VES NEWS

The Newsletter of the Vermont Entomological Society

Number 110
Winter 2021

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The **Vermont Entomological Society** (VES) is devoted to the study, conservation, and appreciation of invertebrates. Founded in 1993, VES sponsors selected research, workshops and field trips for the public, including children. Our quarterly newsletter features developments in entomology, accounts of insect events and field trips, as well as general contributions from members or other entomologists.

VES is open to anyone interested in arthropods. Our members range from casual insect watchers to amateur and professional entomologists. We welcome members of all ages, abilities and interests.

You can join VES by sending dues of $15 per year to:

Deb Kiel
147 Allen Irish Road
Underhill, VT 05489

Front Cover Photo: European Hornet (*Vespa crabro*), a non-native VT hornet (left) and Asian Giant Hornets (right)
Photo by: Hanna Royals, Museum Collections: Hymenoptera, USDA APHIS PPQ, Bugwood.org
Back Cover Photo: Scalloped Sack-Bearer (*Lacosoma chiridota*) Photo by: JoAnne Russo

For more information on the Vermont Entomological Society, visit **www.VermontInsects.org**

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Newsletter Schedule

Spring: Deadline April 7 - Publication May 1
Summer: Deadline July 7 - Publication August 1
Fall: Deadline October 7 - Publication November 1
Winter: Deadline January 7 - Publication February 1

Membership

Check Your Mailing Label

The upper right corner of your mailing label will inform you of the month and year your VES membership expires.

Dues are $15 and can be sent to our Treasurer:

Vermont Entomological Society
c/o Deb Kiel
147 Allen Irish Road
Underhill, VT 05489

President's Message

This is a note to welcome everyone to the new year. We start the new year still in the throes of an international pandemic; fortunately, vaccines have started to be made available. I want to acknowledge that the Covid-19 pandemic has likely affected some aspect of all our lives; for some in a very profound way.

Insect wise the pandemic multiplied my usual activities as I found myself doing a greater amount of identifications and dissections, etc. I also was able to make the occasional field foray and run a light on an almost nightly basis. I ended 2020 with a personal record of 1,258 lepidoptera dissections for the year.

Annual meeting: We haven't made up our mind yet as to what we should do for an annual meeting. Not likely that we will be meeting in person this Spring. We will either meet in person or via internet this Fall.

Volunteer opportunities: VES is looking for individuals to relieve Bryan Pfeiffer in managing the VES website and to help Laurie DiCesare in getting the newsletter into Publisher format. We are also looking for individuals to volunteer to lead field trips and conduct seminars.

VES Tax deductible: A reminder that donations to the Vermont Entomological Society are tax deductible. Donations to the society support our activities as well as keep the society viable.

VES Facebook Group: VES has a Facebook group. I encourage members to check it out as well as use it to post insect-related articles and activities that may be taking place.

Congratulations to JoAnne Russo: JoAnne received Vermont Center for Ecostudies's (VCE) Julie Nicholson Community Science Award. This lifetime achievement award is presented annually to an individual who exemplifies Ms. Nicholson's dedication to the important role that community science plays in wildlife conservation. Joanne Russo's contributions to better understanding the conservation status of Vermont's wildlife (especially moths) have been extraordinary"

https://vtecostudies.org/blog/joanne-russo-receives-2020-julie-nicholson-community-scientist-award/

We wish everyone the best of health and happiness and hope to see you in the field sometime soon!

Michael Sabourin
VES President

Comstock Cabinet Finds A New Home

by Michael Sabourin

This past October, we received an innocuous e-mail from Jeff Freeman stating "Some 60 years ago I acquired this 46-drawer, homemade case. I have finished emptying it and it might help someone with Lepidoptera again, or other pinned insects. How might we make this known?" In a subsequent e-mail he gave the following instructions: "Please just take it away. That's what they told me years ago."

He described the case as overall 62 inches tall, 15 inches from front to back, and 40 inches wide. Each drawer is about 12 1/2 by 16 1/2 inches wide and 2 3/16 inches deep. Each drawer has dovetail corners; the top of each drawer with a pane of 12 x 16-inch glass that fits into a recess. My impression was that the cabinet and drawers were United States National Museum (USNM) style.

At the time Jeff acquired the case, it was being discarded by Rutgers University, Dept. of Entomology. The case had formerly held a Comstock Collection of Lepidoptera. The Comstock Collection of Lepidoptera which had been at Rutgers at some point was transferred to the American Museum of Natural History (AMNH) in New York City.

I posted the following notice on several germane entomological Facebook (FB) groups: "Free insect cabinet! Some 60 years ago Jeff Freeman acquired this 46- drawer, homemade case. He has finished emptying it and it might help someone with Lepidoptera again, or other pinned insects. It has some historical as well as functional value formerly hosting the Comstock Collection at Rutgers University. The Comstock Case overall is 62 inches tall, …. The Comstock Collection went to Rutgers and later to the American Museum of Natural History in New York City. The Comstock Case is now free for the taking."

