# Fireflyer Companion & Letter

*Vol. 1, Number 1 Winter 1993-94*

# Where are the Lightningbugs?

Fireflyer. firefly + er. *n.* short for *firefly chaser.* A person who thinks about lightningbugs.

Last fall the *The Wall Street Journal* (2 Sep 93) ran a front page article expressing concern that fireflies may be disappearing. Several activities of humans were mentioned as possibly being connected. I suspect that many of the species that I used to see and census here in Alachua County may no longer be present. There is reason for attention if not concern. In the past decade herpetologists have noted an apparent world-wide decrease in the number of frogs, and even held a conference to discuss it. Among questions for us to ask: is the absence of fireflies apparent or real?, is it local or general?, is it a natural phenomenon that could have serious consequences, given the humanization of the firefly world?, are there hard data available, or can we get some and how?, if fireflies are actually on the decline can we do anything about it?, and, is there something we can be doing before we know for sure? I have gotten several letters and phone calls asking about this, and have made this the opportunity to start a firefly-letter a little earlier than I had planned. I can pass along some of my thoughts and perhaps get readers to do some thinking and looking too. A line from a recent letter is a start and a title…

*Dark summer.*

## What can I do to help?

Alysse & Daniel
Leesburg FL

Dear Alysse and Dan,

Yours is a good, and embarrassing question. I should have been thinking on it a long time ago. First I'll warm up to it with some preliminary cogitations, that I will do here, out loud. Maybe these will give you some ideas and you will send them in. We need observations, ideas, and direction.

Lightningbugs play a special role in childhood and its memories. They are a part of the personal Currier and Ives Days of millions of Americans. They are as popular as dinosaurs, without benefit of Hollywood animations and hype. They linger in fond recollections, in vivid images of chasing them over the lawn just before bedtime when deepening shadows grew menacingly at lawn edges. Strangers have told me of their personal experiences with Mason and mayonnaise jars and flashes on their bedstands.

I am asked, by writers, reporters, teachers, and mothers, with an answer in the affirmative being expected, whether the fireflies have been poisoned by pesticides. When I say that there is no direct information available on the matter, I sometimes get the feeling that my answer may be suspect because of my known connection with Entomology.

There are a number of reasons why we may not be seeing fireflies so often nowadays. Ever more of us live in urbanized areas where there are fewer undisturbed grasslands and creek sides; where there are more streetlights, where more twilights are unseen while we watch TV-news, and seldom if at all do we sit on the porch reading the newspaper by fading skylight and watching playing children; and where there are fewer safe parks and known neighbors.

Even suburbs have had their soils shoved around, mixed, and structurally damaged, and made less hospitable for earthworms and other firefly prey. And yes, where there might have once occurred fireflies, more herbicides and pesticides have been used to encourage sterile monocultures of socially approved vegetation. I have noted to questioners that it is reasonable to expect that contaminants from various sources, in the water, air, and soil that are known to kill other things, certainly kill fireflies and their prey too.

And, how can one estimate the acreage and diversity of habitats that have been built upon, paved over, and put into agriculture production. It runs into the millions. Remember, Thomas Barbour expressed his concern over Florida and a Vanishing Eden decades before the booms since World War II.

Consider too, there is more stray light from street- and yard-lights, and city-light reflections from clouds, that shine in little eyes. These are pollution to lightningbugs trying to find mates with wee little bioluminescent lanterns in their tails!

Another way that human population growth and "progress" has mal-affected fireflies, at distances even greater than the reach of sky-light, has to do with available ground water. The level of water-tables has dropped in many areas because of the amount of water that is pumped from wells. Lowered tables mean loss of habitats—marshes and wet areas around ponds and streams, the last themselves dependent on water reaching the surface, naturally.

There is also a focused attack on fireflies. Tens of millions of them have been collected over the years for the light-emitting chemicals that they have in

***Continued on page 2, see Save***

*Save, continued from page 1*

their tails, especially the emission-facilitating enzymes generically known as luciferase. These chemicals are used in basic research, for illuminating points of activity on chromosomes and potentially for looking for life in Space, in medical and agricultural research, and for disease diagnosis.

Of course, the collectors probably mostly net common, widely-occurring and likely "renewable" grassland species, such as the Big Dipper Firefly *(Photinus pyralis)* and various common *Photuris* species [see sl article]. But, undoubtedly rare and uncommon species are taken, local populations certainly have been eradicated, and rare and new (emerging) species have been wiped out. Mass collectors, children and adults alike will not discriminate rare species, and pecuniary fixation will displace other and abstract concerns.

A newspaper story a couple of years ago quoted a firefly-tail-collecting mother who said something to the effect that every time she saw a firefly's flash she saw a penny. In contrast, another mother sent me a poem that her mother had written about fireflies for her daughter. (When I find these two filed references I will give more detail.)

The foregoing introduction warms us up to addressing the key questions. It reminds us that lifestyles have changed, says that there are reasons to be suspicious that fireflies are at risk, and that their enemies "is us."

Now, what data would it take to satisfy skeptics and fence-sitters? Where could we find the evidence that is needed? Can we only now begin to gather it? Are there no old records that will give tentative but better answers than the circumstantial notions that I started with?

**Museum Answers**

Insect collections in museums and the people who care for them are not the anachronisms that many people (including some politicians and university administrators) think. They are the archives, the repositories of stored information of conditions, ecologies, places, and summers past. Were atmospheric poisons killing off our insects A) years ago? - look inside the carcasses of faded and brittle museum firefly specimens. Are tests for pesticide residues *only* positive for specimens collected **after** the pesticide was used? Test specimens that were deposited long ago, with their carefully prepared labels. Were insect inhabitants of pure water only, present in the Potomac, Shenandoah, and Susquehanna 50, 80, 110 years ago? Look at specimens that were collected on these rivers back then, for there are specimens in collections from that long ago.

Insect collections also used to routinely "archive" old men with squinting, lens-assisted eyes, smelly clothes, and bow ties (long an outdated curiosity, but bows didn't drape into trays and break specimens), that took the welfare of their well-curated charges very seriously, and that worked overtime for life, for nothing, for love. They were the unsung treasures of research museums, but they too are nearly extinct and few are being cultivated today.

I know an elderly insect taxonomist who has even spent most of his home life bent over his personal microscope studying *his* flies. In World War II he was a medical entomologist in the tropical Pacific with the U.S. Army. His wife has said that when he dies she will have him stuffed (curated by a taxidermist) sitting there at his scope, and then she can always see him and not notice any difference.

Such insect taxonomists know and respect the past, labor long, personally and intently in the present, and prepare for a future they won't see but hope will be there, by maintaining and improving collections, and helping anyone who comes along that shows an interest. Sometimes age and destroyed collecting sites make them become cynical, and as sour as they sometime smell. More and more they must feel as though they will become (objective) paleontologists - considering that the instant an insect becomes extinct in nature, specimens of it in museums become fossils, and perhaps should be placed with those in amber and rocks? … But, perhaps I digress?

Thus, one source of information on our firefly question is in these museum archives: on the labels and in bodies of the insects, and in the letters and papers of the solitary curators. What specifically is in such records depends upon the individual taxonomists who observed and collected Specimens, who exchanged information, wrote insect labels, and especially those who focused their attention on their own personal favorite group of insects, and how much time and effort have been put into proper curating since the collectors had to leave them in a museum's care. (I remember once seeing insect cabinets filled with Parliament cigarette boxes containing crane fly specimens, the love-labor of a deceased dipterist (student of flies). I suspect they are still waiting for someone to pick up where death took this enthusiast from his adventure.)

First among the firefly records that are

***Continued on page 5, see Save***

## Twinkle Twinkle

Half Moon on the horizon
seen through green colored glasses
It is time for her to hunt
earthbound stars by their flashes.

Constellations like Big Dipper
seemingly simple; really complex.
Shining toward earth,
they're searching for sex.

Cryptic signals are given
from ground toward heaven and back.
Timing is everything,
for the codes she must crack.

He flashes for answers to
Who? What? and Why?
She gives patterns of deceit;
just a twinkle in his eye.

Closer (flicker),
closer (flash), closer still.
This siren's light beckons him
against his will.

