

# Aton Forest Fellow's Annual Report and Prospectus

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The general focus of my research, both at Aton Forest and elsewhere, is documenting the host plants and natural history of understudied herbivorous insects. This year I got about halfway through completing the third edition of my self-published serial e-book *Leafminers of North America*, and I am in the process of compiling a similar guide to North American sawfly larvae. I am continually updating both guides with information gleaned from newly published literature, photographs posted online (iNaturalist.org and BugGuide.net), and my own observations. When my own observations represent significant new information (e.g., new species or previously unknown host associations), I am documenting them thoroughly in peer-reviewed publications.

## Research at Aton Forest

This year I visited Aton Forest five times. I photographed at least one example of each type of leaf mine and sawfly larva I encountered, along with miscellaneous other insects and signs thereof (e.g., galls and folded or tied leaves). Herbivorous insect larvae that I could not identify to species in the field were collected in an attempt to rear them to adults. The dates of each visit are listed below, along with the general area explored, a link to view photos from that day, my specific objectives/targets for the day (if any), and a list of some other highlights (new discoveries or mysteries to follow up on in the future).

June 5 – State Line Hill Rd.; stream near Aton Forest headquarters; Doolittle Lake Brook  
[https://www.inaturalist.org/observations?on=2024-06-05&user\\_id=ceiseman&verifiable=any](https://www.inaturalist.org/observations?on=2024-06-05&user_id=ceiseman&verifiable=any)

My main targets were two unknown leaf-mining flies (Agromyzidae) I had found at Aton Forest in previous years, both of which are active only in spring: a *Liriomyza* on false hellebore (*Veratrum viride*), and a *Phytomyza* on marsh marigold (*Caltha palustris*). I did not find either of these, but I did find:

- Leaf mines on golden alexanders (*Zizia aurea*) of *Phytomyza cicutella*, a fly that was known only from California until I found it in Wisconsin a few years ago. I collected larvae to rear adults, but won't know if I have succeeded until next spring.
- Leaf mines on American brooklime (*Veronica americana*) of *Metriocnemus erythranthi* (Chironomidae), a midge that I helped describe and name in a paper published in 2023. At the time of that publication, there were no records of this species east of Pennsylvania. I was able to rear an adult to confirm the identification.
- While examining false hellebore plants, I noticed evidence of something mining/boring in one of the stems. This turned out to be some sort of scathophagid fly, which I am attempting to rear (another one that requires waiting until next spring), but in the meantime numerous other insects appeared in the bag in which I had collected the plant sample. These included larvae of the sawfly *Rhadinoceraea nubilipennis* (Tenthredinidae), which I had never encountered before, as well as many inchworms (geometrid moth larvae), belonging to two different species—one of which is presumably *Eupithecia cretacea*, the only inchworm that is known to feed on *Veratrum* in North

America, whose larva apparently has never been described. I am attempting to rear these as well.

June 15 – State Line Hill Rd.; stream near Aton Forest headquarters; Doolittle Lake Brook  
[https://www.inaturalist.org/observations?on=2024-06-15&user\\_id=ceiseman&verifiable=any](https://www.inaturalist.org/observations?on=2024-06-15&user_id=ceiseman&verifiable=any)

My targets were the same as in the previous visit, plus the possibly undescribed leaf-mining fly (Anthomyiidae: *Chirosia*) on silvery spleenwort (*Deparia acrostichoides*) and the bud gall on meadowsweet (*Spiraea alba*) caused by an undetermined gall midge (Cecidomyiidae), both of which I had found at Aton Forest in previous years. I found only a few empty *Liriomyza* mines on false hellebore, but I succeeded in collecting a good number of *Phytomyza* larvae from marsh marigold and a small number of *Chirosia* larvae from silvery spleenwort. I also succeeded in collecting some of the midge galls, most of which I sent to the gall midge specialist Raymond J. Gagné (at the Smithsonian), and we are both attempting to rear adults. A couple of interesting byproducts of these collection efforts were:

- In the meadowsweet patch where I collected the galls, I found some previously undocumented leaf mines on steplebush (*Spiraea tomentosa*). These were unfortunately already empty, but I will watch for them in future years.
- The marsh marigold leaves I collected had numerous aphids on them, and I sent these to Bryan Brunet (at the Canadian National Collection of Insects) for identification. He reported that they may belong to an undescribed species, which so far he has not been able to place with confidence to any known genus.

