New records of gall midges (Diptera, Cecidomyiidae) from Norway

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In 2018, the Norwegian Biodiversity Information Centre supported a project aimed at increasing the knowledge on gall midges in Norway. This paper reports the first results of the project based on material collected between 2019 and 2022. 93 species of gall midge are reported from Norway for the first time, and new records are provided for an additional 63 previously reported species. DNA barcodes are provided for 76 named species. The collecting method consisted of sampling plant material with or without visible midge galls, and of obtaining midges and associated insects from this material by dissection of galls and hatching of adults. This method captures not only the gall makers themselves, but also a diverse associated fauna of inquilines, predators, and parasitoids. A description of the sampling and rearing methods is provided. In all, more than 1 600 plant samples from more than 350 plant species were collected during the project, and gall midges were obtained from more than 800 of the samples. Much of this material is still unprocessed, however, and will be published later. In addition to the physical specimens, the project has produced a large collection of photos of galls and gall midges. Some of these pictures are shown in this paper, and many more are available at Artsdatabanken.no.

Key words: Diptera, Cecidomyiidae, Cecidomyiinae, Norway, hatching, barcoding.

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Introduction

The gall midges (Diptera, Bibionomorpha, Sciaroidea, Cecidomyiidae) are one of the largest and most poorly studied families in the order Diptera. Currently, 6 651 species in 832 genera are known (Gagné & Jaschhof 2021), but these probably constitute only a small fraction of the real diversity (Hebert *et al*. 2016). The family has an ancient origin, with a single fossil known from the Jurassic Period and a considerable number from the Cretaceous (Gagné & Jaschhof 2021).

About 240 species of gall midge were known from Norway prior to this study (Jaschhof & Jaschhof 2009, 2013, Skuhravá & Skuhravý 2012). The family is still poorly studied in Norway, however, and the actual number of Norwegian species is predicted to be at least 900 (Elven & Søli 2021). In 2018, the Norwegian Biodiversity Information Centre supported a project aimed at increasing the knowledge on gall midges in Norway. The project targeted the subfamily Cecidomyiinae, which includes all the phytophagous members of the family. In this paper, we report the first results of the project.

Gall midges are an ecologically diverse group of flies. The family is best known for the huge variety of galls that they form on plants, but other lifestyles include mycophagy, saprophagy, and predation. The family is divided into six subfamilies (Gagné & Jaschhof 2021), of which Catotrichinae, Lestremiinae, Micromyinae, Porricondylinae, and Winnertziinae are exclusively mycophagous. The sixth and largest subfamily, Cecidomyiinae, contains all the phytophagous species but also many mycophages, saprophages and predators.

Most of the phytophagous gall midges are gall makers on vascular plants. Their larvae develop in or on plants and usually cause some form of gall formation. The galls come in a great variety of forms. Globular (round) or fusiform (bottle-shaped) outgrowths on leaves are common. Many species develop inside stems or twigs, often causing a swelling of the affected part. Other species develop in flower buds, which often become inflated and fail to open properly. The larvae may live entirely inside the plant tissue, or more or less externally on the plant. Even if living externally, they usually induce the plant to grow some sort of partial protection around them. Examples include many species which develop in leaf folds or leaf rolls. Some larvae live fully exposed on leaves. In some species, the larva simply hangs suspended in a drop of sticky fluid on the underside of the leaf, which often is not significantly altered apart from some local discoloration. Some species do not cause any visible alteration of the plant at all. This is true for many species that live freely in the capitula of different species of Asteraceae. The phytophagous gall midges furthermore include a great number of species that do not make galls of their own, but instead live as inquilines in the galls of other species. Some species can act both as inquilines and as independent gall makers, and in some cases, it is still not clear which of two co-occurring species is the gall maker and which is the inquiline (Fedotova 2019).

Gall midges can utilize every type of plant organ, including roots, seeds and buds, but each species is usually restricted to a specific organ. Phytophagous gall midges are furthermore usually monophagous or narrowly oligophagous. This in turn means that the diversity of species that an area can harbour is strongly linked to the diversity of plants in the area.

The two other main lifestyles among gall midges are mycophagy and predation. Most mycophagous gall midges live in woodland habitats and develop either in the soil or in decaying wood. Unlike the phytophages, the mycophages tend to be generalists, but they can nevertheless be very diverse even within a small area of woodland (Jaschhof & Jaschhof 2009, 2013). Some groups are phytomycetophages (or "ambrosia gallers"). They form galls on plants, but the galls are lined with mycelium on the inside, and the midge larvae are believed to take at least part of their nutrients from the fungi. Examples are the members of *Asphondylia* Loew, 1850 and *Lasioptera* Meigen, 1818. Predatory gall midge larvae may be free living, or they may live inside the galls of their prey. Three noteworthy genera of predatory gall midges are *Arthrocnodax* Rübsaamen, 1895, which prey upon gall mites, *Lestodiplosis* Kieffer, 1894, which mostly prey upon other gall midges, and *Aphidoletes* Kieffer,

1904, which prey upon aphids. The species *Aphidoletes aphidimyza* (Rondani, 1847) is often used as a biological control agent of aphids in greenhouses. A recent study has shown that the transition from mycophagy to phytophagy has occurred only once or twice in the evolution of the subfamily Cecidomyiinae, and that predation has evolved only once (Dorchin *et al*. 2019).

Pupation may take place in the gall, but more often the mature larva leaves the gall to pupate in the soil. Gall midges can be either uni-, bi- or multivoltine. Hibernation takes place as either larva or pupa, either in the host plant or in the soil. Some multivoltine species will pupate in the gall during the spring and summer generations, but the last generation of the year will leave the plant to hibernate in the soil. Gall midges usually hatch after a single hibernation, but extremely prolonged dormancy (sometimes more than 13 years) has been demonstrated in the species *Contarinia vincetoxici* Kieffer, 1909 (Widenfalk & Solbreck 2005, Solbreck *et al*. 2022).

Gall midges have received relatively little attention from Norwegian entomologists. Most of the work on the group in the previous century has been focused on species of agricultural importance. Schøyen published several papers on gall midge pests between 1914 and 1942, and Fjelddalen between 1954 and 1994. Leatherdale (1959) compiled a catalogue of plant galls in the collection of the Zoological Museum at the University of Bergen, which included 41 galls produced by gall midges. By 1982, still only 65 species of gall midges were known from Norway, in contrast to 261 species known from Sweden (Skuhravá & Skuhravý 2012). Between 1995 and 2005, several international experts on gall midges made collecting trips to Norway; the Czech dipterologists Marcela Skuhravá and Václav Skuhravý, who worked on Cecidomyiinae, and the German dipterologists Mathias and Catrin Jaschhof, who worked on Lestremiinae. In 2009, Jaschhof & Jaschhof (2009) published an updated checklist of the Lestremiinae in Fennoscandia and Denmark, raising the number of Lestremiinae known from Norway from 35 to 109. Three years later, Skuhravá & Skuhravý (2012) published a checklist of the Norwegian Cecidomyiinae, raising the number of species in that subfamily from 73 to 119 and bringing the total number of Cecidomyiidae known from Norway up to 238. The number has not increased much in the following years. A good historical review of the work on Cecidomyiinae in Norway is given in Skuhravá & Skuhravý (2012). These two authors have also made collecting trips to many other European countries as well as to Russia. Their work has resulted in numerous publications and has contributed tremendously to the knowledge of the distribution of Cecidomyiinae in Europe. Skuhravá *et al*. (2014) provides a good historical overview of earlier gall midge research in Europe with focus on Germany.

The most common method for recording phytophagous gall midges is to search for the galls and immature stages (larvae or pupae) on the host plants. This can be done in several ways. The easiest approach is to simply record the presence of the gall itself, and document it for instance by a photo. While simple, this approach also yields the least amount of information. It only records the gall maker itself, and the identification is often highly unreliable. A more thorough approach is to dissect the galls and secure the larvae and pupae of the inhabitants in alcohol. This captures not just the gall maker, but also the inquilines, predators, and to some extent the parasitoids that often occupy the same galls. Identification is much more reliable when the larvae and pupae can be studied as well as the gall. The most thorough approach is to also try to hatch the adult insects. This approach can potentially capture the whole fauna of inquilines, predators and parasitoids in addition to the actual gall maker. It can in principle capture all their life stages except the egg, providing a wealth of morphological data on which to base the identifications. The method also provides a lot of ecological data on the inhabitants, such as host associations and various aspects of their life history. The drawback of the approach is that it is quite labor intensive.

In this project, we have used the latter approach (hatching of imagines) whenever the amount of material allowed, and the intermediate approach (only securing larvae and/or pupae) when there was less material to work with. The hatching

method is described below.

