

## THE FEARED, THE PEST, THE COCKROACH

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It is what you have always dreaded. A six-legged creature that has been around since the time that dinosaurs roamed the earth. Living in a squalid world of garbage, it runs from the daylight and emerges only at night. This creature looks like it is from deep in the jungle, or straight from a horror movie; but it could be in your own backyard, or even your home.

Cockroaches are undisputedly one of the most hated insects on earth. Imagine coming into the kitchen for a midnight snack.



You flip the light on and then you hear the unmistakable scurrying of a cockroach across the kitchen floor. To a cockroach your kitchen seems like a luxury hotel. Your kitchen contains what all animals need in order to

survive. Cockroaches find food (any crumbs left on the floor), air, water (from a leaky sink), space to live in, and shelter (a nice warm environment) in your kitchen. What more could a cockroach ask for? If you want to keep cockroaches out of your home, just eliminate some of the conditions, i.e. fix the sink or be careful about the crumbs.

Generally, cockroaches that are found in homes are either the oriental roach, the brown-banded cockroach, the German cockroach, or the American cockroach. Diseases are not commonly carried by cockroaches, however, several studies have shown that cockroaches can cause allergies and worsen asthma. Still, the number of cockroaches living indoors is not what you would expect. About one percent of cockroach species

are household pests. The other 99 percent live outdoors, mainly in tropical regions.

With over 4,000 species, cockroaches can be found almost everywhere. In fact, to escape from cockroach territory, you would have to live in the arctic. Even then you might not be safe; some cockroaches have penetrated the polar regions. No matter what you try, you are not going to be able to get away from them, so why not try living with them? I'm not asking you to start a colony of cockroaches in your home; I am trying to convince you to learn more about this insect before you decide whether or not you like them.

My view of cockroaches has been permanently shaped by an experience I had as a volunteer at the Metro Washington Park Insect Zoo. Volunteers handle a tropical species of cockroach, the Madagascar hissing cockroach, for the public. The first time I held this cockroach was during my orientation as an insect zoo volunteer.

I sat in the chair wondering what creature was going to emerge from the transportable plastic home. The curiosity overwhelmed me. The creature was taken from the transport case and set on my outstretched hands. The insect was long and shiny; its feet tickled my palm. Its body looked like polished wood with a deep brown coloration and the golden hue of honey. I lifted my hand to eye level. Two shiny black eyes peered back at me. Its mouth curved back and seemed to form a gentle smile. The cockroach began to move its antennae delicately along my palm; its touch was so light that I could not feel it.

Carefully I moved my finger down along its segmented back. I could feel the hard covering, the exoskeleton surrounding the insect. The hardness and the segments made it have the same smooth, rigid feel as a turtle shell. I could feel each segment dipping in gently, giving way to my finger for a moment, and then returning to its original position.

Suddenly and with an air of determination, the creature turned, exposing the legs which had, until then, remained unnoticed.

Each leg was glossy black and was covered by hair-like spines that resembled the thorns on thistles, but seemed remarkably harmless. Each foot had a round section that looked like an upside-down bowl and there were two hooks on either side of this. The hooks kept the cockroach from falling off my hand. Amazingly, and with much caution, I discovered that I could turn my hand palm-down without this creature having any difficulty staying put.

Truly this creature, this remarkable animal, could not be the same pest people complained about, it could not be the cockroach! There was nothing scary or disgusting about it. It was not dirty and it did not run from light. It was, indeed, a cockroach, but it was not what I had expected a cockroach to be.

At home among a rain forest of lemurs, chameleons, and geckos, the Madagascar hissing cockroach has to be careful that it does not become a meal. The Madagascar hissing cockroach, as its name suggests, is found in the jungles of Madagascar, the island off the east coast of Africa. Madagascar's life forms have evolved in isolation, independent of the rest of the world. As a result, about 80 percent of the island's plants and animals occur nowhere else on earth. Can we even begin to imagine the ecosystem that this cockroach is part of?