July 21 – Doolittle Lake Brook; State Line Hill Rd.

[https://www.inaturalist.org/observations?on=2024-07-21&user\\_id=ceiseman&verifiable=any](https://www.inaturalist.org/observations?on=2024-07-21&user_id=ceiseman&verifiable=any)

My main reason for visiting Doolittle Lake Brook was to collect a sample of *Conocephalum* liverwort to send to Connor Wardrop, a graduate student at the University of British Columbia who is studying this genus for his thesis. Along State Line Hill Road I checked for midge galls on wild mint (*Mentha arvensis*), and leaf/stem mines on bugleweed (*Lycopus uniflorus*) of the undetermined *Pseudopostega* (Opostegidae) species I had found in previous years, neither of which were yet in evidence.

- Along Doolittle Lake Brook I found another false hellebore stem with scathophagid fly larvae boring inside, which I collected for rearing. More than 20 dark-winged fungus gnats (Sciaridae) emerged from this stem, apparently secondary inhabitants of the scathophagid tunnels.

August 16 – State Line Hill Rd.

[https://www.inaturalist.org/observations?on=2024-08-16&user\\_id=ceiseman&verifiable=any](https://www.inaturalist.org/observations?on=2024-08-16&user_id=ceiseman&verifiable=any)

My targets were the same as in the previous visit. This time I found both, and the midge galls turned out to be *Dasineura piperitae*, not something new and exciting.

- However, the wild mint plants also unexpectedly turned out to have *Pseudopostega* mines like those on the bugleweed. In both cases, the larva starts out as a leafminer, then mines into the stem and apparently overwinters in the roots/tubers. I dug up a few mined individuals of each plant species and potted them to try and rear the moths; these pots are currently overwintering in my garage. I also found some mines on native wild mints (*Mentha canadensis*), which were too big to dig up and pot.

- I found a sawfly larva in the genus *Dolerus* (Tenthredinidae) feeding on a horsetail (*Equisetum arvense*). Horsetail-feeding sawfly larvae are normally only present in spring and very early summer, so this was a surprise. I collected this larva and with any luck it will emerge as an adult next spring.
- I found larvae of the leaf-mining dark-winged fungus gnat *Phytosciara greylockensis* (Sciaridae) and succeeded in rearing an adult. I helped describe and name this species in 2018, and until this year specimens were known only from Massachusetts.
- I found a sawfly larva of the genus *Dimorphopteryx* (Tenthredinidae) on maleberry (*Lyonia ligustrina*). The only sawfly previously associated with this plant is the *Caliroa* I found on it at Aton Forest last year (which I succeeded in rearing, but it has not yet been identified to species). I managed to rear the *Dimorphopteryx* larva through several instars but then it died, perhaps because maleberry is not actually a suitable host. I preserved the larva and its shed skins for possible DNA barcoding.

October 6 – Doolittle Lake Brook; State Line Hill Rd.; Bull Pasture

[https://www.inaturalist.org/observations?on=2024-10-06&user\\_id=ceiseman&verifiable=any](https://www.inaturalist.org/observations?on=2024-10-06&user_id=ceiseman&verifiable=any)

This day's missions were to look for an unknown stem-mining fly (Agromyzidae: *Ophiomyia*) on the miterwort (*Mitella diphylla*) along Doolittle Lake Brook, and to mark *Pseudopostega*-mined bugleweed and wild mint plants to revisit in early spring if I fail to get adults from the potted plants in my garage. I marked one bugleweed plant along Doolittle Lake Brook and fifteen near State Line Hill Road. The wild mint plants had lost most of their leaves, so I could no longer see any mines, but I will still check these plants in the spring, since they are right near the marked bugleweed plants. I also looked for leaf mines of an undescribed *Ectoedemia* species (Nepticulidae) on the red oaks (*Quercus rubra*) in Bull Pasture.

- I looked at over 100 miterwort plants and failed to find any stem mines (which I have yet to see at Aton Forest, but I did find a few in southwestern Massachusetts this year). Looking for some sort of consolation prize, I split open a cardinal flower (*Lobelia cardinalis*) stem and found numerous *Ophiomyia* puparia inside. After this discovery I found many more cardinal flower stems with puparia inside along a short stretch of Doolittle Lake Brook, so I have a good chance of rearing adults of this previously unknown fly.
- At Bull Pasture I did not find the *Ectoedemia* mines, but I collected several mines of *Stigmella altella* with the hope of rearing adults, since specimens of this species are only known from Ohio.
- Also at Bull Pasture, I found a single larva of the undescribed *Brachys* (Buprestidae) that mines leaves of maleberry. The maleberry leaves were shriveling up from the drought at this point, and I don't think this larva survived to maturity.