The last two decades have seen a massive effort in DNA barcoding of insects both in Norway and globally. However, the task of assigning names to the sequences (i.e. building a Reference Library) lags behind the effort of producing them. Kjærandsen (2022) summarised the situation in Sciaroidea by October 2021. With respect to gall midges, 2 560 specimens representing 614 tentative species (BINs) had been barcoded from the Nordic countries. However, only 14% of these tentative species (81 species) had names assigned to them. In Norway, the number of gall midge species known from sequences was 2,5 times higher than the official species count for Norway based on traditional surveys. This highlights the potential of DNA barcoding for revealing more of our diversity, but it also highlights the need to invest more in building the Reference Library.

The overall aim of this project was to increase the knowledge of Cecidomyiidae in Norway. The main goal was to find and report species not previously reported from Norway. Additionally, the project aimed to make new regional discoveries, to produce new insights into the ecology and host associations of this diverse group, and to convey knowledge about gall midges to the scientific community and to the public. Finally, the project aimed to produce DNA barcodes for as many species as possible, thus contributing to the Reference Library for Cecidomyiidae. This paper presents the first results from the project. Only part of the substantial material collected between 2019 and 2022 has so far been fully identified, and more results will be published later.

Material and methods

Geographical and temporal scope. The material was collected in Norway between 2019 and 2022. A few previously unpublished records from before 2019 are also included. The collecting sites (Figure 1) are distributed over most of Norway, but most of the collecting was done in the south-east part of the country, particularly around the capital Oslo.

Sampling strategy. As preparation for the project, we produced a list of all Cecidomyiinae known from Norway, Denmark and/or Sweden, totaling 402 species (Skuhravá *et al.* 2006, Jørgensen 2009, Bruun & Skuhravá 2011, Bruun *et al.* 2012, Skuhravá & Skuhravý 2012, Bruun *et al.* 2014, Haarder *et al.* 2016, Artsnavnebasen, Dyntaxa). Our primary target species were the 277 species on the list that were not yet known from Norway. This provided us with a starting point, but the search was not limited to these species. In the field, we used an approximation of the "Time and area" method described by Skuhravá & Skuhravý (2009). This method involves moving slowly through the terrain, carefully inspecting trees, bushes, and herbs visually for signs of galling. A problem with this method is that the outcome is very dependant on the level of experience of the sampler. Lack of experience can be mitigated by researching relevant species in advance, and in particular by studying pictures of their galls to form a search image. The web resource 'Plant Parasites of Europe' (Ellis 2022) is an invaluable resource in that respect. The method also misses the many species that produce either very inconspicuous galls or no galls at all. For this reason, we often collected flowers, seeds and other promising plant material "blindly"; that is, without knowing if the material contained gall midges or not. This has proved a very effective method for finding additional species.

Collecting and sorting. Plant material with or without visible galls was collected in transparent plastic bags (Figure 2). In the lab, some of the galls were opened and examined for larvae and/or pupae, which were transferred to 80% ethanol. The color of the living midge larvae was recorded, together with any jumping behaviour observed (important for identifying certain genera). If the sample contained only a few larvae or pupae, all of them would be preserved. If there were enough larvae or pupae to attempt hatching, 10–20 specimens would be preserved, and the rest would be used for the hatching attempt. The plant material was often not examined right away but allowed to stay in the collecting bag for a while first. This was especially the case when the sampled material did not contain visible galls ("blind" sampling). Any midge larvae in the sample will as a rule start to evacuate the plants after some time and

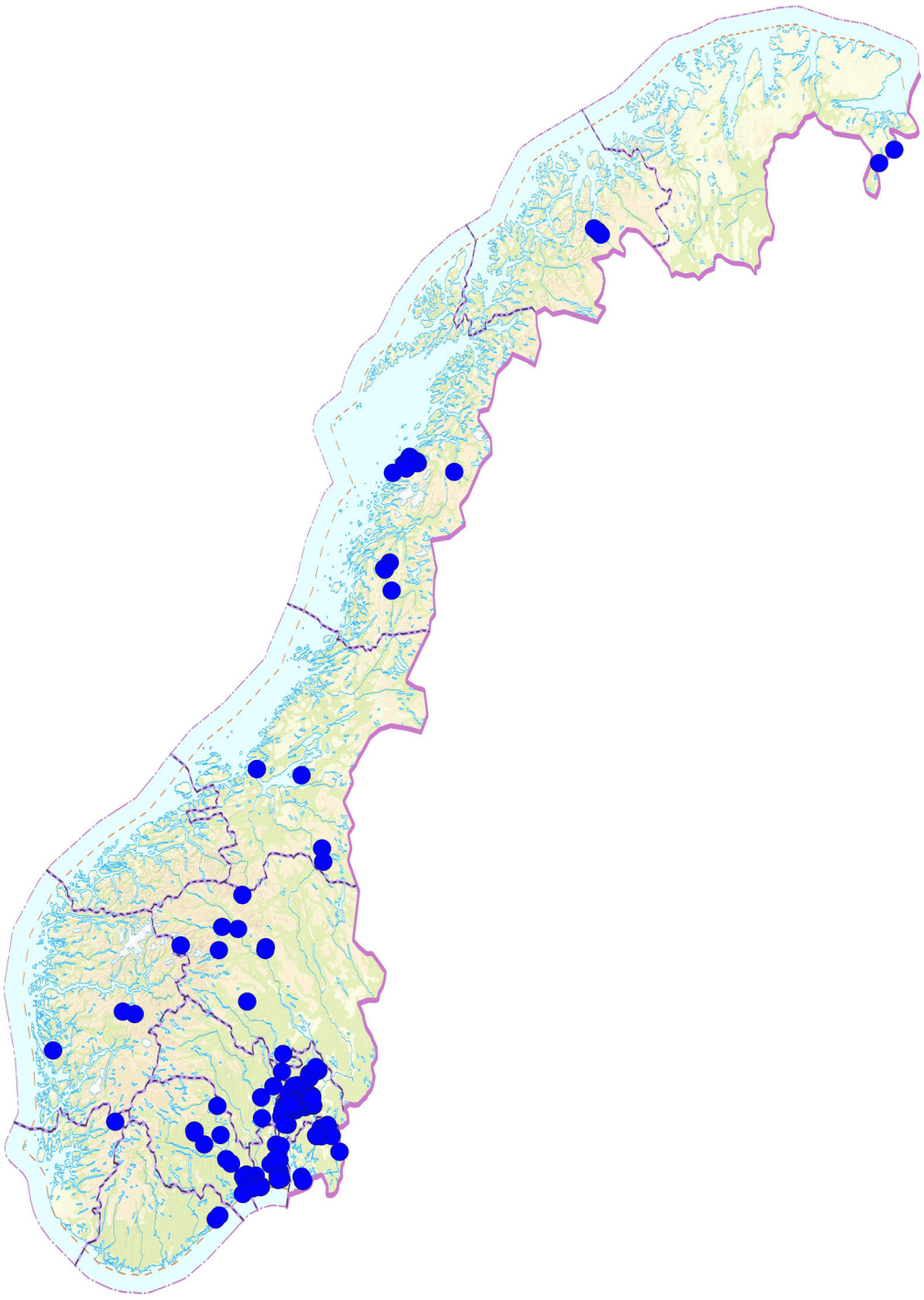

FIGURE 1. Map of the collection sites. Map source: Kartverket.

FIGURE 2. Clear plastic bags are used for collecting plant material with or without visible galls. Photo: Hallvard Elven.

FIGURE 3. After some time in the bag, gall midge larvae will usually start to evacuate the plants and start crawling around on the inner walls of the bag, where they are easy to spot. Photo: Hallvard Elven.

can then be easily spotted on the walls of the bag (Figure 3). Similarly, if there are pupae in the material, adult midges will usually start to hatch in the bag after a while, revealing their presence. Further benefits of keeping the material in the bags for some time is that the plants stay fresh longer, improving the chances that the larvae will reach maturity. Also, if the sample contains larvae

