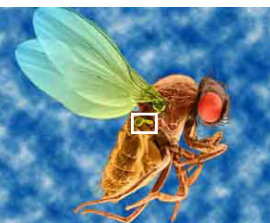
↑ Mole crickets (order Orthoptera): **fossorial** front legs

Grasshoppers ↑ (order Orthoptera): **saltatorial** hind legs

Leg modifications

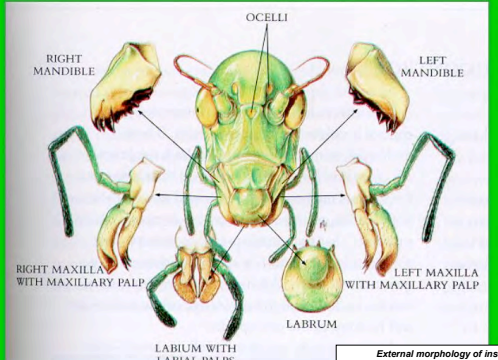
Mantids → (order Mantodea): **raptorial** front legs

insect wing modifications

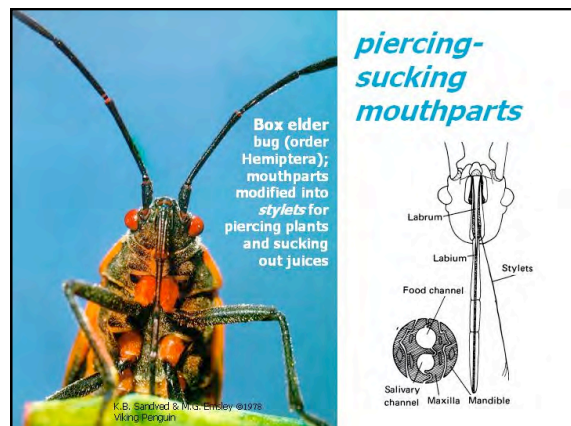
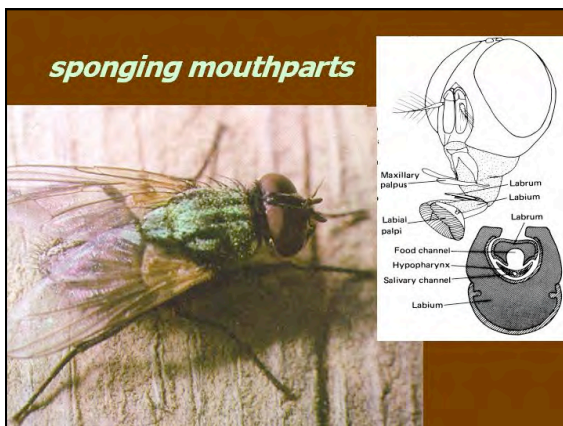
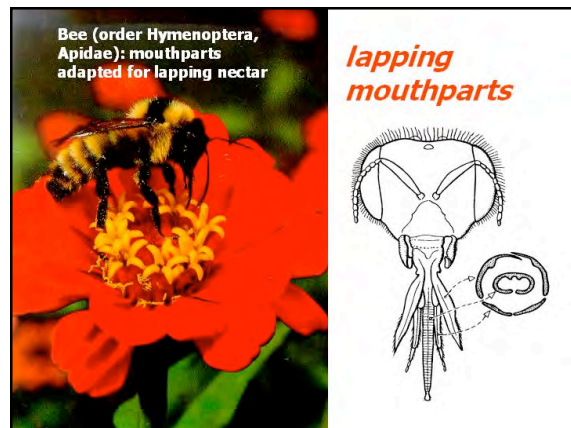
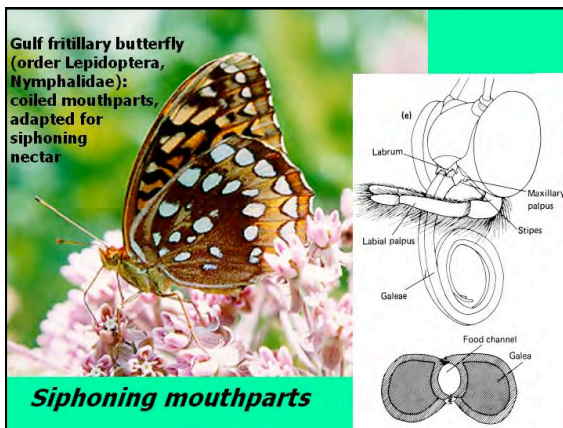
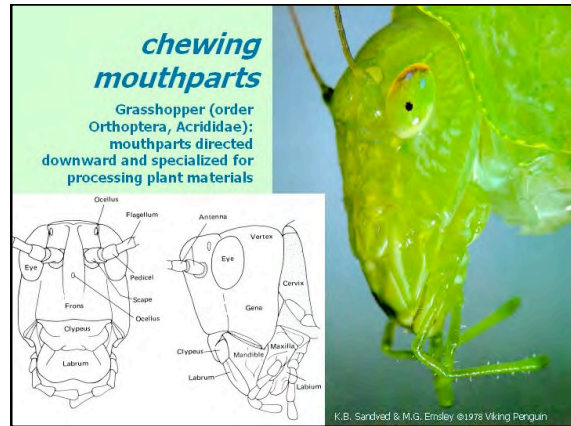
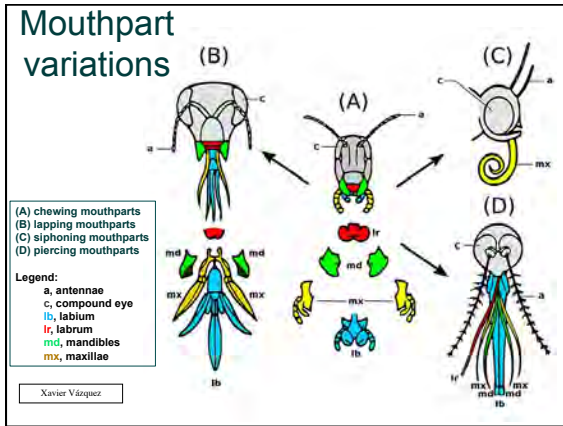
- **Elytra** — front wings of beetles modified into wing cover
- **Haltere** — modified 2nd pair of wings in flies. Gyroscopic stabilization of flight.

