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The story of the Malagasy devils (Orthoptera, Tetrigidae): *Holocerus lucifer* in the north and *H. devriesei* sp. nov. in the south?

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Abstract

Madagascar is home to some of the largest and most colorful pygmy grasshoppers (Tetrigidae) in the world, known as 'Malagasy Metrodorinae'. Among them, Devil's pygmy grasshoppers (genus *Holocerus* Bolívar, 1887) are unique in having two long spines on the back, which are modified internal lateral pronotal carinae. The genus *Holocerus* was composed of two species – *H. lucifer* (Serville, 1838) and *H. taurus* Rehn, 1929 **syn. nov.**, but here it is evidenced that the latter represents a junior synonym of the former. Simultaneously, *H. devriesei* **sp. nov.** is described as a species new to science. *Holocerus lucifer* is a northern species of paler coloration and longer spines (distributed from Marojejy and Maroantsetra in the north to Zahamena in the south), whereas *H. devriesei* **sp. nov**. represents the southern and darker species (distributed from Vohimana and Andasibe-Mantadia in the south to the Antongil Bay in the north). There are potential overlaps in the distribution of the two species, but without more georeferenced localities, it is impossible to discriminate whether they occur only sympatrically or also syntopically.

Keywords

pygmy grasshoppers, Tetrigoidea, Metrodorinae, *Holocerus*, Hendrik Devriese, Madagascar, new species, threatened species

Introduction

Research on Malagasy Tetrigoidea has, to date, been carried out for 180 years. Pioneer researchers, such as Serville (1838), Bolívar (1887) and Brancsik (1892), examined the material collected by researchers who took part in expeditions. A lot of research has been added to the knowledge of the pygmy grasshoppers of Madagascar since the time of the pioneers, and today we are aware of the existence of 75 species, most of which are endemic to the island (e.g., Bruner 1910; Devriese 1991; Günther, 1959; 1970; Hancock 1900, 1907).

Serville (1838) described three species of peculiar pronotal morphology and named them after Biblical demons – (i) *Tetrix asmodaeus* Serville, 1838 (now in *Pterotettix*), (ii) *T. belphegor* Serville, 1838 (now in *Pterotettix*), and (iii) *T. lucifer* Serville, 1838 (now in *Holocerus*). *Tetrix lucifer* has lateral pronotal carinae projected in two long spines, one on each side of the pronotum. Bolívar (1887) placed *T. lucifer* in the genus *Holocerus* Bolívar, 1887, which belongs to the likely monophyletic group of 'Malagasy Metrodorinae', also including *Andriana* Rehn, 1929, *Bara* Rehn, 1929, *Eurybiades* Rehn, 1929, *Hovacris* Rehn, 1929, *Hybotettix* Hancock, 1900, *Notocerus* Hancock, 1900, *Rehnitettix* Günther, 1939, and *Silanotettix* Günther, 1959 (Günther 1959, 1974). The group is characterized by (i) antennae with modified segments, (ii) projected or undulated median and internal lateral carinae of the pronotum, (iii) elevated promedial projection (a spine on the median carina of the pronotum in the prozona), (iv) lack of tegminal sinus, (v) rounded pulvilli of the hind tarsi, (vi) lack of humeral carinae, and (vii) rich coloration (Günther 1974; Devriese 1991). The longest spines are exhibited by members of the genera *Eurybiades*, *Holocerus*, and *Notocerus*, known as the Devil's pygmy grasshoppers.

We know about the existence of two *Holocerus* species, as defined by Rehn (1929). Those are Serville's *H. lucifer*, which is, according to Rehn, a darker species with shorter dorsal spines, and Rehn's *H. taurus*, a yellowish-green species with long spines. After the insight into the entomological collections of the MNHN in Paris and the ANSP in Philadelphia, it became evident that both Serville and Rehn described the very same species. In this study, we provide photographs of *Tetrix lucifer* and *Holocerus taurus* type specimens, as well as living specimens, and we aim to clarify once and for all what the epithet '*lucifer'* refers to. We present an annotated distribution of *H. lucifer,* a pale colored species with long spines; synonymization of *H. taurus* Rehn, 1929 syn. nov. with *H. lucifer*; and an annotated distribution of a newly described darker species with shorter spines, *H. devriesei* sp. nov.

Materials and methods

Acronyms of museum collections

ANSP – The Academy of Natural Sciences of Drexel University, Philadelphia, USA; **JSTC** – Josip Skejo Tetrigidae Collection, Zagreb, Croatia; **MNCN** – Museo Nacional Ciencias Naturales, Madrid, Spain; **MNHN** – Muséum national d'Histoire naturelle, Paris, France.

Abbreviations

HT – holotype; **OSF** – Orthoptera Species File (Online Database of Orthoptera – Cigliano et al. 2020); **PT** – paratype; **PTs** – paratypes.

Identification, nomenclature and taxonomy

The two taxa within the genus *Holocerus* can be easily distinguished based on the characteristics presented by Rehn (1929). However, Rehn's nomenclature is incorrect. The two could be treated as species or subspecies, but based on the overlaps in their distributions and no evidence of intermediate forms, we treated them as separate species. Nomenclature follows the International Code of Zoological Nomenclature (ICZN 1999), whereas Tetrigidae taxonomy follows the Orthoptera Species File (Cigliano et al. 2020).

Morphological terminology and measurements

We followed Tumbrinck (2014) for the description of general morphology; Devriese (1991, 1995, 1999) for the nomenclature of pronotal carinae; and Pushkar for terminology of pronotal projections (Storozhenko and Pushkar 2017). Measurements were taken on museum specimens in ImageJ2 (Rueden et al. 2017) on the traits previously measured in *Holocerus* taxonomy (Rehn 1929). The accuracy of the measurements was 0.1 mm.

Photography

Several photos of living individuals were obtained online. These are included in the study with the permission of the photographers (Rowe Becky, Paul Bertner, Marc Hoffmann, and Frank Vassen).

Results

Taxonomic treatment

Family Tetrigidae Rambur, 1838
Subfamily Metrodorinae Bolívar, 1887

Informal group, 'Metrodorinae of Madagascar'

Composition and tentative diagnosis. The group is composed of the genera *Andriana* (4 sp.), *Bara* (1 sp.), *Eurybiades* (1 sp.), *Holocerus* (2 spp.), *Hovacris* (1 sp.), *Hybotettix*

(2 spp.), *Notocerus* (2 spp.), *Rehnitettix* (1 sp.), and *Silanotettix* (3 spp.), which share the lack of a tegminal sinus; the lack of humeral carinae; rounded tarsal pulvilli; modified antennal segments; and pronotum with projected and undulated parts (Devriese 1991).

Genus *Holocerus* Bolívar, 1887

Common name: Malagasy Devil's pygmy grasshoppers

Tetrix Latreille, 1802 (partim): Serville (1838: 758); Augé (1898: 296; first depiction of *Holocerus lucifer* after the holotype);

Holocerus Bolívar, 1887: Bolívar (1887: 186, 231–232; tentative description, assignment to Metrodorinae); Kirby (1910: 28; listed in catalogue); Rehn (1929: 492–493; redescription); Rehn (1937: 320; new records); Günther (1939: 91; listed in catalogue, taxonomic position discussed); Günther (1959: 11; included in key, discussed), Günther (1970: 79–92; discussed); Devriese (1995: 123–124; mentioned and depicted); Yin et al. (1996: 876; listed in catalogue); Otte (1997: 45; listed in catalogue); Skejo and Caballero (2016: figs 2a, b; mentioned and depicted); Skejo (2017: 14, 19, 68; listed in catalogue); Cigliano et al. (2020; OSF catalogue).

Type species. *Tetrix lucifer* Serville, 1838 (*Holocerus lucifer*), by monotypy (Bolívar).

Composition and distribution. The genus is composed of two species, *Holocerus lucifer* and *H. devriesei* sp. nov. Both species inhabit rainforests of East Madagascar, from Ranomafana in the south to Marojejy in the north.

Ecology and habitat. Records of adults and nymphs in different parts of the year indicate that the species may be active throughout the year. Devil's pygmy grasshoppers are rainforest dwellers and they inhabit primary and secondary rainforests of Madagascar, where they can be found standing on both wet and dry tree bark of species such as the traveler's palm (*Ravenala madagascariensis*; order *Zingiberales*: family *Strelitziaceae*) (Figure 4). *Holocerus lucifer* and *H. devriesei* sp. nov. are good fliers and can glide for long distances (> 10 m) between rainforest trees and bushes.

Generic diagnosis and affinity to other genera. The genus *Holocerus* is similar to the genera *Notocerus* (2 spp.) and *Eurybiades* (1 sp.), which are both endemic to Madagascar. Unlike the clearly separated dorsal spines in *Holocerus*, members of the genus *Notocerus* (*N. cornutus* Hancock, 1900 and *N. formidabilis* Günther, 1974) have a highly elevated dorsum between the spines (making the spines connected). With the morphology of its spines, *Notocerus cornutus* is more similar to the members of the genus *Holocerus* than to its own congener, *N. formidabilis* (which has a high and warty hump). *Holocerus* can also easily be distinguished from *Notocerus* by the more prominent eyes. The only species from the genus *Eurybiades*, *E. cerastes* Rehn, 1929, is much smaller than the members of the genus *Holocerus*, and is easily distinguished from both *Holocerus* and *Notocerus* members by the long promedial projection, which is spiky and directed forwards. *Holocerus* and *Notocerus* have a short and tooth-like promedial projection of the prozona.

***Holocerus lucifer* (Serville, 1838)**
Figs 1, 2
Common name: Northern Devil's pygmy grasshopper

Tetrix Lucifer Serville, 1838: Serville (1838: 758; description of the species based on a single ♀ holotype (MNHN) from Paris, see Fig. 1A–D); Augé (1898: 296; drawing of the HT from MNHN Paris = first depiction of this genus member, Fig. 1D);
Holocerus Lucifer: Bolívar (1887: 186, 231, 232; mentioned, tentatively assigned to the genus *Holocerus*); Kirby (1910: 28; listed in catalogue);
Holocerus taurus Rehn, 1929 syn. nov.: Rehn (1929: 494–497; detailed description of the species based on seven specimens, ♂ HT, 1 ♀ PT and 3 ♂♂ PTs from unknown locality, and 2 ♀♀ PTs from Maroantsetra, depicted) (Fig. 1E–G); Günther (1939: 91; mentioned, new records); Günther (1959: 11; included in key, depicted); Günther (1970: 79–92; discussed); Günther (1974: 966, 967; new records, depiction); Yin et al. (1996: 876; listed in catalogue); Otte (1997: 45; listed in catalogue); Cigliano et al. (2020; listed in catalogue).

Type material. (1 HT of *T. lucifer* (Figure 1A–D), 1 HT (Figure 1E–G) + 6 PTs of *H. taurus*). ♀ HT of *Tetrix lucifer*, Madagascar (MNHN); ♂ HT of *Holocerus taurus*, Madagascar, 1♀ PT from Madagascar, 3♂♂ PTs from Madagascar, 2♀♀ PTs from Maroantsetra II.1919 (ANSP).

Table 1. List of all known records of *Holocerus lucifer* with approximate coordinates and a reference or link for each record. (*in the narrow sense, Tamatave or Toamasina region probably refers to rainforests close to the city of Toamasina, whereas in the wide sense, this region covers most of the rainforests from the city of Toamasina to the Bay of Antongil).

	Locality	Coordinates	Date	References or link
1	no specified locality	N/A	N/A	1♀ HT of *Tetrix Lucifer*: Serville 1838: 758; Bolívar 1887: 186, 231, 232, Augé 1898: 296; Kirby 1914
2	no specified locality	N/A	N/A	1♂ HT and 4 PTs (1♀, 3♂♂) of *Holocerus taurus*: Rehn 1929: 497
3	Antongil Bay: Maroantsetra	15.34S, 49.86E	II.1919.	2♀♀ PTs of *Holocerus taurus*: Rehn 1929: 497
4	Antongil Bay	15.34S, 49.86E	N/A	1♂, 1♀ (deposited in Vienna) (Günther 1939: 91)
5	Antongil Bay: Maroantsetra	15.34S, 49.86E	N/A	3♂♂ 12.1897. (deposited in MNCN Madrid, MNCN_ Ent 268523, MNCN_Ent 268525 and MNCN_Ent 268525)
6	Marojejy: Ambonanitelo	15.374S, 49.523E	XII.1958.	2♀♀, 2♂♂, 1 nymph leg. E. Raharizonina (Günther 1974: 967)
7	Marojejy: Ambatosoratra	14.43S, 49.73E	VII.[19]60.	1 nymph leg. P. Soga (Günther 1974: 967)
8	Maroantsetra: Ambodivoangy	14.401S, 49.941E	III.[19]49.	1♀ leg. Michel (Günther 1974: 967)
9	Marojejy NP	14.437S, 49.742E	01.I.2006.	Living specimen, ID H. Devriese, photo Rowe_Becky, https://www.flickr.com/photos/rowe_becky/497874026
10	Zahamena NP	17.612S, 48.779E	X.2000.	1♀ (uploaded by Chris Grinter to Twitter)
11	Tamatave (= Toamasina) *	17.92S, 48.96E	N/A	1♂ 1888. Leg. Perrot (deposited in MNCN Madrid, MNCN_Ent 268526)

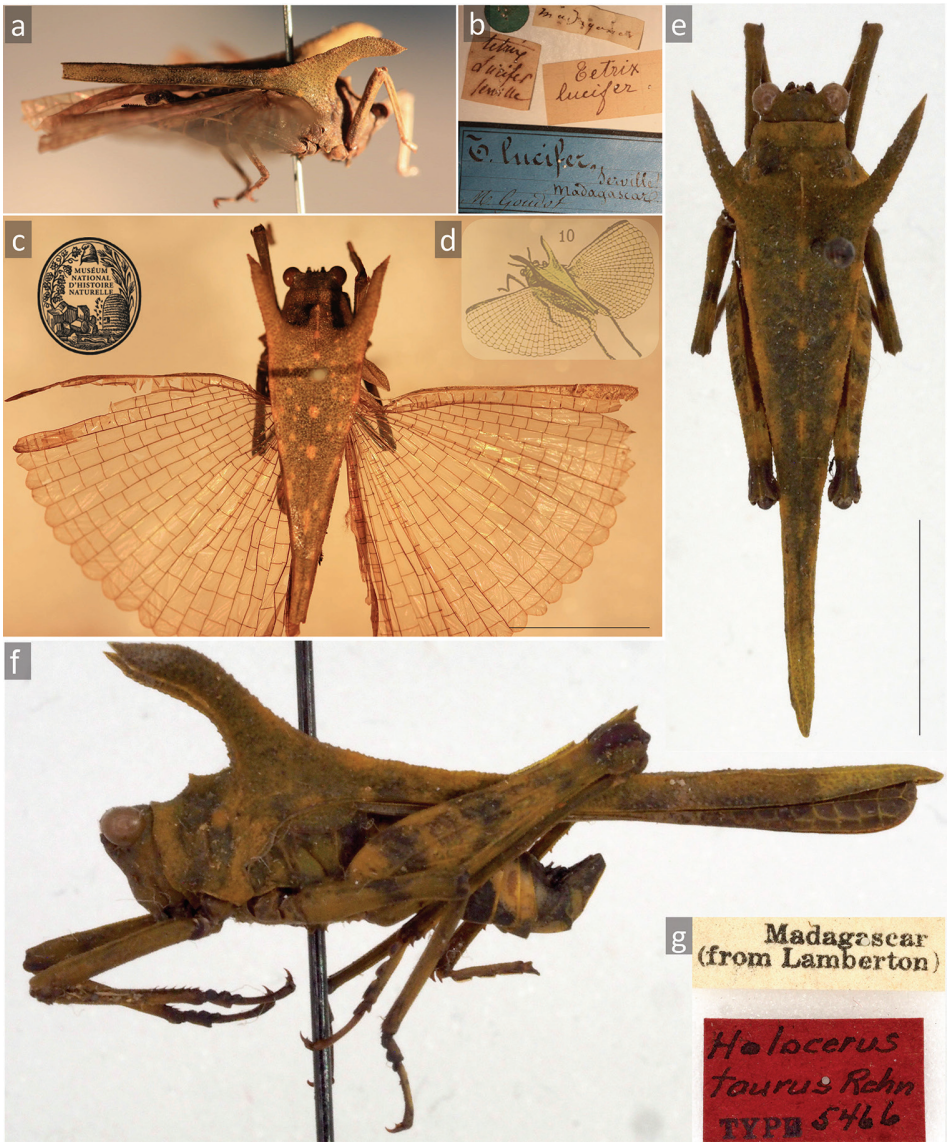

Figure 1. A–F *Holocerus lucifer*. Female holotype of *Holocerus lucifer* (original combination *Tetrix lucifer*) from MNHN Paris (**A–D**) and male holotype of *Holocerus taurus* syn. nov. from ANSP Philadelphia (**E–G**) **A** habitus in lateral view **B** labels **C** habitus in dorsal view, (photos **A–D** J. Skejo & MNHN Paris) **D** the first depiction of *Holocerus lucifer* (Augé 1898) **E–G** holotype of *Holocerus taurus* (from here on syn. nov. of *H. lucifer*) **E** habitus in dorsal view **F** habitus in lateral view **G** labels (photos **E–G** Jason D. Weintraub / ANSP Entomology). Scale bar: 1 cm.

Additional examined material. There are a few records of the species since its description – by Rehn (1929) under the name *H. taurus*; a photographic record from Flickr; a photographic record from Twitter; and several specimens from a museum collection in MNCN, Madrid. For detailed data on all records, see Table 1.

Figure 2. Variability of *Holocerus lucifer*. **A** living specimen in Marojejy NP (photo R. Becky) **B–E** variability of pronotal projection morphology (**B** holotype of *Holocerus lucifer* **C** Maroantsentra, Antongil Bay **D** holotype of *H. taurus* **E** Tamatave).

Annotated specific diagnosis. *Holocerus lucifer* is similar to *H. devriesei* sp. nov., which is the only other species of the genus *Holocerus*. *Holocerus lucifer* is easily distinguished from *H. devriesei* sp. nov. with the following set of characteristics: (i) *Holocerus lucifer* has slenderer femora of fore and mid legs than that of *H. devriesei* sp. nov.; (ii) dorsal spines are slenderer, more elongate and decurved in *H. lucifer* than those in *H. devriesei* sp. nov., and in profile they are, as described by Rehn, 'distinctly falcate, scimitar like'; (iii) middle prozonal spine (promedial projection) is blunter and lower in *H. lucifer* than that in *H. devriesei* sp. nov., and (iv) *H. lucifer* generally has more pale colored parts than *H. devriesei* sp. nov.

Measurements. Body length, pronotum length, pronotum width, and hind femora length are shown (Table 2).

Variability. (Figure 2). Variability is evident in (1) coloration, as there are darker and paler specimens, (2) size, as there are larger and smaller specimens, and (3) the shape of the dorsal spines (elevated internal lateral carinae of the pronotum), as there are specimens in which the spines are more decurved and specimens with almost straight projections.

Distribution and habitat. The species is known from the rainforests of Madagascar, from Marojejy and Maroantsetra in the north to the rainforests of Zahamena

Table 2. *Holocerus lucifer* measurements ('*taurus*' is synonymous with '*lucifer*', and these are the measurements of its type specimens). Note that the locality is known only for one individual (♀ from Maroantsetra).

	Body length	Pronotum length	Pronotum width (humeral spines)	Hind femora length
Lucifer ♀HT (Madagascar)	18.8 mm	>19.8 mm (tip broken)	8.4 mm	N/A (missing)
taurus ♂HT (Madagascar)	14.2 mm	22.3 mm	8.2 mm	10.0 mm
taurus ♂PT (Madagascar)	13.9 mm	20.0 mm	8.0 mm	9.0 mm
taurus ♀PT (Madagascar)	17.6 mm	22. 6 mm	N/A (broken)	10.6 mm
taurus ♀PT (Maroantsetra)	20.8 mm	23.2 mm	8.5 mm	11.2 mm

in the south. A specimen with the label 'Tamatave' could have been collected in the rainforests in the vicinity of the city of Toamasina, but also anywhere in the wide Toamasina region. The species inhabits primary and secondary rainforests and is probably a good flier, taking into account the observations of its sibling species' ecology. As only one photo of a living individual of this species has been taken to date, hardly anything can be concluded about the species' natural history. Despite being described for already 180 years, this species is less known and understood than *H. devriesei* sp. nov.

***Holocerus devriesei* sp. nov.**

http://zoobank.org/4A0CCADC-D104-489D-A350-F4B595AC559B
Figs 3, 4
Common name: Southern Devils' pygmy grasshopper

Holocerus lucifer: Rehn (1929: 493; description, drawings, and distribution); Günther (1939: 91; reported from Antongil Bay and from Alahakato (= Lakato, approximately S19.171498, E48.510321)); Günther (1959: 10; included in key, reported sympatrically two *Holocerus* species; records from Antongil Bay and from Alahakato Forest); Günther (1974: 966–967; reported from Périnet and Rogez = Andasibe-Mantadia NP and Analamazaotra, but also from Antongil Bay, sympatrically with the other *Holocerus* species); Devriese (1991: 123–124; mentioned and depicted); Yin et al. (1996; listed in catalogue); Otte (1997; listed in catalogue); Cigliano et al. (2020; OSF catalogue);

Holocerus taurus: Skejo and Caballero (2016: Figs 2a, b; photographs of living specimens (an adult and a nymph), wrongly identified as *H. taurus*).

Derivatio nominis. We name this neat new species in honor of Hendrik Devriese, a Belgian entomologist and botanist. Devriese is one of the world's leading tetrigidologists, geographically specialized in African and Malagasy taxa, taxonomically in Tetriginae and Xerophyllini genera. He has hitherto introduced the terminology of pronotal carinae with an emphasis on Malagasy taxa, described five new genera, 12 new species,

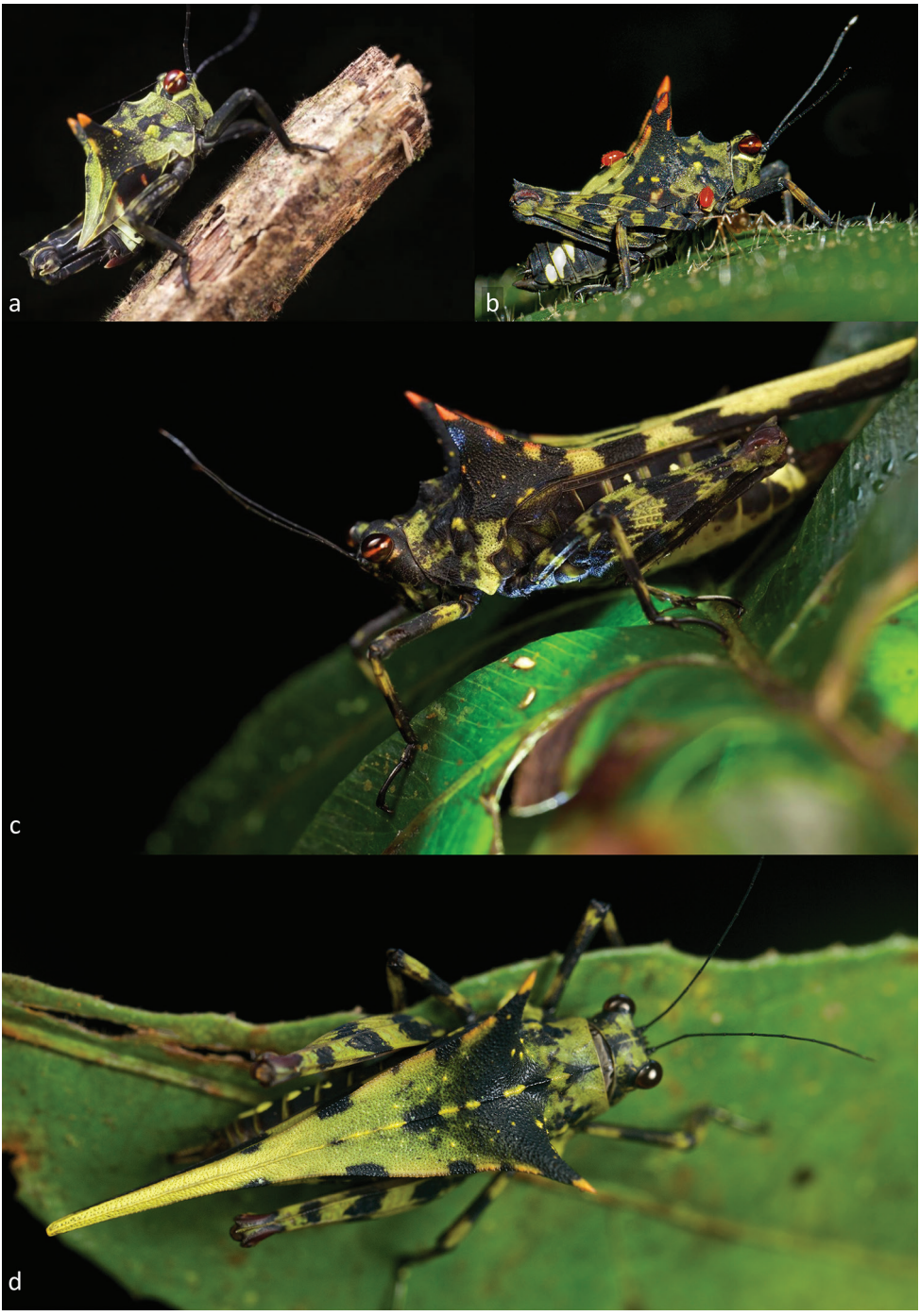

Figure 3. *Holocerus devriesei* sp. nov. in natural habitat. **A** Nymph from Andasibe (photo P. Bertner) **B** nymph from Vohimana (photo F. Vassen) **C** adult ♀ from Andasibe in c in dorsal view and **D** in dorsal view (photo P. Bertner).

Figure 4. *Holocerus devriesei* sp. nov. and its habitat. **A** ♂ from Ranomafana in natural habitat (photo M. Hoffmann) **B–E** adult ♂ from Analamazaotra **F–G** natural habitat in Analamazaotra **G** *Ravenala madagascariensis*, the Traveler's Palm (**B–G** photo J. Skejo).

and one new subspecies, and many more are awaiting description, especially those from Madagascar. The specific epithet is a genitive case second Latin declension noun, derived from the Latin version of the surname 'Devriese' – N *devrieseus* G *devriesei*.

Type material. (11 specimens: holotype and 10 paratypes): 1♂ HT Analamazaotra (S18.943 E48.428) 12.I.2010. leg. Miko (MNCN, Catalogue number MNCN_Ent 26936); (**1/10**) 1♀ PT, Madagascar, Tananarive, Lamberton 1914. (Catalogue number MNHN-EO-CAELIF 9070); (**2/10–3/10**) 2♀♀ PTs, Madagascar, Perinet, forêt côte Est, A. Seyrig, 1937. (Catalogue numbers MNHN-EO-CAELIF 9071, MNHN-EO-CAELIF 9072); (**4/10**) 1♀ PT, Madagascar, Forestier, Frappe, 1946. (Catalogue number MNHN-EO-CAELIF 9073); (**5/10–6/10**) 2♂♂ PTs, Madagascar, Perinet, forêt côte Est, A. Seyrig, 23-2-34. (Catalogue numbers MNHN-EO-CAELIF 9074, MNHN-EO-CAELIF 9075) (MNHN); (**7/10–9/10**) 2♂♂ + 1♀ Madagascar: Rogez, Madagascar Centr., I-1932. A. Seyrig (Catalogue numbers MNCN_Ent 195226, MNCN_Ent 195227, MNCN_Ent 195230), (**10/10**) 1♀ PT (Catalogue number MNCN_Ent 268524) Madagascar: Rogez, Madagascar Centr., XII-1931. A. Seyrig (MNCN).

Type material depository. The holotype male is a wet preserved specimen, kept in 80% ethyl alcohol, deposited in MNCN Madrid. One hind leg of the holotype was isolated for future molecular studies. The paratypes are ten dry-mounted specimens. Four paratypes are deposited in the Orthoptera collection within the Entomological collections of the Museo de Ciencias Naturales, Madrid, while six paratypes are deposited in the Entomological collections of the Muséum national d'Histoire naturelle, Paris.

Additional material examined (altogether 17 specimens).

Museum collections (9 specimens). 2♂♂ Madagascar; Anovano, Madagascar (probably within hither Andasibe – Mantadia), I-1934. A. Seyrig (MNCN_Ent 195223, MNCN_Ent 195224) (MNCN); 2♀♀ Madagascar: Rogez (Analamazaotra), Madagascar Centr., II-1932. A. Seyrig (MNCN_Ent 195229, MNCN_Ent 195231) (MNCN); 1♀ Madagascar: Omalamazaotra (= Analamazaotra) I-1933 A. Seyrig (MNCN_Ent 195233); 1 nymph Madagascar: Omalamazaotra XII-1933. A. Seyrig (MNCN_Ent 195239); 4♀♀ Madagascar: Fito IV-V.1932. A. Seyrig (MNCN_Ent 195235, MNCN_Ent 195236, MNCN_Ent 195237, MNCN_Ent 195238).

Online social media platforms (8 specimens). 1♀ Moramanga region 25.VI.2011. obs. entomokot (Konstantin) (uploaded to iNaturalist); 1♂ nymph Andasibe-Mantadia NP: Andasibe 13.XI.2011. obs. P. Bertner (uploaded to Flickr); 1♂ nymph Vohimana reserve 29.XI.2013. obs. F. Vassen (uploaded to Flickr and Wikimedia Commons); 1♂ Ranomafana NP 12.V.2015. obs. Paul Bertner (uploaded to Flickr); 1♂ Andasibe-Mantadia NP: Périnet (Analamazaotra) 1.II.2018. obs. J.-Y. Grospas/ Biosphoto (uploaded to Alamy); 1♂ Analamazaotra (S18.943552 E48.428283) 18.I.2019. obs. Miko and Skejo (uploaded to iNaturalist); 1♂ Andasibe-Mantadia: Périnet (Analamazaotra) NP 26.III.2019. obs. J.-Y. Grospas/ Biosphoto (uploaded to Alamy); 1♂ Ranomafana NP obs. Marc Hoffmann (uploaded to Instagram).

Annotated specific diagnosis. The new species, *Holocerus devriesei* sp. nov., is similar to *H. lucifer*, its only congener, but is easily distinguished from it by the following set of traits: (i) compared to *H. lucifer*, the new species *H. devriesei* sp. nov. has more robust (less elongated) femora of fore and mid legs; (ii) dorsal spines (elevated lateral carinae) are short and projected as acute triangular plates in *H. devriesei* sp. nov., whereas in *H. lucifer* they are long and decurved; (iii) middle prozonal spine (prome-

Table 3. *Holocerus devriesei* sp. nov. measurements. Note that there are two measurements for pronotum width, one between the lateral lobes and the other between the dorsal spines.

	Body length	Pronotum length	Pronotum width (lateral lobes)	Pronotum width (dorsal spines)	Hind femur length
♂♂ (N = 6)	13.5–17.1 mm	19.8–22.9 mm	4.0–5.2 mm	6.2–7.2 mm	9.0–9.9 mm
♀♀ (N = 6)	18.0–23.2 mm	20.8–25.4 mm	4.9–6.1 mm	7.0–8.8 mm	10.2–11.4 mm

dial projection) is sharp and higher in *H. devriesei* sp. nov. than in *H. lucifer*; and (iv) *H. devriesei* sp. nov. is generally a darker species, with less yellowish-green parts (*H. lucifer* is usually paler in coloration, but exceptions do occur). For a ***detailed description*** of *H. devriesei* sp. nov., see Rehn's (1929) description of what he called '*H. lucifer*'.

Measurements. Body length, pronotum length, pronotum width between the lateral lobes, maximum pronotum width (between the tips of the dorsal spines), and hind femur length are shown (Table 3).

Distribution, habitat and threats. *Holocerus devriesei* sp. nov. inhabits eastern Malagasy rainforests, from Ranomafana in the south, *via* Analamazaotra, rainforests around Lakato, Vohimana and Andasibe-Mantadia, all the way to the Antongil Bay, where it has an overlap in distribution with *H. lucifer*. The natural habitat of the species are primary and secondary rainforests, but on account of forest depletion and habitat degradation, population decline is expected, as well as extinction of its subpopulations in certain territories where the rainforest is undergoing degradation.

Discussion and conclusions

We know about the existence of two species of Malagasy pygmy devils within the genus *Holocerus*. A pale colored species with longer decurved spines (Figs 1, 2) inhabits the rainforests of Marojejy and Masoala, from around the Antongil Bay in the north to the Zahamena NP in the south (Figure 5), and should be referred to as *Holocerus lucifer*. A darker species with shorter angular spines (Figs 3, 4), which should from now on be referred to as *H. devriesei* sp. nov., inhabits the rainforests from Ranomafana in the south to the Bay of Antongil in the north (Figure 5). There are distribution overlaps between the two species, but as there are no evidences of hybridization, we treated them as separate species.

The name confusion originated when Rehn (1929) described the pale-colored species with longer spines (the true *H. lucifer*) as a new species under the name *H. taurus*, while at the same time applying the name '*lucifer*' to designate the darker specimens with shorter and angular spines (*H. devriesei* sp. nov.). Subsequent authors followed Rehn's application of these names (Günther 1939, 1959, 1970; Yin et al.1996; Otte 1997). This was a serendipitous error, as Rehn (1929) did not have a possibility to check what Serville (1838) described under the name *H. lucifer*. As we had the name-bearing specimens of both species before us, it became clear that *H. taurus* syn. nov. represents a synonym of *H. lucifer*. This confusion was furthermore inflamed by Skejo (Skejo and Caballero 2016; Skejo 2017) who applied the epithet '*taurus*' to a dark species with

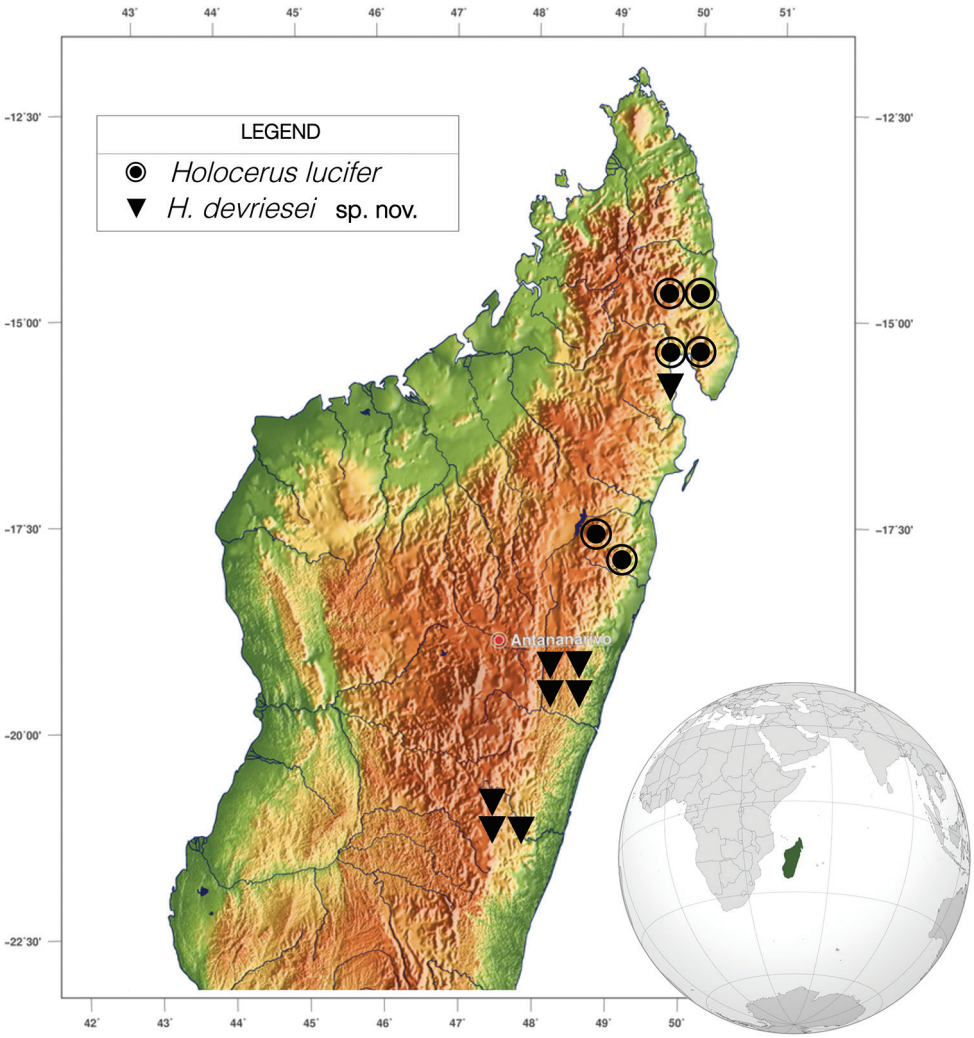

Figure 5. Distribution map of *Holocerus* species – *H. lucifer* (circles) and *H. devriesei* sp. nov. (triangles).

angled spines. Now, with the description of this dark *Holocerus* species as *H. devriesei* sp. nov., we hope that this nomenclatural knot has been untangled and that both experts and citizen scientists will be able to correctly name *Holocerus* specimens. The IUCN Red List assessments (Danielczak et al. 2017a, b) should be amended accordingly.

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REVIEW ARTICLE

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The Black Fungus Gnats (Diptera, Sciaridae) of Norway – Part I: species records published until December 2019, with an updated checklist

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Abstract

Black Fungus Gnats (Sciaridae) are a megadiverse, cosmopoliltan family of bibionomorph Diptera. Even in Europe, the continent with the longest tradition in sciarid taxonomy, numerous taxonomic issues remain unresolved and countless species await discovery and description. The fauna of Norway is in these respects no exception. Recognising considerable knowledge gaps, the Norwegian Biodiversity Information Centre provided substantial funding for a detailed inventory of the Sciaridae species occurring in Norway, which was realised in 2014–2018. The results of this project will be published in a series of papers, of which the first is presented here, summarising available data on the taxonomy, faunistics, and autecology of Norwegian Sciaridae beginning with Zetterstedt's pioneering work in 1838 and ending with 31 December 2019 as the cut-off date. All published records from that period were analysed. The result is a list of 143 species and four unplaced names. Following a consistent scheme, verified locality details are provide including alternative spellings, habitats, and flight times of adults in Norway, literature citations for the faunistic records, and general taxonomic references for classification or identification. A checklist of the sciarid fauna of Norway and a complete list of the relevant literature are also presented.

Keywords

armyworm, diversity, Europe, faunistics, habitats, literature review, localities, phenology, Scandinavia, Sciaroidea

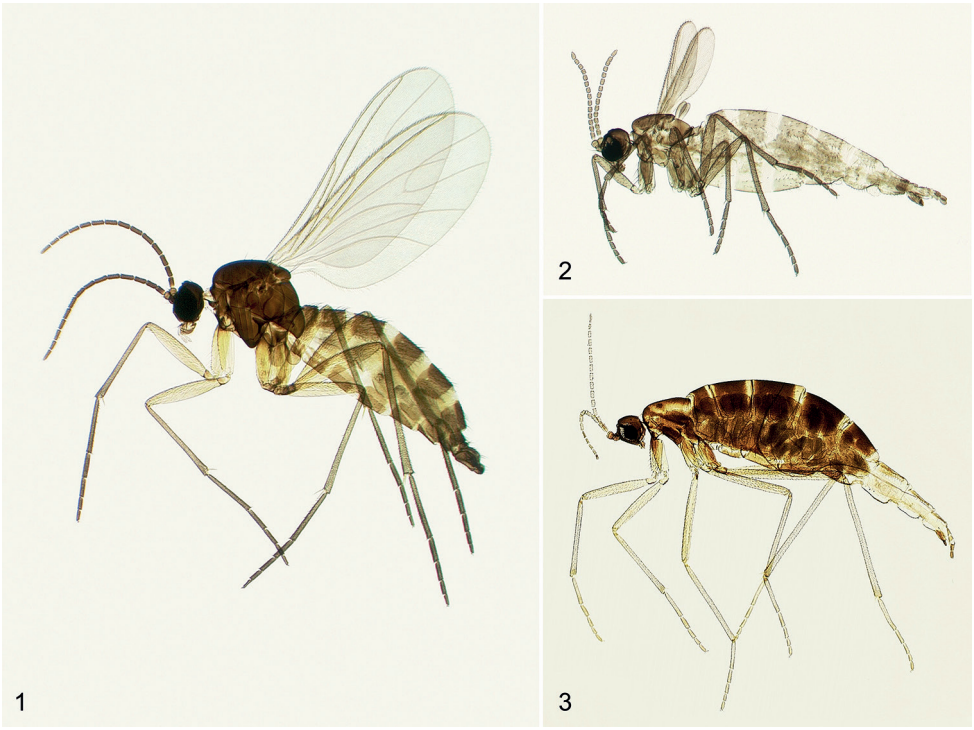
Introduction

The Sciaridae is one of the largest families of Diptera, rich in both species and individuals, and plays a significant role in natural ecosystems (summarised in Menzel and Mohrig 2000; Menzel and Schulz 2007). For example, the larvae are important for the litter decomposition in forests (Hövemeyer 1989; Deleporte and Rouland 1991; Deleporte and Charrier 1996), and the adults for the transmission of basidiospores of fungi (Schmidt 1979) and the pollination of plants (Vogel and Martens 2000; Rulik et al. 2008). Sciarids are also well-known as pests in mushroom farms and greenhouses, or as common inhabitants of pot plants in houses (e.g., Broadley et al. 2018).

Often sciarids are one of the most dominant Diptera families in ecological studies (e.g., Thiede 1977; Feldmann 1992; Hövemeyer 1992; Bickel and Tasker 2004), and thousands of specimens can be collected in a short time (Menzel and Schulz 2007). Many species prefer moist, shady deciduous and coniferous woods with a high proportion of dead wood (Hövemeyer 1998, 1999, 2002; Menzel and Schulz 2007). Other species can be found in wetlands (e.g., moist meadows, fens) or xerothermic habitats (e.g., dry grassland, heath) (Hövemeyer 1996; Heller 1998, 2000; Menzel et al. 2006).

The Black Fungus Gnats (Figs 1–3) are inconspicuous, minute to medium-sized flies (0.8–7.0 mm body length) and are fairly uniform in appearance. While adults of most species are completely black or dark brown, others exhibit some yellow or orange. The head is relatively small and usually rounded, with the eyes meeting at a narrow bridge above the antennae. There are three ocelli on the forehead. The antennae are long and thin, with 16 segments. Of the mouthparts, which are generally inconspicuous, only the palpi are of relevance for taxonomy. The body is almost hairless at first glance. The wings are rather broad and rounded at the apex, often smoky-coloured, with a distinctively curved vein fork (M_1+M_2) in the middle of the apex of wing. Females of some species have reduced wings (e.g., in *Epidapus* Haliday). The legs are long and slender, but not as long as for example in Mycetophilidae. The larvae are cylindrical, white and shiny, with a clearly sclerotised, dark head capsule. Detailed descriptions for the preimaginal stages and adults, and their importance for the identification and classification of sciarids, are given by Menzel and Mohrig (2000) and Menzel and Smith (2017).

Compared to most other Diptera in Norway, Sciaridae have previously attracted little attention from entomologists. Notorious for their uniformity and small body size, adult sciarids are largely the domain of taxonomic specialists, while larvae of most species remain undiscovered. The earliest mention of Black Fungus Gnats in Norway was by Ramus (1735), who reported about the 'armyworm', a migration of thousands of sciarid larvae. However, the first taxonomic studies of Sciaridae in Norway are those of Zetterstedt (1838–1860), Walker (1848), Siebke (1853–1877), and Holmgren (1869). Later, Edwards (1923–1935), Lengersdorf (1926b–1930c), Soot-Ryen (1942), Frey (1948), and Tuomikoski (1960, 1967) contributed to the knowledge of the sciarid fauna of Norway. Some of these early records, but not all, were later treated in a modern review of the family (Menzel and Mohrig 2000). Relatively few recent studies exist, but notably Thunes et al. (2004), Hippa et al. (2010), Köhler et al. (2014),



Figures 1–3. Habitus of Norwegian Sciaridae **1** winged male of *Bradysia fenestralis* (Zetterstedt, 1838) **2** brachypterous female of *Corynoptera minima* (Meigen, 1818) **3** apterous female of *Epidapus gracilis* (Walker, 1848).

and Heller et al. (2016) have presented new and valuable information on the fauna of Norwegian Sciaridae.

In 2014 the Norwegian Biodiversity Information Centre (NBIC) granted the project 'Sørgemygg i Norge' (Sciaridae of Norway) funding for the period 2014–2016. Later NBIC also granted funding for the project 'Sørgemygg i norske skoger' (Sciaridae in Norwegian forests), which is effectively the second phase of our research work. This ran from January 2017 to December 2018. Our study collates the records published between 1735 and 2019 and provides many corrected locality data for the Norwegian sciarid fauna. The revised nomenclature and the evaluation of faunistic records at species level form the basis for an updated checklist. For the first time, information is also summarised on the identified habitats and the phenology of species in Norway. Consequently, all results presented here comprise the published 'status quo', form the basis for the evaluation of our faunistic work in both mentioned NTI projects, and are the starting point for a series of papers on the Norwegian fauna. Many unpublished data on the Black Fungus Gnats of Norway, based on the identification of specimens in several museum collections, or on the samples collected by the authors between 2014 and 2018, shall be published in this series.

Material and methods

Norway, Europe's sixth largest country by land area, occupies approximately half of the Scandinavian Peninsula, bordering Sweden to the east, and Finland and Russia to the northeast (Fig. 4). The Norwegian mainland extends from 57.9 to 71.2N. The extensive coastline is dominated by many fjords and numerous islands, making it highly indented and irregular. The remote island of Jan Mayen (70.5–71.1N, 07.6–09.0E) and the archipelago of Svalbard comprising Bjørnøya (74.2–74.3N, 18.4–19.1E) and Spitsbergen (76.3–80.5N, 10.3–33.3E) are also parts of the Kingdom of Norway.

All data analysed here were taken from both the scientific literature and publications in the media. They relate exclusively to the sciarid specimens recorded from Norway. The great total amount of data made it impossible for us to validate all the species identifications on which published records are based. To enable comparison with previous faunal lists, references to earlier records were added to the list and the synonymous names were given for each species.

Nomenclature and systematics

Employed nomenclature and systematics are mainly based on the revision of Palaearctic fauna (Menzel and Mohrig 2000), the revision of Nearctic fauna (Mohrig et al. 2013), and some works after 2000. These comprise Hippa and Vilkamaa (2004, 2016) [*Xylosciara*, *Claustropyga*]; Hippa et al. (2003, 2010) [*Claustropyga*, *Corynoptera* s. str.]; Vilkamaa and Menzel (2019) [*Lycoriella*, *Hemineurina*, *Trichocoelina*] and Vilkamaa et al. (2004, 2013a) [*Dichopygina*, *Camptochaeta*]. The proposal by Mohrig et al. (2017), who postulated *Ctenosciara* Tuomikoski, 1960 as a junior synonym of *Austrosciara* Schmitz & Mjöberg, 1924, was not followed here, because the procedure used therein is contrary to the International Code of Zoological Nomenclature (ICZN 1999), and the type specimens of the type species have not yet been revised and compared. Some other nomenclatural problems at the species level are discussed at the appropriate places in 'Taxonomic notes'.

Presentation of data

All literature sources containing data and information on the Norwegian sciarid fauna are cited for each species under '*Faunistics*'. Various outdated catalogues (e.g., Kertész 1902, 1903; Gerbachevskaja-Pavluchenko 1986) were not evaluated because they do not contain primary data for the sciarid fauna of Norway and/or their abstracted and largely unverifiable content may lead to false results. In addition, in the category '*Taxonomy*' publications are mentioned that are important for the classification, nomenclature and/or identification of the included sciarid species.

Locality data. Due to the geographical peculiarities, the Norwegian mainland with the offshore islands is treated first in the faunistic section on each species. Counties (fylke) and localities are listed in alphabetical order, unlike the traditional practice

Figure 4. The studied area for the sciarid fauna of Norway, subdivided into 18 mainland counties, the island Jan Mayen and the Svalbard archipelago comprising Bjørnøya and Spitsbergen.

in lists of Norwegian fauna, which are arranged from south to north. Because the Arctic island of Jan Mayen and the Arctic archipelago of Svalbard are very remote from the Norwegian mainland, they are considered separately. Faunistic records for these islands are summarised in a separate block at the end of the locality lists, following the 'mainland records'. Geographic names are given in both modern Norwegian script and the spelling(s) used in the original literature, to facilitate their location in geographical maps and electronic resources. The reclassification of the Norwegian counties valid since 1 January 2020 was not taken into account here.

If available, all information about a locality is presented in a unified data structure as follows:

"• *County*; *municipality, region/island(s), city/village/collecting place* without or with an explanation of more precise geographic location (= 'citation of different *original spellings* in the analysed literature, including wrong spellings')". For example, data-

sets of localities in various publication languages and/or with different spellings would look as follows:

"• Finnmark; Vardø, Varangerhalvøya, Persfjorden (= 'Finmark, Vardø, Persfjord'; = 'Vardö, Persfjord') • Oslo; Oslo, Tøyen (= 'ad Christianiam in Tøien'; = 'Tøien ad Christianiam'; = 'in Tøien ad Christ.'; = 'Töien nahe Kristiania [Oslo]'; = 'Tøien'; = 'Töien'; = 'Toiën').

• Jan Mayen; without further locality details (= 'Jan Mayen'; = 'Jan Mayen Island') • Svalbard; Bjørnøya, mining camp Tunheim on the NE coast (= 'Bear Island, Tunheim') • Spitsbergen, Isfjorden, Dickson Land, Kapp Thordsen (= 'in Spetsbergia ad Cap Torsden in Isfjorden'; = 'Cap Torsden')."

Ecological data. If the literature sources provide information on habiat and/or temporal occurrence of a species, these data were summarised in an 'Ecological note'. All data published here refer exclusively to the Norwegian sciarid fauna. It should be noted that for most species the habitat requirements are poorly known or missing, so notes in this paragraph should be considered as incomplete. For example, the listing of a single habitat type does not necessarily mean that the species is only adapted to that habitat or that this information applies to all published Norwegian records and/or collected specimens. For many Norwegian species with few published data, no information currently exists on the habitat or the flight time of adults. Such 'negative results' of our literature study are indicated in the ecological notes of the species concerned by 'Habitat not specified' and/or 'Phenology: without data'.

Meanings of common Norwegian locality names

Listed here are Norwegian words, or suffixes, frequently occurring in place names together with their English translations:

-**dal**/-**dalen** = valley; -**bukta**/-**bugten** = bay; -**elv**/-**elva** = river; -**fjell**/-**fjellet**/-**fjella** = mountain(s); -**fjellstue** = mountain lodge/inn; -**fjord**/-**fjorden** = fjord; -**halvøya** = peninsula; -**hytta** = hut/bothy; -**øy**/-**øya** = island; -**stua**/-**stue** = cabin/hostel/mountain lodge; -**vann**/-**vannet**/-**vatn**/-**vatnet** = lake; -**vidda** = plateau.

Abbreviations

The following general abbreviations are used in the text: **E** = eastern; **N** = northern; **NE** = northeastern; **NW** = northwestern; **S** = southern; **SE** = southeastern; **SW** = southwestern; **W** = western; **?** = questionable content (concerning locality names, species identifications, or cited references in literature); **SG** = subgenus (only used in the checklist); **Mar.**–**Dec.** = month (March to December) in relation to the collecting time (= flight time of imagines).

Some museums and institutions were abbreviated as follows: **BFCO** = BioFokus Collection, Oslo, Norway; **NHMO** = University of Oslo, Natural History Museum, Oslo, Norway; **NIBR** = Norwegian Institute of Bioeconomy Research, Ås, Norway;

NTNU-VM = Norwegian University of Science and Technology, University Museum, Department of Natural History, Trondheim, Norway; **PWMP** = Private Collection of Werner Mohrig, Poseritz, Germany; **SDEI** = Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany; **TMUC** = The Arctic University Museum of Norway, Tromsø Museum, Tromsø, Norway; **UZMH** = University of Helsinki, Finnish Museum of Natural History, Helsinki, Finland.

Results

Records of 'armyworms'

Some publications, especially older ones, contain reports about spectacular processions of sciarid larvae. The up to ten meters long columns are called an 'armyworm' in the popular language. In the studied literature sources which refer to Norway, can also be found – partly in other languages – the synonym names 'hærorm' (= 'Heervurm'; = 'Heerwurm'), 'dragfæ' (='dragfæe'; = 'fedrag'), 'ormedrag' (= 'Orme-Drag'; = 'Wurmdrache'), 'budrag', 'markskrei', 'härmask', 'hærmygg', 'hærsørgemygg' or 'sørgemygg'. In Norway, these have been partly associated with the species *Sciara hemerobioides* (Scopoli, 1763) [= *thomae* (Linnaeus, 1767)] (Berthold 1854: 30; Berthold 1856: 66; Schøyen 1926: C31; Hansen and Granrud 2011: 46) and *Sciara militaris* Nowicki, 1868 (Schøyen 1893: 41; Schøyen 1917: 94; Schøyen 1936: 81; Sundby 1967: 6; Hansen and Granrud 2011: 46). No reliable information currently exists on the occurrence of the 'armyworm creator' *Sciara militaris* Nowicki, 1868 in Norway. Although adults of *Sciara hemerobioides* have been found several times in Norway, none of the specimens mentioned in the evaluated literature sources was reared from larvae of an 'armyworm'. Besides the two *Sciara* species discussed above, other sciarids can also form long columns of larvae. The same phenomenon has already been reported from other European countries in the species *Bradysia bicolor* (Meigen, 1818), *Cratyna perplexa* (Winnertz, 1867), *Ctenosciara hyalipennis* (Meigen, 1804) and *Sciara analis* Schiner, 1864 (Menzel and Mohrig 2000: 17). Except for *Sciara analis* these are species that are also very common in Norway. For these reasons, all unspecified 'armyworm' records are not assigned to any Norwegian sciarid species and are listed in the section 'Doubtful species'.

The Norwegian records of 'armyworms' were presented or summarised in the following publications: Ramus (1735) [1715]: 240; Berthold (1845): 65, 66; Boheman (1847): 22; Berthold (1854): 4, 5; Berthold (1856): 40, 41; Schøyen (1893): 41; Schøyen (1917): 94; Schøyen (1926): C31; Schøyen (1936): 81; Sundby (1967): 4; Greve Jensen (1979): [unpaginated page]; Menzel and Mohrig (2000): 18; Hansen and Granrud (2011): 45; Stenløkk (2011): 9 [without data]; Giske and Blåsmo Aronsen (2016): [unpaginated page]; Nesvold (2017a): [unpaginated page]; Nesvold (2017b): [unpaginated page]; Ringsaker (2018): [unpaginated page].

Finds of 'armyworms' have been reported from the following Norwegian localities:
• Norway; without further locality details (= 'i Norrige'; = 'in Norwegen') – Ramus

(1735) [1715]: 240; Pontoppidian (1753): 67; Pontoppidian (1755b): 42; Berthold (1845): 65, 66; Boheman (1847): 22; Berthold (1854): 4, 5; Berthold (1856): 40, 41 • Akershus; Aurskog-Høland, N part of the area Aurskog [formerly 'Urskog'] NW of Aursmoen and SE of Blaker (= 'ved Blaker i Urskog') – Schøyen (1917): 94; Sundby (1967): 5 • Buskerud; Modum [without exact locality] – Hansen and Granrud (2011): 48 [based on a forum blog by Haavik (2009)] • Hedmark; Eidskog [in the former district 'Hedmarka'] (= 'Eidsskogen, Hedemarken'; = 'i Eidsskogen på Hedemarken') – Schøyen (1917): 94; Sundby (1967): 5 • Løten, in Løten (= 'i Løyten') – Schøyen (1893): 41; Sundby (1967): 5 • Hordaland; Bergen (= 'Bergen') – Menzel and Mohrig (2000): 18 • Bergen, Søreidgrenda, Søviknes [today settlement area at the street Søvikneset] (= 'på Søviknes i Fana') – Greve Jensen (1979): [unpaginated page] • Møre Og Romsdal; Eide, Vevang SW of Kristiansund (= 'ved Vevang pr. Kristiansund'; = 'på Vevang ved Kristiansund') – Schøyen (1926): C31; Sundby (1967): 5 • Nordland; Sørfold, Seljåsen (= 'Seljåsen, Nordland') – Ringsaker (2018): [unpaginated page] • Oppland; Sel, Heidal, side valley Heidal in the Gudbrandsdalen ('Heidal i Sel kommune i Gudbrandsdalen') – Hansen and Granrud (2011): 46 • Østfold; Eidsberg, Mysen (= 'Mysen i Østfold') – Schøyen (1936): 81 • Rømskog, Flaten near the Swedish border (= 'på Flaten i Rømskog'; = 'Flaten i Rømskog') – Sundby (1967): 4; Hansen and Granrud (2011): 48 • Troms; Tromsø, village Tromvika on the Kvaløya (= 'Tromvika i Tromsø') – Giske and Blåsmo Aronsen (2016): [unpaginated page] • Trøndelag; Holtålen, Ålen, on the Hessjøvegen NW of the lake Hessjøen (= 'ved Hessjøen i Holtålen, på Hessjøvegen') – Nesvold (2017a): [unpaginated page]; Nesvold (2017b): [unpaginated page] • Vest-Agder; Flekkefjord, Gyland NE of Flekkefjord (= 'Gyland ved Flekkefjord') – Schøyen (1936): 81.