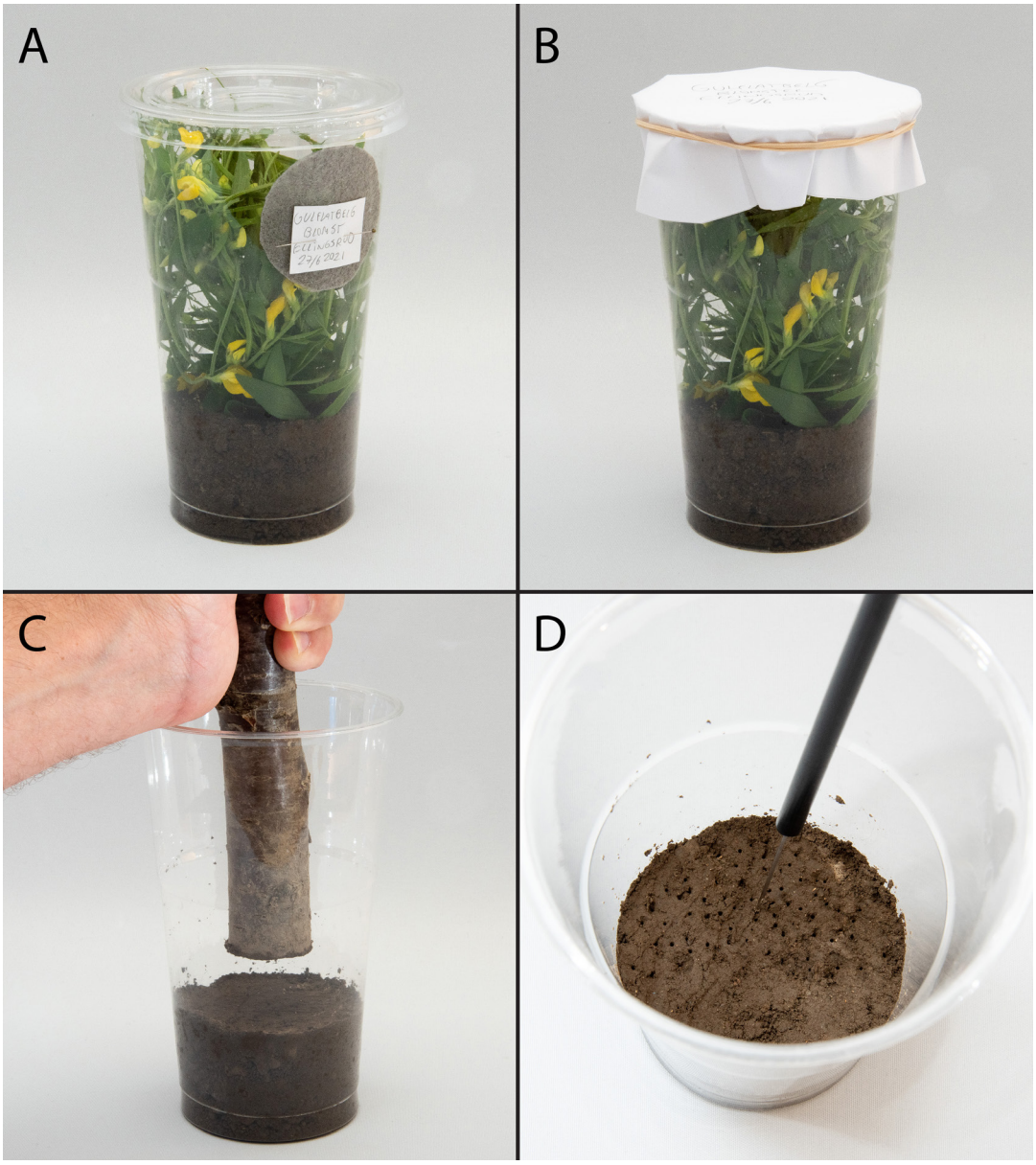

FIGURE 4. Rearing containers for gall midges. Two designs are shown, both made of 0.5 L clear plastic drinking cups. **A**. Design with snap lid, and with a mesh-covered ventilation hole in the side of the cup. **B**. Design with paper lid held on with rubber bands. This design is easier to make, but it is more difficult to inspect, and the paper lid is not entirely escape-proof. **C**. With either design, the cup is filled with a 4 cm deep layer of moist soil pressed as hard as possible. **D**. A dissecting pin is used to make several dozen holes in the soil surface, which the larvae can crawl into to pupate. Photos: Hallvard Elven.

of several species, these can then be sorted apart as they evacuate and be hatched separately, which greatly eases the later task of associating larvae to adults. The time required before larvae start to emerge can vary from a few hours to several weeks. The bags would generally be kept and inspected daily until larvae emerged or until the contents were thoroughly decomposed.

Hatching. Several hatching methods were used in the project. We here describe the method that was used most, and which has proved very effective. It largely follows the methods described

FIGURE 5. Rearing containers stacked in SmartStore-boxes. Photo: Hallvard Elven.

FIGURE 6. Newly emerged adults of *Contarinia craccae*, reared from galled flowers of *Vicia cracca.* Photo: Hallvard Elven.

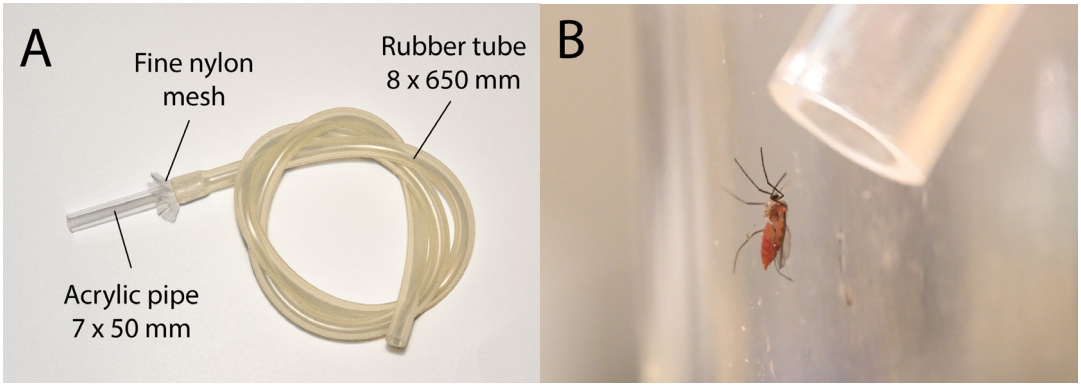

FIGURE 7. A modified exhauster is used for transferring newly hatched gall midges to alcohol. **A**. The exhauster consists of a rubber tube with a short acrylic pipe (the collecting pipe) inserted at one end. The midge is sucked gently into the collecting pipe, then blown gently out again into a tube with alcohol. A small piece of fine nylon mesh between the pipe and the tube prevents the midge from being sucked into the rubber tube and further. **B**. A midge being extracted. Photos: Hallvard Elven.

by Fedotova (2000), which in turn build on the methods of Mamaev & Krivosheina (1965). With this method we succeeded in hatching adult midges from about 50% of the samples where hatching was attempted.

The rearing container (Figure 4 A, 5) consisted of a 0,5 L transparent plastic drinking cup with tight fitting snap lid. In the side near the top was cut a 35 mm wide, circular opening for ventilation. The opening was covered with a piece of polypropylene fiber mesh attached using hot glue. An alternative design (Figure 4 B) is to replace the snap lid with a double layer of printing paper folded tightly down around the rim and held in place with a tight rubber band. This design does not require a separate opening for ventilation, but it is more difficult to inspect, and the paper lid is not 100% escape proof.

The bottom of the cup is filled with an approximately 4 cm deep layer of slightly moistened soil (Figure 4 C). The purpose of the soil is to keep moisture and to provide the midge larvae with a substrate for pupation and hibernation. The soil should be a fairly balanced mix of sand, clay and organic matter. It should retain water well, and it should stick together well even when dry. We used locally collected woodland soil rather than commercial soil. There are some risks in doing this, especially that of introducing other gall midges with the soil. We have not seen evidence of this happening, but it is something to be aware of. On the other hand, there are also concerns with commercial soil. The composition is generally not suitable, and the soil may easily contain pesticides, fertilisers, or other harmful chemicals.

The soil should be pressed as hard and compact as possible (Figure 4 C). Then, by means of a dissecting pin, a few dozen holes about 10 mm deep are made in the soil surface (Figure 4 D). This provides the larvae with tunnels in which to pupate. The plant material is then placed in the cup, and if necessary divided over several cups.
The cups are checked daily for newly hatched midges and parasitoid wasps (Figure 6). Newly hatched insects should be immediately transferred to ethanol. The modified exhauster shown in Figure 7 is very useful for this. Also, the exuviae (empty pupal skins) of the midges should be collected. They can be found sticking out of the soil or from the galls.

The soil should be kept moderately moist at all times. When watering, the cup should be held at an angle, and water trickled down one side so it does not flood the surface and collapse the pinholes. Mold will usually start to develop on the plant material after a while. This is not a big problem, but the plants should be moved around a bit to keep the mold from forming a tight seal on the soil surface.

Hatching can last for several months. After about three months, if no new midges have appeared for some time, or if nothing has hatched at all, the cups should be prepared for hibernation. Many species will only hatch after a period of cold. As preparation, the cups may be placed in a cold storage at +4°C. This can be done as early as July. The soil in the cups should be only slightly moist at this point. Once the outside temperature drops to around freezing point, the cups should be placed outside in a shaded location (Figure 8). If one does not have access to a cold storage, the cups can be placed directly outside in summer or fall. Both methods were used with success in the project. After several weeks of sub-zero temperatures, the cups may be brought into room temperature to induce hatching. Midges may start to hatch immediately after the cups are taken in, and hatching may continue for several months.

The method described above works well for many types of fresh (green) plant material. Gall midges can also be hatched from overwintered plant material such as twigs, straws or wilted flowers collected in late winter or early spring. In these cases, the material can be brought inside, placed in 6-liter clear plastic bags, and misted with water occasionally to bring the adults out.

Storage and processing. Both larvae, pupae, exuviae and imagines were preserved in 80% ethanol. The material was stored at +4°C while working actively with it, and then at -20°C to preserve the DNA. The actual galls were usually not kept but were as a rule documented with photo.

