

# Beetle Facts



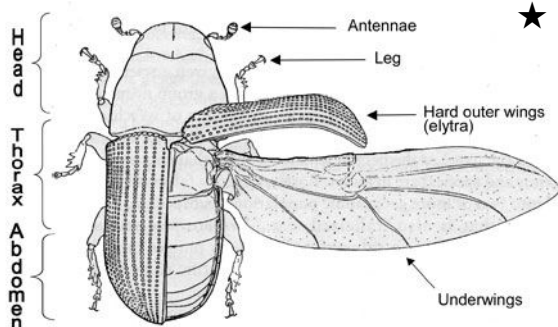
The largest group in the animal kingdom, beetles are small-sized insects of the order *Coleoptera*, which vary in color, shape, and size. With more than 350,000 species identified, from june bugs to weevils, fireflies to ladybugs, thousands of beetles have yet to be discovered.

## ETYMOLOGY

- ★ Aristotle noticed these insects' elytra (hardened shield-like forewings), so he named the order *Coleoptera*, from the Greek word *koleopteros*, derived from *koleos* meaning "sheath (cover)" and *pteron* meaning "wing."
- ★ The world beetle originated from the Old English word *bitela* which means "little biter", and *Ċeafor* or "chafer."

## ANATOMY

Beetle anatomy



- ★ Beetles usually have a hard exoskeleton and hard forewings (elytra) that cover the back part of their body and shield the second wings (alae). Their forewings are not used in flying, but can be raised just enough to move the back wings.



# Beetle Facts

- ★ Some lost their ability to fly, such as the ground beetles (*Carabidae*), snout beetles, and true weevils (*Curculionidae*).



Ground beetle



Snout beetle



True weevil

- ★ In some beetle families, the ability to fly and the forewings have been lost, such as the glowworms of the *Phengodidae* family, in which the females remain as larvae throughout their lives.
- ★ Bodies of beetles are divided into three main segments: head, thorax, and abdomen.



Female common glowworm



Whirligig beetle

- ★ **Head.** This is where the eyes, mouth, brain, and antennae are found. They have a compound sense of sight, and may display some unusual adaptability, such as the Whirligig beetles of the *Gyrinidae* family, in which their eyes are split to get a view above and below the waterline. Beetle antennae have sensory perception and can detect motion, odor, and chemical substances. Their mandibles are a pair of hard, tooth-like appendages, resembling large pincers on the front of most beetles.

- ★ **Thorax.** This serves as the powerhouse of the beetle's body, which is subdivided into three other segments. They have wings attached to their six legs, with some species trapping moisture under their wings, helping them survive hot temperatures. Others are able to live underwater because air is trapped under their forewings.
- ★ **Abdomen.** This segment houses organs for digestion and reproduction, protected by their tough exoskeleton and elytra, thus preventing beetles from drying out or getting saturated with water.
- ★ Instead of blood, beetles have hemolymph.



# Beetle Facts

## EVOLUTIONARY HISTORY AND CLASSIFICATION

- ★ Based on research, fossil records of beetles date to the Lower Permian period, about 265 million years ago.
- ★ Beetles have four extant (living) suborders: (1) *Polyphaga*, the largest suborder with more than 300,000 described species in at least 170 families, known for their cervical sclerites or hardened parts found on the head where muscles are attached, (2) *Adephaga*, having 10 families of predatory beetles with tubular testes and first abdominal sternums segmented by the hind coxae, (3) *Archostemata*, consisting of four families of wood-eating beetles, and (4) *Myxophaga*, having at least a hundred species, most of which are very small.



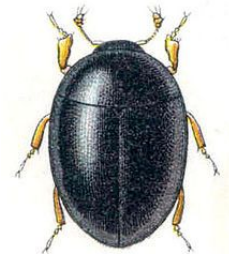
Rose chafer  
(*Polyphaga*)



Tiger beetle  
(*Adephaga*)



*Tenomerga mucida*  
(*Archostemata*)



*Sphaerius acaroides*  
(*Myxophaga*)

## ECOLOGY

- ★ Except in freezing polar regions, beetles are found everywhere - from trees to flowers, leaves, underground near roots, and even in freshwater and coastal habitats. They can also be spotted inside plants, even those decaying ones.
- ★ Some beetles have a highly specialized diet, such as the Colorado potato beetle (*Leptinotarsa decemlineata*) which feeds on plants of the potato family. Others are herbivores, while ground beetles (*Carabidae*) and rove beetles (*Staphylinidae*) are completely carnivorous and prey on earthworms and snails.



