The insect's exoskeleton is made up of a series of plates. These plates make up the insect's exoskeleton. These plates are connected by joints or sutures that make the skeleton flexible.

The outer layer of the exoskeleton is called the cuticle. The cuticle has an outer waxy layer. The main component of the exoskeleton is chitin.

Purpose of the Exoskeleton

1. Supports the weight of the body.
2. Protects the body from minor injury.
3. Provides internal attachment point for the muscles.
4. Allows some chemicals to pass in or out of the body.
5. The waxy layer prevents desiccation (water loss).

Insects have 3 major body divisions:

- HEAD
- THORAX
- ABDOMEN
External Anatomy of Insects

Compound Eyes (C) - made up of many small lenses, called ommatidia. Purpose: detect movement, light intensity and color.

Simple Eyes (S) - “ocelli” Insects have 0-3 simple eyes. Purpose: detect light intensity.

Insect Head - Antennae
- Insects have one pair of antennae.
- May have the function of touch, smell, and in some cases, hearing.
- Used for navigation, food location, grasping (in some species)
- Used for detection of:
  - temperature
  - chemicals produced by plants or other foods
  - chemicals produced by other members of their species (pheromones)

Insect Head - Antennae
- Shape, number, and size of the segments are frequently used for identification.
- The overall appearance of the antennae are also used in identification.

- plumose
- lamellate
- serrate
- filiform
- geniculate
Insect Head - Mouthparts

• Variations in insect mouthparts are frequently used in the identification of insects.
• Mouthparts also tell us something about the food habits of the insect

**Chewing** type - "mandibles"

Examples - caterpillars, wasps, and grasshoppers

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**CHEWING MOUTHPARTS**

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**PIERCING-SUCKING MOUTHPARTS**

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Insect Head - Mouthparts

**Piercing-sucking** type - a proboscis that pierces tissue and sucks out fluids.

Examples:
- Aphids
- Mosquitoes
- Wheel bug

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**Sponging** type - consumes liquefied food (Ex - flies)

**Siphoning** type - consumes liquid food, such as flower nectar (Ex - butterflies)

**Chewing-lapping** type - Honey bees have "chewing mouthparts" but they form a “tongue” for lapping up liquid foods.
Insect Thorax

Size and shape of the legs and wings are important characteristics for identifying insects.

Insect Thorax

Contains the appendages for movement
- Insects have three pairs of legs
- Insects are the only invertebrates capable of active flight.
  They have 0-2 pairs of wings.
- Only adult insects have wings

Insect Leg

Insect Legs
Insect Flight

Snowy Tree Cricket

- Males rub parts of their wings ("scraper" and "file") together to make the chirp

Insect Abdomen

Contains most of the vital organs for:
- Digestion
- Circulation
- Excretion
- Reproduction

“Tymbals”

- Found on:
  - caterpillars
  - sawflies
- Not segmented like the true legs
- Not found on adult insects

Abdominal Appendages - Prolegs

- Segmented sensory organs on the end segment of abdomen.
- Most noticeable on
  - earwigs
  - cockroaches
  - crickets

Abdominal Appendages - Cerci
External Anatomy of Insects

Abdominal Appendages - **Ovipositor**
- Found only on female insects
- Used for laying eggs

Abdominal Appendages - **Stinger**
- A modified ovipositor
- Found only on females insects
- Used for defense or catching prey

**HONEY BEE STINGER**

Spiders, Mites, and Ticks
Spiders, mites, and ticks have **two** body divisions:
- **Cephalothorax** - fused head and thorax
- **Abdomen** - similar to that of insects

Spiders, Mites, and Ticks
Mouthparts - **chelicerae**

Insect Body Aspects
- **Dorsal**
- **Posterior**
- **Anterior**
- **Lateral**
- **Ventral**
QUESTIONS?