Slide mounting. Several protocols were used, but the main steps were as follows. Larvae were

FIGURE 8. Gall midges in winter storage. The rearing cups must be stored outside in the snow for at least a few weeks but can then be brought inside to start hatching early. Photo: Hallvard Elven.

cleared using either NaOH or KOH solution, then stained using a solution of acid fuchsin in 70% acetic acid. The stained skins were washed in 96% ethanol, transferred to clove oil, and finally mounted in either Canada balsam or Euparal on a microscope slide. Adult midges were dehydrated using 100% ethanol, cleared for some time in clove oil, and then dissected and mounted in Canada balsam on a microscope slide.

Photo documentation. Galls, larvae, and imagines were photographed as far as was feasible. In addition to pictures of larvae and adults in alcohol, the project aimed to produce photographs of the living, adult midges for as many species as possible.

Specimens in alcohol were photographed using a Nikon Z7 camera with an AF Micro Nikkor 200mm lens. To obtain sufficient magnification, the lens was combined with one of the following conversion lenses or microscope objectives: Raynox 250, Nikon LU Plan Fluor 5x WD 23,5, Nikon LU Plan Fluor 10x WD 17,5, or Nikon LU Plan ELWD 20x. Stacking photos were taken using the Stackshot macro rail (Cognisys) and the Zerene Stacker software (Zerene Systems).

Photographs of living specimens were mostly taken using a Nikon D810 camera with an AF Micro Nikkor 105 mm lens combined with either the Raynox 250 or Raynox 202 conversion lenses. Adult midges were placed on a suitable piece of plant material in a white nylon mesh cage and photographed against a green background through the opening of the cage. The motif was lighted indirectly using two external Nikon SB-800 flashes.

Identification. The plants were identified using Mossberg & Stenberg (2012) and Lid & Lid (2005). Gall midges were identified using the following classical and modern works; Houard (1908/13), Kieffer (1913), Barnes (1946/56), Möhn (1955a,b), Skuhravá & Skuhravý (1960, 1992, 2021), Buhr (1964–1965), Mamaev & Krivosheina (1965), Mamaev (1968, 1969), Yukawa (1971), Sylvén (1975), Gagné (1981, 1989, 1994, 2018), Kolomoets *et al*. (1989), Coulianos & Holmåsen (1991), Skuhravá (1997),

Skuhravý & Skuhravá (1998), Redfern & Shirley (2011), Simova-Tošić (2014), Roskam (2019), Roskam & Carbonnelle (2023) and the web resource 'Plant Parasites of Europe' (Ellis 2022), in addition to many papers on individual species and genera.

DNA barcoding. Part of the collected material has been DNA barcoded through the Norwegian Barcode of Life initiative (NorBOL). For adults, one to three legs were used for barcoding depending on the size of the specimen. For larvae, the middle section of the larva was used, corresponding to about 1/3 of the whole larva. The remaining parts of each specimen were kept as vouchers and are stored in alcohol pending slide mounting. Sequencing of CO1 was done by BOLD in Guelph using the two mixed primers C_LepFolF and C_LepFolR (Hernández-Triana *et al*. 2014).

Biology. The information on biology used in the species mentions was largely obtained from 'Plant Parasites of Europe' (Ellis 2022) and from Skuhravá & Skuhravý (2021).

Distribution. Information on distribution was obtained from several sources, most importantly the Catalogue of Palaearctic Diptera (Skuhravá 1986), A Catalog of the Cecidomyiidae (Diptera) of the World (Gagné & Jaschhof 2021) and The Gall Midges of Europe (Skuhravá & Skuhravý 2021). Additional information on the distribution of selected species in Russia and surrounding countries was obtained from Skuhravá & Skuhravý (1993), Skuhravý *et al*. (1997) and Baranchikov *et al*. (2012). Information about occurrence in the other Fennoscandian countries was obtained from Jaschhof *et al*. (2014), Haarder *et al.* (2016), Bruun (2020), Dyntaxa, Naturbasen and the Finnish Biodiversity Info Facility.

Results

General results

93 species of gall midge are reported from Norway for the first time. Additionally, new records are provided for 63 previously reported species. The species are listed in Table 1. Of the 156 species, 154 belong to the subfamily Cecidomyiinae, and two to the subfamily Porricondylinae. With "previously reported" we mean species that have been reported from Norway in a publication of some sort. Species reported only through Artskart are not considered previously reported, but such records are mentioned under the relevant species if the identity could be verified from the information provided.

The midges were collected from 116 plant species in 39 families. Table 2 lists the plant species and the corresponding species of gall midge. New host plants have been identified for four species: *Achillea ptarmica* (Asteraceae) for *Macrolabis achilleae* Rübsaamen, 1893, *Centaurea jacea* (Asteraceae) for *Dasineura miki* (Kieffer, 1909), *Hemerocallis lilioasphodelus* (Asphodelaceae) for *Contarinia quinquenotata* (Löw, 1888) and *Silene nutans* (Caryophyllaceae) for *Contarinia steini* (Karsch, 1881).

Among the reported gall midges are five that are alien in Norway (Skuhravá *et al.* 2010, own data): *Contarinia quinquenotata* (native to Asia), *Cupressatia siskiyou* (Felt, 1917) (native to North America), *Mikiola fagi* (Hartig, 1839) (Native to Europe and Western Asia), *Monarthropalpus flavus* (Schrank, 1776) (native to southern Europe and western Asia) and *Zygiobia carpini* (Löw, 1874) (native to Europe and some surrounding countries). Of these, *Mikiola fagi* was previously reported from Norway by Hagen et al. (2012) and *Contarinia quinquenotata* by Skuhravá & Skuhravý (2012). The remaining three species are reported from Norway for the first time. Some of these species are native to Europe, but all have probably been introduced to Norway through plant import. Additionally, the species *Hyperdiplosis bryanti* (Felt, 1913) was originally described from North America and is most likely an alien species in Europe, but little seems to be known about it.

In all, more than 1 600 plant samples were collected from more than 350 plant species in the project. Gall midges were obtained from more than 800 of the samples. Much of the material is still unprocessed, however, and will be published later.

Most of the collected material is deposited at the Natural history museum, University of Oslo (NHM). Some additional material is deposited

TABLE 1. Alphabethical list of the species of gall midges reported in this paper. Species not previously reported from Norway are marked with an asterisk (*).

Anisostephus betulinus	* *Contarinia solani*	*Dasineura tiliae*
* *Aphidoletes aphidimyza*	*Contarinia sorbi*	*Dasineura tortilis*
* *Aphidoletes urticaria*	*Contarinia steini*	* *Dasineura traili*
* *Arthrocnodax coryligallarum*	*Contarinia tiliarum*	*Dasineura trifolii*
* *Arthrocnodax fraxinellus*	* *Contarinia tremulae*	*Dasineura ulmaria*
* *Asphondylia hornigi*	* *Contarinia viburnorum*	*Dasineura urticae*
* *Asphondylia lathyri*	* *Cupressatia siskiyou*	*Dasineura viciae*
* *Asphondylia sarothamni*	*Cystiphora sanguinea*	* *Dasineura violae*
* *Asynapta phragmitis*	* *Cystiphora sonchi*	* *Dasineura vulgatiformiae*
Asynapta strobi	* *Dasineura acrophila*	*Didymomyia tiliacea*
Clinodiplosis cilicrus	* *Dasineura affinis*	* *Drisina glutinosa*
* *Contarinia anthobia*	* *Dasineura aucupariae*	*Geocrypta galii*
* *Contarinia arrhenatheri*	*Dasineura berti*	* *Giraudiella inclusa*
* *Contarinia artemisiae*	* *Dasineura bistortae*	*Harmandiola cavernosa*
* *Contarinia barbichei*	* *Dasineura chrysanthemi*	*Harmandiola globuli*
Contarinia betulicola	*Dasineura engstfeldi*	*Harmandiola populi*
Contarinia campanulae	*Dasineura epilobii*	*Harmandiola tremulae*
* *Contarinia chrysanthemi*	* *Dasineura frangulae*	* *Hyperdiplosis bryanti*
* *Contarinia coryli*	*Dasineura fraxinea*	*Iteomyia capreae*
Contarinia craccae	*Dasineura fraxini*	*Iteomyia major*
* *Contarinia dipsacearum*	* *Dasineura fructum*	* *Jaapiella chelidonii*
* *Contarinia fagi*	*Dasineura geranii*	* *Jaapiella cirsiicola*
* *Contarinia festucae*	*Dasineura kiefferiana*	* *Jaapiella floriperda*
* *Contarinia floriperda*	*Dasineura leguminicola*	* *Jaapiella inflatae*
* *Contarinia gei*	* *Dasineura miki*	* *Jaapiella inulicola*
* *Contarinia hypochoeridis*	* *Dasineura myosotidis*	* *Jaapiella moraviae*
* *Contarinia jacobaeae*	* *Dasineura oxyacanthae*	* *Jaapiella rubicundula*
* *Contarinia lonicerearum*	*Dasineura populeti*	* *Jaapiella schmidti*
Contarinia loti	*Dasineura pustulans*	*Jaapiella veronicae*
* *Contarinia lysimachiae*	*Dasineura rosae*	*Kiefferia pericarpiicola*
Contarinia nasturtii	*Dasineura saussureae*	*Lasioptera carophila*
Contarinia petioli	* *Dasineura schulzei*	* *Lasioptera flexuosa*
* *Contarinia polygonati*	* *Dasineura serotina*	*Lasioptera rubi*
* *Contarinia pruniflorum*	* *Dasineura silvestris*	* *Lathyromyza abruptis*
* *Contarinia quercina*	* *Dasineura similis*	* *Lathyromyza florum*
Contarinia quinquenotata	* *Dasineura sisymbrii*	*Lathyromyza schlechtendali*
Contarinia rhamni	* *Dasineura spadicea*	* *Lestodiplosis tarsonemi*
* *Contarinia rubicola*	* *Dasineura thomasiana*	* *Lestodiplosis vasta*