Colorado potato  
beetle



Scarab beetle



Carrion beetle

- ★ Most species feed on decaying organic matter, such as dung which is eaten by scarab beetles (*Scarabaeidae*), and dead animals consumed by carrion beetles (*Silphidae*). KIDSKONNECT.COM





# Beetle Facts



Diving beetle

- ★ Predaceous diving beetles (*Dytiscidae*) make use of a technique in which they retain air when diving. This beetle mechanism takes place between the abdomen and the forewings.
- ★ Most beetles produce squeaking sounds by rubbing body parts together or tapping on hard surfaces. These species have better hearing than those that do not make noises.

- ★ Both beetles and larvae employ simple camouflage to avoid being eaten by predators. Leaf beetles (*Chrysomelidae*), for example, blend in with their habitat on tree leaves. Species of longhorn beetles (*Cerambycidae*) have a similar appearance to wasps, thus protecting themselves from other animals.
- ★ Large ground beetles, on the contrary, attack by forcing their predators to look for an easier prey by using their mandibles. Other species, such as lady beetles and blister beetles, emit poisonous substances to make themselves unpleasant preys.



Leaf beetle



Longhorn beetle



Lady beetle



Blister beetle

## REPRODUCTION AND DEVELOPMENT

- ★ Beetles show complex behaviors when mating. They use their sense of smell to locate a prospect mate.
- ★ Conflict may happen during mating rituals, such as the rage between a group of male and female burying beetles (*Nicrophorus*) until one of each is left. Most beetles are aggressive in defending their territory from other males.



Mating burying beetles

- ★ In some species, pairing might take place for a long time. While this happens, sperm cells are transported to the female in order to fertilize the egg.
- ★ Parental care, ranging from laying eggs to feeding the young, varies among species.



# Beetle Facts

- ★ They are endopterygotes - a superorder of insects that undergo distinctive larval, pupal, and adult stages, or full metamorphosis.
- ★ Females lay tiny and brightly colored eggs, from a dozen to a thousand, and are arranged in clumps. Once these eggs hatch, the larvae, also known as a grub, serve as the most important feeding stage of the beetle's life cycle.
- ★ Blister beetle (*Meloidae*) undergo several transitory larvae stages known as hypermetamorphosis.
- ★ Various beetle species have different larval periods, and some can last as long as several years.

## IMPACT ON HUMANS

- ★ **Agricultural and household pests.** The Colorado potato beetles (*Leptinotarsa decemlineata*) are infamous pests of potato plants, destroying these crops, which can only be treated using expensive pesticides. The elm bark beetles (*Hylurgopinus rufipes*), elm leaf beetle (*Pyrrhalta luteola*), and *Scolytus multistriatus* (in the family *Scolytidae*) plague elm trees, carrying Dutch elm disease (the fungus *Ophiostoma ulmi*) as they transfer from infected areas to feed on elm trees that are in good condition. Wooden structures in older buildings in Great Britain are also infested by the death watch beetle (*Xestobium rufovillosum*).



Colorado potato beetle damage



Elm bark beetle



Elm leaf beetle



Death watch beetle

- ★ **Beneficial beetles.** Larvae of ladybugs (*Coccinellidae*) are often spotted consuming agricultural pests, such as aphids. Large ground beetles (*Carabidae*) act as predators of caterpillars and other pest insects. Dung beetles feed on animal droppings, thus recycling waste materials and accelerating the circulation of nutrients back in the food chain.

