

# The Maine Entomologist

A forum for students, professionals and amateurs  
in the Pine Tree State

The Official Newsletter of the Maine Entomological Society



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## PRESIDENT'S CORNER



BY HILLARY MORIN PETERSON

Dear MES Members,

Happy November! I hope you had a lovely summer and fall season.

I spent this first summer in my role as an IPM entomologist with the Department of Agriculture, Conservation and Forestry involved with many projects, but I think the most interesting for me was working on releasing and monitoring for a biocontrol agent for the invasive swallowwort plant.

Caterpillars of *Hypena opulenta* moths, a species originally from Ukraine, are a viable option for biocontrol as they only feed on black swallowwort and do not pose a threat to native plant species. It is important to learn if they will be able to establish in the Maine climate, and to determine the best practices for releasing them to ensure their establishment and survival.

Our two-part project during the spring and summer of 2022 involved investigating the success of a previous release of the caterpillars in 2018 and 2021 in Ogunquit, and controlled releases of *Hypena* caterpillars in Harpswell. In early July, we investigated the release sites in Ogunquit along Marginal Way, looking at all swallowwort plants for tell-tale signs of caterpillar activity and staying late in the evening sampling with a black light and a sheet to try to attract the adults of the *Hypena* caterpillars (I hope to have a field trip for MES to join me next summer with this!). We did not find any caterpillar damage on plants (which have been reduced quite a bit through the work of volunteers removing seed pods) and did not find any adults. This information was important, as it helped us to modify our release strategy in Harpswell to try to ensure more survival of the caterpillars.

We received *Hypena* pupae from the URI (University of Rhode Island) Biocontrol Lab in the spring and reared these pupae to adults at the office where they were released into cages with swallowwort plants. The *Hypena* moths were brought to Harpswell in June and placed at two locations in

their cages. Two additional cages set up with just swallowwort plants and no *Hypena* were used as controls. The adult moths mated and laid eggs on the swallowwort plants in the cages, and we monitored the cages for caterpillars and rated the amount of feeding damage seen on the leaves.

So far, things are looking good. In one of the cages, the caterpillars ate every single swallowwort leaf, so we removed the cage and let them feed on surrounding plants. At both locations we were surprised by a second generation of adults in early August, meaning that we had released adults that laid eggs, fed, pupated, and emerged again as adult moths. We are hoping they will be able to pupate before winter and survive. We will continue monitoring the survival and potential establishment of *Hypena* for swallowwort control in Harpswell.

One more thing! Please **SAVE THE DATE for the 2023 Winter Workshop** on General Insect Physiology by Dr. István Mikó. The plan is to hold the workshop in Augusta in person on Saturday, January 28th. More on page 12.

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## DUES REMINDER!

M.E.S. dues are payable on a calendar-year basis. If you haven't already done so, please renew now for 2023 to guarantee uninterrupted receipt of the Newsletter; you'll find an insert inside (or as a separate e-mail attachment). Treasurer Dana Michaud's name and mailing address are also at the bottom of this page for your convenience. **Dues are \$15 per year** (\$18 if paid on-line through the web site, via PayPal), and may be paid up to two years in advance; lifetime memberships are \$300.

## Minutes of MES Annual Meeting:

October 8, 2022

Submitted by Anna Court, Secretary

Eighteen M.E.S members and guests attended the 2022 annual business meeting at Bob and Nettie Nelson's home in Clinton on October 8. This was the 25th annual meeting of the Society.

**Business Meeting.** M.E.S Vice President Michael Parisio called the annual business meeting to order at 1:30 p.m. President Hillary Peterson was unable to attend because of a conflicting family event. Present were Nina Beckwith, Kathy Claerr, Anna Court, Peter Darling, Charlene Donahue, Gail Everett, Karen Johnson, Louis King, Esther Merry, Karen Hopkins, Dana Michaud, Kathy Murray, Bob Nelson, Nettie Nelson, Roger Rittmaster, Kate Wilcox, and Frank Woodard.

### *Approval of Minutes*

**ACTION:** Minutes of the October 2, 2021, Annual Meeting were approved without one correction (misspelled name).

**Treasurer's Report:** The M.E.S. fiscal year is September 1 to August 31. Dana Michaud presented the Treasurer's Report, which showed a balance in the General Account of \$2,334.13 as of August 31, 2022. Income came primarily from dues and Winter Workshop fees (80%) and sales of M.E.S. clothes and pins (18%). Major expenditures were for anniversary T-shirts and sweatshirts (\$1,651.56), the Insect Decline Project of the Maine Audubon Society (\$1,000), the Newsletter (\$936.45), the presenter's fee for the Winter Workshop (\$400), and the 25th Anniversary Celebration (\$372.91)

Michaud reported that the balance in the Scholarship Account was \$5,386.41 on August 31, 2022. This is an increase of \$1,050.66 from Fiscal Year 2021. Funds came from \$1 assessment for each dues payment and sales of merchandise. In addition, \$1,000 was donated by Louis King in memory of Edie King. One grant (\$500) was made from the Scholarship Fund in the 2022 fiscal year to University of Maine for MES member Wesley Hutchins, who continued working with Professor Amber Roth on a project tagging Monarch butterflies. Hutchins received \$1,000 in fiscal year 2021 for this project.

M.E.S. Secretary Anna Court noted that we have 173 members of which 24 are life members. We had 14 new members in Fiscal Year 2022.

**ACTION:** The Treasurer's Report was provisionally approved by the Annual Meeting participants, pending an audit by Nettie Nelson.