External anatomy — insect head



External morphology of insects
<http://www.insectsexplained.com/>

Arthropods



Arthropods

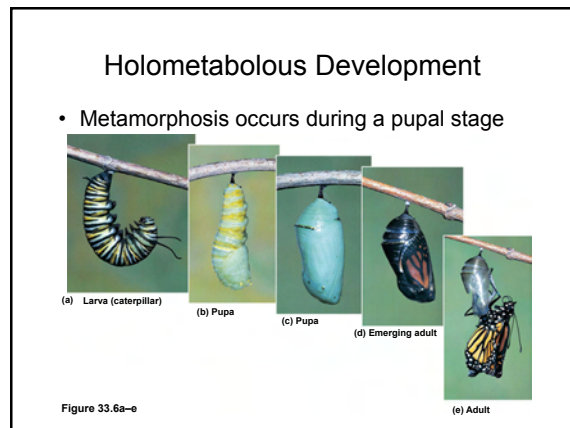
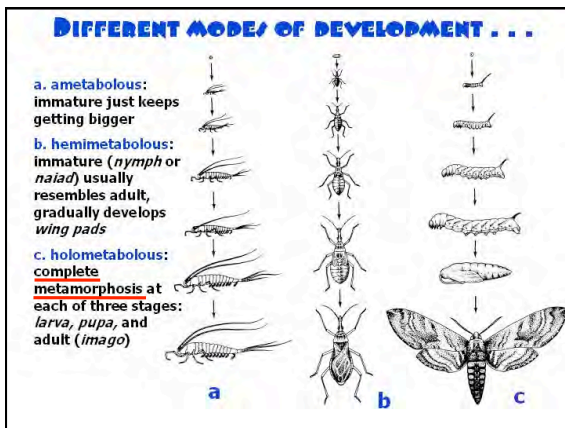
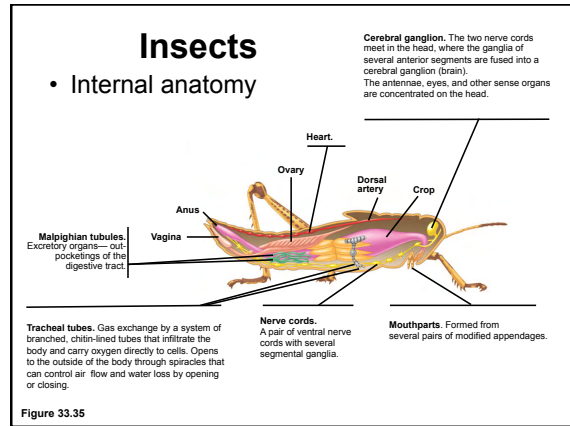
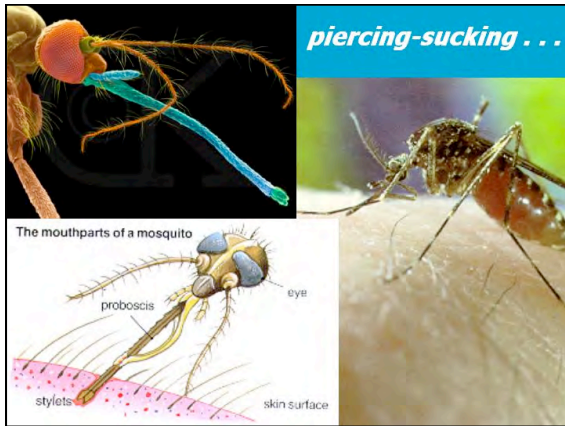


