

All About Fireflies

by Zachary Velcoff

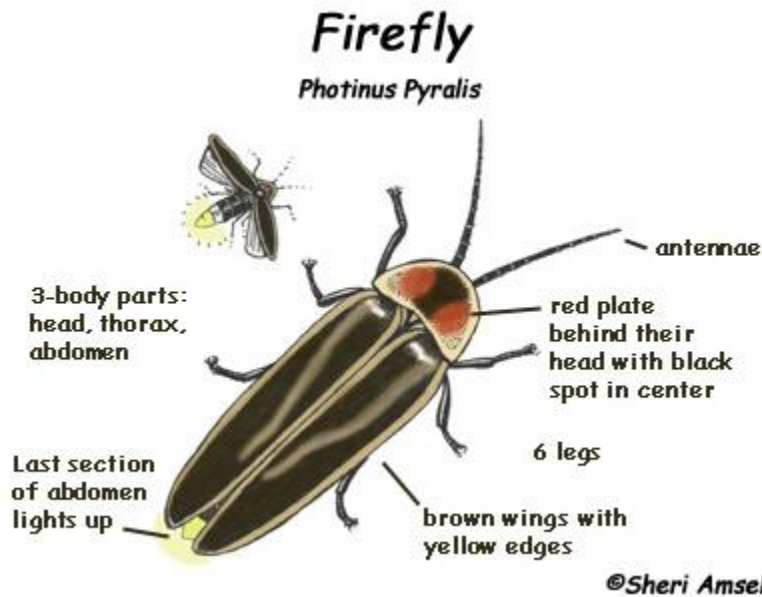


<http://www.firefly.org/images/pictures/firefly-pics2.jpg>

Why am I here?

Through the Interdisciplinary Studies program at Cornell University, I study storytelling and the **natural sciences** (living things and the ways they interact). In my talks and writing, I hope to present science as something active, interesting, and fun. Because I grew up in the Big Apple, **urban ecology** (the study of nature in city environments) is important to me. The firefly, the animal I'm going to talk about today, lives in both New York City and Ithaca.

What makes a firefly a firefly?



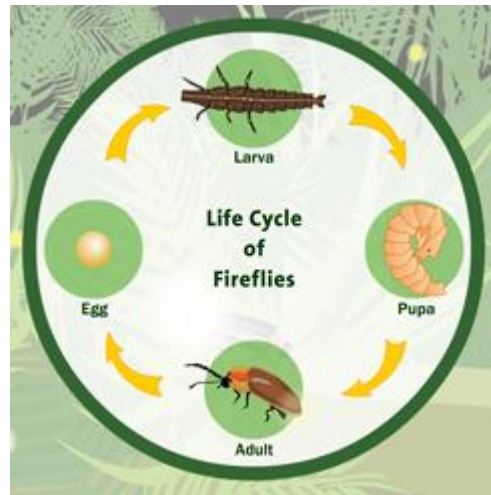
http://www.richardton-taylor.k12.nd.us/bianca.sperry/images/firefly_diagram.jpg

Fireflies are a kind of **insect**. All insects have three things in common: **three body segments (head, thorax, and abdomen)**, **six legs**, and a skeleton on the outside (an **exoskeleton**) made out of hard plates called **chitin**. The name firefly is tricky, because fireflies are actually a kind of **beetle**. Of all animals, insects are the most abundant; of all insects, beetles are the most abundant. You can find them everywhere except the poles, and you can tell them by their **elytra**. All beetles have two pairs of wings – a soft pair for flying, and a hard pair – the elytra – for protection.

Where do fireflies live?

Fireflies like tall grasses and standing water; they live everywhere it's wet and warm. There are 2000 different **species** of fireflies on Earth. A species is a type of living organism, whether plant or animal, fungus or bacteria. When it comes to fireflies, you can tell species (and sexes) apart by the patterns they flash.

How do fireflies live?



http://www.wetlandpark.com/images/wcms/exhibit_highlights_firefly_08en.jpg

Fireflies, like many other (holometabolous) bugs, go through four life stages. In summer, we see **adults** glowing and flying around. Depending on the species, some adults eat nectar or pollen, some eat other insects, and some even eat other species of firefly! Adult fireflies only live a few weeks – just long enough to mate and lay their **eggs** in the ground. During fall, firefly eggs remain underground. After a few weeks the eggs hatch into **larvae**. Firefly larvae live beneath the earth, hibernating through winter and spending early spring eating worms and the larvae of other bugs. In late spring, larvae turn into **pupae**, which hatch into adults in summer, continuing the cycle.

How do fireflies light up?

Animals that light up, like fireflies, are called **bioluminescent**. Fireflies bioluminesce with two different chemicals. These chemicals are called **luciferin** and **luciferase**, and they work like a lock and key. Luciferase unlocks luciferin, letting in **oxygen**. Oxygen then combines with luciferin to make light! Unlike a lightbulb, firefly light is **cold light** – the energy it produces is 100% light, 0% heat.

Why do fireflies light up?



<http://www.firefly.org/images/pictures/elkmont-synchronous-fireflies.jpg>

Fireflies light up to attract mates of the opposite sex. Males and females of different species flash unique patterns to let potential partners know they're available and interested in mating. But this kind of signaling can be dangerous...

What's the catch?

Lighting up is a great way to get yourself noticed by other animals who want to eat you. However, lighting up can also scare predators away. Fireflies are full of **lucibufagins**, toxic chemicals which sicken animals that make the mistake of ingesting them. For predators that have suffered this nasty reaction, just seeing a firefly light up is enough to convince them to try another food for dinner. Fireflies also use something called **reflex bleeding**, voluntarily leaking blood drops full of these smelly lucibufagins, in order to ward off predators. But what happens when the predator is another firefly?



http://25.media.tumblr.com/tumblr_ljbfo2yD8H1qeeqk5o1_500.jpg

Most of the time, male and female fireflies flash, meet, and mate. But sometimes, the male gets eaten! The female fireflies of one species, *Photuris*, mimic the flashing signals of females of another species, *Photinus*. The *Photinus* male approaches, thinking he's going to get to mate, but when he gets too close the *Photuris* female eats him! When it comes to firefly love, you never know what you're gonna get.

Are fireflies in trouble?

Recently, scientists have noticed that firefly numbers are declining. Human development and pesticide use can damage their habitats, and light pollution interferes with their mating signals. To prevent the threat to these fascinating creatures, Boston's Museum of Science has started **Firefly Watch**. At <https://www.mos.org/fireflywatch/>, you can register as a **citizen scientist**, helping track firefly populations by observing these insects in your own backyard.

Where can you learn more?

- ⤴ <http://animals.nationalgeographic.com/animals/bugs/firefly/>
- ⤴ <http://www.firefly.org/>
- ⤴ *Creatures of Light* at the American Natural History Museum (through Jan 6, 2013)