Faunistic note: Most of the Norwegian armyworm records in Menzel and Mohrig (2000: 18), taken from historical literature of the 18th Century (Ramus 1735; Pontoppidan 1753, 1755b), were incorrectly translated or indicate only unspecified localities. So, the expression 'Baand in Vejen' (recte 'og Baand i Vejen')], originates from Ramus (1735: 240), lines 15–17: '*Gemeene Folk*, …, *kaste deres Klæder* ***og Baand i Vejen*** *for dem*, …', which in Danish language simply means '*Common people ... throw their clothes and ribbons in their way* …'. The title '*Firefodde Dyr*, *som findes* ***i Norrige*** *samt krybende Orme*' [= '*Four-footed animals*, *found* ***in Norway*** *as well as creeping worms*'] indicates, that Ramus (1735: 240) mentions the armyworm ('dragfæ' or 'ormedrag') for the first time for Norway, which was cited by Pontoppidan (1753: 68; 1755b: 42).

Those armyworm records included in Menzel and Mohrig (2000: 18) refer to the preceding definition of the area in the first part of the 'Natural history of Norway' by Pontoppidan (1752: 67; 1755a: 41) and are not certain. Accordingly, the following misinterpreted localities are to be deleted from the list of Norwegian armyworm records (cited from the secondary literature): 'Bygle-Field = Byglefield; Dofre-Field = Dofrefield; File-Field = Filefield; Hardanger-Field = Hardangerfield; Halne-Field = Halnefield; Hekle-Field = Hecklefield [also as 'Seklefield']; Jokle-Field = Joklefield; Lang-Field = Langfield; Loms-Field = Lomsfield; Norden-Fields = Nordenfield; Sogne-Field = Sognefield; Sønden-Fields = Søndenfield; Tronhiems Stift; Vesten-Fields = Vestenfield'.

Alphabetical list of Norwegian species with associated data

Bradysia affinis (Zetterstedt, 1838)

Synonym. = *pratincola* Tuomikoski, 1960.

Literature. *Faunistics*: Zetterstedt (1851): 3752; Siebke (1877): 214 [both as *Sciara affinis*]; Tuomikoski (1960): 119 [only correctly mentioned under *Bradysia affinis* as 'in Norwegen' [in Norway] based on the old records by Zetterstedt (1851) and Siebke (1877); the rest are misidentifications] and 120 [as *Bradysia pratincola*]; Menzel et al. (1990): 368 [as *Bradysia pratincola* only; not *Bradysia affinis* sensu Tuomikoski; misidentification]; Menzel and Mohrig (2000): 178 [as *Bradysia pratincola*]; Köhler et al. (2014): 328 [as *Bradysia affinis*]. *Taxonomy*: Tuomikoski (1960): 116, 120 [as *Bradysia pratincola*]; Menzel and Mohrig (1998): 356 [as *Bradysia affinis*]; Menzel and Mohrig (2000): 172 [as *Bradysia affinis*] and 178 [as *Bradysia pratincola*].

Localities. • Norway; without further locality details (= 'Norwegen'; = 'Norway') • Finnmark; Tana, Tanafjorden, fjord Vestertana (= 'Finmark, Tana, Vestertana') • Telemark; Drangedal, Djupedal 1.5 km SE of Henneseid (= 'Drangedal, Djupedal, Henseid') • Drangedal, woodland Steinknapp SW of Drangedal (= 'Drangedal, Steinknapp') • Troms; Nordreisa, woodland and farm Hallen at the E shore of Reisaelva SE of Storslett (= 'Nordreisa, Hallen') • Tromsø (= 'Tromsø'; = 'Tromsö') • Trøndelag; Verdal, Østre Nes at the Jamtlandsvegen [road no. 72] between Verdal and Lysthaugen (= 'ad diversorium Näs Værdaliæ'; = 'ad diversorium Næs Værdaliæ').

Ecological note. Grove meadows. Phenology: Jun.–Aug.

Bradysia alpicola (Winnertz, 1867)

Synonyms. = *caliginosa* (Winnertz, 1867); = *concolor* (Beling, 1873); = *egens* (Winnertz, 1867); = *meridiana* (Lengersdorf, 1926); = *moreensis* (Lengersdorf, 1926); = *mutabilis* (Lengersdorf, 1926); = *obscura* (Winnertz, 1867); = *rogenhoferi* (Winnertz, 1867).

Literature. *Faunistics*: Lengersdorf (1926b): 7 [as *Sciara mutabilis*]; Lengersdorf (1928–30): 6, 31 [as *Lycoria* (*Neosciara*) *mutabilis*]; Soot-Ryen (1942): 78 [as *Neosciara mutabilis*]; Menzel and Mohrig (2000): 164 [as *Sciara mutabilis* under *Bradysia alpicola*]; Köhler et al. (2014): 328 [as *Bradysia alpicola*]. *Taxonomy*: Zetterstedt (1851): 3716 [as *Sciara morio*; misidentification]; Tuomikoski (1960): 125 [as *Bradysia morio* sensu Zetterstedt and Frey; misidentification]; Menzel and Mohrig (2000): 163 [as *Bradysia alpicola*].

Localities. • Norway; without further locality details (= 'Norwegen') • Finnmark; Alta, Bojobæskihytta in the Stabbursdalen between Karasjok and Alta (= 'Bojobæske'; = 'Bojobaeske') • Alta, Jotkajavre fjellstue on the Finnmarksvidda between Karasjok and Alta (= 'Jotkajavre') • Karasjok, Karasjok at the river Karasjohka (= 'Karasjok') • Nordland; Sørfold, Røsvik at the S shore of Sørfolda (= 'Røsvik'; = 'Røsvik [? Rørvik]') • Telemark; Drangedal, woodland Steinknapp SW of Drangedal (= 'Drangedal, Steinknapp').

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jun.–Aug.

Bradysia angustipennis Winnertz, 1867

Synonyms. = *campestris* Mohrig & Mamaev, 1970; = *pedestris* (Kieffer, 1903).

Literature. *Faunistics*: Vilkamaa and Hippa (2004): 21 [as *Bradysia angustipennis*]. *Taxonomy*: Menzel and Mohrig (2000): 119 [as *Bradysia angustipennis*].

Locality. • Norway; without further locality details (= 'Norway').

Faunistic note. The single Norwegian record of *Bradysia angustipennis* was published by Vilkamaa and Hippa (2004) in a phylogenetic analysis (appendix 2) as 'Norway' without further locality details. The male specimen is deposited in the UZMH collection and was not revised here.

Ecological note. Habitat not specified. Phenology: without data.

Bradysia bicolor (Meigen, 1818)

Synonyms. = *abdominalis* (Lehmann, 1824); = *bicolor* var. *alpestris* (Lengersdorf, 1926); = *bore* (Walker, 1848); = *rufiventris* (Macquart, 1834).

Literature. *Faunistics*: Walker (1848): 107 [as *Sciara bore*]; Zetterstedt (1851): 3724 [as *Sciara bicolor*] and 3725 [as *Sciara rufiventris*]; Siebke (1853): 305; Zetterstedt (1855): 4889 [both as *Sciara rufiventris*]; Siebke (1866b): 417; Siebke (1877): 211 [both as *Sciara bicolor* and *Sciara rufiventris*]; Becher (1886): 62; Strand (1904): 9; Edwards (1923): 236 [all as *Sciara bicolor*]; Lengersdorf (1926b): 3 [as *Sciara bicolor*] and 9 [as *Sciara rufiventris* and *Sciara bore*]; Soot-Ryen (1942): 77 [as *Neosciara bicolor*]; Mohrig and Menzel (1993): 270 [as *Bradysia bicolor*]; Menzel and Mohrig (2000): 133 [as *Bradysia bicolor* and *Sciara bore* under *Bradysia bicolor*]. Coulson and Refseth (2004): 102 [as *Bradysia bicolor*]. *Taxonomy*: Tuomikoski (1960): 137, 139; Mohrig and Menzel (1993): 270; Menzel and Mohrig (2000): 133 [all as *Bradysia bicolor*].

Localities. • Norway; without further locality details (= 'Nord-Norwegen') • Buskerud; Røyken (= 'in par. [parochia] Røken'; = 'Røken'; = 'Røyken') • Finnmark; Alta, Jotkajavre fjellstue on the Finnmarksvidda between Karasjok and Alta (= 'Jotkajavre') • Hammerfest, Hammerfest (= 'Hammerfest'; = 'Hammerfest, Finmark'; = 'Hammerfest, Finmark [Hammerfest auf der Insel Kvalöya]') • Nordland; Hattfjelldal, Røssvatnet (= 'Røsvand'; = 'Røssvatn') • Nord-Helgeland, Ranfjorden (= 'Ranfjord') • Oppland; Nord-Fron or Sør-Fron in the Gudbrandsdalen (= 'Gudbrandsdalen, Fron') • Øyer in the Gudbrandsdalen (= 'Øier Gudbrandsdaliæ'; = 'Gudbrandsdalen, Öier'; = 'Öier') • Øyer, Moshus in the SE part of Øyer in the Gudbrandsdalen (= 'Øier Gudbrandsdaliæ ad Moshus'; = 'Moshus, Øyer') • Troms; Tromsø, Ramfjorden (= 'Ramfjord') • Trøndelag; Levanger, Alstadhaug (= 'Alstadhaug, Levanger'; = 'ad Alstadhaug'; = 'ad Alstahaug') • Levanger, Levanger (= 'ad Levanger'; = 'Levanger') • Vestfold; Sandefjord (= 'ad Sandefjord'; = 'ved Sandefjord'; = 'Sandefjord') • Stavern (= 'ad oppidum Staværn'; = 'ved Staværn'; = 'Staværn').

• Jan Mayen; without further locality details (= 'Jan Mayen'; = 'Jan Mayen Island').

Ecological note. Habitats not specified. Phenology: Jul.–Aug.

Bradysia brevispina Tuomikoski, 1960

Literature. *Faunistics*: Thunes et al. (2004): 72, 85 [as *Bradysia brevispina*]. *Taxonomy*: Tuomikoski (1960): 130, 135; Menzel and Mohrig (2000): 151 [both as *Bradysia brevispina*].

Localities. • Norway; without further locality details (= 'Norway') • Buskerud; Sigdal, Heimseteråsen (= 'Sigdal').

Ecological note. *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*. Phenology: Jul.

Bradysia confinis (Winnertz, 1867)

Synonyms. = *myrtilli* (Winnertz, 1867); = *nigrescens* (Winnertz, 1869); = *occulta* (Winnertz, 1867); = *sororcula* (Winnertz, 1867); = *tarda* (Winnertz, 1867).

Literature. *Faunistics*: Lengersdorf (1926b): 3 [as *Sciara sororcula*]; Soot-Ryen (1942): 78 [in part as *Neosciara nervosa*; misidentification (only cited *sororcula* specimens)]. *Taxonomy*: Tuomikoski (1960): 139, 140; Menzel and Mohrig (2000): 127 [both as *Bradysia confinis*].

Localities. • Finnmark; Alta, Bossekop in Alta (= 'Bosekop') • Hammerfest, Hammerfest (= 'Hammerfest') • Porsanger, farm Fæstningsstua near Lævnasjarvi W of Skoganvarre (= 'Fæstningstuen'; = 'Festningsstuen') • Møre Og Romsdal/Oppland/Trøndelag; Dovrefjell [Dovre Mountains] (= 'Dovre') • Troms; Balsfjord, Svendborg ca. 1.7 km from the N shore of Fjellfrøsvatnet (= 'Svendborg'; = 'Svendborg') • Karlsøy, Torsvåg at the NW coast of Vannøya 15 km N of Tromsø (= 'Torsvaag'; = 'Torsvåg') • Tromsø (= 'Tromsø') • Tromsø, Ramfjorden (= 'Ramfjord').

Ecological note. Habitats not specified. Phenology: Jul.–Aug.

Bradysia distincta (Staeger, 1840)

Synonyms. = *egregia* (Beling, 1873); = *fastuosa* (Winnertz, 1867); = *insignis* (Winnertz, 1867).

Literature. *Faunistics*: Siebke (1877): 212 [as *Sciara distincta*]; Soot-Ryen (1942): 78 [in part as *Neosciara morio*; misidentification (only cited *distincta* specimen)]. *Taxonomy:* Menzel and Mohrig (2000): 165 [as *Bradysia distincta*].

Locality. • Møre Og Romsdal/Oppland/Trøndelag; Dovrefjell [Dovre Mountains] (= 'in alpe Dovre'; = 'Dovre').

Ecological note. Habitat not specified. Phenology: Jul.

Bradysia fenestralis (Zetterstedt, 1838)

Synonyms. = *bulbostyla* Mohrig & Menzel, 1990; = *frigida* (Winnertz, 1867); = *signata* (Winnertz, 1867).

Literature. *Faunistics*: Köhler et al. (2014): 328 [as *Bradysia fenestralis*]. *Taxonomy*: Menzel and Mohrig (1998): 354 [as *Bradysia fenestralis*]; Menzel and Mohrig (2000): 120 [as *Bradysia bulbostyla*] and 153 [as *Bradysia fenestralis*]; Menzel and Heller (2005): 349 [as *Bradysia fenestralis*]; Menzel and Heller (2006): 49 [as *Bradysia signata*].

Locality. • Telemark; Drangedal, 300 m SE of Henneseid (= 'Drangedal, Henseid').

Faunistic note. The first specimen of *Bradysia fenestralis* from Norway, on which the record in the cited literature was based, was identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jul.

Bradysia flavipila Tuomikoski, 1960

Literature. *Faunistics*: Vilkamaa (2000): 71 [as *Bradysia* sp.]. *Taxonomy*: Tuomikoski (1960): 144, 146; Menzel and Mohrig (2000): 125 [both as *Bradysia flavipila*].

Localities. • Norway; without further locality details (= 'Norway') • Rogaland; Finnøy, Finnøy Island, Lasteinvatnet SE of Lastein on the SE coast (published as 'Norway'; see faunistic note).

Faunistic note. The single Norwegian record of *Bradysia flavipila* published in Vilkamaa (2000) as 'Norway' (without collecting details) was based on the following material: Norway • 2 ♂♂; 'Rogaland; Finnöy, Lasteinvatnet'; 15–23 May 1994; J. Skartveit leg.; Malaise trap; UZMH.

Ecological note. Habitat not specified. Phenology: May.

Bradysia forficulata (Bezzi, 1914)

Synonyms. = *luravi* (Johannsen, 1929); = *nocturna* Tuomikoski, 1960.

Literature. *Faunistics*: Menzel et al. (2013): 286 [as *Bradysia forficulata*]. *Taxonomy*: Tuomikoski (1960): 139, 141 [as *Bradysia nocturna*]; Mohrig and Menzel (1993): 281 [as *Bradysia forficulata*] and 283 [as *Bradysia nocturna*]; Menzel and Mohrig (2000): 119 [as *Bradysia forficulata*] and 141 [as *Bradysia nocturna*]; Menzel et al. (2013): 286; Mohrig et al. (2013): 159 [both as *Bradysia forficulata*].

Locality. • Norway; without further locality details (= 'Norway').

Ecological note. Habitat not specified. Phenology: without data.

Bradysia fungicola (Winnertz, 1867)

Synonyms. = *fera* (Winnertz, 1867); = *hercyniae* (Winnertz, 1869); = *incana* (Strobl, 1910); = *ingrata* (Winnertz, 1867); = *sylvicola* (Winnertz, 1869).

Literature. *Faunistics*: Soot-Ryen (1942): 78 [as *Neosciara fungicola*]. *Taxonomy*: Tuomikoski (1960): 115, 119; Menzel and Mohrig (2000): 175 [both as *Bradysia fungicola*].

Locality. • Troms; Balsfjord, Fjellfrøsvatnet [Fjellfroskvannet] N of Øverbygd (= 'Fjellfrøskvann').

Ecological note. Habitat not specified. Phenology: Jul.

Bradysia giraudii (Egger, 1862)

Synonyms. = *clavigera* (Lengersdorf, 1926); = *nemorum* (Winnertz, 1867).

Literature. *Faunistics*: Soot-Ryen (1942): 78 [as *Neosciara nemorum*]; Menzel et al. (1990): 358 [as *Bradysia giraudii*]. *Taxonomy*: Tuomikoski (1960): 130; Menzel and Mohrig (1993b): 74 [both as *Bradysia giraudi* (Schiner); recte *giraudii* (Egger)]; Menzel and Mohrig (2000): 144 [as *Bradysia giraudii*].

Localities. • Norway; without further locality details (= 'Norwegen') • Troms; Tromsø, Ramfjorden (= 'Ramfjord').

Ecological note. Habitats not specified. Phenology: Jul.

Bradysia hilariformis Tuomikoski, 1960

Literature. *Faunistics*: Köhler et al. (2014): 328 [as *Bradysia hilariformis*]. *Taxonomy*: Tuomikoski (1960): 125, 127; Menzel and Mohrig (2000): 120 [both as *Bradysia hilariformis*].

Locality. • Telemark; Drangedal, woodland Steinknapp SW of Drangedal (= 'Drangedal, Steinknapp').

Faunistic note. The first specimen of *Bradysia hilariformis* from Norway, on which the record in the cited literature was based, was identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jun.

Bradysia hilaris (Winnertz, 1867)

Synonyms. = *betuleti* (Lengersdorf, 1940); = *dolens* (Johannsen, 1912); = *fumida* (Johannsen, 1912).

Literature. *Faunistics*: Tuomikoski (1960): 125 [as *Bradysia hilaris*]. *Taxonomy*: Tuomikoski (1960): 125; Menzel and Mohrig (2000): 167; Mohrig et al. (2013): 161 [all as *Bradysia hilaris*].

Locality. • Troms; Tromsø (= 'Tromsø').

Ecological note. Habitat not specified. Phenology: Aug.

Bradysia impatiens (Johannsen, 1912)

Synonyms. = *agrestis* Sasakawa, 1978; = *hardyi* (Shaw, 1952); = *paupera* Tuomikoski, 1960; = *tristicula* var. *difformis* Frey, 1948.

Literature. *Faunistics*: Sundbye and Johansen (2002): 26; Sundbye and Johansen (2003): 1; Sundbye (2005): 1 [all as *Bradysia difformis*]. *Taxonomy*: Tuomikoski (1960): 130, 134 [as *Bradysia paupera*]; Menzel and Mohrig (2000): 146 [as *Bradysia agrestis*] and 152 [as *Bradysia difformis*]; Mohrig et al. (2013): 162; Broadley et al. (2018): 205 [both as *Bradysia impatiens*].

Localities. • Norway; without further locality details (= 'Norway'; = 'several horticultural localities') • Akershus; Ås.

Ecological note. In greenhouses and laboratories on poinsettia (*Euphorbia pulcherrima*). Phenology: without data.

Bradysia inusitata (Tuomikoski, 1960)

Literature. *Faunistics*: Komarova (2009): 2 [as *Bradysia inusitata*]. *Taxonomy*: Tuomikoski (1960): 144, 148; Menzel and Mohrig (2000): 128 [both as *Bradysia inusitata*].

Locality. • Norway; without further locality details (= 'Norway').

Ecological note. Habitat not specified. Phenology: without data.

Bradysia iridipennis (Zetterstedt, 1838)

Synonyms. = *hirundina* (Winnertz, 1867); = *latiuscula* (Winnertz, 1867); = *merula* (Winnertz, 1867); = *tremulae* (Beling, 1873).

Literature. *Faunistics*: Zetterstedt (1855): 4890; Siebke (1877): 213 [both as *Sciara iridipennis*]; Soot-Ryen (1942): 78 [as *Neosciara iridipennis*]. *Taxonomy*: Tuomikoski (1960): 122, 124; Menzel and Mohrig (2000): 178; Mohrig et al. (2013): 163 [all as *Bradysia iridipennis*].

Localities. • Norway; without further locality details (= 'Norwegia') • Finnmark; Alta, Jotkajavre fjellstue on the Finnmarksvidda between Karasjok and Alta (= 'Jotkajavre') • Nordland; Herøy, Måsvær Island (= 'Måsvær') • Øksnes, in the NW part of Langøya of the Vesterålen archipelago (= 'Øksnes') • Oslo; Oslo, Tøyen (= 'in Tøien ad Christianiam'; = 'Tøyen, Oslo') • Troms; Balsfjord, Fjellfrøsvatnet [Fjellfroskvannet] N of Øverbygd (= 'Fjellfrøskvann') • Tromsø (= 'Tromsø') • Trøndelag; Verdal, farm Nes between Verdal and Lysthaugen at the S site of Verdalselva (= 'Nes, Værdal').

Ecological note. Habitats not specified. Phenology: Jun.–Jul., Sep.

Bradysia lapponica (Lengersdorf, 1926)

Synonyms. = *nigerrima* (Lengersdorf, 1940); = *pseudopraecox* Frey, 1948; = *quinquedentata* (Lengersdorf, 1936).

Literature. *Faunistics*: Tuomikoski (1960): 123; Menzel et al. (1990): 359 [both as *Bradysia lapponica*]. *Taxonomy*: Tuomikoski (1960): 122, 123; Menzel and Mohrig (2000): 145 [both as *Bradysia lapponica*].

Localities. • Norway; without further locality details (= 'Norwegen') • Finnmark; Vardø, Varangerhalvøya, Persfjorden (= 'Finmark: Varangerhalbinsel, Persfjord') • Troms; Tromsø (= 'Tromsø').

Ecological note. Habitats not specified. Phenology: Aug.

Bradysia longicubitalis (Lengersdorf, 1924)

Synonym. = *cinereovittata* Frey, 1948.

Literature. *Faunistics*: Komarova (2009): 3 [as *Bradysia longicubitalis*]. *Taxonomy*: Tuomikoski (1960): 138, 140 [as *Bradysia cinereovittata*]; Mohrig and Menzel (1993): 275; Menzel and Mohrig (2000): 119 [both as *Bradysia longicubitalis*].

Locality. • Norway; without further locality details (= 'Norway').

Ecological note. Habitat not specified. Phenology: without data.

Bradysia nervosa (Meigen, 1818)

Synonyms. = *fucata* (Meigen, 1818); = *variabilis* (Zetterstedt, 1838).

Literature. *Faunistics*: Zetterstedt (1838): 827 [as *Sciara variabilis*]; Walker (1848): 108 [as *Sciara nervosa*]; Zetterstedt (1851): 3738 [as *Sciara variabilis*]; Zetterstedt (1855): 4890 [as *Sciara nervosa* and *Sciara variabilis*]; Boheman (1866): 575; Holmgren (1869): 8 [both as *Sciara variabilis*]; Siebke (1877): 212 [as *Sciara variabilis*] and 213 [as *Sciara nervosa*]; Lengersdorf (1926b): 4 [as *Sciara nervosa*] and 9 [as *Sciara variabilis*]; Thor (1930): 4 [as *Sciara variabilis*]; Soot-Ryen (1942): 78 [in part as *Neosciara nervosa*; misidentification (only cited *variabilis* specimens)]; Coulson and Refseth (2004): 102; Coulson (2008): 160; Coulson (2013): 153 [all as *Bradysia nervosa*]. *Taxonomy*: Tuomikoski (1960): 125; Menzel and Mohrig (2000): 161 [both as *Bradysia nervosa*].

Localities. • Norway; without further locality details (= 'Norwegia'; = 'Norwegen'; = 'Nord-Norwegen') • Finnmark; Hammerfest, Hammerfest (= 'Hammerfest, Finmark'; = 'Hammerfest') • Karasjok, Karasjok at the river Karasjohka (= 'Karasjok') • Møre og Romsdal/Oppland/Trøndelag; Dovrefjell [Dovre Mountains] (= 'in alpe Dovre'; = 'Dovre') • Nordland; Narvik, Bjerkvik at the Ofotfjorden NE of Narvik (= 'in Nordlandiæ Norvegicæ, ad diversorium Björkvik juxla Ofodenfjorden'; = 'ad diversorium Bjørkvik prope Ofodenfjord Nordlandiae'; = 'ad Bjŏrkvik Nordlandiae Norvegicae'; = 'Bjørkvik, Ofoten') • Oslo; Oslo, Tøyen (= 'ad Christianiam in Tøien'; = 'in Tøien ad Christianiam'; = 'Tøien ad Christianiam'; = 'Tøyen, Oslo') • Oslo, Tøyenhaven (= 'Töienhaven'; = 'Tøyenhaven') • Trøndelag; Verdal, farm Nes between Verdal and Lysthaugen at the S site of Verdalselva (= 'ad Næs Værdaliæ'; = 'ad Näs Værdaliæ'; = 'Nes, Værdal'; = 'Værdaliæ') • Verdal, former poststation 'Suulstuen' SE of Vuku at the Jamtlandsvegen [road no. 72] (= 'ad diversorium Suul'; = 'ad Suul Værdaliæ'; = 'Suul Værdaliæ'; = 'Sul, Værdal'; = 'Værdaliæ').

• Svalbard; Spitsbergen, Bellsund at the W coast (= 'ad Bel Sund') • Spitsbergen, Edgeøya at the Storfjorden, ? Kvalpynten at the N side of the mouth of Tjuvfjorden

(= ‘in Spetsbergia ad Whales Point in Storfjorden’; = ‘ad Whales Point in Storfjorden’; = ‘Whales Point, Storfjord’) • Spitsbergen, Isfjorden, Dickson Land, Kapp Thordsen (= ‘ad Cap Thordsen in Isfjorden’) • Spitsbergen, without further locality details (= ‘Spetsbergen; = ‘Spitsbergen’).

Ecological note. Habitats not specified. Phenology: Apr.–Sep.

Bradysia nitidicollis (Meigen, 1818)

Synonyms. = *alacris* (Winnertz, 1867); = *albicans* (Winnertz, 1867); = *aprilina* (Meigen, 1818); = *atroparva* Frey, 1948; = *fenestrata* (Meigen, 1818); = *inornata* (Winnertz, 1867); = *scatopsoides* (Meigen, 1818); = *tenella* (Winnertz, 1867); = *trichoptera* (Lengersdorf, 1926).

Literature. *Faunistics*: Walker (1848): 108 [as *Sciara aprilina*]; Zetterstedt (1851): 3737; Zetterstedt (1855): 4890; Siebke (1877): 212 [all as *Sciara nitidicollis*]; Lengersdorf (1926b): 4 [as *Sciara nitidicollis*] and 9 [as *Sciara aprilina*]; Soot-Ryen (1942): 76 [in part as *Neosciara aprilina* (only cited Walker’s specimen)] and 79 [as *Neosciara nitidicollis*]; Tuomikoski (1960): 124; Köhler et al. (2014): 328 [both as *Bradysia nitidicollis*]. *Taxonomy*: Tuomikoski (1960): 122, 124; Menzel and Mohrig (2000): 179 [both as *Bradysia nitidicollis*].

Localities. • Norway; without further locality details (= ‘Norwegia’) • Akershus; Frogn, Sønderstøa-Degerud (= ‘Degerud’) • Finnmark; Alta, Jotkajavre fjellstue on the Finnmarksvidda between Karasjok and Alta (= ‘Jotkajavre’) • Hammerfest, Hammerfest (= ‘Hammerfest, Finmark’; = ‘Hammerfest’) • Vardø, Varangerhalvøya, Persfjorden (= ‘Finmark: Varangerhalbinsel, Persfjord’) • Hordaland; Kvam, ‘Berge landskapsvernområde’ [protected landscape area with the Bergsvatnet] NW of Tørvikbygd (= ‘Kvam, Berge’) • Nordland; Sømna, Sømnes at the bay Sømnesvika N of Vik (= ‘Sømnes’) • Oslo; Oslo, Tøyen (= ‘ad Christianiam in Tøien’; = ‘Tøien’; = ‘Tøyen, Oslo’) • Østfold; Halden, Halden SE of Fredrikstad (= ‘ad Fredrikshald’) • Troms; Nordreisa, woodland and farm Hallen at the E shore of Reisaelva SE of Storslett (= ‘Nordreisa, Hallen’) • Tromsø, lake Prestvannet on the Tromsøya (= ‘Prestvann, Tromsø’) • Trøndelag; Verdal, former poststation ‘Suulstuen’ SE of Vuku at the Jamtlandsvegen [road no. 72] (= ‘ad Suul’; = ‘ad Suul Værdaliæ’; = ‘Sul, Værdal’).

Ecological note. Oak canopies of *Quercus robur*; on mountains. Phenology: May–Oct.

Bradysia opaca (Winnertz, 1871)

Synonym. = *formosa* (Winnertz, 1871).

Literature. *Faunistics*: Lengersdorf (1926b): 3 [as *Sciara opaca*]. *Taxonomy*: Menzel and Mohrig (2000): 166 [as *Bradysia opaca*].

Localities. • Finnmark; Alta, Bojobæskihytta in the Stabbursdalen between Karasjok and Alta (= 'Bojobæske') • Nordland; Sørfold, Røsvik at the S shore of Sørfolda (= 'Røsvik') • Troms; Karlsøy, Nord-Fugløya (= 'Nord-Fuglø').

Ecological note. Habitats not specified. Phenology: Jul.–Aug.

Bradysia pallipes (Fabricius, 1787)

Synonyms. = *agilis* (Winnertz, 1867); = *brunnipes* (Meigen, 1804); = *conica* (Grzegorzek, 1884); = *dispar* (Winnertz, 1868); = *engadinica* (Winnertz, 1867); = *fallax* (Winnertz, 1867); = *kowarzii* (Grzegorzek, 1884); = *laeta* (Grzegorzek, 1884); = *luctuosa* (Winnertz, 1867); = *morbosa* (Winnertz, 1867); = *picipes* (Zetterstedt, 1838); = *prolifica* (Felt, 1897); = *rufipodex* (Frey, 1945); = *rufipodex* var. *elysiaca* (Frey, 1945); = *spreta* (Winnertz, 1867); = *subgrandis* (Shaw, 1941); = *tristis* (Winnertz, 1867); = *umbratica* (Zetterstedt, 1851).

Literature. *Faunistics*: Lengersdorf (1926b): 3 [as *Sciara brunnipes*]; Soot-Ryen (1942): 77 [as *Neosciara brunnipes*]; Tuomikoski (1960): 141 [as *Bradysia brunnipes*]. *Taxonomy*: Tuomikoski (1960): 139, 141; Mohrig and Menzel (1993): 270; Menzel and Mohrig (2000): 134 [all as *Bradysia brunnipes*]; Mohrig et al. (2013): 168; Broadley et al. (2018): 226 [both as *Bradysia pallipes*].

Localities. • Finnmark; Vardø, Varangerhalvøya, Persfjorden (= 'Finmark: Varangerhalbinsel, Persfjord') • Nordland; Øksnes, in the NW part of Langøya of the Vesterålen archipelago (= 'Øksnes') • Troms; Tromsø (= 'Tromsö'; = 'Tromsø') • Trøndelag; Levanger, Hestøya NW of Alstahaug, southern tip Måkeskjær (= 'Måkeskjær').

Ecological note. Habitats not specified. Phenology: Jun.–Sep.

Bradysia pauperata (Winnertz, 1867)

Synonyms. = *aestivalis* (Winnertz, 1871); = *antennata* (Winnertz, 1867); = *lugubris* (Winnertz, 1867); = *rustica* (Winnertz, 1867).

Literature. *Faunistics*: Lengersdorf (1926b): 3 [as *Sciara lugubris*]; Soot-Ryen (1942): 78 [in part as *Neosciara morio*; misidentification (only cited *lugubris* specimens)]. *Taxonomy*: Tuomikoski (1960): 123; Menzel and Mohrig (2000): 166 [both as *Bradysia pauperata*].

Localities. • Finnmark; Alta, Bossekop in Alta (= 'Bosekop') • Troms; Tromsø (= 'Tromsø').

Ecological note. Habitats not specified. Phenology: Jun.–Jul.

Bradysia placida (Winnertz, 1867)

Synonym. = *fimbricauda* Tuomikoski, 1960.

Literature. *Faunistics*: Lengersdorf (1926b): 3 [as *Sciara placida*]; Soot-Ryen (1942): 78 [in part as *Neosciara nervosa*; misidentification (only cited *placida* specimen)]. *Taxonomy*: Tuomikoski (1960): 125, 128 [as *Bradysia fimbricauda*]; Menzel and Mohrig (2000): 162 [as *Bradysia placida*].

Localities. • Finnmark; Alta, Jotkajavre fjellstue on the Finnmarksvidda between Karasjok and Alta (= 'Jotkajavre') • Troms; Målselv, Takvatnet (= 'Takvand'; = 'Takvann').

Ecological note. Habitats not specified. Phenology: Jun.–Jul.

Bradysia praecox (Meigen, 1818)

Synonyms. = *albinervis* (Winnertz, 1867); = *brevipalpis* (Winnertz, 1868); = *leclerqi* (Lengersdorf, 1950); = *macilenta* (Winnertz, 1867); = *morosa* (Winnertz, 1867); = *nocticolor* (Winnertz, 1867); = *simplex* (Winnertz, 1867); = *simplex* var. *subsimplex* (Lengersdorf, 1926); = *unicolor* (Winnertz, 1868).

Literature. *Faunistics*: Zetterstedt (1851): 3735; Siebke (1863): 176; Siebke (1866a): 385, 388; Siebke (1877): 212; Strand (1904): 10; Summerhayes and Elton (1923): 222, 262 [all as *Sciara praecox*]; Lengersdorf (1926b): 3 [as *Sciara praecox*] and 4 [as *Sciara albinervis*]; Summerhayes and Elton (1928): 236 [as *Sciara praecox*]; Soot-Ryen (1942): 76 [in part as *Neosciara aprilina*; misidentification (only cited *albinervis* specimens)] and 79 [as *Neosciara praecox*]; Coulson and Refseth (2004): 102; Coulson (2008): 160; Coulson (2013): 153 [all as *Bradysia praecox*]. *Taxonomy*: Tuomikoski (1960): 122, 123; Menzel and Mohrig (2000): 181 [both as *Bradysia praecox*].

Localities. • Norway; without further locality details (= 'Norwegen') • Finnmark; Karasjok, Ravnastua fjellstue NW of Karasjok (= 'Ravnastuen') • Porsanger, farm Fæstningsstua near Lævnasjarvi W of Skoganvarre (= 'Fæstningstuen'; = 'Festningsstuen') • Møre Og Romsdal; Fræna, Hammarøya NW of Hopadalen (= 'Hammarøy') • Haram, ? Ormeneset (= in Romsdalia ad Ormen'; = 'Romsdals Amt, omkring Ormen'; = 'Ormem') • Rauma, between Veblungsnes and Romsdalshornet Mountain in the Romsdalsalpene SE of Åndalsnes (= 'Romsdals Amt, mellem Veblungsnæsset og Romsdalshorn') • Rauma, Horgheim SE of Åndalsnes in the Romsdalen (= 'in Romsdalia ad Horgheim; = 'Romsdals Amt, Horgheim'; = 'Horgheim') • Rauma, Veblungsnes at the Romsdalsfjorden SW of Åndalsnes (= 'in Romsdalia ad Veblungsnæs; = 'Veblungsnes, Romsdal') • Smøla, Smøla Island (= 'in insula Smølen in Nordmøre'; = 'ad Smölen'; = 'Smøla') • Nordland; Hamarøy (= 'Hammerø') • Oppland; Lesja, Fogstuen on the Dovrefjell plateau (= 'Fogstuen'; = 'ad Fokstuen'; = 'in alpe Dovre ad Fokstuen'; = 'in alpe Dovre') • Oslo; Oslo (= 'ad Christianiam'; = 'Oslo') • Oslo, Botanisk hage (= 'in horto botanico ad Christianiam'; = 'Botanical Garden, Oslo') • Troms; Balsfjord, Øverbygd (= 'Øverbygd') • Karlsøy, Vannøya (= 'Vannø'; = 'Vannøy') • Tromsø, Ramfjorden (= 'Ramfjord') • Tromsø (= 'Tromsø') • Trøndelag; Levanger, Skogn SE of Levanger (= 'ad Thyæs in par. [parochia] Skogn'; = 'ad Thyæs in Skogn'; = 'Thynäs'; = 'Tynes, Værdal') [= in the accommodation of Thy in Skogn] • Meråker, NE of mountain Kølhaugan near the Swedish border [maybe a collecting

place in Sweden: Jämtland, village Skalstugan close to the border with Norway] (= 'ad diversorium Skalstugan prope jugum alpinum Norwegiæ') • Oppdal, Kongsvoll near Kongsvold Fjeldstue in the Drivdalen (= 'Kongsvold'; = 'ad Kongsvold'; = 'in alpe Dovre ad Kongsvold'; = 'in alpe Dovre').

• Svalbard; Bjørnøya (= 'Bear Island, southern part') • Spitsbergen, Aldert Dirkses Bugt in the Wijdefjorden (= 'Spitsbergen, Aldert Dirkses Bay District [Wijde Bay]') • Spitsbergen, Bünsow Land, Brucebyen 0.5 km S of Kapp Napier (= 'Spitsbergen, Klaas Billen Bay (Bruce City Region), around Bruce City').

Ecological note. On beaches with *Salix polaris* and mosses; *Cassiope* heath; plant community 'fjaeldmark' (= feldmark; mountain field) with phanerogams, mosses, lichens and *Salix polaris* (all Svalbard records); on mountains; in botanical gardens. Phenology: Jun.–Aug.

Bradysia quercina Menzel & Köhler, 2014

Literature. *Faunistics*: Köhler et al. (2014): 325 [as *Bradysia quercina*]. *Taxonomy*: Köhler et al. (2014): 325; Heller et al. (2015): 12 [both as *Bradysia quercina*].

Locality. • Telemark; Drangedal, Djupedal 1.5 km SE of Henneseid (= 'Drangedal, Djupedal, Henseid').

Faunistic note. The first specimens of *Bradysia quercina* from Norway, on which the cited literature based, were identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jul.

Bradysia rufescens (Zetterstedt, 1852)

Synonyms. = *pullula* (Winnertz, 1867); = *somnians* (Winnertz, 1867); = *testacea* (Zetterstedt, 1851) [preocc.]; = *villosa* (Winnertz, 1867).

Literature. *Faunistics*: Zetterstedt (1851): 3763 [as *Sciara testacea*; preocc.]; Siebke (1853): 305; Zetterstedt (1855): 4890; Siebke (1863): 177 [all as *Sciara rufescens*]; Siebke (1877): 212 [as *Sciara testacea*] and 214 [as *Sciara rufescens*]; Lengersdorf (1926b): 3 [as *Sciara pullula* and *Sciara rufescens*]; Soot-Ryen (1942): 80 [as *Neosciara pullula* and *Neosciara rufescens*]; Tuomikoski (1960): 145 [as *Bradysia rufescens*]. *Taxonomy*: Zetterstedt (1852): 4545 [*Sciara rufescens* as new name for *Sciara testacea* [preocc.; not *Sciara testacea* Zetterstedt, 1838]; Tuomikoski (1960): 143, 145 [as *Bradysia rufescens*]; Menzel et al. (1990): 370 [as *Bradysia rufescens*, in part]; Menzel and Mohrig (2000): 129 [as *Bradysia rufescens*].

Localities. • Finnmark; Alta, Bojobæskihytta in the Stabbursdalen between Karasjok and Alta (= 'Bojobæske') • Alta, Bossekop in Alta (= 'Bosekop') • Vardø, Vardø (= 'Vardø') • Møre og Romsdal; Smøla, Smøla Island (= 'in insula Smølen'; = 'ad Smölen'; = 'Smøla') • Oppland; Dovre, Hjerkinn NW of Folldal in the Gudbrandsdalen (= 'in alpe Dovre ad Jerkin'; = 'Jerkin'; = 'Hjerkin, Dovre') • Lesja, Fogstuen on the

Dovrefjell plateau (= 'Fogstuen'; = 'ad Fokstuen'; = 'Fokstuen, Dovre'; = 'in alpe Dovre ad Fokstuen'; = 'in alpe Dovre') • Øyer in the Gudbrandsdalen (= 'in parochiis Øyer … Gudbrandsdaliæ'; = 'Gudbrandsdalen, Öier'; = 'Öier'; = 'Øyer') • Ringebu in the Gudbrandsdalen (= 'in parochiis … Ringebo Gudbrandsdaliæ'; = 'Gudbrandsdalen, Ringebo'; = 'Ringebo'; = 'Ringebu, Gudbrandsdal') • Oslo; Oslo, Botanisk hage (= 'in horto botanico ad Christianiam') • Oslo, Tøyen (= 'ad Töien prope Christianiam'; = 'Töien nahe Kristiania [Oslo]') • Troms; Karlsøy, Torsvåg at the NW coast of Vannøya 15 km N of Tromsø (= 'Torsvaag') • Nordreisa, woodland and farm Hallen at the E shore of Reisaelva SE of Storslett (= 'Nordreisa, Hallen'; = 'Nordreisa') • Tromsø (= 'Tromsø') • Trøndelag; Levanger, Hestøya NW of Alstahaug, southern tip Måkeskjær (= 'Måkeskjær') • Oppdal, in the Drivdalen (= 'Drivdalen') • Oppdal, Kongsvoll near Kongsvold Fjeldstue in the Drivdalen (= 'Kongsvold'; = 'ad Kongsvold'; = 'Kongsvold, Dovre'; = 'in alpe Dovre ad Kongsvold'; = 'in alpe Dovre').

Taxonomic note. After Lengersdorf (1930a: 52) and Tuomikoski (1960: 145) *Sciara testacea* Zetterstedt, described in Zetterstedt (1838: 826), does not belong to the Sciaridae, but to the Diadocidiidae [= *Diadocidia testacea* (Zetterstedt, 1938)]. Zetterstedt (1851: 3763) later describes another '*Sciara testacea*' [preocc.; not *Sciara testacea* Zetterstedt, 1838], which without doubt belongs to the Sciaridae and was renamed by Zetterstedt himself as *Sciara rufescens* [see Zetterstedt (1852: 4545)]. Siebke (1877: 212) used the name '*Sciara testacea* Zetterstedt' in connection with Zetterstedt's original description in volume 'X' of 'Diptera scandinaviae disposita et descripta' (Zetterstedt 1851). For that reason the citation by Siebke (1877) and the Norwegian record on page 212 is preliminarily included here.

In the here presented checklist of Norwegian Sciaridae, ***Bradysia vagans* (Winnertz, 1868)** is missing, with its synonyms *B. angustipennis* Frey, 1948 [preocc.], *B. callicera* Frey, 1948 and *B. richardi* Gerbachevskaja, 1986. This is a very common species throughout Europe. It is dark brown, with rather broad wings and unicoloured dark-brown antennae, but is not distinguishable by the male genitalia from the reddish-yellow *Bradysia rufescens* (Zetterstedt). It is possible, that there are some misidentified specimens of *Bradysia vagans* (Winnertz) among the records of '*Bradysia rufescens*', published before Tuomikoski (1960).

Ecological note. In the grass in humid places; in botanical gardens. Phenology: Jun.–Aug.

Bradysia sordida (Zetterstedt, 1838)

Literature. *Faunistics*: Siebke (1863): 176; Siebke (1877): 212 [both as *Sciara sordida*]. *Taxonomy:* Menzel and Mohrig (2000): 185 [as *Bradysia sordida*].

Localities. • Norway; without further locality details (= 'Norwegen') • Oppland; Dovre, Hjerkinn NW of Folldal in the Gudbrandsdalen (= 'in alpe Dovre, ad Jerkin'; = 'Jerkin') • Trøndelag; Oppdal, in the Drivdalen (= 'Drivdalen') • Oppdal, Kongsvoll near Kongsvold Fjeldstue in the Drivdalen (= 'in alpe Dovre ad Kongsvold').

Ecological note. Habitats not specified. Phenology: Jul.–Aug.

Bradysia strenua (Winnertz, 1867)

Synonyms. = *annulata absoloni* (Bezzi, 1911); = *ardua* (Grzegorzek, 1884); = *watsoni* Colless, 1962.

Literature. *Faunistics*: Broadley et al. (2018): 230 [as *Bradysia strenua*]. *Taxonomy*: Mohrig and Menzel (1993): 283; Menzel and Mohrig (2000): 142; Broadley et al. (2018): 229 [all as *Bradysia strenua*].

Locality. • Norway; without further locality details (= 'Norway').

Ecological note. Habitat not specified. Phenology: without data.

Bradysia strigata (Staeger, 1840)

Synonym. = *robusta* (Lengersdorf, 1926) [preocc.].

Literature. *Faunistics*: Zetterstedt (1851): 3747 [as *Sciara strigata*] and 3749 [as *Sciara persicariae* (Linnaeus); misidentification]; Siebke (1863): 177; Siebke (1870): 304; Siebke (1877): 213 [all as *Sciara persicariae* sensu Zetterstedt; misidentification]; Menzel et al. (1990): 372 [as *Bradysia strigata*]. *Taxonomy*: Frey (1948): 54, 77; Tuomikoski (1960): 144, 149; Menzel and Mohrig (1993b): 77; Menzel and Mohrig (2000): 130 [all as *Bradysia strigata*].

Localities. • Norway; without further locality details (= 'in jugo alpino Norwegiæ'; = 'in Norwegia'; = 'Norwegen') • Oppland; Dovre, Hjerkinn NW of Folldal in the Gudbrandsdalen (= 'in alpe Dovre, ad Jerkin'; = Dovre ad Jerkin; = 'Jerkin'; = 'Hjerkin, Dovre') • Lesja, Fogstuen on the Dovrefjell plateau (= 'Dovre ad Fogstuen'; = 'Fogstuen') • Vang, Nystuen at the Otrøvatnet NW of Vang (= 'in alpibus Filefjeld ad Nystuen; = 'Nystuen') • Trøndelag; Oppdal, Kongsvoll near Kongsvold Fjeldstue in the Drivdalen (= 'Dovre ad Kongsvold'; = 'Dovre ad Kongsvoll') • Verdal, Kjølhaugan mountain SE of Sul, close to the Swedish border (= 'in summo cacumine alpis … Kälahög (4000 ped. supra mare elevato)'; = 'in summo cacumine alpis Kælahøg Værdaliae').

Taxonomic note. The taxon '*Tipula persicariae*' was originally described by Linnaeus (1767: 977). The revision of the types revealed, that this species belongs to the gall midges and was placed in the genus *Wachtiella* Rübsaamen, 1915 [= *Wachtliella persicariae* (Linnaeus, 1767); Cecidomyiidae: Cecidomyiinae, Dasineurini]. Soot-Ryen (1942: 74) interpreted '*Sciara persicariae* (Linnaeus)' in Zetterstedt (1871) and Siebke (1863, 1870, 1877) as a species of '*Dasyneura*' [recte '*Dasineura*' (Cecidomyiidae)] and ignored therefore all records of '*Sciara persicariae*' in his list of Norwegian Sciaridae. Frey (1948: 54, 77) states however, that some specimens of '*Sciara persicariae* (Linnaeus)' sensu Zetterstedt were interpreted incorrectly and might belong to *Bradysia strigata* (Staeger) [misidentification]. One specimen in the TMUC collection (belonging to Sciaridae) was found under '*sororcula* Zetterstedt' (det. Siebke), which – following the synonymy of types – would be *Bradysia confinis* (Winnertz). We are following Frey (1948) and list under *Bradysia strigata* (Staeger) all Norwegian records until a final revision of misidentified '*Sciara persicariae* (Linnaeus)' sensu Zetterstedt is undertaken.

Ecological note. On sides and peaks of mountains, up to 4,000 ft (1,219 m). Phenology: Jul.–Aug.

Bradysia tilicola (Loew, 1850)

Synonyms. = *amoena* (Winnertz, 1867); = *alma* (Winnertz, 1871); = *caldaria* (Lintner, 1895); = *coprophila* (Lintner, 1895); = *domestica* Frey, 1948; = *incomta* (Winnertz, 1867); = *marcilla* (Hutton, 1902); = *nanella* (Frey, 1936); = *selecta* (Winnertz, 1871); = *setigera* (Winnertz, 1867); = *silvatica* (Meigen, 1818); = *sexdentata* (Pettey, 1918); = *triseriata* (Winnertz, 1867); = *turbida* (Winnertz, 1867); = *vana* (Winnertz, 1871); = *vividula* (Winnertz, 1867); = *volucris* (Winnertz, 1867); = *wendalinae* (van Bruggen, 1954).

Literature. *Faunistics*: ? Schøyen (1889) 14; ? Trail (1889) 203, 215 [both as *Sciara tilicola*]; Soot-Ryen (1942) 78 [as *Neosciara modesta*; misidentification] and 80 [as *Sciara silvatica*]. *Taxonomy*: Tuomikoski (1960): 130, 132; Menzel and Mohrig (2000): 147 [both as *Bradysia amoena*]; Menzel and Heller (2005): 351; Menzel et al. (2013): 286; Mohrig et al. (2013): 171; Broadley et al. (2018): 224 [all as *Bradysia tilicola*].

Localities. • Finnmark; Alta, Jotkajavre fjellstue on the Finnmarksvidda between Karasjok and Alta (= 'Jotkajavre') • ? Hordaland; Hardanger, Granvin, Eide [= 'vicinity of Eide'; = 'Eide i Hardanger' = 'Eide, Hardanger') • Oslo; Oslo, Tøyen (= 'Tøyen, Oslo') • Troms; Balsfjord, Øverbygd (= 'Øverbygd') • Tromsø (= 'Tromsø') • Trøndelag; Levanger, Hestøya NW of Alstahaug, southern tip Måkeskjær (= 'Måkeskjær') • Verdal, Tromsdal SE of Lysthaugen (= 'Tromsdal').

Ecological note. On twig of *Tilia parvifolia* [questionable record based on galls]. Phenology: Jun.–Oct.

Bradysia trivittata (Staeger, 1840)

Synonyms. = *basalis* (Winnertz, 1867); = *decipiens* (Winnertz, 1867); = *devittata* Tuomikoski, 1959; = *lignorum* (Kieffer, 1919); = *spectrum* (Winnertz, 1867); = *versicolorea* (Lengersdorf, 1940).

Literature. *Faunistics*: Siebke (1877): 215 [as *Sciara trivittata*]. *Taxonomy*: Tuomikoski (1960): 130, 133; Menzel and Mohrig (2000): 156 [both as *Bradysia trivittata*].

Locality. • Oslo; Oslo, Botanisk hage (= 'in horto botanico ad Christianiam').

Ecological note. In botanical gardens. Phenology: Jun.

Bradysia vernalis (Zetterstedt, 1851)

Synonyms. = *monticola* (Winnertz, 1867); = *vallestris* (Lengersdorf, 1926).

Literature. *Faunistics*: Lengersdorf (1926b): 5 [as *Sciara vallestris*]; Soot-Ryen (1942): 80 [as *Neosciara vernalis*]; Menzel et al. (1990): 377 [as *Bradysia vernalis*].

Taxonomy: Tuomikoski (1960): 123, 124; Menzel and Mohrig (2000): 183 [both as *Bradysia vernalis*].

Localities. • Norway; without further locality details (= 'Norwegen') • Finnmark; Porsanger, farm Fæstningsstua near Lævnasjarvi W of Skoganvarre (= 'Fæstningsstuen'; = 'Festningsstuen') • Troms; Karlsøy, Vannøya (= 'Vannö'; = 'Vannø'; = 'Vannøy').

Ecological note. Habitats not specified. Phenology: Jul.–Aug.

Bradysiopsis vittigera (Zetterstedt, 1851)

Literature. *Faunistics*: Zetterstedt (1851): 3751; Siebke (1877): 213 [both as *Sciara vittigera*]; Soot-Ryen (1942): 80 [as *Neosciara vittigera*; in part]; Menzel and Mohrig (2000): 189 [as *Bradysiopsis vittigera*]. *Taxonomy*: Tuomikoski (1960): 74 [as *Lycoriella* (*Bradysiopsis*) *vittigera*]; Menzel and Mohrig (1998): 361; Menzel and Mohrig (2000): 189 [both as *Bradysiopsis vittigera*].

Localities. • Norway; without further locality details (= 'in Norwegia'; = 'Norwegia [Norwegen]') • Oslo; Oslo (= 'ad Christianiam'; = 'Oslo') • Oslo, Bekkelaget (= 'Bækkelaget propre Christ.'; = 'Bekkelaget') • Østfold; Halden, Halden SE of Fredrikstad (= 'ad Fredrikshald'; = 'Fredrikshald').

Ecological note. Habitats not specified. Phenology: May, Jul.

Camptochaeta bournei (Shaw, 1941)

Synonym. = *subvivax* (Mohrig, 1985).

Literature. *Faunistics*: Hippa and Vilkamaa (1994): 29 [as *Camptochaeta bournei*]. *Taxonomy*: Mohrig (1985): 233 [as *Corynoptera subvivax*]; Hippa and Vilkamaa (1994): 29; Menzel and Mohrig (2000): 194; Mohrig et al. (2013): 174 [all as *Camptochaeta bournei*].

Locality. • Finnmark; Vardø, Varangerhalvøya, Persfjorden (= 'Persfjord, Varranger').

Ecological note. Habitat not specified. Phenology: without data.

Camptochaeta camptochaeta (Tuomikoski, 1960)

Literature. *Faunistics*: Hippa and Vilkamaa (1994): 27; Thunes et al. (2004): 72, 85 [both as *Camptochaeta camptochaeta*]. *Taxonomy*: Tuomikoski (1960): 67, 69 [as *Corynoptera camptochaeta*]; Hippa and Vilkamaa (1994): 27; Menzel and Mohrig (2000): 195; Komarova et al. (2007): 4 [all as *Camptochaeta camptochaeta*].

Localities. • Norway; without further locality details (= 'Norway') • Buskerud; Sigdal, Heimseteråsen (= 'Sigdal') • Finnmark; Alta, Leirbotn at the E side of Altafjorden (= 'Leirbotn') • Porsanger, Børselv NE of Lakselv at the E coast of Porsangerfjorden (= 'Börselv').

Ecological note. *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*. Phenology: Jun.–Jul.

Camptochaeta consimilis (Holmgren, 1869)

Synonym. = *glacialis* (Rübsaamen, 1898)

Literature. *Faunistics*: Holmgren (1869): 6, 16, 54 [as *Sciara consimilis*]; Edwards (1922): 198; Edwards (1924): 164 [both as *Sciara praecox*; misidentification]; Lengersdorf (1930a): 55 [as *Sciara consimilis* and *Sciara ecalcarata*; misidentification]; Lengersdorf (1930c): 52 [as *Sciara ecalcarata* sensu Lengersdorf; misidentification, and *Sciara glacialis* Rübsamer; recte Rübsaamen]; Edwards (1935): 534; Bertram and Lack (1938): 51 [both as *Sciara consimilis*]; Soot-Ryen (1942): 78 [as *Neosciara glacialis*]; Tuomikoski (1967): 46 [as *Corynoptera consimilis*]; Hippa and Vilkamaa (1994): 12 [as *Camptochaeta consimilis*]; Menzel and Mohrig (2000): 197 [as *Camptochaeta consimilis*] and 198 [as *Camptochaeta consimilis* in the discussion of *Camptochaeta delicata*]; Coulson and Refseth (2004): 102; Komarova et al. (2007): 6; Coulson (2008): 161; Coulson (2013): 153; Mohrig et al. (2013): 174 [all as *Camptochaeta consimilis*]. *Taxonomy*: Hippa and Vilkamaa (1994): 12; Menzel and Mohrig (2000): 197; Mohrig et al. (2013): 174 [all as *Camptochaeta consimilis*].

Localities. • Norway; without further locality details (= 'Norway') • Finnmark; Sør-Varanger, Bugøyfjord (= 'Buköyfjord') • ? Troms; Tromsø (= 'Tromsø').

• Svalbard; Bjørnøya (= 'Beeren Eiland'; = 'Beeren Island'; = 'Bear Island') • Bjørnøya, Gravodden [grave point (graveyard)] at the N coast (= 'Bear Island, Gravodden') • Bjørnøya, Haussvatnet in the N part of island (= 'Bear Island, Hausvatnet') • Bjørnøya, Kvalrossbukta [formerly 'Hvalrosbugten'] at the SE side of island (= 'Bear Island, Walrus Bay, S.E.') • Bjørnøya, Laksvatnet in the N part of island (= 'Bear Island, Laksvatnet') • Bjørnøya, near the Steelva at the Laksvatnet in the N part of island (= 'bei Steelva', am Laksvatnet (B.)') • Bjørnøya, Røyevatnet in the SW part of island (= 'Bear Island, Röyevatnet') • Spitsbergen, Adventdalen near Adventfjorden at the W coast (= 'Spitzbergen, Adventdalen'; = 'Adventdalen') • Spitsbergen, Adventfjorden at the W coast (= 'in Spetsbergia ad Advent Bay'; = 'Spetsbergia ad Advent Bay' [Spitzbergen, bei der Advent Bay]'; = 'Spitsbergen, near Advent Bay'; = 'Spitzbergen, Advent Bay') • Spitsbergen, Albert I Land, Cape Flathuken on the Vasahalvøya (= 'Spitzbergen, Flathuken'; = 'Flathuken') • Spitsbergen, Albert I Land, strait Sørgattet between Reuschhalvøya and Danskøya (= 'Sørgattet'; = 'Sörgatt') • Spitsbergen, Billefjorden between Dickson Land and Bünsow Land (= 'head of Billefjorden [Klaas Billen Bay]') • Spitsbergen, Bünsow Land, Brucebyen 0.5 km S of Kapp Napier (= 'Spitsbergen, Bruce City, head of Klaas Billen Bay'; = 'Brucebyen [Bruce City]') • Spitsbergen, Grønfjorden, Barentsburg (= 'Barentsburg'; = 'bei Barentsburg (S.)') • Spitsbergen, Haakon VII Land, Liefdefjorden (= 'N. Spitsbergen, Liefde Bay') • Spitsbergen, Haakon VII Land at the NW coast, S side of Reinsdyrflya (= 'middle of S. side of Reindeer Peninsula'; = 'middle of S. side of Reinsdyrflya [Reindeer Peninsula]') • Spitsbergen, Hiorth-

hamn [former mining settlement] at the E side of Adventfjorden (= 'Hiorthhamn (S.), bei Residensen') • Spitsbergen, Kobbefjorden at the NW coast near the Danskøya (= 'in Spetsbergia ad Kobbebay'; = 'Kobbefjorden [Kobbebay]'; = 'Kobbebay') • Spitsbergen, Longyearbyen (= 'Spitzbergen, Longyearbyen'; = 'Longyearbyen auf Spitzbergen'; = 'Longyearbyen') • Spitsbergen, Nordenskiöld Land, Helvetiadalen between the mountains Helvetiafjellet and Artowskifjellet N of Adventdalen (= 'front face of Helvetiadalen') • Spitsbergen, Nordenskiöld Land, Mälardalen at the N side of the mouth of Adventelva (= 'Mælardalen') • Spitsbergen, Ny-Ålesund (= 'Spitsbergen, Ny Ålesund') • Spitsbergen, Ny-Friesland, Dirksbukta at the S side of the Dirksodden (= 'N. Spitsbergen, Albert Dirkses Bay'; = 'Dirksbukta [Albert Dirkses Bay]') • Spitsbergen, S coast of Kongsfjorden along the N side of Brøggerhalvøya, W of Ny-Ålesund [= 'NW Spitsbergen, South cost Königsfjord, W Ny Ålesund'] • Spitsbergen, Sassen-Bünsow Land, Sassendalen (= 'Sassendalen') • Spitsbergen, Wijdefjorden (= 'N. Spitsbergen, Wijde Bay'; = 'Wijdefjorden [Wijde Bay]') • Spitsbergen, without further locality details (= 'Spetsbergen'; = 'Spitzbergen'; = 'Spitsbergen').

