

**Entomology 156: Biology of Parasites
The Arthropod Parasites
Lecture 1.
Introduction to Arthropod Biology and
Development**

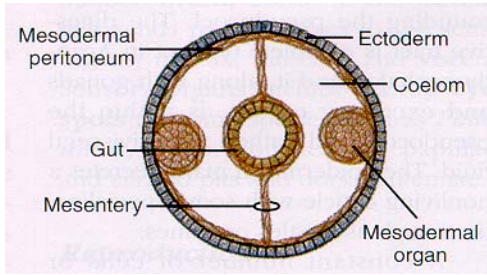
I. Introduction to the Arthropod parasites

- A. General statistics of the group
 - 1. Insects largest group 6,000,000 spp
 - 2. Arachnids 60,000 spp
 - 3. Crustaceans 30,000 spp
 - 4. About 15% of all insects are parasites
 - 5. One in 10 animals is a parasitic insect

**B. Ancestral characteristics– Protostomes:
related to Annelids and Molluscs**

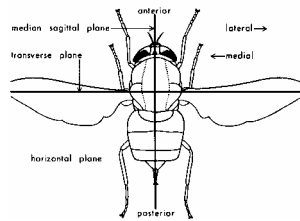
- 1. Triploblastic
 - a. Three layered type of body organization
 - b. Ectoderm mesoderm and entoderm-
standard germ tissues
 - c. Embryonic development variable but
standard
 - d. Formation of Blastula and Gastrulation

**B. Ancestral characteristics– Protostomes:
related to Annelids and Molluscs**



B. Ancestral characteristics– Protostomes

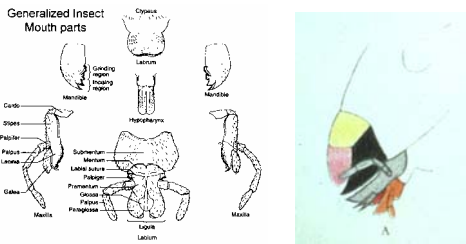
- 2. Bilateral symmetry
 - a. Developmental exceptions
 - b. Fly genitalia rotation

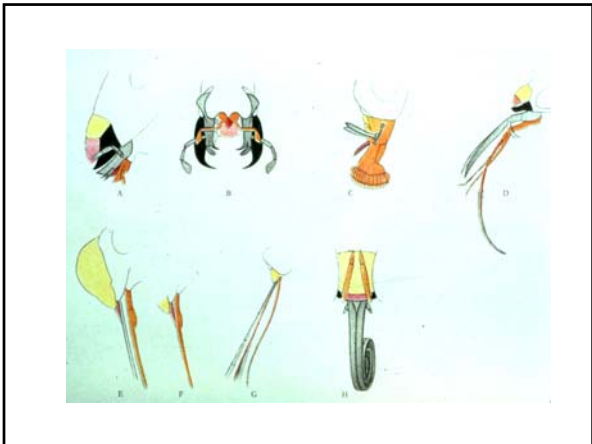


B. Characteristics

- 3. Tubular gut
 - a. Fore gut-ectodermal

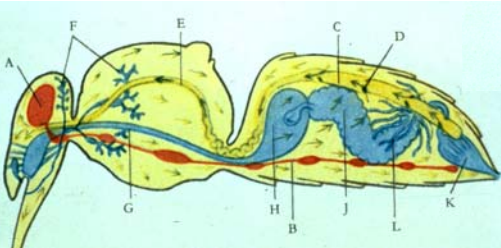
1) Mouth parts- acquisition





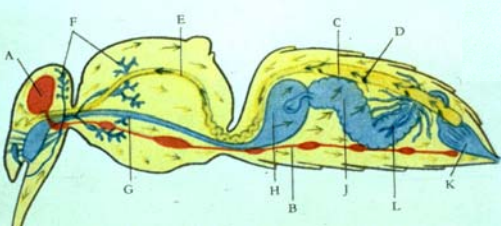
B. Characteristics

- 2) Cibarium- pumping and processing
- 3) Mouth- ingestion
- 4) Esophagus- connection



B. Characteristics

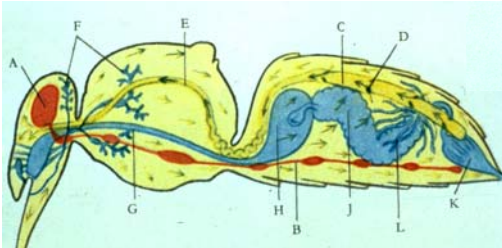
- 5) Crop- storage
- 6) Proventriculus and teeth- metering and physical reduction of food
- 7) Stomadeal valve- prevents back flow



B. Characteristics

3. Tubular gut

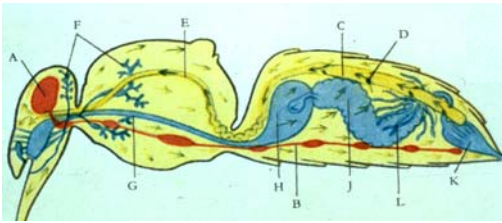
- b. Mid gut, meso and endodermal - digestion and adsorption



B. Characteristics

3. Tubular gut

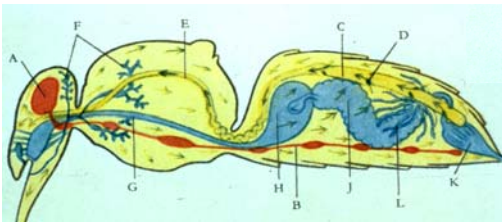
- c. Hind gut ectodermal
 - 1) Rectum- water regulation
 - 2) Anus- water retention or exclusion