He throws caution to the wind
and approaches too fast.
The conflict is over,
he's now her repast. [tf]

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What was the first scientific name used for a firefly? Taxonomic literature now in use indicates that Linnaeus first named fireflies in his *Systema Naturae,* 12th Edition (1767). Among them was what is now *Photinus pyralis.* Even he overlooked his first names. In his 10th Edition (1758), he named several fireflies, including *pyralis,* in the soldier beetle genus *Cantharis.* Because Zoological Nomenclature officially starts with the 10th Edition, *Cantharis pyralis, Cantharis* (now *Lampris) noctiluca, Cantharis* (now *Luciola*) *lusitanica* and a few others, were the first now-officially named species. An earlier non-acceptable name used by Waller in 1685 was *Cicindella volans* —the generic name now being used for tiger beetles. Waller's *volans* was Linnaeus' *Cantharis* — and then *Lampyris noctiluca.* Based on this information answer this question: "What nomenclatural change must be now made to the scientific name of the European glowworm *L. noctiluca* Linnaeus?" Why? [jl&lb]


## Fireflyer Companion

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# Fireflies at Risk

**When was the last time you saw a firefly?** The last time we saw these flashing beetles, many of us were probably children. We all remember the fascination we felt as we watched these tiny cordless lights on wings. We ran around the fields in a frenzy trying to capture as many as we could, collecting them in jars for later examination. After a night or two on a bedside table, the captives would be set free. Despite a few casualties, our childhood fireflies returned year after year to continue their dazzling displays.

**Where have all the fireflies gone?** There has been a lot of concern recently about an apparent decline in the number of fireflies. Despite lack of long-term ecological studies documenting population trends for any single firefly species, there is widespread perception that firefly numbers may be decreasing. There are several possible reasons for decline in firefly numbers, including habitat destruction, pesticide use, and collecting pressure. Several aspects of firefly biology may make them particularly susceptible to habitat desctruction, including the fact that most species of firefly are quite habiLat-specific. Particular species arc associated with specific habitats such as wetlands, forests, and old fields. As these habitats recede in the face of suburban development, appropriate firefly habitat is reduced. Many firefly species are also extremely site-specific, flashing and mating in the same locality over many years. For example, we have been studying the reproductive ecology of a population of *Photinus marginellus* fireflies in eastern Massachusetts for the past Mine years. Each year, the local breeding population of this species is restricted to a small grove of cherry trees, and their complete life cycle appears to be carried out underneath these trees. *Photinus* species devote most of their adult lives searching for mates, and both males and females mate repeatedly over their 1-2 week lifespan (adultspan). Between mating, adult females lay their eggs at the bases of grasses. Photinus larvae are subterranean, and probably do not travel far afield during the two years they spend below the soil surface feeding on earthworms and possibly other softbodied invertebrates. In the spring, the larvae pupate near the surface and emerge as adults about two weeks later, possibly within a few meters of where they were first deposited as eggs. Since adult *Photinus* fireflies are not strong fliers, adult dispersal distances are probably limited. These aspects of *Photinus* firefly biology indicate that once a breeding population is disturbed, relocation ("migration'~ to nearby undisturbed sites of similar habitat-form may be unlikely.

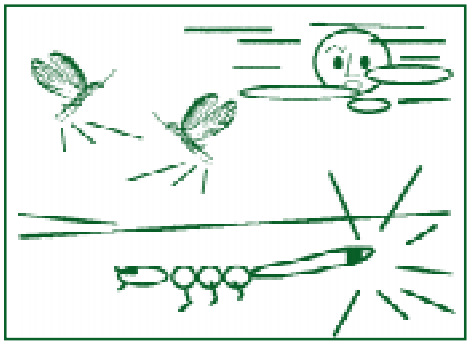
**Firefly Hunting.** Another potential cause of declining firefly populations is that fireflies are still being mass-harvested from wild populations. For about 30 years, Sigma Chemical Company of St. Louis, Missouri, has been harvesting live fireflies as a source of luciferase. Luciferasc, an enzyme produced by fireflies and other luminescent creatures, is widely used to assay ATP (adenosine triphosphate) levels in cells. Sigma Chemical sponsors an organization called the Sigma Firefly Scientists Club, which pays amateur collectors a penny for each firefly captured from the wild, regardless of species. After processing, Sigma sells these beetles as Desiccate Whole Fireflies ($12.80 per gram), or as one of several processed firefly products, such as Luciferasc Powder ($41.84 per milligram).

Several millions of fireflies have been collected for Sigma from the Midwest and eastern United States over the years, although Sigma will not give an exact number. One proud collector, described as the "Lightning Bug Lady" of Vinton, Iowa in a recent article in the Wall Street Journal, catches and sells as many as a **million** fireflies to Sigma each year. Firefly collectors generally catch anything that flashes in the night, and Sigma indiscriminately processes all fireflies, without distinguishing common or rare species. While mass-harvesting may not be a problem for some of the more common firefly species, this level of harvesting sustained over a few years may easily wipe out Populations of many less common firefly species. Thus, amateur collectors sponsored by Sigma may inadvertently be driving breeding populations of many firefly species to local extinction.

**Hope for Fireflies.** There is hope for fireflies, however, because luciferase harvesting from wild fireflies is no longer necessary. Several years ago scientists cloned the gene for firefly luciferase, and recombinant firefly luciferase (produced by bacteria in the lab) is now commercially available. This recombinant luciferase provides a purer form of the enzyme for research purposes, eliminating the need to collect and process huge numbers of wild fireflies to obtain this enzyme.

We can preserve the magic of summer nights filled with flying beacons of light. People who care about keeping fireflies around should let Sigma and others know that the unnecessary harvesting of these beetles should be stopped. You can write to: Mr. Tom Cori, Chief Executive Officer, Sigma-Aldnich Corporastion, 3050 Spruce St., St. Louis, Missouri 63103, or call Sigma technical service at 1-800-325-5832. Let them know that you think they should stop harvesting live fireflies. Let's keep fireflies in the air, flying and flashing.

[Jeff Monchamp and sl]



Because the kids glow for no obvious reason humans think we must not light up for sex!

**Twice when I was growing up I came across an unusual sort of lightningbug. They had green flashing lights, prominent eyes, and fat hairy bodies. They looked like bees with flashing lights on the ends of their abdomens. Do you know of any such lightning bug?**

**Joseph,**
**Pittsburgh, PA**

Dear Joseph,

I am stumped. I have never seen nor heard of such a one. A fuzzy beetle, to say nothing of it having a light too, would be a special treat. Next time I am near the sw Penn border I shall keep my eyes open! [jl]

# Other Fires — Other Flies

## The Luminescence of Fireflies — Not

## I. Introducing Phengodid Glowworms

Millions of insects live in darkness. They lurk beneath bark and fallen leaves, underground and under refrigerators. In large part they do so to avoid reflecting light and being seen. The American cockroach is a too-familiar example. The long antennae and flattened body mark it as an animal that gets along by its senses of touch and smell while living under something in the gloom. A hidden life for so small and fragile a creature makes sense. To venture out only at night, to be invisible, is protection against the appetites that relish cockroaches and other sheltering creepers.

Therefore, it is interesting when a boldly colored insect, such as a butterfly, appears to be designed to be seen. We must assume that this self-advertising is due to something very important in the life of the advertiser. Luminescent insects are the ultimate in the obvious. Far from trying to avoid reflecting light, they actually emit it! By breaching the night they become the most conspicuous of things, lights in darkness. First, we wonder at their beauty and then we wonder why it should exist.

Beauty is an opinion. But for me, of all the lovely shining things, the glowworms of the family Phengodidae are the most marvelous. These glowworms are actually the juveniles and adult females of a beetle and relatives of the fireflies. They are long cylindrical creatures, small-headed, with a sleek, occasionally plump appearance. Phengodid glowworms are not often encountered. A pioneer of bioluminescence studies, Princeton professor E. Newton Harvey, noted that he had seen only four living specimens of North American species in twenty-five years. Very rarely someone locates a concentration of them. A friend [sw] once discovered a depression in a meadow that held dozens of young larvae crawling among the blades of grass. Another [jl] came across a species in the jungles of Colombia that was in the unusual "habitat" of tree branches. But, most phengodid glowworms spend most of their time under stones, under fallen trees (logs), or underground. If you wish to see a phengodid you must put considerable trust in luck or put considerable effort into the search (a California naturalist, the late Darwin Tiemann, once dug for 50 hours to find a single larva of the Western Banded Glowworm, *Zarhipus integripennis*). The effort is rewarded once the insect is in hand, for these often huge (up to 70 mm) animals are speckled and striped with a score or more of soft green lights, its movements traced in rippling light.