We can understand the Madagascar hissing cockroach's ecosystem on a simplified level. Each ecosystem is comprised of organisms. These organisms can be the same or different from those in other ecosystems. Each ecosystem has a unique combination of organisms, but needs the same jobs done. Every organism in an ecosystem has a niche, a special role or function that they play. The cockroach plays the role of a decomposer which is an essential part of any ecosystem. Living organisms are interdependent, they need each other in order to survive. Take a look:

Plants perform photosynthesis. This is the process of absorbing sunlight and transforming it into usable energy. A waste product of photosynthesis is oxygen. All organisms need oxygen for respiration. Consumers eat these, meeting their bodies'

energy requirements. Organisms that only eat plants are known as herbivores. Organisms which eat both plants and animals are omnivores.

Next, consumers feed upon consumers—this is known as a food chain. Organisms that only eat other animals are called carnivores. An example of a simple food chain is an insect that is eaten by a fish which is then eaten by a bear.

Consumers feed on other consumers until the uneaten predator dies. Decomposers, including cockroaches, feed upon leaf litter: leaves, twig, pieces of bark, as well as decaying plants and animals. They recycle water, nutrients, and energy back into the ecosystem. Doing this creates nutrient-rich soil that the plants use to repeat the cycle.

What is it about cockroaches that make them able to survive in such a variety of conditions? Cockroaches are able to adapt to (and many times thrive in) almost any environment due to their remarkable bodies. The human body is composed of eight body systems. Let's compare some of these systems with those of the cockroach:

### **nervous system**

All of our life activities are triggered by our nervous system, with the central controls in our brain. Our nervous system allows us to respond to stimuli. The stimuli can be reading a book (we have to assemble individual letters into meaningful words) or even sensing pain and moving away from what is causing it. Our nervous system performs a variety of tasks. Cockroaches are built completely differently than we are. While a large portion of our nervous system is contained in our heads, cockroaches have only a portion in their heads, most of it is spread throughout their bodies. Along each leg there are clumps of nervous system. That means that a cockroach without a head can still function! It will live until it starves to death or dies of thirst, which can take up to a week. This sounds strange, but think about how incredible it is.

Another remarkable difference between humans and

cockroaches is in their senses. Let's look at sight first. Humans only have one lens in each eye. Cockroaches, however, have compound eyes which means each eye is made of 2,000 lenses! With this many lenses, the cockroach is not able to focus on objects very well. Instead, cockroaches can see when an object is moving. Cockroaches also have a very good sense of touch. Their feet are so sensitive that cockroaches can detect when the ground vibrates less than one millionth of a millimeter. Similarly, cockroaches have two projections coming off their rear quarters called cerci which can detect air movements behind them. The cockroach's sharp senses are extremely useful since they can sense any predator trying to sneak up on them long before it arrives.

### **circulatory system**

A cockroach has blood, but it does not circulate through veins and arteries the way our blood does. Blood sloshes around inside the insect, but is moved by the heart. Digested food is moved throughout the body by the blood, which is usually green!

### **respiratory system**

All animals breathe through their mouths and noses, right? Not cockroaches. Along the side of a cockroach's body are tiny holes called spiracles. Oxygen enters the cockroach through these holes and follows the tiny breathing tubes called tracheae to all of the cockroach's body parts.

### **skeletal & integumentary systems**

Humans have skeletal systems which function to provide the structural support necessary to support their bodies. Cockroaches (and all insects) are invertebrates, they do not have backbones. Insects are surrounded by a hard covering called an exoskeleton. This shield serves as both a structural and protective armor.

Since cockroaches are covered with this hard exoskeleton, how do they grow? Snakes shed their skins and insects do too. A cockroach grows inside of its old exoskeleton until the normally flat creature looks puffed up and ready to explode. Then, along



its back, the exoskeleton splits and the cockroach can pull itself right out of the old crowded exoskeleton.

When it does this, it is completely white and noticeably bigger. After a few hours, the new exoskeleton has hardened and now has a slightly brownish tint. After several hours, the cockroach has completely hardened and become completely brown.

Based on this information, I hope you are able to come to terms with cockroaches. Even if you still dislike them, can't you at least admit that they are amazing animals and a necessary part of this world?

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