**Discussion – Reflection on the 25th Anniversary Celebration.** The group discussed the event on June 4th at Viles Arboretum in Augusta. Dana Michaud organized the event and 35 people attended. The event was a complete success, members said: the weather was excellent, the speakers were interesting and their presentations informative. The graphics and displays for the event were also praised, especially the trifolds

that Kathy Claerr made. Members praised the catered lunch (Otto's By the River) and the ladybug cake which looked like a frog. Many thanks are due Dana Michaud for planning and managing the event, the group said.

### **NEW BUSINESS**

**Election of Officers.** The following individuals were nominated:

**President:** Hillary Peterson

**Vice President:** Roger Rittmaster

**Secretary:** Anna Court

**Treasurer:** Dana Michaud

**Members-at-Large:** Cathie Murray and Kathy Murray

**Newsletter Editor:** Bob Nelson

Anna Court read a statement from Cathie Murray about her desire to remain as Member-at-Large. Anna also suggested that at the first M.E.S. Executive Meeting (early November) the roles of each position be reviewed and clarified. Mike Parisio, who is retiring as Vice President, said that he would get Roger Rittmaster up to speed on the obligations of that office including managing M.E.S. monthly webinars.

**ACTION:** The nominated individuals were elected unanimously.

**Discussion – Open Meetings Requirements.** Kathy Murray suggested that we open the quarterly Executive Committee Meetings to all members in some fashion. It was suggested that we could post notice of Executive Committee meetings on the M.E.S. website and also post minutes.

**ACTION:** The Executive Committee will review the bylaws and Constitution and discuss this matter at their first meeting.

**Discussion – Bylaws Revision.** Kathy Claerr rewrote the M.E.S. bylaws and Constitution to make operations more flexible for the Executive Committee. She said these would be circulated for comment and discussed at the November Executive Meeting. A vote of the full membership will have to be completed at least three weeks prior to the Annual Meeting. Kathy Claerr, Kathy Murray and Gail Everett are on the sub-committee to present the bylaws and Constitution revisions to first the Executive Committee in November. The Executive Committee will then present the final drafts of these documents to the Society membership to adopt via voting.

**ACTION:** This procedure was approved by vote of the members present.

**Discussion – M.E.S.'s Online Presence.** Kathy Murray reported on the current online activity for the M.E.S. Facebook page, Maine Insects. The Group has 5,600 members and there are daily posts including excellent photographs with many requests for identification that are answered by group members. The moderators for the Facebook Group are Kathy Murray, Hillary Peterson, Serene Sligona, and Haley Mealey. Kathy Murray noted that this function is working well and that additional moderators are not needed.

*(continued on next page)*

(Minutes, cont.)

**Discussion – Partnering with Land Trusts for M.E.S.**

**Field days.** Roger Rittmaster suggested that for some of our Field Days we could co-sponsor with land trusts in the areas we want to visit. This will expose our Field Day offerings to larger groups of people.

**Discussion – Outreach to Youth.** The group discussed the need to interest youth in entomology. One avenue would be through Maine Master Naturalists. Kathy Murray, Kathy Claerr, and Gail Everett are interested in generating ideas on this issue.

**Discussion – Ad Hoc Committees.** The group discussed the need to consider what ad hoc committees we should have and identify members. Anna Court said that we should rejuvenate the Scholarship Committee to recruit scholarship participants.

**MES Field Trips and Activities.** The group discussed the need to formalize Field Day procedures and responsibilities for facilitators. Hillary Peterson has a format for this which needs to go up on the website. The following events are planned:

**Insect Workdays at the State Museum.** Insect collection work days at the State Museum Annex may be scheduled on Monday holidays if Dana's and Charlene's schedules permit. Email notices will be sent out in advance of a work day. Dana and Charlene are usually at the Annex most Mondays and sometimes Thursdays throughout the year. Individuals can volunteer on any of those days – just be sure to contact one of them in advance to make sure someone will be there.

**January 28 Winter Workshop.** The group discussed the winter workshop to be held in January. Istvan Miko will present on insect physiology. He already has prepared a class on this subject that he teaches at University of New Hampshire. Tom Schmeelk, Michael Parisio, and Hillary Peterson will organize the workshop and hold it at the Maine DACF in the Deering Building, Augusta.

**March 25** Field Day, Maple Syrup and Insect Collecting, Whitefield; Leader: Charlene Donahue.

**April** Workshop on writing about insects. Kathy Claerr will organize this workshop which was postponed because of the pandemic. Kathy said we may offer the workshop as a hybrid – both in person and on Zoom. Seri Lowell will be asked to conduct the workshop.

**May** Field Day, Southern Maine, Ringed Boghaunter Dragonfly search. Pete Darling will facilitate this Field Day, working for the third year with Mark Ward.

**June 24** Field Day, Kennebec Land Trust, Oak Hill Conservation Area, Fayette. Dana Michaud will facilitate this Field Day.

**July 8** Field Day, Camden Snow Bowl; Roger Rittmaster and Kathy Murray will lead.

**August 5** Field Day, Lubec. Bob Nelson will facilitate and suggest places for an overnight stay.

**September 9** Field Day, Goodwill-Hinckley trails, Hinckley, Maine.

**September 30** Annual Meeting, Clinton; at Bob and Nettie Nelson's home.

**Adjourn.** The group voted to adjourn the meeting at approximately 3:30 p.m.

\* \* \* \* \*



The common fruit fly, *Drosophila melanogaster*. Length ~ 3mm (1/8"). Photo by Mohammed El Damir, Bugwood.org .

### My Pet Fruit Flies by Frank Woodard

I walked into a hardware store during harvest season and they had a big new display selling fruit fly traps. Why would anybody want to trap fruit flies? Do they make good pets?

Like any "kid," I like to try insect pets. Crickets sing but don't live long. A fat juicy green caterpillar found in the Autumn builds a cocoon and emerges as a stunning Cecropia Moth in the spring. I have several fish tanks I use as terrariums to host insect pets and nurse plant cuttings.

