Nantucket's Neglected Herbivores II: Diptera

Article *in* Proceedings of the Entomological Society of Washington · December 2022

DOI: 10.4289/0013-8797.124.3.564

2 authors, including:

Charles Eiseman

93 PUBLICATIONS **337** CITATIONS

SEE PROFILE

Nantucket's Neglected Herbivores II: Diptera

Authors: Eiseman, Charles S., and Blyth, Julia A.

Source: Proceedings of the Entomological Society of Washington, 124(3) : 564-605

Published By: Entomological Society of Washington

URL: https://doi.org/10.4289/0013-8797.124.3.564

PROC. ENTOMOL. SOC. WASH.
124(3), 2022, pp. 564–605

NANTUCKET'S NEGLECTED HERBIVORES II: DIPTERA

Charles S. Eiseman and Julia A. Blyth

(CSE) 276 Old Wendell Rd., Northfield, MA 01360, USA (e-mail: ceiseman@gmail.com; https://orcid.org/0000-0001-5496-9114); (JAB) 276 Old Wendell Rd., Northfield, MA 01360, USA (e-mail: jablyth@gmail.com; https://orcid.org/0000-0002-4306-2370)

Abstract.—Records of Diptera and their hymenopteran parasitoids are reported from a ten-year study of herbivorous insects of Nantucket Island, Massachusetts, USA, with a focus on searching for galls, leaf mines, and other characteristic feeding evidence on host plants. Our field observations and reared specimens are supplemented with herbarium records and Johnson's (1930) list of the insect fauna of Nantucket. Compared with Johnson's list of nine species of Agromyzidae, we identified 53 along with 15 others determined only to genus or higher taxa (a few of the latter could conceivably be conspecific with the former or with one another). We found 37 named species of Cecidomyiidae (including eight of the nine on Johnson's list), as well as 26 others that are undescribed or are currently unidentifiable for other reasons (a few of which could conceivably be conspecific with one of the identified species, or represent galls not actually caused by midges). A few rearings and collections of Anthomyiidae, Chloropidae, Ephydridae, Phoridae, Sphaeroceridae, and Tephritidae are reported, adding another seven species and two genera to Johnson's list. *Cerodontha (Dizygomyza) edithae* Eiseman and Lonsdale (Agromyzidae), an as yet undescribed species of *Ophiomyia* Braschnikov (Agromyzidae), *Megaselia nantucketensis* Eiseman and Hartop (Phoridae), and the cecidomyiid parasitoids *Platygaster tephrosiae* Buhl and Eiseman and *P. vitisiellae* Buhl and Eiseman (Hymenoptera: Platygastridae) are known only from specimens reared as part of this study, which also produced paratypes of *Liriomyza pistilla* Lonsdale (Agromyzidae). Noteworthy cecidomyiid records include the first known specimens of an undescribed *Asphondylia* Loew on *Solidago sempervirens* L. (Asteraceae), galls of an undetermined lasiopterid species on *Tephrosia virginiana* (L.) Pers. (Fabaceae) that have only been found on Nantucket, and previously unreported galls on *Gaylussacia baccata* (Wangenh.) K. Koch (Ericaceae), *Ionactis linariifolia* (L.) Greene (Asteraceae) (*Dasineura* Rondani sp.), *Quercus prinoides* Willd. (Fagaceae), *Salix purpurea* L. (Salicaceae), and *Solidago latissimifolia* Mill. (Asteraceae) (*Asphondylia* sp., *Rhopalomyia* Rübsaamen sp.).

Key Words: biodiversity inventory, extended phenotype, Braconidae, Eulophidae

DOI: 10.4289/0013-8797.124.3.564

This is a continuation of a report on a ten-year study of leafminers, gall inducers, and other generally understudied herbivorous insects of Nantucket Island, Massachusetts, USA, with a focus on searching for characteristic feeding evidence on host plants. See Eiseman and Blyth (2022) for the introduction and an account of the beetles (Coleoptera) we documented. The present paper covers our dipteran observations, which primarily involve leaf-mining Agromyzidae and gall-inducing Cecidomyiidae; along with a few Anthomyiidae, Cecidomyiidae, Chloropidae, Ephydridae, Phoridae, Sphaeroceridae, and Tephritidae that are either leafminers, were reared as inquilines, predators, or contaminants while attempting to rear other insects, or were collected as adults.

Materials and Methods

See Eiseman and Blyth (2022) for general collecting, rearing, preservation, and photography methods, including a list of all collection sites along with their coordinates and an accounting of which collectors/observers were present on each date they were visited. All reared Agromyzidae were identified by O. Lonsdale, and all reared Cecidomyiidae were identified by R. J. Gagné except for those deposited at TAUI which were examined by N. Dorchin. Other cecidomyiid galls were identified using Gagné (1989), if no other reference is given. Gagné and Jaschhof (2021) was consulted for current nomenclature and further host records of Cecidomyiidae. We used Eiseman (2019, 2021) to identify all leafminers that we did not rear.

Photo vouchers for records annotated with "BG" (for BugGuide) followed by a number can be found online by adding that number to the end of this URL: https://bugguide.net/node/view/. For those annotated with "iNat", the number is added to the end of https://www.inaturalist.org/observations/.

The following abbreviations are used for current locations and ultimate depositories of collected and reared specimens: BMNH = Natural History Museum, London, UK; CNC = Canadian National Collection of Insects, Arachnids & Nematodes, Ottawa; CUPC = Department of Zoology, Charles University, Prague, Czech Republic; FJPF = personal collection of Francisco Javier Peris Felipo, Basel, Switzerland (most specimens destined for CNC); HEC = Hope Entomological Collections at the Oxford University Museum of Natural History, England; LACM = Natural History Museum of Los Angeles County, Los Angeles, California; NMMA = Maria Mitchell Association, Nantucket, MA; SJS = sent to Sonja J. Scheffer, Systematic Entomology Laboratory, Beltsville, MD (possibly lost); SMNS = State Museum of Natural History Stuttgart, Germany; TAUI = National Collection of Insects, Zoological Museum, Tel Aviv University, Israel; USNM = National Museum of Natural History, Smithsonian Institution, Washington, DC; ZMUC = Natural History Museum of Denmark, Zoological Museum, Copenhagen, Denmark.

Plant taxonomy follows POWO (2021), except we use *Carya tomentosa* (Poir. in Lam.) Nutt. (Juglandaceae) instead of *C. alba* (L.) Nutt. ex Elliott which was proposed as a nomen ambiguum by Rehder (1945). In the Biology sections, only host plants documented on Nantucket are listed unless otherwise indicated. An asterisk (*) before a plant family, genus, or species name indicates that this taxon represents a host record that had not been reported in literature prior to this study, based on the identification references cited above (in some cases these new associations have been reported previously by us or were duplicated in our concurrent off-island investigations).

Results and Discussion

Agromyzidae

Johnson (1930) included nine species of Agromyzidae in his Nantucket list. Four of these are vouchered by specimens in the NMMA collection, as indicated below, but we have not attempted to verify their identities. His record of *Agromyza aeneiventris* Fallén ("Maxcys Pond, June 25") is presumably a misidentification; this species, now known as *Melanagromyza aeneoventris*, is a European stem borer in several genera of Asteraceae and is not known to occur in North America. Felt (1906) applied this name to the "poplar twig gall fly," whose correct name is *Euhexomyza schineri* (Giraud), but since Johnson gave no biological information and we did not find galls of *E. schineri*, we cannot be certain that this was the species observed. Johnson's eight other Agromyzidae entries are discussed below in the Notes sections for species we documented.

Most agromyzid specimens reared prior to 2019 were previously reported by Eiseman and Lonsdale (2018), Eiseman et al. (2021), or Lonsdale (2017, 2021), and further details on the biology, hosts, and distribution of the species concerned are given in those publications as well as in Eiseman (2019, 2021).

Agromyza aristata Malloch

Biology.—Forms linear-blotch mines on *Ulmus* L. (Ulmaceae). Univoltine; larvae and adults are active only in spring.

Mines observed.—Milk St., 9.ix.2019, *Ulmus* (iNat 95640363).

Agromyza idaeiana Hardy

Biology.—Forms linear-blotch mines on *Potentilla simplex* Michx. (Rosaceae).

Mines observed.—Squam Swamp, 8.ix.2019, *Potentilla simplex* (iNat 95639738).

Agromyza isolata Malloch

Biology.—Forms blotch mines on *Populus *alba* L. and *P. deltoides* W. Bartram ex Marshall (Salicaceae).

Reared specimens.—Reyes Pond, 5.ix.2019, em. 26.ix.2019, ex *Populus alba*, #CSE5941, CNC1903471–1903474 (2 ♂♂, 2 ♀♀).

Herbarium specimen.—Vicinity of Milestone Road at the intersection with the Polpis Road, 29.viii.1970, D. S. Lipof, *Populus deltoides* (NMMA006612).

Agromyza masculina Sehgal

Biology.—Univoltine, active only in spring; forms linear-blotch mines on *Rosa *multiflora* Thunb. and *R. *virginiana* Mill. (Rosaceae).

Reared specimens.—Grove Lane, 15.vi.2018, em. 27.iii.2019, ex *Rosa multiflora*, #CSE5150, CNC1903469 (1 ♂); NCF Bird Sanctuary, 11.vi.2013, em. 21–27.iii.2014, ex *Rosa multiflora*, #CSE1016, CNC384739–384741 (3 ♀♀).

Other mines observed.—Gardner Farm, 13.vi.2013, *Rosa virginiana* (iNat 95032518); Ice Pond Lot, 15.vi.2018, *Rosa* (iNat 95612482); Quaker cemetery, 15.vi.2018, *Rosa virginiana* (iNat 93566091); State Forest, 10.vi.2013, *Rosa* (iNat 94989712).

Parasitoids.—Braconidae: Alysiinae sp. (CSE5159, FJPF). Eulophidae: Entedonini sp. (CSE5186, CSE5208, CNC).

Agromyza vockerothi Spencer

Biology.—Forms linear leaf mines on *Rubus allegheniensis* Porter (*Rosaceae).

Notes.—No hosts were known prior to this study, and the only previous eastern records were from Ontario, Nova Scotia, Tennessee, and North Carolina.

Reared specimen.—NCF Bird Sanctuary, 11.vi.2013, em. 22.viii.2013, ex *Rubus* (blackberry), #CSE829, CNC392662 (1 ♂).

Other mines observed.—Coskata, 9.ix.2011, *Rubus allegheniensis* (iNat 94929707).

Agromyza sp. 1

Biology.—Forms blotch mines on *Dichanthelium clandestinum* (L.) Gould (Poaceae).

Notes.—At least four *Agromyza* species form similar mines in *Dichanthelium* leaves, including three that are known from Massachusetts (*A. parca* Spencer, *A. proxima* Spencer, *A. pudica* Spencer) and one known only from North Carolina (*A. indistincta* Eiseman, Lonsdale and Feldman).

Johnson (1930) listed "*A. parvicornis* Loew (*dubitata* Mall.). Polpis, July 27." *Agromyza dubitata* Malloch is now considered a synonym of *A. albipennis* Meigen, which like *A. parvicornis* is a leafminer of various grasses. These species cannot be reliably identified without examination of male genitalia, and have historically been confused with unrelated leafminers of dicots such as *A. reptans* Fallén and *Nemorimyza posticata* (Meigen) (Lonsdale 2021), so we cannot be sure what species Johnson actually observed.

Mines observed.—Squam Swamp, 27.vii.2017, *Dichanthelium* (iNat 95601909); Stump Pond, 30.vii.2017, *Dichanthelium clandestinum* (iNat 95610440).

Amauromyza flavifrons (Meigen)

Biology.—Forms linear-blotch mines on *Saponaria officinalis* L. (Caryophyllaceae).

Mines observed.—Near the Creeks, 9.ix.2011, *Saponaria officinalis* (iNat 94931012); Sesachacha Pond (N), 9.ix.2011, *Saponaria officinalis* (iNat 94931011).

Amauromyza pleuralis (Malloch)

Biology.—Forms linear-blotch mines on *Catalpa* Scop. (Bignoniaceae).

Notes.—Not previously recorded from Massachusetts.

Mines observed.—Old Gaol, 9.ix.2019, *Catalpa* (iNat 95640236).

Aulagromyza cornigera (Griffiths)

Biology.—Forms broadly linear leaf mines on *Lonicera *japonica* Thunb. (Caprifoliaceae). Univoltine; larvae and adults are present only in spring.

Mines observed.—Lost Farm, 12.vi.2016, *Lonicera japonica* (iNat 95463968).

Aulagromyza luteoscutellata (Meijere)

Biology.—Forms widening linear leaf mines on *Lonicera morrowii* A. Gray. (Caprifoliaceae).

Notes.—Not previously recorded from Massachusetts.

Reared specimens.—Dead Horse Valley, 6.xi.2017, em. 26–30.iv.2018, ex *Lonicera morrowii*, #CSE4440, CNC1135691–1135692 (1 ♂, 1 ♀); Ice Pond Lot, 13.vi.2013, em. 1.vii.2013, ex *Lonicera morrowii*, #CSE631 (1 ♂).

Other mines observed.—Coffin Park (S), 7.viii.2012, *Lonicera morrowii* (iNat 94983826); NCF Bird Sanctuary, 11.vi.2013, *Lonicera morrowii* (iNat 93754455); UMass classroom, 11.vi.2013, *Lonicera morrowii* (iNat 95028308); Vesper Lane, 9.ix.2011, *Lonicera morrowii* (iNat 94928797).

Parasitoids.—Eulophidae: *Chrysocharis* cf. *nephereus* (Walker), *Closterocerus cinctipennis* Ashmead (both CSE632, BMNH), Entedonini sp. (CSE639, CNC/BG 872944, BG 872945), Eulophini sp. (CSE608, CNC/BG 870855).

Aulagromyza populicola (Walker)

Biology.—Forms broadly linear leaf mines on *Populus *grandidentata* Michx. (Salicaceae).

Mines observed.—Stump Pond, 25.ix.2020, *Populus grandidentata* (iNat 95641071).

Calycomyza menthae Spencer

Biology.—Forms linear-blotch mines on *Mentha *spicata* L. (Lamiaceae).

Mines observed.—Lily Pond Park, 28.vii.2017, *Mentha spicata* (iNat 95602931).

Calycomyza platyptera (Thomson)

Biology.—Forms whitish, typically digitate leaf mines on *Bidens *connata* Muhl. ex Willd. and **Iva frutescens* L. (Asteraceae).

Notes.—This may be the species Johnson (1930) listed as *Agromyza platyptera* var. *jucunda* v. d. W. ("Madeket, July 16").

Reared specimens.—Lily Pond Park, 9.ix.2019, em. 15–16.ix.2019, ex *Bidens connata*, #CSE5913, CNC1903468 (1 ♀); Masquetuck, 28.vii.2017, em. by 31.vii–5.viii.2017, ex *Iva frutescens*, #CSE4015, CNC939652–939653 (1 ♂, 1 ♀).

Parasitoids.—Braconidae: Alysiinae sp. (CSE5922, CSE5930, CSE5947, FJPF).

Calycomyza promissa (Frick)

Biology.—Forms a white linear-blotch mine on *Symphyotrichum *lanceolatum* (Willd.) G. L. Nesom (Asteraceae), centered on the midrib. The puparium is held above the floor of the mine by a narrow pedestal of frass.

Mines observed.—Lily Pond Park, 28.vii.2017, *Symphyotrichum lanceolatum* (iNat 93757350); Stump Pond, 30.vii.2017, *Symphyotrichum lanceolatum* (iNat 95608910).

Parasitoids.—Eulophidae: Entedonini sp. (CSE4078, CNC).

Calycomyza solidaginis (Kaltenbach)

Biology.—Forms whitish linear-blotch mines on *Solidago *altissima* L., *S. *latissimifolia* Mill., *S. *odora* Aiton, and *S. *sempervirens* L. (Asteraceae).

Reared specimens.—Dead Horse Valley, 6.viii.2012, em. by 15.viii.2012, ex *Solidago altissima*, #CSE32, CNC391435–391439 (4 ♂♂, 1 ♀); Ice Pond Lot, 5.viii.2012, em. 8–15.viii.2012, ex *Solidago latissimifolia*, #CSE22, CNC391431–391434 (3 ♂♂, 1 ♀); 26.vii.2014, em. 5.viii.2014, ex *Solidago latissimifolia*, #CSE1269, CNC384825–384826 (2 ♀♀); Squam Swamp, 12.vi.2013, em. 23.vi.2013, ex *Solidago latissimifolia*, #CSE587, CNC384812 (1 ♀); Tuckernuck, 14.vii.2012, em. 22.vii.2012, ex *Solidago sempervirens*, #CSE58, CNC391440 (1 ♂).

Other mines observed.—Coffin Park (S), 7.viii.2012, *Solidago latissimifolia* (iNat 93704186); Hummock Pond, 10.ix.2011, *Solidago sempervirens* (iNat 95641326); LLNF (S), 11.vii.2012, *Solidago latissimifolia* (iNat 94937138); Sanford Farm, 27.vii.2017, *Solidago odora* (iNat 93749780); Squam Farm, 9.vi.2013, *Solidago latissimifolia* (iNat 94988892); Squam Farm, 9.vi.2013, *Solidago latissimifolia* (iNat 93568105); Squam Swamp, 8.viii.2012, *Solidago latissimifolia* (iNat 94985733); Tuckernuck, 14.vii.2012, *Solidago* (iNat 93756469); UMass pond, 29.viii.2015, *Solidago latissimifolia* (iNat 93874024).

Parasitoids.—Braconidae: Opiinae sp. (CSE39, BG 743056; CSE615, BG 871955), unknown sp. (CSE40). Eulophidae: Entedonini sp. (CSE51, CNC/BG 743741; CSE1453, CNC), *Chrysocharis* sp. (CSE-4069, CNC/BG 1462621). Eupelmidae: *Eupelmus messene* Walker (CSE53, CNC/BG 743747). Figitidae: Eucoilinae sp. (CSE2035, USNM). Pteromalidae: unknown sp. (CSE40, BG 743058).

Calycomyza sp. 1

Biology.—Forms whitish linear-blotch mines on *Euthamia graminifolia* (L.) Nutt. (Asteraceae).

Notes.—To date this is the only record of a *Calycomyza* from *Euthamia*. The mine is similar to that of *C. solidaginis* on *Solidago*, but the adult matches the description of *C. platyptera*. Eiseman and

Lonsdale (2018) were hesitant to assign this female to *C. platyptera* due to the mine having a long linear portion with a conspicuous frass line.

Reared specimen.—Squam Farm, 27.viii.2015, em. by 6.ix.2015, ex *Euthamia graminifolia*, #CSE2024, CNC564624 (1 ♀).

Cerodontha (Butomomyza) angulata (Loew)

Biology.—Forms leaf mines on *Carex *crinita* Lam. (Cyperaceae), *Juncus tenuis* Willd. (*Juncaceae), and *Dichanthelium clandestinum* (L.) Gould (Poaceae).

Reared specimens.—Squam Swamp, 27.vii.2017, em. 26.iv–1.v.2018, ex *Juncus tenuis*, #CSE4444, CNC1135688–1135689 (1 ♂, 1 ♀); stream near flowering dogwood, 30.vii.2017, em. 18.viii.2017, ex *Carex crinita*, #CSE4140, CNC939651 (1 ♂).

Other mines observed.—Reyes Pond, 6.ix.2019, *Dichanthelium clandestinum* (iNat 95638512); Squam Swamp, 8.ix.2019, *Juncus tenuis* (iNat 95638775); Stump Pond, 30.vii.2017, *Dichanthelium clandestinum* (iNat 95610439).

