Insect body plan

**Cuticle**

Varies greatly among species and life stages in toughness
Important for structure and for forming the barrier between the inside of the animal and its external environment

**Structure**

- **epidermis**
  - Live cells
  - Secretes cuticle

- **Procuticle**
  - Consists of chitin and protein
  - Provides support
  - Thickest layer (10 um to 0.5 mm)

- **Epicuticle**
  - Contains lipids and hydrocarbons
  - Inhibits dessication
  - Can confer color pattern and olfactory cues for species recognition

**Segmentation and tagmosis**

- **Fusion of segments to form insect body**
  - Head- 6 segments fused to one region
  - Thorax- 3 segments
  - Abdomen- 11 segments

**Orientation**

**Principal body regions**

- Dorsum- upper surface
- Venter- lower surface
- Pleura- lateral surfaces

**Locations of slerotization- sclerites**

- Tergum- dorsal plate (tergite is a subdivision)
- Sternum- ventral plate (sternite)
- Pleuron- lateral plates (pleurite)

**Head anatomy**

- **Posterior cranium**
  - Connects vertex dorsally
  - Connects genae laterally
Anterior

Vertex and genae merge into

Frons
Clypeus

Compound eyes lie between vertex and genae
Three light sensitive simple eyes, ocelli, situated on anterior vertex

Mouthparts

Derived from appendages (walking legs)
structure

Labrum

Attached to clypeus
Covers mandibles

Hypopharynx

Tongue like structure
Food manipulation

Mandibles

Primitively biting and chewing type
Hard

Maxillae

structure

Basal segment: cardo
Attached to stipes
Galea and lacina attached to inner stipe
Maxillary palp attached to outer

function

Palp and lacina manipulate food
Galea have sensory structures for taste

Labium

Two appendages fused at base
May also manipulate and 'taste' food
Diverse evolutionary modifications

Bees- Chewing and lapping
- Labium modified into tongue
- Folds together with galea and labial palps to make sort of a straw
- Maxillary lacinia and palps reduced

Butterflies & moths
- Feeding tube derived from enlarged galea
- Food pumped in through pharynx
- Blood sucking by spines at tip and by sliding two galea against each other

Diptera- flies (biting and sucking, primitive for order)
- Scissor-like mandibles and maxillae for piercing
- Labium forms a sheath to support them
- Food travels up tube between labrum and other parts
- Pierce into body and search for capillaries

Mosquitoes
- Scissor-like mandibles and maxillae for piercing
- Labium forms a sheath to support them
- Food travels up tube between labrum and other parts
- Pierce into body and search for capillaries

Housefly- lapping mouthparts
- Loss of mandibles and maxillary lacinia
- Labium modified into 'sponge'
- Partially digest food before sucking it in

Tsetse flies- another sucking mechanism
- No mandibles or maxillae
- Labium does piercing- sharp hooks at end
- Create pool of blood at wound to suck from