I was surprised by the over-all interest the Comstock Cabinet generated. The postings received over 100 likes, 30 comments, and several shares from individuals all over the world. I also received at least 12 direct FB messenger inquiries.

Comstock Cabinet
Photo: Jeff Freeman

Here are some interesting comments: "Such an important piece of bug history. I hope it finds a good home with an entomologist that uses it!" - Eva Doane

"I'd love to have them but I live in Brazil! I've studied Comstock's collection at the amnh, as my PhD thesis was a follow up to his unfinished studies with the Anaea. Leafwing butterflies intrigues me still, and Comstock's studies continues to be the foundation of most of my research. Nice!" - Fernando Dias

"I will drive from Arizona to get it if it's still available." - Albert Thurman

I monitored the FB responses for locations that were reasonably close to Jeff. One of the earliest responders was Adam Kohl of Wendell, Massachusetts. He responded with: "I'm a lepidopterist studying nocturnal moth pollination, and I'm in the market for somewhere to start storing specimens, this would be amazing!" Most importantly, he was willing to make the move happen.

Comstock Cabinet Finds A New Home (continued)

Jeff Freeman (left) and Adam Kohl (right)
Photo: Sam Potrykus

The Comstock Case formerly contained an extensive collection of New Jersey (NJ) butterflies that had been made by William Phillips Comstock (https://entomology.rutgers.edu/museum/history.html). The collection was donated to Rutgers circa 1953. The cabinet was likely discarded when the college decided to purchase new large steel specimen cabinets in the summer of 1958.

Comstock had authored "The Butterflies of New Jersey: A List of the Lepidoptera Suborder Rhopalocera Occurring in the State of New Jersey; Giving Time of Flight, Food Plants, Records of Capture with Locality and Date" (Journal of the New York Entomological Society Vol. 48, No. 1 (Mar., 1940), pp. 47-84.)

Jeff Freeman noted that the Comstock Cabinet had abbreviations of Comstock's NJ collecting localities. Comstock, a noted lepidopterist, passed away in 1956. He had authored 32 published works (Remington, 1956), and he was considered a mentor by Vladimir Nabokov; an illustrious novelists and lepidopterists. (https://www.amnh.org/shelf-life/nabakov-butterflies-360)

Adam Kohl (left) and Jeff Freeman (right)
Photo: Sam Potrykus

Jeff, a dipterist, used the Comstock Cabinet in support of his masters work. He originally moved the cabinet in his Ford station wagon which accommodated the 40-inch width of the cabinet. Adam hired a moving guy in early November and the cabinet found a new home.

Jeff wrote to me that: "Adam appears to be working with Prof. Robert Gegear at UMass Dartmouth on pollination ecology. Lots of moths and other pollinators."

For more information on Adam see: https://adamkohl.info/

A final word from Adam: "The case is with me now, it's lovely!" References: Emington, C. L. 1959. Obituary: William Phillips Comstock (1880-1956) Journal of the Lepidopterists' Society, Volume 13, p. 30.

VES Financial Statement 2020

Assets at start	$2,860.27	Postage to Mail Newsletters to Members	$ 14.00
Income:		Web Hosting	$144.00
Membership Dues	$ 635.00	Paper Bank Statements	$ 36.00
Donations	$ 34.00	Annual Report Non Profit	$ 20.00
Book Royalties	$128.00	Stipend for Teaching	$ 75.00
Ross Bell Memorial	$ 339.08	Membership Refund	$ 15.00
Book Sales from Gordon Nielson Donated Estate Collection	$ 205.00		
Total Income:	$1,341.08	Total Expenses:	$1,455.02
Expenses:		**Bank Balance End of Year**	**$2,746.33**
Newsletter costs:	$1151.02		

New Moths for Vermont

By JoAnne Russo

2020 has been a remarkable year. Covid-19 affected the world in ways no one could have ever imagined. We dealt with it in our own way, most of us canceling travel plans and family outings. I postponed all scheduled trips, moth presentations and social gatherings, deciding instead to explore my home base. For me, that meant having my UV lights on every night starting in early March and going through the end of November. I'd stay up late and check again about 4 a.m. before turning off the lights. I would try to shoo away the remaining moths, but the birds did enjoy a few each morning. Since this was the first complete season to be documented at my home, I expected to gain some new species. When the season was over, I was quite shocked to find that I had 60 species new for my location and 7 were new for Vermont. The following are a few of my favorites.

Scalloped Sack-bearer Moth (*Lacosoma chiridota*) seems to make occasional treks north of its usual range which extends to just south of our southern Vermont border. In previous years, they have been reported as far north as Athol, Massachusetts. The larvae, which feed on oak, build open-ended cases (sacks) in which they overwinter. This was Vermont's first reported sighting.