Parasitoids.—A *Pnigalio* sp. (Eulophidae) (CSE4088, BMNH) emerged in a vial containing *Juncus tenuis* leaves that produced the *Cerodontha angulata* adults as well as a *Cerodontha* female tentatively identified as *C. incisa* (see below).

Cerodontha (Cerodontha) dorsalis (Loew)

Biology.—Feeds on various grasses (Poaceae) including **Glyceria septentrionalis* Hitchc. and *Phalaris *arundinacea* L., forming a long, narrow, whitish leaf mine that leads into the sheath, where the puparium is formed.

Notes.—This is presumably the species represented by Johnson's (1930) listing: "*C. femoralis* Meig. (*dorsalis* Loew). Surfside, Sept. 16."

Mines observed.—Lily Pond Park, 28.vii.2017, *Phalaris arundinacea* (iNat 94766319); Squam Swamp, 27.vii.2017, *Glyceria septentrionalis* (iNat 95469444).

Parasitoids.—Pteromalidae: unknown sp. (CSE4117, CNC/iNat 94767283).

Cerodontha (Dizygomyza) edithae Eiseman and Lonsdale

Biology.—Forms an elongate blotch mine on *Iris versicolor* L. (Iridaceae).

Notes.—The Nantucket holotype is the only known specimen, and we have not found similar leaf mines off island with the exception of one example photographed by J. Klymko in Nova Scotia (iNat 87713632).

Reared specimen.—Stump Pond, 4.viii.2012, em. 10.viii.2012, ex *Iris versicolor*, #CSE26, CNC481637 (1 ♂).

Parasitoids.—Eulophidae: Entedonini sp. (CSE42, CNC/BG 743648).

Cerodontha (Dizygomyza) morosa (Meigen)

Biology.—Forms an elongate whitish leaf mine on *Carex *swanii* (Fernald) Mack. (Cyperaceae), with the frass deposited in a single blackish lump toward the leaf apex, and with the brown puparium glued to the floor of the mine toward the leaf base.

Notes.—The specific identification of this fly should be considered tentative, but *C. morosa* is the only species we have reared from mines of this description (Eiseman and Lonsdale 2018).

Mines observed.—Squam Swamp, 27.vi.2017, *Carex swanii* (iNat 93772264).

Parasitoids.—Eulophidae: *Pediobius albipes* (Provancher) (CSE4153, BMNH).

Cerodontha (Dizygomyza) scirpivora Spencer

Biology.—Larvae gregariously mine leaves of *Scirpus cyperinus* (L.) Kunth (Cyperaceae). The puparia are formed side by side laterally across the leaf. Each is yellowish to brownish orange with a

broad, black, central band along the ventral surface.

Notes.—Adult specimens of this species are only known from Ontario.

Mines observed.—Lily Pond Park, 5.ix.2019 and 3.xi.2019, *Scirpus cyperinus* (iNat 93571174).

Parasitoids.—Braconidae: Opiinae sp. (CSE6066, CSE6076, CSE6089, CSE-6100). Eulophidae: Eulophini sp. (CSE-6035, CNC).

Cerodontha (Dizygomyza) thompsoni (Frick)

Biology.—Forms a long, zigzagging, linear leaf mine on *Iris versicolor* L. (Iridaceae), terminating at the base of the leaf where the puparium is formed.

Notes.—Johnson (1930) listed *Agromyza laterella* Zetterstedt: "June 8-25. The larvae form galls on the leaves of Iris" (5 ♂ at NMMA). This was the name Claassen (1918) used for *C. thompsoni*, and he reported that when the mine is formed in the youngest, innermost leaf, a gall develops around the puparium when growth is resumed in the spring.

Mines observed.—Lily Pond Park, 28.vii.2017, *Iris versicolor* (iNat 95604414); Ram Pasture/Clark Cove, 27.vii.2017, *Iris versicolor* (iNat 95467322).

Cerodontha (Poemyza) incisa (Meigen)

Biology.—Normally a leafminer of grasses (Poaceae, e.g. *Dactylis glomerata* L. and **Glyceria septentrionalis* Hitchc.), but the tentatively identified Nantucket female was reared from *Juncus tenuis* Willd. (*Juncaceae).

Notes.—Some of the grass mines we observed could conceivably represent *C. (P.) pygmaea* (Meigen), which has similar metallic black puparia, but we have only reared *C. incisa* from such puparia elsewhere (Eiseman and Lonsdale 2018), and no specimens of *C. pygmaea* are known from New England (Lonsdale 2021). The fact that the *Juncus* and *Glyceria* mines were collected in close proximity to each other on the same date supports the assumption that the leafminers on these two hosts are conspecific.

Johnson (1930) listed *Agromyza coquilletti* Malloch ("July 4 (*Cushman*). Surfside, Sept. 9-16."), which is a synonym of *Cerodontha (Poemyza) superciliosa* (Zetterstedt), another leafminer of various grass genera. It likewise forms a metallic black puparium, but this is anchored in the mine with frass, not loosely tethered by a string of silk as in *C. incisa* and *C. pygmaea*. We did not find any potential mines of *C. superciliosa* during this survey.

Reared specimen.—Squam Swamp, 27.vii.2017, em. by 22.viii.2017, ex *Juncus tenuis*, #CSE4157, CNC939650 (1 ♀).

Other mines observed.—Squam Swamp, 27.vii.2017, *Glyceria septentrionalis* (iNat 93760643); Stump Pond, 30.vii.2017, *Dactylis glomerata* (iNat 93544427).

Parasitoids.—Braconidae: unknown sp. (CSE4116, FJPF); Eulophidae: Entedonini sp. (CSE4116, FJPF; CSE4121, CSE4127, CSE4129, CSE4229, CNC). A *Pnigalio* sp. (CSE4088, BMNH) emerged in a vial containing *Juncus tenuis* leaves that produced the *Cerodontha* cf. *incisa* female as well as adults of *C. angulata*.

Cerodontha sp. 1

Biology.—Forms an elongated, whitish leaf mine on *Carex lurida* Wahlenb. (Cyperaceae).

Mines observed.—Squam Farm, 27.viii.2015, *Carex lurida* (iNat 95076220).

Cerodontha sp. 2

Biology.—Forms an irregular linear leaf mine on *Juncus canadensis* J. Gay ex Laharpe (Juncaceae).

Mines observed.—Wigwam Ponds, 30.vii.2017, *Juncus canadensis* (iNat 95642970).

Japanagromyza viridula (Coquillett)

Biology.—Larvae form blotch mines in young, tender leaves of *Quercus *alba* L., *Q. *bicolor* Willd., *Q. *ilicifolia* Wangenh. and *Q. *velutina* Lam. (Fagaceae). Continued expansion of leaves following host-feeding by adult females results in characteristic "shotholes." We found shotholes on *Q. prinoides* Willd., but larval mines have never been documented on this host.

Reared specimens.—Squam Farm, 9.vi.2013, em. 30.vi.2013, ex *Quercus ilicifolia*, #CSE627, CNC358584–358585 (2 ♀♀); Squam Swamp, 12.vi.2013, em. 30.vi.2013, ex *Quercus velutina*, #CSE619, CNC392713 (1 ♂).

Herbarium specimen.—Lily Pond Park, 7.vi.2021, K.A. Omand, mines and shotholes on *Quercus bicolor* (NMMA006761).

Other observations.—Dead Horse Valley, 6.viii.2012, shotholes on *Quercus ilicifolia* (iNat 94976414); Lost Farm, 12.vi.2016, shotholes on *Quercus ilicifolia* (iNat 95464868); Madequecham, 8.ix.2011, shotholes on *Quercus prinoides* (iNat 94977054); 10.vi.2013, mine on *Quercus ilicifolia* (iNat 94989236); Masquetuck, 11.vi.2013, mine on *Quercus alba* (iNat 94991866); Squam Swamp, 12.vi.2013, mines and shotholes on *Quercus alba* (iNat 93542005); shotholes on *Quercus ilicifolia* (iNat 95029997); State Forest, 10.vi.2013, shotholes on *Quercus ilicifolia* (iNat 94990205).

Predator.—Formicidae: *Temnothorax curvispinosus* (Mayr) (BG 783572). This tiny ant was observed chewing a hole in the underside of a mine and then removing the *J. viridula* larva.

Parasitoids.—Braconidae: Alysiinae sp. (CSE637, BG 872541), Opiinae sp. (CSE626, BG 872498), unknown sp. (CSE633).

Liriomyza asclepiadis Spencer

Biology.—Forms blotch mines on *Asclepias syriaca* L. (Apocynaceae).

Mines observed.—MMA, 2.viii.2012, *Asclepias syriaca* (iNat 94939225); Polpis Rd., 9.ix.2011, *Asclepias syriaca* (iNat 94928234).

Liriomyza baptisiae (Frost)

Biology.—Forms linear-blotch mines on *Baptisia tinctoria* (L.) R. Br. (Fabaceae).

Notes.—These are the first New England records for this species.

Mines observed.—Head of the Plains, 10.vi.2016, *Baptisia tinctoria* (iNat 93570560); Madequecham, 3.viii.2012, *Baptisia tinctoria* (iNat 93705785); Pout Ponds, 9.vi.2016, *Baptisia tinctoria* (iNat 95416156); SHCP, 14.vi.2018, *Baptisia tinctoria* (iNat 95612100).

Parasitoids.—Braconidae: Opiinae sp. (CSE3680, FJPF). Eulophidae: Entedonini sp. (CSE55, CNC/BG 743754), Eulophini sp. (CSE23, CNC/BG 742354).

Liriomyza blechi Spencer

Biology.—Forms irregular leaf mines on *Plantago major* L. (Plantaginaceae).

Mines observed.—Stump Pond, 4.viii.2012, *Plantago major* (iNat 94940165).

Liriomyza brassicae (Riley)

Biology.—Forms linear leaf mines on *Cakile edentula* (Bigelow) Hook. (Brassicaceae).

Notes.—Priest et al. (2020) confirmed this new host record for *L. brassicae* by rearing adults.

Mines observed.—Eel Point, 26.vii.2014, *Cakile edentula* (iNat 93570056).

Parasitoids.—Braconidae: Opiinae sp. (CSE1295, CSE1330).

Liriomyza carphephori Eiseman, Lonsdale, and Feldman

Biology.—Forms linear leaf mines on *Mikania scandens* (L.) Willd. (Asteraceae). We tentatively attribute the mines found on *Ageratina altissima* (L.)

R. M. King and H. Rob. (Asteraceae) to this species, but it is also possible that they represent *L. eupatoriella* Spencer.

Mines observed.—Academy Hill (41.284948, -70.102744), 11.ix.2019, K.A. Omand, *Ageratina altissima* (iNat 123696795); Windswept Cranberry Bogs, 24.ix.2020, *Mikania scandens* (iNat 95640620).

Liriomyza eupatorii (Kaltenbach)

Biology.—Forms linear leaf mines, often beginning with a distinct spiral, on various Asteraceae, including *Baccharis halimifolia* L., **Erigeron canadensis* L., *Solidago* **altissima* L., *S.* **latissimifolia* Mill., *Symphyotrichum lanceolatum* (Willd.) G.L. Nesom, and *S. lateriflorum* (L.) Á. Löve and D. Löve. We strongly suspect that *Liriomyza* mines on *Euthamia graminifolia* (L.) Nutt. are attributable to this species, but adults have not been reared.

Notes.—This may be the species represented by Johnson's (1930) entry of "*A[gromyza] pusilla* Meig., Serpentine Leaf-miner. Polpis, Aug. 6" (1 ♀ at NMMA). *Liriomyza pusilla* (Meigen) is a European species that is nearly indistinguishable from *L. eupatorii* (see Eiseman et al. 2021), but this name has also been applied historically to species such as *L. asclepiadis*, *L. brassicae*, *L. sativae* Blanchard, and *L. trifolii* (Burgess).

Reared specimens.—Coskata, 12.vi.2013, em. 25.vi.2013, ex *Baccharis halimifolia*, #CSE605, CNC392681–392682 (1 ♂, 1 ♀); same data, #CSE606, CNC422936–422942 (1 ♂, 6♀); Ice Pond Lot, 13.vi.2013, em. 3.vii.2013, ex *Solidago latissimifolia*, #CSE648, CNC392710 (1 ♂); Masquetuck, 11.vi.2013, em. 24.vi.2013, ex *Baccharis halimifolia*, #CSE595 (CNC—lost?, 1 ♀); same collection data, em. 30.vi.2013, #CSE618, CNC358470 (1 ♂); 14.vi.2018, em. ~29.vi.2018, ex *Baccharis halimifolia*, #CSE4706, CNC1135694 (1 ♀); Squam Swamp, 12.vi.2013, em. 24.vi.2013, ex *Solidago latissimifolia*, #CSE598, CNC392714 (1 ♂); same data, #CSE603, CNC392701–392702 (2 ♂♂); same collection data, em. 24–30.vi.2013, #CSE601, CNC392939–392944 (3 ♂♂, 3 ♀♀); same collection data, em. 30.vi.2013, #CSE624, CNC392715 (1 ♂); UMass classroom, 11.vi.2013, em. 24.vi.2013, ex *Baccharis halimifolia*, #CSE595 (1 ♀, lost); 11.vi.2013, em. 25.vi.2013, ex *Solidago altissima*, #CSE604, CNC384815 (1 ♀); same collection data, em. 30.vi.2013, #CSE617, CNC384819–384820 (2 ♂♂).

Other mines observed.—Almanac Pond, 4.viii.2012, *Euthamia graminifolia* (iNat 94940948); Coskata, 6.viii.2012, *Baccharis halimifolia* (iNat 94972860); Gardner Farm, 13.vi.2013, *Solidago latissimifolia* (iNat 93974558); Lily Pond Park, 28.vii.2017, *Symphyotrichum lanceolatum* (iNat 95603944); LLNF (S), 11.vii.2012, *Solidago latissimifolia* (iNat 94937137); MMA, 28.vii.2017, *Erigeron canadensis* (iNat 95605617); NCF Bird Sanctuary, 11.vi.2013, *Solidago latissimifolia* (iNat 95028618); Pout Ponds, 29.viii.2015, *Euthamia graminifolia* (iNat 93543438); Squam Farm, 9.vi.2013, *Symphyotrichum?* (iNat 94987645); Squam Swamp, 8.ix.2019, *Symphyotrichum lateriflorum* (iNat 95639534); Stump Pond, 30.vii.2017, *Euthamia graminifolia* (iNat 95607946) and *Symphyotrichum lanceolatum* (iNat 95609684); Trott's Swamp, 28.viii.2015, *Euthamia graminifolia* (iNat 95103007).

Parasitoids.—Braconidae: Opiinae sp. (CSE620, BG 871970; CSE625, BG 872493), unknown sp. (CSE2030, CSE2062). Eulophidae: Eulophinae sp. (CSE584, CNC/870711), *Pnigalio* sp. (CSE647, CSE2015, CSE2029, BMNH), *Zagrammosoma multilineatum* (Ashmead) (CSE596, CNC/BG 870793). Figitidae: *Gronotoma* sp. (CSE640, CSE653, CSE664, USNM).

Liriomyza fricki Spencer

Biology.—Forms a somewhat blotchy linear leaf mine on *Trifolium repens* L. (Fabaceae).

Mines observed.—Bartlett's Farm, 7.ix.2019, *Trifolium repens* (iNat 96520726).

Liriomyza orilliensis Spencer

Biology.—Forms an irregular leaf mine on *Nabalus* **trifoliolatus* Cass. (Asteraceae).

Reared specimen.—Squam Swamp, 8.ix.2019, em. 14.iii.2020, ex *Nabalus trifoliolatus*, #CSE6053, CNC1904821 (1♀).

Other mines observed.—Squam Swamp, 27.vii.2017, *Nabalus trifoliolatus* (iNat 95481759).

Liriomyza pistilla Lonsdale

Biology.—Forms linear-blotch mines on *Melampyrum lineare* Desr. (Orobanchaceae).

Notes.—Our reared adults are among the paratypes of this species, which also include specimens from several Canadian provinces; the holotype was collected in North Carolina (Lonsdale 2017).

Reared specimens.—Masquetuck, 11.vi.2013, em. 26–30.vi.2013, ex *Melampyrum lineare*, #CSE610, CNC422920–422923 (1 ♂, 3 ♀♀).

Other mines observed.—Madequecham, 3.viii.2012, *Melampyrum lineare* (iNat 94939536).

Parasitoids.—Braconidae: Opiinae sp. (CSE616, BG 871963). Figitidae: *Zaeucoila robusta* (Ashmead) (CSE651, USNM).

Liriomyza sp. 1 (*flaveola* group)

Biology.—Forms a linear leaf mine on *Anthoxanthum odoratum* L. (Poaceae), exiting to form a yellow puparium.

Notes.—No species of the grass-feeding *flaveola* group have been documented in the eastern USA, but several occur in adjacent Canada. Hosts are unknown for most species, but *Anthoxanthum* is one of the many host genera reported in Europe for the Holarctic *L. flaveola* (Fallén).

Mines observed.—Lost Farm, 12.vi.2016, *Anthoxanthum odoratum* (iNat 95416671).

Liriomyza sp. 2

Biology.—Forms a linear leaf mine on *Erechtites hieraciifolius* (L.) Raf. ex DC. (Asteraceae), pupating externally.

Mines observed.—Quaise, 5.ix.2019, *Erechtites hieraciifolius* (iNat 95637675).

Liriomyza sp. 3

Biology.—Forms a linear leaf mine on *Pseudognaphalium obtusifolium* (L.) Hilliard and B. L. Burtt (Asteraceae).

Notes.—This is the first record of any agromyzid from this host. *Liriomyza sabaziae* Spencer, known from the West Coast to Manitoba, is recorded from *P. leucocephalum* (A. Gray) Anderb.

Mines observed.—Reyes Pond, 6.ix.2019, *Pseudognaphalium obtusifolium* (iNat 95638087).

Nemorimyza maculosa (Malloch)

Biology.—Forms brown blotch mines on various Asteraceae, including *Arctium* L., *Erechtites hieraciifolius* (L.) Raf. ex DC., and *Erigeron canadensis* L.

Reared specimens.—Little Sesachacha Pond, 2.ix.2012, em. 3.x.2012, ex *Erechtites hieraciifolius*, #CSE109, CNC480523–480524 (2 ♂♂); N. Liberty St., 7.viii.2012, em. 23.viii.2012, ex *Erigeron canadensis*, #CSE43, CNC480555–480556 (1 ♂, 1 ♀); Reyes Pond, 6.ix.2019, em. 28.ix.2019, ex *Erechtites hieraciifolius*, #CSE5949, CNC1903465 (1 ♂).

Other mines observed.—Bamboo Forest, 31.vii.2017, *Arctium* (iNat 95611636); Lily Pond Park, 24.ix.2020, *Erechtites hieraciifolius* (iNat 95640716);

Maxcy Pond, 2.viii.2012, *Erechtites hieraciifolius* (iNat 94938153); Near the Creeks, 9.ix.2011, *Erechtites hieraciifolius* (iNat 94931361); Quaise, 5.ix.2019, *Erechtites hieraciifolius* (iNat 95621412).

Nemorimyza posticata (Meigen)

Biology.—Forms brown trumpet/blotch mines on various Asteraceae, including *Baccharis halimifolia* L., *Solidago* *altissima L., *S. gigantea* Aiton, *S.* *latissimifolia Mill., and *S. sempervirens* L., as well as on *Teucrium canadense* L. (Lamiaceae).

