

DISSECTING COCKROACHES

BACKGROUND

Cockroaches belong to class *Insecta* (insects), which is a very diverse group of animals consisting of 4/5 of known species. Insects have adapted to life on land and it is possible to see several structures which enable living in dry environments. The surface of insects is covered with a hard **cuticula**, most insects can fly and they have efficient secretory and respiratory systems.

All insects have the same basic structures, which have differentiated in slightly different purposes in various insect orders. Most insects have three body parts and three pairs of appendages. The **appendages** (legs) may have been specialized for e.g. walking, digging or jumping. There is a lot of variation in **mouthparts** as well. In this task, you will dissect a cockroach with chewing mouthparts, which can grind the food into small pieces. Some insects may also have siphoning or sucking mouthparts. Different mouthparts have enabled using various sources of food.

In this task, you will dissect a cockroach. It's a representative example of an insects because you can find all the basic structures. You should find all the mentioned structures and take a look at the entrails as well.

ESTIMATED TIME

30-40 min

QUESTIONS BEFORE THE TASK

- Insects belong to the phylum *Arthropoda*. Do you know any other arthropods?
- Think an example of an insect with siphoning or sucking mouthparts.

EQUIPMENT

- forceps
- scissors
- pins
- petri dish with water
- microscope

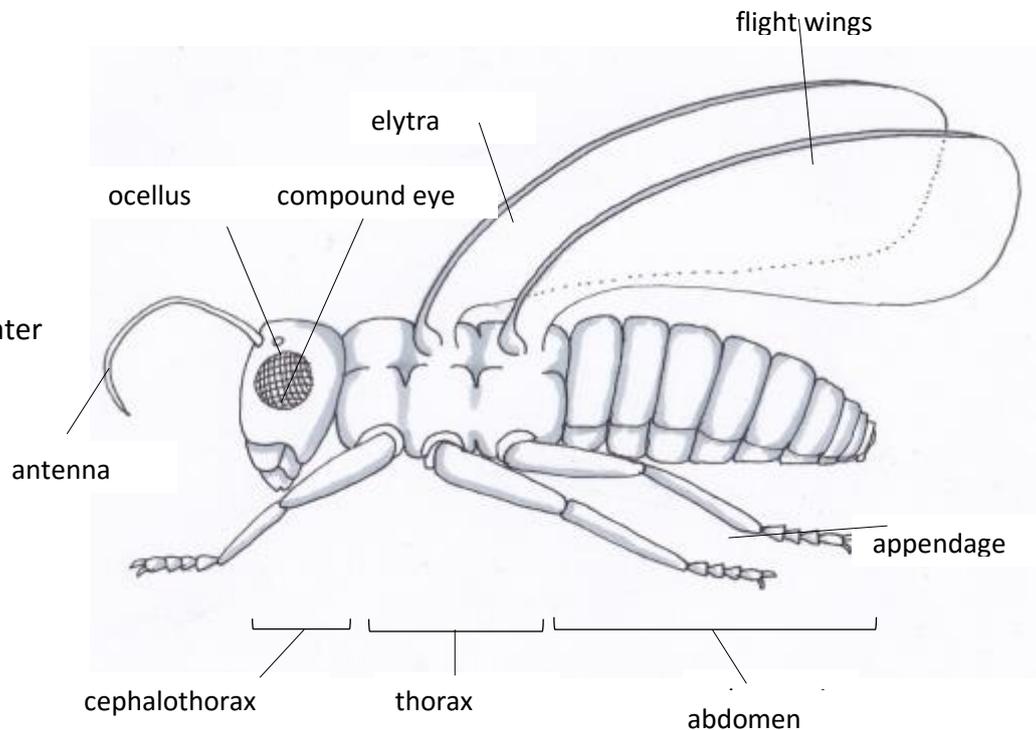


Image 1. The basic parts of an insect.

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1. Take a look at the external parts of the cockroach. Can you find the basic structures of an insect? Find the cephalothorax and thorax, which are clearly separated from each other. The cockroach has a hard exoskeleton consisting of different parts. In the **cephalothorax**, there are **antennae**, **compound eyes** and small **ocelli** close to the antennae. The compound eyes consist of small **ommatidia**, which can be seen through a microscope. In the end of the abdomen you can also find **cerci** (bristles). Turn the cockroach upside down to see the respiratory openings.
2. Take a look at the mouthparts of the cockroach with a microscope. On the external side, you can see two different pairs of jaws. The upper jaws (**mandibles**) are strong structures which cut and chew food. The lower jaws (**maxilla**) are thread-like structures which move the food towards the other mouthparts. You can try to separate the mouthparts with forceps and try to separate them under a microscope. You can also find a **hypopharynx** which salivates the chewed food. In addition, you can find an upper lip (**labrum**), and lower lip (**labium**) with labial palps.

