Gromphadorhina portentosa

Madagascar Hissing Cockroach

Other names: Hissing Cockroach, Hisser

Physical Description: The hissing cockroach has a typical insect tagmata, or compound body plan, which are the head, thorax and abdomen. The thorax has three pair of legs which have pads and hooks on their feet that allow them to climb smooth surfaces. Unlike many cockroach species, however, they do not possess wings. Their exoskeleton is dark, from mahogany brown to black, and is very thick, hard, and waxy. Both sexes have a pair of large bumps behind their head called pronatal humps, these structures are larger in males and much smaller in females. The Madagascar Hissing, Gromphadorhina portentosa, is one of the largest species of the cockroaches in the world; adults are 2-4” long, with males growing larger than females.

Diet in the Wild: Hissing cockroaches are opportunistic decomposers, feeding on ripened fruits and other plant matter that fall to the rain forest floor. This food provides much of the moisture required for the cockroach; however, they occasionally drink dew from surrounding plants.

Diet at the Zoo: Monkey biscuits, kale, sweet potatoes.

Habitat & Range: Hissing cockroaches live in the dry litter of the forest floor of tropical lowland rainforests. Range: the island of Madagascar.

Life Span: Up to 5 years in captivity.

Perils in the wild: Arachnids, ants, insects, tenrecs, lemurs, other mammals, reptiles, amphibians, and birds all may feed on hissing cockroaches.

Physical Adaptations:
- The Madagascar hissing cockroach’s hissing sound is created by the roach forcing air through the spiracles (breathing pores) on each side of its abdomen and thorax. The location of the spiracles is one of the reasons why roaches can live without a head for some time
- Roaches also have an open circulatory system (weak blood pressure), being cold-blooded they require minimal food, and bodily functions are not brain dependent, all summing up to a headless cockroach being functional for a few hours to a few weeks but will eventually die of thirst.
- Their feet have both adhesive pads and pre-tarsal claws to enable adhesion to a wide range of substrates
- Pliable exoskeleton allows cockroaches to take refuge in narrow crevices
Behavioral Adaptations:
- Nocturnal
- Live in colonies with a definite social hierarchy. Males establish and defend a territory on a rock or other similar structure for several months; leaving only for brief periods to obtain food and water.
- Alarm hiss is an anti-predatory strategy, producing a loud snake-like noise to startle potential predators.
- Males use their horns in aggressive encounters reminiscent of battles between horned or antlered mammals. Rivals ram one another with their horns or abdomens and hiss. Winning roaches hiss more than losers, so the sounds may be used to help determine a roach hierarchy.

Reproduction and Development:
- Male hissing cockroaches are attracted and stimulated by the odor of the female. The males have specialized sense organs on their antennae for this. The amount of sex attractant secreted is higher in virgin females, although the output can be sporadic, decreasing with age. When the male is attracted to the female, he begins to hiss and touch her antennae. The pair then attaches to one another and turns rear to rear and remain in this position for 30 minutes. The females carry the ootheca, a long yellowish egg case, internally and release the young nymphs after the eggs have hatched. Typically 15 - 40 cockroach nymphs will emerge.
- The Madagascar hissing cockroach is one of the rare ovoviviparous species of roaches. The eggs are incubated by the female in a special brood pouch within her body. They hatch from eggs within the female’s body as nymphs (giving the look of a live birth), which are quite similar to adults in general structure, but lack reproductive organs.
- Hissing cockroaches go through incomplete or gradual metamorphosis. Nymphs molt six times as they grow to adulthood, a process that takes 6-7 months.
- Males produce specific hissing sounds during courtship interactions. Two types of signals are used, a calling sound and a courtship sound. The calling sound is a long distance sound that is used to attract females while the courtship sound is used more during close range interaction.
- Adult male hissing cockroaches defend mating territories from other males, and attempt to monopolize mating with all the females in their territory. Any number of females and nymphs are allowed on the defended area, but only one male. When a male intrudes on a neighboring male’s territory, a fight will ensue. One male will attempt to push the other out of his territory. During the battle, a great deal of movement and hissing will occur; however, no harm is done to the loser.
- Cockroach mating can occur year around, but only when the climate is warm.

Additional Information:
- Plays a role in the rainforests of Madagascar by recycling a large amount of decaying plant and animal matter.
- The mite Androlaelaps schaeferi is a common parasite of this cockroach. These mites form small clumps at the base of the leg of their cockroach host. While it was originally thought that this mite was blood-sucking, recent studies showed that the mite simply "shares" the cockroach’s food.
- Like most cockroach species, hissing cockroaches are not pests and do not inhabit human dwellings.
- Each has its own characteristic sound; the cockroaches can distinguish between each other’s hisses.
- Dominant males show off by standing on their toes. This is called "stilting".
- A cockroach can move very fast, approximately 3 MPH. If it were human-size that would be 93MPH!
- A cockroach’s heart is not much more than a simple tube with valves, which can pump blood backwards and forwards in the insect. The heart can even stop moving without harm.

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- Roaches use their antennae as noses; sense of smell is so great that it can recognize family and friends by distinct odors.
- Roaches mouthparts move from side to side instead of up and down.
- Cockroaches are found on every continent, including Antarctica.
- The hiss is 90 decibels—equivalent to the sound made by a lawnmower or hair dryer!
- Hearing appendages are in the *tibiae* of roaches’ forelegs.

**Conservation Connection: Insects**
Although we may think of insects as pests, people would have a hard time if insects were to disappear. Many of them produce useful materials: honey and bees wax from bees, silk from silkworms and other products. More important, however, insects are necessary for the pollination of many vegetables, fruits, flowers and other plants.

Insects and higher plants have formed relationships which are to each other’s advantage. Insects exploit the flower for food, and flowers exploit the insect for pollination. Among these mutual adaptations are amazing devices of allurements, traps, special structures, precise timing and so on.

Many insects are predators of harmful insects, helping out gardeners and farmers. Dead animals may be quickly consumed by the larva stage of flies and beetles. In turn many insects also are a source of food for many species of birds, fish, amphibians, mammals and reptiles.

**Conservation Connection: Madagascar Hissing Cockroach**
Like 99 percent of all cockroach species, Madagascar hissing cockroaches are not pests and do not inhabit human dwellings. These insects live on forest floors, where they hide amidst leaf litter, logs, and other detritus. Cockroaches play an important ecological role. They are generalist feeders, capable of digesting a wide range of substances due to the variety of bacteria and protozoa in their digestive systems. They help decompose forest litter and animal fecal matter and are, in turn, food for many other animals.


**Conservation Status:** Least concern; IUCN

**Conservation Efforts:** N/A

**Glossary:** List of definitions of the most important recurrent technical terms used in the text.

tibiae – section of an insect leg

incomplete metamorphosis – some insects undergo gradual or incomplete metamorphosis where the stages are egg, nymph and adult. The insect grows by successive molts.

ovoviviparity. Adj. ovoviviparous – Reproduction where the eggs develop within the maternal body without outside nourishment and hatch within the parent or immediately after laying.

ootheca – An egg case.

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tagma (pl) tagmata – a compound body structure of an arthropod resulting from fusion of two or more segments; for example head, thorax and abdomen.

pronatal humps – humps or horns on the heads of some insects.

spiracle- External opening of a trachea in Arthropods.

Sources:
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