Looking for phengodids can be almost as memorable as the insect itself. I recall one stormy Florida night when a flashlight shone into a flood water caused it to boil with leeches, and flashlights pointed up illuminated treetrunks plastered with thousands of earthworms. They were climbing to escape drowning in the soaking mud and were joined by other luckless subterrainean creatures. Here and there marooned on humps of ground, pale rare firefly larvae glimmered.

A male *Phengodes nigromaculata,* attracted by a perfume (pheromone) and flying above an adult female would see this patern of "landing strip" lights upon her back and sides.

A luminous centipede, captured in a cranny by a larger relative, flashed a bright white light in its death struggle. And the greatest cause for celebration were two phengodid glowworms found huddled on stumps.

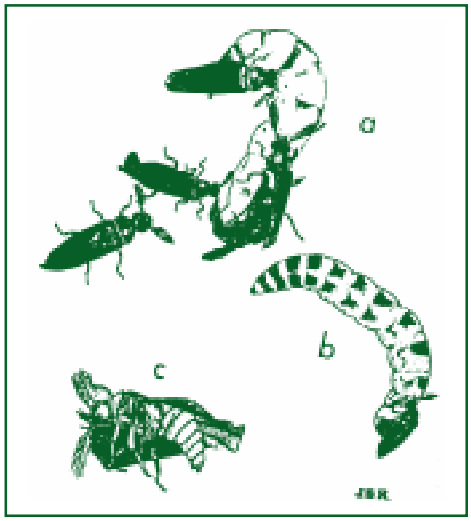
The flood, by forcing up the luminous underworld, revealed the surprising fact that we tread over sunken constellations scattered through the earth. While phengodids are the most spectacular, other glowing organisms live underfoot. Besides the centipedes and firefly larvae, there are luminous springtails (insectan Order Collembola), click beetle larvae (family Elateridae), millipedes, and earthworms, all that spend at least part of their lives buried underground or in rotting wood.

Why do phengodids and these others shine in a solid, totally non-transparent environment? It seems at first to be like trying to shout in a vacuum. The difficulty in answering such a question is compounded by the difficulty of making observations in nature. What habitat could be less available to humans? It is not much easier to follow the natural lives of insects under an inch of soil than it is to watch the doings of abyssal shrimp under a mile of seawater. But no observation platform can dive submarine-like beneath a willow thicket!

Phengodid are representative of another puzzling phenomenon, that of female neotony, the continuance of the larval body plan into adulthood. Like Peter Pan, female phengodids appear never to grow up. Their reproductive organs mature, but they maintain their "childhood" forms and grow only larger — quite a bit larger compared to their males. While the female design is for a wingless exterior, decked with lights and stretched over a stuffing of eggs, the male juvenile completes his metamorphosis (transformation) into a specialized and unusual adult beetle. He bears short wing-covers (elytra, *el'-ih-truh*), and his large, feathery antennae wave over a pair of sharp, sickle-shaped jaws (mandibles). In his short, wild life, he is designed to find females, kill sexual rivals, and mount huge glowing mates. He will not feed, other than to sip moisture from leaves, and he dies a few days after growing up.

Before looking into one explanation for the phengodid peculiarity of subterrainean light, let me introduce our North American phengodid fauna. [js]

(to be continued)




Science fiction titles "Jurassic Sex" or "Attraction By a 50-Foot Female" might capture the flavor of love in phengodid beetles. Males fight to the death (c) for a chance to mate with enormously larger females (b). Drawing by John Randall from a book published by Academic Press.

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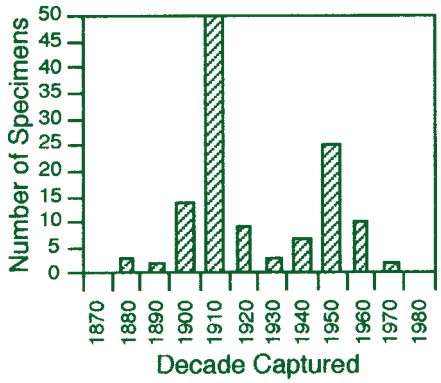
available, are the places and dates that fireflies *have* occurred. The map of the geographic distribution of *Photinus pyralis* that appears on page 9 uses data from the labels of over a 1000 museum specimens that I have examined, from more than a dozen university and other collections. Such maps can now be constructed for many of the roughly 180 species in the United States. Such a map, based on all specimens deposited since the late 1800s is a summary, a composite. The base data are stored in a computer, and can be dissected, to see, for example, whether some localities have no recent representation. This could mean that the species no longer occurs in some regions. Also, the relative number of specimens in museums can sometimes give a clue to the abundance of a species.

Consider the region around New York City (Map at right). No one would disagree that much of the area has been altered greatly during the past century, and that there are fewer available firefly sites than there were in 1880. The graph below (Graph 1) shows the decade of collection for the 125 specimens of eight species that I found in museum collections.

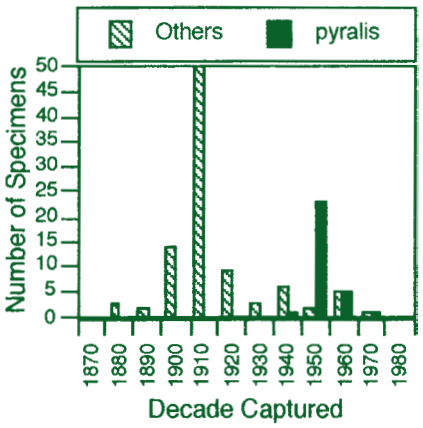
Seven of the species are found in woodlands or wetlands. The other species, the Big Dipper Firefly, is an inhabitant of grassland and ecologically disturbed areas, and is commonly found around human habitations (see article on page 9). A century ago Charles Knipp* observed that *pyralis* moved into areas in nw Ohio when virgin forest was cut. One would expect that *pyralis* records from the NYC area might differ from those of other species, and indeed they do (Graph 2).

When *pyralis* records are separated it appears that this species may not have been present in the region until the 1940s

*Science 1939, 89:386.



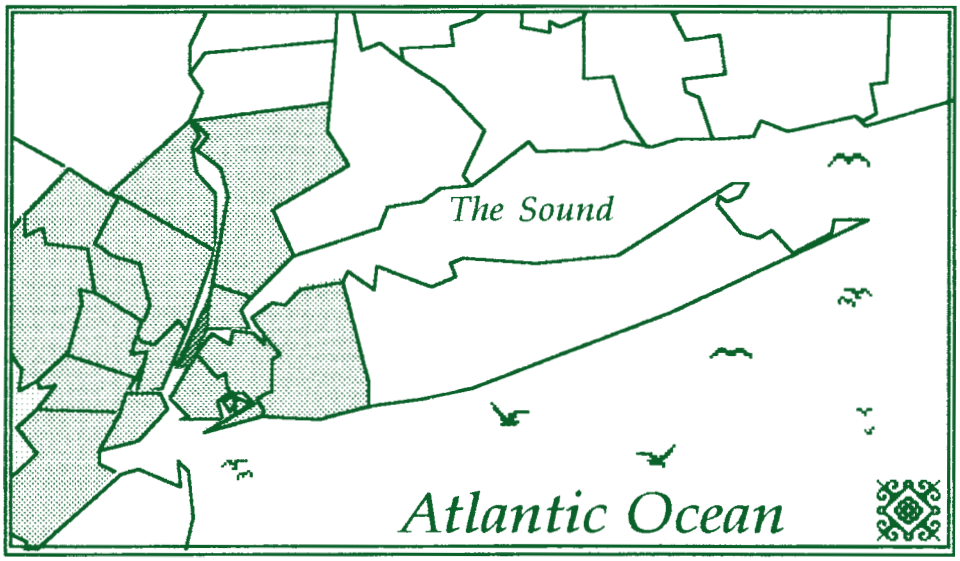

**Graph 1.** Museum holdings of 8 species from 16 NJ and NY counties in the NYC area (shaded in the map). By taking into account differences in the ecology of the species more can be learned. See Graph 2 and text.




**Graph 2.** Same data-base as in Graph 1, but Big Dipper records have been graphed separately because the ecology of this apparent "weed species" is conspicuously different. The firefly history of the area is probably very complex and may never be understood (see text).

initial considerations being shared, I shall use the ***"Venitian"*** typeface for key words, Venice the city being an Italian city of light in 14th Century European Renaissance): The initial increase of records, ***is due to*** an increase in entomological interest — check the records, publications of the New York and the Brooklyn Ent Societies, and State lists for New Jersey and New York. The subsequent decrease ***is due to*** increased loss of wet- and woodland habitat and/or decrease in entomological interest (but *pyralis* records increase?) —check specimen records for adjacent rural areas, collection records for other insect species, and contemporary publications for waning entomological interest and for studies, discussion, and alarm, apropos of habitat loss.