Taxonomic note. The female holotype of *Sciara glacialis* Rübsaamen was studied by the senior author and identified as a junior synonym to *Camptochaeta consimilis* (Holmgren). More detailed information will be presented in a separate publication about the *Sciara* species described by Rübsaamen (1898).

Ecological note. Bird cliffs; in mosses, lichens and *Salix* plants; on *Cerastium alpinum*, *Salix polaris* and *Cassiope*; on shingly raised beaches with *Dryas*; among stones; on bare rocks (all Svalbard records). Phenology: Jun.–Aug.

Camptochaeta delicata (Lengersdorf, 1935)

Synonyms. = *macrodon* (Frey, 1948); = *pallidiventris* (Holmgren, 1869) [preocc.].

Literature. *Faunistics*: Holmgren (1869): 15, 53 [as *Sciara pallidiventris*]; Edwards (1922): 196; Edwards (1924): 164; Summerhayes and Elton (1923): 262; Edwards (1925): 354; Summerhayes and Elton (1928): 209, 218, 228, 236; Lengersdorf (1930a): 55 [all as *Sciara pallidiventris*]; Edwards (1935): 534 [as *Sciara* sp. indet. and *Sciara pallidiventris*]; Lengersdorf (1935): 75; Soot-Ryen (1942): 77 [both as *Neosciara delicata*]; Frey (1948): 86, 91 [as *Bradysia* (*Diorychophthalma*) *macrodon*]; Tuomikoski (1967): 47 [as *Corynoptera macrodon*] and 50 [as *Sciara delicata*]; Hippa and Vilkamaa (1994): 36 [as *Camptochaeta delicata*]; Menzel and Mohrig (2000): 197 [as *Camptochaeta delicata* and *Sciara pallidiventris*]; Coulson and Refseth (2004): 102 [as *Camptochaeta delicata* (Frey); recte (Lengersdorf)]; Hågvar et al. (2007): 67; Komarova et al. (2007): 6 [both as *Corynoptera delicata*]; Coulson (2008): 161; Coulson (2013): 154 [both as *Camptochaeta delicata* (Frey); recte (Lengersdorf)]; Mohrig et al. (2013): 174 [as *Camptochaeta delicata*]. *Taxonomy*: Hippa and Vilkamaa (1994): 36; Menzel and Mohrig (2000): 197; Mohrig et al. (2013): 174 [all as *Camptochaeta delicata*].

Localities. • Norway; without further locality details (= 'Norway') • Finnmark; Karasjok, 20 km N of Karasjok (= '20 km N of Karasjok').

• Svalbard; Bjørnøya (= 'Bear Island') • Bjørnøya, Brettingsdalen at the E side of Miseryfjellet (= 'Bear Island, Brettingsdalen') • Spitsbergen, Adventdalen, Fivelflyane 8 km E of Longyearbyen (= 'Adventdalen, Fivelflyane') • Spitsbergen, Adventfjorden at the W coast (= 'in Spetsbergia ad Advent Bay'; = 'Spetsbergia, Advent Bay'; = 'Spitzbergen, bei der Advent Bay'; = 'Adventfjorden [Advent Bay]') • Spitsbergen, Aldert Dirkses Bugt in the Wijdefjorden (= 'Spitsbergen, Aldert Dirkses Bay District [Wijde Bay]') • Spitsbergen, Billefjorden between Dickson Land and Bünsow Land (= 'head of Billefjorden [Klaas Billen Bay]') • Spitsbergen, Bünsow Land, Brucebyen 0.5 km S of Kapp Napier (= 'Spitsbergen, Bruce City, head of Klaas Billen Bay'; = 'Spitsbergen, Klaas Billen Bay (Bruce City Region), around Bruce City'; = 'Bruce City, Klaas Billen Bay (S.)'; = 'Brucebyen [Bruce City]') • Spitsbergen, Haakon VII Land, Bockfjorden at the W side of Woodfjorden (= 'Bockfjorden') • Spitsbergen, Haakon VII Land, Reinsdyrflya, at the Liefdefjorden (= 'Spitsbergen, Reindeer Peninsula, at the Liefde Bay'; = 'N. Spitsbergen, Liefde Bay'; = 'Liefdefjorden [Liefde Bay]') • Spitsbergen, Haakon VII Land, S side and centre of Reinsdyrflya (= 'West Spitsbergen Island, south side and centre of the east half of Reindeer Peninsula') • Spitsbergen, Isfjorden (= 'Isfjorden') • Spitsbergen, Isfjorden, Dickson Land, Kapp Thordsen (= 'in Spetsbergia ad Cap Torsden in Isfjorden'; = 'Cap Torsden') • Spitsbergen, Kobbefjorden at the NW coast near the Danskøya (= 'in Spetsbergia ad Kobbebay'; = 'Kobbefjorden [Kobbebay]') • Spitsbergen, Longyearbyen (= 'Spitzbergen, Longyearbyen'; = 'Longyearbyen auf Spitzbergen'; = 'Longyearbyen') • Spitsbergen, Nordaustlandet (= 'Spitsbergen, North-East Land') • Spitsbergen, Nordenskiöld Land, Arctowskifjellet mountain S of Sassenfjorden (= 'Arctowskifjellet') • Spitsbergen, Nordenskiöld Land, Helvetiadalen between the mountains Helvetiafjellet and Artowskifjellet N of Adventdalen (= 'front face of Helvetiadalen') • Spitsbergen, Ny-Friesland, Dirksbukta at the S side of the Dirksodden (= 'Dirksbukta [Aldert Dirkses Bay]'; = 'N. Spitsbergen, Albert Dirkses Bay') • Spitsbergen, Sassen-Bünsow Land, Sassendalen (= 'Sassendalen') • Spitsbergen, Sigridholmen, Kongsfjorden • Spitsbergen, Wijdefjorden (= 'N. Spitsbergen, Wijde Bay'; = 'Wijdefjorden [Wijde Bay]') • Spitsbergen, without further locality details (= 'Spetsbergen; = 'Spitsbergen'; = 'Spitzbergen').

Ecological note. From plants on flower slopes; *Dryas* community on mountain slopes (*Dryas octopetala*, *Carex misandra*, *Cerania vermicularis*, *Cetraria nivalis*); over leaves and flowers of *Dryas* plants; *Cassiope* heath; lichen-moss heath; plant community 'fjaeldmark' (= feldmark; mountain field) with phanerogams, mosses, lichens and *Salix polaris*; on *Saxifraga oppositifolia*; from grass; under stones with some vegetation; on beaches with *Salix polaris* and mosses; on shingly raised beaches with *Dryas* (all Svalbard records). Phenology: Jul.–Aug.

Camptochaeta fallax Hippa & Vilkamaa, 1994

Literature. *Faunistics*: Hippa and Vilkamaa (1994): 19; Rudzinski and Ševčík (2012): 146 [both as *Camptochaeta fallax*]. *Taxonomy*: Hippa and Vilkamaa (1994): 19; Menzel and Mohrig (2000): 194 [both as *Camptochaeta fallax*].

Localities. • Norway; without further locality details (= 'Norway') • Finnmark; Lebesby, at the Matselva (= 'Mattselva') • Porsanger, Børselv NE of Lakselv at the E coast of Porsangerfjorden (= 'Börselv').

Ecological note. Habitats not specified. Phenology: Jul.

Camptochaeta hirtula (Lengersdorf, 1934)

Synonym. = *fulvicollis* (Tuomikoski, 1960).

Literature. *Faunistics*: Hippa and Vilkamaa (1994): 14 [as *Camptochaeta fulvicollis*]; Thunes et al. (2004): 85 [as *Camptochaeta hirtula*]. *Taxonomy*: Tuomikoski (1960): 67 [as *Corynoptera fulvicollis*]; Hippa and Vilkamaa (1994): 14 [as *Camptochaeta fulvicollis*]; Menzel and Mohrig (2000): 198; Mohrig et al. (2013): 176 [both as *Camptochaeta hirtula*].

Localities. • Buskerud; Sigdal, Heimseteråsen (= 'Sigdal') • Finnmark; Kvalsund, Skaidi (= 'Skaidi') • Sør-Varanger, Bugøyfjord (= 'Buköyfjord') • Sør-Varanger, Neiden (= 'Neiden') • Troms; Nordreisa, Sappen (= 'Sappen').

Ecological note. *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*. Phenology: Jun.–Aug.

Camptochaeta mimica Hippa & Vilkamaa, 1994

Literature. *Faunistics*: Mohrig et al. (2013): 176 [as *Camptochaeta mimica*]. *Taxonomy*: Hippa and Vilkamaa (1994): 39; Mohrig et al. (2013): 176 [both as *Camptochaeta mimica*].

Locality. • Svalbard; Spitsbergen, Ny-Ålesund (= 'Spitsbergen, Ny Ålesund').

Ecological note. Habitat not specified. Phenology: Jul.

Camptochaeta truncata Vilkamaa & Mohrig, 2013

Literature. *Faunistics*: Vilkamaa et al. (2013a): 484 [as *Camptochaeta truncata*]. *Taxonomy:* Vilkamaa et al. (2013a): 484 [as *Camptochaeta truncata*].

Locality. • Svalbard; Spitsbergen, S coast of Kongsfjorden along the N side of Brøggerhalvøya, W of Ny-Ålesund [= 'Spitzbergen, southern cost of Königsfjord, west of Ny Ölesund'].

Ecological note. Habitat not specified. Phenology: Jul.

Camptochaeta xystica Hippa & Vilkamaa, 1994

Literature. *Faunistics*: Hippa and Vilkamaa (1994): 44 [as *Camptochaeta xystica*]. *Taxonomy*: Hippa and Vilkamaa (1994): 44; Menzel and Mohrig (2000): 194 [both as *Camptochaeta xystica*].

Locality. • Finnmark; Tana, Storfossen at the river Karasjohka near the Finnish border (= 'Tana, Nedre Storfoss').

Ecological note. Habitat not specified. Phenology: Jul.

Chaetosciara estlandica (Lengersdorf, 1929)

Synonym. = *lengersdorfi* (Frey, 1948).

Literature. *Faunistics*: Staverløkk and Sæthre (2007): 16, 36; Sæthre et al. (2010): 28, 31 [both as *Chaetosciara estlandica*]. *Taxonomy*: Tuomikoski (1960): 41; Menzel and Mohrig (2000): 202 [both as *Chaetosciara estlandica*].

Locality. • Norway; without further locality details (= 'Norway, imported from the Netherlands').

Ecological note. On plants of *Taxus media*. Phenology: Apr.

Claustropyga brevichaeta (Mohrig & Antonova, 1978)

Literature. *Faunistics*: Hippa et al. (2003): 488; Vilkamaa et al. (2013): 22 [both as *Claustropyga brevichaeta*]. *Taxonomy*: Menzel and Mohrig (2000): 222 [as *Corynoptera brevichaeta*]; Hippa et al. (2003): 488 [as *Claustropyga brevichaeta*].

Localities. • Norway; without further locality details (= 'Norway') • Trøndelag; Oppdal, Kongsvoll near Kongsvold Fjeldstue in the Drivdalen (= 'Oppdal, Kungsvoll').

Ecological note. Habitats not specified. Phenology: Jun.–Jul.

Claustropyga refrigerata (Lengersdorf, 1930)

Synonym. = *scandinavica* (Rudzinski, 1992).

Literature. *Faunistics*: Lengersdorf (1930b): 3; Soot-Ryen (1942): 80 [both as *Neosciara refrigerata*]; Tuomikoski (1960): 47; Menzel and Mohrig (2000): 250 [both as *Corynoptera refrigerata*]; Hippa et al. (2003): 502 [as *Claustropyga refrigerata*]. *Taxonomy*: Tuomikoski (1960): 43, 46; Menzel and Mohrig (2000): 250 [both as *Corynoptera refrigerata*]; Hippa et al. (2003): 501 [as *Claustropyga refrigerata*].

Localities. • Norway; without further locality details (= 'Nordnorwegen') • Finnmark; ? Tana, Hangalacærro mountain near Austertana (= 'Finnmark, Caerro') • Troms; Balsfjord, Fjellfrøsvatnet [Fjellfroskvannet] N of Øverbygd (= 'Fjellfrøskvann') • Balsfjord, Øverbygd (= 'Øverbygd') • Kvænangen (= 'Kvaenangen') • Tromsø (= 'Tromsø') • Tromsø, lake Prestvannet on the Tromsøya (= 'Prestvann, Tromsø') • Tromsø, Ramfjorden (= 'Ramfjord') [misinterpretation in Menzel and Mohrig (2000), not 'Ramsøyfjord zwischen den Inseln Smøla und Hitra'].

Ecological note. Habitats not specified. Phenology: Jun.–Aug.

Corynoptera boletiphaga (Lengersdorf, 1940)

Synonyms. = *filiceti* (Frey, 1948); = *geogenia* Tuomikoski, 1960.

Literature. *Faunistics*: Thunes et al. (2004): 72, 85 [as *Corynoptera boletiphaga*]; Hippa et al. (2010): 177 [as *Corynoptera* (*Corynoptera*) *boletiphaga*]. *Taxonomy*: Tuomikoski (1960): 49, 61; Mohrig (1978): 426; Menzel and Mohrig (2000): 250 [all as *Corynoptera boletiphaga*]; Hippa et al. (2010): 176 [as *Corynoptera* (*Corynoptera*) *boletiphaga*].

Localities. • Buskerud; Sigdal, Heimseteråsen (= 'Buskerud, Sigdal'; = 'Sigdal') • Finnmark; Sør-Varanger, near Neiden (= 'nr. Neiden') • Vardø, Vardø (= 'Vardsø').

Ecological note. *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*; birch forest with shrubs. Phenology: Jun.–Aug.

Corynoptera brachypennis (Lengersdorf, 1926)

Literature. *Faunistics*: Lengersdorf (1926b): 4; Lengersdorf (1928–30): 22; Soot-Ryen (1942): 75 [all as *Bradysia brachypennis*]; Mohrig and Mamaev (1970): 353; Mohrig et al. (1978): 398; Menzel and Mohrig (2000): 260 [all as *Corynoptera brachypennis*]. *Taxonomy:* Menzel and Mohrig (2000): 260 [as *Corynoptera brachypennis*].

Localities. • Norway; without further locality details (= 'Norwegia'; = 'Norwegen') • Troms; Tromsø (= 'Tromsö'; = 'Tromsø'; = 'Umgebung Tromsø').

Ecological note. Habitats not specified. Phenology: May.

Corynoptera defecta (Frey, 1948)

Literature. *Faunistics*: Hippa et al. (2010): 174 [as *Corynoptera* (*Corynoptera*) *defecta*]. *Taxonomy*: Tuomikoski (1960): 49, 60 [as *Plastosciara* (*Plastosciara*) *defecta* under *Corynoptera bistrispina*]; Menzel and Mohrig (2000): 250 [in part as *Corynoptera bistrispina*; misidentification]; Hippa et al. (2010): 174 [as *Corynoptera* (*Corynoptera*) *defecta*].

Locality. • Finnmark; Kvalsund, Skaidi (= 'Skvalsund, Skaidi').

Ecological note. Habitat not specified. Phenology: Jul.

Corynoptera fatigans (Johannsen, 1912)

Synonyms. = *bicornis* (Lengersdorf, 1943); = *perpusilla* Winnertz, 1867 [preocc.].

Literature. *Faunistics*: Soot-Ryen (1942): 79 [as *Neosciara perpusilla*]. *Taxonomy*: Menzel and Mohrig (2000): 223; Hippa et al. (2010): 21 [both as *Corynoptera perpusilla*]; Mohrig et al. (2013): 183 [as *Corynoptera fatigans*].

Localities. • Troms; Balsfjord, Fjellfrøsvatnet [Fjellfroskvannet] N of Øverbygd (= 'Fjellfrøskvann') • Tromsø, Ramfjorden (= 'Ramfjord') • Trøndelag; Verdal, Tromsdal SE of Lysthaugen (= 'Tromsdal').

Ecological note. Habitats not specified. Phenology: Jun.–Jul.

Corynoptera flavicauda (Zetterstedt, 1855)

Literature. *Faunistics*: Lengersdorf (1926b): 3 [as *Sciara flavicauda*]; Soot-Ryen (1942): 77 [as *Neosciara flavicauda*]; Menzel et al. (1990): 382 [as *Corynoptera flavicauda*]. *Taxonomy*: Tuomikoski (1960): 48, 52; Menzel and Mohrig (2000): 255 [both as *Corynoptera flavicauda*]; Hippa et al. (2010): 119 [as *Corynoptera* (*Corynoptera*) *flavicauda*].

Localities. • Norway; without further locality details (= 'Norwegen') • Oslo; Oslo, Tøyen (= 'Tøien'; = 'Tøyen') • Troms; Tromsø (= 'Tromsø') • Tromsø, Ramfjorden (= 'Ramfjord').

Ecological note. Habitats not specified. Phenology: Jun.–Jul.

Corynoptera forcipata (Winnertz, 1867)

Literature. *Faunistics*: Köhler et al. (2014): 328 [as *Corynoptera forcipata*]. *Taxonomy*: Tuomikoski (1960): 64, 65; Menzel and Mohrig (2000): 247 [both as *Corynoptera forcipata*].

Localities. • Hordaland; Kvam, point Skeianeset at the N shore of the Hardangerfjorden SW of Indre Ålvik (= 'Kvam, Skeianeset') • Telemark; Drangedal, 300 m SE of Henneseid (= 'Drangedal, Henseid') • Drangedal, woodland Steinknapp SW of Drangedal (= 'Drangedal, Steinknapp').

Faunistic note. The first specimens of *Corynoptera forcipata* from Norway were identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jun.–Jul.

Corynoptera hypopygialis (Lengersdorf, 1926)

Synonyms. = *pachycerca* (Frey, 1948); = *piniphila* (Lengersdorf, 1940).

Literature. *Faunistics*: Tuomikoski (1960): 52 [as *Corynoptera piniphila*]; Köhler et al. (2014): 328 [as *Corynoptera hypopygialis*]. *Taxonomy*: Tuomikoski (1960): 48, 52 [as *Corynoptera piniphila*]; Menzel and Mohrig (1993b): 72; Menzel and Mohrig (2000): 256 [both as *Corynoptera hypopygialis*]; Hippa et al. (2010): 121 [as *Corynoptera* (*Corynoptera*) *hypopygialis*].

Localities. • Finnmark; Vardø, Varangerhalvøya, Persfjorden (= 'Vardö, Persfjord') • Telemark; Drangedal, 300 m SE of Henneseid (= 'Drangedal, Henseid') • Drangedal, woodland Steinknapp SW of Drangedal (= 'Drangedal, Steinknapp').

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jun.–Aug.

Corynoptera irmgardis (Lengersdorf, 1930)

Literature. *Faunistics*: Köhler et al. (2014): 329 [as *Corynoptera irmgardis*]. *Taxonomy*: Tuomikoski (1960): 49, 57; Menzel and Mohrig (2000): 225 [both as *Corynoptera irmgardis*]; Hippa et al. (2010): 100 [as *Corynoptera* (*Corynoptera*) *irmgardis*].

Locality. • Telemark; Porsgrunn, Mule Varde SE of Porsgrunn at the Eidangerfjorden (= 'Porsgrunn, Mule Varde').

Faunistic note. The first specimen of *Corynoptera irmgardis* from Norway was identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jul.

Corynoptera membranigera (Kieffer, 1903)

Synonym. = *trispina* Tuomikoski, 1960.

Literature. *Faunistics*: Köhler et al. (2014): 329 [as *Corynoptera membranigera*]. *Taxonomy*: Tuomikoski (1960): 49, 63 [as *Corynoptera trispina*]; Menzel and Mohrig (2000): 230 [as *Corynoptera membranigera*]; Hippa et al. (2010): 153 [as *Corynoptera* (*Corynoptera*) *membranigera*].

Localities. • Hordaland; Kvam, point Skeianeset at the N shore of the Hardangerfjorden SW of Indre Ålvik (= 'Kvam, Skeianeset') • Telemark; Drangedal, Djupedal 1.5 km SE of Henneseid (= 'Drangedal, Djupedal, Henseid') • Drangedal, woodland Steinknapp SW of Drangedal (= 'Drangedal, Steinknapp') • Vestfold; Larvik, lake Skjærsjø near Kvelde NW of Larvik (= 'Larvik, Skjærsjø').

Faunistic note. The first specimens of *Corynoptera membranigera* from Norway were identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jun.–Jul.

Corynoptera minima (Meigen, 1818)

Synonyms. = *brachyptera* (Lengersdorf, 1941); = *brevipennis* (Walker, 1848).

Literature. *Faunistics*: Zetterstedt (1851): 3749; Siebke (1877): 213 [both as *Sciara minima*]; Soot-Ryen (1942): 78 [as *Neosciara minima*]; Thunes et al. (2004): 85 [as *Corynoptera minima*]; Hippa et al. (2010): 189 [as *Corynoptera* (*Corynoptera*) *minima*]. *Taxonomy*: Tuomikoski (1960): 61, 62 [as *Corynoptera brachyptera* in the discussion of *Corynoptera geogenia*]; Mohrig (1978): 427 [as *Corynoptera brachyptera*]; Menzel and Mohrig (2000): 253 [as *Corynoptera minima*]; Hippa et al. (2010): 188 [as *Corynoptera* (*Corynoptera*) *minima*].

Localities. • Norway; without further locality details (= 'Norwegiæ') • Buskerud; Sigdal, Heimseteråsen (= 'Sigdal') • Oslo; Oslo, Botanisk hage (= 'in horto botanico ad Christianiam'; = 'Botanical Garden, Oslo').

Ecological note. *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*; in botanical gardens. Phenology: Apr., Jun.–Jul.

Corynoptera montana (Winnertz, 1869)

Synonym. = *fusca* (Winnertz, 1871).

Literature. *Faunistics*: Hippa et al. (2010): 57 [as *Corynoptera* (*Corynoptera*) *montana*]. *Taxonomy*: Tuomikoski (1960): 48, 50; Menzel and Mohrig (2000): 256 [both as *Corynoptera montana*]; Hippa et al. (2010): 57 [as *Corynoptera* (*Corynoptera*) *montana*].

Locality. • Finnmark; Kvalsund, Kvalsund (= 'Kvalsund').

Ecological note. Habitat not specified. Phenology: Jul.

Corynoptera penna (Pettey, 1918)

Synonym. = *alneti* Hippa, Vilkamaa & Heller, 2010.

Literature. *Faunistics*: Hippa et al. (2010): 25 [as *Corynoptera* (*Corynoptera*) *alneti*]; Mohrig et al. (2013): 189 [as *Corynoptera* (*Corynoptera*) *penna*]. *Taxonomy*: Hippa et al. (2010): 25 [as *Corynoptera* (*Corynoptera*) *alneti*]; Mohrig et al. (2013): 189 [as *Corynoptera* (*Corynoptera*) *penna*].

Locality. • Finnmark; Sør-Varanger, Kirkenes (= 'Kirkenes').

Ecological note. Forest with birch, willow and bushes. Phenology: Jul.

Corynoptera roederi (Lengersdorf, 1931)

Literature. *Faunistics*: Lengersdorf (1931): 65 [as *Neosciara röderi*; recte *roederi*]; Bertram and Lack (1938): 51 [as *Sciara röderi*; recte *roederi*]; Menzel and Mohrig (1993a): 54 [as *Lycoriella* (*Lycoriella*) *roederi*]; Menzel and Mohrig (2000): 257 [as *Corynoptera roederi*]; Coulson and Refseth (2004): 103; Coulson (2008): 161; Coulson (2013): 154 [all as *Corynoptera röderi*; recte *roederi*]. *Taxonomy*: Menzel and Mohrig (1993a): 54 [as *Lycoriella* (*Lycoriella*) *roederi*]; Menzel and Mohrig (2000): 257 [as *Corynoptera roederi*].

Locality. • Svalbard; Bjørnøya (= 'Bäreninsel'; = 'Bear Island').

Ecological note. Habitats not specified. Phenology: without data.

Corynoptera saetistyla Mohrig & Krivosheina, 1985

Synonym. = *densiseta* Mohrig & Menzel, 1990.

Literature. *Faunistics*: Hippa et al. (2010): 114 [as *Corynoptera* (*Corynoptera*) *saetistyla*]. *Taxonomy*: Menzel and Mohrig (2000): 226 [as *Corynoptera saetistyla*]; Hippa et al. (2010): 113; Mohrig et al. (2013): 192 [both as *Corynoptera* (*Corynoptera*) *saetistyla*].

Localities. • Norway; without further locality details (= 'Norway') • Finnmark; Vardø, Vardø (= 'Vardsø').

Ecological note. Birch forest with shrubs. Phenology: Jul.

Corynoptera sphenoptera Tuomikoski, 1960

Literature. *Faunistics*: Hippa et al. (2010): 35 [as *Corynoptera* (*Corynoptera*) *sphenoptera*]. *Taxonomy*: Tuomikoski (1960): 49, 58; Menzel and Mohrig (2000): 227 [both as *Corynoptera sphenoptera*]; Hippa et al. (2010): 34; Mohrig et al. (2013): 192 [both as *Corynoptera* (*Corynoptera*) *sphenoptera*].

Locality. • Finnmark; Sør-Varanger, Kirkenes (= 'Kirkenes').

Ecological note. Forest with birch, willow and bushes. Phenology: Jul.

Corynoptera spoeckeri (Lengersdorf, 1930)

Synonym. = *venerata* Rudzinski, 1994.

Literature. *Faunistics*: Menzel et al. (1990): 389 [as *Corynoptera spoeckeri*]. *Taxonomy:* Menzel and Mohrig (2000): 249 [as *Corynoptera spoeckeri*].

Locality. • Norway; without further locality details (= 'Norwegen').

Ecological note. Habitat not specified. Phenology: without data.

Corynoptera subtilis (Lengersdorf, 1929)

Synonyms. = *longicornis* (Bukowski & Lengersdorf, 1936); = *signhildae* (Frey, 1948).

Literature. *Faunistics*: Hippa et al. (2010): 93 [as *Corynoptera* (*Corynoptera*) *subtilis*]. *Taxonomy*: Tuomikoski (1960): 49, 57 [as *Corynoptera longicornis*]; Menzel and Mohrig (2000): 228 [as *Corynoptera subtilis*]; Hippa et al. (2010): 92 [as *Corynoptera* (*Corynoptera*) *subtilis*].

Localities. • Finnmark; Båtsfjord, Varangerhalvøya, Ytre Syltefjord 35 km SE of Båtsfjord (= 'Varanger peninsula, Ytre, Syltefjord, 35 km SE Batsfjord') • Sør-Varanger, Svanvik 40 km S of Kirkenes (= 'Svanvik') • Vardø, Vardø (= 'Vardsø') • Nordland; Nessna, Nessna in Helgeland (= 'Nessna').

Ecological note. Mixed forest (pine, birch); birch forest with shrubs; dwarf-shrub tundra. Phenology: Jul.

Corynoptera subvariegata Rudzinski, 1992

Literature. *Faunistics*: Vilkamaa et al. (2013b): 329 [as *Corynoptera subvariegata*]. *Taxonomy*: Menzel and Mohrig (2000): 221; Vilkamaa et al. (2013b): 329 [both as *Corynoptera subvariegata*].

Locality. • Troms; Nordreisa, Sappen (= 'Sappen').

Ecological note. Habitat not specified. Phenology: Jul.

Corynoptera trepida (Winnertz, 1867)

Synonyms. = *clinochaeta* Tuomikoski, 1960; = *subflava* (Lengersdorf, 1941).

Literature. *Faunistics*: Thunes et al. (2004): 72, 85 [as *Corynoptera trepida*]; Hippa et al. (2010): 96 [as *Corynoptera* (*Corynoptera*) *trepida*]. *Taxonomy*: Tuomikoski (1960): 49, 52 [as *Corynoptera clinochaeta*]; Menzel and Mohrig (2000): 230 [as *Corynoptera trepida*]; Hippa et al. (2010): 95; Mohrig et al. (2013): 194 [both as *Corynoptera* (*Corynoptera*) *trepida*].

Localities. • Buskerud; Sigdal, Heimseteråsen (= 'Sigdal') • Hedmark; Trysil, Fulufjellet mountain near Ljørdalen (= Ljørdal, way to Fulufjället') • Rogaland; Finnøy, Finnøy Island, Lasteinvatnet SE of Lastein at the SE coast (= 'RY, Finnöy, Ledsteinvatnet').

Ecological note. *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*. Phenology: Apr.–Aug.

Corynoptera waltraudis Mohrig & Mamaev, 1987

Literature. *Faunistics*: Hippa et al. (2010): 91 [as *Corynoptera* (*Corynoptera*) *waltraudis*]. *Taxonomy*: Menzel and Mohrig (2000): 221 [as *Corynoptera waltraudis*]; Hippa et al. (2010): 91 [as *Corynoptera* (*Corynoptera*) *waltraudis*].

Localities. • Finnmark; Berlevåg, Varangerhalvøya, Kjølnes fyr (= 'Varanger Peninsula, Kjölnes fyr') • Sør-Varanger, Svanvik 40 km S of Kirkenes (= 'Svanvik') • Trøndelag; Oppdal, stream Sprenbekken NE of Kongsvold Fjeldstue in the Drivdalen (= 'Oppdal, Kongsvoll, Sprenbekken').

Ecological note. Mixed forests (pine, birch); meadows at coasts. Phenology: Jul.–Aug.

Cratyna (*Cratyna*) *ambigua* (Lengersdorf, 1934)

Synonyms. = *latiforceps* (Bukowski & Lengersdorf, 1936); = *lignea* (Lengersdorf, 1941); = *prima* (Frey, 1942).

Literature. *Faunistics*: Köhler et al. (2014): 329 [as *Cratyna* (*Cratyna*) *ambigua*]. *Taxonomy*: Tuomikoski (1960): 32 [as *Plastosciara* (*Decembrina*) *latiforceps*]; Menzel and Mohrig (1998): 363; Menzel and Mohrig (2000): 272 [both as *Cratyna* (*Cratyna*) *ambigua*].

Locality. • Hordaland; Kvam, 'Berge landskapsvernområde' [protected landscape area with the Bergsvatnet] NW of Tørvikbygd (= 'Kvam, Berge').

Faunistic note. The first specimen of *Cratyna ambigua* from Norway was identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jun.

Cratyna (*Cratyna*) *atra* Winnertz, 1867

Synonyms. = *corticalis* (Lengersdorf, 1930); = *ericia* (Pettey, 1918); = *lugens* (Johannsen, 1912); = *macclurei* (Shaw, 1941); = *pictiventris* (Kieffer, 1898).

Literature. *Faunistics*: Lengersdorf (1926a): 253 [as *Sciara pictiventris*]; Lengersdorf (1926b): 4; Soot-Ryen (1942): 75 [both as *Plastosciara pictiventris*]. *Taxonomy*: Tuomikoski (1960): 33, 34 [as *Plastosciara* (*Plastosciara*) *pictiventris*]; Menzel and Mohrig (1998): 363; Menzel and Mohrig (2000): 271; Mohrig et al. (2013): 196 [all as *Cratyna* (*Cratyna*) *atra*].

Localities. • Norway; without further locality details (= 'N. = Norwegen') • Finnmark; Alta, Bossekop in Alta (= 'Bosekop').

Ecological note. Habitats not specified. Phenology: May–Jul.

Cratyna (*Cratyna*) *hirticornis* (Meigen, 1818)

Literature. *Faunistics*: Zetterstedt (1851): 3753; Siebke (1877): 214 [both as *Sciara hirticornis*]; Soot-Ryen (1942): 80 [in part as *Scatopsciara vitripennis* (only cited *hirticornis* specimen)]. *Taxonomy*: Menzel and Mohrig (1998): 363; Menzel and Mohrig (2000): 274 [both as *Cratyna* (*Cratyna*) *hirticornis*].

Locality. • Trøndelag; Verdal, former poststation 'Suulstuen' SE of Vuku at the Jamtlandsvegen [road no. 72] (= 'ad Suul'; = 'ad Suul in Værdalen'; = 'Sul, Værdal').

Ecological note. Habitat not specified. Phenology: Jul.

Cratyna (*Cratyna*) *longipennis* (Lengersdorf, 1931)

Literature. *Faunistics*: Lengersdorf (1931): 66 [as *Plastosciara longipennis*]; Menzel and Mohrig (1993a): 56 [as *Plastosciara* (*Plastosciara*) *longipennis*]; Menzel and Mohrig (2000): 275 [as *Cratyna* (*Cratyna*) *longipennis*]. *Taxonomy*: Menzel and Mohrig (1993a): 56 [as *Plastosciara* (*Plastosciara*) *longipennis*]; Menzel and Mohrig (2000): 275 [as *Cratyna* (*Cratyna*) *longipennis*].

Locality. • Svalbard; Bjørnøya (= 'Bäreninsel').

Ecological note. Habitat not specified. Phenology: without data.

Cratyna (*Cratyna*) *uliginosa* (Lengersdorf, 1929)

Literature. *Faunistics*: Thunes et al. (2004): 72, 85 [as *Cratyna uliginosa*]; Heller et al. (2016): 100 [as *Cratyna* (*Cratyna*) *uliginosa*]. *Taxonomy*: Tuomikoski (1960): 32, 33 [as *Plastosciara* (*Decembrina*) *uliginosa*]; Menzel and Mohrig (1998): 363; Menzel and Mohrig (2000): 277; Heller et al. (2016): 98 [all as *Cratyna* (*Cratyna*) *uliginosa*].

Localities. • Akershus; Asker, Sem NW of Asker, Tangen Peninsula at the E side of Semsvannet (= 'Asker, Sem, Tangen') • Aust-Agder; Birkenes, Birkeland, Nordåsen. Lillesand, Lillesand, Furulia • Buskerud; Sigdal, Heimseteråsen (= 'Sigdal') • Finnmark; Sør-Varanger, Neiden • Hedmark; Elverum, Starmoen naturreservat SE of Elverum (= 'Starrmoen NR') • Stor-Elvdal, N of Krokmyra, at a cabin E of Fåfengtjørna (= 'N Krokmyra – Ved hytta, E Fåfengtjørna') • Hordaland; Bergen, Bergen, Fløyen mountain, mountain top Fløyfjellet (= Bergen, Fløyfjellet) • Stord, NE coast of Stord Island, SW part of Hageberg SE of Vistvik (= 'Hageberg SV – SE of Vistvik, NE coast of Stord') • Møre Og Romsdal; Ørskog, Nysætra, near the Nysætervatnet NE of Sjøholt (= 'Nysætra – NE of Sjøholt, near Nysætervatnet') • Sogn Og Fjordane; Jølster, Hamarsvika, Jølstravatnet NE of Vassenden (= 'Hamarsvika – NE of Vassenden, Jølstravatnet') • Vestfold; Larvik, Farmenrøysa mountain NE of Kvelde (= 'Larvik, Farmenrøysa Ø' [correctly: 'Farmenrøysa, east-facing slope']) • Larvik, hill Småås N of Larvik (= 'Larvik, Småås') • Larvik, Nevlungstranda W of Nevlunghavn, beach Mølen (= 'Mølen') • Re, Revetal, Våle.

Ecological note. On sandy beaches and hillsides; east- and south-facing mountain slopes with damp meadows (downy birch, dwarf birch, scots pines, blueberry, rushes, sedges, mosses) and deadwood-rich mixed forests (grey alder, downy birch, rowan, Norway spruce); swampy old spruce forests; in the damp ground vegetation (blueberry, ferns, grasses, mosses) with small springs; *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*. Phenology: May–Sep.

Cratyna (*Cratyna*) *uliginosoides* Heller, Köhler & Menzel, 2016

Literature. *Faunistics*: Heller et al. (2016): 102, 103, 104 [as *Cratyna* (*Cratyna*) *uliginosoides*]. *Taxonomy*: Heller et al. (2016): 102 [as *Cratyna* (*Cratyna*) *uliginosoides*].

Localities. • Akershus; Ullensaker, Sessvollmoen N of Moen (= 'Sessvollmoen – N Moen') • Aust-Agder; Evje og Hornnes, Klepsland • Buskerud; Sigdal, Heimseteråsen (= 'Sigdal, Furukrone Nr. 1' [correctly translated from Norwegian: 'Sigdal, crown of pine tree no. 1']) • Hordaland; Stord, NE coast of Stord Island, SW part of Hageberg SE of Vistvik (= 'Hageberg SV – SE of Vistvik, NE coast of Stord') • Sveio, Langemyr SE of Sveio (= 'Langemyr – SE of Sveio') • Møre Og Romsdal; Molde, N part of Julaksla mountain W of Mek (= 'Julaksla N – W of Mek') • Vestnes, Småøyane SE of Kristisetra, SE of Vestnes (= 'Vestnes, Småøyane, SE of Kristisetra [SE of Vestnes]') • Volda, at the Øyraelva. Sogn Og Fjordane; Høyanger, NE of Austreim at the N side of Sognefjorden, N of hill Furehaugen (= 'N Furehaugen') • Telemark; Bamble, Langøya in the Langesundsfjorden, bay at the E side of island (= 'Langøya – Bukt på østsiden (Langøya I)' [correctly translated from Norwegian: 'Langøya, bay at the eastern side (Langøya I)']) • Tinn, Hovin NW of Kongsberg, Spjeldset SW of Øvre Fjellstul (= 'Hovin, Spjeldset') • Trøndelag; Trondheim, Trondheim, Sommerlystvegen (= 'Sør-Trøndelag, Trondheim, M. Sommerlystvegen – in the garden of nr. 22') • Vestfold; Horten, Borre, Adaltjern naturreservat NW of Bakkenteigen (= 'Adaltjern, Bakkenteigen') • Larvik, hill Småås N of Larvik (= 'Larvik, Småås').

Faunistic note. The first specimens of *Cratyna uliginosoides* from Norway were collected and/or identified in our NTI project 2014–2016. Erroneously Heller et al. (2016) listed the specimen with the no. BAB415020 twice: one time correctly as *Cratyna uliginosa* and one time falsely as paratype of *Cratyna uliginosoides*. Therefore the record of *Cr. uliginosoides* in Hedmark is not reliable.

Ecological note. On woody hillsides and in mountain birch forests; pine forests (e.g. *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*); forests with oak, birch, juniper, blueberry and wavy hair-grass; mixed forests (scots pine, Norway spruce, downy birch, common hazel, juniper) with ferns and mosses; mixed forests on steep mountain slopes with crevices and cavities (scots pine, Norway spruce, downy birch, grey alder, rowan, juniper, heather, blueberry, cotton grass, marsh orchids, rushes, mosses); in bogs, otherwise muddy terrain and deadwood-rich carrs along streams and near rivers (downy birch, grey alder, rowan, juniper, rushes, sedges, mosses, lichens); deadwood-rich deciduous forests (common hazel, grey alder, sycamore maple, rowan, birch, ferns, mosses); in gardens with lawn and some larger trees, also on waste. Phenology: May–Sep.

Cratyna (*Spathobdella*) *colei* (Freeman, 1990)

Literature. *Faunistics*: Tuomikoski (1960): 27; Menzel et al. (1990): 321 [both as *Plastosciara* (*Spathobdella*) *brachialis* sensu Tuomikoski; misidentification]. *Taxonomy*: Tuomikoski (1960): 35, 37 [as *Plastosciara* (*Spathobdella*) *brachialis*; misidentification]; Rudzinski (1994): 17 [as *Plastosciara brachialis* sensu Tuomikoski; misidentification]; Freeman (1990): 52 [as *Plastosciara* (*Spathobdella*) *colei*]; Menzel and Mohrig (2000): 281 [as *Cratyna* (*Spathobdella*) *colei*].

Localities. • Norway; without further locality details (= 'Norwegen') • Finnmark; Tana, Tanafjorden, fjord Vestertana (= 'Finmark, Vestertana') • Tana, upper part of the Langfjordelva (= 'Finmark, am oberen Lauf des Flusses Langfjordelva') • Vardø, Varangerhalvøya, Persfjorden (= 'Finmark, Varangerhalbinsel, Persfjord').

Ecological note. Habitats not specified. Phenology: Aug.

Cratyna (*Spathobdella*) *falcata* (Tuomikoski, 1960)

Literature. *Faunistics*: Tuomikoski (1960): 39; Menzel et al. (1990): 321 [both as *Plastosciara* (*Spathobdella*) *falcata*]. *Taxonomy*: Tuomikoski (1960): 35, 39; Mohrig (1978): 430 [both as *Plastosciara* (*Spathobdella*) *falcata*]; Menzel and Mohrig (2000): 270 [as *Cratyna* (*Spathobdella*) *falcata*].

Localities. • Norway; without further locality details (= 'Norwegen') • Finnmark; Tana, Tanafjorden, fjord Vestertana (= 'Finmark, Vestertana') • Vardø, Varangerhalvøya, Persfjorden (= 'Vardø, Persfjord').

Ecological note. Habitats not specified. Phenology: Aug.

Cratyna (*Spathobdella*) *longispina* (Pettey, 1918)

Synonym. = *tuberculata* (Tuomikoski, 1960).

Literature. *Faunistics*: Tuomikoski (1960): 39 [as *Plastosciara* (*Spathobdella*) *tuberculata*]; Mohrig et al. (2013): 199 [as *Cratyna* (*Spathobdella*) *tuberculata* under *Cratyna* (*Spathobdella*) *longispina*]; Shin et al. (2014): 352 [as *Cratyna* (*Spathobdella*) *longispina*]. *Taxonomy*: Tuomikoski (1960): 37, 39 [as *Plastosciara* (*Spathobdella*) *tuberculata*]; Menzel and Mohrig (2000): 270 [as *Cratyna* (*Spathobdella*) *tuberculata*]; Mohrig et al. (2013): 199 [as *Cratyna* (*Spathobdella*) *longispina*].

Localities. • Norway; without further locality details (= 'Norway') • Finnmark; Tana, upper part of the Langfjordelva between Porsangerfjorden and fjord Vestertana (= 'Finmark, am oberen Lauf des Flusses Langfjordelva zwischen Porsangerfjord und Vestertana'; = 'Finnmark, river Langfjordelva between Porsangerfjord and Vestertana').

Ecological note. Habitats not specified. Phenology: Aug.

Cratyna (*Spathobdella*) *nobilis* (Winnertz, 1867)

Synonyms. = *brachialis* (Winnertz, 1867); = *cunctans* (Winnertz, 1871).

Literature. *Faunistics*: Lengersdorf (1926b): 3 [as *Sciara nobilis*]; Soot-Ryen (1942): 79 [as *Neosciara nobilis*]; Tuomikoski (1960): 39 [as *Plastosciara* (*Spathobdella*) *nobilis*]. *Taxonomy*: Tuomikoski (1960): 35, 38 [as *Plastosciara* (*Spathobdella*) *nobilis*]; Menzel and Mohrig (2000): 280 [as *Cratyna* (*Spathobdella*) *nobilis*].

Localities. • Finnmark; Tana, Tanafjorden, fjord Vestertana (= 'Finmark, Vestertana') • Vardø, Varangerhalvøya, Persfjorden (= 'Finmark, Vardø, Persfjord'; = 'Vardö, Persfjord') • Nordland; Sørfold, Røsvik at the S shore of Sørfolda (= 'Røsvik') • Rogaland; Sandnes, Sandnes S of Stavanger (= 'Sandnes') • Troms; Balsfjord, Labukt (= 'Labukt') • Balsfjord, Fjellfrøsvatnet [Fjellfroskvannet] N of Øverbygd (= 'Fjellfrøskvann') • Tromsø (= 'Tromsø') • Tromsø, lake Prestvannet on the Tromsøya (= 'Prestvann, Tromsø') • Trøndelag; Levanger, Hestøya NW of Alstahaug, southern tip Måkeskjær (= 'Måkeskjær').

Ecological note. Habitats not specified. Phenology: Jul.–Sep.

Cratyna (*Spathobdella*) *perplexa* (Winnertz, 1867)

Synonyms. = *brevicornis* (Tuomikoski, 1957); = *dispar* (Beling, 1885) [preocc.]; = *gregaria* (Beling, 1872); = *pilosa* (Rübsaamen, 1894) [preocc.]; = *socialis* (Winnertz, 1871).

Literature. *Faunistics*: Soot-Ryen (1942): 80 [as *Neosciara socialis*]; Menzel et al. (1990): 323 [as *Plastosciara* (*Spathobdella*) *socialis*]. *Taxonomy*: Tuomikoski (1957): 14 [as *Plastosciara* (*Spathobdella*) *brevicornis*]; Tuomikoski (1960): 35, 37 [as *Plastosciara* (*Spathobdella*) *socialis*]; Menzel and Mohrig (2000): 284 [as *Cratyna* (*Spathobdella*) *perplexa*].

Localities. • Norway; without further locality details (= 'Norwegen') • Troms; Balsfjord, Fjellfrøsvatnet [Fjellfroskvannet] N of Øverbygd (= 'Fjellfrøskvann').

Ecological note. Habitats not specified. Phenology: Jul.

Ctenosciara hyalipennis (Meigen, 1804)

Synonyms. = *annulata* (Meigen, 1818); = *autumnalis* (Winnertz, 1867); = *electa* (Grzegorzek, 1884); = *eximia* (Winnertz, 1867); = *insularis* (Frey, 1936); = *rufa* (Grzegorzek, 1884); = *sordidella* (Zetterstedt, 1851).

Literature. *Faunistics*: Zetterstedt (1851): 3728 [as *Sciara hyalipennis*] and 3729 [as *Sciara sordidella*]; Siebke (1863): 176 [as *Sciara hyalipennis*]; Siebke (1877): 211 [as *Sciara hyalipennis*] and 212 [as *Sciara sordidella*]; Lengersdorf (1926b): 3 [as *Sciara autumnalis*];

Soot-Ryen (1942) 75 [as *Lycoria annulata*]; Tuomikoski (1960): 110; Menzel and Martens (1995): 121; Thunes et al. (2003): 493; Thunes et al. (2004): 72, 85 [all as *Ctenosciara hyalipennis*]. *Taxonomy*: Tuomikoski (1960): 110; Menzel and Mohrig (2000): 295 [both as *Ctenosciara hyalipennis*].

Localities. Norway; without further locality details (= 'Norwegen') • Buskerud; Sigdal, Heimseteråsen (= 'Sigdal') • Finnmark; Alta, Bojobæskihytta in the Stabbursdalen between Karasjok and Alta (= 'Bojobæske') • Alta, Jotkajavre fjellstue on the Finnmarksvidda between Karasjok and Alta (= 'Jotkajavre') • Hordaland; Kvam, Geitaknottene naturreservat between Hardangerfjorden and Bjørnafjorden NE of Gjermundshamn (= 'Kvam, Geitaknottane') • Nordland; Herøy, Måsvær Island (= 'Måsvær') • Oslo; Oslo, Tøyen (= 'ad Christianiam in Tøien'; = 'in Töien prope Christianiam'; = 'in Tøien; = 'Tøyen, Oslo') • Oslo, Ryenberg (= 'monte Ryenbjerg'; = 'Ryenberg, Oslo') • Oppland; Dovre, Hjerkinn NW of Folldal in the Gudbrandsdalen (= 'Hjerkin') • Lesja, Fogstuen on the Dovrefjell plateau (= 'Fogstuen'; = 'Fokstuen', Dovre'; = 'in alpe Dovre ad Fokstuen'; = 'in alpe Dovre'; = 'Dovre') • Troms; Nordreisa, woodland and farm Hallen at the E shore of Reisaelva SE of Storslett (= 'Nordreisa, Hallen') • Trøndelag; Levanger, Skogn SE of Levanger (= 'ad diversorium Thyæs in parochia Skogn'; = 'ad diversorium Thynäs prope Levanger'; = 'Thynäs') [= in the accommodation of Thy in Skogn] • Oppdal, Kongsvoll near Kongsvold Fjeldstue in the Drivdalen (= 'Kongsvold'; = 'in alpe Dovre ad Kongsvold'; = 'in alpe Dovre'; = 'Dovre').

Ecological note. *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*; rearing of adults from larvae found in rotten wood of gray alder (*Alnus incana*). Phenology: Jun.–Sep.

Ctenosciara lutea (Meigen, 1804)

Literature. *Faunistics*: Siebke (1877): 215 [as *Sciara lutea*; in part]; Soot-Ryen (1942): 76 [as *Lycoria lutea*]. *Taxonomy*: Menzel et al. (1990): 329; Menzel and Mohrig (2000): 298 [both as *Ctenosciara lutea*].

Locality. • Oppland; Øyer in the Gudbrandsdalen (= 'in par. [parochia] Øier Gudbrandsdaliæ'; = 'Øier Gudbrandsdaliæ'; = 'Øyer').

Ecological note. Habitat not specified. Phenology: Jul.

Dichopygina aculeata Vilkamaa, Hippa & Komarova, 2004

Literature. *Faunistics*: Leng et al. (2018): 19 [as *Dichopygina aculeata*]. *Taxonomy:* Vilkamaa et al. (2004): 110 [as *Dichopygina aculeata*].

Locality. • Norway; without further locality details (= 'Norway') • Møre Og Romsdal; Vestnes, Småøyane SE of Kristisetra, SE of Vestnes (published as 'Norway'; see faunistic note).

Faunistic note. The first specimens of *Dichopygina aculeata* mentioned in Leng et al. (2018: 19) from 'Norway' (without locality details) were collected and identified in our NTI project 2014–2016, based on the following material: Norway • 2 ♂♂; 'Møre og Romsdal; Vestnes, Småøyane SE of Kristisetra (SE of Vestnes)'; 62.5598N, 06.9944E; 170 m a.s.l.; 22 Aug. 2015; K. Heller leg.; sweep net; bog and deadwood rich carr between road and river (downy birch, grey alder, rowan, juniper, rushes, sedges, mosses, lichens); BFCO; BOLD ID SCINO1252-16 (BAB 421460, bf-sci-00981) and SCINO1253-16 (BAB 421463, bf-sci-00982).

Ecological note. Bog and carr rich in dead wood (downy birch, grey alder, rowan, juniper, rushes, sedges, mosses, lichens). Phenology: Aug.

Dichopygina bernhardi Vilkamaa, Hippa & Komarova, 2004

Literature. *Faunistics*: Leng et al. (2018): 19, 23 [as *Dichopygina bernhardi*]. *Taxonomy*: Vilkamaa et al. (2004): 115 [as *Dichopygina bernhardi*].

Locality. • Hedmark; Elverum, Starmoen naturreservat SE of Elverum (= 'Elverum, S Starmoen'; see faunistic note).

Faunistic note. The first specimen of *Dichopygina bernhardi* mentioned in Leng et al. (2018: 19, 23) was collected and identified in our NTI project 2014–2016, based on the following material: Norway • 1 ♂; 'Hedmark; Elverum, S of Starmoen – I'; 60.8524N, 11.6951E; 205 m a.s.l.; 1–6 Sep. 2014; K.M. Olsen leg.; yellow pan trap; sand pit; BFCO; BOLD ID SCINO736-15 (BAB 410634, bf-sci-00696).

Ecological note. sand pit with open vegetation. Phenology: Sep.

Dichopygina nigrohalteralis (Frey, 1948)

Literature. *Faunistics*: Leng et al. (2018): 19, 23 [as *Dichopygina nigrohalteralis*]. *Taxonomy*: Tuomikoski (1960): 70, 72; Menzel and Mohrig (2000): 259 [both as *Coryno-*

ptera nigrohalteralis]; Vilkamaa et al. (2004): 116; Mohrig et al. (2013): 199 [both as *Dichopygina nigrohalteralis*].

Localities. • Norway; without further locality details (= 'Norway') • Buskerud; Kongsberg, Haugplassen in the Rajedalen (published as 'Norway'; see faunistic note) • Oppland; Sør-Aurdal, SE part of Moldberget naturreservat NW of Nes (published as 'Norway'; see faunistic note) • Trøndelag; Trondheim, Trondheim, Sommerlystvegen (published as 'Norway'; see faunistic note).

Faunistic note. The first specimens of *Dichopygina nigrohalteralis* mentioned in Leng et al. (2018: 19, 23) were collected and/or identified in our NTI project 2014–2016, based on the following material: Norway • 1 ♂; 'Sør-Trondelag; Trondheim, Sommerlystvegen 22'; 63.4049N, 10.3829E; 65 m a.s.l.; 11–25 May 2014; E. Stur and T. Ekrem leg.; Malaise trap; garden with lawn and some larger trees at the top of a wooded hill side; NTNU; BOLD ID GMNWF813-14 • 1 ♂; 'Buskerud; Kongsberg, Haugplassen'; 59.5340N, 09.5677E; 520 m a.s.l.; 26 Sep. 2013; Malaise trap; NW portion of managed meadow with a lot of *Dactylorhiza sambucina* and *Primula veris*; K.M. Olsen leg.; BFCO; BOLD ID SCINO031-14 (bf-sci-00031, BAB 363266) • 1 ♂; 'Oppland; Sør-Aurdal, Moldberget E'; 60.6199N, 09.8935E; 308 m a.s.l.; 3 Jun. 2014; K. Heller leg.; sweep net; coniferous forest; BFCO; BOLD ID SCINO192-15 (bf-sci-00193, BAB 374132).

Ecological note. Managed meadows dominated by *Dactylorhiza sambucina* and *Primula veris*; gardens with lawn on wooded hills; coniferous forests. Phenology: May–Jun., Aug.–Sep.

Dichopygina ramosa Vilkamaa, Hippa & Komarova, 2004

Literature. *Faunistics*: Leng et al. (2018): 19 [as *Dichopygina ramosa*]. *Taxonomy:* Vilkamaa et al. (2004): 119 [as *Dichopygina ramosa*].

Localities. • Norway; without further locality details (= 'Norway') • Akershus; Nesodden, Blåbærstien in Nesoddtangen (published as 'Norway'; see faunistic note) • Telemark; Kragerø, pond Frydensborgtjenna in Kragerø (published as 'Norway'; see faunistic note).

Faunistic note. The first specimens of *Dichopygina ramosa* mentioned in Leng et al. (2018: 19) were identified in our NTI project 2014–2016, based on the following sciarid material: Norway • 1 ♂; 'Akershus; Nesodden, Blåbærstien'; 59.8523N, 10.6698E; 25 March–7 Jun. 2012; O.J. Lønnve leg.; Malaise trap; residential area; BFCO; BOLD ID SCINO235-15 (bf-sci-00237, BAB 374552) • 1 ♂; 'Telemark; Kragerø, Frydensborgtjenna'; 58.8748N, 09.3992E; 4 m a.s.l.; 17.08–28.09.2009; S. Olberg and A.E. Laugsand leg.; Malaise trap; pond with enhanced growth of aquatic vegetation (probably eutrophic); BFCO; BOLD ID SCINO497-15 (bf-sci-00500, BAB 393143).

Ecological note. At ponds with rich aquatic vegetation; in settled areas. Phenology: Mar.–Jun., Aug.–Sep.

Dolichosciara flavipes (Meigen, 1804)

Synonyms. = *flavipes* var. *nigrithorax* (Strobl, 1898); = *fugax* (Grzegorzek, 1884).

Literature. *Faunistics*: Zetterstedt (1852): 4355 [as *Sciara flavipes*]; Siebke (1877): 214 [as *Sciara flavipes* Panzer; recte Meigen] and 215 [in part as *Sciara lutea*; misidentification]; Soot-Ryen (1942): 75 [as *Phorodonta flavipes*]. *Taxonomy*: Tuomikoski (1960): 108, 109; Mohrig and Menzel (1994): 186; Menzel and Mohrig (2000): 440 [all as *Phytosciara* (*Dolichosciara*) *flavipes*]; Vilkamaa (2000): 48 [as *Dolichosciara flavipes*].