Reared specimens.—Dead Horse Valley, 6.viii.2012, em. 26.viii.2012, ex *Solidago altissima*, #CSE45, CNC480533 (1 ♂); Ice Pond Lot, 5.viii.2012, em. 26.viii.2012, ex *Baccharis halimifolia*, #CSE46, CNC480534 (1 ♀); UMass classroom, 11.vi.2013, em. 2.vii.2013, ex *Solidago altissima*, #CSE641, CNC384796 (1 ♀); Squam Swamp, 12.vi.2013, em. 3.vii.2013, ex *Solidago latissimifolia*, #CSE646, CNC392660 (1 ♂).

Other mines observed.—Capaum Pond, 8.ix.2019, *Teucrium canadense* (iNat 95640014); Coskata, 9.ix.2011, *Solidago sempervirens* (iNat 95641499); 6.viii.2012, *Baccharis halimifolia* (iNat 93704695); 12.vi.2013, *Baccharis halimifolia* (iNat 95031593); Lily Pond Park, 7.viii.2012, *Solidago gigantea* (iNat 93567048); Lost Farm, 12.vi.2016, *Solidago latissimifolia* (iNat 95464604); Masquetuck, 11.vi.2013, *Baccharis halimifolia* (iNat 94992093); 28.vii.2017, *Teucrium canadense* (iNat 95606978); Transfer Station, 3.viii.2012, *Baccharis halimifolia* (iNat 93976259); UMass classroom, 7.ix.2011, *Baccharis halimifolia* (iNat 94888823).

Parasitoids.—Braconidae: *Oenonogastra* sp. (CSE38, BG 743053), Opiinae sp. (CSE634, 872521; CSE655, BG 873545). Eulophidae: Entedonini sp. (CSE52, CNC/BG 743745). Figitidae: *Zaeucoila robusta* (Ashmead) (CSE57, USNM/BG 743813).

Ophiomyia beckeri (Hendel)

Biology.—The single mine found was on *Taraxacum officinale* F. H. Wigg. (Asteraceae). It began on the lower leaf surface and then switched to the upper, where it followed the full length of the midrib with irregular excursions into the blade. The larva then proceeded down the petiole and continued onto the lower surface of a fresh leaf, where it formed a whitish puparium. Previous accounts of the mining habits of this species have not mentioned the larva forming an initial lower-surface portion or moving from one leaf to another.

Notes.—The only previous North American records of this Old World species are those of four specimens reared in North Carolina beginning in 2015 (Eiseman et al. 2019).

Reared specimen.—Vestal St., 9.ix.2019, em. 24.ix.2019, ex *Taraxacum officinale*, #CSE5935, CNC1903470 (1 ♂).

Ophiomyia carolinensis Spencer

Biology.—Forms a leaf mine on *Symphyotrichum lateriflorum* (L.) Á. Löve and D. Löve (Asteraceae) that is initially linear (this portion often only intermittently visible on the upper surface), later becoming an elongate, poorly defined blotch running along both sides of the midrib.

Mines observed.—Squam Swamp, 27.vii.2017, *Symphyotrichum lateriflorum* (iNat 95483167).

Ophiomyia cf. *congregata* (Malloch)

Biology.—Forms a branching leaf mine emanating from the petiole and midrib of *Nabalus trifoliolatus* Cass. (Asteraceae).

Notes.—We have reared *O. congregata* from similar mines on *N. altissimus* (L.)

Hook. in western Massachusetts. Larvae produce narrow, whitish mines in the leaf blade in summer and autumn, then descend into the petiole and apparently overwinter in the crown of the plant before forming mines in the spring like the one reported here (Eiseman and Lonsdale 2018).

Mines observed.—Squam Swamp, 12. vi.2013, *Nabalus trifoliolatus* (iNat 95030325).

Ophiomyia kwansonis Sasakawa

Biology.—Forms long linear leaf mines on *Hemerocallis* L. (Asphodelaceae).

Mines observed.—MMA, 6.viii.2012, *Hemerocallis* (iNat 94976117).

Ophiomyia maura (Meigen)

Biology.—Forms long, narrow, linear leaf mines on various Asteraceae, on the upper surface of *Solidago *latissimifolia* Mill., but on the lower surface of *Euthamia graminifolia* (L.) Nutt.

Notes.—Johnson (1930) listed "*A[gromyza] maura* var. *simplex* Loew, Asparagus Miner. July 16-Aug. 6" (1 ♂ at NMMA). *Ophiomyia simplex* (Loew) forms stem mines on *Asparagus officinalis* L. (Asparagaceae), but since Johnson did not indicate whether his observations were based on reared or caught adults, it is possible these records represent *O. maura* or some other congener. We only had the opportunity to examine one asparagus patch (at Ice Pond Lot), and no mines were found.

Reared specimens.—Gardner Farm, 13.vi.2013, em. 24.vi.2013, ex *Solidago latissimifolia*, #CSE600, CNC1150980 (1 ♀); Squam Farm, 27.viii.2015, em. 31.viii.2015, ex *Euthamia graminifolia*, #CSE2014 (1 ♀, lost); Squam Swamp, 12.vi.2013, em. by 21.vi.2013, ex *Solidago latissimifolia*, #CSE570, CNC1150981 (1 ♀); same collection data, em. 26–30.vi.2013, #CSE609, CNC384817–384818 (1 ♂, 1 ♀).

Other mines observed.—Ice Pond Lot, 26.vii.2014, *Solidago latissimifolia* (iNat 93755306).

Parasitoids.—Braconidae: Opiinae sp. (CSE599; CSE621, BG 872033). Eulophidae: Entedonini sp. (CSE1328, CNC).

Ophiomyia parda Eiseman and Lonsdale

Biology.—Forms a long, narrow, linear leaf mine on *Symphyotrichum lateriflorum* (L.) Á. Löve and D. Löve (Asteraceae), with frass in conspicuous, widely spaced black lumps that fill the width of the mine.

Mines observed.—Squam Swamp, 8.ix.2019, *Symphyotrichum lateriflorum* (iNat 94767569).

Parasitoids.—Tetracampidae: *Epiclerus* sp. (CSE5892, CNC / iNat 94768492).

Ophiomyia sp. 1

Biology.—Forms long, narrow, linear leaf mines on *Euthamia caroliniana* (L.) Greene ex Porter and Britton (Asteraceae), involving both leaf surfaces.

Notes.—This is the first record of any agromyzid from *Euthamia caroliniana*. On *E. graminifolia*, *Ophiomyia maura* has been reared from a lower-surface mine, and *O. euthamiae* Eiseman and Lonsdale from mines that switched from the lower to the upper surface, but O. Lonsdale (in litt.) was unable to reconcile the distiphallus of our male specimen with that of either of these, or of any other described species. The other observations of mines on *E. caroliniana* listed below, including the collection that produced an adult female, are only tentatively attributed to this undescribed species.

Reared specimens.—Reyes Pond, 6.ix.2019, em. 14.ix.2019, ex *Euthamia caroliniana*, #CSE5909, CNC1903467 (1 ♀); Stump Pond, 5.ix.2019, em. 7.ix.2019, ex *Euthamia caroliniana*, #CSE5881, CNC1903479 (1 ♂).

Other mines observed.—Squam Swamp, 12.vi.2013, *Euthamia caroliniana* (iNat 95032238).

Ophiomyia sp. 2

Biology.—Forms a linear stem mine on *Nabalus trifoliolatus* Cass. (Asteraceae).

Notes.—The only known stem miner of *Nabalus* is *Ophiomyia nabali* Eiseman and Lonsdale, reared from *N. albus* (L.) Hook. in Iowa, but the single observed mine on Nantucket was aborted at an early stage and even the genus of the miner is in some doubt.

Mines observed.—Stump Pond, 5.ix. 2019, *Nabalus trifoliolatus* (iNat 95613046).

Phytoliriomyza melampyga (Loew)

Biology.—Forms linear-blotch mines on *Impatiens capensis* Meerb. (Balsaminaceae).

Notes.—Johnson (1930) listed "*A[gromyza] melampyga* Loew (*flaviventris* John.). Polpis, Aug. 6. Hummock Pond, Aug. 8" (1 ♂ at NMMA). *Phytoliriomyza melampyga* may have been the species observed, but this could also represent a misidentification of *Liriomyza blechi*, which Frost (1924) treated as *Agromyza melampyga* (as evidenced by his listing of *Plantago major* as a larval host).

Reared specimens.—Lily Pond Park, 28.vii.2017, em. 30.iv–4.v.2018, ex *Impatiens capensis*, #CSE4458, CNC1144080–CNC-1144081 (1 ♂, 1 ♀).

Other mines observed.—NCF Bird Sanctuary, 7.viii.2012, *Impatiens capensis* (iNat 94984441); Squam Swamp, 7.ix.2011, *Impatiens capensis* (iNat 94926916); 8.viii.2012, *Impatiens capensis* (iNat 94985340).

Phytoliriomyza sp. 1

Biology.—Forms linear mines on pinnae of *Pteridium aquilinum* (L.) Kuhn (Dennstaedtiaceae).

Notes.—Spencer and Steyskal (1986) attributed these mines to *Phytoliriomyza clara* (Melander), which they considered to be a transcontinental species, while noting that the newly described, very similar *P. pulchella* Spencer probably also fed on *Pteridium aquilinum*. Lonsdale (2021) determined all eastern material he examined (Ontario and Michigan to Newfoundland, south to Florida) to represent *P. pulchella*, and was only able to confirm the presence of *P. clara* in Washington, Oregon, and California. It is thus highly likely that the Nantucket mines represent *P. pulchella*, but this host association needs to be confirmed by rearing, and so far our repeated attempts to rear *Phytoliriomyza* adults from *Pteridium* in the northeastern USA have been unsuccessful.

Mines observed.—Coskata, 6.viii.2012, *Pteridium aquilinum* (iNat 94973529).

Phytomyza actaeivora Eiseman and Lonsdale

Biology.—Forms blotch mines on *Actaea rubra* (Aiton) Willd. (Ranunculaceae).

Herbarium specimen.—Rattlesnake Bank, 24.viii.1915, G. B. Gardner, *Actaea rubra* (NMMA003893).

Phytomyza aquilegiana Frost

Biology.—Forms blotch mines on *Aquilegia vulgaris* L. (Ranunculaceae).

Mines observed.—Ice Pond Lot, 5.viii.2012, *Aquilegia vulgaris* (iNat 93705237).

Parasitoids.—Eulophidae: Entedonini (CSE54, CNC/BG 743749).

Phytomyza astotinensis Griffiths

Biology.—Forms linear leaf mines on *Solidago* **latissimifolia* Mill. (Asteraceae). At least two generations per year, with larvae active in June, July, and (based on off-island records) October.

Notes.—Prior to this study, Alberta was the only confirmed locality for this species.

Reared specimens.—Ice Pond Lot, 26.vii.2014, em. 15–17.viii.2014, ex *Solidago latissimifolia*, #CSE1329, CNC384835–384836 (2 ♀♀); Squam Swamp, 12.vi.2013, em. 30.vi.2013, ex *Solidago latissimifolia*, #CSE630, CNC384813 (1 ♂).

Other mines observed.—Squam Swamp, 7.ix.2011, *Solidago latissimifolia* (iNat 94888538).

Parasitoids.—Braconidae: Opiinae sp. (CSE629, BG 872514).

Phytomyza crassiseta Zetterstedt

Biology.—Forms linear leaf mines on *Veronica chamaedrys* L. and *V. officinalis* L. (Plantaginaceae).

Herbarium specimens.—Hawthorn Lane at Elihu Coleman House, 8.vi.1995, P. W. Dunwiddie and C.J. Moffitt, *Veronica officinalis* (NMMA003203); Siasconset, Burnell St., 13.vi.2005, C. C. Beaton, *Veronica chamaedrys* (NMMA003185).

Phytomyza glabricola Kulp

Biology.—Forms linear-blotch mines on *Ilex glabra* (L.) A. Gray (Aquifoliaceae).

Mines observed.—MMA, 18.v.2012, *Ilex glabra* (iNat 93747784).

Parasitoids.—Eulophidae: *Chrysocharis* sp. (CSE9, SJS/BG 679441).

Phytomyza ilicicola Loew

Biology.—Forms linear-blotch mines on *Ilex opaca* Aiton (Aquifoliaceae).

Mines observed.—Dead Horse Valley, 18.v.2012, *Ilex opaca* (iNat 93540394).

Parasitoids.—Braconidae: *Opius* sp. (CSE86, BG 735611), unknown sp. (CSE85).

Phytomyza multifidae Sehgal

Biology.—Forms linear leaf mines on *Anemone *quinquefolia* L. (Ranunculaceae).

Notes.—The population at Squam Farm, first reported by Eiseman et al. (2015), is still the only known site for this species besides the type locality in Alberta.

Reared specimens.—Squam Farm, 16.v.2014, em. 1–3.vi.2014, ex *Anemone quinquefolia*, #CSE1116, CNC358488–CNC358492 (2 ♂♂, 3 ♀♀).

Other mines observed.—Squam Farm, 17.v.2012, *Anemone quinquefolia* (iNat 93773690); 9.vi.2013, *Anemone quinquefolia* (iNat 94987882).

Parasitoids.—Eulophidae: *Pnigalio* sp. (CSE242, CSE1119, BMNH).

Phytomyza plantaginis Robineau-Desvoidy

Biology.—Forms a long, narrow, white, linear leaf mine on *Plantago lanceolata* L. (Plantaginaceae).

Mines observed.—UMass classroom, 9.ix.2011, *Plantago lanceolata* (iNat 94773621).

Parasitoids.—Pteromalidae: *Halticoptera* sp. (582650, CNC/BG 582650).

Phytomyza ranunculi (Schrank)

Biology.—Forms linear leaf mines on *Ranunculus repens* L. (Ranunculaceae).

Reared specimen.—Lily Pond Park, 10.vi.2016, em. 28.vi.2016, ex *Ranunculus repens*, #CSE2645, CNC654249 (1 ♀).

Other mines observed.—Lily Pond Park, 7.viii.2012, *Ranunculus repens* (iNat 94983556); MMA, 2.viii.2012, *Ranunculus repens* (iNat 94939021).

Phytomyza solidaginophaga Sehgal

Biology.—Univoltine; forms linear mines on *Solidago* sp. (Asteraceae) in May, similar to those formed by *P. astotinensis* later in the season.

Mines observed.—Squam Farm, 17.v.2012, *Solidago* (iNat 94931934).

Phytomyza spondylii heracleiphaga Spencer

Biology.—Forms linear leaf mines on *Heracleum maximum* W. Bartram (Apiaceae).

Notes.—The only other confirmed specimens of this species are from Alaska and California.

Reared specimen.—Abrams Point, 30.v.2012, em. by 24.vi.2012, ex *Heracleum maximum*, #736991 (CNC, 1 ♂).

Phytomyza syngenesiae (Hardy)

Biology.—Forms linear leaf mines on various Asteraceae, including **Arctium* L., *Bidens* L., **Erechtites hieraciifolius* (L.) Raf. ex DC., *Leucanthemum vulgare* Lam., *Sonchus asper* (L.) Hill, and *Tanacetum parthenium* (L.) Sch. Bip. The aborted mines on *Erigeron* L. are tentatively attributed to this species based on their close proximity to *P. syngenesiae* mines on *Leucanthemum* and *Tanacetum*. They could conceivably represent a species in the *P. albiceps* group, which when finished feeding would exit to form a black puparium instead of forming a white puparium within the leaf.

Notes.—This European species was introduced from Europe in the 1880s and was reported from greenhouses across the northern USA through 1916. It is now established along the Pacific Coast, but it has not been documented farther east in over a century with the exception of the Nantucket population.

Reared specimens.—Liberty St., 31.vii.2017, em. 2–4.viii.2017, ex *Sonchus asper*, #CSE4055, CNC939655–939659 (2 ♂♂, 3 ♀♀); MMA, 10.vi.2016, em. 22–29.vi.2016, ex *Tanacetum parthenium*, #CSE2612, CNC634774–634776 (3 ♂♂); 11.vi.2016, em. 23.vi.2016, ex *Leucanthemum vulgare*, #CSE2619, CNC635235, CNC635236 (2 ♀♀).

Other mines observed.—Almanac Pond, 4.viii.2012, *Erechtites hieraciifolius* (iNat 94960514); Bamboo Forest, 31.vii.2017, *Arctium* (iNat 93758988); MMA, 30.v.2012, *Tanacetum parthenium* (iNat 93752510); 9.vi.2012, *Leucanthemum vulgare* (iNat 93774931); 8.vi.2016, *Erigeron* (iNat 95104291); NCF Bird Sanctuary, 7.viii.2012, *Bidens* (iNat 94984231); TTOR gate, 9.ix.2011, *Arctium* (iNat 94929066).

Parasitoids.—Eulophidae: Entedonini sp. (CSE2713, CSE4085, CSE4163, CNC), *Chrysocharis pubicornis* (Zetterstedt) (CSE1455, CSE2668, CSE2705; BMNH), *Pnigalio* sp. (CSE237, BMNH). Pteromalidae: *Halticoptera* sp. (CSE2699, CNC/iNat 94090319).

Phytomyza wiggii Lonsdale and Scheffer

Biology.—Forms linear leaf mines on *Ilex verticillata* (L.) A. Gray (Aquifoliaceae).

Notes.—Apart from the reared male, some of the observations below could conceivably represent other species in the *P. ilicis* group. *Phytomyza ditmani* Kulp, *P. lineata* Lonsdale and Scheffer, *P. verticillatae* Kulp, and possibly *P. nemopanthi* Griffiths and Piercey have likewise been reared from *I. verticillata* (Scheffer et al. 2021).

Reared specimens.—State Forest, 10.vi.2013, em. 16.vi.2013, ex. *Ilex verticillata*, #CSE565, CNC384810 (1 ♂); UMass classroom, 11.vi.2013, em. 24.vi.2013, ex *Ilex verticillata*, #CSE593 (1 ♀, lost).

Other mines observed.—Capaum Pond, 8.ix.2019, *Ilex verticillata* (iNat 95639877); Coskata, 9.ix.2011, *Ilex verticillata* (iNat 94930095); Miacomet Pond, 2.viii.2012, *Ilex verticillata* (iNat 93753127); Squam Swamp, 8.viii.2012, *Ilex verticillata* (iNat 94985537); 12.vi.2013, *Ilex verticillata* (iNat 93566606).

Parasitoids.—Braconidae: Dacnusini sp. (CSE628, BG 872508), Opiinae sp. (CSE592, BG 870776). Eulophidae: *Closterocerus* sp. (CSE21, CNC/BG 741947), *C. cinctipennis*

Ashmead (CSE695, BMNH), Eulophini sp. (CSE589, SJS/BG 870729).

Phytomyza sp. 1 (*albiceps* group)

Biology.—Forms a linear leaf mine on *Eurybia divaricata* (L.) G. L. Nesom (Asteraceae).

Notes.—This species is possibly *P. asterophaga* Spencer, known from *E. conspicua* (Lindl.) G. L. Nesom in Alberta and a caught specimen from North Carolina.

Mines observed.—Squam Swamp, 8.ix. 2019, *Eurybia divaricata* (iNat 95639282).

Phytomyza sp. 2 (*minuscula* group)

Biology.—Forms linear leaf mines on *Aquilegia vulgaris* L. (Ranunculaceae).

Notes.—These mines are likely the work of *P. aquilegivora* Spencer, which we have reared from *A. vulgaris* in western Massachusetts, but could also represent *P. minuscula* Goureau, which we have reared from *Thalictrum pubescens* Pursh (Ranunculaceae) in northern Vermont and is known to feed on *Aquilegia* spp. in the western USA and in Europe.