There was a sudden appearance of *pyralis* records, after more than a half century of now (post facto) not-




**Map 1.** A map of the New York City area with the sampled counties in New Jersey and New York shaded. Manhattan (NYC) is the north-south elongate darker-shaded island in the Hudson River, dividing the shaded areas. Long Island (NY) is east-west in the center, and Connecticut is north across L. I. Sound.

and since then, like others (?), it has gradually decreased in numbers, or disapeared. Now the real detective work begins. We need hypotheses to test, and to formulate them we first need *working* (preliminary) interpretations, speculations, and predictions. As examples, observe the changes in firefly specimen records: (1) an initial increase (1880-1910), (2) followed by a long-continued decrease in specimens of wet- and woodland species, (3) the appearance of *pyralis'* specimens for the 1940s — recall that this is a firefly that utilizes man's lawns, parks, and meadows, and, (4) after a peak of 1950s records, a decreasing number of *pyralis* records.

**Speculations?** (to remind the reader when statements are not conclusions, but

ably-conspicuous absence — the distribution map (page 9) shows that the NYC area is at the northern limit of *pyralis'* geographic distribution. —***Could*** we be seeing the ***effects of changes*** in two ecological elements, habitat and climate? —***Could*** *pyralis* gradually have moved northward into the region with the increased ***availability of suitable habitat*** after (2) the regional climate ***had moderated*** with winter warming from heating by houses, factories, steam vents, etc)?

The "terminal" decrease in numbers of all species ***could*** be from continuing and extensive habitat destruction, and a growing lack of interest in insects, and an in-

***Continued on page 10, see Save***

# Roadside Attractions

## A forum for fireflyers

Suppose your mission was to design an insect that could easily be found. You might make a large insect with brightly colored, flapping wings, like a butterfly, that would be conspicuous in daylight. But for the nighttime, could you imagine anything easier to see than a flashing firefly? You might try designing an insect that makes loud sounds so that you could locate it in the dark. But if you have ever tried to pinpoint the location of a cricket or katydid by its chirps or trill, you know it isn't easy. Their sounds disclose their vicinity, but the exact location is often difficult to find. You might want to make a large, light colored insect. It would show up in moonlight; but that light would be from another source, reflected from your insect. The firefly makes its own light. That means that the firefly flashes with or without a moon. And each flash shows you exactly where the firefly is at that moment.

Where should you look for fireflies? Your own back yard might be the first place to try, even if you live in a city. More often, though, a drive in the country is the way to find places where fireflies live. Always take every precaution for your own safety, of course. It is helpful to have two people, one to drive and one to watch. Peaceful roads without heavy traffic offer fewer distractions, and driving slowly makes it easier to spot the flashes. Often fireflies can be found right beside the road, which is very convenient for collecting and making observations. Roads cut through various habitats including forests, fields, and marshes, and run beside lakes and beaches. Bridges cross creeks and rivers. So, from a car you can check many different kinds of places easily. Fireflies might be found in or near any of these habitats.

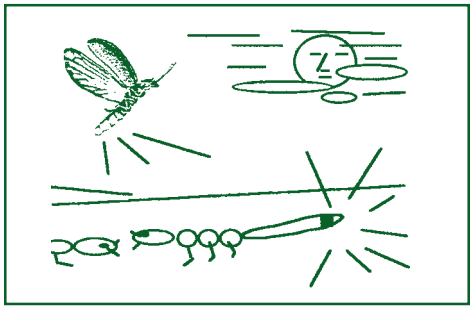
The best time of day to look for fireflies is almost always in the dark. (We'll consider exceptions in a later issue.) After sunset as the twilight fades, until an hour or two after sunset is a good time to find many different species. Some are active all night long, while other species are active for only a few minutes each night.

You are more likely to find fireflies during the warmer months of the year, during spring, summer, and fall. Exactly which species you can find will change from month to month. Adults of some species are active during only a few weeks each year, while other species may be found month after month. In some warm climates, fireflies can be found year round. Where the winters are cold, though, your best bets are the warmer months. During their cold "off" seasons nearly all live as larvae in dead logs, the earth, or in leaf litter.

When you are at a location looking for fireflies, be sure to look in all the different levels of vegetation. Different species of fireflies may be seen in different parts of the same habitat. Some fly close to the ground, while others fly above the treetops, and others fly in between.

Finding fireflies is easy, and the advice above can make it even easier! Please share your tips and experiences. Send these, and your questions to the *Fireflyer*. [sw]

I never saw a flashing bee,
nor anyone who'd seen one;
I wonder if their honey glows?
I'd flash myself to tree one!
[jl]



"just because we glow a little, one should not presume we are sexually active!"

**What are the glowing larvae just beneath the surface of a small nearby lake?**

Gunther, Kalamazoo MI

Dear Gunther,

I believe your lights were those of firefly larvae. Larvae of some *Pyractomena* species are semiaquatic and go underwater to hunt snails. Note whether there are flying, flashing adults (males) over the adjacent shore of this lake in early June. If they emit 4-6 rapid, yellow pulses each 3-4 sec (ca 15°C) they are *Py. dispersa;* if a 0.3-0.4 sec yellow flare, they are *Py. linearis;* if an amber flicker of 8-12 rapid pulses (too fast to count) they are *Py. angulata;* and if a dim glow of 3-10 sec with the OFF between glows of a similar duration, they are *Py. sinuata.* Of course you could have something that is unknown— Michigan's LP has some special features, perhaps due to its isolation, being open only to the south now, with this door having opened after a postglacial prairie barrier(?). [jl]

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**Where can I find some general information on fireflies?**

John, Ames IA

Dear John,

There have been no recent books on fireflies, other than those for juveniles, some of which we will list in the next issue. Your best bet, if you have access to a pretty good library, is to look up some of the reviews and others listed below. One and 5 give references on various topics. If your library does not have the ones you need, drop me a line and I can send you thermocopies. [jl]


1. *Annual Review of Entomology*, vols for 1971 and 1983, Annu. Reviews, Inc.
2. Chapter 8 [in] *How Animals Communicate*, 1978, Thomas Sebeok, Ed., Indiana University Press.
3. Chapter 8 [in] *Sexual Selection and Reproductive Competition in Insects*, 1979, M. & A. Blum, Eds. Academic Press.
4. *1984 Yearbook of Science and the* Future Ency. Britt., Inc. pages 188-201.
5. *Insect Bioluminescence* [in] *Bioluminescence in Action*, 1978, P. Herring, Ed., Academic Press.
6. *Mimicry in the Sexual Signals of Fireflies, Scientific American. 1981, 245:138-145.*

# Firefly Tails

**with Bean**

We leave the truck pulled off the road in a solitary campsite clearing, and walk down the hill the last 200 feet to the bridge, and a very cold stream called Lone Hemlock Run. We are at 2500 feet in the forested mountains of Garrett County in western Maryland— one of my favorite states — in the "northern" Appalachians by some reckoning. Below us, after tunnelling a quarter of a mile further through the dripping hemlock, yew and laurel, the Run caucuses with the rocky North Fork of the Potomac, what there is of it. I came up here the first time several years ago, to see if *Photuris potomaca,* a species originally found along the river just above Washington, got this far upstream. If it did I figured that it might have jumped the divide going west and gotten into the drainage of the Ohio River. No telling how far west it could be, if it got over the divide. Settlers went west, and this River Firefly might have crossed the divide and gone west too— but, maybe it got into the Potomac by going east through the divide? Anyway, that is why I was in the mountains, where Lone Hemlock Run joins an embryonic Potomac River.

In the twilight under the shrubs by a near corner of the bridge, a firefly has started to fly, emitting his short flash each 3-4 seconds. No, he's stopped. There must still be a little too much light for him, and he could see that only after he had left his shady perch and flew out into the open. Five minutes later there are a dozen more like him, each hovering and flashing, and moving to flash again a yard later— space is time to Einstein and a firefly, but the fireflies dealt with this truth first. How much space/time does a male have each evening, in a lifetime, to search for a mate or mates?