At the time my largest terrarium, an illuminated twenty-gallon tank with a thirty-inch-tall glass and wood top, was filled with sod from a construction project the year before, with its complement of flowers, grasses, worms, little black flying things and of course the ubiquitous house spiders, since I'd left a door open. It's far from the human food in the darkest part of the basement, yet creates the illusion of a sunny window as well as a very real little ecosystem. There's always a couple fruit flies around when processing tomatoes, so I threw some half-eaten watermelon in the terrarium and waited to see if the fruit flies would find it. After a few days about a half dozen fruit flies found the watermelon and I closed the door.

My new pets soon disappeared. Yet a couple weeks later I went down and there were several dozen fruit flies happily flying about the fat spiders. It wasn't long before a few escaped.

Fruit Flies are like cats, in that mostly they ignore me and hang out in the sinks until suppertime. Then they're like dogs. They show up by the food asking, "What you cooking Daddy? Can I have some?" They then hang close during supper, hoping I'll let them lick the plate. Their favorite farm food other than fruit, is buttered bread. Their favorite

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**(Fruit Flies, cont.)**

farm drink is whiskey. After a month or so, once again my pets disappeared, only to reappear a couple weeks later. Now there were a couple hundred! I added more watermelon.

I learned in great detail the life cycle of the Drosophilidae (Latin for "fruit fly"), from a small number of busy little flies that dwindle away, to the emergence of larvae munching on whatever grows on decaying watermelon, to pupae clinging to every flat surface and a brief pause ending with MORE! The terrarium was a busy place and the spiders were real happy!

By the third generation, there were about five hundred of them. While the antics of a few are entertaining, a few dozen escapees are a big nuisance! I tried to seal up the terrarium, filling every little crack and adding more screen around the vents. The I added more watermelon hoping they would be happy and stay put. They still escaped!

I'd had enough! Of course, being a responsible pet owner I couldn't set them free in the middle of winter. I added more watermelon. I would endure two more iterations that winter, though about five hundred seemed to be the limit my little ecosystem could produce. But now the best I could hope for was several dozen escapees at all times. I took to vacuuming the ones in the kitchen at supertime. I didn't feel too guilty, as there were plenty more.

Finally, on a warm spring day, after the snows had melted and the tank was in a lull, I took off the top, brushed aside the plump cellar spiders so they could get the dozens of flies that had just escaped in the house, and set my pets free by dumping the tank out by the compost pile.

I don't know what that hardware store chain was thinking. Fruit flies do NOT make good pets!

\* \* \* \* \*



**A cuckoo wasp, family Chrysididae. Photographed in Corea, Maine, by Margie Patlak.**

**Insect Safari  
By Margie Patlak**

Every day last summer I went on an insect safari in my backyard flower garden.

Armed with my iPhone and an observant and patient eye, I trailed whatever flying bug came my way and snapped a picture of it when it stopped to rest or eat, or I zoomed in and took pictures of the specks skating the surface of flower petals.

Every day my findings amazed me.

My discoveries included two kinds of bird-poop-mimicking moths, a dozen different kinds of bees, multiple kinds of flower flies that mimic bees with their stripes, iridescent beetles and wasps, a moth that resembles a hummingbird, and numerous humpbacked dance flies wearing golden slippers of pollen. My world enlarged immensely once I started doing these backyard safaris that focus on the minute and exotic around me rather than the tigers, elephants and other huge beasts comprising traditional fodder for such trips.

Like most people, I once tended not to notice tiny insects, even though they outnumber us on the planet by more than 200 million times, according to the Smithsonian Institution. But my camera phone and photo editing software can capture and enlarge these creatures so they fill my screen. With that capability along with the use of the app iNaturalist to identify them, I discovered all sorts of critters I didn't know were there.

Many are stunningly beautiful.

One morning I spotted something glinting on a leaf and discovered it was made by a golden 2-millimeter-sized long-legged fly. Another time the macro lens of my camera transformed a green speck that landed on my sweatshirt into an elongate glittering emerald tiger beetle with distinctive white spots and long antennae. Often the insects were more gorgeous than the flowers on which they landed.



**A Hybotid dance fly (family Hybotidae). Photo in Corea, Maine, by Margie Patlak.**

The variety of butterflies and bees detected multiplied exponentially once I learned to carefully follow them until they stopped to suck nectar from a flower. While they were immobilized there for a few seconds, I captured them with my photos, instead of a net, and identified them later. It turns out orange-and-black butterflies are not all monarchs,

*(continued on next page)*

**(Insect Safari, cont.)**

but rather a number of species with fanciful names like the Great Spangled Fritillary, the Northern Crescent, and American Lady. And the bees in my garden weren't just the large and obvious bumblebees, of which I detected several kinds, but also the much smaller sweat, leaf-cutter, or furrow bees. These smaller bees are only between one-quarter and one-half inch in length, and are barely noticeable with the naked eye.

I even discovered previously unnoticed lifecycle forms of insects--the half-inch-long, oblong patches of flat black scales attached to one of the walls of my house are the juvenile forms of fireflies; the fat white grubs with brown heads found while digging in the garden are the larval forms of June bugs.

One morning I noticed a bee unusually still on a flower. It wasn't until zooming in on the bee to take a picture that I discovered a well-camouflaged crab spider clutching it. The spider had paralyzed the bee with its venom so as to consume it. A life-and-death drama befitting a David Attenborough nature show all happening on a black-eyed Susan petal.

I don't have to go on an African safari to see new exotic creatures. Instead I can venture out into my own backyard where there are many animals I've never seen before--hiding in plain sight.