TABLE 1. *continued*

* *Lestodiplosis xylodiplosuga*	*Oligotrophus juniperinus*	* *Rhopalomyia baccarum*
Macrodiplosis pustularis	* *Ozirhincus hungaricus*	* *Rhopalomyia foliorum*
Macrolabis achilleae	* *Ozirhincus longicollis*	* *Rhopalomyia millefolii*
* *Macrolabis cirsii*	*Ozirhincus millefolii*	* *Rhopalomyia palearum*
* *Macrolabis fagicola*	* *Parallelodiplosis galliperda*	*Rondaniola bursaria*
* *Macrolabis incolens*	*Physemocecis ulmi*	*Schizomyia galiorum*
Macrolabis luceti	* *Piceacecis abietiperda*	*Semudobia betulae*
* *Macrolabis pavida*	* *Placochela nigripes*	*Semudobia skuhravae*
* *Macrolabis vicicola*	* *Planetella arenariae*	* *Semudobia tarda*
Massalongia rubra	* *Planetella gallarum*	* *Tricholaba trifolii*
Mikiola fagi	*Rabdophaga iteobia*	* *Tricholaba viciobia*
* *Monarthropalpus flavus*	*Rabdophaga marginemtorquens*	*Wachtliella persicariae*
* *Monodiplosis liebeli*	*Rabdophaga rosaria*	* *Xylodiplosis nigritarsis*
* *Mycocecis ovalis*	*Rabdophaga rosariella*	* *Zygiobia carpini*

at the All-Russian Institute of Plant Protection (FSBSI VIZR), and some is in the private collection of Arne Fjellberg.

Barcoding results

285 specimens from 194 collecting events were sent to barcoding through NorBOL. Usable sequences were obtained for 256 specimens (= 90%). The sequences represented 133 tentative species, of which 76 were possible to assign a name to at this point. These are reported in this paper, whereas the remaining 57 tentative species need more work. Sequencing failed for 19 specimens. This was largely due to contamination by Hymenoptera DNA, no doubt stemming from parasitoids. The DNA barcodes are available at BOLD (https://www.boldsystems.org/) under the project name NOCEC.

Parasitoid wasps

In addition to gall midges, the project has produced a large material of parasitoid wasps associated with gall midges. This material is still under processing and will be published separately.

Photographs

The project has produced a large collection of photos of gall midges, both living and preserved. These include pictures of galls, larvae, pupae and adult midges of many species. The collection of pictures of living adult midges is unique, as for most of these species the adult stage has never been depicted alive before. The pictures of living specimens show a lot of characters that are lost in preserved specimens. Most adult gall midges have strong body colors, and many genera have a striking and colorful plumage of scale-like setae on the head, thorax and abdomen. In alcohol, the body coloration quickly fades, and the scales change color and usually quickly fall off altogether.

A collection of 651 pictures from the project, representing 113 gall midge species, has been published under an open Creative Commons license. Some of these pictures are used in this article, and all can be found at Artsdatabanken.no. The pictures have also been shared with the web resource 'Plant Parasites of Europe' (Ellis 2022).

The species

The nomenclature and classification follow Gagné & Jaschhof (2021): A Catalog of the Cecidomyiidae (Diptera) of the World (5th Edition). Global species counts are also taken from Gagné & Jaschhof (2021). Species not previously reported from Norway are marked with an asterisk (*). Counties are given using the revised Strand-system (Økland 1981). The life stages obtained

TABLE 2. List of plant species and the associated species of gall midges reported in this paper. The term «galler» in the last column should be interpreted broadly to include also non-galling species if they feed on plants as independent agents, not as inquilines in the galls of other species. Not all the listed gall midges have a strict connection to the plants they were found on. This is particularly true for the predatory and detritivorous species.

Plant family and species	Gall midge	Plant organ	Biology
APIACEAE			
Anthriscus sylvestris	*Lasioptera carophila*	Stem	Galler
Pimpinella saxifraga	*Kiefferia pericarpiicola*	Fruit	Galler
-	*Lasioptera carophila*	Stem	Galler
ASPARAGACEAE			
Convallaria majalis	*Contarinia polygonati*	Flower	Galler
ASPHODELACEAE			
Hemerocallis lilioasphodelus	*Contarinia quinquenotata*	Flower	Galler
ASTERACEAE			
Achillea millefolium	*Macrolabis achilleae*	Flower	Galler
-	*Ozirhincus millefolii*	Achene	Galler
-	*Rhopalomyia millefolii*	Systemic	Galler
Achillea ptarmica	*Macrolabis achilleae*	Flower	Galler
-	*Rhopalomyia palearum*	Flower	Galler
Artemisia vulgaris	*Contarinia artemisiae*	Flower	Galler
-	*Rhopalomyia baccarum*	Root/stem	Galler
-	*Rhopalomyia foliorum*	Leaf/stem	Galler
Centaurea jacea	*Clinodiplosis cilicrus*	Flower	Detritivore
-	*Dasineura miki*	Flower	Galler
Cirsium arvense	*Jaapiella cirsiicola*	Flower	Galler
Cirsium heterophyllum	*Macrolabis cirsii*	Flower	Galler
Hieracium section Hieracium	*Aphidoletes aphidimyza*	-	Predator
-	*Aphidoletes urticaria*	Leaf	Predator
-	*Cystiphora sanguinea*	Leaf	Galler
-	*Dasineura vulgatiformiae*	Flower	Galler
Hieracium section Vulgata	*Cystiphora sanguinea*	Leaf	Galler
Hypochaeris radicata	*Contarinia hypochoeridis*	Flower	Galler
Jacobaea vulgaris	*Contarinia jacobaeae*	Flower/stem	Galler
Leucanthemum vulgare	*Contarinia chrysanthemi*	Achene	Galler
-	*Dasineura chrysanthemi*	Flower	Galler
-	*Ozirhincus longicollis*	Achene	Galler
Pentanema salicinum	*Jaapiella inulicola*	Flower	Galler
Saussurea alpina	*Dasineura saussureae*	Flower	Galler
Senecio viscosus	*Aphidoletes aphidimyza*	Flower	Predator
Sonchus arvensis	*Cystiphora sonchi*	Leaf	Galler
Tanacetum vulgare	*Ozirhincus hungaricus*	Achene	Galler

TABLE 2. *continued*

Plant family and species	Gall midge	Plant organ	Biology
Tripleurospermum inodorum	*Ozirhincus longicollis*	Achene	Galler
BETULACEAE			
Alnus incana	*Dasineura tortilis*	Leaf	Galler
Betula pendula	*Semudobia betulae*	Seed	Galler
-	*Semudobia skuhravae*	Catkin scale	Galler
-	*Semudobia tarda*	Seed	Galler
Betula pubescens	*Anisostephus betulinus*	Leaf	Galler
-	*Contarinia betulicola*	Shoot	Galler
-	*Massalongia rubra*	Leaf	Galler
-	*Semudobia betulae*	Seed	Galler
Carpinus betulus	*Zygiobia carpini*	Leaf	Galler
Corylus avellana	*Arthrocnodax coryligallarum*	Bud	Predator
-	*Contarinia coryli*	Male catkin	Galler
-	*Mycocecis ovalis*	Trunk	Fungivore
BORAGINACEAE			
Myosotis arvensis	*Dasineura myosotidis*	Flower	Galler
BRASSICACEAE			
Barbarea vulgaris	*Dasineura sisymbrii*	Flower bud/ stem	Galler
Raphanus raphanistrum	*Contarinia nasturtii*	Flower bud/ shoot	Galler
Turritis glabra	*Aphidoletes aphidimyza*	Flower	Predator
BUXACEAE			
Buxus sempervirens	*Monarthropalpus flavus*	Leaf	Galler
CAMPANULACEAE			
Campanula rotundifolia	*Contarinia campanulae*	Flower	Galler
CAPRIFOLIACEAE			
Knautia arvensis	*Contarinia dipsacearum*	Flower	Galler
Lonicera xylosteum	*Contarinia lonicerearum*	Flower	Galler
CARYOPHYLLACEAE			
Cerastium fontanum	*Dasineura fructum*	Fruit	Galler
Silene latifolia	*Contarinia steini*	Flower	Galler
Silene nutans	*Contarinia steini*	Flower	Galler
Silene vulgaris	*Jaapiella floriperda*	Flower	Galler
-	*Jaapiella inflatae*	Flower	Inquiline
Viscaria vulgaris	*Jaapiella moraviae*	Flower	Galler
CUPRESSACEAE			
Chamaecyparis lawsoniana	*Cupressatia siskiyou*	Cone	Galler