At dusk, when ambient light is high, fireflies sometimes pick their places to flash. They aim their flashes at nooks and crannies that are more likely to harbor females. When the females see the correct flash they flash back and attract them. Sometimes it takes a dozen or more such flash exchanges, actually coded dialogues, before a male reaches the female. Sometimes the approaching male just "gives up" and leaves. This reminds me of a line from a Kenny Rogers song: "You've got to know when to hold em, know when to fold em; Know when to walk away, know when to run." You'll see why this certainly is true for fireflies, later.

Males flash at clumps of tall dark weeds, which are like black holes in space warps that seem to attract more than their share of hexapod pulsars. But these holes don't capture and swallow their prey, and turn them into anti-fireflies. Would a firefly on the other side of a real black hole have its light on all of the time and emit darks? That would be more expensive for fireflies in this world, for searching anyway, but it could work up close.

I once had a professor who declared that I would have to deal with astronomy's Doppler redshifts in firefly luminescence for my firefly studies. He was serious too. A color-shift that firefly eyes could detect would be emitted by a firefly that was traveling so fast that he would be heated to an incandescent glow from the friction of passing air— and might get someone a grant from the Department of Defense. I have wondered whether by manipulating the position of firefly black holes on a lawn, you would be able to control the search of the Big Dipper Firefly, *Photinus pyralis,* in a predictable and quantifiable way.

The flash of the Lone Hemlock Firefly looks simple enough. You always want to look close at the flashes of a firefly from the side and below to see if it has any structure to it. If he is flying fast enough, the flash will be stretched out in space so you can see time along the flight axis. Sometimes smeared out flashes twinkle, ripple, or hitch. The human eye may be confusing time and space and flash intensity, and a *coleoptical* illusion may give some diagnostic assistance, but its not fool-proof. From underneath, the flash of an upstate New York *Photuris* firefly looks like a bow tie that isn't tied exactly in the middle. There is an unnamed *Photinus* in Arkansas that I found on the bank of the Arkansas River, that has a flash something like it, but it flies so low to the ground that it is hard to see a bow tie. This is the only North American *Photinus* I know of whose males have a rapidly modulated flash but there are several in Jamaica and South America. I plan to name this species after an antique coleopterist from Indiana named Willis Blatchley. He put in his time as State Geologist, retired early, and did what he wanted to, he wrote several definitive books on insect taxonomy — including "The Coleoptera of Indiana." I doubt there will be any more like him uriless we hold special searches, and classes to train them in what they know they need and ask for and then learn to leave them alone.

From a little distance the Lone Hemlock Flasher looks to be one of the little twilight *Photinus* species, and here in western Maryland that would probably be *Photinus marginellus.* But it isn't — up close this firefly is not that little and it is not even a *Photinus!* It is a *Photuris* species.

As shadows fill in, blacking out the details of the edges under the trees and shrubs, another flash pattern appears. This one is clearly, almost, the flash-dash pattern that H.S. Barber described for *Photuris pennsylvanica. A* sharp flash, OFF, and then an immediate sharp ON again for a 2-3 foot/second streak. But this is a long way from the tidal marshes where Barber found his *pennsylvanica?* The flash-dashers fly amongst the short-flashers, looking for love in all the same places, it would appear, They fly along the road, over the ditch, goldenrods and ferns, under an overhanging bank, and later, up into the trees. Up there you can really see the structure of their pattern, and also see that they are not all exactly the same. The OFF doesn't go completely off in all of them. I have seen the same thing in populations many miles north of here at the edge of the glacial moraine south of the Mohawk Valley in New York State.

All this intense and life-serious activity and ageless competition is pursued in a roaring, silence that sounds like a mountain stream. Under the roar, and especially when alone and after dark, there is an intermittent, deep-throated murmur, or rumble, like low conspiring voices. It's spooky. Boulders rubbing, or cavities resonating like an organ, maybe. Now the penn-flashers have completely taken over. The short-flashers had only 20-30 minutes of search at most, and they have been replaced for the night.

Tomorrow we can compare flash-voucher specimens of the two flash patterns, but it will do no good. Even under the stereomicroscope they will look the same. They are the same, the very same males, and if short flashers had been marked with a tiny dot of piper-cub-yellow airplane dope on an elytron (wing cover), they would have turned up later giving the flash-dash pattern. There is an easier and faster way than marking them, to see if it is one species doing both things. If you hold the tip of a penlight on the ground in front of a short-flashing male — the penlight isn't the best decoy for this but it is small and easy to carry between fireflies — he will switch and emit the penn-flash as he comes to your answering decoy, if you have timed your flash correctly after his. [$jl_wb$]

# Nomenclature: Getting Names Right
## How about De Geer, as in Chas. De Geer?

Taxonomists often have interests and specialties beyond their intimate knowledge of the group of organisms they taxonomize. A few actually understand the structure and proper use of the Classical languages that are used in formal taxonomic names, and often their interests extend to history and philosophy. Such men, and sometimes women, are among the treasures that museum ranges (collection rooms) harbor and protect. They help the rest of us select terms to use for scientific names, they tell us when we have assigned a word to the wrong gender, when a combination we suggest is inappropriate, vulgar, or otherwise awful, and they help us put the correct ending (inflection I think it may be called) on our undeleted epithets ect.

The taxonomic-language-experts that I know, or knew, received their education before World War II. I know not whether there are any coming down the trail, but I suspect not. One such student, Ashley B. Gurney, for a long time was associated with the Entomology Research Branch of the USDA, in Washington. Some time ago* he turned his attention to the proper rendition of the name Charles DeGeer (1720 - 1778)— The man De Geer named the American firefly now known as *Photuris pennsylvanica* (De Geer). For nearly a century almost every *Photuris* firefly in the United States was called by this name, because of the (then) impossibility of distinguishing among *Photuris* species with characters present in dead specimens.

Among other "factoids" concerning this firefly name is that De Geer originally spelled *pennsylvanica* with one "n" and that the specimen he attached the name to (what we now would call the holotype specimen) came from the area of Wilmington, Delaware, then part of the Territory of Pennsylvania — a firefly story to tell later.

De Geers name, as it has appeared in the formal presentation of the scientific names of insects, say, *"Lampyris pensylvanica* De Geer, 1774," was written in many different forms. Among those Gurney mentioned were DeGeer, Degeer, de Geer, and Geer. He noted that when used as the author of insects, the name had been abbreviated as DeG. and Deg. Gurney examined the evidence for how De Geer himself presented and accepted his name, in signature and set type, how his biographers, publishers, and contemporaries wrote his name, and various other sources, practices, and variations. Gurney noted that 1. most differences in the rendering of De Geer's name involve the way 'de' is combined with 'Geer,'" that De Geer had on occasion used CARL DeGEER, a latinized CAROLO De GEER, and Carol. De Geer. Linnaeus, the originator of the essence (pun intended) of the scientific naming system in use today, and a fellow-countryman and friend of De Geer, used the form "De Geef" in the 10th Edition of his *Systema Naturae*.

Gurney's paper demonstrates the care that many taxonomists put into their use and studies of names of biologial significance. His research and analysis could be used in history and English, as well as biology. His bottom line was, "it is concluded that De Geer is the correct rendering of the surname." Unfortunately, Gurney is now extinct, and his own, an endangered species. [jl]

Bull. Brooklyn Ent. Soc., 1956, 51:127

## Fireflies, Lightningbugs, and Roses

What's in a name? Most people in the United States refer to flashing lampyrids as lightningbugs, but for more than a century the term *firefly* has been used almost exclusively in scientific literature. Of course fireflies are neither bugs (Order Hemiptera) nor flies (Order Diptera), but which name did you grow up with? Where did you grow up, and who did you learn the word from? Where did they grow up? Please drop us a line, and we will begin to put spots on a map.

## Exotic Fireflies

There are many organisms in North America that have arrived from other continents in the past 500 years. Some were brought on purpose, some hitchhiked. A firefly arrived with ballast, and survived nearly 150 years. Another is known only from two very old specimens, and one was intercepted recently at a Florida quarantine station. One firefly was brought from "Ceylon" to Hawaii in the 50s to control pest snails, but didn't work out [jl]

## Finding Obscure Collecting Localities

An obscure collecting locality is a placename that appears on the locality label of a museum specimen that can not been found (with certainty) on maps or in gazeteers (by a taxonomist that has identified the specimen and wants to put a spot on a distribution map). One of the big-little pleasures of being an insect taxonomist is that of digging out such localities, and then, sometimes, visiting them to make observations or to collect more specimens. Such a name may be the collectors's nickname for the site (the Shack), or an acronym (Canara), or use an ambiguous abreviation (F. = Fort or Fred? Smith), or a slip of the pen or memory.