Localities. • Oslo; Oslo, Botanisk hage (= 'in horto botanico ad Christianiam'; = 'Botanical Garden, Oslo') • Oslo, Tøyen (= 'ad Töien') • Trøndelag; Oppdal, Kongsvoll near Kongsvold Fjeldstue in the Drivdalen (= 'ad Kongsvold in alpe Dovre'; = 'Kongsvold, Dovre'; = 'Dovre').

Ecological note. In botanical gardens. Phenology: Aug.–Sep.

Epidapus (*Epidapus*) *alnicola* (Tuomikoski, 1957)

Literature. *Faunistics*: Tuomikoski (1960): 100 [as *Caenosciara alnicola*]; Menzel et al. (1990): 347 [as *Caenosciara* (*Bonessia*) *alnicola*]. *Taxonomy*: Tuomikoski (1957): 16 [as *Vimmeria alnicola*]; Tuomikoski (1960): 100 [as *Caenosciara alnicola*]; Mohrig (1970): 144 [as *Caenosciara* (*Bonessia*) *alnicola*]; Menzel and Mohrig (2000): 319 [as *Epidapus* (*Epidapus*) *alnicola*].

Localities. • Norway; without further locality details (= 'Norwegen') • Troms; Nordreisa, woodland and farm Hallen on the E shore of Reisaelva SE of Storslett (= 'Troms, Hallen').

Ecological note. From rotten wood of gray alder (*Alnus incana*). Phenology: without data.

Epidapus (*Epidapus*) *gracilis* (Walker, 1848)

Synonyms. = *aptera* (Kieffer, 1903); = *edwardsi* Freeman, 1983; = *gracilis* (Winnertz, 1853) [preocc.]; = *longicornis* (Lengersdorf, 1941); = *pulicina* (Frey, 1952).

Literature. *Faunistics*: Thunes et al. (2004): 72, 85 [as *Epidapus gracilis*]; Köhler et al. (2014): 329 [as *Epidapus* (*Epidapus*) *gracilis*]. *Taxonomy*: Tuomikoski (1960): 97, 98; Mohrig (1969): 54 [both as *Epidapus* (*Epidapus*) *gracilis* (Winnertz)]; Freeman (1983): 170 [as *Epidapus edwardsi*]; Menzel and Mohrig (2000): 319 [as *Epidapus* (*Epidapus*) *gracilis* (Walker)].

Localities. • Buskerud; Sigdal, Heimseteråsen (= 'Sigdal') • Vestfold; Larvik, lake Skjærsjø near Kvelde NW of Larvik (= 'Larvik, Skjærsjø').

Ecological note. *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*; oak canopies of *Quercus robur*. Phenology: Jul.

Hemineurina abbrevinervis (Holmgren, 1869)

Literature. *Faunistics*: Holmgren (1869): 16, 54; Lengersdorf (1930a): 56 [both as *Sciara abbrevinervis*]; Frey (1948): 35, 85, 91 [as *Bradysia* (*Bradysia*) *abbrevinervis*]; Tuomikoski (1967): 48; Menzel and Mohrig (2000): 402; Coulson and Refseth (2004): 103; Coulson (2008): 161; Coulson (2013): 154 [all as *Lycoriella* (*Hemineurina*) *abbrevinervis*]. *Taxonomy*: Tuomikoski (1967): 48; Menzel and Mohrig (2000): 402 [both as *Lycoriella* (*Hemineurina*) *abbrevinervis*]; Vilkamaa and Menzel (2019): 50 [as *Hemineurina abbrevinervis*].

Localities. • Svalbard; Spitsbergen, Kobbefjorden at the NW coast near the Danskøya (= 'in Spetsbergia ad Kobbebay'; = 'Spetsbergia ad Kobbebay'; = 'Spetsbergia, Kobbebay'; = 'Spitzbergen bei Kobbefjorden') • Spitsbergen, without further locality details (= 'Spetsbergen'; = 'Spitsbergen'; = 'Spitzbergen').

Ecological note. Bird cliffs. Phenology: Jul.

Hemineurina conspicua (Winnertz, 1867)

Synonym. = *polychaeta* (Pettey, 1918)

Literature. *Faunistics*: Lengersdorf (1926b): 4 [as *Sciara conspicua*]; Soot-Ryen (1942): 77 [as *Neosciara conspicua*]; Menzel et al. (1990): 335 [as *Lycoriella* (*Hemineurina*) *conspicua*]. *Taxonomy*: Tuomikoski (1960): 75, 76; Menzel and Mohrig (2000): 400; Mohrig et al. (2013): 210 [all as *Lycoriella* (*Hemineurina*) *conspicua*]; Vilkamaa and Menzel (2019): 50 [as *Hemineurina conspicua*].

Localities. • Norway; without further locality details (= 'Norwegen') • Hordaland; Modalen, Mo (= 'Mo') • Oslo; Oslo, Tøyen (= 'Tøien'; = 'Tøyen') • Troms; Tromsø (= 'Tromsøy').

Ecological note. Habitats not specified. Phenology: Aug.–Sep.

Hemineurina inflata (Winnertz, 1867)

Synonyms. = *difficilis* (Grzegorzek, 1884); = *interdicta* (Grzegorzek, 1884); = *nitens* (Winnertz, 1867); = *subvenosa* (Mohrig & Krivosheina, 1983).

Literature. *Faunistics*: Zetterstedt (1851): 3758; Siebke (1877): 214 [both as *Sciara venosa*; misidentification]; Lengersdorf (1926b): 3 [as *Sciara inflata*]; Soot-Ryen (1942): 80 [in part as *Neosciara vittigera*; misidentification (only cited *inflata* specimens)]; Tuomikoski (1960): 77 [as *Lycoriella* (*Hemineurina*) *venosa* sensu Frey; misidentification]. *Taxonomy*: Tuomikoski (1960): 75, 77 [as *Lycoriella* (*Hemineurina*) *venosa* sensu Frey; misidentification]; Menzel and Mohrig (2000): 403 [as *Lycoriella* (*Hemineurina*) *inflata*]; Vilkamaa and Menzel (2019): 50 [as *Hemineurina inflata*].

Localities. • Nordland; Sømna, Sømnes at the bay Sømnesvika N of Vik (= 'Sømnes') • Sørfold, Røsvik at the S shore of Sørfolda (= 'Røsvik') • Oslo; Oslo,

Tøyen (= 'in Töien prope Christianiam'; = 'ad Christianiam in Tøien'; = 'Tøyen, Oslo') • Troms; Balsfjord/Målselv/Tromsø [former municipality 'Malangen'] (= 'Malangen') • Tromsø (= 'Tromsø') • Tromsø, Ramfjorden (= 'Ramfjord') • Trøndelag; Verdal, former poststation 'Suulstuen' SE of Vuku at the Jamtlandsvegen [road no. 72] (= 'in jugo alpino Norvegiæ ad Suulstuen'; = 'ad Suulstuen Værdaliæ'; = 'ad Suul Værdaliæ'; = 'Sulstuen, Værdal'; = 'ad Suul').

Ecological note. On mountains. Phenology: Jun.–Aug.

Hemineurina modesta (Staeger, 1840)

Synonyms. = *arctica* (Holmgren, 1869); = *conglomerata* (Pettey, 1918); = *ecalcarata* (Holmgren, 1869); = *frigida* (Holmgren, 1869) [preocc.]; = *fumatella* (Lundbeck, 1898); = *globiceps* (Becher, 1886); = *groenlandica* (Holmgren, 1872); = *holmgreni* (Rübsaamen, 1894).

Literature. *Faunistics*: Holmgren (1869): 16, 52 [as *Sciara arctica* and *Sciara ecalcarata*] and 15, 53 [as *Sciara frigida*]; Becher (1886): 62; Edwards (1923): 236 [both as *Sciara globiceps*]; Edwards (1925): 354; Summerhayes and Elton (1928): 209, 220, 221, 225 [both as *Sciara holmgreni*]; Lengersdorf (1930a): 55 [as *Sciara arctica* and *Sciara frigida*]; Lengersdorf (1930c): 52 [as *Sciara groenlandica*]; Edwards (1935): 533; Bertram and Lack (1938): 51 [both as *Sciara holmgreni*]; Frey (1948): 91 [as *Bradysia* (*Hemineurina*) *modesta* var. *frigida*]; Tuomikoski (1967): 48 [as *Lycoriella* (*Hemineurina*) *modesta*], 49 [as *Sciara acrctica*] and 50 [as *Sciara ecalcarata*]; Menzel et al. (1990): 337 [as *Lycoriella* (*Hemineurina*) *modesta*]; Menzel and Mohrig (2000): 405 [as *Sciara acrctica*, *Sciara ecalcarata* and *Sciara frigida* under *Lycoriella* (*Hemineurina*) *modesta*] and 198 [in the discussion of *Camptochaeta delicata*; misidentification]; Coulson and Refseth (2004): 103 [as *Lycoriella* (*Hemineurina*) *globiceps* and *Lycoriella* (*Hemineurina*) *modesta*]; Thunes et al. (2004): 85 [as *Lycoriella globiceps*]; Coulson (2008): 161; Coulson (2013): 154 [both as *Lycoriella* (*Hemineurina*) *modesta*]; ? Coulson et al. (2013): 6 [as *Lycoriella* (*Hemineurina*) sp.]. *Taxonomy*: Tuomikoski (1960): 75, 77; Menzel and Mohrig (2000): 405; Mohrig et al. (2013) 213 [all as *Lycoriella* (*Hemineurina*) *modesta*]; Vilkamaa and Menzel (2019): 10, 51 [as *Hemineurina modesta*].

Localities. • Norway; without further locality details (= 'Norwegen') • Buskerud; Sigdal, Heimseteråsen (= 'Sigdal').

• Jan Mayen: without further locality details (= 'Jan Mayen'; = 'Jan Mayen Island') • Svalbard; Bjørnøya (= 'Bear Island') • Bjørnøya, bay Austervåg at the E coast (= 'bei Austervåg (B.)') • Bjørnøya, mining camp Tunheim at the NE coast (= 'Bear Island, Tunheim') • Bjørnøya, Røyevatnet in the SW part of island (= 'Bear Island, Röyevatnet') • Spitsbergen, Amsterdamøya, Smeerenburg at the SE coast (= 'in Spetsbergia ad Smeerenberg'; = 'Spitzbergen, Smeerenberg') • Spitsbergen, Bellsund at the W coast (= 'in Spetsbergia ad Belsund') • Spitsbergen, Edgeøya at the Storfjorden, ? Kvalpynten at the N side of the mouth of Tjuvfjorden (= 'in Spetsbergia ad Whales Point in Storfjorden') • Spitsbergen, Grønfjorden (= 'in Spetsbergia ad Green Harbour'; = 'Spetsbergia, Green Harbour'; = 'Spitzbergen, Green Harbour'; = 'Grønfjorden') • Spitsber-

gen, Grønfjorden, Barentsburg (= 'Barentsburg'; = 'bei Barentsburg (S.)'; = 'Grønfjord, Barentsburg') • Spitsbergen, Haakon VII Land, Gerdøya in Dyrevika at the head of Kongsfjorden (= 'Head of King's Bay, Deer Bay Island') • Spitsbergen, Haakon VII Land, Reinsdyrflya, at the Liefdefjorden (= 'Spitsbergen, Reindeer Peninsula, at the Liefde Bay') • Spitsbergen, Hiorthhamn [former mining settlement] at the E side of Adventfjorden (= 'Hjorthhamn'; = 'Hiorthhamn (S.), bei Residensen') • Spitsbergen, Kobbefjorden at the NW coast near the Danskøya (= 'in Spetsbergia ad Kobbebay'; = 'in Spetsbergia ad Kobbebay [Spitzbergen, bei Kobbefjorden]'; = 'Kobbebay'; = 'Kobbefjorden') • Spitsbergen, Nordaustlandet (= 'Spitsbergen, North-East Land') • Spitsbergen, Nordenskiöld Land, Mälardalen at the N side of the mouth of Adventelva (= 'Mælardalen'; = 'Maelardalen [Mælardalen]') • Spitsbergen, without further locality details (= 'Spetsbergen; = 'Spitzbergen'; = 'Spitsbergen').

Ecological note. Lichen-moss heath; bogs (grass-swamp); mats of *Luzula confusa* and mosses; in hollows and slight crevices of erratic boulders with mosses and lichens; plant community 'fjaeldmark' (= feldmark; mountain field) with phanerogams, mosses, lichens and *Salix polaris*; in mosses and lichens; on grass-leaves, moss-hummocks and hard snowdrifts near streams; among stones; from plants in stony areas and on large boulders; mixture of discarded greenhouse soil and manure from animal houses (all Svalbard records); *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*. Phenology: Jun.–Sep.

Hemineurina postconspicua (Mohrig, 1985)

Literature. *Faunistics*: Hågvar et al. (2007): 67; Coulson (2008): 161; Coulson (2013): 154 [all as *Lycoriella postconspicua*]. *Taxonomy*: Mohrig (1985): 236 [as *Lycoriella postconspicua*]; Menzel and Mohrig (2000): 385 [as *Lycoriella* (*Hemineurina*) *postconspicua*]; Vilkamaa and Menzel (2019): 51 [as *Hemineurina postconspicua*].

Localities. • Svalbard; Spitsbergen, Kapp Linné by the Isfjord, Isfjord Radio station (= 'Svalbard, Isfjord Radio') • Spitsbergen, Ny-Ålesund.

Ecological note. On dry ridges and slopes, with *Saxifraga oppositifolia*, mosses and lichens; in the ground vegetation with *Poa* spec., *Oxyria digyna* and *Deschampsia cespitosa*. Phenology: Jun.–Jul.

Hemineurina venosa (Staeger, 1840)

Synonyms. = *crassivenosa* (Lengersdorf, 1943); = *lepida* (Winnertz, 1867); = *praevenosa* (Mohrig & Menzel, 1990).

Literature. *Faunistics*: Lengersdorf (1926b): 3 [as *Sciara lepida*]; Soot-Ryen (1942): 78 [as *Neosciara lepida*]. *Taxonomy*: Menzel et al. (1990): 337 [as *Lycoriella* (*Hemineurina*) *praevenosa*]; Menzel and Mohrig (2000): 407 [as *Lycoriella* (*Hemineurina*) *venosa*]; Vilkamaa and Menzel (2019): 51 [as *Hemineurina venosa*].

Locality. • Troms; Målselv, farm Frihetsli in the Dividalen 32 km SE of Øverbygd (= 'Frihetsli').

Ecological note. Habitat not specified. Phenology: Jul.–Aug.

Leptosciarella (*Hirtipennia*) *hirtipennis* (Zetterstedt, 1838)

Synonyms. = *absurda* (Winnertz, 1867); = *hirtipennis* var. *minor* (Frey, 1948); = *jugicola* (Strobl, 1898); = *parcepilosa* var. *opacicollis* (Strobl, 1902).

Literature. *Faunistics*: Zetterstedt (1838): 826; Zetterstedt (1851): 3731; Siebke (1877): 212 [all as *Sciara hirtipennis*]; Lengersdorf (1926b): 9; Soot-Ryen (1942): 75 [both as *Trichosia hirtipennis*]; Menzel et al. (1990): 316 [as *Trichosia* (*Leptosciarella*) *hirtipennis*]. *Taxonomy*: Tuomikoski (1960): 20, 21 [as *Trichosia* (*Leptosciarella*) *hirtipennis*]; Mohrig and Menzel (1997): 45; Menzel and Mohrig (2000): 369 [both as *Leptosciarella* (*Hirtipennia*) *hirtipennis*].

Localities. • Norway; without further locality details (= 'Nord-Norwegen') • Nordland; Narvik, Bjerkvik at the Ofotfjorden NE of Narvik (= 'in Nordlandia ad diversorium Bjørkvik; = 'ad diversorium Björkvik juxla Ofodenfjoid'; = 'ad Bjŏrkvik Nordlandiae'; = 'Bjørkvik, Ofoten'; = 'Lappland (Norwegen)' [misinterpretation in Menzel et al. (1990), correctly 'Nordland (Norwegen)']).

Ecological note. Habitats not specified. Phenology: Jul.

Leptosciarella (*Leptosciarella*) *fuscipalpa* (Mohrig & Mamaev, 1979)

Literature. *Faunistics*: Mohrig and Menzel (1997): 65; Komarova (2016a): 197; Komarova (2016b): 256 [all as *Leptosciarella* (*Leptosciarella*) *fuscipalpa*]. *Taxonomy*: Mohrig and Menzel (1997): 65; Menzel and Mohrig (2000): 360 [both as *Leptosciarella* (*Leptosciarella*) *fuscipalpa*].

Localities. • Norway; without further locality details (= 'Norwegia'; = 'Norway') • Finnmark; Berlevåg/Nesseby/Tana/Vadsø/Vardø, Varangerhalvøya (= 'Finmark, Waranger-Halbinsel') • Østfold; Hvaler, Hvaløerne (= 'Hvaløerne').

Ecological note. Habitats not specified. Phenology: Jul.

Leptosciarella (*Leptosciarella*) *hispida* (Winnertz, 1867)

Literature. *Faunistics*: Zetterstedt (1871): 3721 [as *Sciara trochanterata*; in part misidentification]; Lengersdorf (1926b): 3 [as *Sciara hispida*]; Lengersdorf (1930a): 49; Lengersdorf (1941): 48 [both as *Sciara hispida* under *Sciara trochanterata*; misidentification]; Soot-Ryen (1942): 76 [in part as *Lycoria trochanterata*; misidentification (only cited specimen from 'Festningsstuen')]. *Taxonomy*: Lengersdorf (1941): 48 [as *Sciara hispida*]; Mohrig and Menzel (1997): 63; Menzel and Mohrig (2000): 366 [both as *Sciara hispida* under *Leptosciarella* (*Leptosciarella*) *rejecta*; misidentification].

Localities. • Finnmark; Porsanger, farm Fæstningsstua near Lævnasjarvi W of Skoganvarre (= 'Fæstningstuen'; = 'Festningsstuen') • Oslo; Oslo, Tøyen (= 'in Töien prope Christianiam'; = 'Toiën'; = 'Toien') • Trøndelag; Meråker, NE of mountain Kølhaugan near the Swedish border [maybe a collecting place in Sweden: Jämtland, village Skalstugan close to the border with Norway] (= 'in Jemtlandia ad diversorium Skalstugan'; = 'Skalstuga').

Ecological note. Habitats not specified. Phenology: Jun.–Aug.

Leptosciarella (*Leptosciarella*) *nudinervis* (Tuomikoski, 1960)

Literature. *Faunistics*: Mohrig and Menzel (1997): 81 [as *Leptosciarella* (*Leptosciarella*) *nudinervis*]. *Taxonomy*: Tuomikoski (1960): 21, 25 [as *Trichosia* (*Leptosciarella*) *nudinervis*]; Mohrig and Menzel (1997): 81; Menzel and Mohrig (2000): 365 [both as *Leptosciarella* (*Leptosciarella*) *nudinervis*].

Locality. • Finnmark; Båtsfjord, Varangerhalvøya, Syltefjorden (= 'Varranger-Halbinsel, Sylkefjord').

Ecological note. Habitats not specified. Phenology: Jul.

Leptosciarella (*Leptosciarella*) *pilosa* (Staeger, 1840)

Literature. *Faunistics*: Siebke (1863): 176; Siebke (1877): 217; Lengersdorf (1926b): 3 [all as *Sciara pilosa*]; Soot-Ryen (1942): 76 [as *Lycoria pilosa*]; Menzel et al. (1990): 314 [as *Trichosia* (*Leptosciarella*) *pilosa*]; Komarova (2016a): 197; Komarova (2016b): 256 [both as *Leptosciarella* (*Leptosciarella*) *pilosa*]. *Taxonomy*: Tuomikoski (1960): 21, 25 [as *Trichosia* (*Leptosciarella*) *scutellata* sensu Frey; misidentification]; Mohrig and Menzel (1997): 72; Menzel and Mohrig (2000): 365 [both as *Leptosciarella* (*Leptosciarella*) *pilosa*].

Localities. • Norway; without further locality details (= 'Norwegia'; = 'Norway'; = 'Norwegen') • Finnmark; Alta, Jotkajavre fjellstue on the Finnmarksvidda between Karasjok and Alta (= 'Jotkajavre') • Trøndelag; Oppdal, Kongsvoll near Kongsvold Fjeldstue in the Drivdalen (= 'ad Kongsvold in alpe Dovre'; = 'Kongsvold'; = 'in alpe Dovre') • Troms; Balsfjord, Fjellfrøsvatnet [Fjellfroskvannet] N of Øverbygd (= 'Fjellfrøskvann') • Balsfjord, Øverbygd (= 'Øverbygd').

Ecological note. Habitats not specified. Phenology: Jul.

Leptosciarella (*Leptosciarella*) *scutellata* (Staeger, 1840)

Synonyms. = *bilineata* (Staeger, 1840); = *elegans* (Winnertz, 1867); = *inhonesta* (Winnertz, 1867); = *interrupta* (Strobl, 1895); = *obscuripennis* (Winnertz, 1867).

Literature. *Faunistics*: Siebke (1877): 210 [as *Sciara bilineata*]; Soot-Ryen (1942): 76 [as *Lycoria scutellata*]. *Taxonomy*: Tuomikoski (1960): 21 [as *Trichosia* (*Leptoscia-*

rella) *elegans*]; Mohrig and Menzel (1997): 58; Menzel and Mohrig (2000): 361 [both as *Leptosciarella* (*Leptosciarella*) *scutellata*].

Locality. • Oslo; Oslo, Bekkelaget (= 'Bækkelaget ad Christianiam'; = 'Bekkelaget').

Ecological note. Habitat not specified. Phenology: May.

Leptosciarella (*Leptosciarella*) *trochanterata* (Zetterstedt, 1851)

Synonyms. = *coarctata* (Winnertz, 1867); = *hirsutissima* (Strobl, 1895); = *prisca* (Winnertz, 1867); = *saltuum* (Winnertz, 1868); = *splendens* (Winnertz, 1867) [*Sciara*].

Literature. *Faunistics*: Zetterstedt (1871): 3721; Siebke (1877): 211 [both as *Sciara trochanterata*; in part]; Soot-Ryen (1942): 76 [as *Lycoria trochanterata*; in part]; Menzel et al. (1990): 314 [as *Trichosia* (*Trichosia*) *trochanterata*; in part]; Mohrig and Menzel (1997): 54; Menzel and Mohrig (2000): 367 [both as *Leptosciarella* (*Leptosciarella*) *trochanterata*]. *Taxonomy*: Tuomikoski (1960): 21, 24 [as *Trichosia* (*Leptosciarella*) *coarctata*]; Mohrig and Menzel (1997): 54; Menzel and Mohrig (2000): 367 [both as *Leptosciarella* (*Leptosciarella*) *trochanterata*].

Localities. • Oslo; Oslo, Botanisk hage (= 'in horto botanico ad Christianiam') • Oslo, Tøyen (= 'in Töien prope Christianiam'; = 'Töien nahe Kristiania [Oslo]'; = 'Töien [Oslo]'; = 'Tøien, Oslo') • Trøndelag; Verdal, near Sul, between Kongsstuggu [formerly 'Kongsstuen fjeldstue'] and Høyfjellsbro (= 'inter Kongsstuen et Höjfjeldbroe'; = 'Kongstuen und Höjfjeldroe'; = 'Höjfjeldbroe'; = 'between Kongsstuen and Høifjellsbro').

Ecological note. On mountains; in botanical gardens. Phenology: Jun.–Jul.

Leptosciarella (*Leptosciarella*) *truncata* (Tuomikoski, 1960)

Literature. *Faunistics*: Tuomikoski (1960): 27 [as *Trichosia* (*Leptosciarella*) *truncata*]; Mohrig and Menzel (1997): 80; Menzel and Mohrig (2000): 368; Komarova (2016a): 198; Komarova (2016b): 258 [all as *Leptosciarella* (*Leptosciarella*) *truncata*]. *Taxonomy*: Tuomikoski (1960): 21, 27 [as *Trichosia* (*Leptosciarella*) *truncata*]; Mohrig and Menzel (1997): 80; Menzel and Mohrig (2000): 368 [both as *Leptosciarella* (*Leptosciarella*) *truncata*].

Localities. • Norway; without further locality details (= 'Norwegia'; = 'Norway') • Finnmark; Båtsfjord, Varangerhalvøya, Syltefjorden (= 'Varranger-Halbinsel, Syltefjord') • Tana, upper part of the Langfjordelva E of the Porsangerfjorden (= 'Finmark, Langfjordelva' [= 'Finmark, am oberen Lauf des Flusses Langfjordelva östlich vom Porsangerfjord'; = 'Oberlauf des Flusses Langfjordelva östlich vom Porsangerfjord']).

Ecological note. Habitats not specified. Phenology: Jun., Aug.

Lycoriella brevipila Tuomikoski, 1960

Literature. *Faunistics*: Tuomikoski (1960): 82 [as *Lycoriella* (*Lycoriella*) *brevipila*]. *Taxonomy*: Tuomikoski (1960): 79, 82 [as *Lycoriella* (*Lycoriella*) *brevipila*]; Menzel and

Mohrig (2000): 393 [as *Lycoriella* (*Lycoriella*) *brevipila* under *Lycoriella* (*Lycoriella*) *ingenua*; misidentification]; Menzel and Heller (2007): 220 [as *Lycoriella* (*Lycoriella*) *brevipila*]; Vilkamaa and Menzel (2019): 51 [as *Lycoriella brevipila*].

Locality. • Troms; Nordreisa, Sappen (= 'Sappen').

Ecological note. Habitat not specified. Phenology: Aug.

Lycoriella ingenua (Dufour, 1839)

Synonyms. = *caesar* (Johannsen, 1929); = *bigoti* (Laboulbène, 1863); = *celer* (Winnertz, 1867); = *debilis* (Winnertz, 1867); = *decliva* (Winnertz, 1867); = *flammulinae* (Sasakawa, 1983); = *flaviventris* (Winnertz, 1867); = *humilis* (Winnertz, 1867); = *jauva* (Rapp, 1946); = *mali* (Fitch, 1856); = *mycorum* (Frey, 1948); = *pauciseta* (Felt, 1897); = *pleuroti* Yang & Zhang, 1987; = *ramicola* (Kieffer, 1919), = *segnis* (Winnertz, 1871); = *solani* (Winnertz, 1871); = *velox* (Winnertz, 1867); = *venusta* (Winnertz, 1867); = *womersleyi* (Séguy, 1940).

Literature. *Faunistics*: Siebke (1863): 177 [as *Sciara fenestralis*; misidentification]; Siebke (1877): 214 [as *Sciara fenestralis*; misidentification] and 215 [as *Sciara pectoralis*; misidentification]; Lengersdorf (1930a): 51 [as *Sciara solani* under *Sciara sordidella*; misidentification]; Soot-Ryen (1942): 77 [as *Neosciara fenestralis*; misidentification]; Kjærandsen (1993): 155 [as *Lycoriella* cf. *solani*]; Komarov (2009): 102; Menzel and Müller (2011): 164 [both as *Lycoriella* (*Lycoriella*) *castanescens*]; Menzel et al. (2013): 291 [as *Lycoriella* (*Lycoriella*) *ingenua*]; Østbye and Lauritzen (2013): 46, 48 [as *Lycoriella* cf. *solani*]; Köhler et al. (2014): 329 [as *Lycoriella* (*Lycoriella*) *ingenua*]. *Taxonomy*: Tuomikoski (1960): 79, 84 [as *Lycoriella* (*Lycoriella*) *solani*]; Menzel and Mohrig (2000): 393; Menzel et al. (2013): 291; Mohrig et al. (2013): 211 [all as *Lycoriella* (*Lycoriella*) *ingenua*]; Broadley et al. (2018): 215; Vilkamaa and Menzel (2019): 52 [both as *Lycoriella ingenua*].

Localities. • Norway; without further locality details (= 'Norwegen'; = 'Norway'; = 'Norwegia'; = 'almindelig overalt' [ordinary everywhere]) • Akershus: Eidsvoll, Minnesund (= 'ad Eidsvold'; = 'ad Eidsvoll'; = 'Eidsvoll') • Hordaland; Bergen, Gymmeland (= 'Bergen, Gymmeland, GR [gruve] 1:50M') • Osterøy, Nonås mine filed (= 'Osterøy, Nonås, gruve 1') • Nordland; Øksnes, in the NW part of Langøya of the Vesterålen archipelago (= 'Øksnes') • Oppland; Dovre, Hjerkinn NW of Folldal in the Gudbrandsdalen (= 'in alpe Dovre, ad Jerkin'; = 'Hjerkin, Dovre') • Lesja, Fogstuen on the Dovrefjell plateau (= 'in alpe Dovre ad Fokstuen'; = 'Dovre ad Fogstuen'; = 'Fokstuen, Dovre') • Oslo; Oslo, Botanisk hage (= 'Botanical Garden, Oslo') • Oslo, Tøyen (= 'ad Christianiam in Tøien'; = 'Tøyen, Oslo') • Telemark; Drangedal, Djupedal 1.5 km SE of Henneseid (= 'Drangedal, Djupedal, Henseid') • Troms; Balsfjord, Fjellfrøsvatnet [Fjellfroskvannet] N of Øverbygd (= 'Fjellfrøskvann') • Karlsøy, Finnkroken at the SW tip of Reinøya (= 'Finnkroken') • Tromsø (= 'Tromsø') • Tromsø, Ramfjorden (= 'Ramfjord') • Trøndelag; Levanger, Skogn SE of Levanger (= 'Thynas'; = 'Tynes') [= in the accommodation of Thy in Skogn] • Oppdal, Kongsvoll near Kongsvold Fjeldstue in the Drivdalen (= 'in alpe Dovre ad Kongsvold'; = 'Kongsvold, Dovre'; = 'ad Kongsvold').

Ecological note. Oak canopies of *Quercus robur*; in houses; as well as in caves and mines. Phenology: Jun.–Sep.; Mar. and Jul. in caves and mines.

Lycoriella latilobata Menzel & Mohrig, 2000

Literature. *Faunistics*: Thunes et al. (2004): 85 [as *Lycoriella latilobata*]. *Taxonomy*: Tuomikoski (1960): 79, 86 [as *Lycoriella* (*Lycoriella*) *obscuratipes*; misidentification]; Menzel and Mohrig (2000): 396 [as *Lycoriella* (*Lycoriella*) *latilobata*]; Vilkamaa and Menzel (2019): 52 [as *Lycoriella latilobata*].

Locality. • Buskerud; Sigdal, Heimseteråsen (= 'Sigdal').

Ecological note. *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*. Phenology: Jun.–Jul.

Lycoriella parva (Holmgren, 1869)

Synonyms. = *curvispina* Tuomikoski, 1960; = *difficilis* var. *obscuratipes* (Frey, 1948).

Literature. *Faunistics*: Holmgren (1869): 16, 52; Lengersdorf (1930a): 56; Edwards (1935): 535; Bertram and Lack (1938): 51 [all as *Sciara parva*]; Frey (1948): 35, 85 [as *Bradysia* (*Bradysia*) *parva*]; Tuomikoski (1967): 49; Menzel and Mohrig (2000): 398; Coulson and Refseth (2004): 103; Coulson (2008): 162; Coulson (2013): 154; Mohrig et al. (2013): 271 [all as *Lycoriella* (*Lycoriella*) *parva*]. *Taxonomy*: Tuomikoski (1960): 79, 85 [as *Lycoriella* (*Lycoriella*) *curvispina*]; Tuomikoski (1967): 49; Menzel and Mohrig (2000): 398; Mohrig et al. (2013): 271 [all as *Lycoriella* (*Lycoriella*) *parva*]; Vilkamaa and Menzel (2019): 52 [as *Lycoriella parva*].

Localities. • Svalbard; Bjørnøya (= 'Bear Island') • Bjørnøya, Laksvatnet in the N part of island (= 'Bear Island, Laksvatnet') • Spitsbergen, Kobbefjorden at the NW coast near the Danskøya (= 'in Spetsbergia ad Kobbebay'; = 'Spitzbergen bei Kobbefjorden') • Spitsbergen, without further locality details (= 'Spitzbergen'; = 'Spitsbergen').

Ecological note. Habitats not specified. Phenology: Jul.–Aug.

Lycoriella piristylata Vilkamaa, Hippa & Heller, 2013

Literature. *Faunistics*: Vilkamaa et al. (2013c): 52 [as *Lycoriella* (*Hemineurina*) *piristylata*]; Vilkamaa and Menzel (2019): 12 [as *Lycoriella piristylata*]. *Taxonomy*: Vilkamaa and Menzel (2019): 12, 52 [as *Lycoriella piristylata*].

Locality. • Finnmark; Båtsfjord, Varangerhalvøya, Ytre Syltefjord 35 km SE of Båtsfjord (= 'Varanger Peninsula, Ytre Syltefjord 35 km SE Batsfjord'; = 'Norway').

Ecological note. Dwarf-shrub tundra. Phenology: Jul.

Lycoriella sativae (Johannsen, 1912)

Synonyms. = *agarici* Loudon, 1978; = *auberti* (Séguy, 1940); = *brevipetiolata* (Shaw, 1941); = *castanescens* (Lengersdorf, 1940); = *difficilis* (Frey, 1948) [preocc.]; = *fucorum* (Frey, 1948); = *jeanneli* (Séguy, 1940); = *kaiseri* (Shaw, 1941); = *paucisetulosa* (Frey, 1948); = *rufotincta* Tuomikoski, 1959; = *similans* (Johannsen, 1925); = *solispina* (Hardy, 1956); = *trifolii* (Pettey, 1918).

Literature. *Faunistics*: Soot-Ryen (1942): 77 [as *Neosciara auripila*; misidentification]; Tuomikoski (1960): 88; Menzel et al. (1990): 342 [both as *Lycoriella* (*Lycoriella*) *fucorum*]; Menzel and Müller (2011): 164 [as *Lycoriella* (*Lycoriella*) *castanescens*]; Menzel et al. (2013): 292 [as *Lycoriella* (*Lycoriella*) *sativae*]. *Taxonomy*: Tuomikoski (1960): 82, 88 [as *Lycoriella* (*Lycoriella*) *fucorum*]; Menzel and Mohrig (2000): 386 [as *Lycoriella* (*Lycoriella*) *castanescens*]; Menzel et al. (2013): 292; Mohrig et al. (2013): 216 [both as *Lycoriella* (*Lycoriella*) *sativae*]; Broadley et al. (2018): 216; Vilkamaa and Menzel (2019): 52 [both as *Lycoriella sativae*].

Localities. • Norway; without further locality details (= 'Norwegen'; = 'Norway') • Finnmark; Porsanger, two localities on the Porsangerfjorden (= '2 Stellen am Porsangerfjord') • Troms; Tromsø (= 'Tromsø') • Trøndelag; Levanger, Hestøya NW of Alstahaug, southern tip Måkeskjær (= 'Måkeskjær').

Ecological note. In accumulations of seaweed on sea shores. Phenology: Aug.

Pseudolycoriella paludum (Frey, 1948)

Synonyms. = *leucocera* (Mohrig & Menzel, 1990); = *polliciformis* (Freeman, 1990).

Literature. *Faunistics*: Köhler et al. (2014): 329 [as *Pseudolycoriella paludum*]. *Taxonomy*: Tuomikoski (1960): 44, 47 [as *Corynoptera paludum*]; Menzel et al. (1990): 336 [as *Lycoriella* (*Hemineurina*) *leucocera*]; Freeman (1990): 54 [as *Corynoptera polliciformis*]; Menzel and Mohrig (1998): 369; Menzel and Mohrig (2000): 474 [both as *Pseudolycoriella paludum*].

Locality. • Telemark; Drangedal, Djupedal 1.5 km SE of Henneseid (= 'Drangedal, Djupedal, Henseid').

Faunistic note. The first specimens of *Pseudolycoriella paludum* from Norway were identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jul.

Scatopsciara (*Scatopsciara*) *atomaria* (Zetterstedt, 1851)

Synonyms. = *borealis* (Rübsaamen, 1898); = *falsaria* (Winnertz, 1867); = *hybrida* (Winnertz, 1867); = *mundula* (Winnertz, 1867); = *nacta* (Johannsen, 1912); = *pagana*

(Winnertz, 1867); = *pratinicola* (Winnertz, 1867); = *radialis* (Shaw, 1934); = *silvestris* (Frey, 1936); = *soluta* (Winnertz, 1867); = *vivida* (Winnertz, 1867).

Literature. *Faunistics*: Zetterstedt (1851): 3761; Siebke (1877): 214 [both as *Sciara atomaria*]; Lengersdorf (1926b): 4 [as *Sciara vivida*]; Lengersdorf (1930c): 52 [as *Sciara borealis* Rübsamer; recte Rübsaamen]; Soot-Ryen (1942): 76 [as *Neosciara atomaria*], 77 [as *Neosciara borealis*] and 80 [as *Neosciara vivida*]; Menzel et al. (1997): 140 [as *Scatopsciara atomaria*]; Menzel and Mohrig (2000): 494 [as *Scatopsciara* (*Scatopsciara*) *atomaria*]; Thunes et al. (2004): 85 [as *Scatopsciara atomaria*]; Mohrig et al. (2013): 235; Köhler et al. (2014): 329 [both as *Scatopsciara* (*Scatopsciara*) *atomaria*]. *Taxonomy*: Tuomikoski (1960): 151, 153 [as *Scaptosciara vivida*; recte *Scatopsciara*]; Menzel and Mohrig (2000): 494; Mohrig et al. (2013): 235 [both as *Scatopsciara* (*Scatopsciara*) *atomaria*]; Broadley et al. (2018): 234 [as *Scatopsciara atomaria*].

Localities. • Akershus; Frogn, Sønderstøa-Degerud (= 'Degerud') • Buskerud; Sigdal, Heimseteråsen (= 'Sigdal') • Finnmark; Alta, Bossekop in Alta (= 'Bosekop') • Alta, Jotkajavre fjellstue on the Finnmarksvidda between Karasjok and Alta (= 'Jotkajavre') • Karasjok, Karasjok at the river Karasjohka (= 'Karasjok') • Hordaland; Kvam, 'Berge landskapsvernområde' [protected landscape area with the Bergsvatnet] NW of Tørvikbygd (= 'Kvam, Berge') • Telemark; Drangedal, woodland Steinknapp SW of Drangedal (= 'Drangedal, Steinknapp') • Porsgrunn, Mule Varde SE of Porsgrunn at the Eidangerfjorden (= 'Porsgrunn, Mule Varde') • Troms; Tromsø (= 'Tromsø') • Tromsø, lake Prestvannet on the Tromsøya (= 'Prestvann, Tromsø') • Trøndelag; Levanger, Hestøya NW of Alstahaug, southern tip Måkeskjær (= 'Måkeskjær') • Levanger, Skogn SE of Levanger (= 'ad diversorium Thynäs'; = 'ad Thyæs in Skogn'; = 'Thynäs'; = 'Tynes, Værdal') [= in the accommodation of Thy in Skogn].

• Svalbard; Bjørnøya, Mosevatnet near Kapp Forsberg (= 'bei Mosevatnet (B.)').

Taxonomic note. The syntypes (two females) of *Sciara borealis* Rübsaamen were studied by the senior author and identified as a junior synonym of *Scatopsciara atomaria* (Zetterstedt). More detailed information will be presented in a separate publication about the *Sciara* species described by Rübsaamen (1898).

Ecological note. *Pinus sylvestris* dominated boreal forests with *Betula pubescens* and *Picea abies*; oak canopies of *Quercus robur*. In mosses, lichens and *Salix* plants (Svalbard records). Phenology: Jun.–Oct.

Scatopsciara (*Scatopsciara*) *brevicornis* (Zetterstedt, 1851)

Literature. *Faunistics*: Zetterstedt (1851): 3748; Zetterstedt (1860): 6526; Siebke (1877): 213 [all as *Sciara brevicornis*]; Soot-Ryen (1942): 79 [in part as *Neosciara nitidula*; misidentification (only cited *brevicornis* specimens)]. Menzel et al. (1990): 326 [as *Scatopsciara nacta* sensu Tuomikoski; misidentification]; Menzel and Mohrig (2000): 490 [as *Scatopsciara* (*Scatopsciara*) *brevicornis*]. *Taxonomy*: Tuomikoski (1960): 151, 153 [as *Scaptosciara nacta*; misidentification; recte *Scatopsciara*]; Menzel and Mohrig (2000): 490 [as *Scatopsciara* (*Scatopsciara*) *brevicornis*] and 498 [in part as *Scaptosciara* (*Scatopsciara*) *nacta* sensu Tuomikoski; misidentification]; Mohrig et al. (2013): 236

[as *Scatopsciara* (*Scatopsciara*) *brevicornis* in the taxonomic note of *Scatopsciara* (*Scatopsciara*) *atomaria*].

Localities. • Norway; without further locality details (= 'Norvegia'; = 'Norwegen') • Oslo; Oslo, Tøyen (= 'Tøyen, Oslo') • Trøndelag; Levanger, Skogn SE of Levanger (= 'Tynes, Værdal') [= in the accommodation of Thy in Skogn] • Trondheim (= 'ad Throndhjem'; = 'ad Trondhjem'; = 'ad Trondhjem [bei Trondheim]'; = 'Trondheim').

Ecological note. Habitats not specified. Phenology: Jul.

Scatopsciara (*Scatopsciara*) *calamophila* Frey, 1948

Literature. *Faunistics*: Köhler et al. (2014): 329 [as *Scatopsciara* (*Scatopsciara*) *calamophila*]. *Taxonomy*: Tuomikoski (1960): 151, 154 [as *Scaptosciara calamophila*; recte *Scatopsciara*]; Menzel and Mohrig (2000): 496 [as *Scatopsciara* (*Scatopsciara*) *calamophila*].

Localities. • Telemark; Drangedal, 300 m SE of Henneseid (= 'Drangedal, Henseid') • Drangedal, Djupedal 1.5 km SE of Henneseid (= 'Drangedal, Djupedal, Henseid') • Drangedal, woodland Steinknapp SW of Drangedal (= 'Drangedal, Steinknapp') • Porsgrunn, Mule Varde SE of Porsgrunn at the Eidangerfjorden (= 'Porsgrunn, Mule Varde').

Faunistic note. The first specimens of *Scatopsciara calamophila* from Norway were identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jun.–Jul.

Scatopsciara (*Scatopsciara*) *fluviatilis* (Lengersdorf, 1940)

Synonyms. = *coei* Freeman, 1983; = *pulchra* (Lengersdorf, 1940); = *robusticornis* (Frey, 1948).

Literature. *Faunistics*: Menzel et al. (1990): 326 [as *Scatopsciara fluviatilis*]; Tuomikoski (1960): 155 [as *Scaptosciara fluviatilis*; recte *Scatopsciara*]. *Taxonomy*: Tuomikoski (1960): 151, 155 [as *Scaptosciara fluviatilis*; recte *Scatopsciara*]; Freeman (1983): 167 [as *Scatopsciara coei*]; Menzel and Mohrig (2000): 486 [as *Scatopsciara* (*Scatopsciara*) *fluviatilis*].

Localities. • Norway; without further locality details (= 'Norwegen') • Finnmark; Tana, Tanafjorden, fjord Vestertana (= 'Finmark, Vestertana') • Troms; Tromsø (= 'Tromsø').

Ecological note. Habitats not specified. Phenology: Aug.

Scatopsciara (*Scatopsciara*) *multispina* (Bukowski & Lengersdorf, 1936)

Literature. *Faunistics*: Köhler et al. (2014): 329 [as *Scatopsciara* (*Scatopsciara*) *multispina*]. *Taxonomy*: Tuomikoski (1960): 150, 152 [as *Scaptosciara multispina*; recte *Scatopsciara*]; Menzel and Mohrig (2000): 492 [as *Scatopsciara* (*Scatopsciara*) *multispina*].

Localities. • Hordaland; Kvam, 'Berge landskapsvernområde' [protected landscape area with the Bergsvatnet] NW of Tørvikbygd (= 'Kvam, Berge') • Telemark; Drangedal, woodland Steinknapp SW of Drangedal (= 'Drangedal, Steinknapp').

Faunistic note. The first specimens of *Scatopsciara multispina* from Norway were identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jun.

Scatopsciara (*Scatopsciara*) *nana* (Winnertz, 1871)

Synonym. = *felti* (Pettey, 1918).

Literature. *Faunistics*: Lengersdorf (1926b): 3 [as *Sciara nana*] and 4 [as *Sciara intermista*; misidentification]; Soot-Ryen (1942): 79 [in part as *Neosciara nitidula*; misidentification (only cited *nana* and *intermista* specimens)]. *Taxonomy*: Menzel and Mohrig (2000): 492; Mohrig et al. (2013): 239 [both as *Scatopsciara* (*Scatopsciara*) *nana*].

Localities. • Finnmark; Alta, Jotkajavre fjellstue on the Finnmarksvidda between Karasjok and Alta (= 'Jotkajavre') • Karasjok, Karasjok at the river Karasjohka (= 'Karasjok') • Rogaland; Sandnes, Sandnes S of Stavanger (= 'Sandnes') • Troms; Balsfjord, Nordkjosbotn 70 km SE of Tromsø (= 'Nordkjosbotn') • Karlsøy, Torsvåg at the NW coast of Vannøya 15 km N of Tromsø (= 'Torsvåg') • Målselv, farm Frihetsli in the Dividalen 32 km SE of Øverbygd (= 'Frihetsli') • Tromsø, lake Prestvannet on the Tromsøya (= 'Prestvand'; = 'Prestvann, Tromsø') • Trøndelag; Levanger, Levanger (= 'ad Levanger'; = 'Levanger').

Ecological note. Habitats not specified. Phenology: Jun.–Aug.

Scatopsciara (*Scatopsciara*) *neglecta* Menzel & Mohrig, 1998

Literature. *Faunistics*: Köhler et al. (2014): 329 [as *Scatopsciara* (*Scatopsciara*) *neglecta*]. *Taxonomy*: Menzel and Mohrig (1998): 370; Menzel and Mohrig (2000): 498 [both as *Scatopsciara* (*Scatopsciara*) *neglecta*].

Locality. • Telemark; Drangedal, 300 m SE of Henneseid (= 'Drangedal, Henseid').

Faunistic note. The first specimen of *Scatopsciara neglecta* from Norway was identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jul.

Scatopsciara (*Scatopsciara*) *pusilla* (Meigen, 1818)

Synonyms. = *paludicicola* (Lengersdorf, 1940); = *pavida* (Winnertz, 1867); = *pusilliformis* Mohrig & Mamaev, 1986; = *zygoneuroides* Frey, 1948.

Literature. *Faunistics*: Lengersdorf (1926b): 3 [as *Sciara pavida*]; Soot-Ryen (1942): 80 [as *Neosciara pusilla*]. Menzel et al. (1990): 327 [as *Scatopsciara pusilla*]; Köhler et

al. (2014): 329 [as *Scatopsciara* (*Scatopsciara*) *pusilla*]. *Taxonomy*: Tuomikoski (1960): 151, 155 [as *Scaptosciara pusilla*; recte *Scatopsciara*]; Menzel and Mohrig (1998): 370; Menzel and Mohrig (2000): 499 [both as *Scatopsciara* (*Scatopsciara*) *pusilla*].

Localities. • Norway; without further locality details (= 'Norwegen') • Finnmark; Alta, Jotkajavre fjellstue on the Finnmarksvidda between Karasjok and Alta (= 'Jotkajavre') • Telemark; Drangedal, woodland Steinknapp SW of Drangedal (= 'Drangedal, Steinknapp').

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jun., Aug.

Scatopsciara (*Scatopsciara*) *vitripennis* (Meigen, 1818)

Synonyms. = *actuosa* (Johannsen, 1912); = *aucta* (Winnertz, 1867); = *basaliseta* (Yang & Zhang, 1987); = *coracina* (Zetterstedt, 1851); = *intermista* (Winnertz, 1867); = *nitidula* (Zetterstedt, 1851); = *quinquelineata* (Macquart, 1834); = *superba* (Winnertz, 1867).

Literature. *Faunistics*: Zetterstedt (1851): 3739 [as *Sciara coracina*] and 3760 [as *Sciara nitidula*]; Siebke (1863): 176; Siebke (1866a): 388 [both as *Sciara quinquelineata* Macquart; recte *quinquelineata* Macquart]; Siebke (1877): 213 [as *Sciara coracina* and *Sciara quinquelineata*] and 214 [as *Sciara nitidula*]; Soot-Ryen (1942): 80 [as *Scatopsciara vitripennis*; in part (only cited *coracina*, *quinquelineata* and *vitripennis* specimens)]; Tuomikoski (1960): 152 [as *Scaptosciara vitripennis*; recte *Scatopsciara*]; Menzel and Mohrig (2000): 487 [as *Sciara coracina* and *Sciara nitidula* under *Scatopsciara* (*Scatopsciara*) *vitripennis*]; Köhler et al. (2014): 329 [as *Scatopsciara* (*Scatopsciara*) *vitripennis*]. *Taxonomy*: Tuomikoski (1960): 150, 151 [as *Scaptosciara vitripennis*; recte *Scatopsciara*]; Menzel and Mohrig (2000): 487; Mohrig et al. (2013): 240 [both as *Scatopsciara* (*Scatopsciara*) *vitripennis*].

Localities. • Finnmark; Tana, between Porsangerfjorden and fjord Vestertana (= 'Finmark, zwischen Porsangerfjord und Vestertana') • Hordaland; Kvam, 'Berge landskapsvernområde' [protected landscape area with the Bergsvatnet] NW of Tørvikbygd (= 'Kvam, Berge') • Møre Og Romsdal; Haram, ? Ormeneset (= in Romsdalia ad Ormen'; = 'Romsdals Amt, omkring Ormen'; = 'Ormem, Romsdal') • Oppland; Lesja, Fogstuen on the Dovrefjell plateau (= 'Fogstuen'; = 'Fokstuen, Dovre'; = 'in alpe Dovre ad Fogstuen'; = 'in alpe Dovre') • Oslo; Oslo, Botanisk hage (= 'ad Christianiam in horto botanico'; = 'Botanical Garden, Oslo') • Oslo, Tøyen (= 'ad Christianiam in Tøien'; = 'in Töien prope Christianiam'; = 'Töien [Oslo]'; = 'Töien') • Telemark; Drangedal, woodland Steinknapp SW of Drangedal (= 'Drangedal, Steinknapp') • Trøndelag; Levanger, Levanger (= 'ad urbem Levanger') • Levanger, Skogn SE of Levanger (= 'ad diversorium Thynæs et urbem Levanger in paroecia Skogn'; = 'ad Thyæs in parochia Skogn'; = 'Thynäs') [= in the accommodation of Thy in Skogn] • Oppdal, Kongsvoll near Kongsvold Fjeldstue in the Drivdalen (= 'Kongsvold'; = 'Kongsvold, Dovre'= 'in alpe Dovre ad Kongsvold'; = 'in alpe Dovre').

Ecological note. On coasts and in botanical gardens; oak canopies of *Quercus robur*. Phenology: May–Aug.

Schwenckfeldina carbonaria (Meigen, 1830)

Synonyms. = *frauenfeldi* (Winnertz, 1867); = *illepida* (Winnertz, 1867); = *indigena* (Winnertz, 1867), = *pilosa* Antonova, 1975.

Literature. *Faunistics*: Zetterstedt (1851): 3717; Siebke (1870): 304; Siebke (1877): 210 [all as *Sciara carbonaria*]; Soot-Ryen (1942): 77 [as *Neosciara carbonaria*]. *Taxonomy*: Tuomikoski (1960): 29; Menzel and Mohrig (2000): 510 [both as *Schwenckfeldina carbonaria*].

Localities. • Buskerud: Bjøberg in the Hemsedalsfjella between Hemsedal and Lærdal (= 'Bjøberg paa Hemsedalsfjeldet'; = 'ad Bjøberg in alpe Hemsedalsfjeld'; = 'Bjøberg, Hemsedal') • Røyken (= 'in parochia Røken'; = 'Røken'; = 'Røyken') • Oslo; Oslo (= 'ad Christianiam'; = 'Oslo') • Oslo, Skøyen (= 'Skøien'; = 'Skøyen') • Oslo, Tøyen (= 'Tøien'; = 'Tøyen').

Ecological note. Habitats not specified. Phenology: Jun.–Jul.

Schwenckfeldina tridentata (Rübsaamen, 1898)

Synonyms. = *atrata* (Holmgren, 1869) [preocc.]; = *holmgreni* (Jacobson, 1898) [preocc.]; = *incisiforceps* (Frey, 1948), = *laguncularis* (Lengersdorf, 1930); = *validicornis* (Lundbeck, 1898).

Literature. *Faunistics*: Holmgren (1869): 15, 51 [as *Sciara atrata*]; Edwards (1922): 196; Edwards (1923): 236; Summerhayes and Elton (1923): 240 [all as *Sciara tridentata*]; Lengersdorf (1930a): 55 [as *Sciara atrata*]; Lengersdorf (1930c): 52 [as *Rhynchosciara laguncularis*]; Thor (1930): 31; Edwards (1935): 532 [both as *Sciara tridentata*]; Frey (1948): 77, 89 [as *Bradysia* (*Neosciara*) *incisiforceps*]; Tuomikoski (1967): 46 [as *Schwenckfeldina tridentata*]; Menzel and Mohrig (2000): 513 [as *Sciara atrata* and *Rhynchosciara laguncularis* under *Schwenckfeldina tridentata*]; Coulson and Refseth (2004): 103; Hågvar et al. (2007): 67; Coulson (2008): 162; Coulson (2013): 155; Mohrig et al. (2013): 246 [all as *Schwenckfeldina tridentata*]. *Taxonomy*: Tuomikoski (1966): 137; Tuomikoski (1967): 45; Menzel and Mohrig (2000): 513; Mohrig et al. (2013): 246 [all as *Schwenckfeldina tridentata*].

Localities. • Jan Mayen: without further locality details (= 'Jan Mayen Island') • Svalbard; Bjørnøya (= 'Bear Island') • Bjørnøya, bay Austervåg at the E coast (= 'bei Austervåg (B.)'; = 'Spitzbergen, bei Austervåg') • Bjørnøya, Brettingsdalen at the E side of Miseryfjellet (= 'Bear Island, Brettingsdalen') • Bjørnøya, Nordcapp at the NE coast (= 'Spetsberg, Nordcap') [misinterpretation in Menzel and Mohrig (2000), not 'Spetsberg, Nordcap (= Spitzbergen, Nordfjorden)'] • Spitsbergen, Adventdalen near Adventfjorden at the W coast (= 'Adventdalen') • Spitsbergen, Amsterdamøya, Smeerenburg at the SE coast (= 'in Spetsbergia ad Smeerenberg'; = 'Spitzbergen, Smeerenberg'; = 'Nordfjorden, Smeerenburg') • Spitsbergen, Bellsund at the W coast (= 'in Spetsbergia ad Belsund'; = 'Bellsund'; = 'Belsund') • Spitsbergen, Grønfjorden (= 'in Spetsbergia ad Green Harbour'; = 'Spetsbergia, Green Harbour'; = 'Spetsbergia ad Green

Harbour [Spitzbergen, bei Green Harbour]'; = 'Green Harbour') • Spitsbergen, Kapp Linné by the Isfjord, Isfjord Radio station (= 'Svalbard, Isfjord Radio') • Spitsbergen, Kobbefjorden at the NW coast near the Danskøya (= 'in Spetsbergia ad Kobbebay'; = 'Spitzbergen, Kobbebay'; = 'Kobbebay') • Spitsbergen, Nordaustlandet (= 'North-East Land') • Spitsbergen, Nordaustlandet, Murchisonfjorden (= 'North-East Land, Murchison Bay') • Spitsbergen, Nordfjorden between Bohemanneset and Kapp Thordsen (= 'in Spetsbergia ad Nordfjorden') • Spitsbergen, Prins Karls Forland at the W coast of Oscar II Land (= 'Prince Charles Foreland (S.)') • Spitsbergen, Prins Karls Forland at the W coast of Oscar II Land, between Richardlaguna and Carmichaelpynten (= 'Spitsbergen, Prince Charles Foreland (North Eastern Region), from Richard Lagoon to Point Carmichael') • Spitsbergen, Prins Karls Forland at the W coast of Oscar II Land, Carmichaelpynten (= 'Spitsbergen, Prince Charles' Foreland, Pt. Carmichael, Freshwater Bay district, N.E. of island') • Spitsbergen, Prins Karls Forland at the W coast of Oscar II Land, Ferskvassbukta at the NE coast (= 'Prince Charles Foreland, Freshwater Bay') • Spitsbergen, S coast of Kongsfjorden, W of Ny-Ålesund (= 'NW Spitsbergen, South coast of Kongsfjord, W of Ny Ålesund') • Spitsbergen, without further locality details (= 'Spetsbergen; = 'Spitsbergen'; = 'Spitzbergen').

Ecological note. In dry ridges and slopes with *Saxifraga oppositifolia*, mosses and lichens; in mosses and lichens; among stones and plants (e.g. *Buellia sorotia*, *Dicranoweisia crispula*, *Parmelia alpicola*, *Saxifraga oppositifolia*, *Salix polaris*); on stones of shingly raised beaches (all Svalbard records). Phenology: Jun.–Jul., Sep.

Sciara flavimana Zetterstedt, 1851

Synonyms. = *fulgens* Winnertz, 1867, = *mannii* Winnertz, 1867.

Literature. *Faunistics*: Siebke (1866a): 385; Siebke (1877): 211 [both as *Sciara flavimana*]; Soot-Ryen (1942): 76 [as *Lycoria flavimana*]; Menzel et al. (1990): 311; Menzel (1992): 267; Komarova (2006): 54 [all as *Sciara flavimana*]. *Taxonomy*: Antonova (1978): 182, 185; Menzel and Mohrig (2000): 530 [both as *Sciara flavimana*].