### Field Research at Other Sites

I conducted investigations of herbivorous insects in my own yard (Northfield, MA) and surrounding areas throughout the growing season. Explorations farther afield included:

- May 7 to September 24 (15 days total) – With Adam Kohl, I conducted rapid ecological assessments of the Norcross Wildlife Foundation's properties in south-central MA and adjacent CT, and identified vascular plants in long-term monitoring plots at one of the

properties. I observed and collected herbivorous insects opportunistically during this work as well as while conducting the fieldwork listed below.

- May 20 to September 27 (27 days total) – I continued the botanical inventory and natural community mapping study in Mount Washington, MA and surrounding areas, sponsored by Green Berkshires, that I began in 2021. This year I focused on streams and wetlands instead of ridges and summits, which were the focus of the first three years.
- June 9 and 10 – As I did in September 2022, I assisted Bill Buck and Beth Herr with their all taxa biodiversity inventory of Kent (Carmel), NY, documenting numerous species of leafminers and gall inducers. The species I found can be viewed here: [https://www.inaturalist.org/observations?place\\_id=1266&subview=table&user\\_id=ceiseman&verifiable=any](https://www.inaturalist.org/observations?place_id=1266&subview=table&user_id=ceiseman&verifiable=any)
- July 11 – I conducted a survey of (mostly) leaf-mining insects throughout the town of Colebrook, Connecticut, for the Colebrook Conservation Commission. My observations from that day can be viewed here: [https://www.inaturalist.org/observations?on=2024-07-11&subview=table&user\\_id=ceiseman&verifiable=any](https://www.inaturalist.org/observations?on=2024-07-11&subview=table&user_id=ceiseman&verifiable=any)
- September 13 – I participated in Berkshire Biodiversity Day in Pittsfield, Massachusetts. The species I found can be viewed here: [https://www.inaturalist.org/observations?on=2024-09-13&subview=table&user\\_id=ceiseman&verifiable=any](https://www.inaturalist.org/observations?on=2024-09-13&subview=table&user_id=ceiseman&verifiable=any)
- October 2 to 5 – With my wife, Julia Blyth, and our daughter Ayla, I attended the 20<sup>th</sup> anniversary celebration of the Nantucket Biodiversity Initiative, where we participated in bioblitzes and collected new observations and specimens for our (until now) ten-year study of the herbivorous insects of Nantucket. I have not yet uploaded these observations to iNaturalist, but eventually they will be viewable at this link, along with many of our previous Nantucket observations: [https://www.inaturalist.org/observations?place\\_id=2160&subview=table&user\\_id=ceiseman&verifiable=any](https://www.inaturalist.org/observations?place_id=2160&subview=table&user_id=ceiseman&verifiable=any)

### **Other Activities**

Throughout the year I worked on several different papers, as well as on updates to the leafminer guide and reports on the work for Green Berkshires, and I served as a peer reviewer for multiple manuscripts about leaf-mining insects. I sent numerous insect specimens to collaborators in Canada, the UK, the Netherlands, Germany, Japan, and the USA, and received specimens from other collaborators throughout the USA.

- I was elected to serve as a Member-at-large of the Executive Council of the Lepidopterists' Society.
- January 9 – I gave a Zoom talk about leafminers to the Maine Entomological Society.
- April 26 – I visited Penn State University, where I was invited to give a presentation about leafminers for the Entomology department's weekly seminar.
- July 5 – I led a private natural history walk in Chester, Massachusetts.
- July 6 – I led a walk focusing on insect-plant interactions at Wing & a Prayer Nursery in Cummington, Massachusetts.
- August 4 to 9 – I taught a field seminar on leaf and stem mining insects at the Eagle Hill Institute in Steuben, Maine.
- August 14 – I led a private insect tracking walk in Longmeadow, Massachusetts.