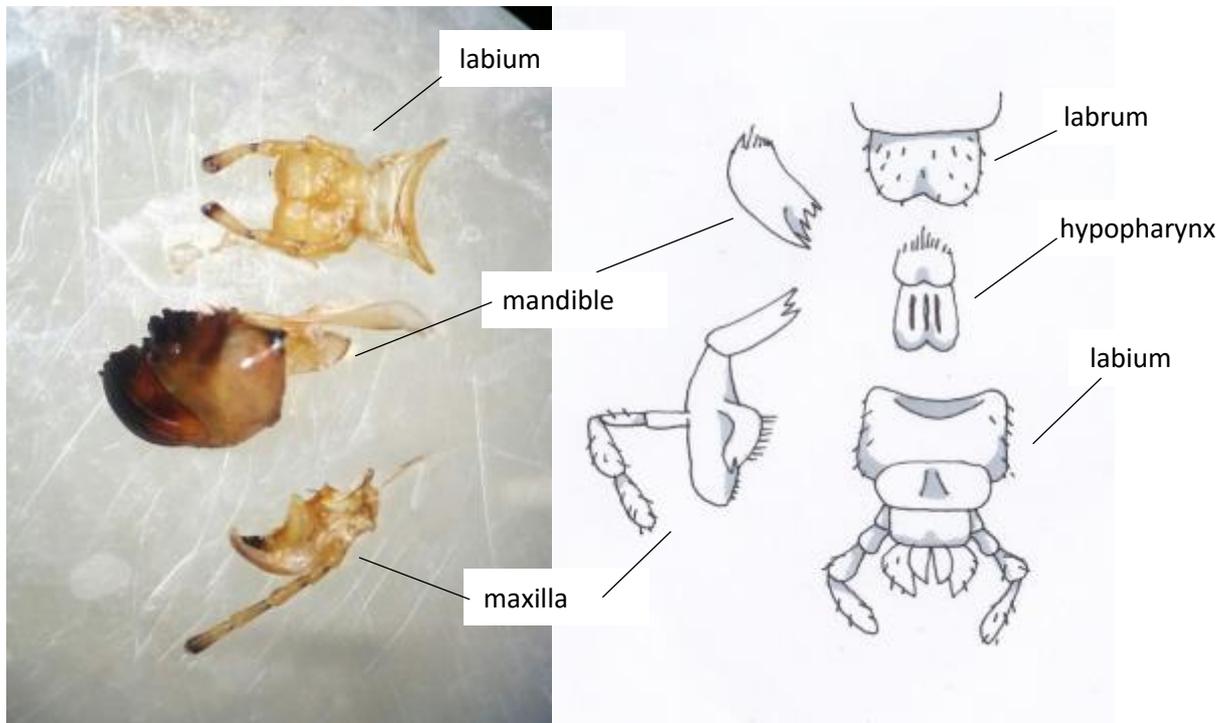


Image 2. The mouthparts of a cockroach.

3. After investigating the mouthparts, you can take a look at the thorax. There are three segments, each with a pair of appendages. The first segment of the thorax forms a bigger

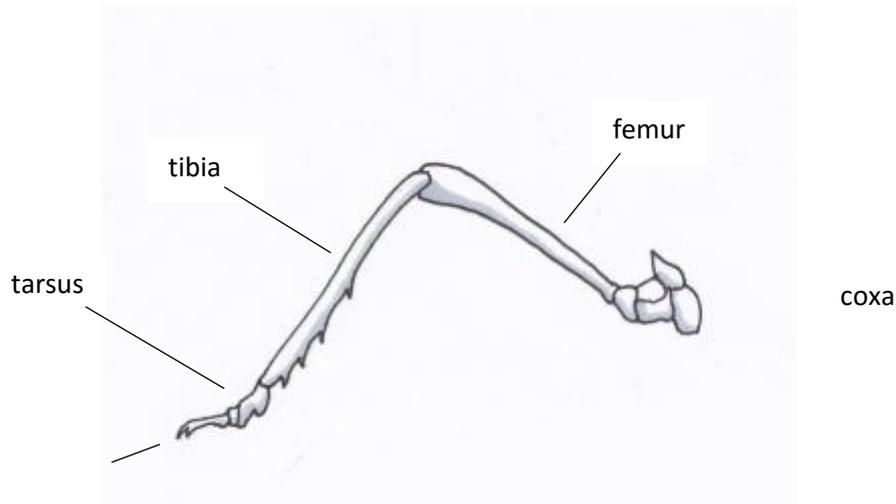


Image 3. The leg (appendage) of a cockroach

carapace (shell). The second segment contain elytra (covering wings) and the third segment contain flight wings. Insects have three pairs of appendages (legs). An appendage consists of hips (**coxa**), a **trochanter**, a thigh (**femur**), a shin (**tibia**), and an ankle (**tarsus**) with two claws.





4. Finally, take a look at the internal parts. Cut the cuticula on the dorsal side with scissors, following the edge of the carapace. At the same time, lift the carapace with your forceps. First, you can find a **bulge of fat** which serves as a storage of fat, and is an important part in the metabolism of toxins. On the surface of the fat bulge, you can see the **trachea** (silver lines). The silver colour is formed because the trachea contain air. The trachea are the respiratory organs which transfer oxygen to the internal organs and muscles. You may also find a tubular **heart**, which pumps blood when the surrounding muscles constrict. The blood flows into **coelom**, where it is mixed with interstitial fluid (an open circulatory system).
5. Remove the fat bulge by immersing it into water. Remove fat with forceps to reveal the **digestive tract**, consisting of an **intestine**, **salivary glands** and **salivary storages** (on the both sides of the digestive tract. You may also find the **genitals** (males: testicles; females: ovaries), but you can also identify the sex by the external parts: males have longer wings than females.

QUESTIONS AFTER THE TASK

- What prevents the insects from growing longer than 20 cm?
- What is the human equivalent to the fat bulge?
- What is the reason that there are so many species in Insecta?