Mines observed.—Ice Pond Lot, 5.viii. 2012, *Aquilegia vulgaris* (iNat 94969838).

Phytomyzinae sp. 1

Biology.—Forms a linear leaf mine on *Iva frutescens* L. (Asteraceae).

Mines observed.—Masquetuck, 28.vii. 2017, *Iva frutescens* (iNat 95606477).

Agromyzidae sp. 1

Biology.—Forms a long linear leaf mine on *Pilosella* Hill (Asteraceae), mostly following the midrib.

Mines observed.—State Forest, 8.viii. 2012, *Hieracium* (iNat 94986246).

Agromyzidae sp. 2

Biology.—The solitary larva forms an elongate blotch mine on *Calamagrostis canadensis* (Michx.) P. Beauv. (Poaceae), exiting to pupate.

Mines observed.—Pout Ponds, 30.vii. 2017, *Calamagrostis canadensis* (iNat 95709478); 29.viii.2015, *Calamagrostis canadensis* (iNat 93769379).

Parasitoids.—Eulophidae: Eulophini sp. (CSE2038, CNC).

Anthomyiidae

Johnson (1930) listed species in 30 different genera of Anthomyiidae, some of which are no longer included in this family, and only two of which include leafminers. *Chirosia* species are all fern feeders as far as is known, but so far leafminers are only known from the *C. flavipennis* section. The only reported rearing of *C. proboscidalis* (Malloch) (*C. albitarsis* section) is from a puparium found floating in a pond (Griffiths 2004). Johnson's entry "*P[ycnoglossa] proboscidalis* Mall. Taupaushaw, July 25" (1 specimen at NMMA) may represent this species but could conceivably refer to one of the two *Chirosia* species we reared. Johnson listed four species of "*Pegomyia*," two of which may have been leafminers (see below under *Pegomya* sp. 1).

Chirosia filicis (Huckett)

Biology.—Mines pinnae of *Osmundastrum cinnamomeum* (L.) C. Presl. (*Osmundaceae).

Notes.—This species had not been reared prior to this study. See Eiseman (2018) for further details.

Reared specimens.—Squam Swamp, 12.vi.2013, em. 3–4.iv.2014, ex *Osmundastrum cinnamomeum*, #CSE1054 (2 ♂♂, HEC).

Other mines observed.—Squam Swamp, 8.viii.2012, *Osmundastrum cinnamomeum* (iNat 95711855).

Chirosia gleniensis (Huckett)

Biology.—Mines pinnae of *Woodwardia areolata* (L.) T. Moore (*Blechnaceae).

Notes.—See Eiseman (2020) for further details.

Reared specimens.—Squam Swamp, 27.vii.2017, em. 8–16.v.2018, ex *Woodwardia areolata*, #CSE4510 (2 ♂♂, 1 ♀♀, CNC).

Other mines observed.—Squam Swamp, 25.vii.2014, *Woodwardia areolata* (iNat 93577779).

Parasitoids.—Braconidae: Alysiinae sp. (CSE1311, CSE4132, CSE4506, FJPF). Pteromalidae: *Halticoptera* sp. (CSE1519, CNC / BG 1152232).

Pegomya hyoscyami (Panzer)

Biology.—Gregarious larvae form blotch mines on *Datura stramonium* L. (Solanaceae).

Herbarium specimen.—Siasconset, 3.ix.1963, F.C. MacKeever, *Datura stramonium* (NMMA004370).

Pegomya rufescens Stein

Biology.—Larvae mine leaves of *Portulaca oleracea* L. (Portulacaceae).

Mines observed.—Ice Pond Lot, 5.viii.2012, *Portulaca oleracea* (iNat 95710192).

Pegomya sp. 1

Biology.—Larvae form blotch mines on *Rumex acetosella* L., *R. crispus* L., and *R. obtusifolius* L. (Polygonaceae), gregariously on the larger-leaved hosts.

Notes.—Six North American species of the *Pegomya bicolor* section are known to feed on *Rumex*. Two are strictly western and two of the others are not known to occur in New England, so mines found on Nantucket are likely to represent either *P. bicolor bicolor* (Wiedemann) or *P. solennis rumicifoliae* Huckett. Both of these species have been reared from *R. crispus* and *R. obtusifolius*, but only the former from *R. acetosella* (Eiseman 2018).

Johnson (1930) listed two names of *Pegomya* species that at that time (Needham et al. 1928) referred to miners of *Rumex* leaves, *P. bicolor* (1 ♂ at NMMA) and *P. winthemi* (Meigen) (4 ♂♂, 1 ♀ at NMMA). Identifications of *P. bicolor* from that time are questionable (Griffiths 1982), and the true *P. winthemi* is a mushroom feeder (Griffiths 1983).

Mines observed.—Coffin Park (S), 3.xi.2017, *Rumex acetosella* (iNat 95712439); NCF Bird Sanctuary, 11.vi.2013, *Rumex crispus* (iNat 93975646); Squam Swamp, 12.vi.2013, *Rumex crispus* (iNat 93975468); near the Creeks, 9.ix.2011, *Rumex obtusifolius* (iNat 95709709).

Parasitoids.—Figitidae: *Trybliographa* sp. (CSE892, CSE898, CSE1069, USNM).

Cecidomyiidae

Johnson (1930) listed seven cecidomyiid species, six of which were based on observations of galls that we likewise found in our surveys. The seventh is represented by the entry "*R[etinodiplosis] resinicola* O. S., The Pitch Pine Midge." Larvae of *Cecidomyia resinicola* (Osten Sacken) live and pupate in masses of resin on twigs of many pines, but it is possible that Johnson's record refers to some other *Cecidomyia* species. There are no adult cecidomyiids deposited at NMMA; five of Johnson's species are vouchered by galls, but *resinicola* is not among them.

Acericecis ocellaris (Osten Sacken)

Biology.—The larva feeds exposed on the lower surface of a leaf spot on *Acer rubrum* L. (Sapindaceae).

Galls observed.—Squam Swamp, 7.ix.2011, *Acer rubrum* (iNat 95791838); 8.viii.2012, *Acer rubrum* (iNat 95913708); Stump Pond, 5.ix.2019, *Acer rubrum* (iNat 96495876).

Ampelomyia viticola (Osten Sacken)

Biology.—Forms spinelike, dehiscent leaf galls on *Vitis *labrusca* L. (Vitaceae).

Notes.—Johnson (1930) listed this species as *Cecidomyia viticola*: "Grape Tube Gall. Conical tube-like galls on leaves. Polpis, Aug. 6" (1 leaf / ~ 36 galls at NMMA). We have found no published references that specify which *Vitis* spp. are used by *A. viticola*.

Galls observed.—Coskata, 9.ix.2011, *Vitis labrusca* (iNat 95798152).

Asphondylia cf. *monacha* Osten Sacken (Fig. 1)

Biology.—Forms large aggregate bud galls on *Solidago sempervirens* L. (Asteraceae) (Fig. 5 in Dorchin et al. 2015), with adults (Fig. 1) emerging in mid-September.

Notes.—This gall was unknown prior to this study; CSE later collected additional material from Maine. Dorchin et al. (2015) did not find morphological differences to distinguish these populations from *A. monacha* or from a population on *S. bicolor* L. in Virginia, but their molecular analysis suggested that these belong to at least two undescribed species. Additional molecular data are needed to determine species boundaries and host associations.

Reared specimens.—Massachusetts Ave., 8.ix.2011, em. ~ 13–16.ix.2011, ex *Solidago sempervirens* (many adults, TAUI).

Parasitoids.—Eurytomidae: *Rileya* sp. (591865, USNM/BG 591865).

Asphondylia pseudorosa Dorchin

Biology.—Forms leafy, single-chambered bud galls on *Euthamia graminifolia* (L.) Nutt. (Asteraceae). For further details see Dorchin et al. (2015). *Euthamia caroliniana* (L.) Greene ex Porter and Britton is not a confirmed host for this species, but the galls we observed on this plant were like those on *E. graminifolia*.

Galls observed.—Almanac Pond, 4.viii.2012, *Euthamia graminifolia* (iNat 95903132); Reyes Pond, 6.ix.2019, *Euthamia caroliniana* (iNat 96499474).

Asphondylia rosulata Dorchin

Biology.—Forms small, single-chambered, terminal rosette galls on *Solidago rugosa* Mill. (Asteraceae). For further details see Dorchin et al. (2015).

Galls observed.—Coffin Park (S), 7.viii.2012, *Solidago rugosa* (iNat 93866611).

Inquiline.—Cecidomyiidae: *Trotteria* sp. (see below).

Asphondylia sp. 1 (Fig. 2)

Biology.—Forms a small, single-chambered, terminal rosette gall on *Solidago latissimifolia* Mill. (Asteraceae) (Fig. 2).

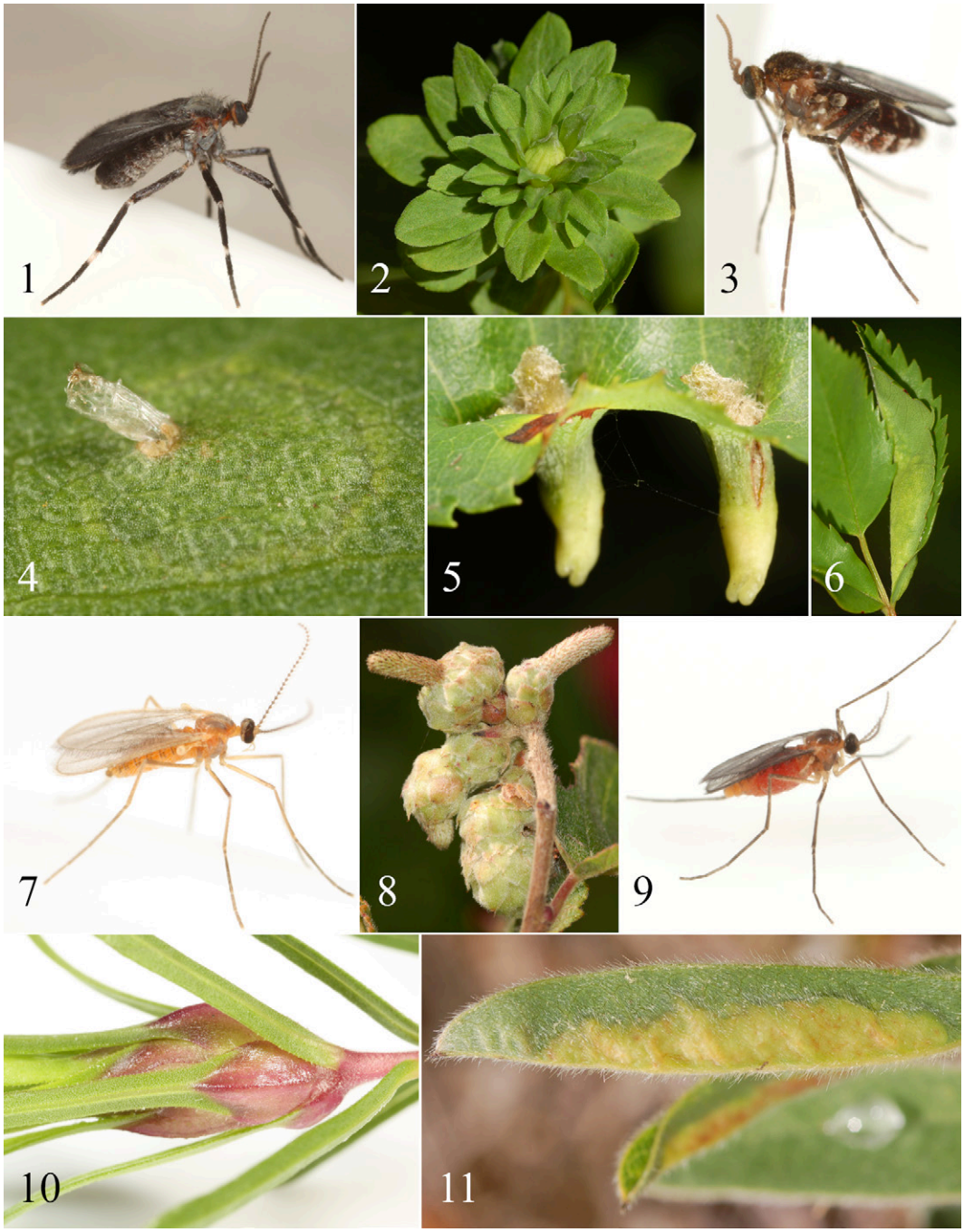
Notes.—This gall has not been reported previously, but based on its form it can be confidently attributed to an *Asphondylia* (N. Dorchin in litt.).

Galls observed.—Squam Swamp, 8.viii.2012, *Solidago latissimifolia* (BG 688202); 8.ix.2019, *Solidago latissimifolia* (iNat 96501056).

Asteromyia carbonifera (Osten Sacken)

Biology.—Forms leaf blister galls containing a symbiotic fungus on *Solidago latissimifolia* Mill., *S. *puberula* Nutt., and *S. rugosa* Mill. (Asteraceae) (Gagné 1968).

Galls observed.—Madequecham, 8.ix.2011, *Solidago puberula* (iNat 95751761); Polpis Bike Path 3, 9.ix.2011, *Solidago rugosa* (iNat 95798614); Squam Swamp, 7.ix.2011, *Solidago latissimifolia* (iNat 95789849).



Figs. 1–11. Cecidomyiidae galls and reared adults. 1, *Asphondylia* cf. *monacha* reared from *Solidago sempervirens*. 2, *Asphondylia* sp. 1 gall on *Solidago latissimifolia*. 3, 4, *Asteromyia modesta*. 3, Adult. 4, Leaf gall on *Solidago latissimifolia* with pupal exuviae protruding. 5, *Blaesodiplosis* sp. 1 galls on *Amelanchier*. 6, 7, *Contarinia* sp. 3 on *Rosa virginiana*. 6, Leaflet fold gall. 7, Adult. 8, *Contarinia squamulicola* galls on *Corylus* catkins. 9, 10, *Dasineura* sp. 1 on *Ionactis linariifolia*. 9, Adult. 10, Gall. 11, *Dasineura* (?) sp. 2 leaflet fold galls on *Lespedeza*.

Asteromyia euthamiae Gagné

Biology.—Forms black leaf blister galls on *Euthamia caroliniana* (L.) Greene ex Porter and Britton and *E. graminifolia* (L.) Nutt. (Asteraceae).

Galls observed.—Maxcy Pond, 2.viii.2012, *Euthamia graminifolia* (iNat 95842624); Pout Ponds, 29.viii.2015, *Euthamia* (iNat 95952030); SHCP, 27.viii.2015, *Euthamia caroliniana* (iNat 95949795); Stump Pond, 30.vii.2017, *Euthamia graminifolia* (iNat 95607947).

Asteromyia modesta (Felt)
(Figs. 3, 4)

Biology.—Forms an inconspicuous leaf blister on *Solidago *latissimifolia* Mill. (Asteraceae) (Fig. 4).

Notes.—This gall was not detected until the adult (Fig. 3) appeared in a vial in which we had collected leaves mined by *Calycomyza solidaginis*.

Reared specimen.—Ice Pond Lot, 5.viii.2012, em. 15.viii.2012, ex *Solidago latissimifolia*, #CSE29 (1 adult, TAUI/BG 742769).

Asteromyia sp. 1

Biology.—Feeds on *Symphyotrichum dumosum* (L.) G. L. Nesom (Asteraceae). The gall of our specimen was not observed, but the two known *Asteromyia* spp. on *Symphyotrichum*, *A. clarkei* (Felt) and *A. laeviana* (Felt), form variously colored leaf blisters and peduncle swellings that (unlike galls of *A. modesta*) contain a symbiotic fungus.

Notes.—This midge appeared as a contaminant in a collection of *Rhopalomyia* galls. Larvae are required for identification of *Asteromyia* spp. on *Symphyotrichum* (R. Gagné, in litt.).

Reared specimen.—Miacomet Pond, 6.ix.2019, em. 24.ix.2019, ex *Symphyotrichum dumosum*, #CSE5938 (1 ♂, USNM).

Blaesodiplosis sp. 1
(Fig. 5)

Biology.—Forms leaf galls on *Amelanchier laevis* Wiegand and *A. nantucketensis* E. P. Bicknell (Rosaceae) consisting of a short, fuzzy protrusion on the upper surface and an elongate, smooth, bilobed protrusion on the lower surface (Fig. 5).

Notes.—Johnson (1930) listed *Hormomyia canadensis* Felt (=*Blaesodiplosis canadensis*): "A subglobose, greenish or reddish, lipped leaf-gall on shad bush (*Amelanchier canadensis* L.)" (3 leaves / ~15 galls at NMMA). We would not characterize any of the galls we observed as subglobose, but the galls Johnson deposited in the NMMA collection are of the same type as ours.

Herbarium specimen.—Surfside Road, 16.viii.1915, G.B. Gardner, *Amelanchier nantucketensis* (NMMA003972).

Other galls observed.—Squam Swamp, 7.ix.2011, *Amelanchier* (iNat 94776073); Stump Pond, 30.vii.2017, *Amelanchier laevis* (iNat 96482600).

Parasitoids.—Torymidae: *Torymus* sp. (CSE218, CUPC/BG 731725).

Caryomyia tubicola (Osten Sacken)

Biology.—Forms a detachable, tubular gall on leaves of *Carya tomentosa* (Lam.) Nutt. (Juglandaceae) (Gagné 2008).

Galls observed.—Stump Pond, 5.ix.2019, *Carya tomentosa* (iNat 96495356).

Contarinia cerasiserotinae (Osten Sacken)

Biology.—Forms terminal bud swellings on *Prunus serotina* Ehrh. (Rosaceae).

Galls observed.—Lost Farm, 12.vi.2016, *Prunus serotina* (iNat 95962200); Squam Swamp, 17.v.2012, *Prunus serotina* (iNat 95799999).

Contarinia squamulicola (Stebbins)
(Fig. 8)

Biology.—Galls on *Corylus* L. (Betulaceae) consist of deformed catkins with greatly enlarged bases (Fig. 8).

Galls observed.—Tuckernuck, 10.ix.2011, *Corylus* (iNat 95745206).

Contarinia sp. 1

Biology.—Forms a small, striate vein fold on leaves of *Quercus ilicifolia* Wangenh. (Fagaceae).

Galls observed.—Near Madequecham, 3.viii.2012, *Quercus ilicifolia* (iNat 95844650); Radar Hill, 15.xi.2015, *Quercus ilicifolia* (iNat 95952605).

Contarinia sp. 2

Biology.—Forms leaf spots on *Sassafras albidum* (Nutt.) Nees (Lauraceae).

Galls observed.—Coskata, 9.ix.2011, *Sassafras albidum* (iNat 95796662); Squam Swamp, 7.ix.2011, *Sassafras albidum* (iNat 95772318).

Contarinia sp. 3
(Figs. 6, 7)

Biology.—Several white larvae feed together in galls consisting of laterally folded leaflets of *Rosa virginiana* Mill. (Rosaceae) (Fig. 6). They drop to the ground by late June and emerge as adults the following spring (Fig. 7).

Notes.—Ours are the first adults reared from folded *Rosa* leaflets in North America since Felt (1908: 337) reared one in New York that he identified as "*Dasyneura*? *rosarum* Hardy", referring to a European species for which the correct name is *Dasineura rosae* (Bremi). That identification has not been confirmed, and the three larvae collected from the same leaflets belonged to a *Contarinia* species (Gagné 1989: 267–268).

Reared specimens.—Quaker cemetery, 15.vi.2018, em. 20–26.iii.2019, ex *Rosa virginiana*, #CSE5133 (6 adults, USNM).