- August 26 – I led a private insect tracking walk in Montague, Massachusetts.
- September 13 – I gave my “Native Plants as Insect Habitat” slideshow presentation at the Berkshire Biodiversity Day event in Pittsfield, Massachusetts.
- September 15 – I led a private insect tracking walk in New Salem, Massachusetts.
- September 21 – I led an insect walk at the Wachusett BioBlitz in Princeton, Massachusetts.
- October 4 – Julia and I were among the speakers in a slideshow presentation at one of the Nantucket Biodiversity Initiative’s 20<sup>th</sup> anniversary events.
- Throughout the year, I served as a consultant for the Greentree Foundation’s survey of moths on their property in Manhasset, NY, continuing the work we began in 2022.
- Throughout the year, as part of my leafminer and sawfly research, I have reviewed and identified photos of these insects submitted to iNaturalist (including those added to the “Leafminers of North America” project I created). According to the website’s calculations as of midday on December 31 (<https://www.inaturalist.org/stats/2024/ceiseman>), in 2024 I have helped 2,052 people with 22,714 identifications.

### Awards

This year, in recognition of my work on leaf-mining insects, I was presented with the HH Bloomer award from the Linnean Society of London. I also received a field biology award of \$100,000 from the Maxwell | Hanrahan Foundation.

### Peer-reviewed Articles Published in 2024

Among the 14 articles published this year is my first to include observations and specimens from Aton Forest—one in which I catalogued the moth and butterfly species whose larvae feed on wild sarsaparilla (*Aralia nudicaulis*). The article on leaf-mining Tephritidae also references an observation of *Euleia fratria* leaf mines on water parsnip (*Sium suave*) along State Line Hill Road; this is a new host record for this fly.

- Eiseman, Charles S., Owen Lonsdale, Graham A. Montgomery, Jake M. Jacobsen, Ethan X. Kahn, Mia C. Rosati, Martin Hauser, Grishma R. Parikh, and Doris Yu. 2024. Invasive Cape ivy (Asteraceae: *Delairea odorata* Lem.) confirmed as a host for the North American leafminer *Liriomyza temperata* Spencer (Diptera: Agromyzidae). *Zootaxa* 5555(1): 24–34.
- Eiseman, Charles S., Tracy S. Feldman, and Michael W. Palmer. 2024. New larval host records, parasitoid records, and DNA barcoding data for North American leaf-mining leaf beetles (Coleoptera: Chrysomeloidea). *Zootaxa* 5549(1): 1–60.
- Eiseman, Charles S., Flown Kimmerling, and Tracy S. Feldman. 2024. New larval host records for three species of leaf-mining weevils in the eastern USA (Coleoptera: Curculionidae: Curculioninae), with a review of hosts and larval habits for the genus *Tachygonus* Schönherr. *Proceedings of the Entomological Society of Washington* 126(2): 247–253.
- Eiseman, Charles S., Tracy S. Feldman, Swarnalatha Moparthy, and Matthew A. Bertone. 2024. Investigation of possible cryptic species within *Orchestes mixtus* Blatchley and O.

- pallicornis* Say (Coleoptera: Curculionidae: Curculioninae: Rhamphini) using DNA barcoding. Proceedings of the Entomological Society of Washington 126(2): 243–246.
- Eiseman, Charles S. 2024. First record of leafmining in Pyraustinae (Lepidoptera: Crambidae) in North America. Proceedings of the Entomological Society of Washington 126(2): 238–242.
- Eiseman, Charles S. and John van der Linden. 2024. New rearing records of Drosophilidae (Diptera: Ephydroidea) from plant tissue. Proceedings of the Entomological Society of Washington 126(2): 172–182.
- Eiseman, Charles S. and Tracy S. Feldman. 2024. New records of leafmining in Tortricidae (Lepidoptera). Proceedings of the Entomological Society of Washington 126(2): 161–171.
- Hough, Karissa E., Charles S. Eiseman, Stephane Perreault, Hugh McGuinness, Russell L. Burke, and Fernando E. Nieto-Fernandez. 2024. Survey of leafminers on American Chestnut and other *Castanea* spp. (Fagales: Fagaceae) on Long Island, NY. Environmental Entomology 53(4): 659–664.
- Eiseman, Charles S. 2024. New rearing records of Lepidoptera from wild sarsaparilla (Araliaceae: *Aralia nudicaulis* L.), with a review of species reported from Nearctic *Aralia* spp. Proceedings of the Entomological Society of Washington 125(4) [2023]: 471–492.
- Eiseman, Charles S. 2024. On the identities of some distinctive, suspended spider egg sacs (Araneae: Liocranidae, Tetragnathidae). Proceedings of the Entomological Society of Washington 125(2) [2023]: 278–284.
- Eiseman, Charles S. 2024. *Procecidochares atra* Loew (Tephritidae) and *Rhopalomyia capitata* Felt (Cecidomyiidae) (Diptera) reared from single-chambered rosette galls on rough-stemmed goldenrod (Asteraceae: *Solidago rugosa* Mill.). Proceedings of the Entomological Society of Washington 125(2) [2023]: 273–277.
- Eiseman, Charles S. 2024. On the hosts and larval habits of *Framinghamia helvalis* (Walker) (Lepidoptera: Crambidae). Proceedings of the Entomological Society of Washington 125(2) [2023]: 268–272.
- Eiseman, Charles S. 2024. New names for Nearctic species of *Euura* Newman (Hymenoptera: Tenthredinidae). Proceedings of the Entomological Society of Washington 125(2) [2023]: 264–267.
- Eiseman, Charles S., Allen L. Norrbom, Spencer Len Pote, Bruce D. Sutton, and Gary J. Steck. 2024. A review of the leaf-mining fruit flies (Diptera: Tephritidae) of Canada and the USA, with new host plant and distribution records. Proceedings of the Entomological Society of Washington 125(2) [2023]: 210–233.