Another very beautiful moth, the Black-bordered Lemon (*Marimatha nigrofimbria*), is usually found in more coastal areas south of Vermont, this was also a first record for the state. In previous years, reports have come close to our southern border in Northfield, Massachusetts. I found them from July 20 through August 14 and noted that the color intensity of the yellow scales varied. The larval hosts are listed as Saltmarsh Morning-glory (*Ipomoea sagittata*) and Smooth Crabgrass (*Digitaria ischaemum*).

The Peppered Haimbachia Moth (*Haimbachia placidellus*) is another new species for Vermont that is generally found south of our border. Previous to this year, the nearest reports were in northern Connecticut and eastern Massachusetts. A member of the Crambid Snout Family (*Crambidae*), these small moths are generally the ones we see while walking through grass, which the larvae presumably feed on.

The year 2020 can also be noted for substantial increases in the number of Lepidoptera observations, observers and species as reported on iNaturalist. Compared to 2019, a 19% increase in observations and an 11% increase in species were reported by a 27% increase in observers. [New for 2020,] The Vermont Center for Ecostudies launched a new project this year, the Vermont Moth Atlas. Links can be found below.

References/Sources/Literature:

iNaturalist, Vermont Atlas of Life project, https://www.inaturalist.org/projects/vermont-atlas-of-life.

Moth Photographers Group, http://mothphotographersgroup.msstate.edu/.

BugGuide, https://bugguide.net/node/view/15740.

https://val.vtecostudies.org/projects/vermont-atlas-moth/.

Black-bordered Lemon Moth (*Marimatha nigrofimbria*) Photo: JoAnne Russo

Photo: JoAnne Russo (*Haimbachia placidellus*) Photo: JoAnne Russo

New Horse Flies in Vermont

By Jeff Freeman

Two Large Horse Flies

In 2012, a horse owner in Addison sent me a cell-phone picture of one of our largest tabanids, *Tabanus calens*. I had collected this 24 mm. horse fly just once at Mt. Independence Historic Site in Orwell, VT during a VES field trip. We do not know how long this species has been in Vermont. When I travelled to the Addison site, I found a skilled observer, her horse, and many of these large horse flies. Then from 2013 to 2015 we operated a two-tier box trap in Addison County and found 43 species.

Answering one question often raises new ones. In 2019, Roy Pilcher found a large horse fly in his car at The Nature Conservancy's Helen Buckner Preserve at Bald Mountain in West Haven. Roy, an accomplished birder and observer, brought it to me. This new-to-Vermont species was *Tabanus limbatinevris*. At 20 mm., this one is a bit smaller than *T. calens*, is brown in color, and has dark spots on its otherwise clear wings. As a concerned entomologist, I started planning.

I asked Dave McDevitt, TNC caretaker at Buckner Preserve, if he would be willing to remove tabanids from a box trap and hold them in his freezer. Dave's wife, who works in Rutland, agreed to transport the catch to me. We tried this in August 2020 and it worked.

Trap Design Trade-Off

To fit into my car, the box trap had to be 3 ft. square rather than 4 ft. as in the original design. The trap included eight 22 x 36-inch panels, 4 upper and 4 lower. Flies enter between the upper and lower panels and fly upward to hit a screen across the top. Eventually most find their way into the collecting bottle and then into the killing jar. Roy's approach is taking excellent digital photographs and verifying them in iNaturalist. My method uses a more traditional approach to observing nature using actual pinned specimens. In 2020, after a short test run in Rutland, we operated the box trap from July 25 to August 25. This gave us a first look at the tabanid community at the end of the Summer season at Buckner. I had wondered if both *T. calens* and *T. limbatinevris* occur in August at Buckner. The 2020 season ended with a violent gust of wind in an August thunderstorm knocking the trap down. We decided to put the trap away until May of 2021.

Collecting in Vermont

Vermont has 14 counties, some of which have been poorly collected. A research team in Rhode Island used canopy traps at 20 locations to characterize the Tabanidae of that state. The late Gordon Nielsen provided his Faunal Lists, one each for deer flies and horse flies. His collection, however, went to the Carnegie Museum in Pittsburgh. Gradually we are improving the collection at the Zadock Thompson Invertebrate Museum at UVM. Howeve, one deer fly from Orleans or Franklin County does not characterize the tabanids there. Collecting from May to August by net, trap and "other means" might yield better results.

Some 13 years elapsed between finding a species new to Vermont (*T. calens* at Mt. Independence, 2000) and then intensifying the collecting in 2013. We are now on the verge of finding how abundant *T. limbatinevris* might be at West Haven. The trap caught just two specimens in August of 2020. The peak of abundance of *T. calens* is mid-August. After 3 weeks of collecting in August, the evidence so far shows that *T. calens* does not occur at Buckner.

The arrow at "a" shows the closed cell (first posterior) that separates *Tabanus limbatinevris* from a similar species. The dark spots also help. Photo: A.C. Thomas, Canadian Tabanidae east of the Rockies

As a reference to assist with determining species distributions, the

Tabanidae in the UVM collection need to show the county on labels. There are now 81 collecting locations. If we had 10 towns representing each county, that would be 140 locations for all of Vermont. At 81 locations, or 57%, we are past half way but still thinly represented. Collecting by former UVM students boosted counts from Chittenden and Addison Counties.