*(A slightly different version of this story appeared in the Central Maine Newspapers in early September.)*

\* \* \* \* \*

**Observations on the Downeast Insect Fauna**

**by Tony Roberts**

Twenty years have now gone by since the prevailing suite of moths, large and small, which I surveyed intensively over the prior two decades immediately on the coast of Steuben, in "Down East" Maine, quite suddenly collapsed. Along with it, virtually all other local insect life, right down to the Blackflies and the Mosquitoes, also all but disappeared, leaving a vacuum of the sort Nature is said to abhor -- a virtual Insect Armageddon!

Adding poignancy to the loss, the fauna I had documented proved to be an exotic mix of Boreal and Holarctic species, strongly suggestive of a Relict Postglacial suite still retaining -- but just barely, as it proved -- a fragile toehold here in what had at one time been persistently wet and boggy terrain extending out along the coves and inlets of Frenchman's Bay.

But dry runnels on the sloping meadow, abandoned cattle/tractor trestles, and remnants of boardwalks in the woods as we found them in 1983, all showed that our immediate parcel of land had once been far wetter, at least seasonally, in the not-too-distant past. It would appear that the terminal drying of the soils is the proverbial last straw in exterminating our local insect fauna.

Well, now, two decades on, while moths are still painfully scarce here, a miniscule component of newcomers have begun - just barely! - to dip their six toes in, too late in the life of this witness to determine, but perhaps worth a shout-out and a welcome: 'Yes, Nature does abhor a

vacuum, even if it takes its own decades and decades simply to begin the restocking!

I add that we are accustomed to hearing of reparations made by human hands, and on a human timetable, for our infringements upon Mother Nature - but clearly these are but ecological window-dressing, more especially here in the North - in 'short-season' country.

The lesson remains: For true repopulation to occur, we must remember to defer to Nature, who performs her work on an Evolutionary scale!

**About Hunting Cocoons  
by Edith Marion Patch**

(reprinted from *How Laddie Tells the Time O'Year*  
by Edith Marion Patch)



NCE when it was winter,  
There was a silken box  
Tied to a branch of apple,  
and it hadn't any locks.

Outside the threads were tangled:  
Inside you couldn't see,---  
You had to wait 'til springtime  
To find what it would be.



'Cause when the sun gets hotter  
And flowers start to sprout,  
Then, if you watch these boxes,  
The nicest things come out.

So now, "most every winter  
A hunting trip I plan  
To gather cocoon secrets;  
And guess them,--- if I can.



\* \* \* \* \*



## Hungry Plants in Porter Lake (or other lakes and ponds)

by Hal Hutchins, Kathy Hutchins and Charlene Donahue

One of my favorite movies growing up was "Little Shop of Horrors," featuring Audrey, the always hungry man-eating plant. Fortunately, there are no voracious plants in Porter Lake unless you are a small organism.

We share the lake with at least three of the many species of ever-hungry carnivorous plants. They thrive where there is little nitrogen available to most plants. Our sundews, pitcher plants and bladderworts can be found in the northern swamp of the lake where low nitrogen conditions are perfect for them.

Kayaking or canoeing along the edges you will spot red tinged mossy logs, home to sundews and pitcher plants. Up toward the beaver lodge you will find floating rosettes with yellow flowers and trailing "stems" supported by tiny bladders of the bladderwort.

Although common sundews (*Drosera rotundifolia*) are tiny (1-2 inches across) with leaves arranged in a rosette, I have seen areas carpeted with these delicate but hungry plants. The reddish "glow" that can be spotted from a distance is created by the thousands of tiny red hairs that cover each leaf. Each hair produces a sticky drop that attracts and entraps small insects and other prey. Mosquitoes, flies and spiders are commonly trapped, but any insect small enough to be ensnared by the sticky tentacles will be eaten. Once the prey is caught, each leaf will slowly curl up, trapping and slowly digesting its meal. After a few days the leaf will unroll, resetting its trap.



Pitcher plants (*Sarracenia purpurea*) are the largest of Porter Lake's carnivorous plants. They may range in size from 5-12 inches tall and are often found on moss-covered stumps. The "pitchers" are modified rolled leaves. Inside are down-pointing hairs and a slippery surface to facilitate insects sliding into the liquid at the bottom, with no way up.

The plant gains needed phosphorous and nitrogen from the insect's body.

Not only do pitcher plants eat insects, but they are also home to a number of insects that have evolved with them. This includes the larvae of the Pitcher Plant Midge (*Metriocnemus knabi*), Pitcher Plant Mosquito (*Wyeomyia smithii*) and at least nine species of flesh flies (Sarcophagidae) (Dahlem and Naczi, 2006). These insects feed on the decomposing insects that have drowned in the pitcher plant. Then there are spiders that compete with the plants for prey, and also assist by discarding unpalatable catches into the plant (Jennings et al., 2008).

Bladderworts (*Utricularia* spp.) gets their name from the thousands of tiny bladders seen in long, floating strings. They lack true leaves, roots and stems and are the most numerous of carnivorous plants worldwide. Out of each bladder stick both long and short hairs. The long hairs guide tiny organisms into the small hairs in the bladder opening. This activates the bladder, causing it to pop open and suck the creature into the trap. Bladderworts eat tiny crustaceans such as daphnia and ostracodes, tadpoles and mosquito larvae. The mosquitoes and tadpoles are a bit out of the size range for the bladderworts, but the plants overcome this by holding onto the animal's tail and digesting it bit by bit (Lloyd, 1942).

*Note:* This article was first published in the *Porter Lake Newsletter* by the first two authors. Additional information on insects was added by Charlene Donahue for submission to *The Maine Entomologist*.

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- Lloyd, F. E. 1942. *The Carnivorous Plants*. Waltham, Massachusetts: Chronica Botanica Company; 352 pp.