Localities. • Norway; without further locality details (= 'Norwegia'; = 'Norwegen') • Møre Og Romsdal; Rauma, between Veblungsnes and Romsdalshornet Mountain in the Romsdalsalpene SE of Åndalsnes (= 'Romsdals Amt, mellem Veblungsnæsset og Romsdalshorn') • Rauma, Veblungsnes at the Romsdalsfjorden SW of Åndalsnes (= 'ad Veblungsnæs Romsdaliæ; = 'Veblungsnes, Romsdal') • Oslo; Oslo, Tøyen (= 'in Tøien ad Christ.'; = 'Tøyen, Oslo').

Ecological note. Habitats not specified. Phenology: Jul.–Aug.

Sciara hemerobioides (Scopoli, 1763)

Synonyms. = *lateralis* Meigen, 1818; = *morio* (Fabricius, 1794); = *thomae* (Linnaeus, 1767); = *valida* Winnertz, 1867.

Literature. *Faunistics*: Zetterstedt (1851): 3714; Siebke (1853): 305; Zetterstedt (1855): 4888; Siebke (1866a): 384, 387; Siebke (1866b): 417; Siebke (1870): 304; Siebke (1872): 96; Siebke (1877): 210; Strand (1904): 9; Lengersdorf (1926b): 3 [all as *Sciara thomae*]; Soot-Ryen (1942): 76 [as *Lycoria thomae*]; Menzel et al. (1990): 313 [as *Sciara thomae*]. *Taxonomy*: Antonova (1978): 181, 182 [as *Sciara thomae*]; Menzel and Mohrig (2000): 520; Sutou et al. (2004): 179; Komarova (2006): 52 [all as *Sciara hemerobioides*].

Localities. • Norway; without further locality details (= 'Norwegen'; = 'Norwegia') • Buskerud; Ål (= 'Aal') • Ringerike, farm Tanberg in Norderhov 5 km S of Hønefoss (= 'Tandberg i Nordrehaug') • Ringerike, Norderhov 5 km S of Hønefoss (= 'in par. [parochia] Nordrehaug Ringerikiæ'; = 'Nordrehaug Ringerikiæ'; = 'Norderhov, Ringerike'; = 'in Ringerike') • Hedmark; Åmot, in the Østerdalen (= 'Østerdalen, Aamodt'; = 'Aamodt') • Tynset, Tylldalen in the Østerdalen (= 'Tyldal Østerdaliæ'; = 'Østerdalen, Tyld. len'; = 'Tyldal') • Møre Og Romsdal; Rauma, Horgheim SE of Åndalsnes in the Romsdalen (= 'Romsdals Amt, Horgheim') • Rauma, Rauma in the Romsdalen (= 'Romsdals Amt, i Rauma') • Rauma, in the Romsdalen (= 'ad Fladmark, Romsdaliæe'; = 'Fladmark, Romsdal') • Oppland; Nord-Fron or Sør-Fron in the Gudbrandsdalen (= 'Gudbrandsdalen, Fron') • Øyer in the Gudbrandsdalen (= 'Øier Gudbrandsdaliæ'; = 'Gudbrandsdalen, Öier'; = 'Øyer') • Oslo; Oslo (= 'circa Christianiam'; = 'Kristiania'; = 'Oslo') • Oslo, Tøyen (= 'circa Christianiam'; = 'circa Christianiam ... in Tøien'; = 'Tøyen, Oslo') • Østfold; Halden, Halden SE of Fredrikstad (= 'ad Fredrikshald'; = 'Fredrikshald') • Sarpsborg, Sarpsborg NE of Fredrikstad (= 'Sarpsborg').

Ecological note. On flowers of *Pimpinella saxifraga* and *Scabiosa*; between stones on sandy soil. Phenology: Jul.–Sep.

Sciara humeralis Zetterstedt, 1851

Synonyms. = *analis* var. *bezzii* Del Guercio, 1905; = *armata* Winnertz, 1867; = *hamatilis* Yang, Zhang & Yang, 1993.

Literature. *Faunistics*: Zetterstedt (1851): 3718; Siebke (1877): 210 [both as *Sciara humeralis*]; Soot-Ryen (1942): 75 [as *Lycoria humeralis*]; Hansen and Falck (2000): 18; Menzel et al. (1990): 312; Menzel and Mohrig (1991): 13; Menzel and Mohrig (2000): 528; Sutou et al. (2004): 187; Komarova (2006): 54 [all as *Sciara humeralis*]. *Taxonomy*: Antonova (1978): 182, 187; Menzel and Mohrig (1991): 13; Menzel and Mohrig (2000): 528; Sutou et al. (2004): 187 [all as *Sciara humeralis*].

Localities. • Norway; without further locality details (= 'Norwegia'; = 'Norwegen') • Buskerud; Ringerike NE of Oslo (= 'in Ringerige Norwegiæ'; = 'Ringerige Norwegiae'; = 'Ringerige'; = 'Ringerike') • Oslo; Oslo, Botanisk hage (= 'ad Christianiam in horto botanico'; = 'Botanical Garden, Oslo') • Østensjø, lake Østensjøvannet SE of Oslo (= 'Østensjøvannet vel 5 km fra Oslo sentrum').

Ecological note. In botanical gardens. Phenology: May, Aug.

Sciara ruficauda Meigen, 1818

Synonyms. = *boleti* Winnertz, 1867; = *mamaevi* Antonova, 1978; = *vigilax* Winnertz, 1867.

Literature. *Faunistics*: Zetterstedt (1852): 4354; Siebke (1863): 176; Siebke (1877): 210; Lengersdorf (1926b): 3 [all as *Sciara ruficauda*]; Soot-Ryen (1942): 76 [as *Lycoria ruficauda*]; Menzel et al. (1990): 312 [as *Sciara ruficauda*]. *Taxonomy*: Antonova (1978): 182, 186 [as Sciara *mamaevi*]; Menzel and Mohrig (2000): 530 [as *Sciara ruficauda*].

Localities. • Norway; without further locality details (= 'Norwegen') • Oppland; Lesja, Fogstuen on the Dovrefjell plateau (= 'ad Fogstuen'; = 'in alpe Dovre ad Fokstuen'; = 'Fokstuen, Dovre') • Oslo; Oslo, Tøyen (= 'ad Christianiam in Tøien'; = 'ad Tøien'; = 'Tøyen, Oslo') • Troms; Målselv, farm Frihetsli in the Dividalen 32 km SE of Øverbygd (= 'Frihetsli').

Ecological note. Habitats not specified. Phenology: Jun.–Jul.

Trichocoelina brevicubitalis (Lengersdorf, 1926)

Literature. *Faunistics*: Lengersdorf (1926b): 6 [as *Sciara brevicubitalis*]; Soot-Ryen (1942): 77 [as *Neosciara brevicubitalis*]; Menzel and Mohrig (2000): 408 [as *Lycoriella* (*Hemineurina*) *brevicubitalis*]. *Taxonomy*: Menzel and Mohrig (2000): 408 [as *Lycoriella* (*Hemineurina*) *brevicubitalis*]; Vilkamaa and Menzel (2019): 19, 53 [as *Trichocoelina brevicubitalis*].

Localities. • Finnmark; Alta, Bojobæskihytta in the Stabbursdalen between Karasjok and Alta (= 'Bojobæske') • Alta, Jotkajavre fjellstue on the Finnmarksvidda between Karasjok and Alta (= 'Jotkajavre') • Karasjok, Karasjok at the river Karasjohka (= 'Karasjok') • Nordland; Sørfold, Røsvik on the S shore of Sørfolda (= 'Røsvik').

Ecological note. Habitats not specified. Phenology: Jul.–Aug.

Trichocoelina cochleata (Rübsaamen, 1898)

Synonym. = *haemorrhoidalis* (Lundbeck, 1898).

Literature. *Faunistics*: Soot-Ryen (1942): 77 [as *Neosciara cochleata*]; Tuomikoski (1960): 76; Tuomikoski (1967): 47; Coulson and Refseth (2004): 103; Coulson (2008): 161; Coulson (2013): 154; Mohrig et al. (2013): 270 [all as *Lycoriella* (*Hemineurina*) *cochleata*]. *Taxonomy*: Tuomikoski (1960): 75, 76; Menzel and Mohrig (2000): 409; Mohrig et al. (2013): 270 [all as *Lycoriella* (*Hemineurina*) *cochleata*]; Vilkamaa and Menzel (2019): 16, 21, 53 [as *Trichocoelina cochleata*].

Localities. • Finnmark; Vardø, Varangerhalvøya, Persfjorden (= 'Vardö, Persfjord').

• Svalbard; Spitsbergen, Longyearbyen (= 'Longyearbyen') • Spitsbergen, without further locality details (= 'Spitsbergen').

Ecological note. Habitats not specified. Phenology: Jul.–Aug.

Trichocoelina ithyspina Vilkamaa & Menzel, 2019

Literature. *Faunistics*: Vilkamaa and Menzel (2019): 29 [as *Trichocoelina ithyspina*]. *Taxonomy*: Vilkamaa and Menzel (2019): 15, 29, 53 [as *Trichocoelina ithyspina*].

Locality. • Hedmark; Stor-Elvdal, at the river Atna, Solbakken NW of Koppang (= 'Stor-Elvdal, Atna River, Solbakken').

Faunistic note. The first specimen (holotype) of *Trichocoelina ithyspina* from Norway was prepared and identified in our NTI projects 2014–2018.

Ecological note. Habitats not specified. Phenology: Jun.–Jul.

Trichocoelina jukkai Vilkamaa & Menzel, 2019

Literature. *Faunistics*: Vilkamaa and Menzel (2019): 33 [as *Trichocoelina jukkai*]. *Taxonomy*: Vilkamaa and Menzel (2019): 15, 33, 53 [as *Trichocoelina jukkai*].

Locality. • Troms; Tromsø, Nakkedalen, S of Estengammen.

Faunistic note. The first specimens (2 paratypes) of *Trichocoelina jukkai* from Norway were identified in our NTI project 2017–2018.

Ecological note. Habitats not specified. Phenology: Jul.

Trichocoelina obesula Vilkamaa & Menzel, 2019

Literature. *Faunistics*: Vilkamaa and Menzel (2019): 35 [as *Trichocoelina obesula*]. *Taxonomy:* Vilkamaa and Menzel (2019): 15, 35, 53 [as *Trichocoelina obesula*].

Locality. • Svalbard; Bjørnøya, at the Engelskelva in the NE part of island (= 'Svalbard, Engelskelva') • Bjørnøya, at the Lakselva (= 'Svalbard, Lakselva').

Faunistic note. The first specimens (holotype, 2 paratypes) of *Trichocoelina obesula* from Norway were identified in our NTI project 2017–2018.

Ecological note. Habitats not specified. Phenology: Jul.

Trichocoelina oricillifera Vilkamaa & Menzel, 2019

Literature. *Faunistics*: Vilkamaa and Menzel (2019): 40 [as *Trichocoelina oricillifera*]. *Taxonomy*: Vilkamaa and Menzel (2019): 15, 40, 53 [as *Trichocoelina oricillifera*].

Localities. • Finnmark; Karasjok, Karasjok at the river Karasjohka (= 'Karasjok') • Tana, Storfossen at the river Karasjohka near the Finnish border (= 'Tana, Nedre Storfoss').

Faunistic note. The first specimens (2 paratypes) of *Trichocoelina oricillifera* from Norway were identified in our NTI project 2017–2018.

Ecological note. Habitats not specified. Phenology: Jul.–Aug.

Trichocoelina semisphaera Vilkamaa & Menzel, 2019

Literature. *Faunistics*: Vilkamaa and Menzel (2019): 43 [as *Trichocoelina semisphaera*]. *Taxonomy:* Vilkamaa and Menzel (2019): 16, 43, 53 [as *Trichocoelina semisphaera*].

Locality. • Svalbard; Bjørnøya, at the Lakselva (= 'Svalbard, Lakselva').

Faunistic note. The first specimen (paratype) of *Trichocoelina semisphaera* from Norway was identified in our NTI project 2017–2018.

Ecological note. Habitats not specified. Phenology: Jul.

Trichocoelina vitticollis (Holmgren, 1883)

Synonyms. = *glacialis* (Lundbeck, 1898) [preocc.]; = *permutata* (Lundbeck, 1900).

Literature. *Faunistics*: Tuomikoski (1967): 48 [as *Lycoriella* (*Hemineurina*) *permutata*]; Menzel and Mohrig (2000): 411 [as *Sciara permutata* under *Lycoriella* (*Hemineurina*) *vitticollis*]; Coulson and Refseth (2004): 103; Coulson (2008): 162; Coulson (2013): 154; Mohrig et al. (2013): 271 [all as *Lycoriella* (*Hemineurina*) *vitticollis*]; Vilkamaa and Menzel (2019): 47 [as *Trichocoelina vitticollis*]. *Taxonomy*: Tuomikoski (1960): 75, 76 [as *Lycoriella* (*Hemineurina*) *permutata*]; Menzel and Mohrig (2000): 411; Mohrig et al. (2013): 271 [both as *Lycoriella* (*Hemineurina*) *vitticollis*]; Vilkamaa and Menzel (2019): 16, 47, 53 [as *Trichocoelina vitticollis*].

Localities. • Svalbard; Bjørnøya (= 'Bear Island') • Bjørnøya, at the Lakselva (= 'Svalbard, Lakselva') • Spitsbergen, Adventdalen near Adventfjorden at the W coast (= 'Adventdalen') • Spitsbergen, Albert I Land, Lillehøkfjorden, E part of Mitrahalvøya, Nilspynten (= 'Svalbard, Lillehoeoekfjorden, Nilspynten') • Spitsbergen, Fjortende Julibukta on the E side of Krossfjorden (= 'Svalbard, Krossfjorden, 14. juli bukta') • Spitsbergen, Kobbefjorden at the NW coast near the Danskøya (= 'Kobbefjorden [Kobbebay]') • Spitsbergen, Nordenskiöld Land, Bjørndalen W of Adventfjorden (= 'Svalbard, Bjorndalen') • Spitsbergen, Nordenskiöld Land, Bolterdalen on the S side of Adventdalen (= 'Svalbard, Bolterdalen') • Spitsbergen, Nordenskiöld Land, Colesbukta on the S side of Isfjorden (= 'Svalbard, Colesbukta') • Spitsbergen, Nordenskiöld Land, Hanaskogdalen on the E side of Adventfjorden (= 'Svalbard, Hanaskogdalen') • Spitsbergen, Nordenskiöld Land, Longyearbyen in the Longyeardalen S of Adventfjorden (= 'Svalbard, Longyearbyen') • Spitsbergen, S coast of Kongsfjorden, W of Ny-Ålesund (= 'NW part of Spitsbergen, S coast of Kongsfjord, W of Ny Ålesund'; = 'NW-Spitzbergen, Kongsfjord, Südküste, westlich von Ny Ålesund') • Spitsbergen, Virgohamna at the N coast of Danskøya (= 'Danskøya, Virgohamna') • Spitsbergen, without further locality details (= 'Spitsbergen').

Ecological note. Under stones (some Svalbard records). Phenology: Jul.–Aug.

Trichosia (*Mouffetina*) *expolita* (Coquillett, 1900)

Synonyms. = *abdita* (Johannsen, 1912); = *clavata* (Garrett, 1925); = *filispina* Menzel & Mohrig, 1997.

Literature. *Faunistics*: Menzel and Mohrig (1997): 32 [as *Trichosia* (*Mouffetina*) *filispina*]; Mohrig et al. (2013): 256 [as *Trichosia* (*Mouffetina*) *filispina* under *Trichosia* (*Mouffetina*) *expolita*]; Vilkamaa et al. (2013): 25 [as *Mouffetina expolita*]. *Taxonomy*: Menzel and Mohrig (1997): 32; Menzel and Mohrig (2000): 551 [both as *Trichosia* (*Mouffetina*) *filispina*]; Mohrig et al. (2013): 256 [as *Trichosia* (*Mouffetina*) *expolita*].

Localities. • Norway; without further locality details (= 'Norway') • Finnmark; Sør-Varanger, Pasvik Valley near lake Vaggatem (= 'Pasvik-Tal bei Vaggatem'; = 'Pasvik Valley near Vaggatem').

Ecological note. Habitats not specified. Phenology: without data.

Trichosia (*Trichosia*) *caudata* (Walker, 1848)

Synonyms. = *dziedzickii* (Grzegorzek, 1884); = *longiventris* (Zetterstedt, 1851); = *mikii* (Grzegorzek, 1884); = *sznablii* (Grzegorzek, 1884).

Literature. *Faunistics*: Zetterstedt (1851): 3727; Siebke (1863): 110; Siebke (1866a): 387; Siebke (1866b): 417; Siebke (1870): 304; Siebke (1872): 97; Siebke (1877): 211; Strand (1904): 10; Lengersdorf (1926b): 3 [all as *Sciara longiventris*]; Soot-Ryen (1942): 76 [as *Lycoria longiventris*]; Tuomikoski (1960): 19; Menzel et al. (1990): 314 [both as *Trichosia* (*Trichosia*) *caudata*]; Menzel and Mohrig (1997): 20 [as *Sciara longiventris* under *Trichosia* (*Trichosia*) *morio* sensu Menzel and Mohrig] and 21 [as *Trichosia* (*Trichosia*) *morio* sensu Menzel and Mohrig; misidentification]; Menzel and Mohrig (2000): 558 [as *Sciara longiventris* under *Trichosia* (*Trichosia*) *morio* sensu Menzel and Mohrig; misidentification]. *Taxonomy*: Tuomikoski (1957): 16 [as *Trichosia caudata*]; Tuomikoski (1960): 18, 19 [as *Trichosia* (*Trichosia*) *caudata*]; Menzel and Mohrig (1997): 19; Menzel and Mohrig (2000): 558 [both as *Trichosia* (*Trichosia*) *morio* sensu Menzel and Mohrig; misidentification].

Localities. • Norway; without further locality details (= 'Norwegen') • Akershus; Skedsmo, Lillestrøm E of Oslo (= 'Lillestrømmen in par. [parochia] Skedsmo'; = 'ad Christianiam, Lillestrømmen'; = 'Lillestrømmen'; = 'Skedsmo') • Buskerud; Krødsherad (= 'Krødsherred'; = 'Krydsherred') • Hedmark; Åmot, Åset 7.5 km N of Åmot in the Østerdalen (= 'in parochiis Aamodt Østerdaliæ (ad Aaset)'; = 'Åset, Åmot') • Åmot, in the Østerdalen (= 'Østerdalen, Aamodt') • Møre Og Romsdal; Rauma, Rauma in the Romsdalen (= 'Romsdals Amt, i Rauma') • Rauma, in the Romsdalen (= 'ad Fladmark, Romsdaliæe'; = 'Fladmark, Romsdal') • Oppland; Nord-Aurdal, Aurdal (= Aurdal in Valders'; = 'Aurdal, Valdres'; = 'Aurdal') • Vågå, farm Sve NE of Vågåmo in the Gudbrandsdalen

(= 'Vaage Gudbrandsdaliæ ad Svee'; = 'i Vaage'; = 'Sve, Våge') • Oslo; Oslo (= 'ad Christianiam'; = 'Oslo'; = 'Moe.' [misinterpretation in Menzel and Mohrig (1997), correctly 'leg. M. Moe']) • Oslo, Tøyen (= 'Tøien'; = 'Tøyen, Oslo') • Østfold; Hvaler, Hvaløerne (= 'Hvaløerne') • Telemark; Porsgrunn, Porsgrunn (= 'Porsgrund') • Troms; Nordreisa, woodland and farm Hallen at the E shore of Reisaelva SE of Storslett (= 'Nordreisa, Hallen') • Trøndelag; Fosnes, Jøa Island, montain Mulfjellet SE of Dun (= 'Mulfjellet') • Levanger, Skogn SE of Levanger (= 'ad Thynæs'; = 'ad Thynäs'; = Tynes) [= in the accommodation of Thy in Skogn] • Stjørdal, farm Hammermoen NE of Stjørdal (= 'ad Hammermoen)'; = 'Hammermoen') • Verdal, former poststation 'Suulstuen' SE of Vuku at the Jamtlandsvegen [road no. 72] (= 'ad Suulstuen Værdaliæ'; = 'Suulstuen Værdaliæ'; = 'Suul. [Suulstuen Vaerdaliae]'; = 'Sulstuen') • Verdal, Kong Carl Johans Klev at the Jamtlandsvegen [road no. 72] SE of Vuku (= 'ad Kong Carl Johans Klev'; = 'Kong Carl Joh. Klev. [Kong Carl Johans Klev]'; = 'ad Carl Johans Klev'; = 'Karl Johans Klev') • Verdal, Østre Nes at the Jamtlandsvegen [road no. 72] between Verdal and Lysthaugen (= 'Østre Værdaliæ'; = 'Østre'; = 'Østre Nes'; = 'Østre Næs'; = 'Östre-Näs'; = 'Näs'; = 'Näs [Östre-Näs]').

Ecological note. Between stones on sandy soil; larvae in rotten wood of gray alder (*Alnus incana*); on mountains. Phenology: Apr., Jun.–Aug.

Trichosia (*Trichosia*) *confusa* Menzel & Mohrig, 1997

Literature. *Faunistics*: Zetterstedt (1871): 3721 [as *Sciara trochanterata*; in part misidentification]; Lengersdorf (1941): 48 [in part as *Sciara trochanterata*; misidentification (also discussed as *Sciara edwardsi*)]; Tuomikoski (1960): 19; Menzel et al. (1990): 314 [both as *Trichosia* (*Trichosia*) *trochanterata* sensu Edwards; in part]. *Taxonomy*: Tuomikoski (1957) 27 [as *Trichosia edwardsi* sensu Frey; misidentification]; Tuomikoski (1960) 18, 19 [as *Trichosia* (*Trichosia*) *trochanterata* sensu Edwards; misidentification]; Menzel and Mohrig (1997) 14; Menzel and Mohrig (2000) 555 [both as *Trichosia* (*Trichosia*) *confusa*].

Locality. • Trøndelag; Verdal, near Sul, Kongsstuggu [formerly 'Kongsstuen fjeldstue'] (= 'Kongsstuen'; = 'Kongstuen').

Ecological note. On mountains. Phenology: Jun.

Trichosia (*Trichosia*) *edwardsi* (Lengersdorf, 1930)

Literature. *Faunistics*: Camaño Portela et al. (2008): 93 [as *Trichosia edwardsi*]. *Taxonomy*: Menzel and Mohrig (1997): 20; Menzel and Mohrig (2000): 559 [both as *Lycoria edwardsi* under *Trichosia* (*Trichosia*) *morio*; misidentification]; Menzel and Heller (2006): 52 [as *Trichosia* (*Trichosia*) *edwardsi*]; Heller et al. (2016): 105 [as *Trichosia edwardsi*].

Locality. • Norway; without further locality details (= 'Norway') • Finnmark; Båtsfjord, Varangerhalvøya, Ytre Syltefjord 35 km SE of Båtsfjord (published as 'Norway'; see faunistic note).

Faunistic note. The single Norwegian record of *Trichosia edwardsi* published in Camaño Portela et al. (2008) as 'Norway' (without collecting data) is based on the following material: Norway • 9 ♂♂; 'Varanger Peninsula, Ytre, Syltefjord, 35 km S Batsfjord'; 7 Jul. 1994; M. Jaschhof leg.; aspirator; PWMP.

Ecological note. Dwarf-shrub tundra. Phenology: Jul.

Trichosia (*Trichosia*) *flavicoxa* Tuomikoski, 1960

Literature. *Faunistics*: Köhler et al. (2014): 329 [as *Trichosia* (*Trichosia*) *flavicoxa*]. *Taxonomy*: Tuomikoski (1960): 18, 19; Menzel and Mohrig (1997): 24; Menzel and Mohrig (2000): 556 [all as *Trichosia* (*Trichosia*) *flavicoxa*].

Locality. • Telemark; Drangedal, woodland Steinknapp SW of Drangedal (= 'Drangedal, Steinknapp').

Faunistic note. The first specimen of *Trichosia flavicoxa* from Norway was identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jun.

Trichosia (*Trichosia*) *lengersdorfi* Heller, Köhler & Menzel, 2016

Literature. *Faunistics*: Heller et al. (2016): 106, 109 [as *Trichosia* (*Trichosia*) *lengersdorfi*]. *Taxonomy*: Heller et al. (2016): 106 [as *Trichosia* (*Trichosia*) *lengersdorfi*].

Localities. • Akershus; Nesodden, Blåbærstien in Nesoddtangen (= 'Nesodden, Blåbærstien'; = 'Nesodden, Blåbærstien – Østvendt skråning' [correctly translated from Norwegian: 'Blåbærstien, east-facing slope']) • Nesodden, Ommen at the W side of Nesodden (= 'Ommen – Sørvendt rasmark' [correctly translated from Norwegian: 'Ommen, south-facing scree']) • Nesodden, W of abandoned settlement Flatebybråten (= 'Flatebybråten vest') • Aust-Agder; Birkenes, Birkeland, Nordåsen • Buskerud; Kongsberg, Haugplassen near Raje in the Rajedalen (= 'Kongsberg, Haugplassen') • Ringerike, W of Hønefoss, small river Veksalbekken E of Veksalplassen [mouth of the Veksalbekken in the river Sogna] (= 'Veksalbekken') • Ringerike, Synneren naturreservat SW of Hønefoss (= 'Synneren NR') • Ringerike, W of Hallingby, S of the marsh Langmyra along the stream Sibekken (= 'S Langmyra – Langs Sibekken' [correctly translated from Norwegian: 'S of Langmyra along Sibekken']) • Hedmark; Kongsvinger, Abborhøgda in the forest Varaldskogen S of Øyermoen [near the Swedish border] (= 'Abborhøgda') • Hordaland; Bergen, Bergen, Fløyen mountain, mountain top Fløyfjellet (= Bergen, Fløyfjellet) • Bergen, Bergen, residential area Skansemyren (= 'Skansemyren') • Bergen, N of Langetoen (= 'N Langetoen') • Bergen, NW of hill Litlelia SE of Bergen, in the Sædalen N of Sædalen school (= 'Litlelia – Valley Sædalen N of Sædalen skole') • Eidfjord, settlement Tveit in the Simadalen NE of Eidfjord (= 'Eidfjord, Simadalen, Tveit') • Oslo; Oslo, Gaustad in the borough Nordre Aker (= 'Gaustad – Jubileumsenga') • Oslo, Ljabru in the borough Nordstrand, at the Ljan-

selva (= 'Ljabru, Ljanselva') • Oslo, borough Nordstrand, at the Ljanselva in the Liadalen (= 'Nordstrand, Ljanselva, Liadalen') • Sogn Og Fjordane; Høyanger, NE of Austreim at the N side of Sognefjorden, N of hill Furehaugen (= 'Høyanger, N Furehaugen') • Høyanger, Vårstølen NE of Bjordal (= 'Vårstølen – Nedenfor veien' [correctly translated from Norwegian: 'Vårstølen, below the road') • Lærdal, Eråksdalen SE of Lærdalsøyri (= 'Eråksdalen') • Lærdal, near settlement Voldum N of Borgund (= 'Lærdal, Eisurda') • Luster, NE of Gjerde, between river Jostedøla and road no. 334 near the stream Flatelvi (= 'Luster, Flatelvi – Ved Rv334' [correctly translated from Norwegian: 'by the road no. 334']) • Luster, NW of Gjerde, at the N shore of Nigardsbrevatnet near the Nigardsbreen parking area (= 'N Nigardsbrevatnet') • Luster, NW of Gaupne, near Hurrene at the E bank of river Jostedøla (= 'SW Hurrene') • Luster, SE of Gjerde, N from the farm Hesjevoll (= 'N Hesjevoll') • Sogndal, NE of Sogndal, above the road no. 55 W of the settlement Steig (= 'Sogndal, W Steig – Ovenfor veien' [correctly translated from Norwegian: 'W of Steig, above the road') • Telemark; Bamble, Langøya in the Langesundsfjorden, bay at the E side of island (= 'Langøya – Bukt på østsiden (Langøya I)' [correctly translated from Norwegian: 'Langøya, bay at the eastern side (Langøya I)']) • Porsgrunn, Brevik, forest Dammane in the W part of Brevik (= 'Brevik, Dammane') • Tinn, Hovin NW of Kongsberg, Spjeldset SW of Øvre Fjellstul (= 'Hovin, Spjeldset') • Tokke, E of Dalen, headland Gunnarshelle at the N coast of the west end of lake Bandak (= 'WNW Gunnarshelle') • Trøndelag; Trondheim, Trondheim, Sommerlystvegen (= 'Sør-Trøndelag, Trondheim, M. Sommerlystvegen – in the garden of nr. 22') • Vestfold; Larvik, Farmenrøysa mountain NE of Kvelde (= 'Farmenrøysa Ø' [correctly: 'Farmenrøysa, east-facing slope']) • Larvik, hill Småås N of Larvik (= 'Larvik, Småås') • Larvik, N part of Jordstøyp naturreservat in the Lågendalen W of Kvelde (= 'Jordstøyp N') • Larvik, Nevlungstranda W of Nevlunghavn, beach Mølen (= 'Nevlungstranda – Mølen II') • Larvik, SE of Kvelde, settlement Fjære W of the Fjæreelva (= 'Fjære').

Faunistic note. The first specimens of *Trichosia lengersdorfi* from Norway were collected and/or identified in our NTI project 2014–2016.

Ecological note. East- and South-facing mountainsides; on scree of steep slopes and on the tops of woody hillsides; eroded mountains with sandy areas at the foot; on steep slopes with large elms and valuable hardwood trees; mountain birch forests; forests along streams in otherwise muddy terrain; gardens with lawn and some larger trees. Phenology: May–Sep.

Trichosia (*Trichosia*) *splendens* Winnertz, 1867

Synonyms. = *maxima* Strobl, 1880; = *winnertzi* Nowicki, 1868.

Literature. *Faunistics*: Menzel and Mohrig (1997): 22; Menzel and Mohrig (2000): 560 [both as *Trichosia* (*Trichosia*) *splendens* in the discussion of *Trichosia* (*Trichosia*) *morio*]. *Taxonomy*: Tuomikoski (1960): 17, 18; Menzel and Mohrig (1997): 10; Menzel

and Mohrig (2000): 552 [all as *Trichosia* (*Trichosia*) *splendens*]; Vilkamaa (2000): 71 [as *Trichosia splendens*].

Localities. • Norway; without further locality details (= 'Norway'; see faunistic note) • Trøndelag; Fosnes, Jøa Island, mountain Mulfjellet SE of Dun (= 'Mulfjellet').

Faunistic note. The Norwegian specimen of *Trichosia splendens*, recorded without collecting details in Vilkamaa (2000), could not be found anymore in the UZMH collection (Vilkamaa, pers. comm.).

Ecological note. Habitats not specified. Phenology: without data.

Xylosciara (*Xylosciara*) *heptacantha* Tuomikoski, 1957

Literature. *Faunistics*: Hippa and Vikamaa (2004): 25 [as *Xylosciara* (*Xylosciara*) *heptacantha*]. *Taxonomy*: Tuomikoski (1957): 10 [as *Xylosciara heptacantha*]; Tuomikoski (1960): 92, 96; Menzel and Mohrig (2000): 574; Hippa and Vikamaa (2004): 23 [all as *Xylosciara* (*Xylosciara*) *heptacantha*].

Localities. • Finnmark; Alta, Leirbotn SE of Kviby, Lakselva at the E side of Altafjorden (= 'Leirbotn, Lakselva') • Kvalsund, Skaidi (= 'Skaidi') • Rogaland; Finnøy, Finnøy Island, Lasteinvatnet SE of Lastein at the SE coast (= 'Finnöy, Ledsleinvatnet') • Trøndelag; Oppdal, Kongsvoll near Kongsvold Fjeldstue in the Drivdalen (= 'Oppdal, Kongsvall').

Ecological note. Habitats not specified. Phenology: May–Jul.

Xylosciara (*Xylosciara*) *spinata* (Pettey, 1918)

Synonym. = *betulae* Tuomikoski, 1960.

Literature. *Faunistics*: Hippa and Vikamaa (2004): 20 [as *Xylosciara* (*Xylosciara*) *betulae*]. *Taxonomy*: Tuomikoski (1960): 92, 95; Menzel and Mohrig (2000): 568; Hippa and Vikamaa (2004): 20 [all as *Xylosciara* (*Xylosciara*) *betulae*]; Mohrig et al. (2013): 264 [as *Xylosciara* (*Xylosciara*) *spinata*].

Localities. • Finnmark; Kvalsund, Skaidi (= 'Skaidi') • Rogaland; Finnøy, Finnøy Island, Lasteinvatnet SE of Lastein at the SE coast (= 'Finnöy, Ledsleinvatnet') • Trøndelag; Oppdal, Kongsvoll near Kongsvold Fjeldstue in the Drivdalen (= 'Oppdal, Kungsvoll').

Ecological note. Habitats not specified. Phenology: May–Jul.

Xylosciara (*Xylosciara*) *trimera* Tuomikoski, 1960

Literature. *Faunistics*: Köhler et al. (2014): 329 [as *Xylosciara* (*Xylosciara*) *trimera*]. *Taxonomy*: Tuomikoski (1960): 90 [as *Xylosciara* (*Trixylosciara*) *trimera*]; Menzel and Mohrig (2000): 573; Hippa and Vilkamaa (2004): 11 [both as *Xylosciara* (*Xylosciara*) *trimera*].

Locality. • Vestfold; Larvik, lake Skjærsjø near Kvelde NW of Larvik (= 'Larvik, Skjærsjø').

Faunistic note. The first specimen of *Xylosciara trimera* from Norway was identified in our NTI project 2014–2016.

Ecological note. Oak canopies of *Quercus robur*. Phenology: Jul.

Xylosciara (*Xylosciara*) *validinervis* Tuomikoski, 1960

Literature. *Faunistics*: Tuomikoski (1960): 95; Hippa and Vilkamaa (2004): 16; Mohrig et al. (2013): 265 [all as *Xylosciara* (*Xylosciara*) *validinervis*]. *Taxonomy*: Tuomikoski (1960): 92, 95; Menzel and Mohrig (2000): 569; Hippa and Vilkamaa (2004): 16; Mohrig et al. (2013): 265 [all as *Xylosciara* (*Xylosciara*) *validinervis*].

Locality. • Finnmark; Tana, Tanafjorden, fjord Vestertana (= 'Finmark, Vestertana'; = 'Finnmark, Vestertana').

Ecological note. Habitats not specified. Phenology: Aug.

Zygoneura (*Zygoneura*) *sciarina* Meigen, 1830

Literature. *Faunistics*: Siebke (1877): 215; Lengersdorf (1926b): 4; Soot-Ryen (1942): 80 [all as *Zygoneura sciarina*]; Shin et al. (2014): 566 [as *Zygoneura* (*Zygoneura*) *sciarina*]. *Taxonomy*: Tuomikoski (1960): 156 [as *Zygoneura sciarina*]; Menzel and Mohrig (2000): 582 [as *Zygoneura* (*Zygoneura*) *sciarina*].

Localities. • Norway; without further locality details (= 'Norway') • Oppland; Lunner, Brovoll N of Oslo (= 'Brovold ad Christianiam'; = 'Brovold, Oslo'; = 'Brovold').

Ecological note. Habitats not specified. Phenology: Sep.

Doubtful species

The names included in this category are to be understood as 'unplaced species' within the Sciaridae. A reliable interpretation of the species names and their unequivocal placement within the Sciaridae on the basis of Meigen's original descriptions is not possible without revision of the types. Consequently, these may either be synonymous names, or the Norwegian specimens may have been misidentified by previous authors.

Sciara fuscipennis Meigen, 1818

Literature. *Faunistics*: Zetterstedt (1855): 4890 [as *Sciara fuscipennis*]; Soot-Ryen (1942): 78 [as *Neosciara fuscipennis*]. *Taxonomy*: Menzel and Mohrig (2000): 600 [as *Sciara fuscipennis*].

Locality. • Norway; without further locality details (= 'Norwegia'; = 'Norge').

Ecological note. Habitats not specified. Phenology: without data.

Sciara longipes Meigen, 1818

Literature. *Faunistics*: Zetterstedt (1851): 3757; Siebke (1877): 214 [both as *Sciara longipes*]; Soot-Ryen (1942): 78 [as *Neosciara longipes*]. *Taxonomy*: Menzel and Mohrig (2000): 600 [as *Sciara longipes*].

Locality. • Oslo; Oslo, Tøyen (= 'in Tøien ad Christianiam'; = 'ad Töien'; = 'Tøyen, Oslo').

Ecological note. Habitats not specified. Phenology: Sep.

Sciara nigripes Meigen, 1830

Literature. *Faunistics*: Zetterstedt (1851): 3719 [as *Sciara nigripes*]; Siebke (1863): 176 [as *Sciara nigripes* Zetterstedt; recte Meigen]; Zetterstedt (1871): 3719; Siebke (1877): 210 [both as *Sciara nigripes*]; Soot-Ryen (1942): 79 [as *Neosciara nigripes*]. *Taxonomy*: Tuomikoski (1960): 52 [as *Sciara nigripes* in the discussion of *Corynoptera montana*]; Menzel and Mohrig (2000): 600 [as *Sciara nigripes*].

Localities. • Nordland; Bodø, Bodø, Bjerkeng (= 'Bjerkeng') • Oppland; Lesja, Fogstuen on the Dovrefjell plateau (= 'Fogstuen'; = 'Fokstuen, Dovre'; = 'in alpe Dovre ad Fokstuen'; = 'in alpe Dovre') • Oslo; Oslo, Tøyen (= 'ad Christianiam in Tøien'; = 'Tøyen, Oslo') • Trøndelag; Verdal, Østre Nes at the Jamtlandsvegen [road no. 72] between Verdal and Lysthaugen (= 'ad Oestre-Näs Værdaliæ'; = 'ad Østre Næs Værdaliæ'; = 'Østre Nes, Værdal').

Ecological note. Habitats not specified. Phenology: Jul.–Aug.

Sciara pulicaria Meigen, 1818

Literature. *Faunistics*: Zetterstedt (1838): 827; Zetterstedt (1851): 3741; Zetterstedt (1855): 4890; Siebke (1866a): 385; Siebke (1877): 213; Lengersdorf (1926b): 9 [all as *Sciara pulicaria*]; Soot-Ryen (1942): 79 [as *Neosciara pulicaria*]. *Taxonomy*: Menzel and Mohrig (2000): 600 [as *Sciara pulicaria*].

Localities. • Norway; without further locality details (= 'Nord-Norwegen') • Møre og Romsdal; Rauma, between Veblungsnes and Romsdalshornet Mountain in the Romsdalsalpene SE of Åndalsnes (= 'Romsdals Amt, mellem Veblungsnæsset og Romsdalshorn') • Rauma, Veblungsnes at the Romsdalsfjorden SW of Åndalsnes (= 'ad Veblungsnæs Romsdaliæ; = 'Veblungsnes, Romsdal') • Oslo; Oslo (= 'ad Christianiam') • Oslo, Bekkelaget (= 'Bækkelgaet'; = 'Bekkelaget') • Oslo, Tøyen (= 'circa Christianiam ... in Tøien'; = 'Tøyen, Oslo') • Troms; Berg/Lenvik/Tranøy/Torsken, Senja Island (= 'Nordlandiæ Norwegieæ insula Senjen'; = Nordlandiæ, insula Senjen'; = 'insula Senjen Nordlandiæ'; = 'Senja').

Ecological note. Habitats not specified. Phenology: May–Aug.

Checklist of Norwegian Sciaridae

***Bradysia* Winnertz, 1867**
affinis (Zetterstedt, 1838)
alpicola (Winnertz, 1867)
angustipennis Winnertz, 1867
bicolor (Meigen, 1818)
brevispina Tuomikoski, 1960
confinis (Winnertz, 1867)
distincta (Staeger, 1840)
fenestralis (Zetterstedt, 1838)
flavipila Tuomikoski, 1960
forficulata (Bezzi, 1914)
fungicola (Winnertz, 1867)
giraudii (Egger, 1862)
hilariformis Tuomikoski, 1960
hilaris (Winnertz, 1867)
impatiens (Johannsen, 1912)
inusitata (Tuomikoski, 1960)
iridipennis (Zetterstedt, 1838)
lapponica (Lengersdorf, 1926)
longicubitalis (Lengersdorf, 1924)
nervosa (Meigen, 1818)
nitidicollis (Meigen, 1818)
opaca (Winnertz, 1871)
pallipes (Fabricius, 1787)
pauperata (Winnertz, 1867)
placida (Winnertz, 1867)
praecox (Meigen, 1818)
quercina Menzel & Köhler, 2014
rufescens (Zetterstedt, 1852)
sordida (Zetterstedt, 1838)
strenua (Winnertz, 1867)
strigata (Staeger, 1840)
tilicola (Loew, 1850)
trivittata (Staeger, 1840)
vernalis (Zetterstedt, 1851)

***Bradysiopsis* Tuomikoski, 1960**
vittigera (Zetterstedt, 1851)

***Camptochaeta* Hippa & Vilkamaa, 1994**
bournei (Shaw, 1941)
camptochaeta (Tuomikoski, 1960)
consimilis (Holmgren, 1869)
delicata (Lengersdorf, 1935)
fallax Hippa & Vilkamaa, 1994
hirtula (Lengersdorf, 1934)
mimica Hippa & Vilkamaa, 1994
truncata Vilkamaa & Mohrig, 2013
xystica Hippa & Vilkamaa, 1994

***Chaetosciara* Frey, 1942**
estlandica (Lengersdorf, 1929)

***Claustropyga* Hippa, Vilkamaa & Mohrig, 2003**
brevichaeta (Mohrig & Antonova, 1978)
refrigerata (Lengersdorf, 1930)

***Corynoptera* Winnertz, 1867**
boletiphaga (Lengersdorf, 1940)
brachypennis (Lengersdorf, 1926)
defecta (Frey, 1948)
fatigans (Johannsen, 1912)
flavicauda (Zetterstedt, 1855)
forcipata (Winnertz, 1867)
hypopygialis (Lengersdorf, 1926)
irmgardis (Lengersdorf, 1930)
membranigera (Kieffer, 1903)
minima (Meigen, 1818)
montana (Winnertz, 1869)
penna (Pettey, 1918)
roederi (Lengersdorf, 1931)
saetistyla Mohrig & Krivosheina, 1985
sphenoptera Tuomikoski, 1960
spoeckeri (Lengersdorf, 1930)
subtilis (Lengersdorf, 1929)
subvariegata Rudzinski, 1992
trepida (Winnertz, 1867)
waltraudis Mohrig & Mamaev, 1987

***Cratyna* Winnertz, 1867**
SG *Cratyna* Winnertz, 1867 s. str.
ambigua (Lengersdorf, 1934)
atra Winnertz, 1867
hirticornis (Meigen, 1818)
longipennis (Lengersdorf, 1931)
uliginosa (Lengersdorf, 1929)
uliginosoides Heller, Köhler & Menzel, 2016
SG *Spathobdella* Frey, 1948
colei (Freeman, 1990)
falcata (Tuomikoski, 1960)
longispina (Pettey, 1918)
nobilis (Winnertz, 1867)
perplexa (Winnertz, 1867)

***Ctenosciara* Tuomikoski, 1960**
hyalipennis (Meigen, 1804)
lutea (Meigen, 1804)

***Dichopygina* Vilkamaa, Hippa & Komarova, 2004**
aculeata Vilkamaa, Hippa & Komarova, 2004
bernhardi Vilkamaa, Hippa & Komarova, 2004
nigrohalteralis (Frey, 1948)
ramosa Vilkamaa, Hippa & Komarova, 2004

***Dolichosciara* Tuomikoski, 1960**
flavipes (Meigen, 1804)

***Epidapus* Haliday, 1851**
SG *Epidapus* Haliday, 1851 s. str.
alnicola (Tuomikoski, 1957)
gracilis (Walker, 1848)

***Hemineurina* Frey, 1942**
abbrevinervis (Holmgren, 1869)
conspicua (Winnertz, 1867)
inflata (Winnertz, 1867)
modesta (Staeger, 1840)
postconspicua (Mohrig, 1985)
venosa (Staeger, 1840)

***Leptosciarella* Tuomikoski, 1960**
SG *Hirtipennia* Mohrig & Menzel, 1997
hirtipennis (Zetterstedt, 1838)
SG *Leptosciarella* Tuomikoski, 1960 s. str.
fuscipalpa (Mohrig & Mamaev, 1979)
hispida (Winnertz, 1867)
nudinervis (Tuomikoski, 1960)
pilosa (Staeger, 1840)
scutellata (Staeger, 1840)
trochanterata (Zetterstedt, 1851)
truncata (Tuomikoski, 1960)

***Lycoriella* Frey, 1942**
brevipila Tuomikoski, 1960
ingenua (Dufour, 1839)
latilobata Menzel & Mohrig, 2000
parva (Holmgren, 1869)
piristylata Vilkamaa, Hippa & Heller, 2013
sativae (Johannsen, 1912)

***Pseudolycoriella* Menzel & Mohrig, 1998**
paludum (Frey, 1948)

***Scatopsciara* Edwards, 1927**
SG *Scatopsciara* Edwards, 1927 s. str.
atomaria (Zetterstedt, 1851)
brevicornis (Zetterstedt, 1851)
calamophila Frey, 1948
fluviatilis (Lengersdorf, 1940)
multispina (Bukowski & Lengersdorf, 1936)
nana (Winnertz, 1871)
neglecta Menzel & Mohrig, 1998
pusilla (Meigen, 1818)
vitripennis (Meigen, 1818)

***Schwenckfeldina* Frey, 1942**
carbonaria (Meigen, 1830)
tridentata (Rübsaamen, 1898)

***Sciara* Meigen, 1803**
flavimana Zetterstedt, 1851
hemerobioides (Scopoli, 1763)
humeralis Zetterstedt, 1851
ruficauda Meigen, 1818

***Trichocoelina* Vilkamaa & Menzel, 2019**
brevicubitalis (Lengersdorf, 1926)
cochleata (Rübsaamen, 1898)
ithyspina Vilkamaa & Menzel, 2019
jukkai Vilkamaa & Menzel, 2019
obesula Vilkamaa & Menzel, 2019
oricillifera Vilkamaa & Menzel, 2019
semisphaera Vilkamaa & Menzel, 2019
vitticollis (Holmgren, 1883)

***Trichosia* Winnertz, 1867**
SG *Mouffetina* Frey, 1942
expolita (Coquillett, 1900)
SG *Trichosia* Winnertz, 1867 s. str.
caudata (Walker, 1848)
confusa Menzel & Mohrig, 1997
edwardsi (Lengersdorf, 1930)
flavicoxa Tuomikoski, 1960
lengersdorfi Heller, Köhler & Menzel, 2016
splendens Winnertz, 1867

***Xylosciara* Tuomikoski, 1957**
SG *Xylosciara* Tuomikoski, 1957 s. str.
heptacantha Tuomikoski, 1957
spinata (Pettey, 1918)
trimera Tuomikoski, 1960
validinervis Tuomikoski, 1960

***Zygoneura* Meigen, 1830**
SG *Zygoneura* Meigen, 1830 s. str.
sciarina Meigen, 1830

Doubtful species
fuscipennis Meigen, 1818 [*Sciara*]
longipes Meigen, 1818 [*Sciara*]
nigripes Meigen, 1830 [*Sciara*]
pulicaria Meigen, 1818 [*Sciara*]

Discussion

In this literature review we document the knowledge on the Sciaridae of Norway accumulated up to 31 December 2019, which was basically the status quo before we started our nationwide taxonomic inventory funded by the NBIC. Nonetheless, data compiled here are the result of a meticulous study of the literature in the past six years, and thus a direct outcome of our NTI projects.

History of data collection. The first mention of black fungus gnats in Norway was by Ramus (1735). In our literature study we evaluated 111 literature sources published during a period of 285 years (Fig. 5). Of these, 43 papers contain first records of species identified between 1838 and 2019 (Fig. 6). Most publications reported the occurrence of 'army worms' until the middle of the 19th century and it was only with Zetterstedt (1838) that faunistic investigations began to be based on detailed Norwegian data at the species level. Of the 147 species now registered, the taxonomic status of four recorded by Zetterstedt (1838, 1851, 1855) is still unclear and these are treated here as doubtful species.

Not surprisingly, knowledge about the composition of the Norwegian sciarid fauna did not increase continuously. Roughly three different time periods of taxonomic work can be distinguished (Fig. 6). The first period began with the work of Johann Wilhelm

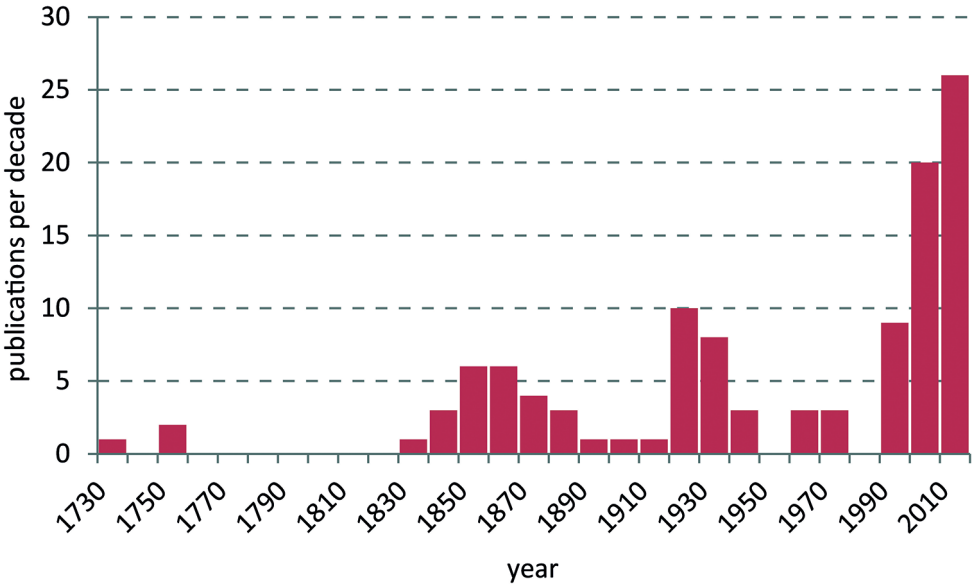


Figure 5. Number of publications on Norwegian sciarid fauna per decade between 1730 and 2020.

Zetterstedt (1785–1874), who described the first two Norwegian species in 1838. Later he published four additional books containing Norwegian records (Zetterstedt 1851, 1852, 1855, 1871). Other famous entomologists such as Francis Walker (1809–1874), Johan Heinrich Spalckhawer Siebke (1816–1875), August Emil Holmgren (1829–1888), and Wilhelm Maribo Schøyen (1844–1918) also contributed to an inventory of the Norwegian fauna. After 51 years, 41 sciarid species were recorded, representing 28% of the currently known species inventory. After an intermission of over 35 years, the second period began in 1926. Between 1926 and 1931 Franz Lengersdorf (1880–1965) added 19 new records to the faunistic inventory. Shortly thereafter, in the timescale of taxonomic and faunistic studies, Tron Soot-Ryen (1896–1986) and the founder of modern sciarid taxonomy Risto Kalevi Tuomikoski (1911–1989) recorded a further 17 species. Thus, in the second period, 36 species were recorded for the first time in Norway, representing a quarter of the known fauna. In the early 1990s, the number of publications and consequently the number of recorded species rose steeply. The increase was almost 86%, from 77 before 1990 to the current 143. The majority of these new records were provided by the dipterists Heikki Hippa, Frank Menzel, and Pekka Vilkamaa.

For the closely related family Mycetophilidae (fungus gnats), Gammelmo and Søli (2006) described a similar curve of knowledge increase. Here, also, the beginning of the recording of the Norwegian fauna goes back to the middle of the 19th century. Through several fundamental works by J.W. Zetterstedt and J.H.S. Siebke, Siebke (1877) was already able to list an inventory of 53 Norwegian species. After this period the Mycetophilidae received only little attention until a few publications appeared in the 1970s. This was followed in 1994 by a steep increase in faunistic knowledge, leading to more

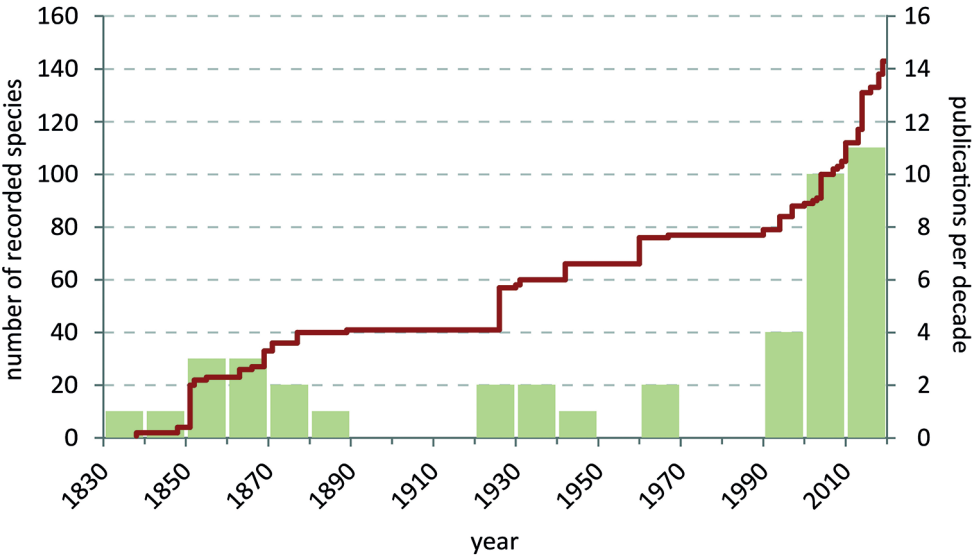


Figure 6. Cumulative increase of the number of Norwegian species records of Sciaridae (red line) and the number of corresponding publications (bars) containing first records per decade until 31 December 2019.

than 600 fungus gnat species having been recorded from Norway to date (see Gammelmo and Søli (2006), and subsequent papers). Records of approximately 200 additional species discovered in recent studies will soon be published (J. Kjærandsen, pers. comm.).

Diversity in Northern Europe. It is obvious that the 143 species summarised here are only a part of the extant sciarid fauna in Norway. We know of numerous additional species that will be dealt with in subsequent publications, including many new to science. We anticipate that the number of species in Norway is at least similar to that in Finland (370) (Vilkamaa 2014, Heller et al. 2015, Salmela et al. 2015, Hippa and Vilkamaa 2016, Vilkamaa and Menzel 2019) and Sweden (299) (Heller et al. 2009, 2015, 2016; Heller and Menzel 2013; Vilkamaa et al. 2013a–c; Vilkamaa and Menzel 2019), although the inventory for Sweden in particular is highly incomplete (Menzel et al. 2020). Even so, the results of our projects should not be regarded as exhaustive; there are still large areas, including very promising habitats, in which sciarids remain poorly sampled or have not been collected at all. Also, as the senior author's experience with the German fauna (more than 650 species) has shown, the high proportion of rare, or rarely collected, species makes it impossible to achieve a comprehensive inventory during a study period of only five years. Due to the diversity of landscape structures, climate conditions, and habitats, the number of sciarid species in Norway, including the Arctic islands, must be 20% higher than that in Sweden and Finland. Consequently, knowledge on the black fungus gnats in Norway summarised here is still incomplete and represents only 30% of the estimated inventory of ca. 450–500 species. The numbers mentioned above are an indication that we are still far from having a complete knowledge of sciarid diversity in Scandinavia, and that extensive research will be needed in the future.

Distribution and phenology in Norway. A rough summary of recorded species by mainland counties south and north of the Arctic Circle, including the offshore islands (Fig. 7) shows that a majority of 83 species were found in southern Norway while the northern mainland supports 74 species. The known species inventory of the Arctic islands ranges from three (Jan Mayen) to 13 (Spitsbergen). Our literature survey shows that some species are very common and widely distributed on the Norwegian mainland (e.g., *Bradysia nitidicollis*, *B. rufescens*, *Ctenosciara hyalipennis*, *Lycoriella ingenua*, *Scatopsciara atomaria*, *Sc. vitripennis*), similar to the situation in other European countries. Some species not only inhabit the entire mainland, but also reach the arctic islands (e.g., *Bradysia nervosa*, *B. praecox*). In addition, there are also species with a relatively large number of records, which are apparently adapted to a harsh climate with a short vegetation-growth period. These species (e.g., *Camptochaeta consimilis*, *Cam. delicata*, *Schwenckfeldina tridentata*, *Trichocoelina cochleata* and *Trichoc. vitticollis*) were only found in the far north (Troms, Finnmark) and/or on the Arctic islands of Jan Mayen, Bjørnøya and Spitsbergen. On the other hand, several species seem to occur only in southern Norway (e.g., *Cratyna uliginosoides*, *Sciara hemerobioides*, *Trichosia lengersdorfi*). The areas south of the Arctic Circle in particular have not been sufficiently investigated. At least 350 sciarid species are expected in southern Norway including the high mountains. By contrast, the number of species on the Arctic islands will be probably increase only slightly (up to 20).