Contarinia (?) sp. 4

Biology.—Forms leaf spots on *Gaylussacia frondosa* (L.) Torr. and A. Gray (Ericaceae).

Notes.—Similar leaf spot galls on *Vaccinium* spp. (Ericaceae) are caused by an undetermined *Contarinia* species, but none have been reported from *Gaylussacia* spp. (Gagné 1989). It is conceivable that these galls are actually caused by a fungus.

Galls observed.—Squam Swamp, 8.viii.2012, *Gaylussacia frondosa* (iNat 95914327).

Dasineura parthenocissi (Stebbins)

Biology.—The white larvae feed gregariously in galls consisting of swollen leaflet midrib folds on *Parthenocissus quinquefolia* (L.) Planch. (Vitaceae). In the galls we observed, the interior of the seam on the upper surface was lined with dense, pink fuzz. Mature larvae are orange; the last of ours burrowed on 30 June, and adults emerged the following spring.

Notes.—Our collection of 69 larvae yielded 14 adult midges and seven platygastrids (Buhl and Eiseman 2017).

Reared specimens.—Squam Swamp, 9.vi.2016, em. 26.iv–1.v.2017, ex *Parthenocissus quinquefolia*, #CSE3563 (13 adults, USNM).

Parasitoids.—Platygastridae: *Trichacis virginiensis* Ashmead (CSE3469, ZMUC) (Buhl and Eiseman 2017).

Dasineura smilacifolia Felt

Biology.—Forms reddened, marginal leaf rolls on *Smilax* *glauca* Walter (Smilacaceae).

Galls observed.—Tuckernuck, 10.ix. 2011, *Smilax glauca* (iNat 95750443).

Dasineura trifolii (Loew)

Biology.—Causes leaflets of *Trifolium repens* L. (Fabaceae) to fold and become swollen along the midvein.

Galls observed.—Almanac Pond, 30.vii. 2017, *Trifolium repens* (iNat 96485853).

Dasineura sp. 1
(Figs. 9, 10)

Biology.—Larvae feed gregariously in an apical gall on *Ionactis linariifolia* (L.) Greene (Asteraceae), formed by several overlapping leaves with swollen, purplish bases (Fig. 10). One adult (Fig. 9) and two orange larvae emerged from the single observed gall 18 days after it was collected.

Notes.—This gall was previously unknown. Gagné (in litt.) is aware of *Dasineura* species that feed gregariously in similar rosette galls on other hosts, but notes that such galls on Asteraceae more often contain *Asphondylia* or *Rhopalomyia* larvae that feed singly.

Preserved larvae.—Head of the Plains, 8.vi.2018, em. 26.vi.2018, K.A. Omand, ex *Ionactis linariifolia*, #CSE4704 (2 larvae, USNM).

Reared specimen.—Head of the Plains, 8.vi.2018, em. 26.vi.2018, K.A. Omand, ex *Ionactis linariifolia*, #CSE4704 (1 ♀, USNM).

Dasineura (?) sp. 2
(Fig. 11)

Biology.—Causes leaflet folds on *Lespedeza* Michx. (Fabaceae) like those of *D. trifolii* on *Trifolium* (Fig. 11). In some cases the gall occupies the whole leaflet, and in others only a small portion near the apex is affected. A pale orange larva emerged from one of the galls the day after it was collected.

Notes.—Felt (1940) attributed "deformed leaflets" of *Lespedeza* to *Youngomyia* sp., but Gagné (1989), who described the leaflet as "rolled," suggested that this midge was possibly predaceous and that the damage was probably caused by a *Dasineura*. Neither reference illustrated the galls, so it is unclear whether ours are the same, but the latter are certainly consistent with *Dasineura* galls on other legumes.

Galls observed.—SHCP, 14.vi.2018, *Lespedeza* (iNat 96491309).

Gliaspilota glutinosa (Osten Sacken)

Biology.—The larva feeds externally on a sticky welt (forming a circular ring in all of the Nantucket examples) on the lower leaf surface of *Carya tomentosa* (Lam.) Nutt. (Juglandaceae) (Gagné 2008).

Galls observed.—Stump Pond, 5.ix.2019, *Carya tomentosa* (iNat 96494644).

Lasioptera excavata Felt

Biology.—Forms a circular leaf spot on *Crataegus *crus-galli* L. (Rosaceae).

Herbarium specimen.—Monomoy, 21.vii.1962, H. H Johnson and S. T. Johnson, *Crataegus crus-galli* (NMMA003981).

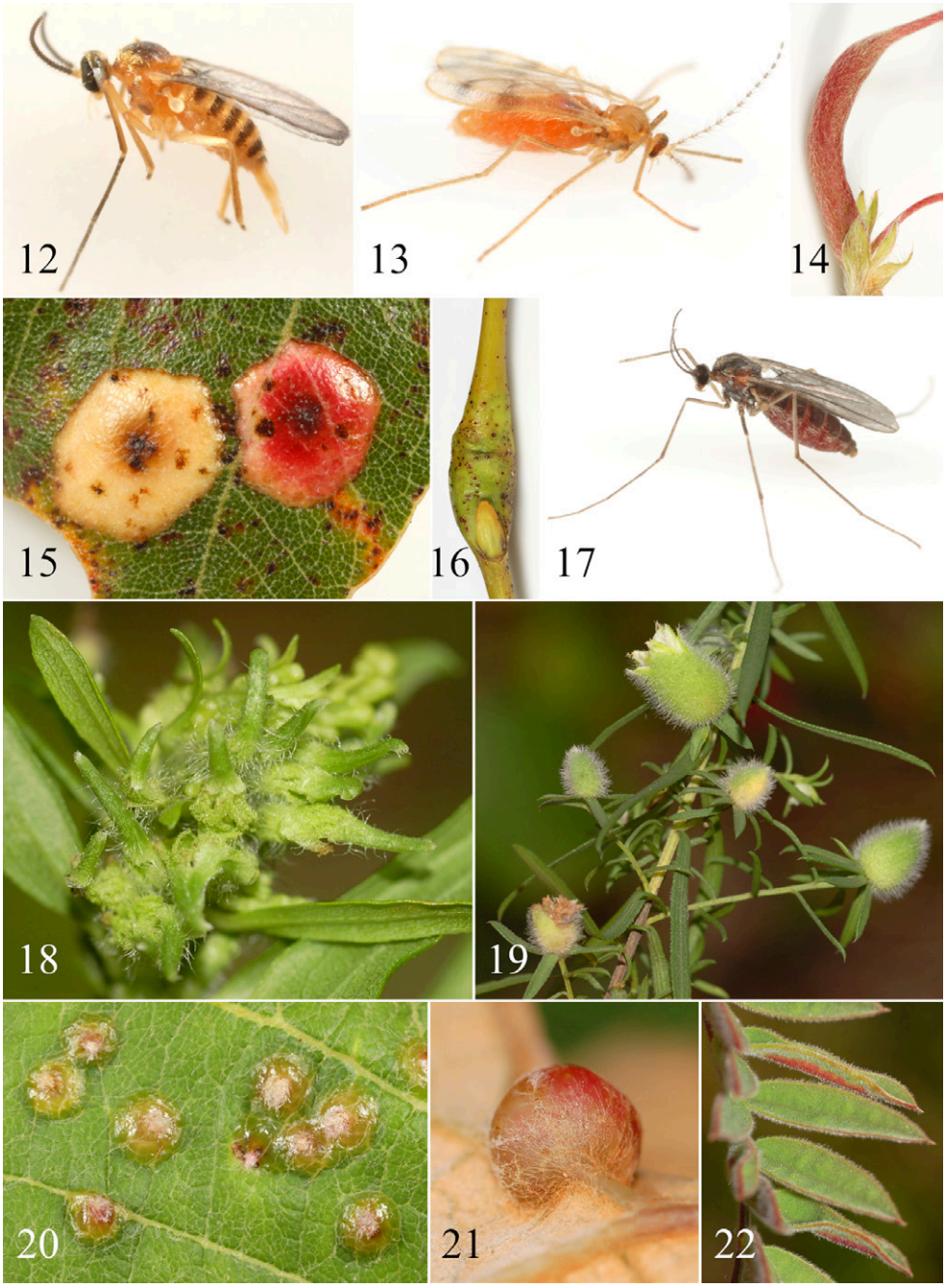
Lasioptera vitis Osten Sacken
(Fig. 12)

Biology.—Inquiline in a blisterlike leaf gall of *Vitisiella* sp. 1 on *Vitis *labrusca* L. (Vitaceae) (see below). The larva burrowed into soil along with the *Vitisiella* larvae and emerged as an adult (Fig. 12) the following spring.

Reared specimen.—Dead Horse Valley, 6.viii.2012, em. 5.vi.2013, ex *Vitis labrusca*, #CSE36 (1 ♀, USNM/BG 820679).

Lestodiplosis sp. 1
(Fig. 13)

Biology.—The larva is a predator, possibly on nymphs of *Livia bifasciata*



Figs. 12–22. Cecidomyiidae galls and reared adults. 12, *Lasioptera vitis* adult reared from *Vitisiella* gall on *Vitis labrusca*. 13, *Lestodiplosis* adult reared from *Livia bifasciata* gall on *Juncus canadensis*. 14, *Neolasioptera potentillaecaulis* stem gall on *Potentilla canadensis*. 15, *Polystepha* sp. 1 leaf galls on *Quercus ilicifolia*. 16, 17, *Rabdophaga* sp. 1 on *Salix purpurea*. 16, Stem gall. 17, Adult. 18, Galls of *Rhopalomyia* sp. 1 on *Solidago latissimifolia*. 19, Galls of *Rhopalomyia* sp. 2 on *Symphyotrichum dumosum*. 20, Blister galls of *Vitisella* sp. 1 on *Vitis labrusca*, viewed from upper leaf surface. 21, Globular gall of *Vitisella* sp. 2 on *Vitis labrusca*, viewed from lower leaf surface. 22, Lasiopteridi sp. 1 leaflet fold galls on *Tephrosia virginiana*.

Provancher (Hemiptera: Liviidae). The adult (Fig. 13) appeared in a rearing container with galls of this psyllid on *Juncus canadensis* J. Gay ex Laharpe (Juncaceae).

Reared specimen.—Pout Ponds, 30.vii.2017, em. 8.viii.2017, ex *Juncus canadensis* with *Livia* galls, #CSE4091 (1 adult, USNM).

Macrodiplosis erubescens (Osten Sacken)

Biology.—Forms a folded sinus in leaves of *Quercus *ilicifolia* Wangenh. (Fagaceae).

Galls observed.—Near Madequecham, 3.viii.2012, *Quercus ilicifolia* (iNat 95844001); Squam Farm, 9.vi.2013, *Quercus ilicifolia* (iNat 95948648); State Forest, 10.vi.2013, *Quercus ilicifolia* (iNat 95948649).

Macrodiplosis cf. *majalis* (Osten Sacken)

Biology.—Forms a ~ 4 mm long pouch gall on the lower leaf surface of *Quercus ilicifolia* Wangenh. (Fagaceae).

Notes.—Gagné (1989) states that the gall of *M. majalis* is usually near a leaf vein, and his illustration shows galls with their slitlike openings on the upper surface aligned with a lateral vein. Just one of the galls we observed opened along a vein, and some were oriented perpendicularly to the nearest veins. The Squam Swamp galls each had a pair of irregular, bract-like "lips" projecting well above the upper leaf surface.

Galls observed.—Madequecham, 8.ix.2011, *Quercus ilicifolia* (iNat 95753496); 3.viii.2012, *Quercus ilicifolia* (iNat 95845501; Squam Swamp, 7.ix.2011, *Quercus ilicifolia* (iNat 95793418).

Macrodiplosis cf. *niveipila* (Osten Sacken)

Biology.—The white larvae feed in leaf galls consisting of elongate, fuzzy, pouchlike folds along the midrib or lateral veins of *Quercus ilicifolia* Wangenh. and *Q. velutina* Lam. (Fagaceae) (illustrated in Eiseman and Hartop (2015)). They drop to the ground in late May, emerging as adults the following spring.

Notes.—Although these galls key to *M. niveipila* in Gagné (1989) and are a good match for the accompanying illustration, Gagné (in litt.) cautions: "The *Macrodiplosis* females you reared from oaks cannot be identified further. What further identification would require is an exclusive and at least three-year project collecting galls from all the oaks east of the Mississippi, retaining some larvae and rearing adults from each kind of gall and host. Basing *Macrodiplosis* identifications on anything less than that would just be guesswork."

Reared specimens.—Coskata, 18.v.2012, em. 20.iv.2013, ex *Quercus velutina*, #CSE320 (1 ♀, USNM); Dead Horse Valley, 18.v.2012, em. 17.iv.2013, ex *Quercus velutina*, #CSE296 (2 ♀♀, USNM); S. Valley Rd., 16.v.2012, em. 23.iv.2013, ex *Quercus ilicifolia*, #CSE333 (1 ♂, USNM).

Other galls observed.—Madequecham, 20.v.2012, *Quercus velutina* (iNat 95801139); Squam Farm, 17.v.2012, *Quercus* (iNat 95800949); Squam Swamp, 7.ix.2011, *Quercus ilicifolia* (iNat 95768275).

Predator.—Phoridae: *Megaselia nantucketensis* Eiseman and Hartop (see below).

Parasitoids.—Platygastridae: *Metaclisis floridana* (Ashmead) (CSE362, ZMUC), *Synopeas* cf. *pubescens* (Ashmead) (CSE327, ZMUC) (Eiseman and Hartop 2015).

Macrodiplosis cf. *qoruca* (Felt)

Biology.—Forms elongate vein folds, with a slitlike opening on the upper leaf surface, on *Quercus velutina* Lam. (Fagaceae).

Galls observed.—Coskata, 9.ix.2011, *Quercus velutina* (iNat 95797664).

Meunieriella sp. 1

Biology.—Forms circular leaf spot galls on *Smilax glauca* Walter and *S. rotundifolia* L. (Smilacaceae). The feeding larva is visible through the lower epidermis.

Notes.—Johnson (1930) reported "Blister-like leaf-galls on *Smilax* (Greenbrier). Taupaushaw, Aug. 7" (2 leaves / 4 galls at NMMA). He attributed these to *Camptoneuromyia rubifolia* Felt, but that species is probably a secondary inhabitant (Gagné 1989). Gagné (in litt.) has reared a *Meunieriella* species from these galls, and he likewise determined that adults we reared from these galls in mainland Massachusetts and Connecticut were *Meunieriella*.

Herbarium specimen.—Vicinity of Wauwinet road one mile west of Squam Head, 18.viii.1970, D. S. Lipof, *Smilax rotundifolia* (NMMA006648).

Other galls observed.—Squam Swamp, 7.ix.2011, *Smilax glauca* (iNat 95762471); 8.ix.2019, *Smilax rotundifolia* (iNat 94073133); Tuckernuck, 10.ix.2011, *Smilax glauca* (iNat 95744787).

Parasitoids.—Platygastridae: *Trichacis* sp. (CSE6231, SMNS_Hym_Pla_001027).

Monarthropalpus flavus (Schrank)

Biology.—Forms leaf blisters on *Buxus* L. (Buxaceae).

Galls observed.—MMA, 31.vii.2017, *Buxus* (iNat 96489514).

Neolasioptera convolvuli (Felt)

Biology.—Forms woody stem swellings on *Calystegia* R. Br. (Convolvulaceae).

Galls observed.—Lily Pond Park, 24.ix.2020, *Calystegia* (iNat 96503005).

Neolasioptera lycopi (Felt)

Biology.—Forms stem swellings on *Lycopus uniflorus* Michx. (Lamiaceae).

Herbarium specimen.—Bamboo Forest, 20.ix.2018, K.A. Omand, *Lycopus uniflorus* (NMMA002542).

Neolasioptera nodulosa (Beutenmüller)

Biology.—Forms stem swellings on *Rubus* spp., including *R. *flagellaris* Willd. (Rosaceae).

Galls observed.—Coskata, 12.vi.2013, *Rubus* (blackberry) (iNat 95949279); Trott's Swamp, 28.viii.2015, *Rubus flagellaris* (iNat 95950608).

Neolasioptera perfoliata (Felt)

Biology.—Forms stem swellings on *Mikania scandens* (L.) Willd. (Asteraceae) (Gagné and Jaschhof 2021).

Galls observed.—Windswept Cranberry Bogs, 24.ix.2020, *Mikania scandens* (iNat 96501898).

Neolasioptera potentillaecaulis (Stebbins) (Fig. 14)

Biology.—Forms stem swellings on *Potentilla canadensis* L. (Rosaceae) (Fig. 14).

Notes.—Stebbins (1909) described this species from a single gall and tentatively attributed it to a cecidomyiid. It has since been tentatively placed in *Neolasioptera*, but the inducer of this gall still has never been observed.

Galls observed.—Head of the Plains, 8.vi.2018, K. A. Omand, *Potentilla canadensis* (iNat 96507335).

Neolasioptera sp. 1

Biology.—Forms stem swellings on *Erechtites hieraciifolius* (L.) Raf. ex DC. (Asteraceae).

Reared specimens.—Almanac Pond, 4.viii.2012, em. 12.viii.2012, ex *Erechtites hieraciifolius*, #CSE63 (1 ♀, USNM).

Other galls observed.—Reyes Pond, 6.ix.2019, *Erechtites hieraciifolius* (iNat 94772253).

Parasitoids.—Pteromalidae: unknown sp. (CSE5924, CNC / iNat 94772701). Torymidae: *Torymus* sp. (CSE41, CUPC / BG 743647), unknown sp. (CSE5903, CUPC / iNat 94775372).

Neolasioptera sp. 2

Biology.—Forms stem galls on *Iva frutescens* L. (Asteraceae) (R.J. Gagné in litt.).

Notes.—This adult appeared in a bag containing an uprooted *I. frutescens* plant from which we were attempting to rear a stem-mining moth (Gracillariidae: *Marmara* sp.). The gall was not observed, but Gagné (in litt.) reported that he has conspecific adults reared from stem galls in Florida.

Reared specimen.—Masquetuck, 14.vi. 2018, em. by 16.vii.2018, ex *Iva frutescens*, #CSE4786 (1 ♀, USNM).

Parallelodiplosis subtruncata (Felt)

Biology.—Forms circular leaf blister galls on *Cornus *amomum* Mill. (Cornaceae).

Galls observed.—Capaum Pond, 8.ix. 2019, *Cornus amomum* (iNat 94770920).

Parasitoids.—Pteromalidae: unknown sp. (CSE5907, CNC / iNat 94772020).

Polystepha globosa (Felt)

Biology.—Forms small (~ 2 mm), spherical, lower-surface leaf galls on *Quercus *ilicifolia* Wangenh. (Fagaceae).

Galls observed.—Radar Hill, 15.xi. 2015, *Quercus ilicifolia* (iNat 96505806); Squam Swamp, 7.ix.2011, *Quercus ilicifolia* (iNat 95779245, 95794649).

Polystepha pilulae (Beutenmüller)

Biology.—Forms irregular upper-surface leaf galls on *Quercus ilicifolia* Wangenh. and *Q. velutina* Lam. (Fagaceae) (Felt 1916).

Notes.—Johnson (1930) listed this species as *Cincticornia pilulae* Walsh: "Oak Pill-gall. Globose, irregular, reddish, wrinkled leaf-galls on oak" (2 leaves / ~30 galls at NMMA).