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### **Bug Maine-ia Brainstorming Session Planned**

Though the Maine State Museum in Augusta is still undergoing renovation and not expected to reopen until 2025, planning in many areas is underway.

Joanna Torow, who's coordinated Bug Maine-ia in the past, has suggested that all interested former and possible future Bug Maine-ia presenters and supporters get together for a brainstorming meeting via Zoom. We could chat about how we see Bug Maine-ia looking in the future, and maybe someone will have the brilliant idea that may be needed to get things moving forward.

She's thinking about pulling this together in early 2023 – after the holidays but before key people are doing fieldwork. Anyone interested in participating should contact her at [Joanna.Torow@maine.gov](mailto:Joanna.Torow@maine.gov).



Several species of fungi have evolved to attack and feed on insects as part of their lifecycles. When that happens, you can often see the fungal spores or filaments on the insect's corpse.

- Image courtesy of Bobbi Jo Hodgdon.

## A fungus in Maine turns flies into zombies to kill necrophiliac mates

by Julia Bayly

It's hard to feel much compassion for a common housefly. But even the most insect-phobic person might muster up a bit of empathy for any fly falling victim to a fungus capable of rendering it a necrophiliac and then killing it.

*Entomophthora muscae*, also called the "zombie fly fungus," is a parasitic fungus that survives by infecting houseflies, and it's right here in Maine attacking flies in houses and gardens around the state.

As parasites go, the zombie fungus is particularly horrifying, with a life cycle that seems more at home in a Stephen King novella than a scientific research article. A recent study out of Denmark\* shows the fungus actually takes control of a female fly's behavior while consuming it from the inside out. It then uses the corpse to attract and infect male houseflies.

According to the study, once the fungus infects a female fly with its spores, it spreads and feeds on her body from the inside. After about six days of feasting on the living fly, the fungus takes over its behavior and forces it to climb to the highest available location, where the female finally dies, leaving only a hollowed-out corpse.

Then things really get gruesome.

According to Dr. Seanna Annis, associate professor of mycology and plant pathology specialist with University of Maine Cooperative Extension, the spores position the fly before it's even dead.

Several species of fungi have evolved to attack and feed on insects as part of their lifecycles. When that happens, you can often see the fungal spores or filaments on the insect's corpse. "They direct the fly to this high location and to put its head down, abdomen sticking up in the air and the wings spread out," Annis said. "Then it dies in that position."

After it dies, the fungus cracks the corpse open, breaking out and shooting off its spores.

"The idea is the spores will fly high and far enough that a new fly will come in contact with them," Annis said.

But the fungus has another trick up its sleeve.

Once the host fly is dead, the fungus starts to release a special chemical signal aimed at male flies.

"The chemical signals act as pheromones that bewitch male flies and cause an incredible urge for them to mate with lifeless female carcasses," explains Henrik H. De Fine Licht, an associate professor at the University of Copenhagen's Department of Environment and Plant Sciences and one of the Denmark study's authors. "Our observations suggest that this is a very deliberate strategy for the fungus [and] it is a true master of manipulation — and this is incredibly fascinating."

In this chemical-induced zombie necrophilia, male flies copulate with dead females, and the fungal spores are showered onto the males, who will later suffer the same gruesome fate as the dead female. It also means the fungi's spores are successfully spread after it flies away.

That, according to Debbie Eustis-Grandy, biology instructor at the Maine School of Science and Mathematics in Limestone, is the ultimate goal.

"Spore dispersal is one of the ways fungi reproduce," Eustis-Grandy said. "For really all organisms [reproduction] is the key goal."

Most fungi disperse their spores via air currents, but Eustis-Grandy said others have taken a different approach by co-evolving with a second, entirely different species to get the job done. Such is the case of *Entomophthora muscae*.

"They have evolved side by side," she said. "Subtle changes in one result in subtle changes in the other."

Another example of this are the parasites that can cause toxoplasmosis in pregnant human females. It's found in cat feces and is the reason pregnant women are strongly discouraged from being around soiled cat litter.

"The parasite requires two hosts, and one is mice," Eustis-Grandy said. "When it infects the mice it makes them stupid, so they are easier for cats to catch, and that's important because cats are the final host for this parasite."

In the case of the zombie files, Licht's research also showed that the longer the female fly is dead, the more seductive it becomes because the number of fungal spores increases with time.

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**(Zombie Fly Fungus, cont.)**

In the future, according to Licht, the chemical found in the fungus could be used to create a biological pesticide.

In the meantime, there is no indication that *Entomophthora muscae* is at all harmful to humans or capable of turning them into zombies. It's just one of the many fungal spores humans breathe in and out every day.

"You often see 'zombie flies' high up on a windowsill or ceiling," Annis said. "But you are never going to get a zombie person because of it."

\*[<https://www.sciencedaily.com/releases/2022/07/220715105806.htm>]

(This story first appeared in the **Bangor Daily News** on August 24, 2022.)