Thirty years ago Marjorie Townes and Ellen Linna* published the names of many localities they had searched for, including those they had found, those that were used for two or more sites, and those that they had not found. One of their obscure localities used by a fireflyer (H.S. Barber) was Difficult Run VA They identified it as "Stream flowing into Potomac River in Fairfax Co., 2 ± miles down river from Great Falls."

Here are a few of the yet-unknowns from their list for your hunting pleasure. Send me your findings: Aden MI; Antelope Mt. OR; Atila, B.C.; Camp Holsum CA; Club Hill MD; Cookshire PA; Hatchery Arm, B.C. Kelley's Camp on Gaspé, Que., Livingston ME, WY, & PA -, Mt. Manitou CO; Orestum, Ont. -, Snake River at Divide Creek ID; Sugar, B.C.; Woodkill DE. (more later) [jl]

*Proc. Ent. Soc. Wash. 1993, 65:233.

**The only color lightningbug you see today is yellow. Everyone thinks I am nuts, but when I was a child they came in different colors?**

Deborah,
Rockford IL.

Dear Deborah,

You are absolutely correct. Fireflies emit light of different colors. The common *Photinus pyralis* emits yellow light; most *Photuris* fireflies emit green bioluminescence, most species in the genus *Pyractomena* emit orange-yellow light, but the flicker of *Py. angulata* is orange. In South America there is a species of Phengodid called the railroad worm, that has spots of green light along its sides and a brilliant ruby-red light shining from its head. [jl]

**How can I attract fireflies to my yard and garden?**

Joann, Beltsville MD

Dear Joann,

There are many species of fireflies in your region, but not all are candidates for your lawn and garden. Most of them have a rather narrow range of habitats to which they are suited and probably would not survive in the place you offer. However, there is one species in particular that is adapted to meadows, pastures and other grassy habitats, and is sometimes referred to as "the lawn firefly". You might say it is sort of a "weed" species, though it is a native American, not an introduced exotic. This is the Big Dipper Firefly, *Photinus pyralis* (L.) (see figure). This firefly occurs throughout much of eastern North America (see map) and often is seen over lawns, in parks, and along roadsides. It is the lightningbug that children know because it flies and flashes shortly after sunset for a half hour or so, and flies low over the grass (up to 4-5 feet) where they can chase and catch it.

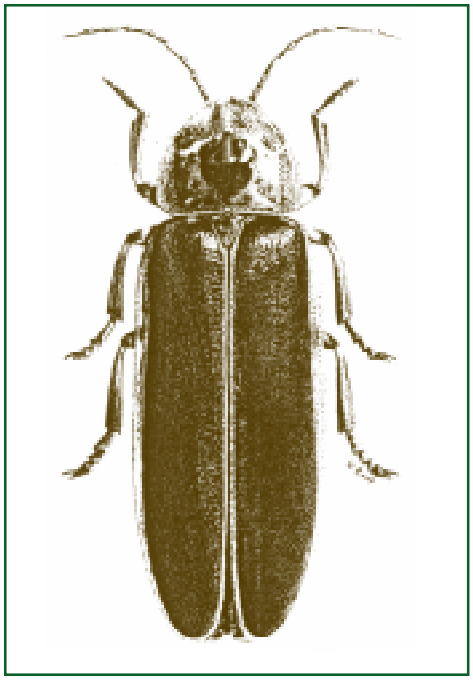
Like larvae of other firefly species, those of *pyralis* are predators and they and other *Photinus* larvae may perhaps feed exclusively on earthworms. They are subterrainean, and should you manage to get them into your yard, you may occasionally find larvae and pupae while digging in the garden. However, fireflies do not seem to occur in areas where recent construction, lawn-making, and bulldozing have shuffled and disturbed the structure and composition of the soil. Also, when chemicals are used in an area (pesticides, lawn fertilizers) they may do damage to the soil, to the worms, and to the things the worms need, and thus keep the fireflies from getting established.

Your mission not impossible is to give them a start, and then hope they survive. Finding eggs would probably be out of the question. You must find females and release them in your yard to lay eggs — not on the lawn, but at the edge where you have let the grass get a little deeper and where the atmosphere near the soil is apt to be better controlled (lawn grass is probably either too hot, too dry, or flooded, maybe, from sprinklers). Perhaps you could let a patch of lawn or an additional yard-wide strip at the edge grow tall (go back to nature) as a sort of nursery. Females released there, we hope, will lay their eggs at the bases of grass stems. A week or so later the eggs will hatch into worm-eating larvae. After finishing larval development and the pupal period, the following June adults will appear above ground and the males fly over the lawn looking for mates.

Finding females may not be as difficult as you might think. Give it a try. Then, you must be certain they are mated. Even this is not too difficult. Here's a guide: *Photinus pyralis* is the firefly that makes the J-flash over grass at twilight. It should be active in Maryland for several weeks in summer. The flying J-flashers are the males giving their species' mating signal. Their females are perched in the grass, and when they see a half-second flash they count 2-3 sec and flash a half-sec answer. The male fly closer, flash his signal again, etc, etc, till he reaches the female. The males will be your competitors when you try to find females. They will not quickly find females that are in brush or back under trees at the edge of the lawns and field where you should look — a firefly chaser selects sites to search by the presence of males, and specific female perches by looking in shady spots and nooks that males are more likely to miss. You will get better with experience. I don't know whether fireflies do.

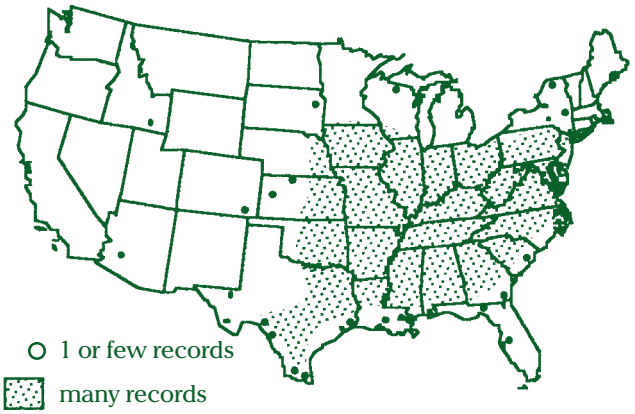
Take a penlight and walk around the edge of the grassy area at sites you locate (don't go alone), and flash half-sec flashes, first here, then there, etc. After you flash each time, wait, and look for the yellow answering flash at the 2-3 sec delay. If none, move on to the next likely spot etc. When you get an answer, flash again and get closer, until you can see the answering female, and carefully pick her up and put her in a jar. It is probably better to gently brush her into an open bottle that is held below her, but do not bump her perch! Put no holes in the lid of her motel, for she will surely dry out and die. Each day that you have her, remove the lid and blow gently across the mouth of the jar. Thiswill stir fresh air (oxygen) down into the jar. With the lid kept on, the air in the jar will remain humid, an absolute necessity, and there is plenty of oxygen sealed in with her for a day or more. Try to find two or three females. Put a thin slice of washed apple in the jar to maintain humidity and for the females to sink their mandibles into. Put in a small wad of fresh grass to give "cover" and places to climb.

Next, catch four or five males and put them in the jar, and give them some privacy (kidding of course). We will hope that if the females had not mated before you caught them, they will within a couple of days, with the males you put in the jar with them. Put the jar with the fireflies in a place where they can see (only) the light from outdoors, which will keep them on a natural daylength and cycled properly. Do not put them in a sunlit window, the heat of their greenhouse will kill them. If you find more females, up to maybe six or seven,



***Continued on page 10, see Dipper***

Known geographic distribution of the Big Dipper Firefly, *Photinus pyralis* (L.)



## A Firefly Paper

I have fond childhood memories of fireflies, like a lot of other people. I remember going out into the soft spring evenings to watch the sun set and listen to the sounds of nature waking up. I would sit on the wide soft lawn behind my house and watch the first sprinkle of flashes of the spring turn into a shower. Each spring I would stare into the darkness searching for the blinking lights, and I remember finding those lights and being captivated — by the firefly. That was in Wisconsin. I also remember the short time we lived in Japan, looking for fireflies, and wondering if they spoke the same language as American fireflies. Unfortunately for me I never found out, because firefly is a language I've never gotten a chance to learn. In Iowa, too, I would journey out with my little brother to watch, then capture them in a jar for closer observation. And yes, even in Louisiana I would go outside on warm evenings to watch for those bright little flashes.