Galls observed.—Coskata, 9.ix.2011, *Quercus velutina* (iNat 95796865); Madequecham, 8.ix.2011, *Quercus ilicifolia* (iNat 95750967); Squam Swamp, 7.ix.2011, *Quercus ilicifolia* (iNat 95779243, 95794415) and *Q. velutina* (iNat 95780834); Tuckernuck, 10.ix.2011, *Quercus ilicifolia* (iNat 95742254) and *Q. velutina*.

Parasitoid.—Ormyridae: *Ormyrus* sp. (CSE231, CNC / BG 681383).

Polystepha sp. 1
(Fig. 15)

Biology.—Forms flat, circular galls on leaves of *Quercus ilicifolia* Wangenh. (Fagaceae) (Fig. 15).

Notes.—Six *Polystepha* species have been described from flat to slightly raised blisters on oak leaves. According to Gagné (1989), the gall of *P. quercifolia* (Felt) is not raised above the surrounding leaf tissue, while those of the other five protrude on both leaf surfaces (although that of *P. sobrina* (Felt) is said to show mostly on the upper surface). With one exception, the galls listed below were flat on the lower surface and slightly raised on the upper surface, and there was always a small central dot, presumably corresponding with the oviposition site. Fresh examples were either entirely yellow or were yellowish with areas of red (e.g. an outer ring). The perfectly flat leaf spot photographed on Tuckernuck possibly was caused by a fungus (Tubakiaceae) rather than a midge.

Galls observed.—Madequecham, 8.ix. 2011, *Quercus ilicifolia* (iNat 95795805); near Madequecham, 3.viii.2012, *Quercus ilicifolia* (iNat 95845050); Radar Hill, 15.xi.2015, *Quercus ilicifolia* (iNat 95952296); Squam Swamp, 7.ix.2011, *Quercus ilicifolia* (iNat 95763316); Stump

Pond, 5.xi.2017, *Quercus ilicifolia* (iNat 95811052); Tuckernuck, 10.ix.2011, *Quercus ilicifolia* (iNat 95742645).

Inquilines.—Cynipidae: *Ceroptres* sp. (CSE4921, USNM/iNat 95795533).

Rabdophaga sp. 1
(Figs. 16, 17)

Biology.—Forms a tapered stem swelling on *Salix purpurea* L. (Salicaceae) (Fig. 16). Pupation occurs within the gall, and the adults (Fig. 17) emerge in spring.

Notes.—All four of our specimens emerged from a single gall. Many species have been described from willow stem swelling galls, and identification will be impossible until they are revised.

Reared specimens.—Lily Pond Park, 9.ix.2019, em. 10–19.iii.2020, ex *Salix purpurea*, #CSE6044 (4 ♂♀, USNM).

Resseliella clavula (Beutenmüller)

Biology.—Forms a smooth, club-like twig swelling on *Cornus florida* L. (Cornaceae).

Notes.—Johnson (1930) listed this species as *Lasioptera clavula*: "Dogwood Club Gall. On the flowering dogwood … Polpis, June 25" (2 galls at NMMA).

Galls observed.—Flowering dogwood, 30.vii.2017, *Cornus florida* (iNat 96484933).

Resseliella liriodendri (Osten Sacken)

Biology.—Forms leaf spots on *Liriodendron tulipifera* L. (Magnoliaceae).

Galls observed.—Polpis Bike Path 3, 9.ix.2011, *Liriodendron tulipifera* (iNat 95798950); Reyes Pond, 6.ix.2019, *Liriodendron tulipifera* (iNat 96500270).

Rhopalomyia clarkei Felt

Biology.—Forms a 2.5–6.0 mm long, conical gall on *Solidago rugosa* Mill. (Asteraceae), usually on the lower leaf surface, occasionally on the upper surface or on the stem (Dorchin et al. 2009).

Notes.—The gall on *S. latissimifolia* Mill. is only tentatively included here. Dorchin et al. (2009) determined that similar galls on *S. gigantea* Aiton and *S. juncea* represent species distinct from *R. clarkei* on *S. rugosa* (the former may be *R. inquisitor* Felt but this requires confirmation; the latter is *R. gina* Dorchin).

Galls observed.—Sanford Farm, 27.vii.2017, *Solidago rugosa* (iNat 94763567); Squam Swamp, 8.viii.2012, *Solidago latissimifolia* (iNat 95947431).

Parasitoids.—Torymidae: *Torymus* sp. (CSE4102, CNC/iNat 94764910).

Rhopalomyia fusiformae Felt

Biology.—Forms sessile, longitudinally ribbed galls, 6–12 mm long, on leaves, stems and inflorescences of *Euthamia caroliniana* (L.) Greene ex Porter and Britton and *E. graminifolia* (L.) Nutt. (Asteraceae).

Galls observed.—Madequecham, 8.ix.2011, *Euthamia graminifolia* (iNat 95796229); Reyes Pond, 6.ix.2019, *Euthamia caroliniana* (iNat 96499932); Squam Farm, 27.viii.2015, *Euthamia* (iNat 95950405); Trott's Swamp, 28.viii.2015, *Euthamia* (iNat 94778724).

Rhopalomyia solidaginis (Loew)

Biology.—Forms a multi-celled terminal rosette gall on *Solidago rugosa* Mill. (Asteraceae) (Dorchin et al. 2009).

Galls observed.—UMass classroom, 6.xi.2011, *Solidago rugosa* (iNat 93851327).

Parasitoids.—Eulophidae: *Aprostocetus* sp. (CSE221, BMNH/BG 625299).

Rhopalomyia sp. 1
(Fig. 18)

Biology.—Forms hairy, elongate, tapering, straight or curved galls in

inflorescences of *Solidago latissimifolia* Mill. (Asteraceae) (Fig. 18).

Notes.—These galls have not been documented previously. We presume they are caused by a *Rhopalomyia* species based on their general similarity in form to *Rhopalomyia* galls occurring on other Asteraceae.

Galls observed.—Squam Swamp, 8.viii.2012, *Solidago latissimifolia* (iNat 95915251).

Rhopalomyia sp. 2
(Fig. 19)

Biology.—Forms hairy, ovoid galls on *Symphyotrichum dumosum* (L.) G. L. Nesom (Asteraceae) (Fig. 19).

Notes.—Three species have been described from similar galls on other *Symphyotrichum* spp., and they are too incompletely known to determine whether they are synonyms (Gagné 1989: 125).

Galls observed.—Miacomet Pond, 6.ix.2019, *Symphyotrichum dumosum* (iNat 93842572).

Parasitoids.—Eulophidae: Tetrastichinae sp. (CSE5899, CNC). Platygastridae: *Platygaster* sp. (CSE5901, SMNS_Hym_Pla_001028). Pteromalidae: unknown sp. (CSE5900, CNC/iNat 94770486).

Sackenomyia commota Gagné

Biology.—Forms leaf blister galls on *Viburnum dentatum* L. (Adoxaceae).

Galls observed.—Coskata, 9.ix.2011, *Viburnum dentatum* (iNat 95798409); 6.viii.2012, *Viburnum dentatum* (iNat 95908564); Ice Pond Lot, 5.viii.2012, *Viburnum dentatum* (iNat 95907312); Squam Swamp, 7.ix.2011, *Viburnum dentatum* (iNat 95754193); Tuckernuck, 10.ix.2011, *Viburnum dentatum* (iNat 95750746).

Trotteria sp. 1

Biology.—Inquiline in gall of *Asphondylia rosulata* on *Solidago rugosa* Mill. (Asteraceae) (see above).

Reared specimen.—Coffin Park (S), 7.viii.2012, em. by 23.vii.2013, ex *Asphondylia* gall, *Solidago rugosa*, #CSE743 (1 adult, USNM).

Vitisiella brevicauda (Felt)

Biology.—Causes smooth, red, globular galls on leaves and tendrils of *Vitis *labrusca* L. (Vitaceae) (Gagné 2009); we also found them on stemlike structures of the inflorescence.

Notes.—The leaf galls of this species are larger and more irregular than the ones discussed below. They project from both leaf surfaces and are aggregated in clusters, partially coalescing, whereas the other *Vitisiella* galls are well spaced.

This is evidently the species Johnson (1930) listed as *Lasioptera vitis*, which is now known to be an inquiline, as noted above: "Grape Tomato Gall. Irregular tumid galls on the tendrils and leaves of the grape. Common on the grape."

Galls observed.—Coskata, 12.vi.2013, *Vitis labrusca* (iNat 95949505); flowering dogwood, 30.vii.2017, *Vitis labrusca* (iNat 96485330); Lily Pond Park, 7.viii.2012, *Vitis labrusca* (iNat 95908881); UMass classroom, 7.ix.2011, *Vitis labrusca* (iNat 95785501).

Vitisiella sp. 1
(Fig. 20)

Biology.—Forms smooth, blisterlike leaf galls, 3–4 mm across, more or less convex on both surfaces, on *Vitis labrusca* L. (Vitaceae) (Fig. 20). The orange larvae emerge in August–September and burrow into soil, emerging as adults the following spring.

Notes.—Our reared specimens belong to an undescribed species (Gagné in litt.). We consider it plausible, but not certain, that the other galls listed here all represent the same species. The Dead Horse Valley galls (illustrated in Buhl and Eiseman

2016) had a central tuft on each leaf surface; the Tuckernuck galls had prominent tufts below but were smooth or with only a small tuft above, and the tufts were less conspicuous or absent in some of the examples found at the UMass field station. The Squam Swamp galls were rather flat, especially on the lower surface, and were possibly not fully developed.

Preserved larva.—Dead Horse Valley, 6.viii.2012, em. by 15.viii.2012, ex *Vitis labrusca*, #CSE36 (1 larva, USNM).

Reared specimens.—Dead Horse Valley, 6.viii.2012, em. by 15.v.2013, ex *Vitis labrusca*, #CSE36 (2 ♀♀, USNM); Tuckernuck, 10.ix.2011, em. by 7.v.2012, ex *Vitis labrusca* (a few adults, USNM).

Other galls observed.—Squam Swamp, 7.ix.2011, *Vitis labrusca* (iNat 95791465); UMass entrance, 7.ix.2011, *Vitis labrusca* (iNat 93841399).

Inquiline.—Cecidomyiidae: *Lasioptera vitis* (see above).

Parasitoids.—Eulophidae: *Closterocerus utahensis* Crawford (591882, BMNH/BG 591882), "*Closterocerus*" sp. (a possibly undescribed species belonging to a group that will be removed from *Closterocerus*, per Christer Hansson in litt.) (591882, BMNH/BG 591884). Platygastridae: *Platygaster vitisiellae* Buhl and Eiseman (CSE555, ZMUC) (Buhl and Eiseman 2016). Pteromalidae: unknown sp. (CSE35, CNC/BG 743041).

Vitisiella sp. 2
(Fig. 21)

Biology.—Forms ~ 5 mm leaf galls, slightly convex on the upper surface and globular on the lower surface, on *Vitis labrusca* L. (Vitaceae) (Fig. 21).

Galls observed.—Coskata, 6.viii.2012, *Vitis labrusca* (iNat 95908365); Squam Swamp, 8.viii.2012, *Vitis labrusca* (iNat 94089837).

Parasitoids.—Pteromalidae: unknown sp. (CSE27, CNC/BG 742428).

Lasiopteridi sp. 1
(Fig. 22)

Biology.—Causes leaflets of *Tephrosia virginiana* (L.) Pers. (Fabaceae) to fold in half longitudinally, and the white larva feeds within a slight swelling along the midrib (Fig. 22; Buhl and Eiseman 2017).

Notes.—This gall inducer is known only from Nantucket, as is its platygastrid parasitoid.

Preserved larvae.—LLNF (E), 27.vii.2014, em. 29.vii.2014, ex *Tephrosia virginiana*, #CSE1227 (4 larvae, USNM).

Other galls observed.—SHCP, 27.viii.2015, *Tephrosia virginiana* (iNat 95950004).

Parasitoids.—Platygastridae: *Platygaster tephrosiae* Buhl and Eiseman (CSE3629, ZMUC) (Buhl and Eiseman 2017). Pteromalidae: *Gastrancistrus* sp. (CSE1527, CNC/BG 1155071).

Cecidomyiinae sp. 1
(Fig. 23)

Biology.—Forms a small apical bud gall on *Solidago latissimifolia* Mill. (Asteraceae), consisting of a few distorted leaves (Fig. 23). The internal structure was not examined.

Notes.—This gall somewhat resembles that of *Asphondylia silva* Dorchin on *S. caesia* L. (N. Dorchin in litt.; Dorchin et al. 2015)

Galls observed.—Squam Swamp, 7.ix.2011, *Solidago latissimifolia* (BG 600675).

Parasitoids.—Eulophidae: Tetrastichinae sp. (591893, CNC/BG 591898, 591955). Pteromalidae: unknown sp. (591893, CNC/BG 591893)

Cecidomyiinae sp. 2

Biology.—Causes enlarged, aborted buds on *Corylus cornuta* Marshall (Betulaceae).

Figs. 23–26. Unidentified Cecidomyiidae galls. 23, Cecidomyiinae sp. 1 on *Solidago latissimifolia*. 24, Cecidomyiinae sp. 4 on *Quercus prinoides*. 25, Cecidomyiinae sp. 3 on *Gaylussacia baccata*. 26, Cecidomyiinae sp. 5 on *Salix purpurea*.

Notes.—Larvae of *Contarinia* and *Dasineura* have been obtained from galls of this type; adults have not been reared (Gagné 1989).

Galls observed.—Coskata, 6.viii.2012, *Corylus* (iNat 96519907); Squam Farm, 17.v.2012, *Corylus cornuta* (iNat 95800558); Squam Swamp, 7.ix.2011, *Corylus cornuta* (iNat 95779935).

Cecidomyiinae sp. 3
(Fig. 25)

Biology.—Causes a narrow, downward marginal leaf roll on *Gaylussacia baccata* (Wangenh.) K. Koch (Ericaceae) (Fig. 25).

Notes.—This gall has not been reported previously. A larva we obtained from a similar gall on *Vaccinium angustifolium* Aiton in western Massachusetts resembled *Putoniella* Kieffer (Buhl and Eiseman 2017).

Galls observed.—Stump Pond, 30.vii.2017, *Gaylussacia baccata* (iNat 94090672).

Parasitoids.—Pteromalidae: unknown sp. (CSE4045, CNC / iNat 94090671).

Cecidomyiinae sp. 4
(Fig. 24)

Biology.—White larvae feed gregariously in long, wrinkled, downward marginal leaf rolls on *Quercus prinoides* Willd. (Fagaceae). In the single affected leaf observed, the rolls occurred on both margins of the leaf (Fig. 24).

Notes.—This gall has not been reported previously.

Galls observed.—Head of the Plains, 10.vi.2016, *Quercus prinoides* (iNat 95953174).

Cecidomyiinae sp. 5
(Fig. 26)

Biology.—Forms small swellings on the twig, petiole, and leaf midrib of *Salix purpurea* L. (Salicaceae) (Fig. 26).

Notes.—Gagné (1989) discusses species of *Lygocecis* Gagné, *Neolasioptera* Felt,

and *Rabdophaga* Westwood that have been reared from woody twig swellings on willows, but no swellings of petioles or midribs are mentioned. We observed a series of galls of similar size and shape, with one at a twig node, two along the adjacent internode, one on the petiole/midrib base of an adjacent leaf, and one near the middle of the same leaf's midrib, and we believe they all represent a single species. We opened one of the galls and found a single orange larva inside. Nearby dead twigs bore vacated multi-chambered swellings from a previous season (iNat 95956162), possibly representing *Rabdophaga* sp. 1, which we later reared from a gall collected at the same location (see above).

Galls observed.—Lily Pond Park, 10.vi.2016, *Salix purpurea* (iNat 95956161).

Chloropidae

Elachiptera nigriceps (Loew)

Biology.—Larvae feed in the stem or petioles of *Bidens* L. (Asteraceae), likely as saprophagous secondary invaders (see discussion of other *Elachiptera* spp. in Eiseman et al. 2016).

Notes.—These flies appeared in a bag containing a *Bidens* plant that was collected because of a knotty stem gall, which was likely fungal. An adult of *Epiblema otiosana* (Clemens) (Lepidoptera: Tortricidae) emerged at about the time the first fly appeared, and this stem-boring species (Covell 1984) was responsible for at least some of the excavations in the plant. At this time two intact *Elachiptera* puparia were found in the base of a hollowed petiole, another was loose in the bag, and a larva was seen wandering on the stem surface.

Johnson (1930) listed this species as *Crassiseta nigriceps*: "May 6 (*Brooks*). June 25-Sept. 9" (4 fairly moldy specimens at NMMA).

Reared specimens.—Milestone Cranberry Bog, 4.viii.2012, em. 8–19.viii.2012, ex *Bidens*, #CSE19, CNC1150982–1150989 (3 ♂♂, 5 ♀♀).

Rhopalopterum painteri (Sabrosky)

Biology.—Unknown. Adult found resting on *Juncus tenuis* Willd. (Juncaceae). Larvae of many chloropid species are internal feeders in graminoids (Sabrosky 1987), so it is conceivable that this is more than an incidental association.

Notes.—None of the 27 chloropid species Johnson (1930) listed are among the ten that are now placed in *Rhopalopterum* Duda.

Collected specimen.—Squam Swamp, 8.ix.2019, on *Juncus tenuis*, #CSE5882 (1 ♀, CNC1903466/BG 2034164).

Ephydridae

Johnson (1930) listed six species in the mostly aquatic, plant-mining genus *Hydrellia* Robineau-Desvoidy. One of these records was confirmed by Deonier (1971) and is listed below; another was a tentative identification of *H. flaviceps* (Meigen), a European species that is not known to occur in North America. The other four are all plausible, but require confirmation: *H. griseola* (Fallén) (as *H. hypoleuca* Loew; 1 specimen at NMMA), a polyphagous species mostly feeding on grasses (Poaceae); *H. tibialis* Cresson, a stem miner of *Eleocharis obtusa* (Willd.) Schult. (Cyperaceae); *H. trichaeta* Cresson (as "*H. coniformis* Loew"), a leafminer of *Potamogeton* L. (Potamogetonaceae); and *H. valida* Loew (1 specimen at NMMA), a leafminer of *Sporobolus alterniflorus* (Loisel.) P. M. Peterson and Saarela [=*Spartina alterniflora*] (Poaceae) (Eiseman 2021).

Hydrellia notiphiloides Cresson

Biology.—This species has been reared from *Polypogon monspeliensis* (L.) Desf. (Poaceae) and *Zannichellia palustris* L. (Potamogetonaceae), and an adult

was found in an emergence trap floating near *Potamogeton amplifolius* Tuck. (Potamogetonaceae) (Deonier 1971). Because *Hydrellia* larvae often exit their feeding mines and then form fresh mines in different plants solely for the purpose of pupariating (Deonier 1971, Eiseman 2021), these records without documentation of larval habits do not necessarily indicate true host plants.

Notes.—Johnson (1930) listed this species with the note "July 20 (*Allen*)." His introduction (p. 9) indicates that G. M. Allen collected insects on Nantucket in 1910. Deonier (1971) listed a male of *H. notiphiloides* collected on Nantucket, seemingly the same specimen ("VII–20– year unknown, collector unknown").

Hydrellia sp. 1

Biology.—Mines thalli of *Lemna* L. (Araceae).

Notes.—Four ephydrid flies are known to mine *Lemna* in North America: the polyphagous *Hydrellia griseola* and the duckweed specialists *H. albilabris* (Meigen), *H. personata* Deonier, and *Lemnaphila scotlandae* Cresson (Eiseman and Zatwarnicki 2019). Of these, the grayish *Hydrellia* adult photographed on *Lemna* could only possibly be *H. griseola*, but we do not know for sure that *Lemna* was its larval host (although it was in a tiny manmade pool with little or no other vegetation), and other *Lemna*-mining species may remain to be discovered.