Least-collected Counties: Towns Collected:
Orleans: Morgan
Orange: Brookfield, W. Brookfield.
Washington: Duxbury (Camels Hump), Barre
Franklin: Fairfax
Grand Isle: Alburgh
Windsor: Weston, Windsor (Paradise Park)

Most-collected Counties:
Addison: 11 sites
Chittenden: 13 sites
Rutland: 20 sites

To broaden our base, we should combine results collected by net, trap, and "other" means. It was by "other" means that we detected *T. limbatinevris*. This 3-part approach is currently under way at Buckner. Although a trap may not appear to be busy or crowded, it is working all day every day. Opting for the 3 x 3 ft design left scraps but this trap fit into the car. The corner uprights were made as 2 parts each, 3 ft. and 4 ft. each, joined with a 4-bolt metal splice. Box traps are all-weather traps and can be repaired after wind and hail damage while the collector remains safe. We could also find the tabanids living in an area like Buckner Preserve by sampling for larvae, but this is time and labor intensive, a bit chancy, and physically demanding. One must be there in person. For now, when we find the most abundant species there are references that help confirm their most common larval habitat. Tabanids overwinter as larvae in moist soil. At Buckner Preserve, the old Galick Farm had many acres of grassland for hay. Grasslands offer larval habitat for the greenhead horse fly.

Caretaker David McDermitt at Buckner Preserve with deer flies on a sticky cap. Photo: Jeff Freeman

Some Results from Buckner Preserve

So far we have documented 11 species. There are 4 deer flies and 7 horse flies. Presence of *Chrysops aberrans* (438 specimens) might indicate a certain kind of wetland as larval habitat but other species of deer fly larvae share this habitat. *T. quinquevittatus*, our upland greenhead (998 specimens), is a common livestock pest. The old farm at Buckner had extensive hay fields and wet parts of grassland make good greenhead larval habitat. *Hybomitra epistates* (32 specimens) is a horse fly with a host preference for deer. These 3 species make up 97% of the 1,501 specimens collected and counted so far in 2020. Just two *T. limbatinevris* in August 2020 confirmed what Roy Pilcher found in August 2019. In 2021 we hope to find out more. The distribution of *T. calens* appears to be spotty. This horse fly can be heard flying nearby, it might be seen, but it is difficult to catch with a net. It also attacks people from behind. Here, with just three *T. limbatinevris* so far, we are taking notice of a species expected in Vermont but not collected in Vermont until now. Does it occur on livestock on farms near Whitehall, NY? Some spot-checking can be done later by others with a portable box trap or other trap. The Buckner Preserve is now the one

3 x 3 ft. box trap at Galick Farm. The black beach ball provides reflected, polarized light attractive to tabanids. Photo: Jeff Freeman

Asian Giant Hornets

By Judy Rosovsky

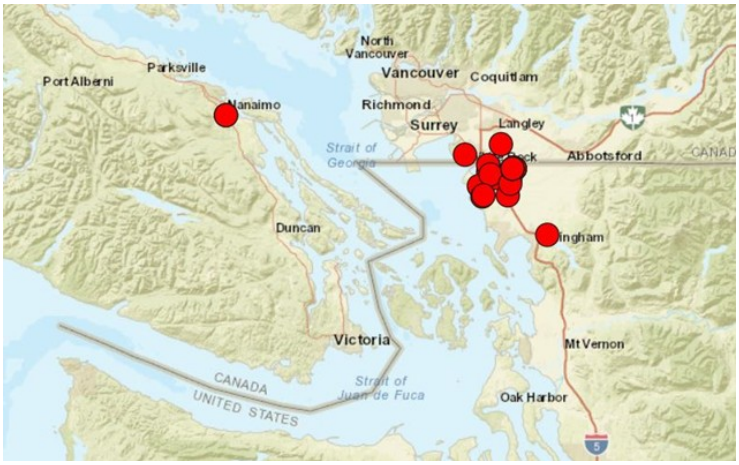
In the fall of 2019, in the Canadian town of Nanaimo, on Vancouver Island in British Columbia, three unusually-large hornets were found and were identified as *Vespa mandarinia*, the Asian Giant Hornet (AGH). These were the first confirmed captures of the so-called 'murder' hornet in North America. In December of that year in Blaine, Washington, USA, two more AGH specimens were found. The cause for alarm at finding these insects is not just because they are the largest hornets in the world, but because they can decimate honeybee colonies (Barth *et al.*, 2013; WSDA, 2021).

Vespa is a genus in the family Vespidae, which is divided into two subfamilies, the Vespinae and the Polistinae. Vespinae include *Vestula* (yellowjackets), *Dolichovespula* (yellowjackets, wasps and hornets, including the bald-faced hornet that is a yellowjacket wasp) and *Vespa* (hornets) (Elberink, 2016). These groups have all been referred to as wasps, including *Vespa*, which contains the true hornets. To add to the confusion created by the common names, some of them have similar markings and colors. In Vermont our only true hornet is the European Hornet (*Vespa crabro*), an invasive from Europe.