I had no idea why or how these strange creatures could make their fascinating little flashes, I guess I just accepted it as a part of nature. Even now I know very little about fireflies (but I'm learning!), and I've started to wonder about the rest of the general (human) population. What do people really know about fireflies? I decided to take an informal survey of my friends to see what they knew (if anything) about fireflies.

**"Facts" and Misconceptions**. I decided to start with the basics. First I asked my friends if they had ever seen a firefly before. Quite happily, all of them had, so I proceeded to the next question. What are fireflies? This question was followed by much laughter, jesting, and a jumble of answers ranging from wrong to somewhat correct — "Bugs! Insects! Their eyes glow. Don't their butts light up? Yeah, don't they have, like, headlights or turn signals or something?" Since I was obviously in a group of incredibly aware and intelligent beings, I decided to ask if anyone knew why fireflies flashed. Once again I received a wide range of answers. "Is this a pornographic question? Doesn't it have something to do with mating? Is this a sex thing?"

Encouraged by these responses, I decided to push my luck and ask a slightly more technical question — do all fireflies have the same flashes? While the general group consensus was that they did, three of my friends' answers rang true. Two speculated on male and female differences, and one, a zoology major, said that, "all different species have basic differences in mating rituals, so logically, different firefly species should be different too." Impressed by her answer, I asked this particularly astute student another question. Do all fireflies look the same? I was much disappointed by her answer, "I guess so, I've never really paid attention." Here we come to the great truth of the firefly story. Many people watch fireflies to be entertained by their bright lights, but very few actually know anything about the insects. It doesn't it seem as if the firefly is being, well...well used? We need to remedy this case of mass ignorance of general firefly information.

**Adventures in Researching**. First I turned to my good friend "Webster" (you know, the one who wrote the dictionary—he's very smart) for a definition of a firefly. This is what he told me. "**Firefly**: any nocturnal beetle of the family Lampyridae having a light-producing organ at the rear of the abdomen. Also called **lightning bug**. Compare glow worm". So, I looked up glow worm as well. "**Glow worm**: the larva or wingless

*see Paper, continued on page 11*

*Save, continued from page 5*

creased danger in nocturnal outdoor activity in and near cities. But, I can say from personal field experience, that there are still some fireflies present in the Bronx, and Nassau, Westchester, and Bergen Counties.

The map for one apparently rare species, shows that it once occurred from New England to the High Plains. There are no archival records for New England after the 1920s. Considering the ecology of the species, as understood through observations I made in Nebraska and North Dakota, stream and pond pollution *could* have been involved. Fortunately, there have been three sightings during the past two summers, in Connecticut, Massachusets and Vermont.

In the next issue I will detail the *nature* of my observational records for fireflies in Alachua County FL, dating from 1964. In the meantime, you might begin to list and photograph the sites in your area where you have seen fireflies in the past and that you could closely monitor on a continuing basis in the future. Have any of your early sites been polluted with street light emissions, or taken out of firefly production for other reasons? [jl]

(to be continued)

Whoo? What? How? **Why?**

*Dipper, continued from page 9*

all the better. Put in a few extra males. You might divide your stock into two jars.

After two to three days put the jars out at the edge of your lawn, in the shade, on their sides with the lids off, and gently slide the loose grass wads to the mouths of the jars — keping it loose in the mouth for easy escape of your propagules. Then hope. You might take some pictures of the process. It certainly is one of the first American firefly "release programs" and deserves to be recorded. Good luck, and please write and keep me informed of your progress and success. [jl]

## Trivial Flashlets

1. What State in the U.S. has more firefly species than any other?
2. What city has a firefly festival every year and has been designated *the firefly capitol of the U.S.?*
3. What continent has no fireflies at all?
4. What city built a monument to honor the boll weevil, another beetle?
5. What town has a 3-ft high statue of a mosquito in the square by the flagpole and a mosquito festival and queen?
6. What is the largest firefly in the world and where does it occur?
7. Are any firefly species cave-dwellers?

(answers next issue)

***Paper, continued from page 10***

female of a beetle, *Lampyris noctiluca*, which emits a sustained greenish light". While this information was somewhat helpful, as it gave me a more specific name to look for, it basically reviewed what I already knew. I turned next to the encyclopedia, which wasn't much help either. The *Encyclopedia Brittanica* told me that fireflies were soft-bodied beetles (I guess they don't work out very often), about 5 to 25 millimeters in length, that use a complex system of flashes as a part of their mating ritual. Needing more in-depth information, I then consulted my friend LUIS, at Library West. He gave me a list of possibly useful sources, including a book entitled "Studies on the Flash Communication System in *Photinus* Fireflies," by some guy named James E. Lloyd at the University of Michigan. I retrieved this book and a few others, and began my search in earnest.

From the above mentioned book, I was able to extract some general information about firefly flash terminology. According to Lloyd, a steady emission of light is called a glow, a series of flashes from the male to the female is called a flash pattern, and a response flash is the female's responding flash to the male flash pattern. These different signals are utilized by different species to attract and communicate with potential mates, and are specific to each species.

The next source I consulted was a thesis paper by Lawrent Lee Buschman, "Biology and Bioluminescence of Selected Fireflies in Three Genera: *Pyractomena*, *Photinus*, and *Photuris*." This study was fairly useful to me because it presented general information about flash patterns in the introduction. Buschman detailed the two main flash systems that were first presented by Lloyd. In the first system, one firefly (usually the female) stays in one place while emitting a signal to attract a firefly of the same species but opposite sex. He noted that in species that use this system, the female has a large, bright light, but the male often does not. In the second system, one firefly (the male) flies around while emitting a signal to stimulate a female firefly of the same species, and the female responds with a signal.

Another book I looked in was a doctoral thesis entitled "*Photinus collustrans*: Reproductive Ecology of Flightless Female Fireflies" by Steven Rae Wing. Although he inadvertently created a new tongue twister for firefly stu-