TABLE 2. *continued*

Plant family and species	Gall midge	Plant organ	Biology
Juniperus communis	*Oligotrophus juniperinus*	Shoot	Galler
CYPERACEAE			
Carex arenaria	*Planetella arenariae*	Root collar	Galler
Carex cf. nigra	*Planetella gallarum*	Leaf/stem	Galler
EUPHORBIACEAE			
Euphorbia palustris	*Dasineura schulzei*	Shoot	Galler
FABACEAE			
Astragalus alpinus	*Dasineura berti*	Leaf	Galler
Cytisus scoparius	*Asphondylia sarothamni*	Pod/stem	Galler
Lathyrus linifolius	*Lathyromyza schlechtendali*	Leaf	Galler
Lathyrus pratensis	*Asphondylia lathyri*	Pod	Galler
-	*Lathyromyza florum*	Flower	Galler
Lathyrus sylvestris	*Dasineura silvestris*	Flower	Galler
Lotus corniculatus	*Contarinia loti*	Flower	Galler
Lotus pedunculatus	*Contarinia barbichei*	Shoot	Galler
Trifolium medium	*Dasineura leguminicola*	Flower	Galler
Trifolium pratense	*Dasineura leguminicola*	Flower	Galler
-	*Tricholaba trifolii*	Leaf	Galler
Trifolium repens	*Dasineura trifolii*	Leaf	Galler
-	*Tricholaba trifolii*	Leaf	Galler
Vicia cracca	*Contarinia craccae*	Flower	Galler
-	*Lathyromyza abruptis*	Flower	Galler
Vicia sepium	*Contarinia craccae*	Flower	Galler
-	*Dasineura viciae*	Leaf	Galler
-	*Macrolabis vicicola*	Leaf	Inquiline
Vicia sylvatica	*Dasineura spadicea*	Leaf	Galler
-	*Tricholaba viciobia*	Leaf	Galler
FAGACEAE			
Fagus sylvatica	*Contarinia fagi*	Leaf	Galler
-	*Macrolabis fagicola*	Leaf	Inquiline
-	*Mikiola fagi*	Leaf	Galler
Quercus robur	*Contarinia quercina*	Shoot	Galler
-	*Lestodiplosis vasta*	Stem	Predator
-	*Macrodiplosis pustularis*	Leaf	Galler
-	*Monodiplosis liebeli*	Leaf	Inquiline
-	*Xylodiplosis nigritarsis*	Stem	Xylophage
Quercus sp.	*Hyperdiplosis bryanti*	Stem	Unknown
-	*Lestodiplosis xylodiplosuga*	Stem	Predator

TABLE 2. *continued*

Plant family and species	Gall midge	Plant organ	Biology
-	*Parallelodiplosis galliperda*	Leaf	Inquiline
-	*Xylodiplosis nigritarsis*	Stem	Xylophage
GERANIACEAE			
Geranium sanguineum	*Dasineura geranii*	Flower	Galler
HYPERICACEAE			
Hypericum maculatum	*Dasineura serotina*	Shoot	Galler
Hypericum perforatum	*Dasineura serotina*	Shoot	Galler
LAMIACEAE			
Glechoma hederacea	*Rondaniola bursaria*	Leaf	Galler
Origanum vulgare	*Asphondylia hornigi*	Flower	Galler
MALVACEAE			
Tilia cordata	*Contarinia tiliarum*	Stem	Galler
-	*Dasineura tiliae*	Leaf	Galler
-	*Didymomyia tiliacea*	Leaf	Galler
Tilia platyphyllos	*Dasineura tiliae*	Leaf	Galler
Tilia x europaea	*Contarinia tiliarum*	Stem	Galler
-	*Dasineura thomasiana*	Shoot	Galler
OLEACEAE			
Fraxinus excelsior	*Arthrocnodax fraxinellus*	Flower	Predator
-	*Dasineura acrophila*	Leaf	Galler
-	*Dasineura fraxinea*	Leaf	Galler
-	*Dasineura fraxini*	Leaf	Galler
-	*Macrolabis pavida*	Leaf	Inquiline
-	*Mycocecis ovalis*	Trunk	Fungivore
Ligustrum vulgare	*Placochela nigripes*	Flower	Galler
ONAGRACEAE			
Chamaenerion angustifolium	*Dasineura epilobii*	Flower	Galler
-	*Dasineura kiefferiana*	Leaf	Galler
PAPAVERACEAE			
Chelidonium majus	*Jaapiella chelidonii*	Flower	Galler
PINACEAE			
Picea abies	*Asynapta strobi*	Cone	Galler
-	*Piceacecis abietiperda*	Stem	Galler
PLANTAGINACEAE			
Plantago lanceolata	*Jaapiella schmidti*	Flower	Galler
Veronica chamaedrys	*Jaapiella veronicae*	Bud/shoot	Galler
-	*Macrolabis incolens*	Bud/shoot	Inquiline
Veronica officinalis	*Dasineura similis*	Shoot	Galler

TABLE 2. *continued*

Plant family and species	Gall midge	Plant organ	Biology
POACEAE			
Arrhenatherum elatius	*Contarinia arrhenatheri*	Flower	Galler
Deschampsia cespitosa	*Aphidoletes aphidimyza*	-	Predator
Lolium arundinaceum	*Contarinia festucae*	Flower	Galler
Lolium pratense	*Contarinia festucae*	Flower	Galler
Phragmites australis	*Asynapta phragmitis*	Stem	Unclear
-	*Giraudiella inclusa*	Stem	Galler
-	*Lasioptera flexuosa*	Stem	Galler
-	*Lestodiplosis tarsonemi*	Stem	Predator
POLYGONACEAE			
Bistorta vivipara	*Dasineura bistortae*	Leaf	Galler
Persicaria amphibia	*Wachtliella persicariae*	Leaf	Galler
Rumex acetosa	*Jaapiella rubicundula*	Flower	Galler
Rumex acetosella	*Jaapiella rubicundula*	Flower	Galler
PRIMULACEAE			
Lysimachia vulgaris	*Contarinia lysimachiae*	Flower	Galler
RANUNCULACEAE			
Ranunculus acris	*Dasineura traili*	Flower	Galler
RHAMNACEAE			
Frangula alnus	*Contarinia rhamni*	Flower	Galler
-	*Dasineura frangulae*	Flower	Inquiline
ROSACEAE			
Crataegus monogyna	*Contarinia anthobia*	Flower	Galler
-	*Dasineura oxyacanthae*	Flower	Galler
Crataegus rhipidophylla	*Contarinia anthobia*	Flower	Galler
Filipendula ulmaria	*Dasineura engstfeldi*	Leaf	Galler
-	*Dasineura pustulans*	Leaf	Galler
-	*Dasineura ulmaria*	Leaf	Galler
Geum rivale	*Contarinia gei*	Leaf	Galler
Prunus spinosa	*Contarinia pruniflorum*	Flower	Galler
Rosa canina	*Dasineura rosae*	Leaf	Galler
-	*Macrolabis luceti*	Leaf	Inquiline
Rubus idaeus	*Lasioptera rubi*	Stem	Galler
Rubus sp.	*Contarinia rubicola*	Flower	Galler
Sorbus aucuparia	*Contarinia floriperda*	Flower	Galler
-	*Contarinia sorbi*	Leaf	Galler
-	*Dasineura aucupariae*	Flower	Inquiline
RUBIACEAE			

