



SUMMER LIGHTNING

By Eric Dinerstein

There's one, then another, then a hundred or more. The fireflies flashing their warm green glow as they swarm under the crown of a giant black walnut tree are a sight to behold. A civilization of flying beacons, each emitting tiny tail lights to track their movements, reminding us of nature's spectacle, visible from our own backyards. The flashing glow of these flying insects must trigger many a young imagination: What causes them to light up? What are they saying to each other, or to me? Who eats them? Do they make good pets?

I wasn't so interested in decoding firefly communication or exploring how they turned on the lights; like most young boys, I was simply keen to catch them in my jar, often forgetting to release them before they expired. I didn't realize what a marvelous example of evolution fireflies represented: creatures capable of "bioluminescence"—creating light through chemicals they produce in their own body—the ultimate party trick, better than walking on the ceiling. (Imagine if back in the days of disco, John Travolta could flash in colors while he gyrated—that's what fireflies do). Fireflies contain the aptly named enzyme luciferase that catalyzes a compound, luciferin, that in the presence of oxygen, emits a green light. Common eastern fireflies (*Photinus pyralis*), or what we used to call back in New Jersey lightning bugs, were a revelation to me, a natural sign that the long days of summer were finally upon us.

Those creatures that light up summer evenings-- fireflies, lightning bugs, or, as they are sometimes called, glow worms — are neither flies (order Diptera), nor true bugs (order Homoptera), nor anything like a worm, but beetles. If you look closely at lightning bugs when they land on your arm to rest for a moment, you can see the pair of wing covers folding over the wings when at rest.

These covers, or elytra, are but one feature that make beetles different from true bugs (which lack elytra), or flies (which have tiny feelers, called halteres, that stick out from their bodies like bicycle kickstands). Lightning bugs belong to the beetle family Lampyridae, which holds more than 2,000 species.

They are distinguished by their relatively soft bodies (compare them to the body-armor exoskeleton of a scarab or dung beetle) and, of course, their light-emitting talent. The ability to give off light may have originated as a warning signal to larval predators that this creature was distasteful.

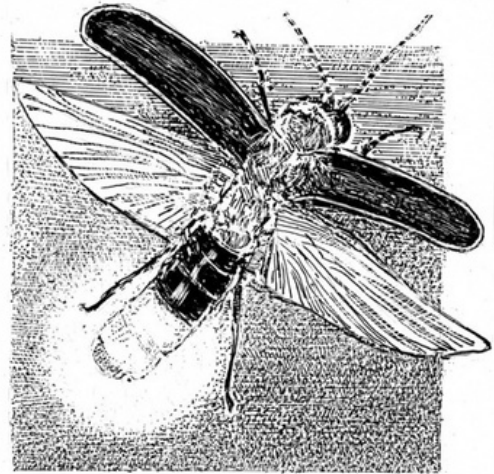


Illustration by Trudy Nicholson

While the origins of bioluminescence in fireflies may have been to ward off creatures that could ingest them, the phenomenon of lighting up one's body shifted to advertise reproductive status. How does this new feature enhance the ability of the organism to leave more offspring that reach reproductive age? Each species seems to have its own distinct lightning bug language able to help individuals detect and find each other in the dark. But the lightning bug story gets darker: the females of some species of fireflies, which can be flightless, emit light so as to attract males. But instead of procreating with their insect suitors, the hungry females lure in the naïve males and eat them. Diabolical — maybe that's why they call it luciferin.

As Lampyrids and their cousins, the Elaterids, or click beetles, are global in distribution, glorious displays of fireflies can be found in many regions. There are even firefly reserves, such as in the mangrove swamps of Bangladesh, called the Sundarbans (which has the highest incidences of tigers taking humans, so be watchful, lightning bug eco-tourist). One of my favorite Elaterids is a tropical species that not only makes an audible click when handled, but also has two bright green "headlights" that make it visible on a dark night in the rainforest. Among biologists in Costa Rica, these charmers became lovingly known as Volkswagen beetles for their green high beams.

As awe-inspiring as they are, the phenomenon of giant aggregations of fireflies may become a thing of the past. Biologists have warned of an insect Armageddon — a massive die-off of insects now underway. Even though people are familiar with the phrase “the sixth great extinction of life on Earth” — an era we are currently living in — they may not realize that the loss of insect species and populations is a major component. If the numbers of insects keep declining, our crop production and our own species may not be far behind, since we depend on healthy plant and animal ecosystems for survival.

What can we do to help lightning bugs and their kind? The first thing I mentioned in last month’s column on the Prometheus moth was to turn off lights at night when you can. Bright lights are thought to interfere with the adults when they fly in twilight. Fireflies breed for only a short period of the year. Leave the lights off or put them on motion-sensors, and let fireflies breed in peace. Stop using pesticide and herbicides in your yard. You can’t have it both ways — a heavy application of toxic chemicals AND the firefly light show.

Another critical action is to preserve more insect habitat—habitat that is, in essence, wildlife habitat. What’s good for lynx and lemur is good for the lightning bug.

In another register, it all goes back to our first brushes with the wonders of the natural world. If the evening glow of fireflies does not reawaken in us our intrinsic connections to nature, if those vital ties to life on Earth are severed, our lives and our presence on Earth are much diminished. A world without fireflies is an impoverished biosphere filled with summer nights of total darkness.