Vespa mandarinia is not hindered by these taxonomic niceties and will attack its congeners, *Vespula* and *Polistes*, as well as *Apis* species, including the European honeybee (*Apis mellifera*) and the Japanese honeybee (*Apis cerano japonica*). There are five *Vespa* species in Japan pertinent to this discussion; *Vespa mandarinia*, *V. mongolica*, *V. analis*, *V. crabro* and *V. tropica*. All five will attack bees and some wasp species (Matsuura and Sakagami, 1973). AGH is a native of Japan, and the Japanese honeybee has evolved some defensive behaviors that the European honeybee lacks (Ono *et al.*, 1995). This illustrates an additional advantage that non-native species have: native species in the invaded area may have no defenses against the new predator.

Asian Giant Hornet on apple (*Vespa mandarinia*)
Photo by: Karla Salp, Washington State Dept. of Agriculture

The life cycle of the AGH is similar to that of the other Vespids. Like many social insects, the queens overwinter in a solitary state. AGH queens form spherical underground hibernating chambers and hang from the top of those for the Winter. They emerge in the Spring and feed and seek nest sites, which are often snake or rodent dens. The queen



Positive finds of Asian Giant Hornets (*Vespa mandarinia*)
Map by Washington State Department of Agriculture Story Map

will work on the nest, start producing eggs, forage for food and care for the young until there are about 40 workers. At that time her extranidal (outside the nest) activities will diminish and end.

By the end of the Summer, male reproductives (drones) will be produced, and then queens. Males emerge and will wait outside for queens to emerge to mate with them, a behavior unique to *V. mandarinia*, at least among Japanese vespids. Once the reproductives leave the nest, they do not return and the males do not survive the Winter. Females (queens), both mated and unmated, will overwinter and forage the next Spring, but the unmated queens will be dead by July. Almost two thirds of the queens don't mate (Matsuura and Sakagami, 1973).

In Japan, *Vespa mongolica* is the smallest hornet, but it can cause a significant amount of damage to hives. Like AGH, *V. mongolica* will locate a hive and catch a bee. It takes the bee to a tree, hangs from a branch by its hind legs and dissects out the thorax, which it chews into a meatball and brings to their own larvae. AGH can make meatballs on the wing. *V. mongolica* never attacks the entire nest but, over time, their persistent attacks remove a substantial number of bees (Matsuura and Sakagami, 1973).

There are two seminal papers on AGH, one by Matsuura and Sakagami (1973) that describes AGH behavior in some detail, and another by Ono *et al* (1995) that describes in detail the Japanese honeybee defense against AGH. Both refer to the different phases of the AGH attack, but for simplicity's sake those will be identified as the hunting, slaughter and occupancy phases. It has been hypothesized that the AGH colonies need large quantities of protein once the reproductive brood has been produced. That is why they attack and consume whole colonies of bees or wasps (Matsuura and Sakagami, 1973). *Polistes* sp. are usually attacked only after the AGH reproductive forms appear.

Dead bees (*Apis mellifera*) possibly from AGH attack
Photo by: Ted McFall, courtesy Washington State Dept. of Agriculture

AGH workers can't ingest solids, and feed on tree sap and other sugar sources (Barth *et al.*, 2013). In the hunting phase, *V. mandarinia* will catch individual bees or wasps and regurgitate the meatball to their larvae. They have been observed forming a pair and regurgitating to each other (Matsuura and Sakagami, 1973). AGH are not agile flyers, so they linger near the prey hives to enhance their chances of making a catch. Once the AGH reproductive forms arrive, the workers will mark a nearby prey species nest, indicating the start of the slaughter phase.

Matsuura and Sakagami (1973) report that somewhere between 2 and 50 AGH workers will arrive at the marked prey hive and start biting to death the counter-attacking prey. They drop dead prey and continue to attack without stopping to masticate. This phase can take 1 to 6 hours and 20 to 30 hornets can kill 5,000 to 25,000 bees. When resistance ends, the hornets occupy the hive (beginning the occupation phase) and start ferrying prey pupal and larval thorax meatballs back to their nest. Prolonged combat can result in hornet starvation. While occupying the prey hive, the hornets will defend it aggressively and they make a clicking noise with their mandibles to warn of imminent attack. Advice to the observer: Don't linger if you hear that sound.