TABLE 2. *continued*

Plant family and species	Gall midge	Plant organ	Biology
Galium album	*Schizomyia galiorum*	Flower	Galler
Galium mollugo	*Schizomyia galiorum*	Flower	Galler
Galium verum	*Geocrypta galii*	Stem	Galler
-	*Schizomyia galiorum*	Flower	Galler
SALICACEAE			
Populus tremula	*Contarinia petioli*	Leaf/petiole	Galler
-	*Contarinia tremulae*	Leaf	Galler
-	*Dasineura populeti*	Leaf	Galler
-	*Harmandiola cavernosa*	Leaf	Galler
-	*Harmandiola globuli*	Leaf	Galler
-	*Harmandiola populi*	Leaf	Galler
-	*Harmandiola tremulae*	Leaf	Galler
Salix aurita	*Iteomyia capreae*	Leaf	Galler
-	*Rabdophaga rosariella*	Bud	Galler
Salix caprea	*Iteomyia capreae*	Leaf	Galler
-	*Rabdophaga iteobia*	Shoot	Galler
-	*Rabdophaga rosaria*	Shoot	Galler
Salix glauca	*Rabdophaga rosaria*	Shoot	Galler
Salix hastata	*Rabdophaga rosaria*	Shoot	Galler
Salix lanata	*Iteomyia major*	Leaf	Galler
-	*Rabdophaga rosaria*	Shoot	Galler
Salix lapponum	*Rabdophaga marginemtorquens*	Leaf	Galler
-	*Rabdophaga rosaria*	Shoot	Galler
Salix myrsinifolia	*Iteomyia major*	Leaf	Galler
-	*Rabdophaga rosaria*	Shoot	Galler
Salix phylicifolia x myrsinifolia	*Rabdophaga rosaria*	Shoot	Galler
SAPINDACEAE			
Acer platanoides	*Drisina glutinosa*	Leaf	Galler
SOLANACEAE			
Solanum dulcamara	*Contarinia solani*	Flower	Galler
ULMACEAE			
Ulmus glabra	*Physemocecis ulmi*	Leaf	Galler
URTICACEAE			
Urtica dioica	*Dasineura urticae*	Leaf/stem	Galler
VIBURNACEAE			
Sambucus nigra	*Placochela nigripes*	Flower	Galler
Viburnum opulus	*Contarinia viburnorum*	Flower	Galler
VIOLACEAE			

TABLE 2. *continued*

Plant family and species	Gall midge	Plant organ	Biology
Viola arvensis	*Dasineura violae*	Leaf/shoot	Galler
Viola canina	*Dasineura affinis*	Leaf	Galler
Viola tricolor	*Dasineura violae*	Leaf/shoot	Galler

are abbreviated as follows: L =l arvae, P = pupae, F = females, M = males, I = imagines of either sex. Unless otherwise stated, the material was collected as larvae on the host plant, and any pupae and/or imagines were obtained through rearing. Collectors are abbreviated as follows: AF = Arne Fjellberg, AK = Aleksandra Kaplina, AL = Andreas Løvold, BN = Björn Nordén, HB = Hanne Breivik, HE = Hallvard Elven, HK = Håkon Krogrud, JW = Jurgen Wegter, KB = Kristina Bjureke, OS = Ove Sørlibråten, SH = Simon Haarder, TS = Trude Starholm, ZF = Zoya Fedotova, ØE = Øystein Elven, ØH = Øyvind Hagen.

SUBFAMILY PORRICONDYLINAE
TRIBE ASYNAPTINI

Genus *Asynapta* Loew, 1850
The genus includes 49 species in the Holarctic, Afrotropical, Neotropical and Oriental regions. The species live as fungivores or detritivores in various substrates. Some species are phytomycetophagous or resinicolous.

* *Asynapta phragmitis* (Giraud, 1863)
(Figure 9 A–B)

Material: AK, Asker: Sætrepollen, N of Grytnes, 59.678368°N 10.538581°E ± 50m, 31 October 2020, Galls of *Lipara* sp. on *Phragmites australis*, I, leg. TS, coll. NHMO; 31 October 2020, Galls of *Steneotarsonemus phragmitidis* on *Phragmites australis*, I, leg. TS, coll. NHMO; Brønnøya, Sandbukta, 59.857333°N 10.528840°E ± 30m, 2 April 2019, Galls of *Lipara lucens* on *Phragmites australis*, 2F, leg. HE, coll. NHMO; Oslo: Østensjøvannet, 59.897597°N 10.830290°E ± 50m, 12 April 2020, Galls of *Lipara* sp. on *Phragmites australis*, I, leg. HE, coll. NHMO.

Biology and notes: The larvae develop in stems of *Phragmites australis* (Poaceae), often in the galls of *Lipara* spp. (Diptera: Chloropidae), but we have also found it associated with mite galls. Univoltine; pupation and hibernation in the host plant. We have not collected larvae of this species, but we have hatched adults from galled *Phragmites* straws collected in late autumn or early spring. The species is part of a complex of gall midges which utilize *Phragmites australis*. The species is reviewed in Skuhravá & Skuhravý (1981).

Distribution: Widespread in Europe including Norway and Sweden. Central Asia.

Asynapta strobi (Kieffer, 1920)
(Figure 9 C–D)

Material: AK, Lillestrøm: Farshatten, 59.992870°N 11.149377°E ± 5m, 2 April 2020, on *Picea abies*, MF, leg. TS, BOLD: NHMO-ENT-548226, coll. NHMO.

Biology: The yellow to orange larvae develop in cones of *Abies alba*, *Larix decidua*, *Picea abies* and *Pinus brutia* (Pinaceae). They live freely among the cone scales. Univoltine; hibernation in the cone followed by pupation there in the spring.

Distribution: Widespread Palearctic, including Norway, Sweden and Finland.

SUBFAMILY CECIDOMYIINAE
SUPERTRIBE CECIDOMYIIDI
TRIBE APHIDOLETINI

Genus *Aphidoletes* Kieffer, 1904
The genus includes four species globally, all of which are predators on Aphidoidea. The genus is reviewed in Harris (1973).

* *Aphidoletes aphidimyza* (Rondani, 1847)
(Figure 10 A–B)

Material: BØ, Drammen: Miletjern, 59.746477°N 10.041469°E ± 20m, 19 June 2019,

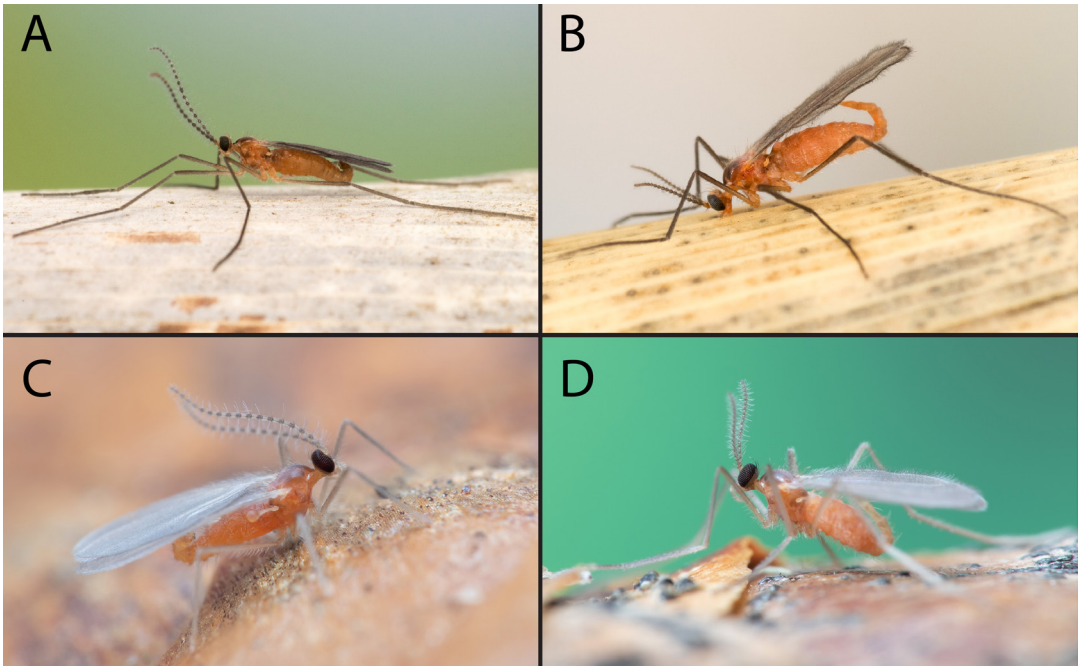

FIGURE 9. A–B. *Asynapta phragmitis* hatched from *Phragmites australis* straws. **A.** Male. **B.** *Semudobia skuhravae*. **C–D.** *Asynapta strobi* hatched from *Picea abies* cones. **C.** Male. **D.** Female. Photos: H. Elven (A, B), T. Starholm (C, D).