Fig. 33.37:
Eight of the thirty insect orders

- Key
- Feeding
- Development

ORDER	APPROXIMATE NUMBER OF SPECIES	MAIN CHARACTERISTICS	EXAMPLES
Coleoptera	385,000	Beetles comprise the most species-rich order of insects. They have two pairs of wings, one of which is thick and leathery, the other membranous. They have an ancestral exoskeleton and mouthparts adapted for biting and chewing. Beetles undergo complete metamorphosis.	
Dermoptera	1,200	Earwigs are generally nocturnal scavengers. While some species are entomophilic, others have two pairs of wings, one of which is thick and leathery, the other membranous. Earwigs have biting mouthparts and large posterior pincers. They undergo incomplete metamorphosis.	
Diptera	151,000	Dipterans have one pair of wings; the second pair has become modified into balancing organs called halteres. They have a large head and mouth. Their mouthparts are adapted for sucking, piercing, or chewing. Dipterans undergo complete metamorphosis. Flies and mosquitoes are among the most common dipterans, which live as scavengers, predators, and parasites.	
Hemiptera	85,000	Hemipterans are so-called "true bugs," including bed bugs, assassin bugs, and stink bugs. Insects in other orders are sometimes erroneously called bugs. Hemipterans have two pairs of wings, one pair partly leathery and the other membranous. They have piercing or sucking mouthparts and undergo incomplete metamorphosis.	
Hymenoptera	125,000	Ants, bees, and wasps are generally highly social insects. They have two pairs of membranous wings, a visible head, and chewing or sucking mouthparts. The females of many species have a posterior stinging organ. Hymenoptera undergo complete metamorphosis.	
Lepidoptera	126,000	Butterflies and moths are among the best-known insects. They have two pairs of wings covered with fine scales. In fact, they are small, long-proboscis. Most feed on nectar, but some species feed on other substances, including animal blood or waste.	
Orthoptera	8,000	Grasshoppers and mantises have two pairs of large, membranous wings. They have an elongated abdomen, large compound eyes, and chewing mouthparts. They undergo incomplete metamorphosis and are active predators.	
Orthoptera	11,000	Cricketflies, crickets, and their relatives are mostly herbivorous. They have large hind legs adapted for jumping, two pairs of wings (only crickets are nocturnal), and biting or chewing mouthparts. Many commonly make chirping sounds by rubbing together body parts. They undergo complete metamorphosis.	