Asian Giant Hornet (*Vespa mandarinia*) with radio transmitter secured by dental floss
Photo by: Karla Salp, Washington State Department of Agriculture

Japanese honeybees can detect the AGH

marking pheromone and have two defense mechanisms, though *A. cerano* subspecies in other areas of Asia do not (Ono *et al*., 1995). The Japanese honeybees make a warning sound when hornets are observed, sending workers into the hive and leaving a prey-less area to discourage lengthy hornet visits. The bees don't launch solo attacks against the hornets. Instead, if the hornet doesn't leave, over 500 bees will surround and shiver their wings for up to 20 minutes, raising the hornet's temperature and surrounding CO_2 to lethal levels (Barth *et al*., 2013; Ono *et al*., 1995). The bees can withstand temperatures of 48° C, but the hornets succumb at 44 to 46° C (Ono *et al*., 1995). Two other species can detect the pheromone: *V. simillima xanthoptera,* which attacks the hornets; and *Polistes rothneyi*, which responds by fleeing the hive and rebuilding elsewhere.

The AGH is close to threatened status in much of its range, in part due to deforestation causing habitat loss (see A-Z Animals). Its introduction to North America might provide the species with ample habitat, but it will not be good for our agriculture (Cobey *et al*., 2020). AGH is not in or near Vermont, nor is it likely to make its way here any time soon. They do not move through the usual invasive species pathways (on wood products or nursery stock) and they nest underground so they are unlikely to be transported inadvertently. But they can hitchhike on straw and people might bring them in as a food item (NIVEMNIC, 2020). Valiant efforts are being made to locate and destroy nests using radio telemetry but they are not easy to find (WSDA, 2021). As this situation develops, the VES will keep you posted.

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NIVEMNIC. 2020. Asian giant hornet – US & Canada Differ – What are the Implications? – Updated! Available online at http://nivemnic.us/asian-giant-hornet-us-canada-differ-what-are-the-implications/.

Washington State Department of Agriculture. 2021. Asian Giant Hornet page. Available online at https://agr.wa.gov/departments/insects-pests-and-weeds/insects/hornets.

For Further Reading on Wasps: "Wasps Make the World Go Round" by Eric R. Eaton, Natural History, Feb. 2021, pp. 16-21, which describes wasp diversity and includes a photo of a female potter wasp carrying a ball of mud to seal her nest pot.

Speedy Ways to Geotag Photos

By Erika Mitchell and Eve Mendelson

Photo-documenting the daily lives of tiny insects, where they live and when they are active, are activities that have given us a sense of purpose as citizen scientists, as well as endless hours of fascination in the field. In order to learn more about insects from our photos, and to make our observations available to others, we both upload our insect photos regularly to iNaturalist. If the insect identifications are verified by experts, the data goes on to the Global Biodiversity Information Facility (GBIF), where it is available to researchers worldwide. In response to some of our iNaturalist contributions, researchers have contacted us with questions and requests for specimens from universities around the country, from Kentucky to Florida.

As with physical entomology specimens, photo observations require location and date data in order to be useful. All digital cameras automatically save time and date data to photos as Exchangeable Image File (EXIF) data. Cell phones and some cameras also add Global Positioning System (GPS) data to the EXIF data. However, sometimes the GPS coordinates supplied by the phone or camera aren't very accurate. (They can be off by more than a mile!) And what to do if your camera doesn't have GPS? In iNaturalist, you can manually enter the location for each observation by selecting an approximate location on the map. Manual entry on iNaturalist can get tedious if you upload more than a couple photos at once. And all that effort only geotags them in iNaturalist; it doesn't add the GPS coordinates to the photos on your computer for your own future reference.

The most efficient way to geotag is to add the GPS coordinates directly to the EXIF data of your photos. If your camera doesn't have built-in GPS, or if the GPS isn't accurate enough for your purposes, you could get a GPS add-on gadget for your camera that snaps on the flash mount and captures GPS data. Erika tried 3 of those units. Of the 3, only one worked, and it broke after 3 weeks. After that, she gave up on GPS gadgets and came up with a better solution that didn't require purchasing any special equipment: pairing photos with GPS tracks using Adobe Lightroom.

Adobe Lightroom versions 5 and above come with a map module. Using the map module, you can drag and drop photos onto specific locations on the map. The GPS coordinates for your location are then added to the metadata for each specific photo (see Figure 1). When you export your photos to upload to iNaturalist, the GPS coordinates are automatically read and added to your observations. But since the GPS coordinates are also paired with the images on your computer, you can visualize your observations right in Lightroom or other mapping software. not just in iNaturalist. If you don't use Adobe Lightroom, there are other apps that will also pair GPS tracks to photos using the photo time data, but we've found the Lightroom mapping function to be extremely simple, especially if you already use Lightroom for other purposes like tagging, cropping, and exposure adjustments.