### Other 2024 Publications and Reports

- Eiseman, Charley. 2024. BugTracks. <https://bugtracks.wordpress.com/> [7 blog posts in 2024, including one focusing on an observation at Aton Forest: <https://bugtracks.wordpress.com/2024/04/29/hickory-gall-interlopers/>]
- Eiseman, Charley. 2024. *Leafminers of North America, Third Edition*. Privately published e-book, clxxiv+1463 pp. Available from: <http://charleyeiseman.com/leafminers/>

## Plans for 2025

This year, my projects include completing a monograph on leaf-mining flies (Agromyzidae), continuing work on the taxonomy of tischeriid moths, continuing to update the *Leafminers of North America* guide, continuing to work on the guide to sawfly larvae, and preparing reports on my botanical / natural community surveys for Green Berkshires. I also hope to complete papers on my long-term surveys of Nantucket Lepidoptera (leaf-mining moths) and Hymenoptera (sawflies and gall wasps), once adults have finished emerging from the samples I collected in October. Other writing projects include ongoing collaborations on the taxonomy and natural history of leaf-mining flies in the families Chironomidae, Chloropidae, and Sciaridae; beetles in the families Buprestidae and Curculionidae; and moths in the families Bucculatricidae, Cosmopterigidae, Elachistidae, Eriocraniidae, Gelechiidae, Gracillariidae, Heliozelidae, Nepticulidae, and Tortricidae. These collaborations will become higher priorities when my collaborators are able to find time to work on them. In January, I will use part of my award from the Maxwell | Hanrahan Foundation to purchase new microscopes and photography equipment, which will help greatly in pursuing my independent moth taxonomy projects.

During the field season, in addition to continuing to add to the overall list of herbivorous insects documented at Aton Forest, I will have a list of specific targets in mind each time I visit, with the goal of collecting larvae and rearing them to adults so that the species in question can be identified (and described, if they turn out to be new). Although I succeeded in collecting some of these species this year, I have left them on this list for now because I won't know until spring whether I have succeeded in rearing adults.

They include:

- Spring: mystery feeding channels on interrupted and sensitive fern; *Pseudopostega* on bugleweed and wild mints; leaf-mining moth on *Spiraea tomentosa*
- Throughout the season, beginning in June: collect mines of *Ophiomyia parda/quinta* on asters and *Phytomyza agromyzina/notopleuralis* on dogwoods, with the hope of rearing enough adults to determine whether these species pairs represent synonyms
- Mid- to late June: *Chirosia* on silvery spleenwort, *Agromyza* on avens, *Liriomyza* on false hellebore, *Phytomyza* on marsh marigold, leaf spot gall midge on sweetgale, leaf curl gall midge on highbush blueberry
- Mid- to late summer: stem-mining *Ophiomyia* on bedstraws; *Taphrocerus* and possibly *Cosmopterix* on *Dulichium arundinaceum*; purported *Polypedilum braseniae* on *Brasenia* and *Nymphaea*
- Autumn: maleberry *Brachys* and *Caliroa*

I look forward to exploring Aton Forest's new acquisitions, including at the bioblitz event planned for this spring. Other fieldwork will include an August trip to Kent, NY, and possibly further surveys sponsored by Green Berkshires in the vicinity of Mount Washington, MA.