The very species-rich genera *Bradysia* Winnertz, *Corynoptera* Winnertz and *Scatopsciara* Edwards are still largely underrepresented in the papers published so far (see checklist). Many Holarctic species of the genera *Claustropyga* Hippa, Vilkamaa &

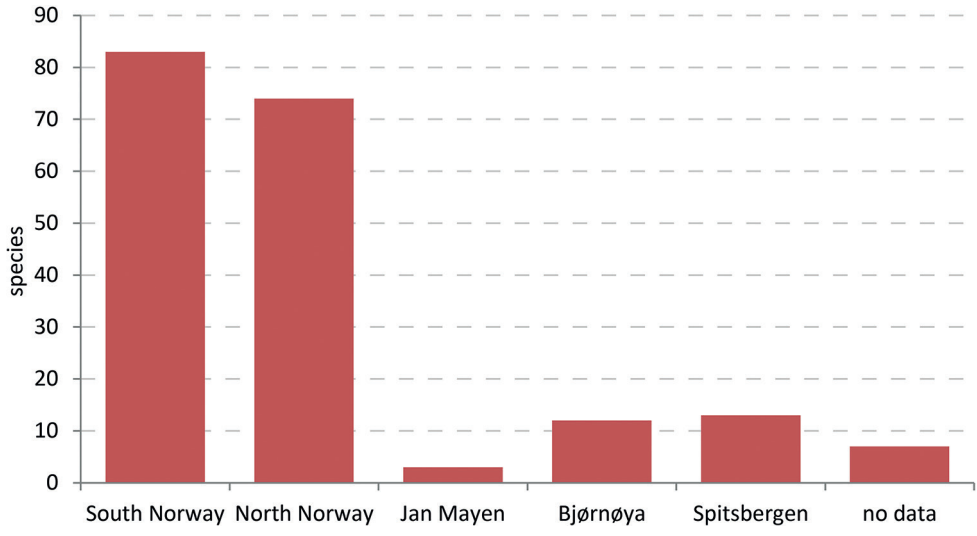


Figure 7. Distribution of sciarid species in Norway based on published records until 31 December 2019. 'North Norway' includes the counties Nordland, Troms and Finnmark, while the remaining counties of the Norwegian mainland are grouped as 'South Norway'.

Mohrig, *Hemineurina* Frey, and *Lycoriella* Frey are also still missing. Only one or two species of *Epidapus* Haliday, *Dolichosciara* Tuomikoski and *Pseudolycoriella* Menzel and Mohrig have been reported from Norway so far. The genera *Cosmosciara* Frey, *Hyperlasion* Schmitz, *Phytosciara* Frey, *Prosciara* Frey, *Pnyxia* Johannsen, *Pnyxiopsis* Tuomikoski, *Scythropochroa* Enderlein and *Stenacanthella* Vilkamaa and Menzel are not known yet from Norway. They were recorded from many countries in central and northern Europe, mostly with few species, and may also be present in Norway.

According to all literature sources, sciarids were found from March to October with a clear peak in July (Fig. 8). However, this is far from providing a realistic picture of the phenology. Together with the higher 'accumulation of species' in June and August, it reflects the preferred collecting period of entomologists in the summer rather than the actual phenology of Sciaridae. The sciarid records considered here are mostly from by-catches, whereas targeted long-term studies carried out with standardised trapping methods over several years in the same habitat type in Norway have not yet been undertaken.

Thiede (1977) and Feldmann (1992), for example, studied the emergence times and activity patterns of sciarids over a two to three year period in selected beech, spruce and pine forests in Germany. They found that sciarid phenology can vary significantly between studied forest ecosystems based on the species identified. Under temperate climatic conditions (e.g., in Central Europe) adults usually have two activity phases: mid-March to early June and early August to late September, with two peaks in April and September. Depending on precipitation and temperature, the first peak may shift to March or May and the second peak to June/July or October/November. Numerous ecological studies have shown that some species complete two generations per year in Central Europe, in spring and late summer or autumn. Other species are univoltine, with only one generation in spring, summer or late summer (Thiede 1977).

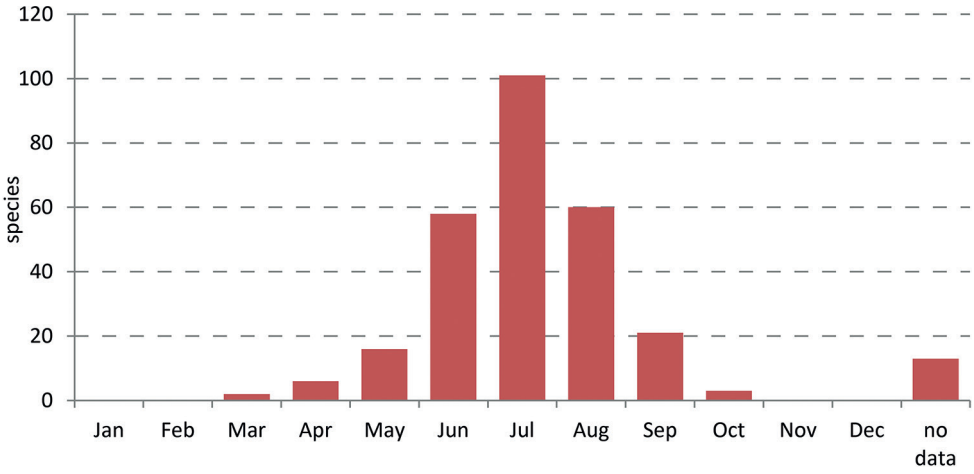


Figure 8. Phenology of sciarid species in Norway based on the flight times of adults summarised from the published records until 31 December 2019.

Unfortunately, data on Norwegian sciarids are still too sparse for a solid evaluation. Some common species are present from spring to autumn, similar to those in Central Europe (e.g., *Bradysia nitidicollis*, *Cratyna uliginosa*, *Cr. uliginosoide*s, *Lycoriella ingenua*, *Scatopsciara atomaria*, *Scatopsciara vitripennis*, *Trichosia lengersdorfi*). In southern Norway some species could be bivoltine (e.g., *Bradysia iridipennis*, *Trichosia caudata*). It is to be expected for Norway that the phenologies of species adapted to temperate habitats will differ clearly from those of subpolar sites. The period of adult activity probably shortens significantly with increasing northern latitude, shifting to the summer months of June to August due to the short vegetation-growth period in the far north and Arctic islands (e.g. *Camptochaeta consimilis*, *C. delicata*, *Trichocoelina vitticollis*).

Outlook. The Sciaridae is still one of the most poorly studied families of Diptera in Norway, especially in the interior of the country, which is mostly unexplored. The life history of most Norwegian sciarid species (including immature stages and life cycles) are largely unknown. In addition, at present only little information exists on habitat preferences of the northern European species, especially those with a subarctic and arctic distribution. As a consequence, the family was not included in the new Red List for Norway (Gammelmo et al. 2015). Knowledge on Sciaridae at the species level is important for understanding the complexity of terrestrial ecosystems, in particular woodland decomposition processes. The first step in establishing such knowledge must be to determine which species occur in Norway and in which habitats they thrive.

The above-mentioned NTI projects (including the present study) aimed to survey sciarids that are found in the wide array of natural habitats in Norway and in the 'Natur i Norge' (NiN) system. Another objective is to provide the Norwegian scientific community with tools for identifying Norwegian sciarids, including identification keys, reference collections and genetic resources. Both projects will also contribute to global biodiversity initiatives by providing data on species occurrence, genetic diversity and geographic distribution. Knowledge on the sciarid fauna in Norway is thus expected to increase considerably in the next few years. Continuous collecting efforts and taxonomic studies will provide a solid new base of knowledge on Sciaridae in Norway. Finally, we hope that the present study will contribute to a better understanding of an interesting insect group and close existing gaps of knowledge in biodiversity research, especially on the sciarid fauna of Scandinavia.

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Splitting the leafmining shield-bearer moth genus *Antispila* Hübner (Lepidoptera, Heliozelidae): North American species with reduced venation placed in *Aspilanta* new genus, with a review of heliozelid morphology

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Abstract

The new genus *Aspilanta* **gen. n.** is described to harbour Nearctic heliozelid moths with reduced venation, previously placed in *Antispila* Hübner, 1825, with type species *Antispila oinophylla* van Nieukerken & Wagner, 2012. The erection of this genus has become possible now that monophyly has been supported by a recent phylotranscriptomics analysis. Six species are combined in this genus: *Aspilanta oinophylla* (van Nieukerken & Wagner, 2012), **comb. n.**, *A. hydrangaeella* (Chambers, 1874), **comb. n.**, *A. ampelopsifoliella* (Chambers, 1874), **comb. n.**, *A. voraginella* (Braun, 1927), **comb. n.**, *A. argentifera* (Braun, 1927), **comb. n.**, *A. viticordifoliella* (Clemens, 1860), **comb. n.** and two candidate species are recognised. DNA barcode COI sequences of Malaise trapped specimens suggest a rich fauna of *Aspilanta* in Central America. All are leafminers, with Vitaceae as main host family, and single species feeding respectively on Hydrangeaceae and Myricaceae. The species are briefly diagnosed, and data on biology, DNA barcodes and distribution are provided. To place the genus in context, a review of heliozelid morphology and phylogeny is presented and a key to Nearctic genera is given. The genus is confined to North and Central

America, possibly also occurring in South America. *Aspilanta oinophylla* is also an invasive species on grapevine in Italy. The genus is sister to *Coptodisca* Walsingham, 1895. Another species is removed from *Antispila*: *Heliozela eugeniella* (Busck, 1900), **comb. n.**, feeding on *Eugenia* (Myrtaceae), from Florida.

Keywords
Canada, DNA barcodes, grapevine pest, *Heliozela*, phylogeny, United States, Vitaceae

Introduction

The taxonomy of the Lepidoptera family Heliozelidae, the shield bearer moths, has recently received considerable attention due to the discovery of several previously unknown pest species, attacking grapevines and walnuts (van Nieukerken et al. 2012; Bernardo et al. 2015; van Nieukerken and Geertsema 2015; Wang et al. 2018; Takács et al. 2020), as well as the discovery of a rich unknown fauna in Australia that includes pollinating species (Milla et al. 2017). Through international collaboration, it became possible to study the phylogeny of the family on the basis of a large selection of taxa with some nuclear and mitochondrial genes (Milla et al. 2017), and for a smaller subset with transcriptomes (Milla et al. 2019).

It soon became apparent that the relatively large genus *Antispila* Hübner, 1825, was a catch-all genus for species similarly patterned with a fascia before the middle of the forewing and a pair of opposing spots (the meaning of the Greek anti-spila / ἀντί-σπιλα) in the distal half. Several African and Asian species in *Antispila* with a reduced venation were transferred to the previously monotypic genus *Holocacista* Walsingham & Durrant, 1909 (van Nieukerken and Geertsema 2015). The Nearctic species that invaded Italy, *Antispila oinophylla* van Nieukerken & Wagner, 2012 and its relatives, share a similar reduced venation, but without a phylogenetic generic framework it was still described in *Antispila*, although in the original description it was made clear that this was a temporary placement (van Nieukerken et al. 2012). The phylogeny in Milla et al. (2017) showed that all taxa with reduced venation form a clade: the genera *Holocacista, Antispilina* Hering, 1941, *Coptodisca* Walsingham, 1895 together with several species in *Antispila*, whereas the type species of *Antispila*, *A. metallella* ([Denis & Schiffermüller], 1775) and other species with the full venation form another clade. However, in that study, the species with reduced venation in *Antispila* were paraphyletic with respect to *Coptodisca* and formed two clades: the *A. ampelopsifoliella* group and *Antispila group* II. The transcriptomics study, in contrast, showed a strong support for monophyly of the sampled representatives of these groups, here *A. oinophylla* and *A. argentifera* Braun, 1927. As the continued use of the incorrect generic name *Antispila* can cause confusion, we describe here a new genus for this group of species and give the invasive grapevine miner *A. oinophylla* its correct taxonomic placement.

To place this description in a wider context, we review the taxonomic history of the genus *Antispila* sensu lato and review knowledge on the morphology and phylogeny of the family Heliozelidae, partly based on the unpublished thesis of the late Ebbe Nielsen (1980).

Taxonomic history of *Antispila* Hübner

In an attempt to divide the large genus *Tinea* into smaller entities, at the time used for almost all small microlepidoptera, Hübner (1816–1826 [1825]: 419) described the genus *Antispila* for a group of species with opposite forewing spots ("Die Schwingen mit entgegengesetzten hellen Flecken oder Bändchen angelegt"). He included 13 species, of which only his *A. Stadtmüllerella* (given as replacement name for his *Tinea Pfeifferella*) is a heliozelid. Other included species belong now to Micropterigidae (3), Eriocraniidae (1), Nepticulidae (1), Meessiidae (1), Elachistidae (3), Oecophoridae (1), and the placement of two is unknown. Hübner's genus was not immediately recognised by other European authors, who usually placed species that are now in *Antispila* in other genera, such as *Elachista* Treitschke, 1833 (Fischer von Röslerstamm 1834–1843; Stainton 1851,1854) or *Oecophora* Latreille, 1796 (Duponchel 1843).

The first to restrict the genus to heliozelid species was Herrich-Schäffer (1855), who recognised two species: *A. treitschkiella* (Fischer von Röslerstamm, 1843) and *A. pfeifferella* (Hübner, 1813), implicitly using *A. Stadtmüllerella* (as *pfeifferella*, a junior synonym of *A. metallella* (Denis & Schiffermüller, 1775)) as type species, although no formal selection was made according to the current rules (ICZN 1999). He also introduced the name *Heliozela* Herrich-Schäffer, 1853, and placed the two genera together (Herrich-Schäffer 1853). This view on *Antispila* was then followed widely in Europe in the 19th and 20th centuries (Frey 1856; Stainton et al. 1870; Meyrick 1895; Spuler and Meess 1910; Heinemann and Wocke 1876), although Frey still also included what we now know as *Stephensia brunnichella* (Linnaeus, 1767) (Elachistidae). Heinemann and Wocke (1876) also recognised and named the family Heliozelidae for the first time.

In North America, Clemens discovered *Antispila* leafmines on "*Nyssa multiflora*" (black gum, now known as *Nyssa sylvatica*, Nyssaceae), but at first did not know where the reared moths belonged and suggested in a letter to Stainton on 15 May 1859 the new name *Diacopia*. This name has unintentionally, but validly been published as *Diacopia* Clemens, 1872, when Stainton published their correspondence much later (Clemens and Stainton 1872). Undoubtedly Stainton informed Clemens about the correct position of this species, and shortly thereafter the first four Nearctic species were described in *Antispila* by Clemens (1860a, 1860b); later more by Chambers (1874a, 1874b), Busck (1900), Braun (1915,1927a, 1927b) and Lafontaine (1973).

A formal selection of *Antispila stadtmuellerella* as the type species was made by Fletcher (1929), but unfortunately, he and most later authors overlooked the fact that Hampson (1918) had already made a selection of the first species in Hübner's list: *A. pagenstecherella* (Hübner, 1825). However, this species was already recognised in the genus *Eudarcia* Clemens, 1860, then Tineidae, now in Meessiidae. Because of this unfortunate situation, where the well-known generic name *Antispila* in fact belonged to another family, Nielsen and Nye (1986) applied to the International Commission on Zoological Nomenclature to validate Fletcher's selection of the type species rather than Hampson's. This was granted two years later (ICZN 1988).

Until recently, the validity of the genus *Antispila* was rarely challenged; only the small Mediterranean species *A. rivillei* (Stainton, 1855) was moved to the genus *Holocacista*, when the different venation was noted by Walsingham (1909). Nielsen and Traugott-Olsen (1981) moved the American *A. major* Kearfott, 1907 to *Stephensia* (Elachistidae) and later one more misplaced Elachistidae was discovered: *A. merinaella* Paulian & Viette, 1955 from Madagascar, without assigning it to another genus (van Nieukerken and Geertsema 2015).

The presence of species with a reduced venation was already noted by Meyrick (1916) when describing the Neotropical *A. trypherantis* Meyrick, 1916, *A. pentalitha* Meyrick, 1916 and later *A. cyclosema* Meyrick, 1921 (Meyrick 1921). This was also noted by Kuroko (1961), when describing the first Japanese *Antispila*. In North America, Don Lafontaine (pers. comm.) had also independently discovered the difference in venation, and a difference in the shape of the "shield", the pupal case cut out from the leaf mine by the mature larva, when working on Heliozelidae, and planned the description of a new genus in the early 1970s; however, this never happened as he changed his study subject to larger moths.

When describing the new *Antispila oinophylla*, the non-monophyly of North American *Antispila* became apparent once again (van Nieukerken et al. 2012), and during the study of South African Heliozelidae, several African and Indian species were transferred from *Antispila* to *Holocacista* and *Heliozela* respectively (van Nieukerken and Geertsema 2015). The two phylogenetic studies that followed (Milla et al. 2017, 2019) corroborated this and strongly indicated the polyphyly of the old genus *Antispila*. Here we continue this process by placing six *Antispila* species in the new genus *Aspilanta* and recombining one species with *Heliozela*. After this action, five named Nearctic species remain in *Antispila* s. str., three feeding on *Cornus* (Cornaceae) and one each on *Nyssa* (Nyssaceae) and *Vitis* (Vitaceae). Globally the genus now has 27 named species in the Holarctic and Oriental regions, mainly feeding on Cornales and Vitaceae. The three European species, all feeding on *Cornus*, were recently revised by van Nieukerken et al. (2018); the 12 named and one unnamed Japanese species were treated by Lee and Hirowatari (2013) and in total five species were recently described from China (Liu and Wang 2017; Wang et al. 2018; Liao et al. 2019). One unnamed species was recorded from South Africa (van Nieukerken and Geertsema 2015). The majority of the nine species listed in *Antispila* from the Neotropics (Heppner 1984) probably belong in other genera, including *Aspilanta*.

Materials and methods

As most species treated here were already discussed in the paper describing *Antispila oinophylla*, we re-use several photographs from van Nieukerken et al. (2012) and refer to that paper for the methodology used by EvN for collecting, preparation, imaging, and DNA barcoding, and updates in subsequent papers on Heliozelidae (van Nieukerken and Geertsema 2015; van Nieukerken et al. 2018). Additional fieldwork in North America was carried out by EvN in 2015, 2016 and 2018.

All examined and observed material, including parasitoids and all available barcoding data are listed in the occurrence dataset, published with GBIF (DOI: https://www.doi.org/10.15468/79mu7z). In the text we omit all material that was already listed by van Nieukerken et al. (2012), even though some of these records later received registry numbers (in CNC and RMNH) or were dissected; these data can be found in the GBIF dataset. Material collected in 2011 was cited in the 2012 paper only from larvae and leafmines; adults reared in 2012 are cited here. We follow the new guidelines for fine-grained formatting of material examined. We divide the material into four categories: examined adults (numbers without male or female sign represent unsexed adults); examined larvae and leafmines; DNA barcoded material that we did not examine personally, but identified on the basis of the barcode (all DNA barcoded specimens can also be found in the BOLD dataset DS-ASPIL (DOI: https://www.doi.org/10.5883/DS-ASPIL); and observations from internet sites and other photographs that could be reliably identified on the basis of the photograph; unless otherwise indicated, these refer to leafmines with or without larvae.

Under the heading "Distribution" we list countries, states and provinces; an asterisk denotes a new record.

Leafmines were photographed by CSE in the field using a Nikon D50 digital camera and a Nikon AF Micro Nikkor 105 mm lens. The camera's built-in flash was used for photographs with reflected light; the sun was used for transmitted light. All other photographs by CSE were taken using a Canon EOS Rebel XSi SLR digital camera, MP–E 65 mm macro lens, and Macro Twin Lite MT–24EX flash unit. For transmitted light in leaf mine photographs, one of the flash heads was removed and aimed at the camera while the leaf was held tightly against it.

Leaves containing larvae were placed in sealed, 9– or 15–dram plastic vials, which were stored away from direct sunlight and checked daily (when possible) for emerging insects. After pupal cases were formed, extraneous leaf material was removed from the vial to minimise mould and a moistened, crumpled piece of toilet paper was added to prevent desiccation. Overwintering pupal cases were stored in a refrigerator at 1–3 °C from 6 November 2013 to 25 February 2014, 1 November 2014 to 1 March 2015, 1 November 2015 to 1 March 2016, 20 October 2017 to 1 April 2018, and 17 October 2019 to 21 February 2020. Adult moths were chilled and photographed as described by Eiseman and Lonsdale (2018) for agromyzid flies.

Morphological terminology follows van Nieukerken et al. (2012) with the corrections proposed by van Nieukerken and Geertsema (2015).

Host plant names follow the Catalogue of Life (Hassler 2020), which agrees with the Flora of North America for the Vitaceae (Moore and Wen 2016) and Hydrangeaceae (Freeman 2016), but for Myricaceae rather follows Wilbur (1994). As the differences between the Virginia creeper species *Parthenocissus quinquefolia* and *P. vitacea* are rather subtle, it is possible that some records of *P. quinquefolia* may in fact refer to *P. vitacea*. According to Pringle (2010) the last species should be named *P. inserta*, but the cited sources do not follow this, despite the rather strong argumentation.

We list parasitoids that we reared from *Aspilanta* larvae. Those reared by EvN were routinely stored in ethanol 96–100%, and later DNA barcoding was performed (dataset DS-PARASP, doi: https://www.doi.org/10.5883/DS-PARASP). Chalcidoidea were

morphologically identified by Sandrine Ulenberg, Braconidae were tentatively identified by EvN on the basis of DNA barcodes; all are stored in RMNH; Barcode Identification Numbers are listed after the taxon names. Parasitoids reared by CSE were photographed alive, then preserved in 95% ethanol and sent to specialists: all Eulophidae, except the *Pediobius*, were examined by Christer Hansson and deposited in BMNH; Braconidae were determined by José Fernández-Triana from photographs and are deposited at CNC. We have not found any literature records of reared parasitoids that were identified below family level. Species listed here as Braconidae: Microgastrinae belong either to the genus *Dolichogenidea* or *Pholetesor*; a detailed taxonomic revision of this group is necessary (José Fernández-Triana, pers. comm.). The record of this subfamily listed here under *A. ampelopsifoliella*, was in fact the basis for the first record of Heliozelidae as host family (Fernandez-Triana et al. 2020). All records of parasitoids are also listed in the GBIF dataset (DOI: https://www.doi.org/10.15468/79mu7z).

Abbreviations for depositories:

ANSP	Academy of Natural Sciences in Philadelphia, Pennsylvania, USA.
BIOUG	Centre for Biodiversity Genomics, Guelph, Canada.
BMNH	Natural History Museum, London, UK.
CNC	Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Canada (registration numbers start with CNCLEP).
CSEC	Personal collection of C.S. Eiseman.
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA.
NFRC	Northern Forest Research Centre, Forestry Canada, Edmonton, Canada.
RMNH	Naturalis Biodiversity Center, Leiden, Netherlands (registration numbers start with RMNH.INS).
TLMF	Tiroler Landesmuseen, Ferdinandeum, Hall, Austria.
USNM	Smithsonian National Museum of Natural History, Washington DC, USA.
ZMUC	Zoological Museum, Natural History Museum of Denmark, Copenhagen, Denmark.

Taxonomy

Genus *Aspilanta* gen. n.
http://zoobank.org/897EE415-F1AF-46A8-9404-49EFC6E2D80A

Antispila: auct. partim, nec Hübner, 1825.
Antispila ampelopsifoliella group; van Nieukerken et al. 2012: 66.
Antispila "group II"; Milla et al. 2019: 133.

Type species. *Antispila oinophylla* van Nieukerken & Wagner, 2012: 38, by present designation.

Differential diagnosis. Very small moths, wingspan between 4.0 and 6.2 mm, with a forewing pattern of metallic–silvery markings, comprising an oblique fascia at ¼, a postmedial pair of spots (one costal and one dorsal), and usually a small apical spot (only absent in *A. viticordifoliella*); fringe line more or less distinct. Males never with androconial scales or hair-pencils. Antennae with only 16–20 segments. *Antispila* species in North America never have an apical spot. *Aspilanta* species are diagnosed by the reduced venation (Figs 9–13); in *Antispila* the discoidal cell is present and more veins are retained (illustrated in van Nieukerken et al. 2012; van Nieukerken et al. 2018); most *Antispila* species are larger and have more antennal segments. Separated from *Heliozela* species by more extensive colour pattern and apical spot, and *Heliozela* species have the venation with discoidal cell and a distinct epiphysis on foreleg. *Coptodisca* species are readily recognised by their colour pattern (Bernardo et al. 2015; Eiseman 2019). The genera *Holocacista* and *Antispilina*, not yet known from the New World, have a very similar venation, but always lack the apical spot. Moreover, *Holocacista* species have a small epiphysis on the foreleg, and the phallus bears an unusually long, often recurved appendix.

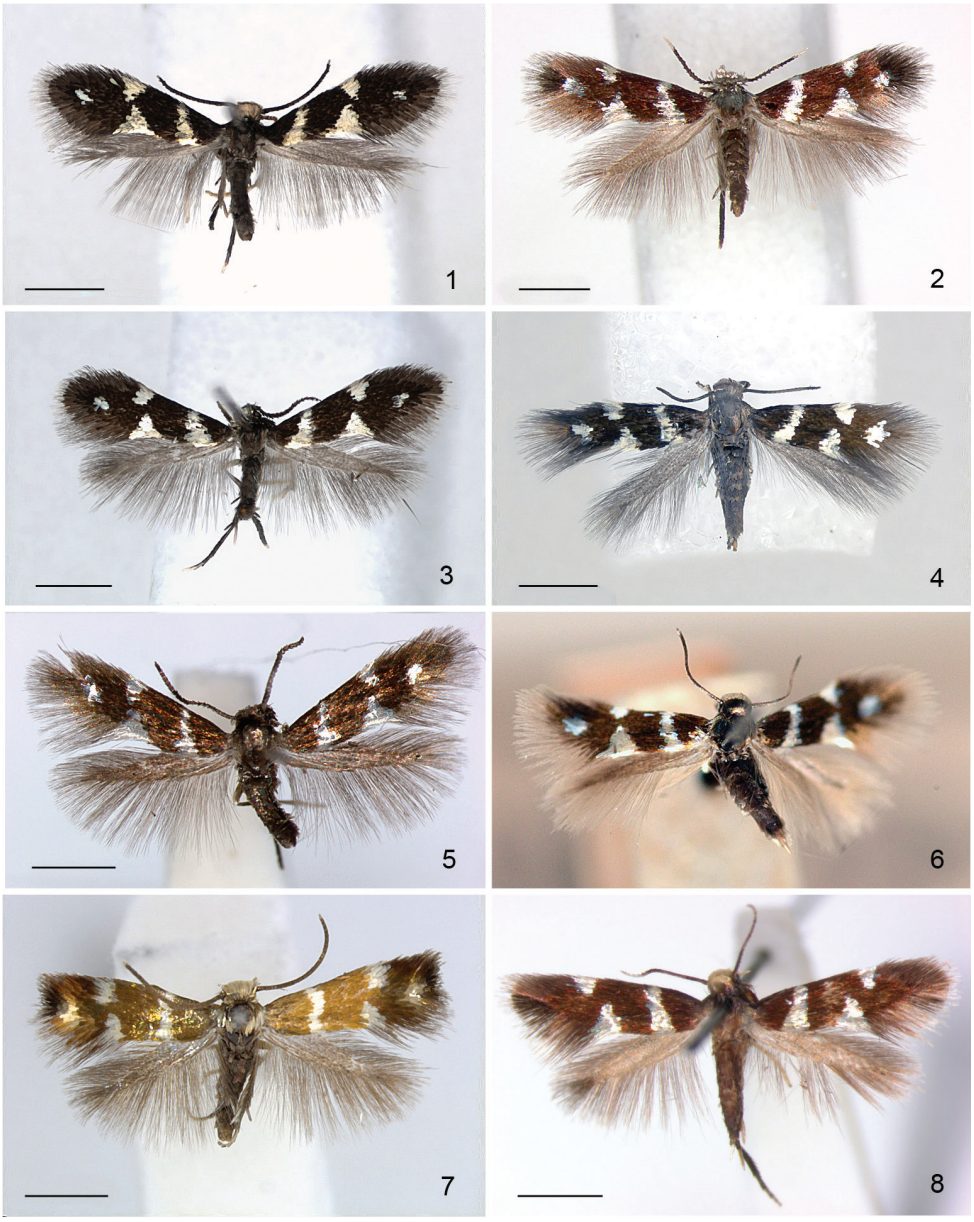
Description. Adults (Figs 1–8, 45–50). Very small moths, forewing length ca. 1.8–2.8 mm (wingspan ca. 4.0–6.2 mm), no sexual dimorphism.

Head (Figs 14–18). Almost oval in outline. Eyes in latero-ventral position, ventral margin not reaching lower margin of head. No sutures present. Anterior tentorial arms very slender, prominently curved laterally before converging towards frons. Vestiture comprising lamellar scales, closely appressed on head, in dry specimens scales on vertex sometimes raised, probably an artefact as a result of drying. Mouthparts: labrum narrow, pilifers absent. Mandibles small, as long as broad, relatively well sclerotised (Fig. 16). Maxilla with galea well developed and almost twice as long as head; maxillary palp reduced to a single segment. Labial palp well developed, 3-segmented, drooping, slightly shorter than head capsule; distal segment almost 3× as long as second segment; depression for Organ von Rath not seen. Antenna (Figs 14, 18) ca. half length of forewing with 14–18 flagellomeres (16–20 segments) [best counted in denuded specimens on slides], no sexual dimorphism. Scape and pedicel of equal length, slightly shorter and wider than flagellomeres. Flagellomeres (Fig.18) cylindrical, ca. twice as long as wide, each with two annuli of scales, most dark, some apical flagellomeres may be white. Pecten present, but not easily visible; with ca. 4–5 hairs.

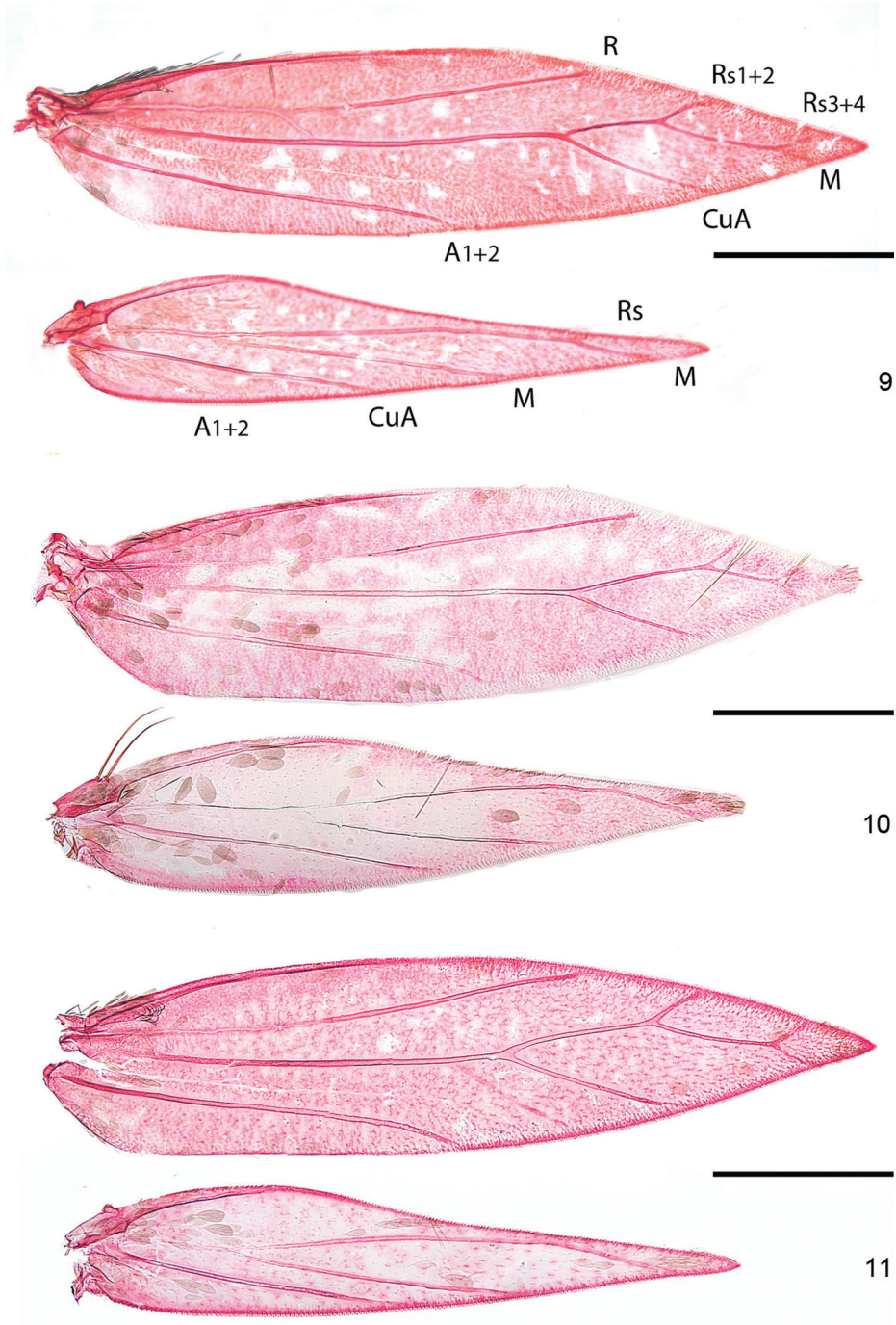
Thorax. Vestiture of appressed lamellar scales, either concolourous with ground colour of forewings or more metallic and similar to vestiture of head. Foreleg (Fig. 20) without epiphysis.

Wings. Male retinaculum a series of 7–12 hook-shaped bristles (Fig. 19), arising from a thickened serrate portion of Sc. Frenulum in male a strong curved bristle (Figs 12, 13), in female two bristles present (Fig. 10); pseudofrenular bristles in male absent. Humeral field with scattered microtrichia, otherwise microtrichia restricted on wing membrane to area just posterior to retinaculum, arranged in longitudinal rows. Scale sockets regularly spaced, not in distinct rows.

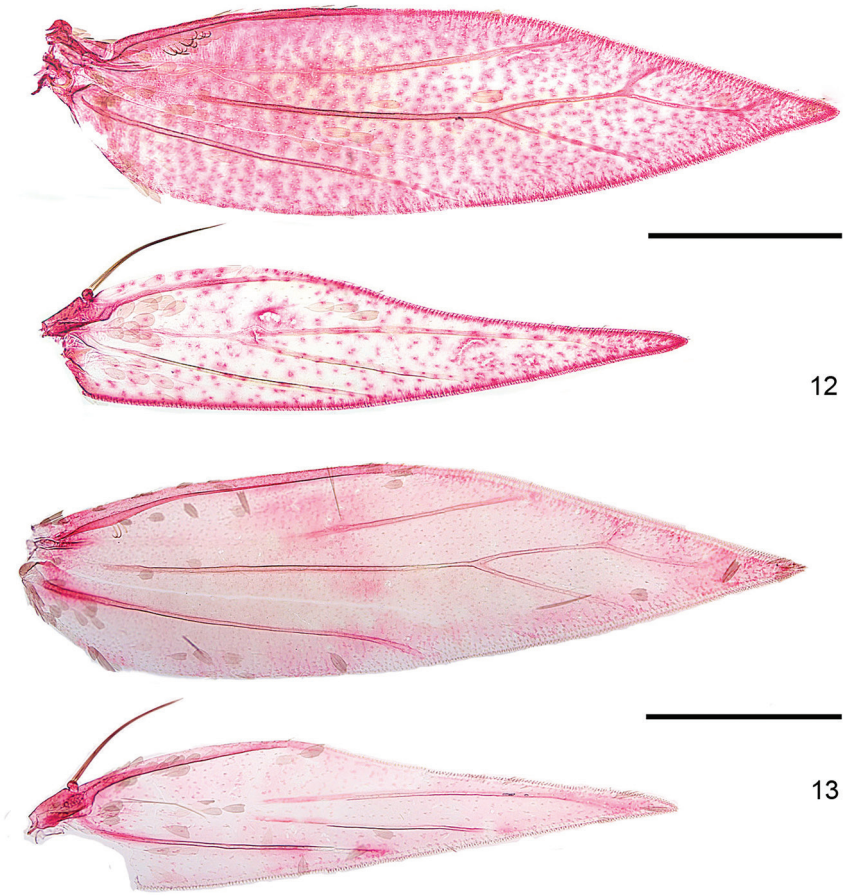
Venation (Figs 9–13). Forewing with Sc to middle of costa. R unbranched, a separate vein, to costa, but a persistent trachea connecting R with Rs+M+CuA. Rs+M+CuA ending in 3–4 branches, interpreted as Rs1+2 to costa, Rs3+4 to termen, M and CuA



Figures 1–8. *Aspilanta* species, mounted adult moths. **1** *A. oinophylla*, male, USA, VT, RMNH.INS.24378 **2** *A. hydrangaeella*, female, USA, NC, RMNH.INS.25191 **3** *A. ampelopsifoliella*, male, USA, CT, RMNH.INS.24377 **4** *A argentifera*, female, USA, MA, RMNH.INS.25019 **5** *A. voraginella*, male, USA, AZ, RMNH.INS.23918 **6** *A. argentifera*, female holotype **7** Undescribed species in unnamed genus14 ("Neospila"), male, Chile, Osorno, 20 km W of Entre Lagos, 17.x.1981, leg. Nielsen & Karsholt, genitalia slide EJvN 4632, ZMUC **8** *A. viticordifoliella*, female, Canada, Ottawa, from *Parthenocissus*, CNCLEP00122404. Scale bars: 1mm.



Figures 9–11. *Aspilanta* species, denuded wings, showing venation. **9** *A. oinophylla*, male, veins labelled, RMNH.INS.24257 **10** *A. hydrangaeella*, female, RMNH.INS.25191 **11** *A. ampelopsifoliella*, male, RMNH.INS.24376. Scale bars: 500 μm.



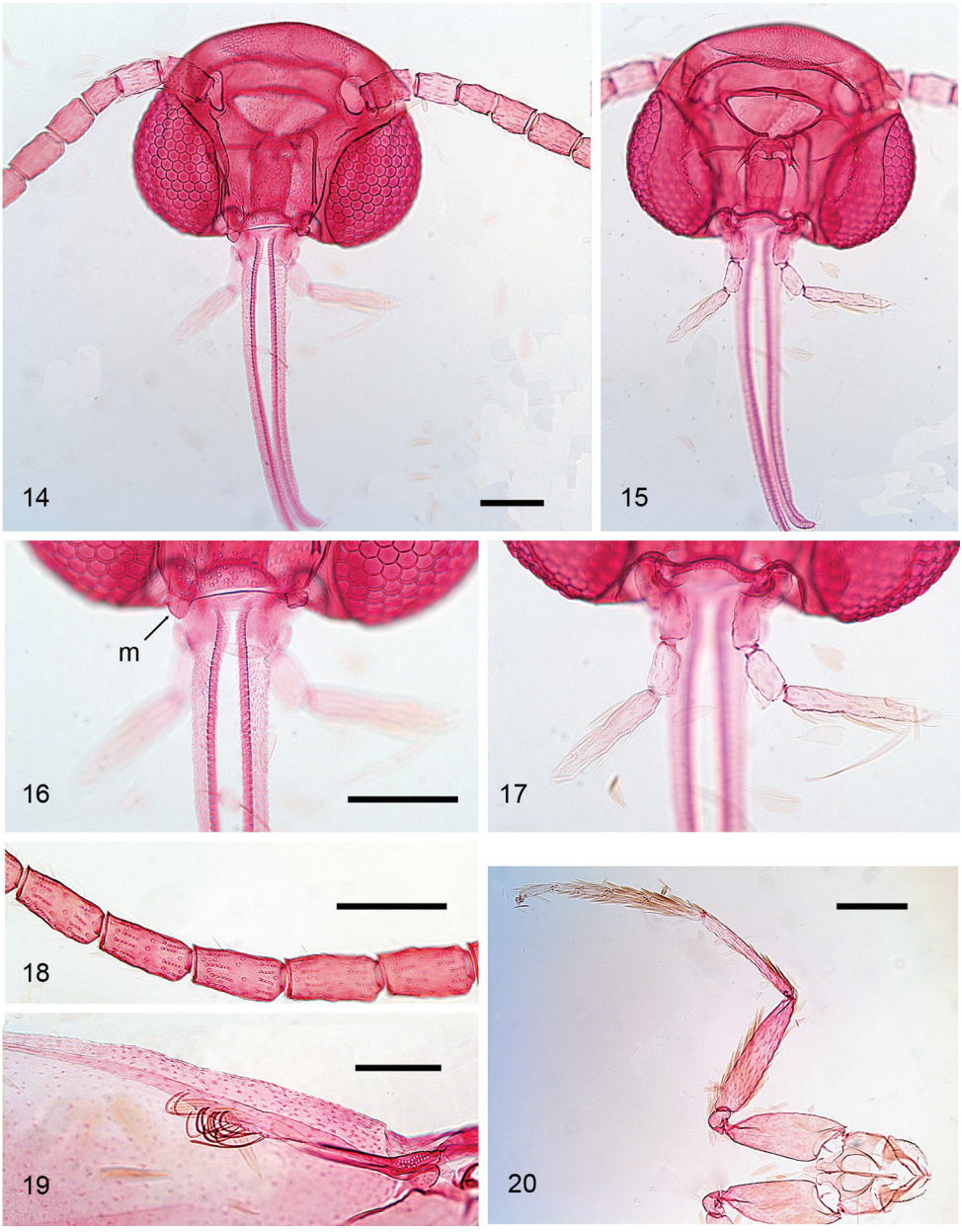
Figures 12–13. *Aspilanta* species, denuded wings, showing venation. **12** *A. voraginella*, male, RMNH.INS.23917 **13** *A. argentifera*, male, RMNH.INS.23917. Scale bars: 500 μm.

to dorsum. Hindwing with Sc+R to costa, Rs+ M with 2–3 branches, Rs to costa, 1 or 2 branches of M to termen and dorsum; CuA a separate vein to dorsum.

Wing pattern (Figs 1–8). On forewing typically comprising a silvery white metallic fascia at 1/3, widest at dorsum, and a similarly coloured pair of opposite spots at 2/3 on a dark background, brown to black, with a small silvery blue spot in apex, equidistant to dorsum, costa and fringe line, but the apical spot is absent in *A. viticordifoliella*. A fringe line often present, with fringe scales pale. Hindwing uniform grey. Androconial scales absent in all species examined.

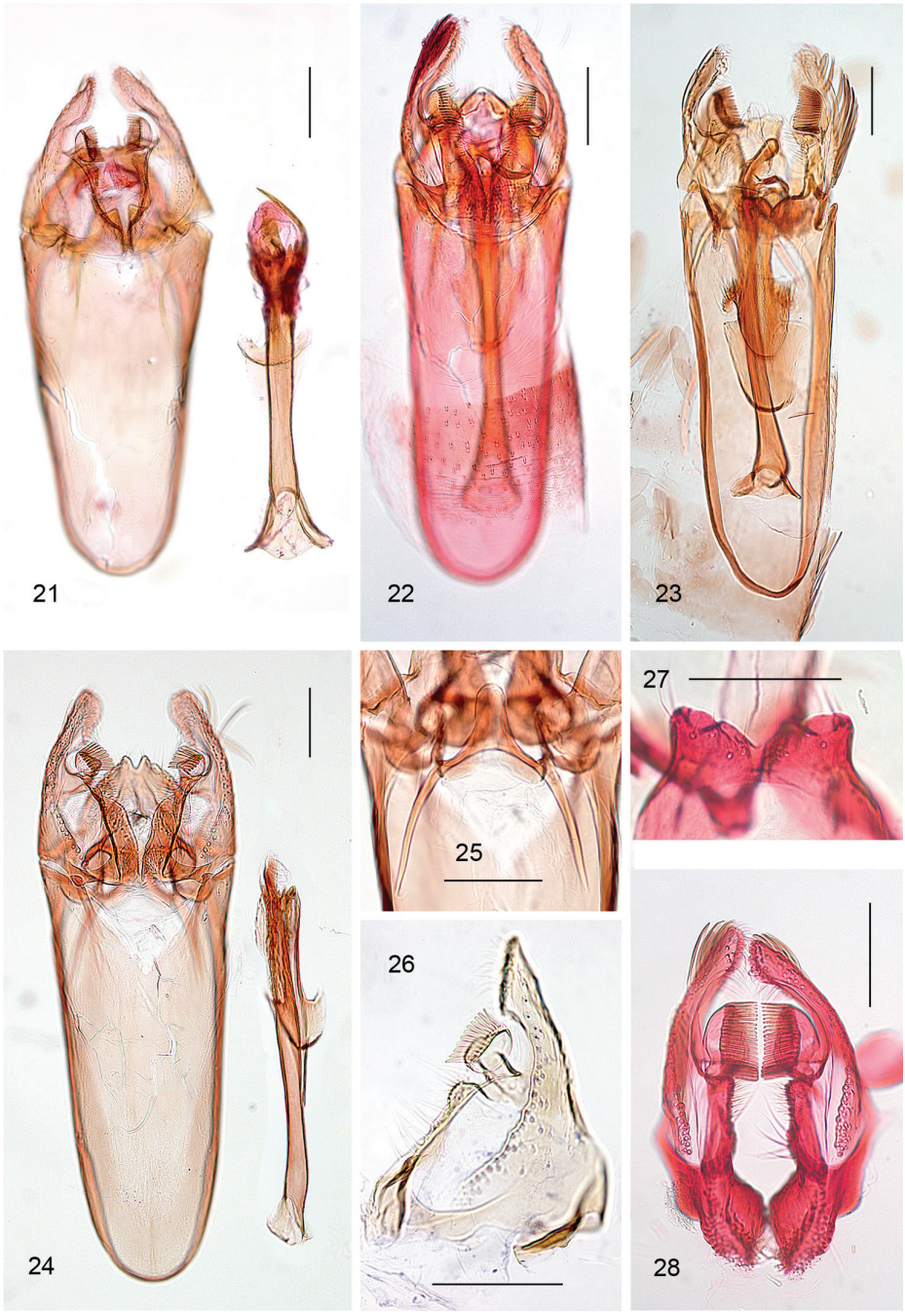
Pregenital abdomen. Abdominal sclerites weakly sclerotised. Anterior sternum II subtriangular, free.

Male genitalia (Figs 21–28). Vinculum (SIX) very long, anteriorly often reaching beyond anterior margin of segment VI, almost cylindrical; approximately 2/3 of total length of genitalia. Tegumen (TIX) narrow, often bilobed, or medially indented, or truncate; probably a composite structure with uncus. Gnathos absent. Valva approxi-



Figures 14–20. *Aspilanta oinophylla*, adult (male) morphology, RMNH.INS.24440. **14, 15** Head, anterior and posterior views **16, 17** Detail of mouthparts, anterior and posterior views; m = mandible **18** Detail of flagellomeres, middle part of antenna, showing scale sockets of two scale rings per flagellomere **19** Forewing, underside, detail of retinaculum **20** Prothorax with forelegs. Scale bars: 100 µm, 200 µm (**20**).

mately triangular, with stalked pectinifer halfway to inner margin, pecten comprising 10–22 blunt sensilla (comb teeth); transtilla typically with medial anterior projection, sublateral processes long. Phallocrypt (manica) with some to many strongly sclerotised



Figures 21–28. *Aspilanta* species, male genitalia. **21** *A. oinophylla*, phallus separate, RMNH.INS.23920 **22** *A. ampelopsifoliella*, phallus in situ, RMNH.INS.24376 **23** *A. hydrangaeella*, phallus in situ, RMNH.INS.25192 **24** *A. voraginella*, phallus separate, holotype, slide EJvN 3916 **25** ditto, detail of transtilla **26** *A. oinophylla*, detail valva (flattened), RMNH.INS.15247 **27, 28** *A. hydrangaeella*, RMNH.INS.25190, details of resp. tegumen and valvae. Scale bars: 100 μm.

conical spines, often arranged in an asymmetric fashion, or with many smaller spines. Phallus outer tube often with remarkable appendices of different sizes and shapes. Juxta present, often bilobed or arrow shaped, in *hydrangaeella* with extra spines laterally.

Female genitalia (Figs 29–33). SVIII truncate, TVIII deeply indented. Oviscapt with few lateral cusps. Anterior and posterior apophyses subequal in length, a short interapodemal process between anterior apophyses (Fig. 29). Spermathecal papilla usually with circular sclerotisation. Ductus spermathecae with several coils.

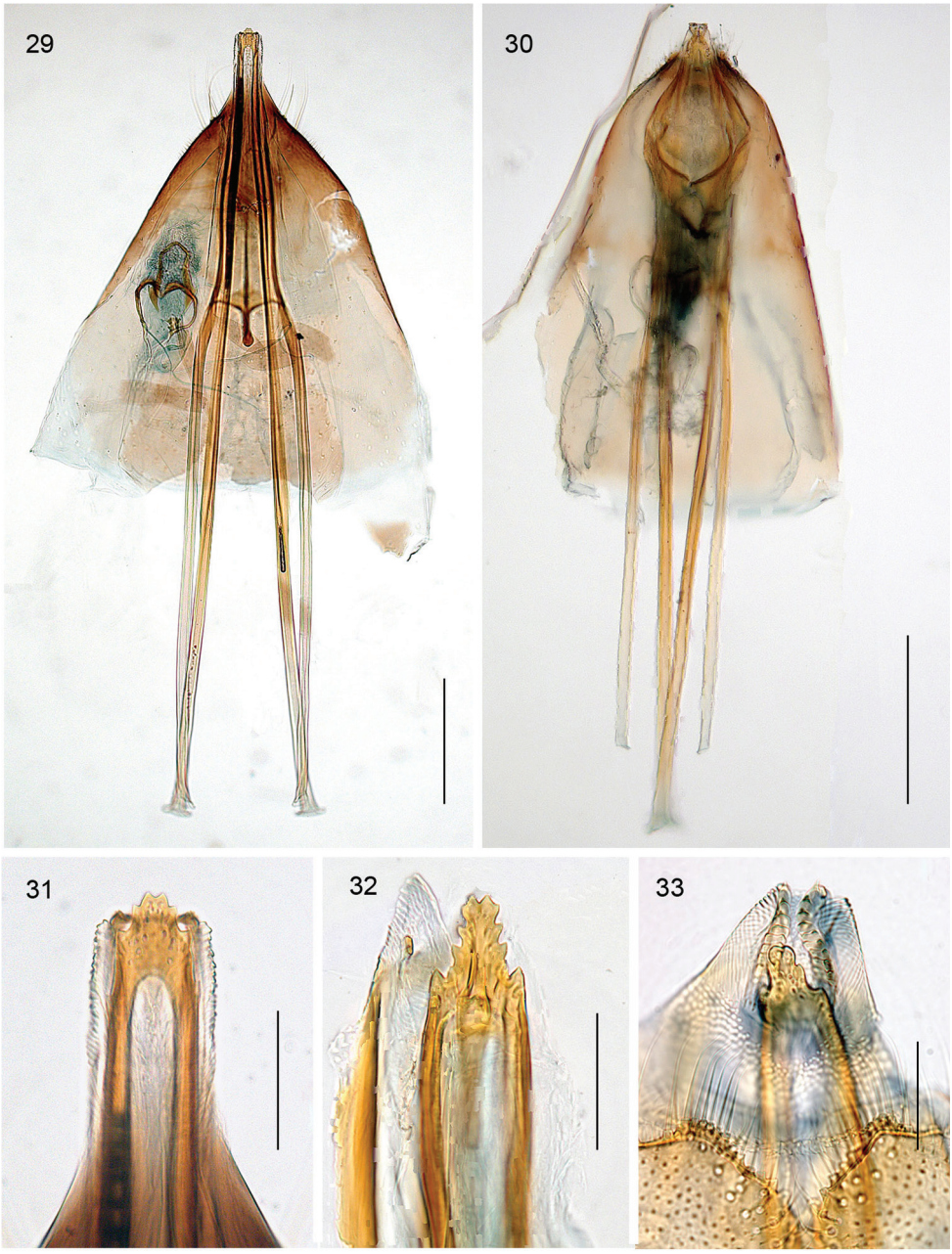
Larva (Figs 34–42). Yellow or whitish, usually with brown to almost black head capsule and prothoracic sclerites and dark anal plates; no plates present on other segments, but concentration of cuticular swellings can give impression of darker plates on abdomen in some species. Head prognathous, 2 stemmata at either side. Thorax with elongate dorsal and ventral sclerites without adornment; 10th (last) abdominal segment with single dorsal and paired ventral sclerites, with several prominent setae; other thoracic and abdominal segments covered with small transverse swellings. Legs and prolegs absent but paired ambulatory calli on T2 and T3 (ventral and dorsal) and fused ventro-medial calli on A3–6. Number of instars unknown, but likely with four feeding instars and a fifth non-feeding instar that constructs the case in which it pupates, in analogy to *Holocacista*, *Coptodisca*, *Antispila* and *Heliozela* (Dziurzyński 1948, 1952; Marchi 1956; Prota 1962; Maier 1988).

Biology. Host plants. Most species feed on Vitaceae, one each on Hydrangeaceae and Myricaceae.

Life history. Eggs are inserted in leaf tissue, often near a vein or leaf margin. All species construct leafmines, either starting as a narrow linear mine and later widening into a blotch, or sometimes starting almost immediately as a blotch mine. All frass is deposited in the mine, initially filling or irregularly scattered in the linear portion, later often scattered in the blotch or pushed by the larva to one side. During the penultimate (fourth) instar an oval section is cut out from both epidermal layers, forming a portable case or "shield". This shield (Figs 55, 68, 76, 93, 106), later forming the cocoon, is more or less flat, without the raised central ridge that is characteristic for *Antispila*. The larva descends with its shield on a strand of silk and may wander for some distance before finally attaching the shield at one end to a substrate (leaf, trunk, leaf litter, etc.), where it moults to the fifth non-feeding instar and later pupates. The pupa protrudes from the opposite end of the shield when the adult emerges. As far as we know, most species are bivoltine, overwintering as fifth instar larva in the cocoon, but *A. voraginella* and possibly *A. ampelopsifoliella* are univoltine. Adults are usually day flying and can be swept from the hosts, but rarely come to light. Several specimens were taken in Malaise traps (DNA barcoded material) and in several cases provide the only accurate phenology data for adults.

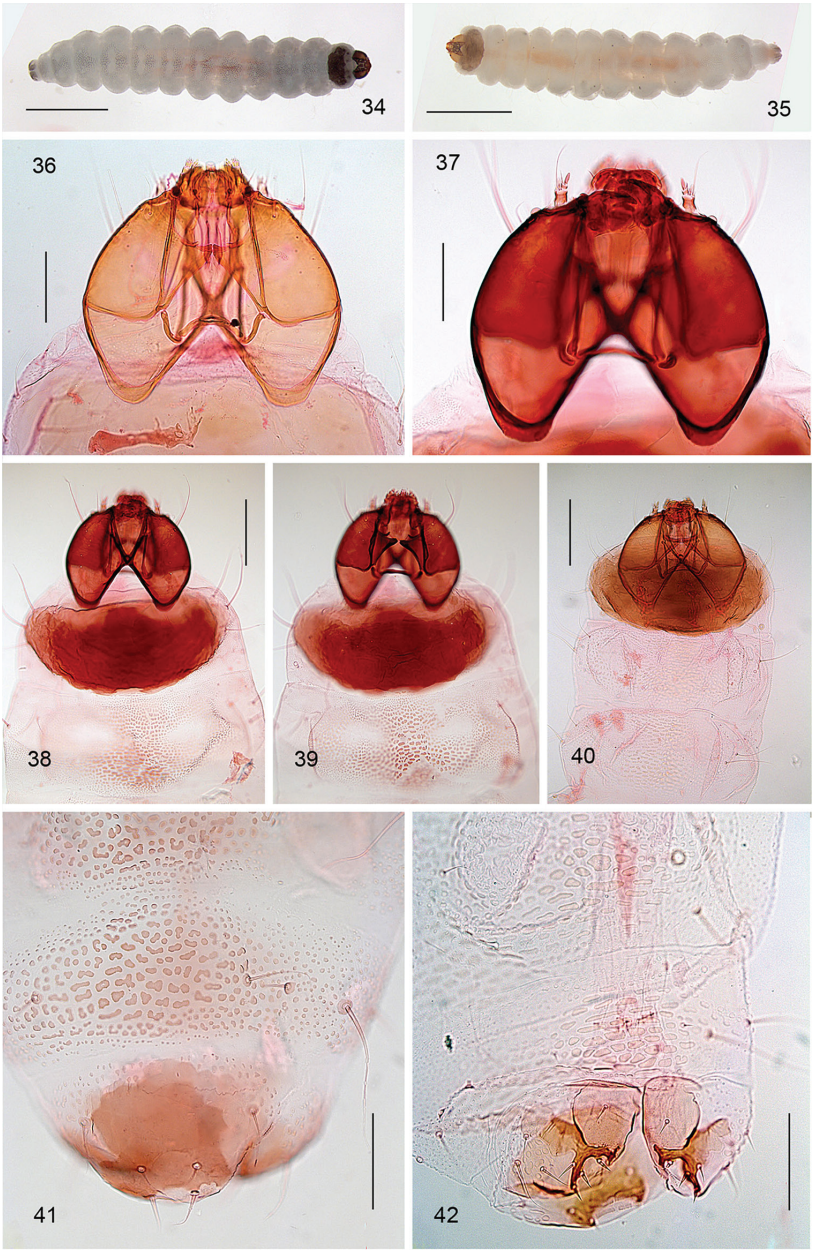
Distribution. North America; DNA barcodes suggest a rich fauna in Central America: Mexico, Honduras, Costa Rica, likely also elsewhere in the Neotropics (see under Composition).

Etymology. The name *Aspilanta* is an anagram of *Antispila*, where one "i" was replaced by an "a". The gender of the name is to be regarded as feminine.



