



ENTFACT-014

### MADAGASCAR HISSING COCKROACHES,

*Gromphadorhina portentosa*

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Illustrations by Bill Wallin

The Madagascar Hissing Cockroach is a large, wingless cockroach from Madagascar, an island off the coast of Africa. Little is known about its ecology, but this insect probably lives on the forest floor in rotten logs and feeds on fallen fruit. The Madagascar hissing cockroach is a fascinating insect because of its unusual ability to produce sound. However, its unusual appearance and elaborate behavior also contribute to its appeal.

The life cycle of the Madagascar hissing cockroach is long and differs some from most other cockroaches. Females are ovoviparous, that is, they give birth to live young. She carries the egg and neonate nymphs for approximately 60 days until they emerge as first instar nymphs. One female can produce as many as 30-60 nymphs. This insect has an incomplete life cycle: egg, nymphs and adult stage. The nymphs undergo 6 molts before reaching maturity in 7 months. The nymphs and adults are wingless and can live for 2 to 5 years.

There are striking differences between the sexes. Males possess large horns on the pronotum (behind the head), while females have only small 'bumps' (Fig 1 & 2). The presence or absence of the pronotal horns allows easy identification of the sexes. The antennae of males are hairy while the antennae of females are relatively smooth. Finally, the behavior of males and females also differ: only males are aggressive.

The aggressive encounters between males are quite impressive. Males ram into each other with their horns and/or they push each other with their abdomens. Larger males usually win. Hissing plays an important role during male-male interactions. Winners of encounters hiss more than losers. The hisses of males also contain information about the size of the male hissing and may be used to assess the opponents size. Males can also discriminate among the hisses of familiar males and strangers. These hisses are audible and can be heard by observers. Although this species is primarily nocturnal, you can see males fighting

during the day.

Males also hiss during courtship interactions with females. Again, their behavior is unusual for insects in that strength and sound are used. Mating occurs in an end-to-end position. To achieve this, the male pushes his abdomen under and along the females body until he engages the end of her abdomen.

Although hissing plays an important role in colony hierarchy and courtship interactions, it is the disturbance hisses that most people are familiar with. Both adult males, adult females, and older nymphs hiss when disturbed or handled. This hiss is very loud and easily heard. This is the only type of hiss produced by females and nymphs.

While many insects use sound, the Madagascar hissing cockroach has a unique way of producing its hisses. In this insect, sound is produced by forcibly expelling air through a pair of modified abdominal spiracles. Spiracles are breathing pores which are part of the respiratory system of insects. Because the spiracles are involved in respiration, this method of sound production is more typical of the respiratory sound made by the vertebrates. In contrast, most other insects produce sound by rubbing body parts (ex. crickets) or vibrating a membrane (ex. cicadas).

The Madagascar hissing cockroach, is an interesting insect because of its appearance, behavior, and mode of communication. This cockroach is easily maintained and reared which makes it an ideal organism to study in the classroom.

#### **Rearing Requirements**

1 -- A 5 to 10 gallon fish tank or other container which would allow a group of 5 or more roaches to have room to move around. Clear plastic or glass is best in that you can more readily observe their behaviors.

2 -- Lid for tank so they will not escape. Although

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wingless they are quite mobile and can climb the sides of the container.

3 -- Mouse bedding or wood shaving to line bottom of cage. The bedding should be changed periodically, especially if there is a high humidity level.

4 -- A wood block or log for them to crawl on, roaches are more apt to exhibit aggressive behavior if there is an object present in the cage.

5 -- A tube filled with water and plugged with cotton. The cockroaches will drink water from the cotton and push it back into the tube to keep it moist. **YOU SHOULD CHANGE THE WATER EVERY WEEK.** The tubes can be obtained from any scientific-type catalog.

6 -- FOOD --- dry dog food or mouse chow every week, supplement every couple of weeks with an apple or banana. They love rotten fruit so don't worry if it isn't fresh.

Gwen Pearson, a Texas entomologist, has reared 5 broods of hissing cockroaches using a KenL-Ration® Meaty Chunks and rat chow mix. Her roaches won't eat any other type of dog food. She says her roaches like apples and bananas, but don't like spinach or lettuce, although they will eat other greens. She uses a sponge in a petri dish as her water source.