

This time of year...as the sun goes down and the landscape darkens, little lights begin flashing. To every child's delight, the blinking begins.

Fireflies. Lightningbugs. Actually, they are neither true flies or true bugs...but beetles.

Perhaps the second most popular beetle, behind the round ladybug beetles, fireflies capture the imagination of children. They blink-and-rise and blink-and-rise, from just a few inches above the ground to maybe two or three feet up. Just the right height to fascinate a child.

Notice how they always seem to be flying upward when they light up? If they continued on that path, they would soon be high in the sky. But they never are. They fly a roller-coaster route, turning their lights on uphill...turning them off going downhill.

These flying fireflies are males. This flashing is their attempt to get a date. The females...well they hang out in the shrubs and bushes. They will flash back when they are ready to mate.

To our human eyes, there is not much difference in the blinking. Some species flash more yellow. Others more green. But insect eyes detect flash patterns we do not see. What we see as one flash could be two rapid short flashes for one species, or another different Morse code for another species. Those differences in blinking keep firefly species apart. So there are well over a hundred different firefly species in the United States. Nearly 2000 species worldwide.

That is a lot of blinking differences. Some tropical species even get together and blink together in synchrony, just like our Christmas tree lights.

But not all is peaceful on a pleasant summer's night. There is one female firefly in the genus *Photuris* –she is a “femme fatale.”

When she wants to mate, she can blink her own correct signal. But when she is hungry, she can mimic other firefly blinking as well. Males of those other species begin flying at dusk, trying to attract a mate: blink, blink. And the female *Photuris* mimics their signal perfectly: blink, blink. Lured into the bushes for romance, the male firefly realizes only too late that it is a dinner date and he is the dinner.

The light of fireflies at night “is really cool.”

I really mean that...cold, not hot. Unlike our incandescent light bulbs that spend more energy putting out heat than light, fireflies produce a highly efficient light with a narrow range of wavelengths between yellow and green. No infrared heat. No U-V radiation.

They perform this from chemistry in the “photocytes” or “light cells” in their tails. Bacteria and fungi and some sea creatures have also invented this “bioluminescence” or living light.

In recent years, we have learned to synthesize this light too, in the glow sticks kid's use at during Halloween.

Fireflies make their light by combining the chemical luciferin with its enzyme in the presence of oxygen and an energy storage molecule. A firefly controls the timing in its tail. But if your car windshield hits a firefly, these all of these chemicals come together in one big flash.

Fireflies are fun. But they offer scientific applications as well. The chemical agents in these bugs could be used to detect life on other planets...and the presence of biological weapons. But that's a story for another day.

Both children and scientists share in imagination this connection between our nighttime fireflies and the stars up above.

Fireflies are not fast fliers. So most children can trap a few, if given an empty pickle jar, and take them to their bedroom. And after we have tucked them in and turned the lights out and left, will they play videogames under the blanket again, or watch the blinking in the firefly jar?

I am betting on the fireflies.