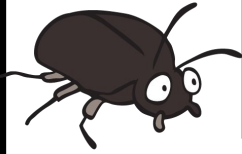


Dung beetle

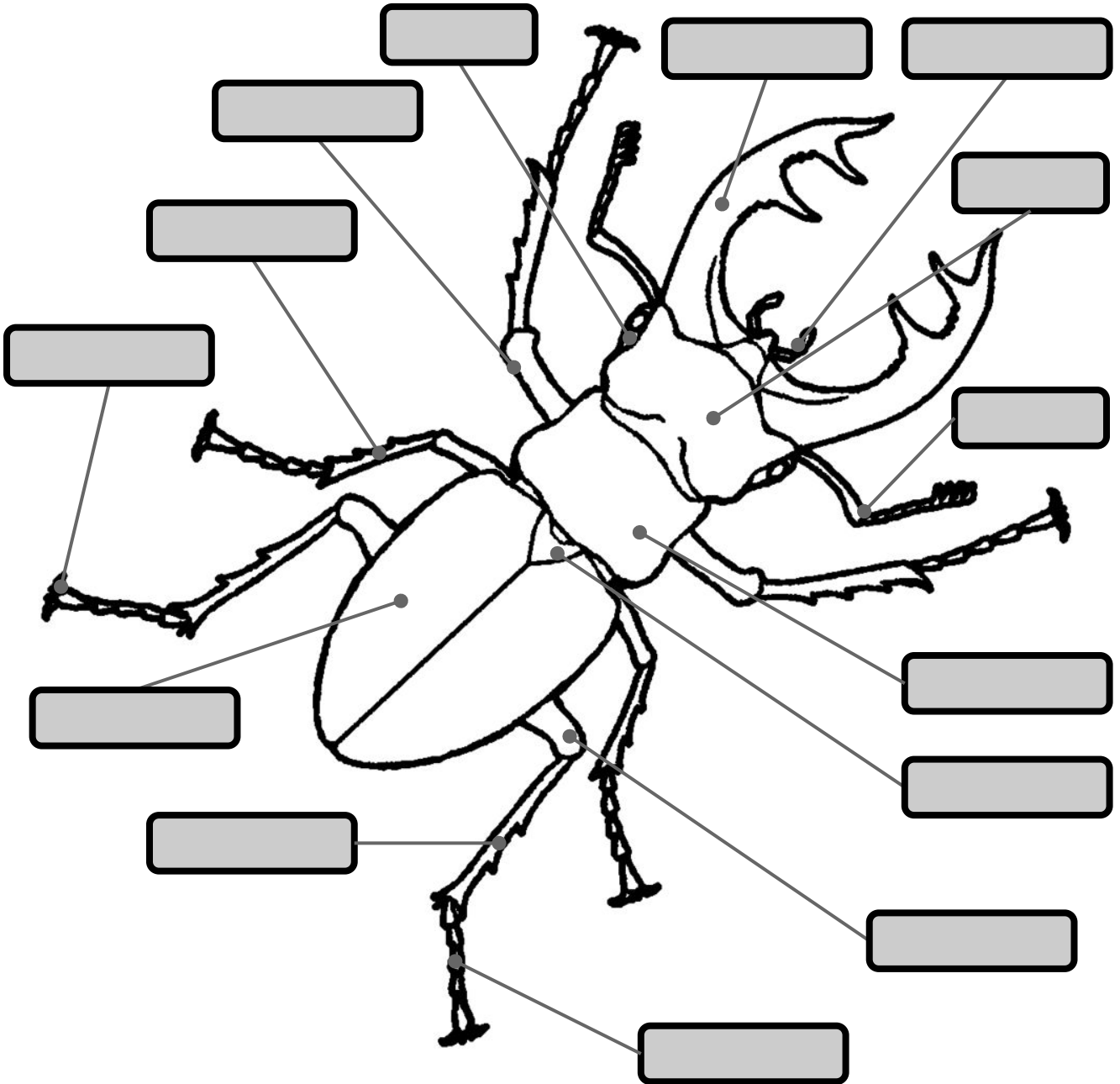


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# Stag's Anatomy

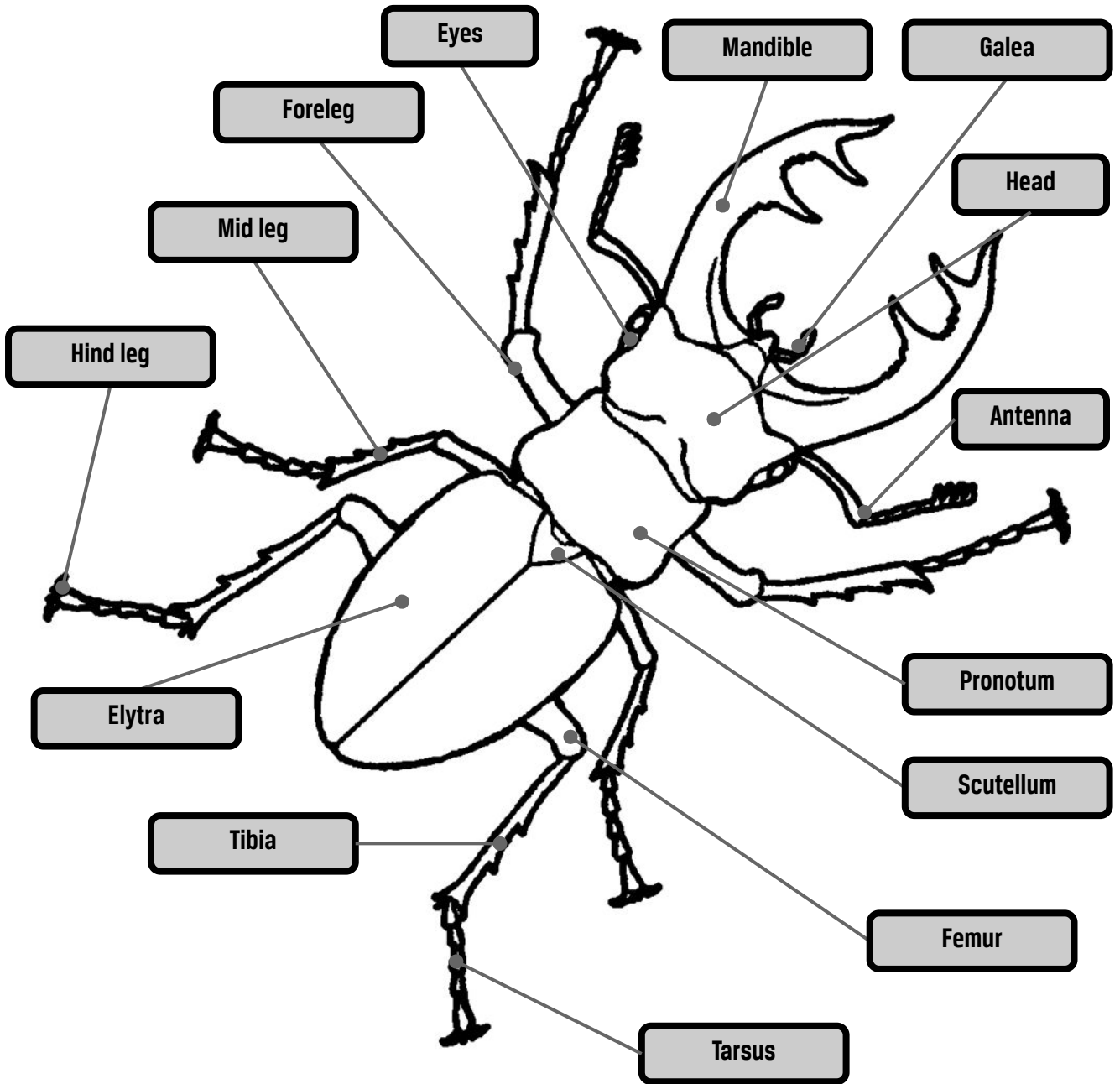
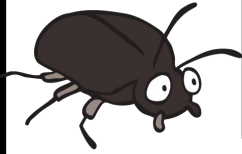


The stag beetle is Britain's largest land beetle, almost 8 cm in length and are easily recognizable because of their antler-shaped jaws. Label the parts of the stag beetle below.



# Stag's Anatomy

## ANSWER KEY



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