Figures 29–33. *Aspilanta* species, female genitalia. **29** *A. argentifera*, RMNH.INS.25019 **30** *A. oinophylla*, RMNH.INS.24211. **31–33** Tip of oviscapt: **31** *A. argentifera*, RMNH.INS.25019 **32** *A. oinophylla*, RMNH.INS.24211 **33** *A. ampelopsifoliella*, RMNH.INS.15220. Scale bars: 200 µm (**29, 30**); 50 µm (**31–33**).

Composition. In the checklist below we provide the original genus in brackets, type locality, and the hostplant of the types. The species are listed according to the posi-



Figures 34–42. *Aspilanta* species, larval morphology, final feeding instar (4th) and non-feeding instar (5th, **36**). **34** *A. ampelopsifoliella*, ventral aspect, ethanol preserved larva, RMNH.INS.18672P **35** *A. viticordifoliella*, ventral aspect, ethanol preserved larva, RMNH.INS.18509P **36** *A. argentifera*, head capsule, RMNH.INS.18566P **37–39** *A. ampelopsifoliella*, head and thorax, resp. focussed at mid levels (head only), dorsally and ventrally, RMNH.INS.18672P **40** *A. oinophylla*, head and thorax, RMNH.INS.18394P **41** *A. ampelopsifoliella*, last 3 abdominal segments, dorsal aspect, RMNH.INS.18672P **42** *A. oinophylla*, last 3 abdominal segments, ventral aspect, RMNH.INS. 18394P. Scale bars: 1 mm (**34, 35**), 100 µm (**36, 37, 41, 42**), 200 µm (**38–40**).

tion in the recent phylogenetic analyses (Milla et al. 2017, 2019).

We also include the candidate species *Aspilanta* "Vitis1_USA" (van Nieukerken et al. 2012) and *A.* "Vitis.arizonica_USA". Some publicly available DNA barcodes (Fig. 44) closely match confirmed *Aspilanta* sequences, suggesting further candidate species and a rich fauna in Mexico, Honduras and Costa Rica, but until these taxa are examined morphologically, we omit them. The following BINs are concerned: Mexico: BOLD:ACZ5051, BOLD:ACP0240, BOLD:ACO9420, BOLD:ACU0821, BOLD:ACT4781; Costa Rica: BOLD:ADA1988, BOLD:ACL9188; Honduras: BOLD:ACF9350.

The Neotropic species *Antispila trypherantis* Meyrick, 1916 (Guyana), *A. pentalitha* Meyrick, 1916 (Guyana) and *A. cyclosema* Meyrick, 1921 (Brazil) may also belong in *Aspilanta*, based on their original descriptions that cite the presence of an apical dot, but without examination of types, we refrain from recombination here. Also the Patagonian group of species, associated with *Nothofagus* (Nothofagaceae), for which Nielsen in his unpublished thesis proposed the name "*Neospila*", could belong in *Aspilanta* on the basis of the very similar externals (Fig. 7), although following the latest phylogeny, where it occurs as Genus14, its inclusion would make *Aspilanta* paraphyletic (Milla et al. 2019) (Fig. 43).

In the Museum of Comparative Zoology (Cambridge, MA), there is a series of externally similar moths of unknown provenance, ex coll. Dietz, allegedly reared from poison ivy, (*Toxicodendron radicans*, Anacardiaceae) with the manuscript name "*Antispila rhoifoliella*" (handwritten label: *on Rhus radicans. Coll 9.7.[18]99, many mines empty, larva pale, green frass line; head + 1 dark brown. [word crossed out] mine begins with a fine tract along edge of leaf, expands & frass collects along edge of mine*.). These specimens have emergence dates of 1–20 June 1900 (written as "19C"). As we have never seen such mines on poison ivy we cannot exclude the possibility that Virginia creeper was mistaken for poison ivy, as both often grow together; in this case the series would likely represent *Aspilanta ampelopsifoliella*. We thus ignore this information until these specimens have been examined in more detail.

Key to the Nearctic genera of Heliozelidae

1 Forewing colour pattern comprising silvery white spots and bands on a dark background **2**

– Forewing basally uniform silvery to leaden grey (exceptionally with paler longitudinal streaks), distal part comprising a pattern of a yellow to orange background, with three silver strigulae and various amounts of black ..... ***Coptodisca***

2 Forewing with an apical silver spot in addition to a fascia at ¼ and two opposite spots at 2/3 ..... ***Aspilanta*** (most species)

– Forewing without apical spot **3**

3 Forewing with a pattern of a fascia at ¼ and two opposite spots at 2/3 ..... **4**

– Forewing with only two spots on dorsum, or a spot at ¼ and a narrow fascia at 2/3 ..... ***Heliozela***

4 Antenna with white tip .....***Aspilanta viticordifoliella*** [note: there may be an *Antispila* species with a similar white tip (see under *A. viticordifoliella*). In that case checking wing venation is necessary for the correct identification]
– Antenna without white tip ..... ***Antispila***

Checklist

Aspilanta oinophylla (van Nieukerken & Wagner, 2012): 38, **comb n.** (*Antispila*) USA, Georgia, Murray Co., *Vitis aestivalis* Michx. var. *aestivalis* [type species]
Aspilanta hydrangaeella (Chambers, 1874a): 170, **comb n.** (*Antispila*) USA, Kentucky, Covington, *Hydrangea arborescens* L.
Aspilanta ampelopsifoliella (Chambers, 1874a): 168, **comb n.** (*Antispila*) USA, Kentucky, Covington, *Parthenocissus quinquefolia* (L.) Planchon
Aspilanta voraginella (Braun, 1927b): 191, **comb n.** (*Antispila*) USA, Utah, Washington Co., *Vitis arizonica* Engelm.
Aspilanta argentifera (Braun, 1927a): 56, **comb n.** (*Antispila*) Canada, Ontario, Sparrow Lake., collected as adult without definite host association.
Aspilanta viticordifoliella (Clemens, 1860): 209, **comb n.** (*Antispila*) USA, Pennsylvania, Easton, *Vitis vulpina* L.

Candidate species

Aspilanta "Vitis1_USA" van Nieukerken & Wagner, 2012 (in *Antispila*) USA, Florida, Connecticut, *Vitis aestivalis* Michx.
Aspilanta "Vitis.arizonica_USA" USA, Arizona, *Vitis arizonica* Engelm.

Comparative morphology of Heliozelidae

In order to judge the validity of the morphological characters in *Aspilanta*, they should be compared with the same characters in other Heliozelidae. There is no single large treatment of the family, but Davis (1998) provides an introductory description and a lot of information is found in Nielsen's unpublished thesis (Nielsen 1980). However, there are very detailed monographs on all stages of species in the genera *Heliozela* (Prota 1962), *Antispila* (Dziurzyński 1948, 1952) and especially for immatures in *Holocacista* (Marchi 1956). For the last genus, the recent taxonomic paper provides further information (van Nieukerken and Geertsema 2015) and for *Coptodisca* a number of papers deal with various aspects (Snodgrass 1922; Peterson 1948; Maier 1988; Bernardo et al. 2015). Some information is also provided in the paper describing the genus *Plesiozela* (Karsholt and Kristensen 2003), but as that genus has now been shown to belong to Incurvariidae (Milla et al. 2019), it is only partly relevant. Unfortunately, there is currently little published information on the detailed morphology of the large Australian clades (*Hoplophanes* group, *Pseliastes* group, Milla et al. 2019), with only a brief adult description of *Hoplophanes* Meyrick, 1897, available in Nielsen's thesis.

Adult. *Head*. All Heliozelidae share the smooth head, with appressed, lamellar scales. This is a strong apomorphy for the family. Antennae in *Hoplophanes* have ca. 28–30 flagellomeres, *Heliozela* 15–25, ca. 23 in *Antispila*, 18 in *Antispilina*, 12–18 in *Holocacista,* 12–16 in *Coptodisca* and 14–18 in *Aspilanta*. The flagellomeres are much longer than wide in *Aspilanta* and other genera in the *Holocacista group*, almost the same in *Antispila*, but in *Heliozela* hardly longer than wide; all flagellomeres have two rings of scales. Mandibles are small, but visible in all genera (according to Nielsen absent in the leafmining genera). The proboscis (galea) is more than twice the height of the head in *Heliozela* and *Antispila*, almost twice the height in *Aspilanta*, but hardly longer than the head in *Holocacista, Antispilina* and *Coptodisca.* The maxillary palpi are progressively reduced, from four segments in *Hoplophanes* and *Heliozela*, through three segments in *Antispila* and a reduction in the *Holocacista group* genera into a single segment (Nielsen considered them absent, but we clearly observed a short palp). Labial palpi usually have three segments, but only two in *Antispilina ludwigi*; the last segment is very long in *Aspilanta* (3 × second segment) compared to *Coptodisca* (slightly longer than second segment). Eyes are rather similar in most Heliozelidae, but comparatively large in *Hoplophanes* (interocular index 1.06, see (Davis 1975)), in other genera much smaller (less than 0.6), but in *Aspilanta* larger than in related genera.

Thorax. The most relevant character in the legs is the presence of an epiphysis on the foretibia, a plesiomorphic condition in Lepidoptera. It is present in *Hoplophanes*, *Tyriozela,* and *Heliozela*, probably also in the other Australian genera, but absent in *Antispila* and most of the genera in the *Holocacista group*, but *Holocacista rivillei* and *H. capensis* have a reduced epiphysis (van Nieukerken and Geertsema 2015).

Forewings in the majority of Heliozelidae are metallic shining. A forewing pattern of spots and fasciae is present in many Heliozelidae, in *Antispila*, *Antispilina*, *Holocacista* and *Aspilanta* comprising a fascia (or two spots) at one third and an opposite pair of spots at two thirds, somewhat reduced in *Ischnocanaba*. An apical dot is characteristic for most *Aspilanta* species, but something similar also occurs in *Ischnocanaba* and Nielsen's "*Neospila*". Larger terminal spots are known in some *Antispila* species. Most *Heliozela* species have the silver spots confined to the dorsal margin, but in some cases one of these reaches the costa, or an extra spot is present on the costa, and a few have a pattern similar to *Antispila*. Such species were previously incorrectly placed in *Antispila* (e.g., *H. anna* (Fletcher, 1920)), like many of the species in *Holocacista* and *Aspilanta*. *Coptodisca* species have a completely different pattern, resembling that of *Leucoptera* (Lyonetiidae).

Androconial scales on one or both wings are common in *Antispila*, but absent from most other genera.

Venation. *Hoplophanes*, *Heliozela,* and *Antispila* have the more complete venation, with a closed cell between Rs and CuA, three branches of Rs; in *Antispilina, Holocacista, Aspilanta* and *Coptodisca* the venation is reduced, Rs, M and Cu are coalescent from wing base, closing the cell, and ending in three or four branches, rarely two. The label CuA given for the *A. oinophylla* forewing by van Nieukerken et al. (2012: fig. 6) is misplaced; the line next to it is a staining artefact. What is labelled M2+3 should be

CuA (see Fig. 9). The hindwing of all Heliozelidae lacks the cross-vein M-CuA that is present in most other Adeloidea. The wing coupling comprises in the hindwing a single frenulum in males and 2–5 frenular bristles in females; in *Heliozela sericiella* it is 4–5 according to Prota (1962), but we observe only two in *H. hammoniella*, in Antispila three, in *Holocacista*, *Aspilanta* and *Coptodisca* only two. The forewing retinaculum comprises a distinct cuticular lobe in male *Hoplophanes*, *Tyriozela* and *Heliozela*, provided with ca. four or five hooked scales; the female has a row of setae inserted on the vein Rs+M. In *Antispila* the Sc forms a long fold with a row of scales, female as in *Heliozela*. Males in the *Holocacista group* have a series of hooked scales on the Sc fold, very similar to that structure in Nepticulidae (van Nieukerken 1986).

Male genitalia. These are rather uniform throughout Heliozelidae, with a long and narrow vinculum; bilobed or truncate tegumen (sometimes termed uncus); triangular or elongate valvae, each with a single pectinifer with 8–30 blunt sensilla, often different numbers on each valva; a spear-shaped juxta; phallus very long and narrow, with anellar spines and often large projections at phallotrema. Whereas the male genitalia are diagnostic at species level, few characters can be used at higher phylogenetic level. The recurved appendix of the phallus is probably characteristic for *Holocacista*, whereas the very long vinculum (more than twice the valva length) separates most species of the *Holocacista group* from *Antispila*.

Female genitalia. The oviscapt is spear shaped with many small teeth in *Hoplophanes*, *Tyriozela* and *Heliozela*, whereas in *Antispila* and the *Holocacista group* it has just a few cusps at either side. In *Antispila* there is a distinct interapodemal process between the anterior apophyses, running almost to the caudal tip. In the *Holocacista* group the process is very short, the caudal part being absent.

Larva. Larvae of the Australian genera are unfortunately hardly known. Leafmining larvae of *Heliozela sericiella* (Prota 1962), *Holocacista rivillei* (Marchi 1956) and *Antispila treitschkiella* (Dziurzyński 1948) have been studied in detail, including all instars, and the fourth instar of *A. metallella* by Grandi (1933). The larvae are usually white to yellow or green, flattened and with prognathous head.

Head. Fourth instar larvae of *Heliozela* have two pairs of stemmata at either side, those of *Antispila* three, and *Aspilanta* two. In *Holocacista* and *Coptodisca* probably also two, but difficult to see in our slide mounted specimens. Davis (1978, 1998) reports 2–5 for the family.

Thorax. Legs are absent in most studied larvae, but some *Heliozela* species have much reduced legs during the 5th, non-feeding instar (Prota 1962). Only for full grown *H. aesella* larvae fully developed thoracic legs are reported (McGiffen and Neunzig 1985; Davis 1987), which CSE has also observed in live larvae (including in early instars). At least some of the Australian taxa also have more developed legs, although many are also legless (Andy Young & Mike Halsey, pers. comm.). In most cases the prosternum and protergum are elongate sclerotised structures, in *Coptodisca* sometimes adorned with a ventral transverse row of swellings.

Abdomen. Prolegs are only reported from 4th instar *Heliozela* larvae on segments 3–6, with 3–8 crochets in single or sometimes double mesoseries. Instead most larvae

show either paired or unpaired calli, the position of which may be diagnostic, but is difficult to assess in slide mounted specimens. The integument is covered by slight, often transverse swellings, which may concentrate in the centre of the segments, and in some cases form a row of abdominal plates in species of *Antispila*. The presence of warts on the 8th larval segment, used for stridulation or drumming (Low 2008; van Nieukerken et al. 2018) is typical for many species of *Antispila*; they are unknown for the other genera.

Cocoon. Cocoons (shields) of leafmining species are prepared from both epidermal layers of the final part of the leafmine, held together by silk, and are very similar in most genera. *Antispila* has as extra character in that the larva contracts the case with silk, resulting in a lengthwise keel; also in all *Antispila* species there are silken projections from the anterior (and sometimes the posterior) end of the case; we do not know them from *Heliozela*, *Holocacista* or *Coptodisca*, but some *Aspilanta* species produce these projections at least sometimes (Fig. 106) (Eiseman 2019). Cocoons are made by 4th instar larvae and not by the final instar as some authors state incorrectly. The final moult takes place in the shield.

Pupa. The pupa of *Heliozela sericiella* was described by Prota (1962); otherwise there is little published information on pupae of Heliozelidae.

Phylogeny. We use the recent molecular phylogeny based on transcriptome data, including up to 1049 nuclear genes (Milla et al. 2019) as the basis for further discussions on the phylogeny. Part of this tree is here reproduced, with the name *Aspilanta* instead of *Antispila* group II, and with the listed apomorphies added (Fig. 43). The resulting tree is in fact not that different from the manually derived tree, based on morphology, in Ebbe Nielsen's thesis (see Milla et al. 2017). The most apparent differences are the removal of *Plesiozela* from Heliozelidae to Incurvariidae, the position of *Antispilina* (Nielsen placed it next to *Antispila*) and the non-monophyly of the Australian *Hoplophanes* and *Pseliastis*. Also, Nielsen did not study any of the species here placed in *Aspilanta*. Interestingly, the leafmining genus groups, viz. the *Heliozela* group, the genus *Antispila* (= *Antispila group*) and the *Holocacista* group together form a monophyletic group, already recognised by Nielsen (1980). Here we provide possible apomorphies for the genera and clades recognised in this part of the tree only, based on Nielsen's work and our own observations. Characters without an asterisk were already listed by Nielsen (1980). They are not explained further when treated above.

Possible apomorphies for the *Heliozela*, *Antispila*, and *Holocacista* groups are:

(1) Size strongly reduced. The wingspan of all the species of these genera is small, always less than 9 mm, and usually smaller.
(2) Compound eyes in a posteroventral position. The anterior lateral margin of the compound eyes does not reach the anterior surface of the head capsule, but is present behind the laterally extended genae.
(3) Proboscis very long, two to three times as long as height of head capsule. However, as noted above, it is shorter again in the small moths of *Holocacista*, *Antispilina*, and *Coptodisca*.

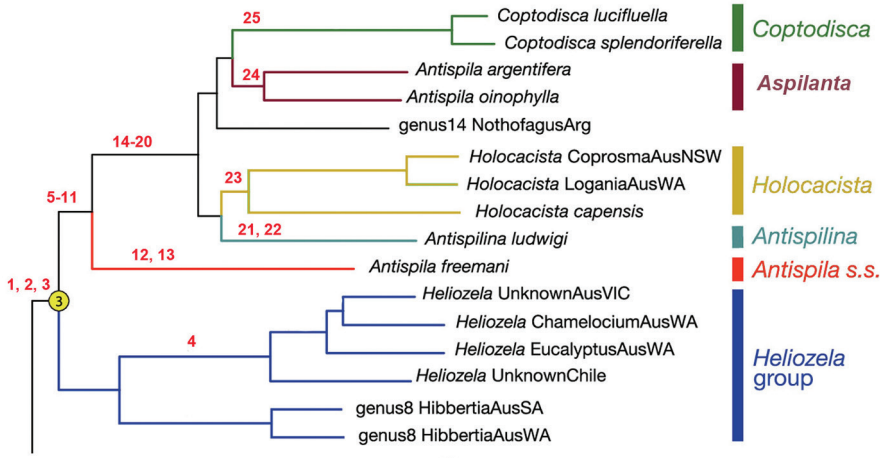


Figure 43. Phylogeny of the cosmopolitan leafmining clade of Heliozelidae, part of fig. 1 in Milla et al. (2019) (*Maximum likelihood phylogeny generated using iq-tree, topology from filtered_nt123 analysis*). '*Antispila*' Group II replaced by *Aspilanta*, branch supports removed and numbers of possible apomorphies added; see text.

Nielsen also listed absence of mandibles as an apomorphy, but we think that reduced mandibles are in fact present.

A possible apomorphy for the *Heliozela* group (including *Tyriozela*) is:

(4) Female with spear-shaped ovipositor tip. The flattened, deeply dented ovipositor observed in the *Antispila* and *Holocacista* groups is regarded as the relatively plesiomorphic state compared to the spear-shaped tip of the *Heliozela* group. The first mentioned type is present in most Incurvariidae and the most generalised genera of Prodoxidae.

Two other characters given by Nielsen are in our view incorrect; the retinaculum is not as long as Sc as he states, and although some species have petiole-mining larvae, this is not the only larval feeding mode; many Australian and Oriental species are leafminers, and others are gall formers.

Possible apomorphies for *Antispila* and the *Holocacista* group are:

(5) Head with transfrontal suture absent and scale-sockets on the entire frons and vertex. The area in all other Adeloidea is strengthened and devoid of scale-sockets.
(6) Foretibia without fully developed epiphysis.
(7) Pseudofrenular bristles absent in male.
(8) Maxillary palpi three-segmented or shorter.
(9) Microtrichiation reduced on forewings. Only the proximal third is provided with microtrichia; in *Hoplophanes* the entire wing surface is covered with microtrichia, what is also regarded as a ground-plan condition within Adeloidea.

(10)*. Larvae without legs and prolegs.
(11)*. Forewing with "*Antispila* pattern" (see above), secondarily derived in *Coptodisca* and a few species of *Holocacista*.

Possible apomorphies for *Antispila* s. str. are:
(12)* Cocoon folded lengthwise, resulting in a distinct keel.
(13)* The presence of warts on the 8th larval segment may be an additional apomorphy, but more likely only for a subset of the genus.

Nielsen gave the presence of an interapodemal process in female as important apomorphy for the *Antispila* group, but we see a similar structure, albeit somewhat reduced, in *Holocacista* (van Nieukerken and Geertsema 2015: figs 53, 68) and *Aspilanta* (see Fig. 29). It is possible that this character is another apomorphy for *Antispila* + *Holocacista* group.

Possible apomorphies for the *Holocacista* group are:
(14). Venation strongly reduced: cell absent in both fore- and hindwings.
(15). Male retinaculum comprising a series of hook-shaped setae.
(16). Sublateral process of the transtilla in male genitalia long and slender.
(17). Larval case attached freely to a branch of the food-plant or other material.
(18)*. Male genitalia: vinculum extremely extended.
(19)*. Number of antennal segments reduced.
(20)*. Reduction of maxillary palps to one segment.

Possible apomorphies for *Antispilina* are:
(21). Larvae mining the leaves of herbaceous Polygonaceae.
(22)*. Labial palpi reduced to 2 segments.

A possible apomorphy for *Holocacista* is:
(23)*. Phallus with long, often recurved appendix.

Possible apomorphies for *Aspilanta* are:
(24)*. Forewing with apical spot.

Possible apomorphies for *Coptodisca* are:
(25). Forewing pattern specialised.

DNA barcoding. We provide COI DNA barcode sequences as an aid for identification for all known species of *Aspilanta*. A Neighbor-Joining tree of these (Fig. 44), including some nearest neighbours (NN) and some species of the sister-group *Coptodisca*. Details on the Barcode Identification Number (BIN), the average and maximum distance within each BIN, and the distance to NN are given for each species. All species are well distinguished by barcodes. *Aspilanta hydrangaeella* has two BINs, with a considerable distance, and *A. viticordifoliella* has three BINs, although the specimen with BIN BOLD:ACA6487 has not been studied; its identification is only based on the barcode.

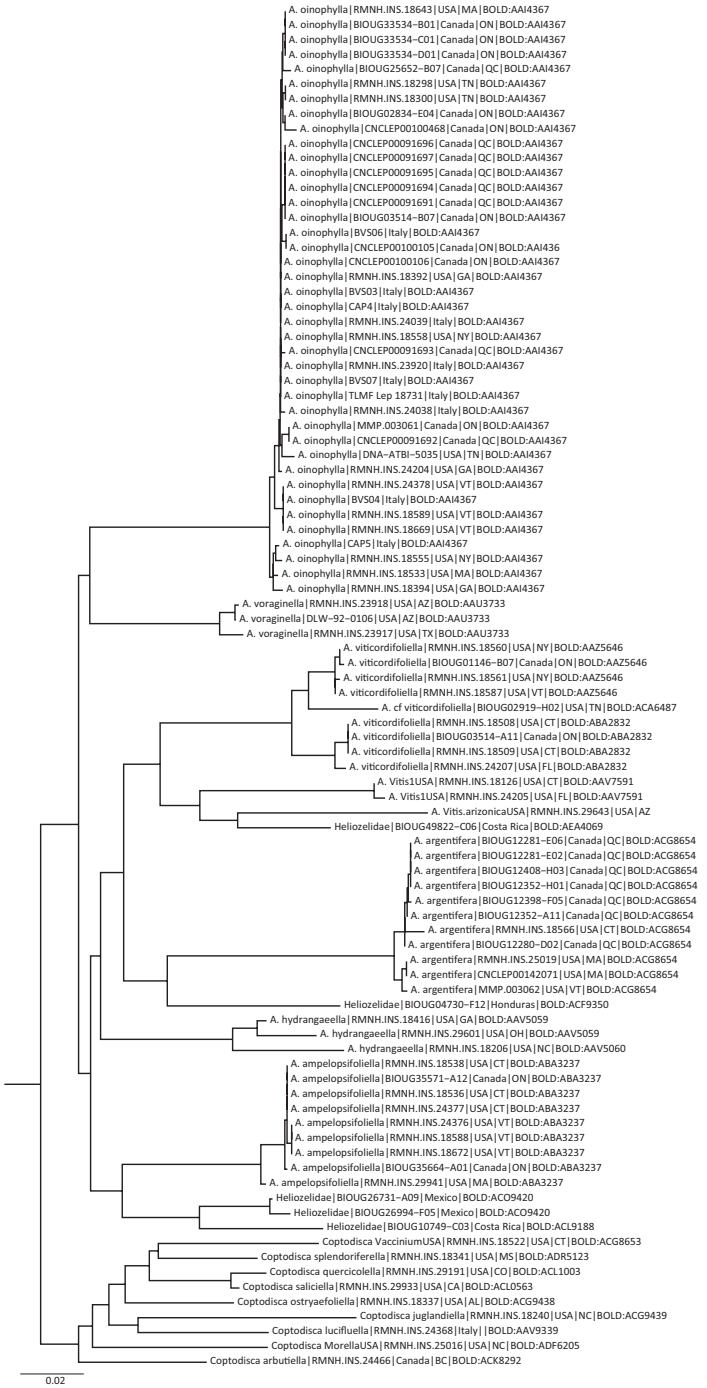


Figure 44. Neighbor-Joining tree of COI barcodes of *Aspilanta* species, including Nearest Neighbours. Several species of *Coptodisca* serve as outgroup. Data with country, and for Canada and United States also the abbreviation for Province or State, plus the BIN number.

Treatment of species

Key to known species of *Aspilanta*

1 Forewing with an apical silver spot in addition to a fascia at ¼ and two opposite spots at 2/3; antenna dark throughout or with the last 1–3 segments white..... **2**

– Forewing without apical spot; antenna with distinct white tip of 2 or 3 segments..... ***A. viticordifoliella***

2 Antennae with last 3 segments clearly white. Larvae mine *Hydrangea*..... ..... ***A. hydrangaeella***

– Antennae dark throughout, or at most last segment white. Larvae mine Vitaceae or Myricaceae..... **3**

3 Head with silvery white scales, forewing with distinct fringe line, fringe almost white. Larvae on Vitaceae ..... ***A. oinophylla, ampelopsifoliella*** **or "*Vitis1*"** See van Nieukerken et al. (2012) for differences in genitalia

– Head with darker bronze brown or brassy scales, forewing with rather indistinct fringe line, fringe grey brown. Larvae on Vitaceae or Myricaceae..... **4**

4 Eastern species (ON & NL to NC), larvae on Myricaceae ..... ***A. argentifera***

– Southwestern species (AZ, UT, TX), larvae on *Vitis*..... ***A. voraginella***

Aspilanta oinophylla **(van Nieukerken & Wagner, 2012), comb. n.**
Figs 1, 9, 14–21, 26, 30, 32, 40, 42, 45, 51–58

Antispila oinophylla van Nieukerken & Wagner, 2012: 38. Holotype ♂, USA: Georgia, Murray Co., Chattahoochee Nat. Forest, E of Chatsworth, GA rd 52, 523 m, 34.74066N, 84.71852W, hardwood forest along highway, leafmines on *Vitis aestivalis* var. *aestivalis*, 14.x.2010, EvN2010266, emerged 14.iv–4.v.2011, E.J. van Nieukerken & C. Doorenweerd, Genitalia slide EJvN 4204, RMNH.INS.24204 (RMNH) [examined].

Antispila oinophylla; Wang et al. 2018: 1 [pheromones]; van Nieukerken and Pohl 2018: 42; Eiseman 2019: 726, 729, 733.

[*Antispila ampelopsifoliella*; Needham et al. 1928: 289 [partim]; Davis 1983b: 4 [partim]; Grehan et al. 1995: 46 [partim]; Laštůvka 2009: S57; van Nieukerken et al. 2011: 51. Misidentifications.]

[*Antispila ampelopsiella*; Chambers 1877: 195 [partim]; Chambers 1879: 126 [partim] Dyar et al. 1903: 539 [partim]; Barnes and McDunnough 1917: 181 [partim]; Forbes 1923: 226; McDunnough 1939: 91 [partim]; Brower 1984: 29 [partim]. Misidentifications.]

Differential diagnosis. Wingspan ca. 4.8–6.2 mm, forewing length 2.3–2.8 mm. Externally inseparable from *A. ampelopsifoliella* and *A.* "Vitis1_USA". The silvery white head separates it from *A. voraginella* and *A. argentifera*, and *A. hydrangaeella*

Figures 45–50. *Aspilanta* species, live adult moths. **45** *A. oinophylla*, male, Italy, Südtirol, Eisacktal, Klausen, 650 m, e.l. 1.viii.2019, photograph Dieter Robrecht **46** *A. hydrangaeella*, female, dorsal view, NC, photograph EJvN **47** *A. ampelopsifoliella*, female, Pelham MA, photograph CSE **48** *A. ampelopsifoliella*, male, dorsal view, VT, photograph EJvN **49** *A. argentifera*, female, Stockbridge MA, photograph CSE **50** *A. viticordifoliella*, female, Pelham MA, photograph CSE.

has distinct white antennal tips. Male genitalia with characteristic long curved process and a comb of 10–12 large teeth at phallotrema; tegumen truncate; valvae with 10–12 pecten sensilla. Female oviscapt with more cusps (4–5 at either side) than *A. ampelopsifoliella* (3). Leafmines differ from other Vitaceae miners by compact size, rather short linear portion close to a vein and frass in concentric lines, especially in thin leaves.

Host plants. Vitaceae: *Parthenocissus quinquefolia*, *P. vitacea*, *Vitis aestivalis*, *V. labrusca*, *V. riparia*, *V. vinifera*, *V. vulpina*.

Leafmines. (Figs 51–58) Egg usually within 1–2 mm from a vein. The mine starts as a rather straight or slightly contorted linear mine towards the vein, usually forming a right angle and often following the vein for a short distance, then again turning away from the vein and expanding into a blotch. The linear portion of the mine is usually later incorporated into the blotch. The frass in the linear portion usually occupies the complete mine width, occasionally deposited in a thin line. In the blotch much of the blackish-brown frass is deposited close to the origin in semi-circular concentric frass lines, best seen in thin shade leaves; in sun-exposed leaves the frass pattern is often obscured. The whole mine occupies as a rule an area of less than 10 × 10 mm; only in thin leaves are mines appreciably larger. The larva cuts out an elliptic case ca. 3.2–4.0 mm long.

Larva. Yellowish green, with green gut contents; head and prothorax brown.

Life history. Larvae in Canada and NE United States in July, August and September, more south until October; in Italy in June–July and August–October. Adults from June to August; apparently bivoltine.

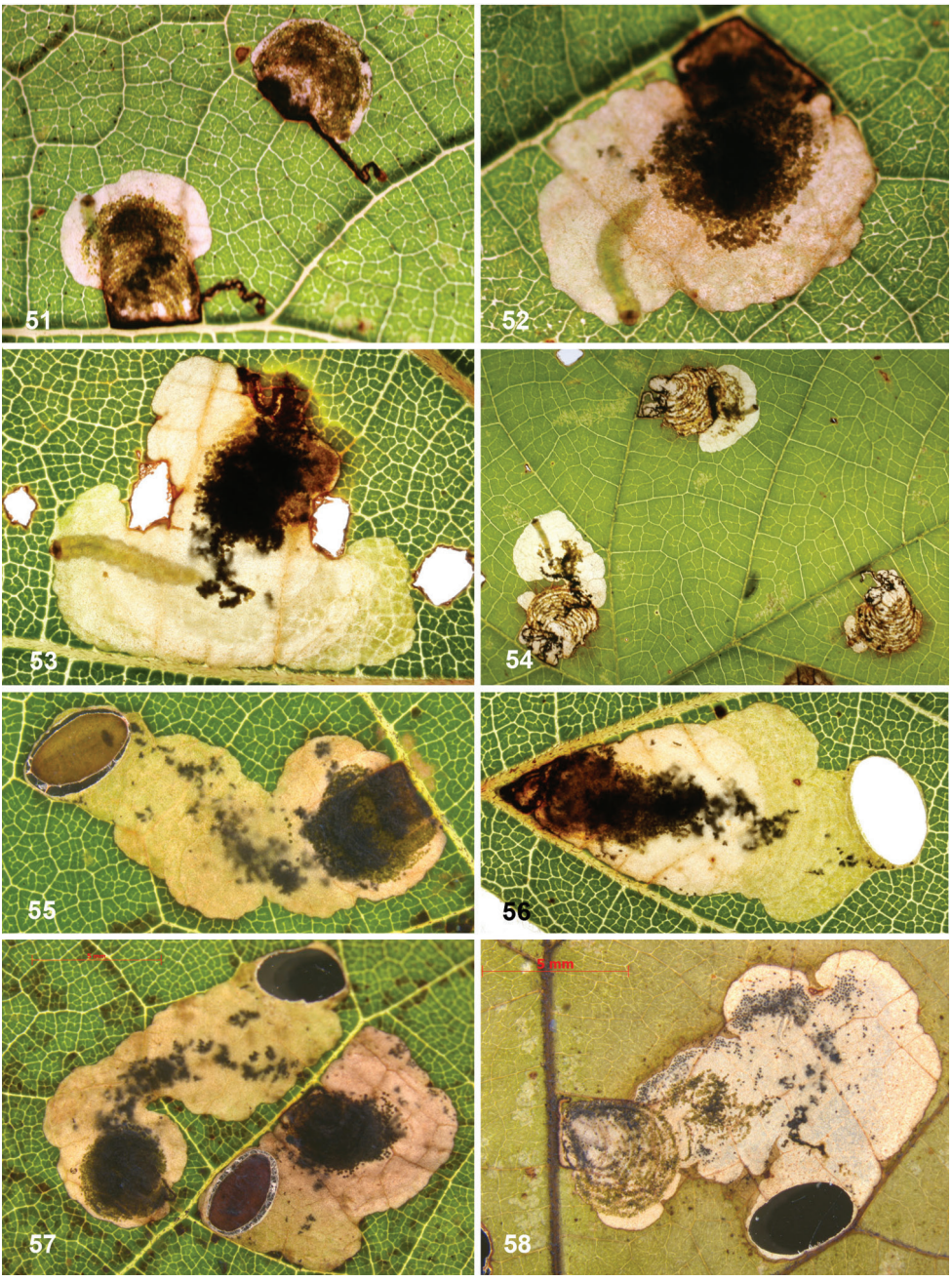
Distribution. Canada: Ontario, Quebec; USA: Connecticut, Georgia, Kentucky, Massachusetts*, Minnesota*, New York, North Carolina*, Oklahoma*, Tennessee, Vermont, Wisconsin*; Europe: Italy (introduced).

Barcode. BIN: BOLD:AAI4367 average distance 0.42%, max. distance 1.28% (*n* = 41), distance to nearest neighbour 9.79% (*A. voraginella*).

Parasitoids. Eulophidae: *Cirrospilus pictus* (Nees, 1834) (Italy) (BOLD:ACZ7659), *Cirrospilus* sensu lato, including *Burkseus* (see Perry and Heraty 2019) (OK), *Pediobius* ? *albipes* (Provancher, 1887) (NC); Braconidae: *Gnamptodon* sp. (NY) (BOLD:ACZ9790), *Mirax* sp. (VT) (BOLD:ACZ7174).

Remarks. In the original description it was noted that the species had not been found on *Parthenocissus* in North America. Since then some specimens of this species were barcoded and reared from *Parthenocissus* by J.-F. Landry (material in CNC), in a situation where *Vitis* and *Parthenocissus* grew entangled. Even though this would weaken the argumentation about the identity of *A. ampelopsifoliella* by van Nieukerken et al. (2012), we observe that still the large majority of mines on *Parthenocissus* in North America that we have seen belong to other species. Selection of a Neotype for *A. ampelopsifoliella* should settle this nomenclatorial issue (see below).

Material. Adults examined. CANADA – **Ontario** • 2; Normandale; 42.71N, 80.31W; Freeman & Lewis leg.; *Vitis*; emerged 22–25 Mar. 1957; EventId: 56–168; CNCLEP00122325–00122326. • 2; Normandale; 42.71N, 80.31W; Freeman & Lewis leg.; *Vitis*; emerged 19–25 Feb. 1960; EventId: 59–198; CNCLEP00122327–00122328. • 1 ♂; Ottawa; 45.41N, 75.69W; G.G.Lewis leg.; *Vitis*; emerged 25 Feb. 1971; EventId: 70–53; Genitalia slide: MIC1871; CNCLEP00100104. • 1 ♀ 1; Ottawa; 45.41N, 75.69W; G.G.Lewis leg.; *Parthenocissus*; emerged 15, 29 Mar. 1971; EventId: 70–48; Genitalia slide: MIC1877; CNCLEP00100105–00100106. • 1 ♂1 ♀ 3; Ottawa; 45.41N, 75.69W; Freeman, Lewis leg.; *Vitis*; emerged 21 Mar. – 08 Apr. 1958; EventId: 57–112; Genitalia slide: MIC1872, MIC1873;



Figures 51–58. *Aspilanta oinophylla*, leafmines, larvae and shields. **51, 52** GA, Chattahoochee NF, 14.x.2010, type locality, *Vitis aestivalis*, EvN2010266 **53, 56 MA,** Northfield, 13.ix.2016, *V. riparia*, CSE **54, 58** TN, Great Smoky Mts NP, 2.x.2010, *V. vulpina*, EvN2010119 **55, 57** VT, Button Bay SP, 16.ix.2011, *V. riparia*, EvN2011253.

CNCLEP00100467–00100468, 00122312–00122314. • 1 ♂ 1; Ottawa; 45.41N, 75.69W; T.N. Freeman leg.; *Vitis*; emerged 16–18 Apr. 1957; EventId: 56–183; Genitalia slide: MIC1875; CNCLEP00122315, 00122316. • 1 ♂ 6; Overbrook; 45.42N, 75.65W; G.G. Lewis leg.; *Vitis*; emerged 15–24 Aug. 1955, 04–06 Jul. 1956; EventId: 55–53; Genitalia slide: MIC1874, MIC1878; CNCLEP00122317 – 00122324. – **Québec** • 1; Gatineau, Aylmer, 48 rue du Couvent; 45.3967N, 75.849W; alt. 80 m; 14 Jul. 2010; J.-F. Landry leg.; *Vitis riparia*; CNCLEP00097660. • 3; same data as preceding; emerged 31 Aug. – 02 Sep. 2011; CNCLEP00091691–00091693. • 4; same data as preceding; *Parthenocissus quinquefolia*; emerged 01–02 Sep. 2011; CNCLEP00091694– 00091697. • 10; same data as preceding; alt. 80 m; J.-F. Landry leg.; *Vitis riparia*; emerged 31 Aug. 2011; CNCLEP00097700–00097709. • 1; Hull; 45.435N, 75.708W; T.N. Freeman leg.; *Vitis*; emerged 07 Jul. 1956; EventId: 55–228; CNCLEP00122305. • 3; Québec, Hull; 45.435N, 75.708W; T.N. Freeman leg.; *Vitis*; emerged 01–07 Jul. 1956; EventId: 55–228; CNCLEP00122306–00122308. • 2; Hull; 45.435N, 75.708W; G.G. Lewis leg.; *Vitis*; emerged 12–15 Aug. 1955; EventId: 55–60; CNCLEP00122309–00122310. • 1; Québec, Hull; 45.435N, 75.708W; G.G. Lewis leg.; *Vitis*; emerged 30 Jun. 1956; EventId: 55–60; CNCLEP00122311.

USA – **Oklahoma** • 1; Payne Co., Mehan; 36.014339N, 96.996744W; 10 Jul. 2016; Michael W. Palmer leg.; *Vitis*; emerged 10 Aug. 2016; EventId: CSE2971; CSEC. – **Vermont** • 1 ♂, 9; Addison Co, Button Bay SP, Lake Champlain borders; 44.18154N, 73.36892W; alt. 40–50 m; 16 Sep. 2011; E.J. van Nieukerken leg.; *Vitis riparia*; emerged 21 May–05 Jun. 2012; EventId: EvN no 2011253–1K; Genitalia slide: EvN4378; RMNH.INS.24378; RMNH.

Larvae and leafmines examined. CANADA – **Ontario** • leafmines and larvae, rearing failed; Chatham–Kent Div., Rondeau Prov. Park, Campground; 42.3223N, 81.8438W; alt. 177 m; 24–25 Jul. 2015; E.J. van Nieukerken leg.; *Vitis riparia*; EventId: EvN no 2015091–1K; RMNH.INS.40130. • Haldimand Co., Dunnville, along Highway 3; 42.91708N, 79.58009W; alt. 180 m; 19 Jul. 2015; E.J. van Nieukerken leg.; *Vitis riparia*; EventId: EvN no 2015068–H/ EvN no 2015068–K; RMNH. INS.40089–40090. • Norfolk Co., Long Point Prov. Park, Cottonwood campground; 42.58039N, 80.4085W; alt. 174 m; 20 Jul. 2015; E.J. van Nieukerken leg.; *Vitis riparia*; EventId: EvN no 2015069–H/2015069–K; RMNH.INS.40091–40092. • Ottawa, Hintonburg, Bayview Rd; 45.40878N, 75.72459W; alt. 58 m; 12 Jul. 2018; E.J. van Nieukerken leg.; *Vitis riparia*; EventId: EvN no 2018081–H; RMNH.INS.46213. • Ottawa, Hintonburg, Fairmont Ave; 45.39979N, 75.72046W; alt. 67 m; 08 Sep. 2015; E.J. van Nieukerken leg.; *Vitis riparia*; EventId: EvN no 2015232–K; RMNH. INS.40384. • 3 larvae (used for transcriptome studies), leafmines; Ottawa, Parkdale, along Ottawa river; 45.41184N, 75.73369W; alt. 55 m; 13 Sep. 2015; E.J. van Nieukerken leg.; *Vitis riparia*; EventId: EvN no 2015246–M/2015246–K; RMNH. INS.30596–30598, 40403. • Ottawa, Parkdale, along Ottawa river; 45.41216N, 75.73006W; alt. 55 m; 13 Sep. 2015; E.J. van Nieukerken leg.; *Vitis riparia*; EventId: EvN no 2015245–K; RMNH.INS.40402. – **Québec** • Gatineau, Aylmer E, near Ottawa river; 45.39261N, 75.78704W; alt. 56 m; 12 Sep. 2015; E.J. van Nieukerken leg.; *Vitis riparia*; EventId: EvN no 2015235–K; RMNH.INS.40387.

USA – **Massachusetts** • Franklin Co., Northfield; 42.646762N, 72.42527W; 13 Sep. 2016; Charley Eiseman leg.; *Vitis aestivalis*; CSEC.

BOLD data, material not examined. CANADA – **Ontario** • 3; Grand Bend, Pinery Provincial Park, Site 2; 43.2699N, 81.8271W; alt. 178 m; 25 Jun.–09 Jul. 2014; CBG Collections Staff leg.; EventId: GMP#03351; BIOUG33534–B01, BIOUG33534–C01, BIOUG33534–D01. • 1; Point Pelee National Park, Cactus Field; 41.939N, 82.516W; alt. 168 m; 27 Jun.–04 Jul. 2012; Tyler Peters leg.; EventId: GMP#00175; BIOUG03514–B07. • 1; Wellington County, Puslinch Township, Concession 11/Hume Rd; 43.537N, 80.134W; alt. 320 m; 10–17 Jul. 2010; Paul Hebert leg.; EventId: L#PHPUS–016; BIOUG02834–E04. • 1; Lambton Co., Port Franks; 43.22N, 81.91W; 02 Jul. 2017; K. H. Stead leg.; EventId: KSLEP1081–17; KSLEP1081–17; Research Collection of Ken Stead. • 1; Lambton Co., Port Franks; 43.2257N, 81.916W; alt. 188 m; 30 Jul. 2012; K.H.Stead leg.; BIOUG20646–E04. • 1; same locality data as preceding; 02 Aug. 2012; K.H.Stead leg.; BIOUG16764–D05. – **Québec** • 1; Montreal, Montreal Botanical Garden, Trap 2; 45.5594N, 73.5668W; alt. 52 m; 11–18 Jun. 2014; Maxim Larrivee leg.; EventId: GMP#04699; BIOUG25652–B07.

ITALY – **South Tyrol** • 1; Bolzano, Kaltern/ Altenburger Wald, Umg. Ziegelstadel; 46.379N, 11.229E; alt. 705 m; 10 Aug. 2015; Huemer P. leg.; TLMF Lep 18731; TLMF.

Observations. ITALY (all from http://www.lepiforum.de/lepiwiki.pl?Antispila_Oinophylla) – **South Tyrol** • 1 adult; Bolzano, Bozen–Rentsch; 46.502N, 11.366E; alt. 265 m; 08 Aug. 2014; Werner Pichler leg.. • many adults; South Tyrol, Bolzano, Bozen–St. Magdalena; 46.503N, 11.372E; alt. 250–600 m; 01 Jul.–30 Aug. 2015; Werner Pichler leg.; *Vitis vinifera*. • Bolzano, Eisacktal, Klausen; 46.64N, 11.56E; alt. 650 m; 09–11 Jul. 2019; Dieter Robrecht leg.; *Parthenocissus vitacea*; Robrecht, Dieter, personal collection. • 15 adults; South Tyrol, Bolzano, Eisacktal, Klausen [Chiusa]; 46.64N, 11.56E; alt. 650 m; 09–11 Jul. 2019; Dieter Robrecht leg.; *Vitis vinifera*; emerged 01–06 Aug. 2019; Robrecht, Dieter, personal collection.

USA – **Minnesota** • Wabasha Co., Weaver Dunes Preserve; 44.258N, 91.932W; 17 Jul. 2015; Charley Eiseman & Julia Blyth leg.; *Vitis*; https://www.inaturalist.org/observations/44819628. – **North Carolina** • Durham Co., 17–acre wood preserve; 36.024N, 78.925W; 29 Sep. 2017; Tracy Feldman leg.; *Vitis*; EventId: CSE4561; https://bugguide.net/node/view/1447964. – **Wisconsin** • Dane Co., Cross Plains; 43.12N, 89.66W; 19 Sep. 2011; Ilona Loser leg.; *Vitis riparia*; https://bugguide.net/node/view/578758/bgimage.

Aspilanta hydrangaeella (Chambers, 1874), comb. n.

Figs 2, 10, 27, 28, 46, 59–68

Antispila hydrangaeella Chambers, 1874a: 170. Syntypes leafmines and larvae: [USA: Kentucky, Covington] on *Hydrangea nivea* [probably lost].

Antispila hydrangiaeella Chambers, 1878: 113. Subsequent incorrect spelling.

Antispila hydrangaeella; Chambers 1877: 195; Chambers 1879: 126; Edwards 1889: 126; Davis 1983b: 4; van Nieukerken et al. 2012: 56; Eiseman 2019: 190, 1333.
Antispila hydrangiaeella; Dyar et al. 1903: 539; Forbes 1923: 226; Needham et al. 1928: 290; McDunnough 1939: 91.

Differential diagnosis. Wingspan ca. 5.0–5.8 mm, forewing length 2.2–2.8 mm. Externally easily separable from other *Aspilanta* species with terminal spot by the white terminal antennal segments (3 flagellomeres with 6 scale rings). Male genitalia characterised by the two long curved terminal spines at phallotrema, the bearded setae on the juxta, the larger number of sensilla (ca 17–21) of the valval pecten and the bilobed tegumen. Female genitalia not examined.

Host plant. Hydrangeaceae: *Hydrangea arborescens*. Chambers (1874a) recorded it from "wild *Hydrangea* (*H. nivea*)", and later as *H. radiata* (Chambers 1878), the correct name for that species. However, according to current knowledge, *H. radiata* occurs only in the southern Appalachians (Kartesz and Biota of North America Program (BONAP) 2015; Freeman 2016), and not in Kentucky, so we assume that Chambers also found the mines on *H. arborescens.* To be searched for on *H. cinerea* and *H. radiata*.

Leafmines. (Figs 59–68) Egg inserted anywhere on the leaf, but frequently near a vein. Mine starts with a rather long linear portion, which may be partly or completely contorted, or often follows veins for some length; later the mine turns into an elongate blotch or a wide gallery. Frass starts usually as a rather narrow line, often broken and irregular, not always in the middle, later becoming more dispersed, in grains or sometimes smeared out, green to brown; in the blotch the frass remains in the middle, smeared out, dark green to black. Often many mines occur in the same leaf; mines can be rather extensive in the thin leaves of *Hydrangea*. The larva cuts out an elliptic case ca. 3.5–4.5 mm long.

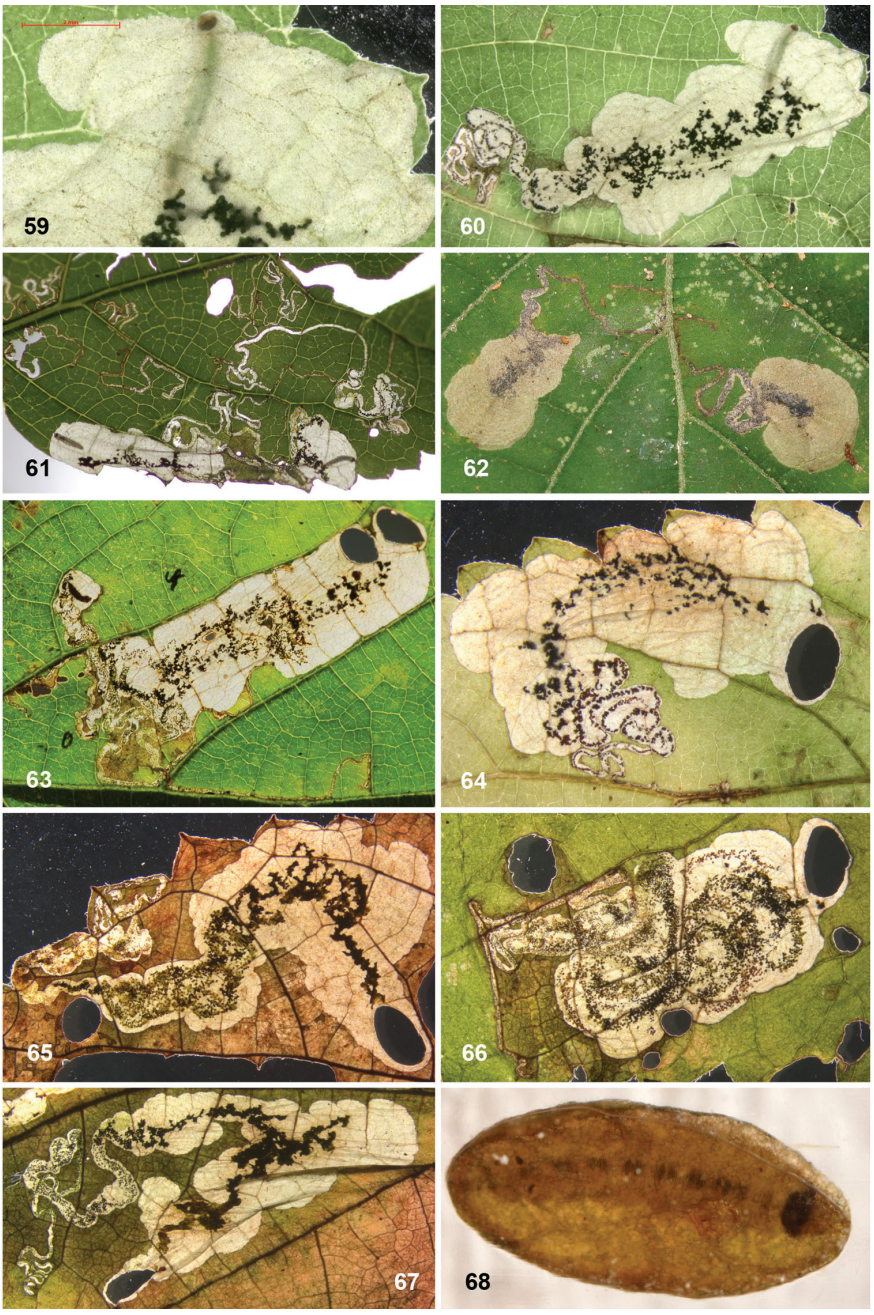
Larva. Colourless or whitish except for green gut contents; head and prothorax dark brown, some darker dots on most segments visible (Fig. 68).

Life history. Poorly known; larvae found in June, August, September and October; adults emerged the following spring from larvae collected in October, but dates are too early due to forced emergence. Chambers provides no information whatsoever; Forbes (1923) reports moths in August. This, together with an early mine photographed in Kentucky on 30 June, suggests the species may be bivoltine.

Distribution. USA: Georgia, Illinois, Kentucky, Maryland*, North Carolina, Ohio*, Tennessee*.

Barcode. Georgia and Ohio population: BIN: BOLD:AAV5059 (n = 2, average distance = 2.15%), Tennessee population: BOLD:AAV5060 (n = 1), distance between these nearest neighbours 5.25%.

Parasitoids. Eulophidae: *Pediobius albipes* (Provancher, 1887) (GA) (BOLD:ACZ8030), *P. ocellatus* Peck, 1985 (GA, NC) (BOLD:ACZ8031); Braconidae: Microgastrinae sp. (GA) (BOLD:ADA0313).



Figures 59–68. *Aspilanta hydrangaeella*, leafmines, larvae and shields, on *Hydrangea arborescens*. **59, 60, 64** GA, Chattahoochee NF, 14.x.2010, EvN2010279 **61, 63, 68** OH, South Bloomingville, 13.ix.2012, CSE, (61=RMNH.INS.29601) **62** OH, Crane Hollow, 5.viii.2016, CSE **65–67** NC, Great Smoky Mts NP, 28.ix.2010, EvN2010073.

Remarks. In our barcode analysis we found two clusters with a distance of 5.25%, even the distance of two specimens of the Georgia population is rather large with 2.15%. By analysing the characters of adults of the two barcoded populations, we did not find any supporting argument for the earlier suggestion that two species might be involved (van Nieukerken et al. 2012). Mines of the Georgia and Ohio populations seem to have more contorted mines than the population from North Carolina, but there is also variation in this character within these populations. A further analysis of material is needed to assess this situation, and designation of a Neotype from Kentucky might be necessary to avoid confusion if the species appears to be part of a complex.

Material: Adults examined. USA – **Tennessee** • 1; Blount Co., NP Great Smoky Mts, Lead Cove Trail; 35.59976N, 83.73998W; alt. 690 m; 03 Oct. 2010; E.J. van Nieukerken & C. Doorenweerd leg.; *Hydrangea arborescens*; emerged 04 Apr. 2011; EventId: EvN no 2010141–K; RMNH.

Larvae and leafmines examined. USA – **Ohio** • 2 larvae, Hocking Co., South Bloomingville, Deep Woods Farm; 39.406165N, 82.574946W; alt. 229 m; 13 Sep. 2012; C. Eiseman leg.; *Hydrangea arborescens*; EventId: CSE-OH; RMNH. INS.29601.P, RMNH.INS.29602.P. – **Tennessee** • leafmines; Blount Co., NP Great Smoky Mts, Lead Cove Trail; 35.59976N, 83.73998W; alt. 690 m; 03 Oct. 2010; E.J. van Nieukerken & C. Doorenweerd leg.; *Hydrangea arborescens*; EventId: EvN no 2010141–K; RMNH.INS.43100.

Observations. USA – **Georgia** • Gilmer Co., Ellijay; 34.651N, 84.608W; 23 Sep. 2019; Lisa Kimmerling leg.; *Hydrangea arborescens*; https://www.inaturalist.org/observations/33268524. – **Kentucky** • Bullitt Co., Bernheim Arboretum and Research Forest; 37.913N, 85.648W; 30 June 2019; Mike Plagens leg.; *Hydrangea arborescens*; https://www.inaturalist.org/observations/29522629. – **Maryland** • Harford Co., Susquehanna State Park; 39.605N, 76.152W; 11 Aug. 2018; Josh Emm leg.; *Hydrangea arborescens*; https://bugguide.net/node/view/1573751/bgimage. – **North Carolina** • Madison Co., Along Appalachian Trail southbound from Devil's Fork Gap; 36.0082N, 82.6098W; 05 Oct. 2019; Jim Petranka leg.; *Hydrangea arborescens*; https://bugguide.net/node/view/1736188/bgimage. – **Ohio** • Hocking Co., Rockbridge, Crane Hollow Preserve; 39.48N, 82.584W; 05 Aug. 2016; Charley Eiseman & Julia Blyth leg.; *Hydrangea arborescens*; https://www.inaturalist.org/observations/44820974.

Aspilanta ampelopsifoliella (Chambers, 1874), comb. n.

Figs 3, 11, 22, 33, 34, 37–39, 47, 48, 69–79

Antispila ampelopsifoliella Chambers, 1874a: 168. Syntypes: leafmines [USA: Kentucky, Covington] on *Ampelopsis quinquefolia* [= *Parthenocissus quinquefolia*], "pseudotypes", Kentucky, Covington (MCZ) [examined].

Antispila ampelopsisella Chambers, 1874b: 197. Subsequent incorrect spelling.

Antispila ampelopsiella Chambers, 1874b: 198. Subsequent incorrect spelling.
Antispila ampelopsilofoliella: internet error.
Antispila ampelopsifoliella; Edwards 1889: 126; Needham et al. 1928: 289 [partim]; Davis 1983b: 4 [partim]; Grehan et al. 1995: 46 [partim]; van Nieukerken et al. 2012: 54; van Nieukerken and Pohl 2018: 41; Eiseman 2019: 190, 434, 729, 730.
Antispila ampelopsiella; Chambers 1877: 195 [partim]; Chambers 1879: 126 [partim]; Dyar et al. 1903: 539 [partim]; Barnes and McDunnough 1917: 181 [partim]; Forbes 1923: 226; McDunnough 1939: 91 [partim]; Brower 1984: 29 [partim].