Photographed adult.—MMA, 2.viii.2012, near mined *Lemna* thalli (BG 741166).

Mines observed.—MMA, 2.viii.2012, *Lemna* (iNat 96511261).

Phoridae

Megaselia nantucketensis Eiseman and Hartop

Biology.—The larva is evidently a predator in the gall of *Macrodiplosis* cf. *niveipila* (above) on *Quercus velutina* Lam. (Fagaceae) (see Eiseman and Hartop 2015).

Notes.—The Nantucket holotype is the only known specimen. Johnson (1930) listed three species of "*Megaselida,*" but these identifications require confirmation.

Reared specimen.—Dead Horse Valley, 18.v.2012, em. 1.v.2013, ex *Macrodiplosis* cf. *niveipila*, *Quercus velutina*, #CSE402 (1 ♂, LACM ENT 329318).

Sphaeroceridae

Trachyopella sp. 1

Biology.—Unclear. Adults appeared in a bag containing a whole, uprooted *Iva frutescens* L. (Asteraceae) plant from which we were attempting to rear a stem-mining moth (Gracillariidae: *Marmara* sp.). Sphaerocerid larvae are generally saprophagous (Marshall and Richards 1987), and it is likely that these flies emerged from the soil around the roots rather than from the living plant tissue.

Notes.—Lonsdale (in litt.) stated that our specimens appear to belong to the genus *Trachyopella* Duda, but he is not sufficiently familiar with this minute-sized and difficult group to identify them definitively. Johnson (1930) listed three species of Sphaeroceridae (as Borboridae): *Leptocera fontinalis* Fallén, *Lotophila carolinensis* Robineau-Desvoidy (as *Scatophora carolinensis*), and *Rachispoda limosa* Fallén (as *Leptocera limosa*).

Reared specimens.—Masquetuck, 14.vi. 2018, em. by 16.vii.2018, ex *Iva frutescens*, #CSE4785, CNC1912553–1912558 (3 ♂♂, 3 ♀♀).

Tephritidae

Johnson (1930) listed ten species of "Trypetidae," all of which are listed below with updated nomenclature and biological information. Seven of these are vouchered by specimens in the NMMA, as indicated in the Notes sections; some are covered to

varying degrees with wispy white mold that makes examination difficult.

Acinia picturata (Snow)

Biology.—Larvae feed in flowerheads and seedheads of *Pluchea odorata* (L.) Cass. (Asteraceae) (Stegmaier 1967).

Notes.—Listed by Johnson (1930) as *Tephritis fucata* Fab.: "Tuckernuck, Aug 6, 1909 (*Cushman*)."

Campiglossa albiceps (Loew)

Biology.—Larvae feed in flowerheads of *Symphyotrichum* spp. (Asteraceae) (Novak and Foote 1968).

Notes.—Listed by Johnson (1930) as *Tephritis albiceps*: "June 23-Sept. 14" (1 ♂, 2 ♀♀, 1 of unknown sex at NMMA, some mold).

Euarestoides abstersus (Loew)

Biology.—This species has been reared from flowerheads of *Carphephorus paniculatus* (J. F. Gmel.) H. J.-C. Hebert (Asteraceae) (Savaris et al. 2019), and presumably feeds on additional Asteraceae since *Carphephorus* does not occur on Nantucket.

Notes.—Listed by Johnson (1930) as *Trypanea abstersa*: "Surfside, Sept. 12-16" (2 specimens at NMMA, quite moldy).

Eurosta solidaginis Fitch

Biology.—Forms round stem galls on *Solidago* spp. (Asteraceae) (Felt 1940).

Notes.—Listed by Johnson (1930) as *E. asteri* Harr.: "Aug. 26 (*Sanford*)" (1 ♂ at NMMA). The distinctive galls of this species, which we find regularly in goldenrod patches throughout New England, were conspicuously absent during our Nantucket surveys.

Neaspilota achilleae Johnson

Biology.—"Frequents the flower buds of yarrow (*Achillea millefolium*)" L. (Asteraceae) (Johnson 1930). Outside of Nantucket, an additional 19 species in ten other genera of Asteraceae have been reported as hosts (Freidberg and Mathis 1986).

Notes.—Johnson's (1930) records for this species are "June 2 (*Brooks*). June 8-Sept. 8" (4 specimens at NMMA, quite moldy).

Procecidochares cf. *atra* Loew

Biology.—Forms clusters of small rosette galls on *Solidago rugosa* Mill. (Asteraceae).

Notes.—We placed the photographed galls in a bag in early evening, and the next morning found that two sweat bees (Halictidae: *Lasioglossum pilosum* (Smith) or *L. leucocomum* (Lovell); BG 687673) had appeared in the bag. They had evidently concealed themselves among the dense modified leaves of the galls to sleep.

Although we did not rear adult flies from these galls, N. Dorchin (in litt.) identified them from our photographs as the work of a *Procecidochares* sp. No eastern *Procecidochares* other than *P. atra* and *P. polita* (Loew) is known to use *Solidago* as a host (Philips and Smith 1998). Similar rosette galls have been attributed to both species (e.g., by Felt 1940), but the records of *P. polita* (see below) all appear to derive from Osten Sacken (1869), who reported rearing that entirely yellow-legged species from galls on *Solidago altissima* "not unlike small Brussels sprouts in appearance." All of Osten Sacken's reared specimens were in fact *P. atra*, which has black femora (Aldrich 1929). *Solidago rugosa* is a plausible, but unconfirmed, host for *P. atra*. Besides *S. altissima*, it has been reported from "*Aster*" (possibly based on a misidentified plant), *S. nemoralis* Aiton (Aldrich 1929), *S. odora* Aiton (Wasbauer 1972), *S. canadensis*, and *Erigeron canadensis* L. (Philips and Smith 1998). The *Erigeron* record is based on a

single specimen reared from a gall consisting of "a swollen stem approximately two inches above the ground," and based on the unusual host and gall morphology, Philips and Smith (1998) suggested that this specimen may represent a distinct, undescribed species.

Galls observed.—NCF Bird Sanctuary, 7.viii.2012, *Solidago rugosa* (iNat 96517854).

Procecidochares polita (Loew)

Biology.—Forms galls on *Solidago* spp. (Asteraceae); apparently small, roundish stem galls and not rosette galls as has been reported by multiple authors, but the galls, host ranges, and species limits of *Procecidochares* are clearly in need of further study. Wasbauer (1972) cited unpublished sources (R. H. Foote and C. Stegmaier) for records of *S. rugosa* Mill. and *S. stricta* Aiton as hosts of this species, and Foote et al. (1993) stated that no biological information is available beyond these host data. Stebbins (1909: 52) may be the original source of the *S. rugosa* record; on this host, she stated that *P. polita* causes a "monothalamous gall, consisting of undeveloped leaves of side bud, massed together. About 15 mm. long. Usually several galls are grouped." It is not clear that she actually reared adults from these galls, and she cited the erroneous record of Osten Sacken (1869, discussed above under *P.* cf. *atra*), which had not yet been corrected by Aldrich (1929). Among the Florida records of *P. polita* listed by Ibrahim (1980) is "Dade Co.: Hialeah, 3♂ 2♀, ex-stem gall *Solidago stricta*, 12-XI-1970 (C. E. Stegmaier, USNM)." One female from this series is at the USNM, and A. L. Norrbom (in litt.) has annotated it with "doubtfully *polita*. 2 dc & no scutellar setulae". Stebbins (1909) also cited Jarvis (1907: 88), who reported *P. polita* causing galls on *S. canadensis* consisting of "a bunch of dwarfed leaves caused by the arrest of the growth of the branches. It is a little more than half an inch in length." But here again, there is no indication that adults were actually reared, and the identification may have been based on Osten Sacken's account. Girault (1913: 340–341) appears to be the only author other than Osten Sacken to explicitly report rearing adults of *P. polita*: "The small, roundish galls of this dipteron are found during the winter in Virginia on composites. The interior of the gall is pithy and may contain two larval cells, though I believe one is the usual number. A number of galls collected from *Solidago* in the winter of 1903 yielded the adult flies on May 13 and 15… The fly was identified by Coquillett. The exit-hole is large and round."

Notes.—Johnson's (1930) records for *P. polita* are "Taupaushaw, Aug. 17 and Sept. 9." Johnson's (1925) statement that *P. polita* "larvae form leafy rosette galls on *Solidago altissima*" was evidently based on Osten Sacken's error (discussed above), since Johnson (1930) did not repeat this statement following Aldrich's (1929) clarification. We believe Johnson's (1930) Nantucket records to be based on caught adults, and not on galls, since there is no mention of host or biology.

Tephritis pura (Loew)

Biology.—Forms "often indistinct apical stem swellings" on *Solidago altissima* L., *S. gigantea* Aiton, and possibly *S. canadensis* L. (Asteraceae). Adults have emerged in June–July from galls collected at Great Smoky Mountains National Park in May–June, and in mid-September from a gall collected in Minnesota a few days earlier (Sutton et al. 2002).

Notes.—Listed by Johnson (1930) as *Euaresta pura*: "July 4, 1905 (*Cushman*)."

Tephritis subpura (Johnson)

Biology.—This species has been reared from terminal stems and flowers

of *Baccharis halimifolia* L. (Asteraceae) (Foote et al. 1993). Our specimen was collected as an adult on *Iva frutescens* L. in close proximity to *B. halimifolia*.

Collected specimen.—The Creeks, 6.xi.2017, on *Iva frutescens*, #CSE4361 (1 ♀, USNM/BG 1468060).

Terellia palposa (Loew)

Biology.—Larvae develop in flowerheads of thistles, including *Cirsium pumilum* Spreng. (Asteraceae) (Johnson 1930) and presumably *C. horridulum* Michx.

Notes.—Johnson's (1930) entry for this species is "June 24-Aug. 9. The larva lives in the flower buds of the pasture thistle (*Cirsium pumilum*)" (3 ♂♂, 2 ♀♀ at NMMA).

Collected specimens.—Head of the Plains (thistle patch), 10.vi.2016, congregating/mating on flowers and foliage of *Cirsium horridulum*, #CSE2566 (2 adults, USNM/BG 1302557); Madaket Marine, 15.vi.2018, on *Lathyrus japonicus*, #CSE4601 (1 ♀, USNM/BG 1633797).

Trupanea dacetoptera Phillips

Biology.—This species has been reared from "tender tips of nonflowering plants" of *Pityopsis microcephala* Small, and also feeds on *Pseudognaphalium obtusifolium* (L.) Hilliard and B.L. Burtt (both Asteraceae) (Foote et al. 1993).

Notes.—Johnson's (1930) records for this species are "June 23-Sept. 13. Tuckernuck, Aug. 6 (*Cushman*)" (1 ♂ 1 ♀ at NMMA, some mold).

Zonosemata electa Say

Biology.—Larvae feed in fruits of *Solanum* spp. (Solanaceae) (Foote et al. 1993).

Notes.—Listed by Johnson (1930) as *Zonosema flavonotata* Macq.: "Taupaushaw, July 25 and Aug. 17" (1 ♂, 1 of unknown sex at NMMA, some mold).

Summary

Our visual searches for galls, leaf mines, and other characteristic evidence on host plants, in conjunction with rearing efforts, have added numerous species to Johnson's (1930) list of the insect fauna of Nantucket (Table 1). Compared with Johnson's list of nine Agromyzidae species, we identified 53, along with 15 others determined only to genus or higher taxa (a few of the latter could conceivably be conspecific with the former or with one another). These included the first New England records for *Agromyza masculina*, *Liriomyza baptisiae*, and *Ophiomyia beckeri*, and the first records of *Phytomyza multifidae* and *P. spondylii* from eastern North America. We found 37 named Cecidomyiidae species (including eight of the nine on Johnson's list), as well as 26 others that are undescribed or are currently unidentifiable for other reasons (a few of which could conceivably be conspecific with one of the identified species, or represent galls not actually caused by midges). Our rearings and collections of Anthomyiidae, Chloropidae, Ephydridae, Phoridae, Sphaeroceridae, and Tephritidae added another seven species and two genera to Johnson's list. Although a few of the species we found may have arrived on Nantucket after 1930, and although our study certainly benefited from 90 years of taxonomic advances and newer literature not available to Johnson, we feel that our methods would similarly complement any contemporary biodiversity survey.

In addition to providing paratypes of *Liriomyza pistilla* and the first known specimens of an as yet undescribed *Asphondylia* species, our reared material of Diptera and their parasitoids from Nantucket includes the only known specimens of *Cerodontha edithae*, an as yet undescribed species of *Ophiomyia*, *Megaselia nantucketensis*, *Platygaster tephrosiae*, and *P. vitisiellae*.

Table 1. Fly species newly reported for Nantucket. We have included incompletely determined taxa only when we are certain that they are distinct from all others on the list and from those listed by Johnson (1930) (and, in the case of galls, when we are certain that cecidomyiids are responsible for them).

Species	Family	Detection Method
Agromyza aristata Malloch	Agromyzidae	Leaf mines
Agromyza idaeiana Hardy	Agromyzidae	Leaf mines
Agromyza isolata Malloch	Agromyzidae	Leaf mines; reared
Agromyza masculina Sehgal	Agromyzidae	Leaf mines; reared
Agromyza vockerothi Spencer	Agromyzidae	Leaf mines; reared
Amauromyza flavifrons (Meigen)	Agromyzidae	Leaf mines
Amauromyza pleuralis (Malloch)	Agromyzidae	Leaf mines
Aulagromyza cornigera (Griffiths)	Agromyzidae	Leaf mines
Aulagromyza luteoscutellata (Meijere)	Agromyzidae	Leaf mines; reared
Aulagromyza populicola (Walker)	Agromyzidae	Leaf mines
Calycomyza menthae Spencer	Agromyzidae	Leaf mines
Calycomyza promissa (Frick)	Agromyzidae	Leaf mines
Calycomyza solidaginis (Kaltenbach)	Agromyzidae	Leaf mines; reared
Cerodontha (Butomomyza) angulata (Loew)	Agromyzidae	Leaf mines; reared
Cerodontha (Dizygomyza) edithae Eiseman and Lonsdale	Agromyzidae	Leaf mines; reared
Cerodontha (Dizygomyza) morosa (Meigen)	Agromyzidae	Leaf mines
Cerodontha (Dizygomyza) scirpivora Spencer	Agromyzidae	Leaf mines
Cerodontha (Poemyza) incisa (Meigen)	Agromyzidae	Leaf mines; reared
Japanagromyza viridula (Coquillett)	Agromyzidae	Leaf mines; reared
Liriomyza asclepiadis Spencer	Agromyzidae	Leaf mines
Liriomyza baptisiae (Frost)	Agromyzidae	Leaf mines
Liriomyza blechi Spencer	Agromyzidae	Leaf mines
Liriomyza brassicae (Riley)	Agromyzidae	Leaf mines
Liriomyza carphephori Eiseman, Lonsdale, and Feldman	Agromyzidae	Leaf mines
Liriomyza eupatorii (Kaltenbach)	Agromyzidae	Leaf mines; reared
Liriomyza fricki Spencer	Agromyzidae	Leaf mines
Liriomyza orilliensis Spencer	Agromyzidae	Leaf mines; reared
Liriomyza pistilla Lonsdale	Agromyzidae	Leaf mines; reared
Liriomyza sp. 1 (*flaveola* group)	Agromyzidae	Leaf mines
Nemorimyza maculosa (Malloch)	Agromyzidae	Leaf mines; reared
Nemorimyza posticata (Meigen)	Agromyzidae	Leaf mines; reared
Ophiomyia beckeri (Hendel)	Agromyzidae	Leaf mines; reared
Ophiomyia carolinensis Spencer	Agromyzidae	Leaf mines
Ophiomyia cf. *congregata* (Malloch)	Agromyzidae	Leaf mines
Ophiomyia kwansonis Sasakawa	Agromyzidae	Leaf mines
Ophiomyia maura (Meigen)	Agromyzidae	Leaf mines; reared
Ophiomyia parda Eiseman and Lonsdale	Agromyzidae	Leaf mines
Ophiomyia sp. 1 [undescribed]	Agromyzidae	Leaf mines; reared
Phytoliriomyza sp. 1 [likely *P. pulchella* Spencer]	Agromyzidae	Leaf mines
Phytomyza actaeivora Eiseman and Lonsdale	Agromyzidae	Leaf mines (herbarium)
Phytomyza aquilegiana Frost	Agromyzidae	Leaf mines
Phytomyza astotinensis Griffiths	Agromyzidae	Leaf mines; reared
Phytomyza crassiseta Zetterstedt	Agromyzidae	Leaf mines (herbarium)
Phytomyza glabricola Kulp	Agromyzidae	Leaf mines

(*Continued*)

Table 1. (Continued)

Species	Family	Detection Method
Phytomyza ilicicola Loew	Agromyzidae	Leaf mines
Phytomyza multifidae Sehgal	Agromyzidae	Leaf mines; reared
Phytomyza plantaginis Robineau-Desvoidy	Agromyzidae	Leaf mines
Phytomyza ranunculi (Schrank)	Agromyzidae	Leaf mines; reared
Phytomyza solidaginophaga Sehgal	Agromyzidae	Leaf mines
Phytomyza spondylii heracleiphaga Spencer	Agromyzidae	Leaf mines; reared
Phytomyza syngenesiae (Hardy)	Agromyzidae	Leaf mines; reared
Phytomyza wiggii Lonsdale and Scheffer	Agromyzidae	Leaf mines; reared
Phytomyza sp. 1 (*albiceps* group)	Agromyzidae	Leaf mines
Phytomyza sp. 2 (*minuscula* group)	Agromyzidae	Leaf mines
Chirosia filicis (Huckett)	Anthomyiidae	Leaf mines; reared
Chirosia gleniensis (Huckett)	Anthomyiidae	Leaf mines; reared
Pegomya hyoscyami (Panzer)	Anthomyiidae	Leaf mines
Pegomya rufescens Stein	Anthomyiidae	Leaf mines
Acericecis ocellaris (Osten Sacken)	Cecidomyiidae	Galls
Asphondylia cf. *monacha* Osten Sacken	Cecidomyiidae	Galls; reared
Asphondylia pseudorosa Dorchin	Cecidomyiidae	Galls
Asphondylia rosulata Dorchin	Cecidomyiidae	Galls
Asteromyia carbonifera (Osten Sacken)	Cecidomyiidae	Galls
Asteromyia euthamiae Gagné	Cecidomyiidae	Galls
Asteromyia modesta (Felt)	Cecidomyiidae	Reared accidentally, then identified by gall characteristics
Asteromyia sp. 1 [on *Symphyotrichum*]	Cecidomyiidae	Reared accidentally (gall never found)
Caryomyia tubicola (Osten Sacken)	Cecidomyiidae	Galls
Contarinia cerasiserotinae (Osten Sacken)	Cecidomyiidae	Galls
Contarinia squamulicola (Stebbins)	Cecidomyiidae	Galls
Contarinia sp. 1 [on *Quercus*]	Cecidomyiidae	Galls
Contarinia sp. 2 [on *Sassafras*]	Cecidomyiidae	Galls
Contarinia sp. 3 [on *Rosa*]	Cecidomyiidae	Galls; reared
Dasineura parthenocissi (Stebbins)	Cecidomyiidae	Galls; reared
Dasineura smilacifolia Felt	Cecidomyiidae	Galls
Dasineura trifolii (Loew)	Cecidomyiidae	Galls
Dasineura sp. 1 [on *Ionactis*]	Cecidomyiidae	Galls; reared
Dasineura (?) sp. 2 [on *Lespedeza*]	Cecidomyiidae	Galls
Gliaspilota glutinosa (Osten Sacken)	Cecidomyiidae	Galls
Lasioptera excavata Felt	Cecidomyiidae	Galls (herbarium)
Lasioptera vitis Osten Sacken	Cecidomyiidae	Reared from gall induced by another cecidomyiid
Lestodiplosis sp. 1	Cecidomyiidae	Reared accidentally; possibly a predator in psyllid galls
Macrodiplosis erubescens (Osten Sacken)	Cecidomyiidae	Galls
Macrodiplosis cf. *niveipila* (Osten Sacken)	Cecidomyiidae	Galls; reared
Monarthropalpus flavus (Schrank)	Cecidomyiidae	Galls
Neolasioptera convolvuli (Felt)	Cecidomyiidae	Galls
Neolasioptera lycopi (Felt)	Cecidomyiidae	Galls (herbarium)
Neolasioptera nodulosa (Beutenmüller)	Cecidomyiidae	Galls