***Continued on page 12, see Paper***

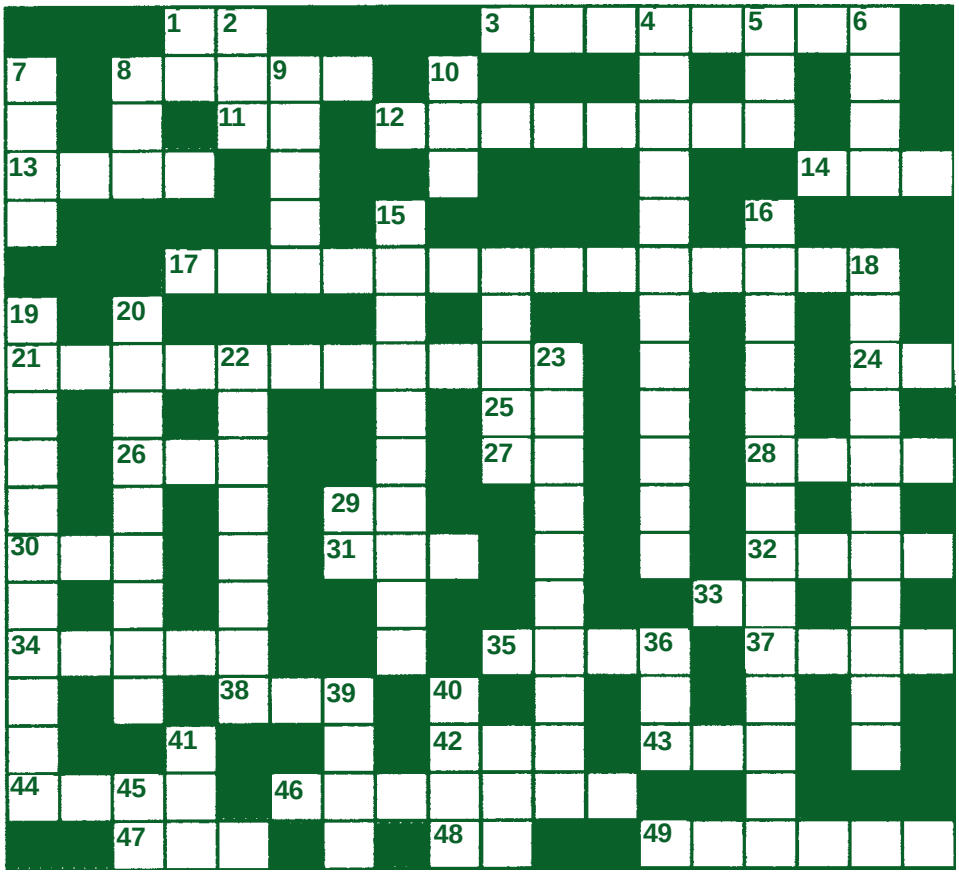
# PUZZLE CLUES

**ACROSS**

1. out of this world *(as in "UFO")*
3. handy pocket decoy
8. winter firefly color
11. firefly first defense
12. Big Dipper time-o-day
13. *pyralis* arena
14. posteni or: insect= _____: ship
17. most evidence for firefly loss
2 1. a family related to fireflies
24. stipes (abbr. In morphol. text))
25. upper leg (abbr. in morphol. text)
26. no. modes in bimodal flash
27. furcula (abbr. in morphol. text)
28. sex of J-flasher over grassland
29. either ____ (facultative *behavior)*
30. *Appalachian pass:* water _____
31. crow's close, blue relative
32. no. native Hawaiian fireflies
33. Latin *(feminine plural)* ending
35. male driving force *(poetic)*
36. cane- _____
37. sperm source/male progenitor
38. Macintosh user group (abbr.)
42. American tree killed by Dutch disease carried by a beetle
43. tarsal claw (colloq.)
44. gastropod prey of certain fireflies
46. our *Twinkle*[2] poet
47. foot, or spider's palp
48. computer disk, not hd or low d
49. a predator's move

**DOWN**

1. elytron (abbr. in morphol. text)
2. space for data in text (abbr.)
4. most common word for firefly
5. intestine: fore___ , mid___ , hind___
6. Big Dipper's substrate (i.e. carpet)
7. when Winter Firefly transforms
8. necktie for insect museum taxonomist and pinned-specimen sorter
9. flash characteristic flawed by observers' own detectors
10. fireflyer's querulous associate
15. firefly enzyme *(generic name)*
16. living *(chemically produced)* light
18. Garrett Co. branch (i.e., stream)
19. Collembola common name
20. "100" legged arthropod
22. wingless emitter
23. *Photinus* underground prey
36. entomology (old abbr.)
39. *integripennis* emission
40. swarm: fireflies =____: buffalo
41. ice ___ , when few bogs open
45. a service for specimen delivery

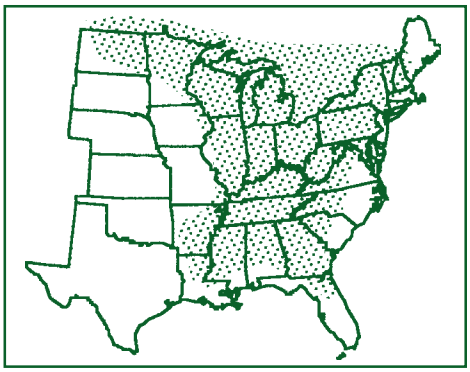


# The Winter Firefly

It may come as a surprise, but summer is not the only season that adults of North American fireflies are abroad. There is "one species" of rather broad occurrence in eastern U.S. and Canada that ecloses to adult-hood in late surnmer and fall, and hangs around until the following summer. This is the Winter Firefly, *Ellychnia* corrusca (L.). I have been collecting data on this firefly for as long as I have been watching fireflies and it is one of the most interesting "species" that I know.

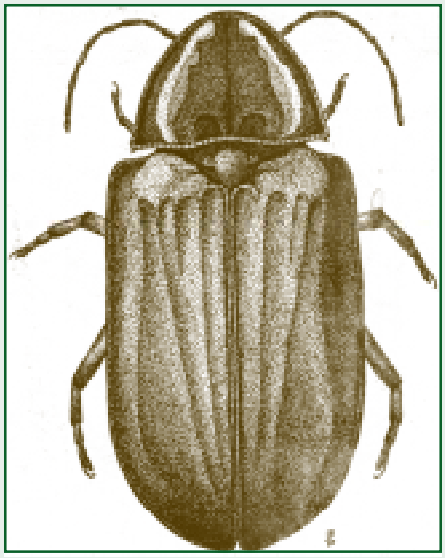
First, it apparently is not a single species, but a mixture of separate entities that has so far defied taxonomic resolution- I keep measuring museum specimens and collecting incidental notes on the "complex," but since I only very rarely see it in Florida I can only wait for another winter trip up north. One "sort" that is worth noting, is the small and broad one that the early entomologist and physician Dr. Frederick Valentine Melsheimer named *autumnalis,* in 1835.

Second, though adults do not have light-organs and certainly must use pheromones (chemical signals) for sexual communication, all of their other features — morphology, life-history, etc — reveal that they clearly belong to the beetle family. Lampyridae. Actually, there are dozens of lampyrid species that do not have lightorgans in the adult stage.



Having said this, I must go on to say that adult *corrusca* sometimes do emit light. Juveniles of all fireflies, as far as now known, do have light organs. In the Winter Firefly the larval lanterns remain functional through the pupal stage and into the adult stage. For a few days after adults eclose, these larval lanterns continue to emit light when the firefly is "roughly" handled, say, by gently being shaken in a loosely closed fist. (Say not "seven come eleven," but "bug come a light.")

Finally, for now, one might expect that Winter Fireflies would hole up for the winter, and remain in crevices under bark and logs, to escape the dangers and accidents of wind, hungry birds, and rapidly-changing temperatures. They don't, at least some don't. They are often found up on tree trunks, freezing temperatures and all, even with tiny piles of snow on their backs. Fred Hough and I are putting together a paper on this firefly that will give some details of winter activity and adult glowing. We will be putting our findings in a research-teaching journal that several fireflyers are developing. More later. [jl]



This ink drawing of the Winter Firefly was made by a student many years ago. When I find her name I'll give her proper credit, but note the initials below the tip of the right elytron. Note the diagnostic dark bands at the lateral margins of the pronotum, the raised lines on the elytra, the general broad and black habitus (body "look"). The light-colored areas on each side of the median vitta (spot) on the pronotum often have red, yellow, or orange pigment. The distribution map is preliminary, and was put together from data on labels of museum specimens.

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**pronotum. *n.*** shield-like plate partially or totally covering the head of fireflies. It is the roof (dorsal sclerite) of the first thoracic segment.

**pheromone. *n.*** molecules emitted by an individual organism that are detected by another of the same species. Carried on the wind in what is called a plume.

**eclose. *n.*** to emerge, as when an adult emerges from the pupa or larva from an egg.

**Lampyridae. *n.*** family of beetles known as fireflies. It is closely related to the soldier beetles and glowworm beetles. The ending -idae identifies the word as a family name in zoological nomenclature. There are about 2000 named species of Lampyridae, and many more to be named and work to be done to understand what a "species" really is in nature.

*Paper, continued from page 11*

dents, he also presented a large volume of information of which I could only utilize a small amount. Wing discussed females of this species, describing them as "pale, soft bodied, conspicuous, and relatively slow-moving." He also noted that Lloyd had pointed out an interesting fact about the species. Males only spend about 18 minutes per evening looking for mates, as compared to over 8 hours in some other species, a fact I find extremely interesting.

**A Glitch in the Process (a.k.a. Where's the Conclusion?)**. It is at this point where I ran out of relatively general information to include in this paper. All of the remaining sources I located were either checked out, too specific, unsuitable material for this paper, or couldn't be persuaded to talk for the meager amount of money I offered them. Unfortunately, that brings my paper to an abrupt end, an occurrence that (for me) is rare and upsetting. I do hope, however, to get a chance in the future to expound on the ideas presented so far. Also, I hope that as I learn more about the interesting insects commonly known as "the firefly", so that I can educate my friends and clear up the misconceptions and misinformation they hold. (— turn signals, pornography, and glowing eyes? They really do need to be educated!). [Holly Saigo, U of F]

## Editor's Note

There are many reasons for beginning a newsletter. Among ours is the shared belief that the best things in life, the stars, the moon, and the fireflies ought to be free, and available. The many phone calls and letters that we get from children, parents, reporters, and editors, asking about fireflies tell us that there is a "market." A need. We don't know how long this will last. It depends on interest, demonstrated by letters and questions. We will try for two years as a start. To get a copy write us a letter at the address given on page 2. Next time we will note publication costs, that we ff hermits pick up this time. Get your penlights and fishpoles… **we go!**