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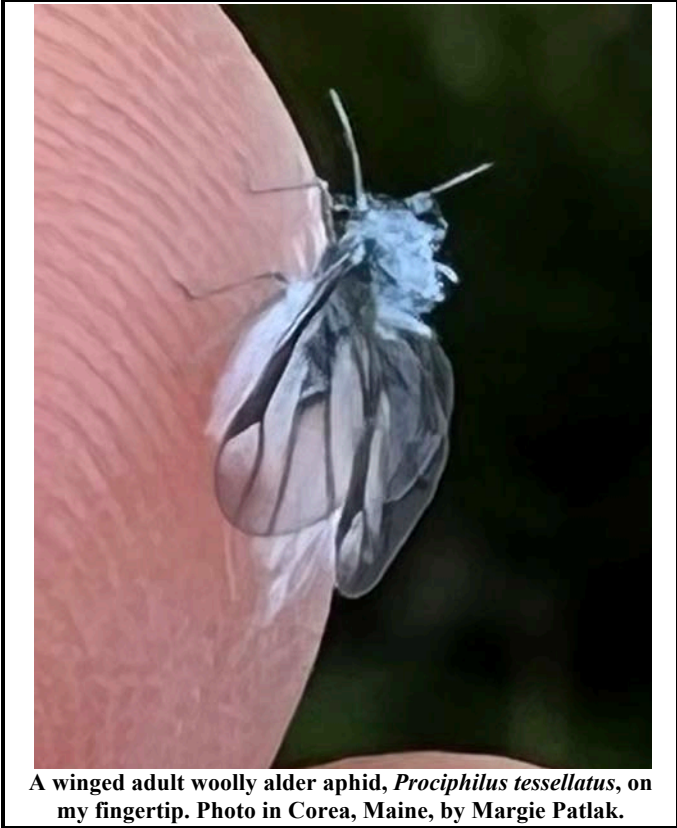
**Fall Fairies**  
by Margie Patlak

It was a fantastic fairy dance performed by tiny insects omnipresent in the air and sparkling like dust motes in the sun. What were they? Unlike swarms of frenetic darting gnats, these flying insects were more spread out and moved more slowly. They seemed to be drifting on the air currents and were so abundant this past fall in Maine that many people were commenting on them in the Maine Naturalist or Maine Insects Facebook pages.

People called them floating fluff or lint, snow flies, or blue fuzzy butts, the latter referring to their diaphanous powder blue tutus that resemble something Tinkerbell would wear. Others mistook them for plant seeds dispersed by the wind. One thing was for certain: you couldn't possibly feel alone in the world when surrounded by so many luminescent specters. There was something magical about their sudden sparkling omnipresence, like dust sprinkled by some wizard's wand from above. While putting my garden to bed for the winter, I took time out to marvel at this ephemeral phenomenon, aware it couldn't last coming on the shirttails of fall with frost already feathering the groundcover. What was flying about so late

in the season, so long after the butterflies and bees had left us?

Fortunately, these little buggers weren't skittish and when one landed on my palm I was able take a picture of it with my phone and submit it to iNaturalist, which informed me it was the adult form of the woolly alder aphid, *Prociphilus tessellatus*. I was already well acquainted with aphids, often spotting them sucking on the stems and leaves of my garden flowering plants, but I didn't realize these insects could wing it! And wing it they did, having the final fall fling of insects destined to spend the winter as eggs tucked into the crevices of tree bark, assuming chickadees and other birds that stay north during winter didn't dine on them.



Until I got the iNaturalist identification, I didn't realize that these fairy flies were probably related to a less prosaic colony of woolly alder aphids I had come across earlier in the summer prior to them morphing into their adult magical forms. These were sooty-colored and rough-textured in a regular (tessellated) fashion, like miniature hand grenades but with white feathery streamers attached to them. Those streamers stem from wax secreted to make them distasteful to predators and to also possibly help them stay aloft in their later flights when they become winged adults.

When I expanded the photo I took of these woolly aphids on an alder shrub and looked more closely, I could see some lighter presumably newborn aphids hiding under their larger and woollier mothers. Multiple generations of aphids are born live like this in quick succession from virgin females, rather than from the fertilized eggs that result from mating. That way the aphids can more rapidly

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*(Fall Fairies, cont.)*

populate an area when food is abundant. Some joke that by the time an aphid has made her way up a plant stem she is feeding on, she's become a great-great-grandmother!

Woolly alder aphids suck away their younger days on maple leaves before transitioning to alders in summer. They are often minded by black ants, who protect them from predators and herd them to new hosts when the sap becomes less nutritious or abundant. In exchange, the ants dine on the aphids' honeyed excretions. Studies show such "farmed" aphids produce more honeydew in their lifetimes than those not farmed by ants.

Some adult woolly aphids opt to wait out winter on alder branches in tight clusters, encased in their own waxy wool. But shorter daylight hours trigger most woolly alder aphids to transform into their final adult flying forms. These glitter the nippy air during sunlit fall days as they try out their new wings while looking for mates and a suitable maple tree on which to lodge their eggs. Unlike their predecessors, many of these lucky aphids get to have sex before they die when the cold weather ensues. But first they put on a dazzling display.

I recommend sitting back with a warm mug of freshly made cider in hand to enjoy this fantastic fall spectacle in Maine, one that triggers that special kind of wonder that only nature can induce.

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**M.E.S. Members Publish on Effective  
Browntail Moth Biocontrol**

M.E.S. members Ellie Groden, Karla Boyd, and Charlene Donahue have just recently (6 October, 2022) published a major paper in the *Journal of Economic Entomology* on the potential for biocontrol of the browntail moth. Entitled "Evaluation of Biorational Insecticides for Management of *Euproctis chrysorrhoea* (Lepidoptera: Erebidae)", their paper presented their research results showing that multiple previously known biocontrol agents, including parasitic fungi and bacterial agents, were effective in decreasing the numbers of caterpillars in both laboratory and field settings.

Bob Nelson (BeetleBob2003@gmail.com) has a pdf copy of the article, which of course could also be obtained from any of the authors.