(*Continued*)

Table 1. (Continued)

Species	Family	Detection Method
Neolasioptera perfoliata (Felt)	Cecidomyiidae	Galls
Neolasioptera potentillaecaulis (Stebbins)	Cecidomyiidae	Galls
Neolasioptera sp. 1 [on *Erechtites*]	Cecidomyiidae	Galls; reared
Neolasioptera sp. 2 [on *Iva*]	Cecidomyiidae	Reared accidentally (gall never found)
Parallelodiplosis subtruncata (Felt)	Cecidomyiidae	Galls
Polystepha globosa (Felt)	Cecidomyiidae	Galls
Polystepha sp. 1 [on *Quercus*]	Cecidomyiidae	Galls
Rabdophaga sp. 1	Cecidomyiidae	Galls; reared
Resseliella liriodendri (Osten Sacken)	Cecidomyiidae	Galls
Rhopalomyia clarkei Felt	Cecidomyiidae	Galls
Rhopalomyia fusiformae Felt	Cecidomyiidae	Galls
Rhopalomyia solidaginis (Loew)	Cecidomyiidae	Galls
Rhopalomyia sp. 1 [on *Solidago*]	Cecidomyiidae	Galls
Rhopalomyia sp. 2 [on *Symphyotrichum*]	Cecidomyiidae	Galls
Sackenomyia commota Gagné	Cecidomyiidae	Galls
Trotteria sp. 1	Cecidomyiidae	Reared from gall induced by another cecidomyiid
Vitisiella sp. 1 [on *Vitis*]	Cecidomyiidae	Galls; reared
Lasiopteridi sp. 1 [on *Tephrosia*]	Cecidomyiidae	Galls
Cecidomyiinae sp. 2 [on *Corylus*]	Cecidomyiidae	Galls
Cecidomyiinae sp. 3 [on *Gaylussacia*]	Cecidomyiidae	Galls
Cecidomyiinae sp. 4 [on *Quercus*]	Cecidomyiidae	Galls
Cecidomyiinae sp. 5 [on *Salix*]	Cecidomyiidae	Galls
Rhopalopterum painteri (Sabrosky)	Chloropidae	Adult collected from possible host plant
Megaselia nantucketensis Eiseman and Hartop	Phoridae	Reared from cecidomyiid gall
Trachyopella sp. 1	Sphaeroceridae	Reared accidentally (probably from soil attached to uprooted plant)
Tephritis subpura (Johnson)	Tephritidae	Adult collected from possible host plant

We also found at least seven previously undocumented cecidomyiid galls (on *Gaylussacia baccata*, *Ionactis linariifolia*, *Quercus prinoides*, *Salix purpurea*, *Solidago latissimifolia*, and *Tephrosia virginiana*) that require further study but likely are caused by additional undescribed species. These discoveries are unlikely to represent species that are unique to Nantucket, but rather underscore how much remains to be learned about the insect fauna of North America in general.

Besides adding many species to the Nantucket list and producing some that were new to science, our hostplant-focused approach has yielded information about larval biology and ecological relationships that would have been missed even if we had somehow managed to collect and identify all of these insects using other sampling techniques. This included the first host records for *Agromyza vockerothi* and *Chirosia filicis*; new host families for *C. gleniensis, Cerodontha angulata,* and *Cer. incisa*; new host genera for *Calycomyza platyptera, Cer. dorsalis, Liriomyza eupatorii,* and *Phytomyza syngenesiae*; and new host species for many

others. Our rearings also established numerous previously undocumented parasitoid-host relationships, which we intend to highlight in future publications focusing on Hymenoptera.

Acknowledgments

We thank Raymond J. Gagné for providing prompt identifications and accompanying commentary for our cecidomyiid specimens throughout this study. In addition, his amateur-friendly guide to identifying midge galls (Gagné 1989) inspired CSE to compile a similarly organized guide to leaf mines (Eiseman 2019, 2021), and Ray's enthusiastic correspondence regarding that work has also been greatly appreciated.

For assistance with identification of other flies or their parasitoids or predators, by examination of specimens or photographs, we thank the late Michael Ackland, John Ascher, Jessica Awad, Matthias Buck, Matthew Buffington, Peter Neerup Buhl, Roger Burks, the late Robert Carlson, John Carr, Netta Dorchin, Joseph Fortier, George Foster, Gary Gibson, Christer Hansson, Martin Hauser, Ross Hill, Yann Kemper, Adam Kranz, Irene Lobato-Vila, Owen Lonsdale, Paul Marsh, Allen Norrbom, Ryan Perry, Michael Sharkey, Bradley Sinclair, John Stireman, James C. Trager, Jeong Yoo, Miles Zhang, and Bob Zuparko.

We also thank the Nantucket Biodiversity Initiative and its member organizations (Nantucket Conservation Foundation, Maria Mitchell Association, Linda Loring Nature Foundation, Mass Audubon, Nantucket Land Bank, Nantucket Land Council, The Trustees of Reservations, Tuckernuck Land Trust, UMass Boston Nantucket Field Station) for funding, transportation, housing, permission to collect on their properties, and other logistical support throughout this study. We thank Andrew McKenna-Foster and Ginger Andrews for letting us stay at their houses, Kelly Omand for directing us to populations of plant species we otherwise would have missed and also collecting two midge galls that we never found in our own surveys, and Noah Charney and Sydne Record for taking part in the initial four-day survey that launched this study.

Finally, we thank Allen Norrbom and two anonymous reviewers for their feedback on the manuscript.

Literature Cited

Aldrich, J. M. 1929. A revision of the two-winged flies of the genus *Procecidochares* in North America, with an allied new genus. Proceedings of the United States National Museum 76(2): 1–13. https://doi.org/10.5479/si.00963801.76-2799.1.

Buhl, P. N. and C. S. Eiseman. 2016. Three new reared species of *Platygaster* (Hymenoptera, Platygastroidea: Platygastridae) from the United States. International Journal of Environmental Studies 73(6): 1006–1015. https://doi.org/10.1080/00207233.2016.1201322.

Buhl, P. N. and C. S. Eiseman. 2017. Host records of five species of Platygastrinae (Hymenoptera, Platygastroidea: Platygastridae) from the United States, with the description of two new species of *Platygaster*. International Journal of Environmental Studies 75(3): 395–404. https://doi.org/10.1080/00207233.2017.1403811.

Claassen, P. W. 1918. Observations on the life history and biology of *Agromyza laterella* Zetterstedt (Diptera). Annals of the Entomological Society of America 11(1): 9–18. https://doi.org/10.1093/aesa/11.1.9.

Covell, C. V., Jr. 1984. Moths of Eastern North America. The Easton Press, Norwalk, CT. 496 pp.

Deonier, D. L. 1971. A systematic and ecological study of Nearctic *Hydrellia* (Diptera: Ephydridae). Smithsonian Contributions to Zoology 68: 1–147. https://doi.org/10.5479/si.00810282.68.

Dorchin, N., M. V. McEvoy, T. A. Dowling, W. G. Abrahamson, and J. G. Moore. 2009. Revision of the goldenrod-galling *Rhopalomyia* species (Diptera: Cecidomyiidae) in North America. Zootaxa 2152: 1–35. https://doi.org/10.11646/zootaxa.2152.1.1.

Dorchin, N., J. B. Joy, L. K. Hilke, M. J. Wise and W. G. Abrahamson. 2015. Taxonomy and phylogeny of the *Asphondylia* species (Diptera: Cecidomyiidae) of North American goldenrods: challenging morphology, complex host associations, and cryptic speciation. Zoological Journal of the Linnean Society 174: 265–304. https://doi.org/10.1111/zoj.12234.

Eiseman, C. S. 2018. New rearing records for muscoid leafminers (Diptera: Anthomyiidae, Scathophagidae) in the United States. Proceedings of the Entomological Society of Washington 120(1): 25–50. https://doi.org/10.4289/0013-8797.120.1.25.

Eiseman, C. 2019. Leafminers of North America. Self-published e-book, available from http://charleyeiseman.com/leafminers/. clii+1857 pp.

Eiseman, C. S. 2020. Further Nearctic rearing records for phytophagous muscoid flies (Diptera: Anthomyiidae, Scathophagidae). Proceedings of the Entomological Society of Washington 122(3): 595–603. https://doi.org/10.4289/0013-8797.122.3.595.

Eiseman, C. 2021. Leafminers of North America. Second Edition. Self-published e-book, available from http://charleyeiseman.com/leafminers/.

Eiseman, C. S. and J. A. Blyth. 2022. Nantucket's neglected herbivores I: Coleoptera. Proceedings of the Entomological Society of Washington 124(2): 202–224. http://doi.org/10.4289/0013-8797.124.2.202.

Eiseman, C. S., J. A. Blyth, and D. R. Smith. 2015. Notes on four anemone-feeding insects in the eastern United States (Diptera: Agromyzidae; Hymenoptera: Tenthredinidae; Lepidoptera: Noctuidae). Proceedings of the Entomological Society of Washington 117(3): 281–289. https://doi.org/10.4289/0013-8797.117.3.281.

Eiseman, C. S. and E. A. Hartop. 2015. A new species of *Megaselia* Rondani (Diptera: Phoridae) reared from a *Macrodiplosis* Kieffer (Diptera: Cecidomyiidae) gall on black oak. Proceedings of the Entomological Society of Washington 117(4): 463–466. https://doi.org/10.4289/0013-8797.117.4.463.

Eiseman, C. S., K. Heller, and B. Rulik. 2016. A new leaf-mining dark-winged fungus gnat (Diptera: Sciaridae), with notes on other insect associates of marsh marigold (Ranunculaceae: *Caltha palustris* L.). Proceedings of the Entomological Society of Washington 118(4): 519–532. https://doi.org/10.4289/0013-8797.118.4.519.

Eiseman, C. S. and O. Lonsdale. 2018. New state and host records for Agromyzidae (Diptera) in the United States, with the description of thirty new species. Zootaxa 4479: 1–156. https://doi.org/10.11646/zootaxa.4479.1.1.

Eiseman, C. S., O. Lonsdale, and T. S. Feldman. 2019. Nine new species of Agromyzidae from North Carolina, USA, with new host and distribution records for additional species. Zootaxa 4571(3): 301–333. https://doi.org/10.11646/zootaxa.4571.3.1.

Eiseman, C. S., O. Lonsdale, J. van der Linden, T. S. Feldman, and M. W. Palmer. 2021. Thirteen new species of Agromyzidae (Diptera) from the United States, with new host and distribution records for 32 additional species. Zootaxa 4931(1): 1–68. https://doi.org/10.11646/zootaxa.4931.1.1.

Eiseman, C. S. and T. Zatwarnicki. 2019. First Nearctic record of *Hydrellia albilabris* (Meigen) (Diptera: Ephydridae), a leafminer of duckweed (Araceae: Lemnoideae), with comments on related species. Proceedings of the Entomological Society of Washington 121(2): 160–167. https://doi.org/10.4289/0013-8797.121.2.160.

Felt, E. P. 1906. Insects affecting park and woodland trees. New York State Museum Memoir 8(2): 333–877. https://doi.org/10.5962/bhl.title.159265.

Felt, E. P. 1908. Appendix D. New species of Cecidomyiidae II. New York State Museum Bulletin 124: 286–422.

Felt, E. P. 1916. Appendix, a study of gall midges IV, family Itonididae, tribe—Asphondyliariae. 31st report of the state entomologist on injurious and other insects of the state of New York, 1915. New York State Museum Bulletin 186: 101–172.

Felt, E. P. 1940. Plant Galls and Gall Makers. Comstock Publishing Company, Ithaca, NY. 364 pp.

Foote, R. H., F. L. Blanc, and A. L. Norrbom. 1993. Handbook of the Fruit Flies (Diptera: Tephritidae) of America North of Mexico. Cornell University Press, Ithaca, NY. 571 pp.

Freidberg, A. and W. N. Mathis. 1986. Studies of Terelliinae (Diptera: Tephritidae): a revision of the genus *Neaspilota* Osten Sacken. Smithsonian Contributions to Zoology 439: iv + 75 pp.

Frost, S. W. 1924. A study of the leaf-mining Diptera of North America. Cornell University Agricultural Experiment Station Memoir 78: 1–228.

Gagné, R. J. 1968. A taxonomic revision of the genus *Asteromyia* (Diptera: Cecidomyiidae). Miscellaneous Publications of the

Entomological Society of America 6(1): 1–40.

Gagné, R. J. 1989. The Plant-feeding Gall Midges of North America. Cornell University Press, Ithaca, NY. 356 pp.

Gagné, R. J. 2008. The gall midges (Diptera: Cecidomyiidae) of hickories (Juglandaceae: *Carya*). Memoirs of the American Entomological Society 48: 1–147.

Gagné, R. J. 2009. Taxonomy of *Janetiella thymi* (Kieffer) (Diptera: Cecidomyiidae) and of the species formerly in *Janetiella* that feed on *Vitis* (Vitaceae). Proceedings of the Entomological Society of Washington 111(2): 399–409. https://doi.org/10.4289/0013-8797-111.2.399.

Gagné, R. J. and M. Jaschhof. 2021. A Catalog of the Cecidomyiidae (Diptera) of the World. Fifth Edition. Digital. 816 pp.

Girault, A. A. 1913. Fragments on North American insects—VI. Entomological News 24(8): 338–344.

Griffiths, G. C. D., ed. 1982. Flies of the Nearctic Region, Volume VIII, Part 2, Number 1: Cyclorrhapha II (Schizophora: Calyptratae) Anthomyiidae. 160 pp.

Griffiths, G. C. D., ed. 1983. Flies of the Nearctic Region, Volume VIII, Part 2, Number 2: Cyclorrhapha II (Schizophora: Calyptratae) Anthomyiidae. 127 pp.

Griffiths, G. C. D., ed. 2004. Flies of the Nearctic Region, Volume VIII, Part 2, Number 15: Cyclorrhapha II (Schizophora: Calyptratae) Anthomyiidae. 196 pp.

Ibrahim, R. B. 1980. Fruit Flies of Florida (Diptera: Tephritidae). Dissertation, University of Florida. 356 pp. https://ufdc.ufl.edu/AA00029795/00001.

Jarvis, T. D. 1907. Additional insect galls of Ontario. Thirty-eighth Annual Report of the Entomological Society of Ontario 19: 85–94.

Johnson, C. W. 1925. Fauna of New England. 15. List of the Diptera or two-winged flies. Occasional Papers of the Boston Society of Natural History 7(15): 1–326.

Johnson, C. W. 1930. A List of the Insect Fauna of Nantucket, Massachusetts. Publications of the Nantucket Maria Mitchell Association 3(2). 174 + xviii pp.

Lonsdale, O. 2017. The *Liriomyza* (Agromyzidae: Schizophora: Diptera) of Canada & Alaska. Zootaxa 4234: 1–156. https://doi.org/10.11646/zootaxa.4234.1.1.

Lonsdale, O. 2021. Manual of North American Agromyzidae (Diptera, Schizophora), with revision of the fauna of the "Delmarva" states. ZooKeys 1051: 1–481. https://doi.org/10.3897/zookeys.1051.64603.

Marshall, S. A. and O. W. Richards. 1987. Sphaeroceridae, pp. 993–1006. *In* McAlpine, J. F., ed. Manual of Nearctic Diptera. Volume 2. Research Branch, Agriculture Canada. Monograph 28. Canada Communication Group, Ottawa, Canada. 657 pp.

Needham, J. G., S. W. Frost, and B. H. Tothill. 1928. Leaf-mining Insects. The Williams & Wilkins Company, Baltimore. 351 pp.

Novak, J. A. and B. A. Foote. 1968. Biology and immature stages of fruit flies: *Paroxyna albiceps* (Diptera: Tephritidae). Journal of the Kansas Entomological Society 41(1): 108–119.

Osten Sacken, R. 1869. Biological notes on Diptera (galls on *Solidago*). Transactions of the American Entomological Society 2: 299–303.

Philips, T. K. and D. C. Smith. 1998. The biology and hosts of *Procecidochares atra* (Diptera: Tephritidae): evidence for cryptic species? Entomological News 109(3): 159–164.

POWO. 2021. Plants of the world online. http://plantsoftheworldonline.org [Last accessed October 2021.].

Priest, R. J., R. R. Kula, and M. W. Gates. 2019 [2020]. Leaf mining insects and their parasitoids in the old-growth forest of the Huron Mountains. The Great Lakes Entomologist 52(3–4): 117–160.

Rehder, A. 1945. *Carya alba* proposed as *nomen ambiguum*. Journal of the Arnold Arboretum 26: 482–483. https://doi.org/10.5962/bhl.part.13127.

Sabrosky, C. W. 1987. Chloropidae, pp. 1049–1067. *In* McAlpine, J. F., ed. Manual of Nearctic Diptera. Volume 2. Research Branch, Agriculture Canada. Monograph 28. Canada Communication Group, Ottawa, Canada. 657 pp.

Savaris, M., A. L. Norrbom, L. Marinoni, and S. Lampert. 2019. Revision of the genus *Euarestoides* Benjamin (Diptera: Tephritidae). Zootaxa 4551(3): 299–329. https://doi.org/10.11646/zootaxa.4551.3.3.

Scheffer, S. J., M. L. Lewis, J. B Hébert, and F. Jacobsen. 2021. Diversity and host plant-use in North American *Phytomyza* holly leafminers (Diptera: Agromyzidae): colonization, divergence, and specificity in a host-associated radiation. Annals of the Entomological Society of America 114(1): 59–69. https://doi.org/10.1093/aesa/saaa034.

Spencer, K. A. and G. C. Steyskal. 1986. Manual of the Agromyzidae (Diptera) of the United States. USDA Agricultural Research Service Agriculture Handbook No. 638. 478 pp. https://doi.org/10.5962/bhl.title.119606.

Stebbins, F. A. 1909. Insect galls of Springfield, Massachusetts, and vicinity. Springfield Museum of Natural History Bulletin 2: 1–139. https://doi.org/10.5962/bhl.title.28611.

Stegmaier, C. E. Jr. 1967. *Pluchea odorata*, a new host record for *Acinia picturata* (Diptera, Tephritidae). The Florida Entomologist 50(1): 53–55. https://doi.org/10.2307/3493208.

Sutton, B. D., G. J. Steck, and D. DeFoe. 2002. New records of Tephritidae (Diptera) from Great Smoky Mountains National Park – II. Insecta Mundi 16(1–3): 1–8.

Wasbauer, M. S. 1972. An annotated host catalog of the fruit flies of America north of Mexico (Diptera: Tephritidae). Occasional Papers No. 19, Bureau of Entomology, Department of Agriculture, Sacramento, California. 172 pp.