Differential diagnosis. Wingspan ca. 5.0–5.3 mm, forewing length 2.4–2.6 mm. Externally inseparable from *A. oinophylla* (see above) and *A.* "Vitis1_USA". Male genitalia characterised by the non-bilobed tegumen, pecten with 11–14 sensilla, and phallus with rather small curved spine at phallotrema. Female oviscapt with 3 cusps at either side. Leafmines recognised by long linear portion that is often sinuous.

Host plants. Vitaceae: *Parthenocissus quinquefolia*, *P. vitacea*.

Leafmines. (Figs 69–79) Egg in the majority of examined mines close to midrib, when at leaf margin then usually close to leaf base, occasionally near another vein. The mine starts with a long linear portion, often very sinuous, occasionally straighter, when it runs along the leaflet margin; gradually widening into elongate blotch. Frass brown to black, initially broken linear, later irregularly dispersed, not always in centre of linear portion; in blotch more or less in centre throughout. The larva cuts out an elliptic case ca. 3.5–4 mm long.

Larva. Colourless or whitish except for green gut contents, in contrast with yellow-green larva of *A. viticordifoliella* on the same host plant (compare Figs 69, 70 with 97–100); head and prothorax almost black.

Life history. Poorly known. Larvae found from June (Oklahoma), August and September, field caught adults only from early July. The adult from the June larva emerged the following spring, like those from August and September larvae, suggesting that this species is univoltine.

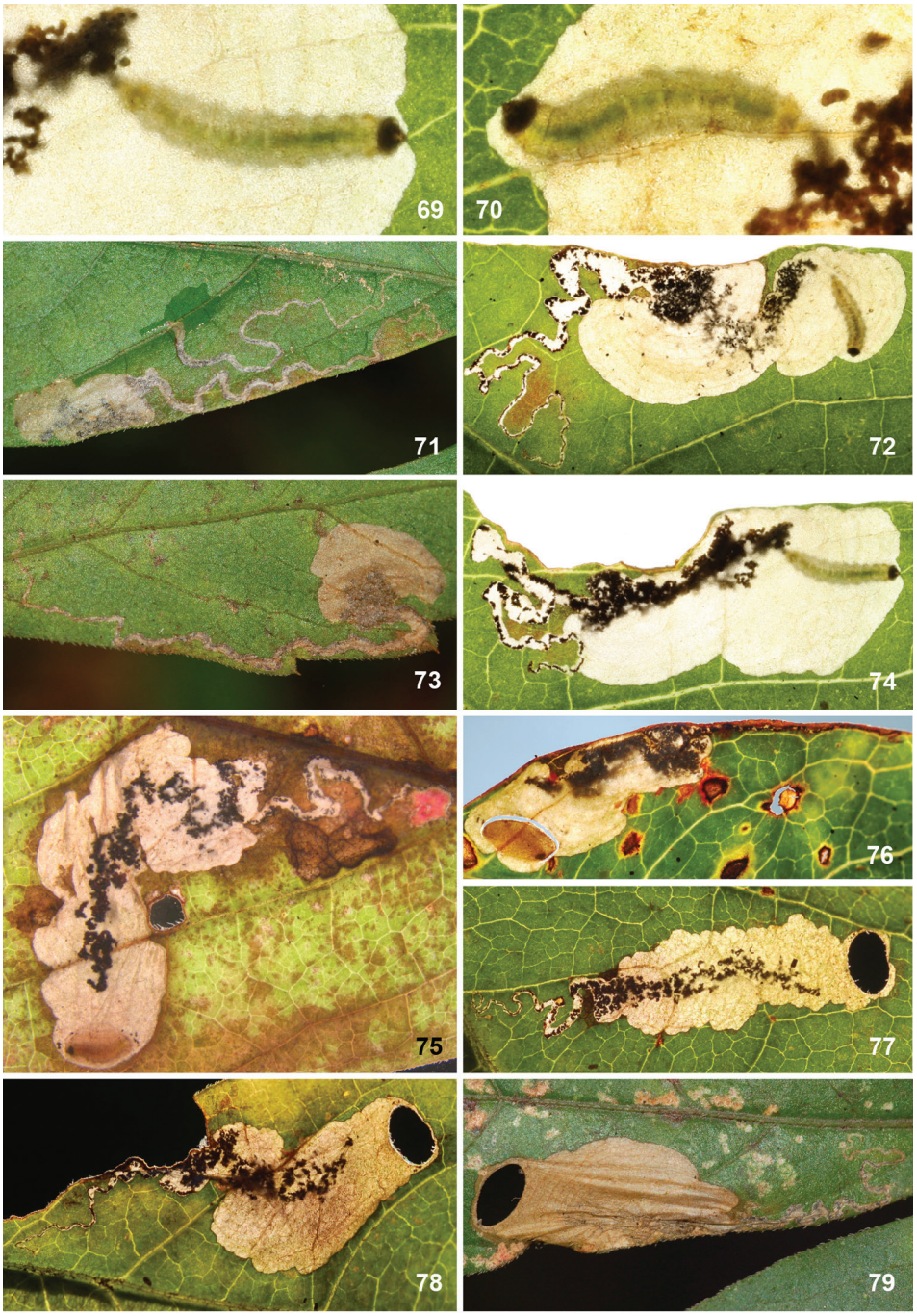
Distribution. Canada: Ontario; USA: Connecticut, Kentucky, Massachusetts*, New York, Oklahoma*, Rhode Island*, Vermont, Wisconsin*.

Barcode. BIN: BOLD:ABA3237, average distance 0.3%, max. distance 1.12% (n = 10), distance to nearest neighbour 8.79% (BOLD:ACO9420, an unidentified Heliozelidae from Mexico, most likely an *Aspilanta* species).

Parasitoids. Eulophidae: *Chrysocharis paradoxa* Hansson, 1985 (MA), *Closterocerus cinctipennis* Ashmead, 1888 (MA); Braconidae: Microgastrinae sp. (MA), *Pseudognaptodon* sp. (VT).

Remarks. The identity of this species follows from the discussion in van Nieukerken et al. (2012). As there are no Syntypes to select as Lectotype, we suggest that a reared male specimen should be selected as Neotype, preferably collected as close to the type locality as possible.

Material: Adults examined. CANADA – **Ontario** • 3 ♀; Normandale; 42.71N, 80.31W; Freeman, Lewis leg.; *Parthenocissus*; emerged 15–23 Mar. 1958; EventId:



Figures 69–79. *Aspilanta ampelopsifoliella*, leafmines, larvae and shields, on *Parthenocissus quinquefolia*. **69, 74** VT, Williston, 28.viii.2016, CSE3764 (same mine) **70, 76–78** MA, Pelham, 30.viii, 4.ix.2013, CSE1102, 1108 **71** MA, Nantucket, Squam Swamp, 7.ix.2011, CSE-C4 **72** MA, Northfield, 16.ix.2016, CSE **73** MA, Nantucket, Stump Pond, 5.ix.2019, CSE **75** VT, Button Bay SP, 16.ix.2011, EvN2011254 **79** MA, Bridgewater, 16.viii.2013, CSE983.

57–157; Genitalia slide: MIC1865, MIC1869, MIC1867; CNCLEP00100465, 00122296, 00122301. • 1 ♂; Normandale; 42.71N, 80.31W; Freeman, Lewis leg.; *Parthenocissus quinquefolia*; emerged 13 Mar. 1958; EventId: 57–157; Genitalia slide: MIC1866; CNCLEP00100464. • 6; Normandale; 42.71N, 80.31W; Freeman & Lewis leg.; *Parthenocissus* (*quinquefolia)*; emerged 14–19 Mar. 1958; EventId: 57–157; CNCLEP00122294, 00122295, 00122297–00122300. • 1 ♂; Overbrook; 45.42N, 75.65W; G.G. Lewis leg.; *Parthenocissus vitacea*; emerged 05 Jul. 1956; EventId: 55–57; CNCLEP00122409. • 1; Simcoe; 42.83N, 80.31W; T.N. Freeman leg.; emerged 16 Jan. 1960; EventId: 65–80; CNCLEP00100466.

USA – **Connecticut** • 1 ♂; Winham Co, Windham airport, Mansfield Hollow SP; 41.74783N, 72.16409W; alt. 80 m; 09 Sep. 2011; E.J. van Nieukerken leg.; *Parthenocissus quinquefolia*; emerged 24 Apr. 2012; EventId: EvN no 2011178–2K; Genitalia slide: EvN4377; RMNH.INS.24377. • 1; same data as preceding; emerged 05 May. 2012; RMNH. – **Massachusetts** • 1 ♂; Hampshire Co., Pelham, 88 Arnold Rd.; 42.3629N, 72.4598W; 30 Aug. 2013; C.S. Eiseman leg.; *Parthenocissus quinquefolia*; emerged 13 May. 2014; EventId: CSE1108; CSEC. • 1 ♀; Hampshire Co., Pelham, 88 Arnold Rd.; 42.3629N, 72.4598W; 04 Sep. 2013; C.S. Eiseman leg.; *Parthenocissus quinquefolia*; emerged 05 May. 2014; EventId: CSE1102; CSEC. – **New York** • 1 ♂; St Lawrence Co., Oak Point; 44.51499N, 75.748734W; 12 Aug. 1988–17 Aug. 1988; D.L. Wagner leg.; *Parthenocissus quinquefolia*; emerged 14 Mar. 1989; Genitalia slide: EvN4200; RMNH.INS.24200; Wagner, D.L., personal collection. – **Oklahoma** • 1; Payne Co., Mehan; 36.014339N, 96.996744W; 26 Jun. 2016; M.W. Palmer leg.; *Parthenocissus quinquefolia*; emerged 16 Apr. 2017; EventId: CSE3567; CSEC. – **Vermont** • 3 ♂; Addison Co, Button Bay SP, Lake Champlain borders; 44.18154N, 73.36892W; alt. 40–50 m; 16 Sep. 2011; E.J. van Nieukerken leg.; *Parthenocissus quinquefolia*; emerged 23 Apr. 2012; EventId: EvN no 2011254–1K; Genitalia slide: EvN4376; RMNH.INS.24376. • 1 ♀; Salisbury Co., Bryant Mtn., 16 Pudding Hill Rd.; 44.54347N, 72.009928W; 10–11 Sep. 1987; D.L. Wagner leg.; *Parthenocissus quinquefolia*; emerged 29 Apr. 1988; Genitalia slide: JCK15220; Wagner, D.L., personal collection.

Larvae and leafmines examined. USA – **Massachusetts** • Franklin Co., Northfield; 42.646558N, 72.426541W; 16 Sep. 2016; Charley Eiseman leg.; *Parthenocissus quinquefolia*; CSEC. • Hampshire Co., Pelham; 42.363212N, 72.460107W; 30 Aug. 2013; Charley Eiseman leg.; *Parthenocissus quinquefolia*; EventId: CSE914; CSEC; • 1 larva; Nantucket Co., Nantucket, Squam Swamp; 41.319937N, 70.00244W; alt. 2 m; 07 Sep. 2011; C.S. Eiseman leg.; *Parthenocissus quinquefolia*; EventId: C4; RMNH.INS.29941. • Plymouth Co., Bridgewater; 41.985542N, 71.044771W; 16 Aug. 2013; C.S. Eiseman leg.; *Parthenocissus*; EventId: CSE983; RMNH. – **Vermont** • Chittenden Co., Williston, Mud Pond; 44.413625N, 73.075697W; 28 Aug. 2016; Charley Eiseman leg.; *Parthenocissus quinquefolia*; EventId: CSE3764; CSEC.

BOLD data, material not examined. CANADA – **Ontario** • 1; St Williams, Turkey Point Provincial Park; 42.7052N, 80.3285W; alt. 222 m; 23 Jun. 2014–07 Jul. 2014; CBG Collections Staff leg.; EventId: GMP#03287; BIOUG35664–A01. • 1; Thorold, Short Hills Provincial Park; 43.1129N, 79.2738W; alt. 94 m;

23 Jun. 2014–07 Jul. 2014; CBG Collections Staff leg.; EventId: GMP#03255; BIOUG35571–A12.

Observations. USA – **Massachusetts** • Nantucket Co., Nantucket, Stump Pond; 41.292454N, 70.002666W; 05 Sep. 2019; Charley Eiseman leg.; *Parthenocissus quinquefolia*; https://www.inaturalist.org/observations/44821470. • **New York** • Putnam Co., Putnam Valley, 392 Dennytown Rd.; 41.41309N, 73.86508W; 09 Aug. 2016; Even Dankowicz leg.; *Parthenocissus*; https://www.inaturalist.org/observations/17908231, https://www.inaturalist.org/observations/17908234. – **Rhode Island** • Washington Co., Block Island; 41.195N, 71.5652W; 08 Aug. 2019; Aaron Hunt leg.; *Parthenocissus*; https://bugguide.net/node/view/1741669/bgimage. – **Vermont** • Chittenden Co., Shelburne; 44.39445N, 73.23003W; 14 Sep. 2019; Spencer Hardy leg.; *Parthenocissus quinquefolia*; https://www.inaturalist.org/observations/32714140. – **Wisconsin** • Dane Co., Madison, UW Lakeshore Nature Preserve; 43.084N, 89.429W; 25 Aug. 2019; Tom Klein leg.; *Parthenocissus quinquefolia*; https://bugguide.net/node/view/1717010/bgimage.

Aspilanta voraginella (Braun, 1927), comb n.

Figs 5, 12, 24, 33, 80–83

Antispila voraginella Braun, 1927b: 191. Holotype ♂: USA: [Utah: Washington County] "B1206/Zion Canyon/Utah i.iv.9 [1926]- Antispila / voraginella / Type Braun.", Genitalia slide EJvN 3916 [reared from mines on *Vitis arizonica*] (ANSP) [examined].

Antispila voraginella; Needham et al. 1928: 290; McDunnough 1939: 91; Davis 1983b: 4; Powell and Opler 2009: 39; van Nieukerken et al. 2012: 54; Eiseman 2019: 732.

Differential diagnosis. Wingspan ca. 4.7–5.4 mm, forewing length 2.3–2.6 mm. Externally separated from *A. oinophylla* and *ampelopsifoliella* by the darker brassy brown head scaling, the absence of a fringe line and the overall less shining metallic pattern. Relatively similar to *A. argentifera*, but unlikely to be sympatric with that species. Male genitalia with distinctly bilobed tegumen, fewer pecten sensilla (8–10) and phallotrema with smaller spines only.

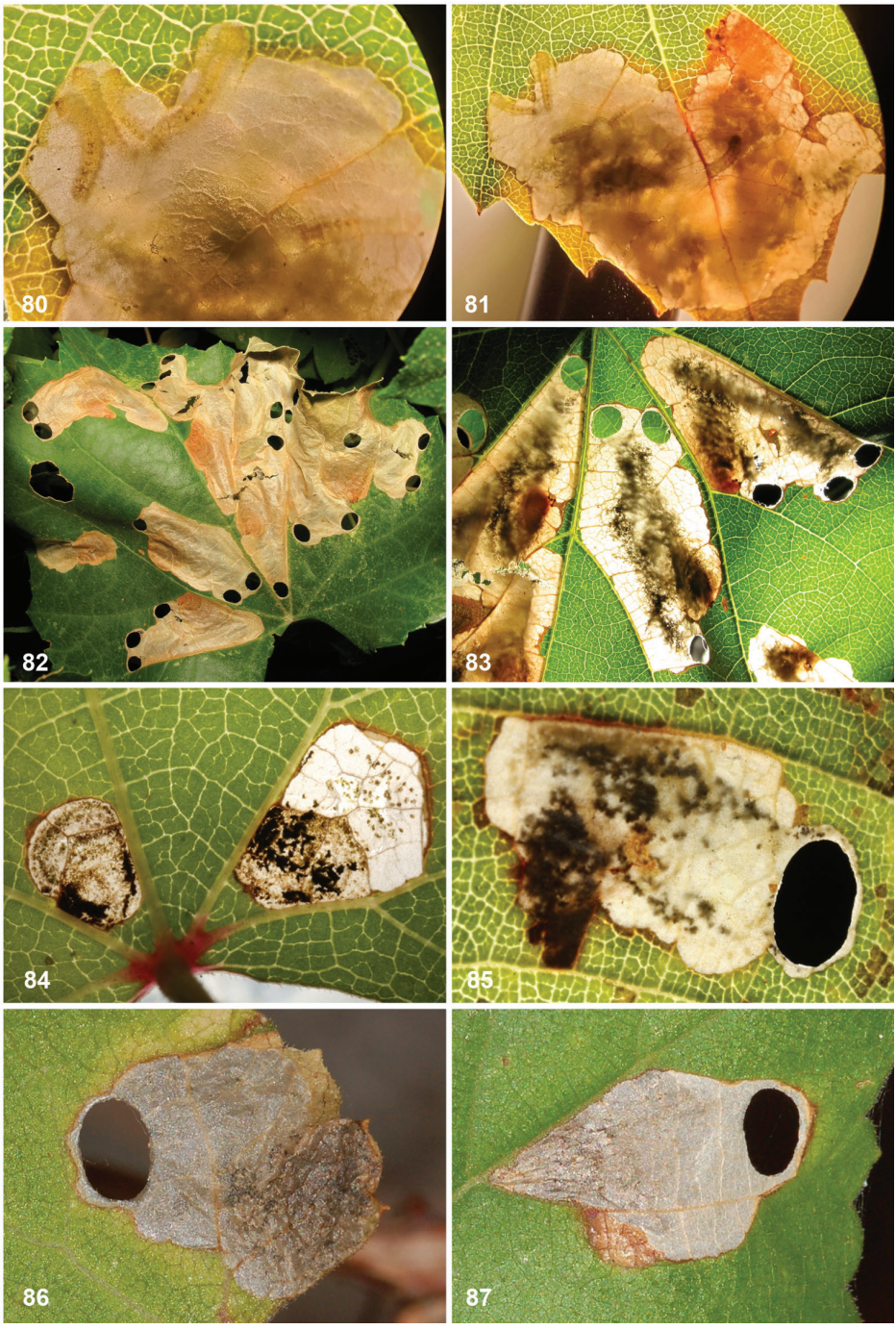
Host plant. Vitaceae: *Vitis arizonica*, unidentified *Vitis*.

Leafmines. (Figs 80–83) Yellowish white blotches, without any linear part; greenish black frass irregularly in centre; mine usually formed from the confluence of several mines; as many as twenty or twenty-five pupal cases may be cut from a single leaf.

Larva. Pale yellowish, head and prothorax hardly darker, mouthparts stand out as darker brown; a row of 5–7 brown spots on abdomen visible (Fig. 80). Larvae gregarious.

Life history. Larvae found between 4 June and 9 August (Arizona); in all cases the adults emerged the next spring (April to June), suggesting that the species is univoltine.

Distribution. USA: Arizona, Texas (west), Utah.



Figures 80–87. *Aspilanta* from SW USA, leafmines, larvae and shields on *Vitis arizonica*. **80, 81** *A. voraginella*, AZ, Cochise Co., 3.viii.2019, photographs by Laura Gaudette **82, 83** *A. voraginella*, US, Zion National Park (type locality), 22.vii.2008, lighting from resp,. above and beneath mines, photographs by Noah Charney **84–87** *Aspilanta* "Vitis.arizonica_USA", AZ, Cochise Co., 11.xi.2012, CSE–L141.

Barcode. BIN: BOLD:AAU3733, average distance 0.92%, max. distance 1.38% (*n* = 3), distance to nearest neighbour 8.83% (BOLD: AAV5059, *A. hydrangaeella*).

Parasitoids. None known.

Material. Adults: see van Nieukerken et al. (2012).

Observations. USA – **Arizona** • Cochise Co., Portal; 31.90918N, 109.25228W; 03 Aug. 2019; Laura Gaudette leg.; *Vitis*; https://www.inaturalist.org/observations/30135988, https://www.inaturalist.org/observations/32296900. – **Utah** • Washington Co., Zion National Park; 37.23N, 112.963W; 22 Jul. 2008; Charley Eiseman & Noah Charney leg.; *Vitis*; https://www.inaturalist.org/observations/44822019.

Aspilanta argentifera (Braun, 1927), comb. n.

Figs 4, 6, 13, 29, 31, 36, 49, 88–96

Antispila argentifera Braun, 1927a: Holotype ♀, Canada, Ontario, Sparrow Lake, 16.vii.1926, A. Braun, on young leaves of birch. (ANSP) [Photograph examined, Fig. 6.]

Antispila argentifera; Needham et al. 1928: 289; McDunnough 1939: 91; Davis 1983b: 4; van Nieukerken and Pohl 2018: 42; Milla et al. 2017: 140; Eiseman 2019: 189, 190, 976, 1082, 1085, 1090, 1093.

Antispila species on sweet fern; Forbes 1923: 227.

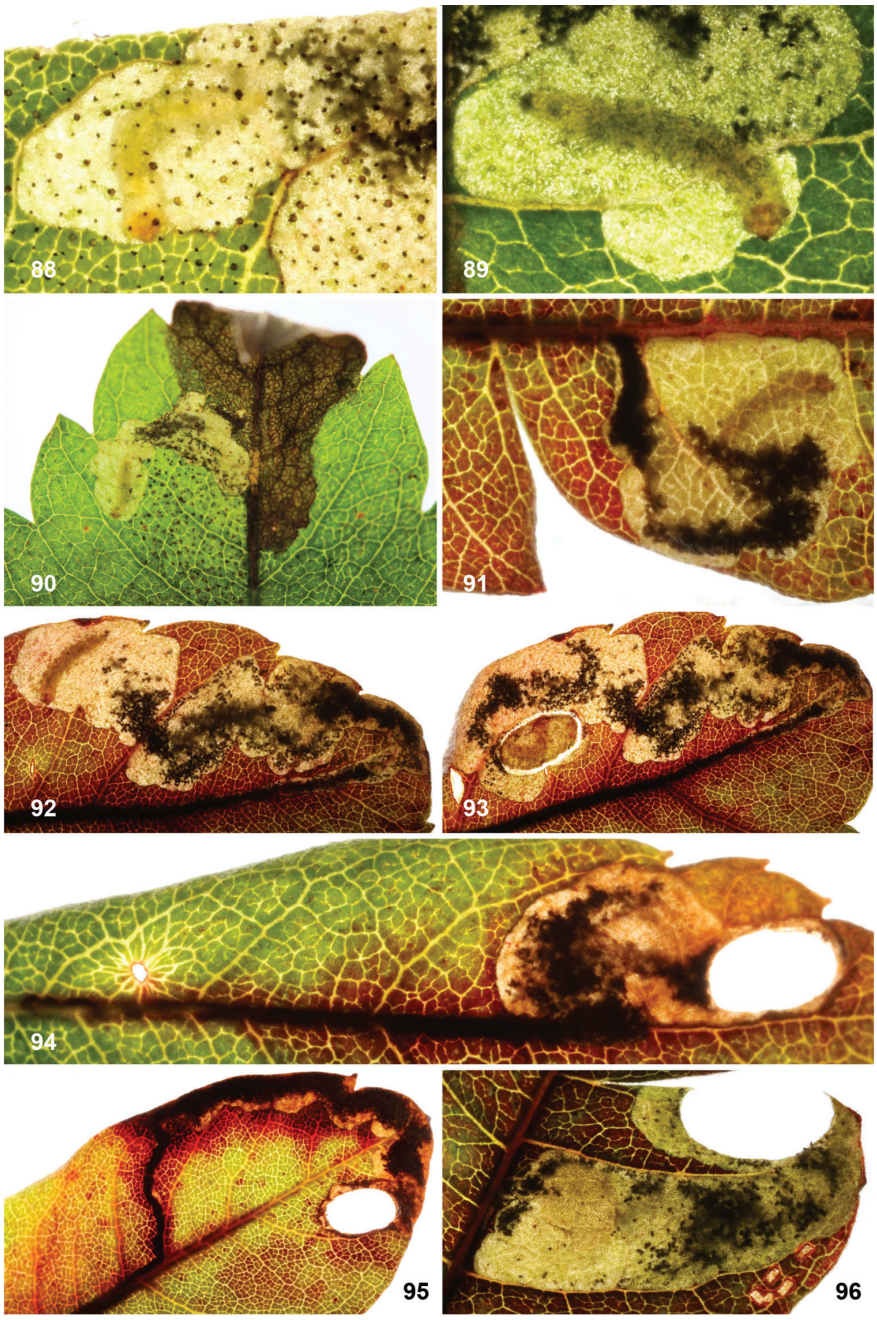
Antispila n. sp., Grehan et al. 1995: 46 [Vermont, from *Comptonia peregrina*, det. D.L. Wagner]

Differential diagnosis. Wingspan ca. 4.0–5.2 mm, forewing length 1.8–2.4 mm. Externally separable from *A. oinophylla* and *ampelopsifoliella* by the darker brassy head scaling, the grey fringe and the indistinct fringe line; *A. argentifera* is also smaller. Relatively similar to *A. voraginella* which is only known from the Southwestern states. Male genitalia with tegumen distinctly bilobed, valvae with 9–12 pecten sensilla, phallus without strong appendices (only one slide examined). Mines on *Morella* distinguished from those of an unnamed *Coptodisca* species, which occurs especially in the Southeast, by the larger cut-out, and the overall larger mine.

Host plants. Myricaceae: *Comptonia peregrina*, *Morella caroliniensis* (including *M. pensylvanica*, cf. Wilbur (2002)), *M. cerifera*, *Myrica gale*.

Leafmines. (Figs 88–96) Egg in the examined mines inserted at the midrib. The mine starts with a linear portion, following the midrib towards the apex, sometimes difficult to see when it is very close to the midrib (Fig. 94); later becoming a small blotch extending from midrib to leaf margin. Frass blackish, varying from dispersed to concentrated near origin of mine; in linear portion a wide line in middle. Mines on *Comptonia* are usually very compact, on *Morella* and *Myrica* more elongate; on *Myrica gale* we observed several mines crossing the midrib, resulting in a wilting leaf tip that may drop off (Fig. 90). The larva cuts out an elliptic case ca. 2.5–3.5 mm long.

Larva. Pale yellowish green, head and prothorax brown.



Figures 88–96. *Aspilanta argentifera*, leafmines, larvae and shields. **88** NC, Laurinburg, 27.ix.2016, *Morella cerifera*, CSE **89** MA, Northfield, 26.x.2015, *Comptonia peregrina*, CSE **90** VT, Chickering Bog, 6.ix.2015, *Myrica gale*, EvN2015222, showing wilted leaf tip **91, 96** MA, Erving, 27.x.2014, *Comptonia peregrina*, CSE1557 **92, 93** MA, Nantucket, Radar Hill, 15.xi.2015, *Morella caroliniensis*, CSE2398, same mine at different stages **94** MA, Stockbridge, 16.vii.2017, *Myrica gale* CSE4096, showing very long linear portion directly along midrib **95** MA, Nantucket, UMass field station, 5.xi.2017, *Morella caroliniensis*, CSE4546.

Life history. Bivoltine. Larvae found in July and September to November, adults in June, July and August; specimens reared from fall mines emerged (indoors) in April to May, from July mines in August. Mines of the first generation seem to be very scarce.

Distribution. Canada: Newfoundland*, Nova Scotia, Ontario, Prince Edward Island*, Quebec*; USA: Connecticut*, Massachusetts*, New York*, North Carolina*, Vermont.

Barcode. BIN: BOLD:ACG8654, average distance 0.66%, max. distance 2.25% (*n* = 15), distance to nearest neighbour 11.67% (BOLD:ACF9350, an unidentified Heliozelidae from Honduras).

Parasitoids. Eulophidae: *Pediobius ? albipes* (Provancher, 1887) (NY), *Pnigalio* sp. (MA).

Remarks. Annette Braun (1927a) believed that the moth that she collected at Sparrow Lake belonged to long leafmines that she found on *Betula* in the same spot. Her description of the mine actually matches very well that of *Phylloporia bistrigella* (Haworth, 1828) (Incurvariidae) (Eiseman 2019; Ellis 2020), a Holarctic species, widespread in Canada, but in 1927 poorly known in North America as either *Incurvaria labradorella* Clemens, 1864 or *I. aureovirens* Dietz, 1905, which had not yet been associated with *Betula* and which were only later synonymised with *P. bistrigella* by Davis (1983a). On the basis of Braun's record of these leafmines, *P. bistrigella* should also be listed for Ontario, a record missing from Pohl (2018). As we have never seen any heliozelid mine on *Betula*, and as the Holotype of *A. argentifera* externally matches the specimens reared from Myricaceae, we are convinced that *argentifera* is the correct name for this species (see also Milla et al. 2017: 140). According to Braun (1927a), the holotype was a male, but the photograph (Fig. 6), kindly made by Mike Palmer, clearly shows a female, with protruding oviscapt. We refrain for now from borrowing and dissecting the holotype, as the characters of female genitalia have not been sufficiently studied, and a future dissection could possibly be combined with newer techniques for obtaining DNA data. Already Forbes (1923) reported an *Antispila* species from sweet fern (= *Comptonia*), which strange enough according to him "has not been distinguished from *A. isabella*".

Specimens from Prince Edward Island were previously regarded as misidentifications (van Nieukerken and Pohl 2018) but are here re-identified as correct *A. argentifera*.

Material: Adults examined. CANADA – **Nova Scotia** • 1 ♂; Barrington; 43.56N, 65.57W; G.G. Lewis leg.; *Comptonia peregrina*; emerged 20 Aug. 1970; EventId: 70–28; CNCLEP00122407. – **Ontario** • 1 ♀ (Holotype, photograph examined, Fig. 6); Sparrow Lake; 44.81N, 79.4W; 16 Jul. 1926; A.F. Braun leg.; ANSP. – **Prince Edward Island** • 1 ♂; Dalvay House, Can. Nat. Park; 46.416N, 63.073W; 19 Jul. 1940; G.S.Walley leg.; Genitalia slide: MIC7517; CNCLEP00100470. • 1 ♂; same data as preceding; Genitalia slide: T.N.F. No. 405; CNCLEP00100469.

USA – **Massachusetts** • 1 ♀; Berkshire Co, Stockbridge, Kampoosa Bog; 42.294364N, 73.304347W; 16 Jul. 2017; C. S. Eiseman leg.; *Myrica gale*; emerged 09 Aug. 2017; EventId: CSE4096; RMNH. • 1 ♀; Franklin Co., Erving; 42.618565N, 72.422256W; 27 Oct. 2014; C. S. Eiseman leg.; *Comptonia peregrina*; emerged 18 May. 2015; EventId: CSE1557; Genitalia slide: EvN5019; RMNH.INS.25019. • 1 ♂; Franklin Co., Erving;

42.618565N, 72.422256W; 27 Oct. 2014; C. S. Eiseman leg.; *Comptonia peregrina*; emerged 18 May. 2015; EventId: CSE1557; CNCLEP00142071. • 1 ♀; Nantucket Co., Nantucket, Radar Hill; 41.28390847N, 70.03875002W; 15 Nov. 2015; C. S. Eiseman leg.; *Morella caroliniensis*; emerged 18 Apr. 2016; EventId: CSE2398; RMNH. • 1 ♂ 1 ♀ (in copula); Nantucket Co., Nantucket, State Forest; 41.26059N, 70.07991W; alt. 9 m; 10 Jun. 2013; C. Eiseman leg.; EventId: CSE564; Genitalia slide: EvN5193; RMNH. INS.25193. • 1; Nantucket Co., Nantucket, State Forest; 41.26059N, 70.07991W; alt. 9 m; 10 Jun. 2013; C. Eiseman leg.; EventId: CSE563; RMNH. • 1 ♀; Nantucket Co., UMass field station; 41.2942N, 70.0399W; 05 Nov. 2017; C.S. Eiseman leg.; *Morella caroliniensis*; emerged 18 May. 2018; EventId: CSE4546; CSEC. – **New York** • 3; Orange Co., Cornwall, Black Rock Forest; 41.396209N, 74.025219W; 30 Aug. 2019; Charley Eiseman & Julia Blyth leg.; *Comptonia peregrina*; emerged 07–30 Apr. 2020; EventId: CSE6145, CSE6169, CSE6188; CSEC.

Larvae and leafmines examined. USA – **Connecticut** • 1 larva, leafmines; New London Co, Connecticut College Arboretum; 41.37929N, 72.11121W; alt. 60 m; 10 Sep. 2011; E.J. van Nieukerken leg.; *Morella caroliniensis*; EventId: EvN no 2011194–2M; RMNH.INS.18566.P, RMNH.INS.43558, RMNH.INS.43559. – **Massachusetts** • vacated mines; Berkshire Co., Beartown State forest, Benedict Pond; 42.20288N, 73.28913W; alt. 485 m; 12 Sep. 2011; E.J. van Nieukerken leg.; *Comptonia peregrina*; EventId: EvN no 2011211–H; RMNH.INS.43586. • Franklin Co., Northfield; 42.646851N, 72.4247W; 26 Oct. 2015; Charley Eiseman leg.; *Comptonia peregrina*; CSEC. • Franklin Co., Erving; 42.618565N, 72.422256W; 27 Oct. 2014; Charley Eiseman & Julia Blyth leg.; *Comptonia peregrina*; EventId: CSE1479; CSEC. • Nantucket Co., Nantucket, Pout Ponds; 41.277N, 70.046W; 03 Nov. 2013; Charley Eiseman & Julia Blyth leg.; *Morella caroliniensis*; CSEC. • Nantucket Co., Nantucket, UMass field station; 41.295464N, 70.039325W; 05 Nov. 2017; Charley Eiseman & Julia Blyth leg.; *Morella caroliniensis*; EventId: CSE4445; CSEC. – **New York** • vacated mines; Essex Co, S Wilmington, W branch Ausable river; 44.3662N, 73.84118W; alt. 340 m; 13 Sep. 2011; E.J. van Nieukerken leg.; *Comptonia peregrina*; EventId: EvN no 2011223–3H; RMNH.INS.43610. – **Vermont** • 3 larvae (used for transcriptome studies), leafmines; Washington Co., North Montpelier, Chickering Bog; 44.3247N, 72.48089W; alt. 365 m; 06 Sep. 2015; E.J. van Nieukerken, C. Eiseman & J. Blyth leg.; *Myrica gale*; EventId: EvN no 2015222–2M; RMNH.INS.30599, 30600, 30601, RMNH.INS.40367, RMNH.INS.40631.

BOLD data, material not examined. CANADA – **Newfoundland and Labrador** • 1 ♀; Barachois Pond Provincial Park, Erin Mtn trail; 48.469N, 58.256W; alt. 240 m; 29 Jun. 2011; G.R.Pohl, D.W.Langor leg.; CCDB–23267–F01; NFC. • 1 ♂; J. T. Cheeseman Provincial Park; 47.633N, 59.255W; 27 Jun. 2011; G.R.Pohl, L.Lafosse leg.; CCDB–23267–E06; NFC. • 1 ♀; Hwy 1, 5 km N jct Rte 480; 48.561N, 58.264W; alt. 138 m; 25 Jun. 2011; G.R.Pohl, D.W.Langor leg.; CCDB–23267–F05; NFC. – **Quebec** • 3; Mingan Archipelago National Park Reserve, Quarry Island; 50.2135N, 63.7979W; 19–26 Jun. 2013; Park Staff leg.; EventId: GMP#01092; BIOUG12280–D02, BIOUG12281–E02, BIOUG12281–E06. • 3; same locality data

as preceding; 02–09 Jul. 2013; Park Staff leg.; EventId: GMP#01096; BIOUG12352–A11, BIOUG12352–H01, BIOUG12398–F05. • 1; same locality data as preceding; 16–24 Jul. 2013; Park Staff leg.; EventId: GMP#01100; BIOUG12408–H03.

Observations. USA – **Massachusetts** • Plymouth Co., Marshfield, Hoyt Hall Preserve; 42.066N, 70.678W; 29 Oct. 2016; Steven Whitebread leg.; *Morella caroliniensis*; (photographs examined). – **New York** • Orange Co., Cornwall, Black Rock Forest; 41.39621N, 74.02522W; 30 Aug. 2019; Charley Eiseman & Julia Blyth leg.; *Comptonia peregrina*; https://www.inaturalist.org/observations/37506602. – **North Carolina** • Scotland Co., Laurinburg, St. Andrews University; 34.747N, 79.477W; 27 Sep. 2016; Tracy Feldman leg.; *Morella cerifera*; https://bugguide.net/node/view/1298044/bgimage same locality as preceding; 08–09 Nov. 2016; Tracy Feldman leg.; *Morella cerifera*; https://bugguide.net/node/view/1312510/bgimage, https://bugguide.net/node/view/1312770/bgimage • same locality as preceding; 16 Oct. 2017; Tracy Feldman leg.; *Morella cerifera*; https://bugguide.net/node/view/1456019/bgimage.

Aspilanta viticordifoliella (Clemens, 1860), comb n.

Figs 8, 35, 50, 97–106

Antispila viticordifoliella Clemens, 1860: 209. Syntype mines, larva [USA: Pennsylvania, Easton], larvae on "wild grapes" [*Vitis vulpina*], August–September, Brackenridge Clemens (ANSP if extant).

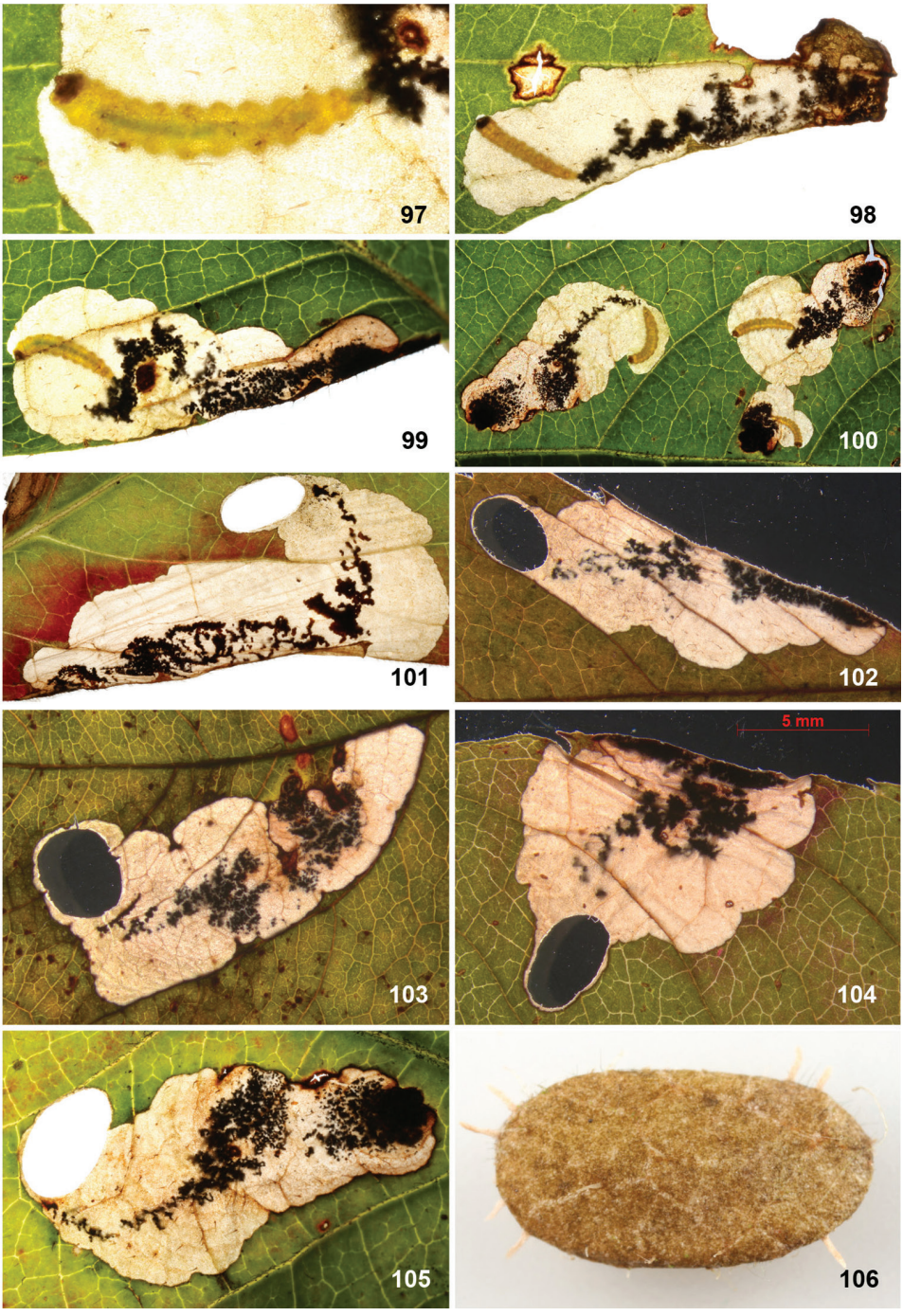
Antispila viticordifoliella; Chambers 1874a: 168; Frey and Boll 1878: 253; Chambers 1880: 65; Edwards 1889: 125; Dyar et al. 1903: 539; Barnes and McDunnough 1917: 181; Forbes 1923: 226; Needham et al. 1928: 20, 153, 290; McDunnough 1939: 91; Davis 1983b: 4; Brower 1984: 29; McGiffen and Neunzig 1985: 55; van Nieukerken and Pohl 2018: 41; Eiseman 2019: 189, 190, 729, 733.

Antispila cf. *viticordifoliella* van Nieukerken et al. 2012: 58; Eiseman 2019: 729.

Differential diagnosis. Wingspan ca. 5.5 mm, forewing length 2.2–2.5 mm. Externally different from all other *Aspilanta* species by the absence of the apical spot in the forewings. Differs from most *Antispila* species, which have a similar wing pattern, by the antennae with distinct white tips, the complete absence of androconial scales in the males and the smaller size. Genitalia not yet examined. Leafmines differ from other *Aspilanta* on Vitaceae by the absence of a linear portion and by the larva that is yellow-green (vs. whitish/colourless in *A. ampelopsifoliella* and *oinophylla*); from *Antispila* species by the black dispersed frass rather than brown and the markedly smaller cut-out. The record of an *Antispila* sp. from similar mines (see Remarks) complicates this, though.

Host plants. Vitaceae: *Parthenocissus quinquefolia*, *P. vitacea, Vitis vulpina*.

Leafmines. (Figs 97–106) Egg in the majority of examined mines in leaf margin, occasionally anywhere in the leaf, usually not associated with veins. The mine starts almost immediately as a blotch, occasionally with a minute linear portion along leaf margin; blotch rather compact, often along leaf margin or slightly extending towards



Figures 97–106. *Aspilanta viticordifoliella*, leafmines, larvae and shields on *Parthenocissus quinquefolia* and *P. vitacea* (104). **97, 99, 100, 105, 106** MA, Northampton, 13.ix.2013, CSE, 105 shows the left mine of 100, 106 showing flat shield to distinguish it from *Antispila* species **98** VT, Williston, 28.viii.2016, CSE **101** MA, Great Barrington, 16.ix.2017, CSE **102, 103** VT, Button Bay SP, 16.ix.2011, EvN2011254–2 **104** QC, Aylmer, 23.viii.2015, EvN2015160.

middle, in narrow leaflets until midrib. Frass black, a thick clump near origin, more dispersed in centre of mine. The larva cuts out an elliptic case ca. 3.5–4 mm long.

Larva. Yellow-green except for green gut contents, in contrast with colourless or whitish larva of *A. ampelopsifoliella* on the same host plant (compare Figs 69, 70 with 97–100); head and prothorax dark brown.

Life history. Larvae found from August to September through most of the range, but in Florida in April. Field caught adults found in July; larvae collected in fall resulted in emerging adults in April-May, the adult from the April larva emerged in May.

Distribution. Canada: Ontario, Québec*; USA: Connecticut, Florida, Kentucky, ? Maine, Massachusetts*, New York, Pennsylvania, ? Texas, Vermont. The previous record from Vermont by Grehan et al. (1995) was incorrect, as the cited material in the collection of D.L. Wagner belongs to an *Antispila* species. Records from Maine (Brower 1984) and Texas (Frey and Boll 1878) are uncertain; the last authors give a description but did not mention the white-tipped antenna.

Barcode. BIN: BOLD:ABA2832 (CT, FL), average distance 0.32%, max. distance 0.8% (n = 5), distance to NN 3.53% (next BIN), BIN: BOLD:AAZ5646 (NY, VT), average distance 0.25%, max. distance 0.46% (n = 4), distance to NN 2.89% (BOLD:ACA6487). The single specimen in a Malaise trap with that BIN: BOLD:ACA6487, most likely also belongs to *A. viticordifoliella*, to be confirmed by morphological examination.

Remarks. *Antispila viticordifoliella* was described on the basis of larvae and leafmines on *Vitis vulpina* (as *V. cordifolia*), with insufficient detail to recognise the species. The first adults were described by Chambers (1874a), again as new species. He clearly described a moth, reared from the same host, without an apical spot and antennae "with about six terminal joints silvery white". His description has later served as basis for the identity of this species, and one of the specimens in MCZ from his collection, incorrectly termed "types" might probably be the best to serve as Neotype, after a male has been dissected and DNA been extracted. Unfortunately the specimens are rather worn, and antennae are missing. The name has also several times been incorrectly used for one of the true *Antispila* species on *Vitis*, *A. isabella* Clemens, 1860 or a related species (see van Nieukerken et al. 2012).

Earlier we excluded the specimens reared from *Parthenocissus* from this species (van Nieukerken et al. 2012), but we are now more convinced that they are conspecific. Since then it has become clear that Vitaceae-feeding Heliozelidae frequently use more than one plant genus as host (eg van Nieukerken and Geertsema 2015), as we also observe in *A. oinophylla*. Still we urge that a species level revision using more material should be carried out.

From very similar mines in *Parthenocissus* collected in North Carolina, CSE and Tracy Feldman have reared an unidentified species of *Antispila*; we have thus omitted possible records of *Aspilanta viticordifoliella* from Iowa, Kansas and Ohio that are based only on photographed mines. In photographs of the North Carolina mines taken in the field, the larvae appear to be paler than those of *A. viticordifoliella*, but this requires confirmation; the *Antispila* mines are otherwise only recognisable when the typical

keeled case is formed. The reared adults in fact also resemble *A. viticordifoliella* because of the white-tipped antennae; only checking wing venation and/or the genitalia will separate the two.

Material: Adults examined. CANADA – **Ontario** • 1 ♀; Ottawa; 45.41N, 75.69W; G.G. Lewis leg.; emerged 02 Apr. 1971; EventId: 70–48; Genitalia slide: MIC1876; CNCLEP00100475.

USA – **Massachusetts** • 1 ♀; Hampshire Co., Pelham, 88 Arnold Rd.; 42.3629N, 72.4598W; 30 Aug. 2013; C.S. Eiseman leg.; *Parthenocissus quinquefolia*; emerged 13 May. 2014; EventId: CSE1109; CSEC.

Larvae and leafmines examined. CANADA – **Québec** • 1 vacated mine; Gatineau, Aylmer E, near Ottawa river; 45.39023N, 75.79139W; alt. 56 m; 23 Aug. 2015; E.J. van Nieukerken leg.; *Parthenocissus vitacea*; EventId: EvN no 2015160–1H; RMNH.INS.40247.

USA – **Massachusetts** • Hampshire, Northampton Co., Northampton Bikeway west of King St.; 42.329151N, 72.637529W; 13 Sep. 2013; Charley Eiseman leg.; *Parthenocissus quinquefolia*; CSEC. – **Vermont** • Chittenden Co., Williston, Mud Pond; 44.413625N, 73.075697W; 28 Aug. 2016; Charley Eiseman leg.; *Parthenocissus quinquefolia*; CSEC.

BOLD data, material not examined. CANADA – **Ontario** • 1; Point Pelee National Park, Cactus Field; 41.939N, 82.516W; alt. 168 m; 27 Jun.–04 Jul. 2012; Tyler Peters leg.; EventId: GMP#00175; BIOUG03514–A11. • 1; Wellington County, Puslinch Township, Concession 11/Hume Rd; 43.537N, 80.134W; alt. 320 m; 18–25 Jul. 2010; Paul Hebert leg.; EventId: L#PHPUS–017; BIOUG01146–B07.

USA – **Tennessee** • 1 ♀; Great Smoky Mountains National Park, Twin Creeks Science and Education Center; 35.6859N, 83.4986W; alt. 559 m; 10–17 Jul. 2012; Becky Nichols leg.; EventId: GMP#00037; BIOUG02919–H02.

Observations. CANADA – **Ontario** • Renfrew, Killaloe, Hagarty and Richards; 45.60491N, 77.59134W; 05 Sep. 2019; Jason J. Dombroskie leg.; *Parthenocissus*; https://www.inaturalist.org/observations/32173691. • Renfrew, Wilno; 45.60508N, 77.59131W; 05 Sep. 2019; Jason J. Dombroskie leg.; *Parthenocissus*; https://www.inaturalist.org/observations/32173324.

USA – **Massachusetts** • Berkshire Co., Great Barrington; 42.197001N, 73.335001W; 16 Sep. 2017; Charley Eiseman & Julia Blyth leg.; *Parthenocissus quinquefolia*; https://www.inaturalist.org/observations/44823345.

Aspilanta "Vitis1_USA"

Antispila Vitis1; van Nieukerken et al. 2012: 56, 77.

Differential diagnosis. Externally not distinguishable from *A. oinophylla* or *A. ampelopsifoliella*. Genitalia and leafmines not yet examined.

Host plants. Vitaceae: *Vitis aestivalis*, *Vitis* spec.

Leafmine. Not examined.

Life history. Larvae in June and July, single adult reared in July. Possibly bivoltine.

Distribution. USA: Connecticut, Florida.

Barcode. BIN: BOLD:ABA2832, average/max. distance 0.35% (n = 2), distance to NN 9.72% (BIN: BOLD:AEA4069, unknown, not a public record).

Material. See van Nieukerken et al. (2012).

Aspilanta "Vitis.arizonica_USA"

Figs 84–87

Antispila sp.; Eiseman 2019: 733.

Differential diagnosis. Adult unknown. Larvae solitary, not forming communal mines as in *A. voraginella*; different timing.

Host plants. Vitaceae: *Vitis arizonica*.

Leafmine. (Figs 84–87) A more or less triangular blotch with scattered black frass, concentrated toward the beginning; no linear part.

Larva. Not examined.

Life history. Larvae collected in November.

Distribution. USA: Arizona.

Barcode. A barcode of 407 bp groups in our tree (Fig. 44) with *A.* "Vitis1_USA".

Remarks. It is yet not certain whether this species belongs really to *Aspilanta*, as the (incomplete) barcode seems to group more with *Holocacista* species.

Material: Larvae and leafmines examined. USA – **Arizona** • 1 larva (barcoded), vacated mines; Cochise Co., Coronado National Forest, near Chiricahua National Monument; 31.978922N, 109.357056W; alt. 1675 m; 11 Nov. 2012; C.S. Eiseman leg.; *Vitis arizonica*; EventId: CSE–CH1/ CSE–L141; RMNH.INS.29643.P. • leafmines; Santa Cruz Co., Madera Canyon; 31.716527N, 110.87731W; alt. 1589 m; 06 Nov. 2012; C.S. Eiseman leg.; *Vitis arizonica*; EventId: CSE–L140; RMNH.

Discussion

The phylogenetic basis for the erection of the genus *Aspilanta* is the transcriptomic study, which provides a high support for its monophyly (Milla et al. 2019). Unfortunately, we were unable to find more than one possible morphological synapomorphy, the presence of an apical spot in the forewing. Possibly, a more detailed study of immature stages would be able to find more apomorphies. For solving the polyphyly of the genus *Antispila* in the old sense we considered also two alternative options:

1) The inclusion of the whole *Holocacista* group in an enlarged genus *Antispila*. Although this would have solved the problem of polyphyly, it would create a large genus with huge differences in many characters, both encompassing species with

reduced venation and the more complete venation, and make recognition of species belonging to this genus almost impossible.

2) Combining all genera of the *Holocacista* group into one genus. Such a genus would be monophyletic and be based on a whole suite of characters, such as the reduced venation. Such a genus should also encompass the undescribed group I (Milla et al. 2017) and the genus14, also known by the manuscript name "*Neospila*" (Milla et al. 2019). The genus should then be named *Coptodisca*, as this is the oldest name. As this name has been in use for more than a century for a rather specialised group of North American leafminers, with a characteristic wing pattern, it would be unfortunate to widen this and include grapevine pests in other parts of the world. Despite the suite of characters, recognition of adults would remain problematic.

The choice of generic borders is in principle not ruled by any other criterion than monophyly, and thus partly subjective. In all three options a number of changes in names are to be expected, but in the chosen option this is limited to just six species, only one of which is an economically important insect. In alternative 1) the number of new combinations would be highest, 26 in total (all *Coptodisca*, *Holocacista* and some others, including five or more economically important species), in 2) still 15 are needed (*Holocacista*, the current *Aspilanta* species, *Antispilina*, *Ischnocanaba*, including at least three economically important species). So in conclusion, the choice for a new genus *Aspilanta* was obvious in terms of stability and recognisability of the groups. Also biogeographically this choice has advantages, as we have now two old world genera (*Holocacista*, *Antispilina*) and two new world genera (*Aspilanta*, *Coptodisca*), whereas *Antispila* remains almost global (unknown from Australia, and so far from the Neotropics). Further study of the Neotropical fauna is important to see whether the monophyly of *Aspilanta* will stand, especially in the light of the position of the Patagonian group of species cited as "*Neospila*". If they belong to *Aspilanta*, which seems likely morphologically, the paraphyly of the combination Genus14 + *Antispila* group II as noted by Milla et al. (2019) could be problematic. However, it should be noted that the position of Genus14 was poorly supported in that study, and in fact the alternative of a monophyletic Genus14+ *Antispila* group II was found in one of the analyses (Milla et al. 2019: Fig S5). An analysis comprising several Neotropical species would be necessary for elucidating this phylogeny.

We choose to describe this genus without a full revision of its species. For several of the species we lack sufficient material, and additional fieldwork is much needed, not only for this genus, but for all North American Heliozelidae. Additionally, in *Antispila*, *Coptodisca,* and *Heliozela* we already know of several unnamed species, partly only from Malaise trapped specimens for barcoding campaigns, but also online photographs suggest there are more species. Inclusion of the rich Mexican fauna in such revisions would also be desirable. Further it would be important to settle the status of some old names by dissecting old types while extracting DNA, and for some species to designate neotypes.

Appendix

By removing six species from *Antispila* to *Aspilanta*, the remaining five named North American species feeding on Cornaceae, Nyssaceae, and Vitaceae belong in the monophyletic genus *Antispila*, as shown by a combination of the molecular studies and their morphology (Milla et al. 2017, 2019). However, one puzzling North American species described in *Antispila* remains: the Myrtaceae-feeding *A. eugeniella* Busck, 1900 from Florida. We here tentatively recombine it with *Heliozela*.

Heliozela eugeniella **(Busck, 1900), comb. n.**
Fig. 107

Antispila eugeniella Busck, 1900: 236. Holotype adult, USA, Florida, Palm Beach, leafmine on *Eugenia* sp., bred 25 Feb. 1900, "819", [leg. Dyar], Type No. 4945, USNMENT 01476200 (USNM).

Antispila eugeniella; Dyar 1901: 478; Dyar et al. 1903: 539; McDunnough 1939: 91; Kimball 1965: 292; Davis 1983b: 4; Heppner 2003 [2007]: 233; Eiseman 2019: 1153.

This species is rare; since the unique holotype was reared, we are only aware of a few specimens reared by David L. Wagner (pers. comm.); all subsequent literature records to Dyar (1901) are simple checklist entries. According to Busck (1900) the host plant was *Eugenia* spec., which was according to Dyar (1901), who collected the mine, probably *E. procera* (identified by F. Kinzel), a misapplied name for the Red stopper, *Eugenia rhombea* Krug & Urb. ex Urb. However, we doubt that this identification is correct, as *E. rhombea* is a very rare tree only of the Florida Keys, and not currently occurring in Palm Beach, where only *E. axillaris* (Sw.) Willd. and *E. uniflora* L. have been recorded (Wunderlin and Hansen 2003; Wunderlin et al. 2020). However, we cannot exclude that it did occur there in 1900, as most of the original habitat is now probably lost to development.

We illustrate the holotype here (Fig. 107): a moth with a small white dorsal spot at 1/3 and a fascia at 2/3, which is narrowest at dorsum and widens towards costa.

The colour pattern of *Antispila* and *Aspilanta* is almost always with a fascia at one third and two opposite spots at two-thirds. The pattern of *H. eugeniella* is different, with a postmedial fascia, and resembles more some species of the Old World genus *Holocacista* (van Nieukerken and Geertsema 2015). Most species of *Heliozela* have a basic pattern of two dorsal spots, but there are some species where one or both of these extend towards the costa, e.g., *H. anna* (Fletcher, 1920) from India with two fasciae and *H. argyrozona* (Meyrick, 1918) from South Africa, with a pattern very much resembling that of *H. eugeniella* (van Nieukerken and Geertsema 2015). Both were reared from Myrtaceae, the latter from *Syzygium cordatum* Hochts. ex Krauss, and *H. anna* from

Figure 107. *Heliozela eugeniella*, Holotype with labels. Photograph USNM.

Eugenia jambolana Lam. (Fletcher 1920), the correct name of which is now *Syzygium cumini* (L.) Skeels (Malabar plum, Jambolan). Also in Australia and Southeast Asia Myrtaceae is a major host family for *Heliozela* (Milla et al. 2017, 2019). These facts suggest that *eugeniella* is better placed in *Heliozela* than in *Antispila*, although still further morphological and molecular confirmation is needed.

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