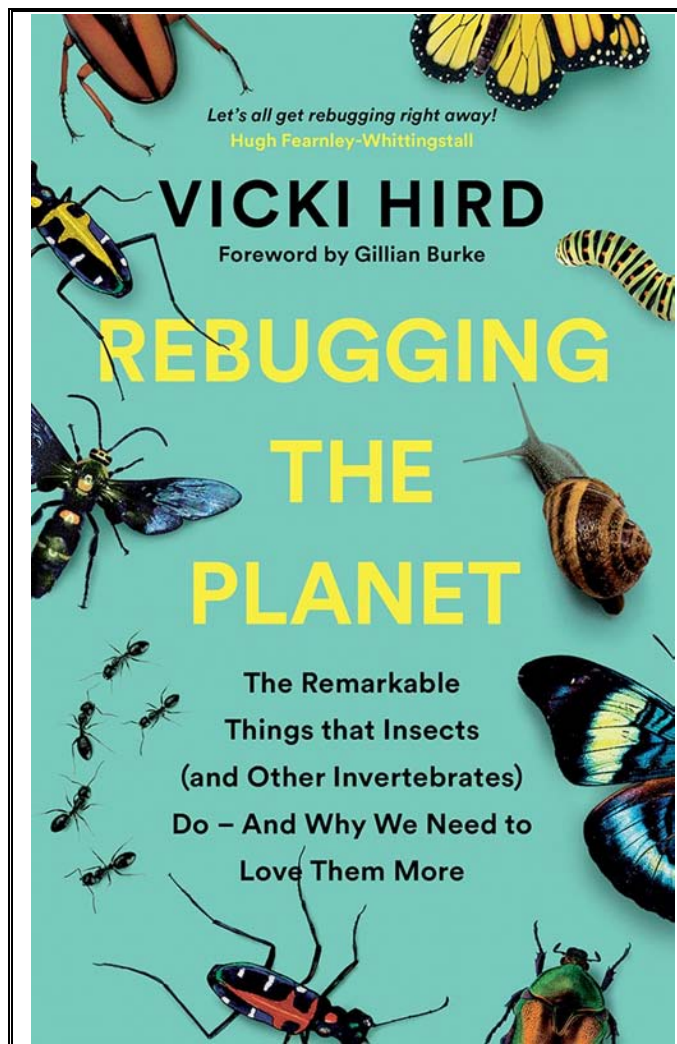
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**Learn to Identify Wasps!**

There's an on-line course in wasp identification being offered in **January, 2023**, through Pennsylvania State University. The WaspID Course covers family-level identification of worldwide wasp families as well as wasp morphology, collection and preservation. No experience in entomology is required, and the course is designed with all possible audiences in mind.

Cost for basic registration is \$50; it's \$40 for students, and \$60 for those wanting professional certification. For more information, go to

<https://waspidcourse.wordpress.com/>



**Book Review: by Dana Michaud**

*Rebugging the Planet, The Remarkable Things that Insects (and Other Invertebrates) Do - And Why We Need to Love Them More*, by Vicki Hird; 2021; Chelsea Green Publishing; 224 pages, 5½" x 8½"; ISBN 9781645020189. (\$17.95 list price)

This is an enlightening book for the many amongst us who would like to help re-bug the planet, and wish to learn how to do so.

Hird, with a Masters in Pest Management, is an experienced, award-winning environmental campaigner involved mainly with the food and farming arena. In her Foreword, she issues a dire warning to mankind, and one which cannot be ignored. We have lost GLOBALLY, 10% of all insects annually since 1970, and will have lost 80% by 2050 (some places in Europe have exceeded this target already). If mankind doesn't respond to this ever-growing threat of species losses, the effects of inaction will reveal themselves through gradual loss of other species dependent on invertebrates for food or pollination. Over 90% of our flowering plants rely on insect pollination, many being our fruits and vegetables. Hird then explores the many reasons contributing to the decline. She defines re-wilding and re-

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***(Rebugging the Planet, cont.)***

bugging, and urges citizens to join forces to change how we live, buy things, and engage in society.

In Chapter 1, "Rebugging our Attitudes," Hird reminds everyone that as children, we were taught the pros and cons of insects early in life. Some sting and bite, while others pollinate our flowers and fruit trees, and aerate our soil. A 2006 study, in the U. S. alone, put their value to the economy at \$57 billion a year. In Chapter 2, "What bugs do for us," many of the positives insects have on humans is explored. They're waste recyclers of all things organic. They're population controllers of each other, contributing to pest management. And they have uses in medicine, in maggot and leech therapies. Hird finally touches upon entomophagy, the consumption of insects as food, practiced commonly amongst 1/3 of the human race.

Chapters 3 ("Rewilding by rebugging") and 4 ("Parks and recreation: rebugging your world") explore the concepts of re-establishing certain ecosystems that have been altered, replanting lost native species of plants that were vital to many endemic species. In rewilding one specific land holding of 3500 acres, one of the many species of creatures that returned was the purple emperor butterfly, a species that had almost disappeared from the U. K. The butterfly, once thought a woodland species, actually prefers a scrubby habitat, a byproduct of the rewilding efforts. This provides clear evidence that we have much to learn about the creatures with which we share Planet Earth.

The following two chapters, titled "The bigger bug challenges" and "Why our farming, food, and shopping need bugs," cover the threats man imposes on the invertebrate world, via climate change, pesticide use, pollution (noise, light, and chemical) and invasive species. Hird also covers the practice of monocultures, the perfect-looking fruits and vegetables, crop rotation, IPM (integrated pest management), and reducing waste that ends up in landfills.

In Chapter 7, "Putting bugs into politics and the economy," Hird examines the power of food industry, and the breadth by which so few control so much, for so many. Six companies control most of the global food trade and earned \$376.9 billion in 2018, of which Cargill, the world's largest, earned \$115 billion. Here the world's huge monocultures of corn, rice, wheat, and soybean dominate the markets, at the expense of all the other denizens of these species-poor acres. If variety IS the spice of life, then monocultures are the bland antithesis.