B. Characteristics

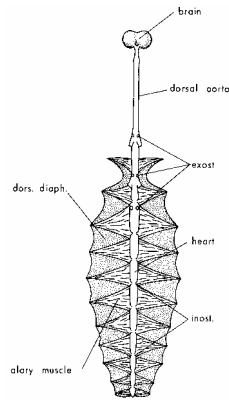
4. Hemocoel

- a. Contains organs
- b. Open bag
- c. Dorsal and ventral diaphragms



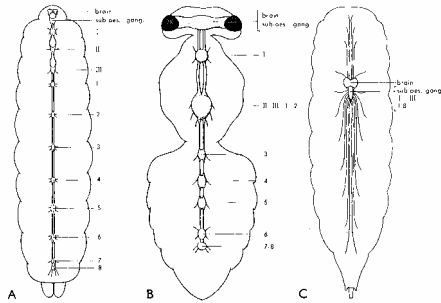
B. Characteristics

- 5. Dorsal heart with pulsatile organs
 - a. Open circulatory system
 - b. Blood- Haemolymph
 - c. Flow back to front
 - d. Each segment, alary muscles, in current and ex current ostia



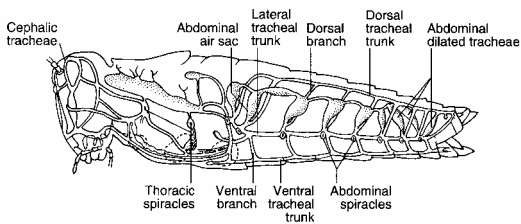
B. Characteristics

- 6. Ventral nerve, ganglia; dorsal brain



B. Characteristics

- 7. Tracheal respiration
 - a. Spiracles
 - b. Tracheae

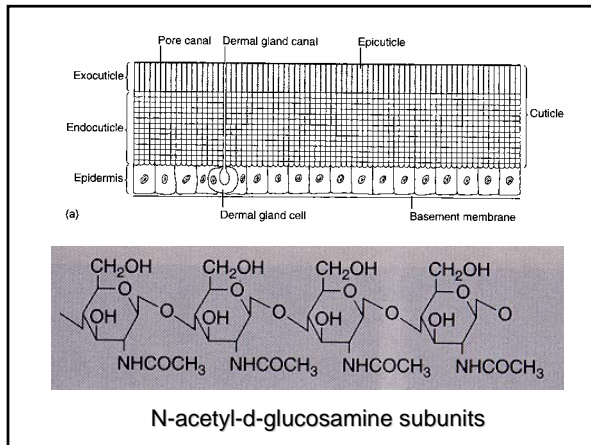


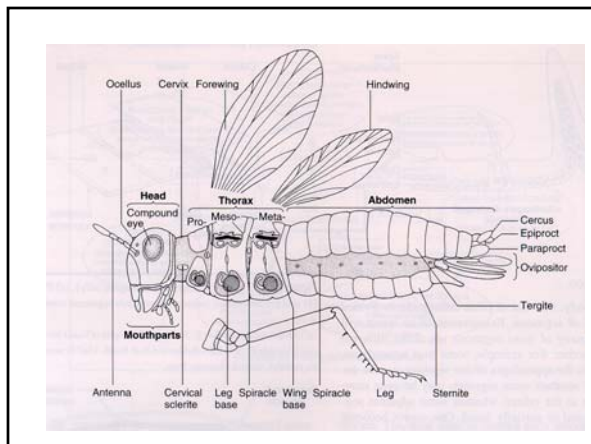
B. Characteristics

8. Exoskeleton

a. Chitin

- 1) Carbohydrates and protein
- 2) N-acetyl-d-glucosamine
- 3) Protein cross linking- soft/hard
- 4) Resilin- elastic rubber like protein



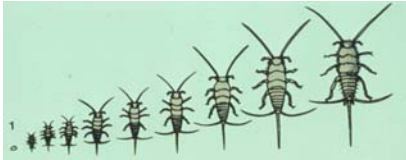


C. Life History Patterns

1. Insects and other hexapods

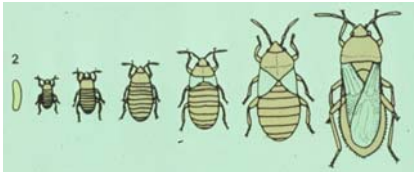
a. Ametabolous: gradual

- 1) Sub adult stages resemble adult
- 2) Several molts to adult
- 3) All stages similar ecology
- 4) Examples: Argulus the fish lice



b. Hemimetabolous or incomplete

- 1) Egg hatches to sub adult
- 2) Several sub adult molts
- 3) Sub adult to adult molt includes major structural changes
- 4) All stages similar ecology and behavior
- 5) Examples: kissing bug



c. Holometabolous or complete

- 1) Egg hatches into sub adult
- 2) One or more different sub adult stages
- 3) Substantive resting stage
- 4) Molt to entirely different adult stage



c. Holometabolous or complete

5) Sub adult and adult stages vastly different ecology

6) Examples: mosquitoes



C. Life History Patterns

2. Crustacea

a. Direct: fish lice

1) Egg hatches

2) Sub adult stages resemble adult

3) Several molts to adult

b. Indirect: copepods