Even more efficient than manually placing photos on the Lightroom map is to use the GPS track-matching tool in Lightroom's map module. If you record a GPS track out in the field, you can upload the track into Lightroom. Then the map

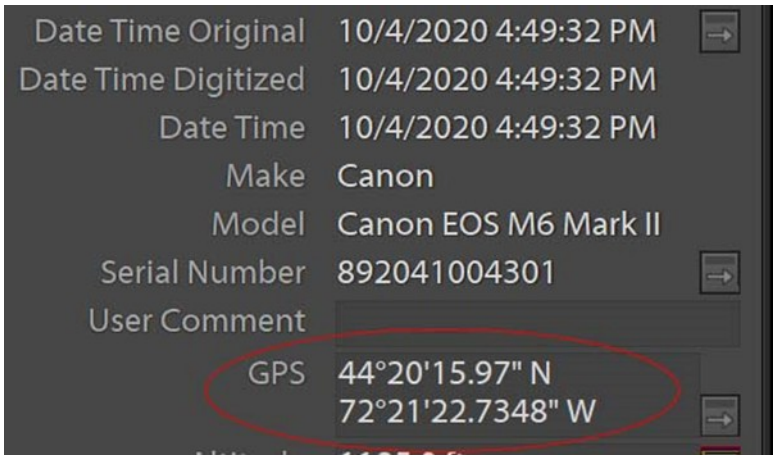


Figure 1: GPS coordinates shown in Lightroom's Library View Module.
Screen Shot: Erika Mitchell

module will automatically place your photos onto the track, pairing each individual photo with the track according to the time stamps on the photos. A single click will geolocate hundreds of photos at a time on your track (see Figure 2).

So how do you record a GPS track? There are lots of options. The least expensive is to use a GPS tracking app on your phone. There are quite a few free options for this on both iOS and Android platforms. Accuracy of the tracks will be limited by the accuracy of your phone GPS data. We have found sports watches with GPS functions generally provide more accurate data than cell phone tracking apps, but only if the watch has built-in GPS. Some smart watches claim that they record GPS tracks, but actually rely on your phone GPS capability since they have no built-in GPS receivers. They are no better than cell phone apps for recording GPS tracks. Another option is to use a dedicated GPS unit to record your track. Once you record the GPS track using your app, your watch, or a GPS unit, you need to download the track to your computer. This usually requires exporting the track from your phone app, online fitness app, or GPS unit, and downloading it onto your computer. If the track is not already in the .gpx format, you will also need to convert it to .gpx format using an online converter. (It's a free process, but an extra step).

Here's a concise list of the steps to pair your photos with GPS coordinates using Lightroom:

While you are in the field, record a GPS track (with your phone, watch, or GPS unit).

Save the GPS track to your computer in .gpx format.

Import your photos into Adobe Lightroom.

In Adobe Lightroom, select the photos that you want to tag. When selected, they are highlighted gray.

In the Map module of Adobe Lightroom, select Tracklog>Load Tracklog and browse to the GPS file that you saved. The tracklog will appear as a blue line on the map.

In the Map module of Adobe Lightroom, select Tracklog>Auto-Tag Photos. Poof! The photos will appear as yellow squares placed along the blue track line on your map.

For greatest accuracy, you need to check your time settings on your camera regularly to make sure they are precisely matched to your GPS track recording device (phone, watch, or GPS unit). We usually synchronize our camera time settings every 2-4 weeks. If your track did not include all the photos you selected (if you took some before or after recording the track), you can manually place them on the map and they will receive GPS coordinates of the locations where you place them.

This method of geotagging photos has greatly improved our efficiency for posting our photographic citizen science observations. If geotagging photos has you bogged down, perhaps this quick method will give you some ideas for how to speed the process.

Resources:

Some apps for recording GPS tracks: https://www.tomsguide.com/round-up/best-running-apps.

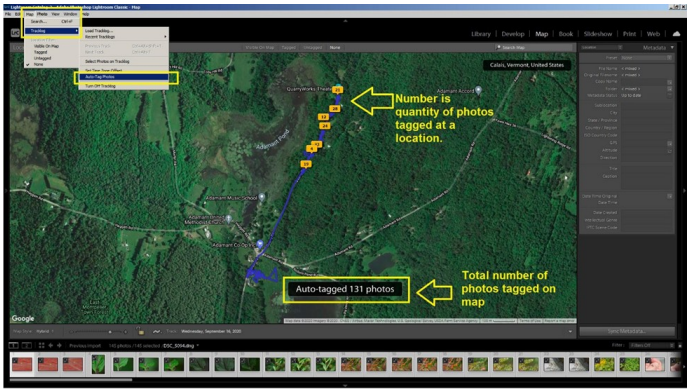


Figure 2: GPS coordinates shown in Lightroom's Library View Module.
Screen Shot: Erika Mitchell

To enlarge, see online figure at www.VermontInsects.org

UVM Bug Club

By Lisa Chamberland

At the heart of the University of Vermont's Zadock Thompson Zoological Collections are the volunteers. These volunteers, including undergraduate students, independent researchers and arthropod enthusiasts have been invaluable in maintaining the invertebrate collections in spite of a tumultuous move following the fire at the museum at Torrey Hall in 2017. Now during the ongoing pandemic, these volunteers have remained committed to ensuring that Vermont's oldest and most complete insect collection doesn't get left behind or forgotten.

Last autumn, we established the UVM Bug Club with the intention of making the museum more accessible and inclusive, and to give greater agency to the volunteers. The goal of this new club is to create a sustainable team of volunteers to manage the collection, while also providing leadership opportunities to the undergraduate students.