In her final two chapters, "Imagined a rebugged planet" and "You don't have to rebug alone," Hird reiterates that we are all in this together and every individual can affect the outcome by doing their small part to reverse the cumulative effects of years of apathy and indifference. In changing our attitudes towards "bugs" and by "rebugging," mankind, as well as all of Earth's inhabitants, can benefit from the environmental improvements that will occur from our respect of this earth and the life forms with which we share it. At the end of Chapter 9 is a section (pages 175-188) listing organizations that can help us in our efforts to re-bug and re-wild.

It is now time to "rethink our place on this earth" and the very danger we pose to all life, both big AND small. Vicki Hird's "Rebugging The Planet", at a cover price of \$17.95, is an affordable easy read, filled with facts and information that many, who wish to re-bug and re-wild, can utilize to take part in healing our ailing planet, one piece of land at a time. In doing so, it's a win/win situation for all involved.

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***Book Review: by Dana Wilde***

*All You Need to Know About Spiders*, by Wolfgang Nentwig, Jutta Ansorg, Angelo Bolzern, Holger Frick, Anne-Sarah Ganske, Ambros Hänggi, Christian Kropf, and Anna Stäubli; Springer, Cham, Switzerland, 2022; 260 pages, hardcover, \$29.95.

This summer I came across a cool book for general readers, *All You Need to Know About Spiders*, by arachnologists of the Association for the Promotion of Spider Research based in Europe. It's an introduction to the physiology, behaviors, and life cycles of spiders, together with some observations on how humans interact with them.

Chapters in "Part I: Facts on Structure and Function" are titled "Getting to Know Spiders" (with crystal-clear diagrams); "How Do Spiders See?"; "Poison Without Sting: The Weapon of Spiders"; "Silk for Many Purposes"; "How Spiders Eat," for some examples, and they cover exactly the

*(continued on next page)*



***(All About Spiders, cont.)***

basic material indicated. "Part II: We Are Living in a World of Spiders" covers topics such as how spiders adapt to seasons and the importance of spiders in the environment. Sections on the increased dispersal of spiders into non-native ranges due to human contact and climate change are particularly interesting.

Part II also offers a couple of chapters on specific spiders commonly found in mainly Central European houses and yards. It happens, largely due to similar climate and habitats, that many spiders found there are also found in Maine, so this book makes not just a good general introduction to spiders, but also a mini-guide to a few of our most visible spiders. There are information-packed sections with great photos, for example, on *Pardosa* and *Trochosa* genus wolf spiders; *Argiope* genus garden spiders; *Xysticus* and *Misumena* crab spiders; *Pholcus phalangioides* (cellar spider); and orbweavers such as *Araneus diadematus* (cross orbweaver) and *Larinioides sclopetarius* (bridge spider), whom I find frequently every summer in my haunts around Troy.

"Part III: Our Emotional Attitude Toward Spiders" offers some sympathetic observations on humans' fear (and love!) of spiders, which seems to be a somewhat neglected, but interesting topic in spider studies.

*All You Need to Know About Spiders* is a great, down-to-earth introduction to spiders that could be used alongside Rainer Foelix's encyclopedic (and endlessly fascinating) tome *Biology of Spiders*. Anyone, from the just plain curious to specialists can find useful information here, given in prose so conversational you can even notice the European accent in some translated turns of phrase.

*All You Need to Know About Spiders* is available through the scientific publisher Springer's website, < <https://link.springer.com/book/10.1007/978-3-030-90881-2> > and through on-line book sellers. Some of the proceeds go to support the Association for the Promotion of Spider Research, which is based in Bern, Switzerland, and maintains the *World Spider Catalog*.

**Catch the Webinars!**

M.E.S. webinars are a really cool way to learn all about Maine's insect fauna, and sometimes just on insects in general. Vice-President Roger Rittmaster and his Webinar team will be lining up great speakers for the coming winter season, when outside insect-related activities are limited in potential.

One of the planned webinars will be Roger himself discussing the use of iNaturalist, a web site that uses AI (Artificial Intelligence) to identify good photos of insects and other macroscopic organisms, from birds to marsh plants. If time permits, he will also discuss BugGuide, which is devoted specifically to insects and terrestrial arthropods, such as mites and spiders.

The webinars will be scheduled on the second Tuesday of each month, from 7:00-8:00 p.m., from December to May. **The first webinar will be at 7:00 p.m. on December 8th, and will feature Jennifer Lund discussing wasps. Not to be missed!** Speakers and subjects will be announced via a membership-wide e-mail. Past webinars are recorded, and may be seen at <https://www.maineentosociety.org/webinar-archive>.



**Marj Dearborn at an M.E.S. field day in Fort Kent in 2008.  
- Photo by Bob Nelson**

**Remembering Marj Dearborn**

Long-time M.E.S. members will remember Marjorie Dearborn, wife of M.E.S. founding member and first President Dick Dearborn. Though trained herself primarily as a botanist, Marj was a regular and engaged attendee at numerous early M.E.S. field days, and had a sharp eye for spotting interesting specimens in the field. She was also the "hostess with the mostest" when the Dearborns hosted the annual meetings at their home in Mount Vernon, serving up incredible meals and infectious laughter in equal measure.

Marj passed away unexpectedly at home on Friday, November 4th; a gathering in her memory took place on Saturday, November 12th. She was predeceased by Dick in 2018, but leaves behind seven children and their families.

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**M.E.S.'s "Science Guy" Has His Own Web Site!**

Long-time M.E.S. member Jon Wallace has a fascinating web page up and running, that features his broad spectrum of scientific interests:

<https://scienceguymaine.com/>

Featured are numerous photos he's taken of micrometeorites that he's found - and hopefully, coming soon, some of his spectacular insect photography. As of right now, there's just a "teaser" in the head of a honeybee - that's so up-close and detailed it's sharper than when you're looking at a live bee yourself in a flower!