The UVM Bug Club has begun to develop remote projects in order to maintain museum operations safely in response to the Covid-19 restrictions. With the help of Neil Cobb from the Symbiota Collections of Arthropods Network (SCAN), we are continuing to digitize and geo-reference the entire invertebrate collection remotely, including over 6,500 new arachnid specimens from the Caribbean.

In 2021, we intend to broaden the scope of our remote work capabilities. This spring the Bug Club will host a number of public virtual events, including a BioBlitz and a virtual open house. While a permanent location for the museum is still undetermined we remain vigilant in our efforts to preserve this collection, which continues to reveal valuable insight into Vermont's biodiversity.

Programs of Interest

Green Hour Website: L.L. Bean and National Wildlife Federation have created a website of children's activities like bird bingo, making nature journals, and ways to spend an hour outdoors every day. Updated weekly. See: thegreenhour.org.

Ongoing; Lady Beetle Survey: Look for lady beetles. You can even find them in your home:
https://val.vtecostudies.org/projects/lady-beetle-atlas/.

Ongoing; Telephone Gap Bioblitz: Look for invertebrates on the snow:
https://www.fs.usda.gov/detail/gmfl/home/?cid=FSEPRD742756.

Turning Stones: Exploring Aquatic Invertebrates: Declan McCabe's (Oct. 21, 2020 Webinar) May still be available for viewing.
https://northbranchnaturecenter.org

Maine Entomological Society Webinars:
https://www.maineentosociety.org/events
See upcoming webinar programs available at modest fees. Past programs are available to view for free.

"How to Shoot Insects ... with a Camera" by Roger Rittmaster (Feb. 4, 2021)

Dragonfly Workshop (Zoomed Jan. 23,2021).

Webinar Series on Hover Fly Migration (March 4, 2021).

Maple Syrup and Insect Collecting (March 27, 2021).

Ringed Boghaunter Dragonfly (April 1, 2021).

Vermont Lady Beetle Atlas

VERMONT CENTER FOR ECOSTUDIES
VERMONT ATLAS OF LIFE

Why Lady Beetles Matter

Lady Beetles act as a form of biological pest control. They exist in all terrestrial ecosystems, from meadows to forests. Native Lady Beetles have evolved with native pests, and many are specially adapted to control these pests.


Parenthesis Lady Beetle


Three-banded Lady Beetle

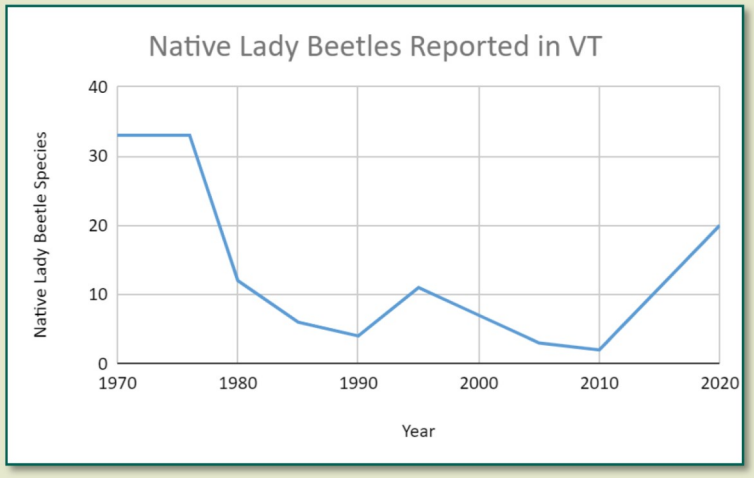
Lady Beetles in Vermont

In Vermont, we have 42 species of Lady Beetle—35 native species, and 7 non-native species. After the discovery of a Lady Beetle checklist from 1976, the Vermont Atlas of Life (VAL) at the Vermont Center for Ecostudies (VCE) realized that 13 of our native lady beetle species were missing, and many other species seemed to be in decline.

Vermont Lady Beetle Atlas

To determine what Lady Beetle species remain in Vermont, and to better understand what conservation measures are needed, VAL started the Vermont Lady Beetle Atlas. Our pilot year kicked off in 2020. We are calling on volunteer naturalists across Vermont to join us in our second year of the Vermont Lady Beetle Atlas, either by uploading Lady Beetle observations to iNaturalist or by adopting a priority block.

Volunteer Naturalist Findings



- Rediscovered 4 species that were lost for over 40 years
- Recorded 3 new species in VT
- Doubled research-grade iNaturalist observations of Lady Beetles in one year (914 of 1707 total observations were made in 2020)
- 234 iNaturalist users in VT uploaded research-grade Lady Beetle observations for the first time in 2020.

We Need Your Help!

- Adopt a Priority Block
- Upload Lady Beetle Finds to iNaturalist
- Learn more: https://val.vtecostudies.org/projects/lady-beetle-atlas/

Vermont Entomological Society
c/o Debra Kiel
147 Allen Irish Road
Underhill, VT 05489