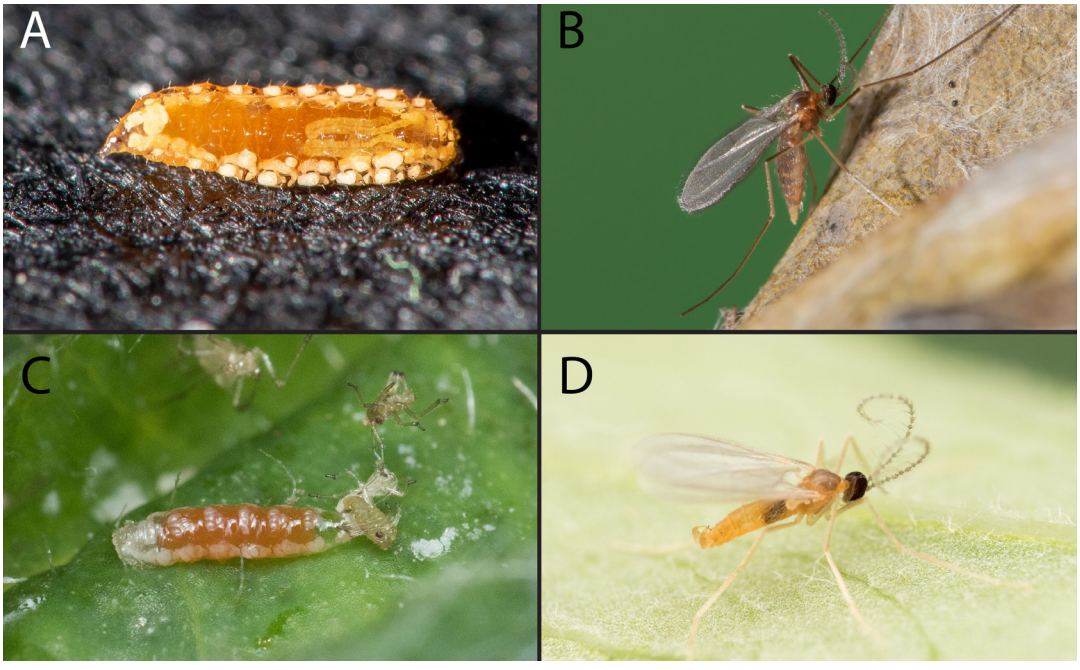

FIGURE 10. *Aphidoletes* spp. The members of this genus are free living predators on aphids. **A.** Larva of *Aphidoletes aphidimyza*. **B.** Female of *Aphidoletes aphidimyza*. **C.** Larva of *Aphidoletes urticaria* attacking and eating aphid. **D.** Male of *Aphidoletes urticaria*. Photos: T. Starholm (A, B), H. Elven (C, D).

on *Hieracium* section *Hieracium*, I, leg. ZF & AK, coll. NHMO; **AK**, Oslo: Ellingsrud, 59.932968°N 10.913741°E ± 10m, 21 August 2019, flowers of *Senecio viscosus*, L, leg. HE, BOLD: NHMO-ENT-548002, coll. NHMO; Lillestrøm: Lillestrøm, Åråsen, 59.966055°N 11.064616°E ± 10m, 22 June 2020, flowers of *Turritis glabra* with aphids, LMF, leg. TS, BOLD: NHMO-ENT-548044,548045,548250, coll. NHMO; 59.966010°N 11.064613°E ± 20m, 29 June 2020, flowers of *Turritis glabra* with aphids, L, leg. TS, BOLD: NHMO-ENT-548051, coll. NHMO; **HOY**, Bergen: Bergen, 60.393230°N 5.324500°E ± 2000m, 24 June 2019, on *Deschampsia cespitosa*, I, leg. ZF & AK, coll. NHMO.

Biology and notes: The orange-red larvae are free living predators on various species of aphids (Hemiptera: Aphidoidea). Often used as a biological control agent in greenhouses. Multivoltine; pupation and hibernation in the soil. As far as we have been able to track down, this species has not been officially reported from Norway before, although it is being sold commercially in Norway as a biological control agent (Brandsæter *et al*. 2006). The species is probably native to Norway, but the wild population today is probably a mix of native and introduced stock.

Distribution: Nearly cosmopolitan. Widespread in Europe including Norway, Sweden, Denmark and Finland.

*** *Aphidoletes urticaria* (Kieffer, 1895)**
(Figure 10 C–D)

Material: AK, Oslo: Malmøya, Solvik, 59.864711°N 10.751989°E ± 8m, 18 June 2020, leaves of *Hieracium* section *Hieracium* with aphids, 4L 2M, leg. HE & TS, coll. NHMO.

Biology: The orange-red larvae are free living predators on *Aphis urticata* Gmelin, 1790 and other species of aphids (Hemiptera: Aphidoidea). The species appears to have a narrower host range than the previous one and is encountered more rarely (Harris 1973). Multivoltine; pupation and hibernation in the soil.

Distribution: Western Palearctic, central Asia and USA. Widespread in Europe including Norway, Sweden and Finland.

TRIBE ASPHONDYLIINI

Genus *Asphondylia* Loew, 1850
This large genus includes 308 species, all of which are gallers on plants. Most species have symbiosis with fungi, which line the inside of the galls. Pupation usually in the gall.

*** *Asphondylia hornigi* Wachtl, 1881**
(Figure 11)

Material: TEI, Seljord: Heggeneset, 59.44055°N 8.78415°E ± 50m, 21 August 2019, L, leg. AF, BOLD: NHMO-ENT-548141, coll. NHMO; **VE,** Larvik: Ødegården, 59.01667°N 9.84546°E ± 10m, 12 August 2020, L, leg. AF, coll. Private; Færder: Gon, 59.10800°N 10.39609°E ± 10m, 15 September 2019, L, leg. AF, coll. Private; **AK**, Asker: Brønnøya, Brønnøyveien 39, 59.853206°N 10.533863°E ± 5m, 4 June 2021, I, leg. HE, coll. NHMO; Brønnøya, Furuholmsveien 33, 59.853191°N 10.526633°E ± 25m, 31 May 2020, MF, leg. HE & TS, BOLD: NHMO-ENT-548233, coll. NHMO; Bærum: Kalvøya, 59.885128°N 10.535102°E ± 20m, 23 April 2021, I, leg. HE, coll. NHMO; 59.884785°N 10.537552°E ± 10m, 23 April 2021, I, leg. HE, coll. NHMO; 59.883264°N 10.543218°E ± 10m, 23 April 2021, PI, leg. HE, coll. NHMO.

Biology and notes: The orange larvae develop singly in the swollen flowers of *Origanum vulgare* (Lamiaceae). The gall is lined with black mycelium on the inside. Univoltine; pupation and hibernation in the gall. We mostly obtained pupae and imagines from overwintered galls collected in the spring. One sample consisted of larvae collected from the galls in the autumn.

Distribution: Widespread in Europe and European part of Russia. In Fennoscandia only known from Norway.

*** *Asphondylia lathyri* Rübsaamen 1914**

Material: TEY, Porsgrunn: Eidanger, 59.117762°N 9.717960°E ± 50m, 16 June 2019, L, leg. HE, coll. NHMO; **AK**, Asker: Brønnøya, Brønnøyveien 23, 59.856305°N 10.533078°E ± 20m, 28 July 2021, P, leg. HE & SH, coll. NHMO; Oslo: Tøyen, Botanical Garden, 59.916840°N 10.768152°E ± 10m, 27 July 2021, P, leg. SH,

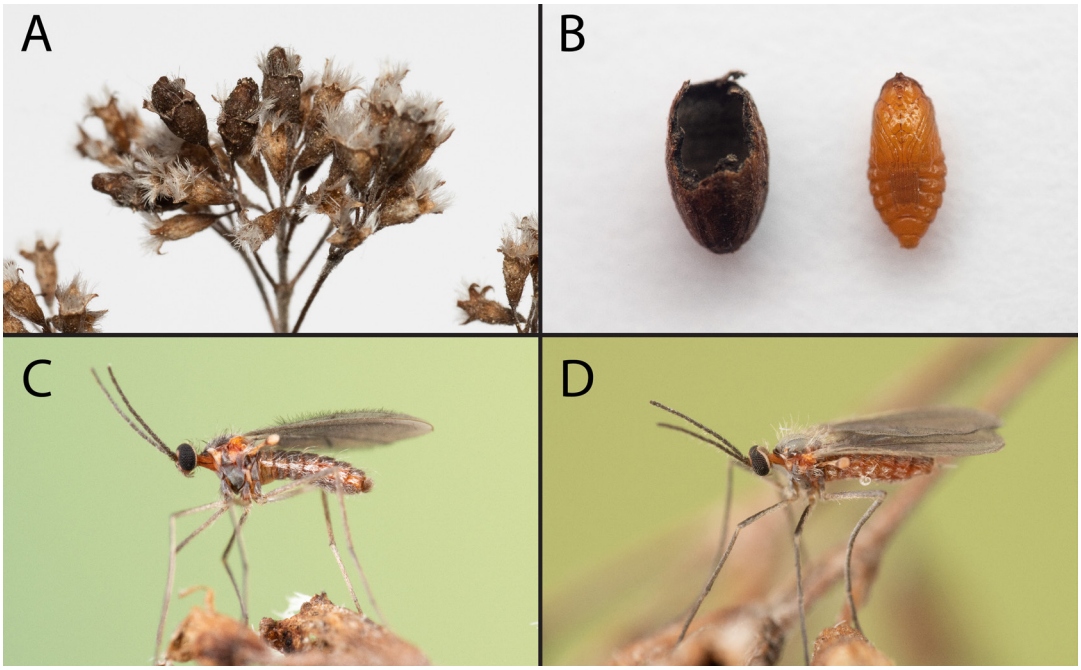

FIGURE 11. *Asphondylia hornigi*. **A.** Overwintered galls in flowers of *Origanum vulgare*. **B.** Opened gall and extracted pupa. **C.** Male. **D.** Female. Photos: H. Elven.

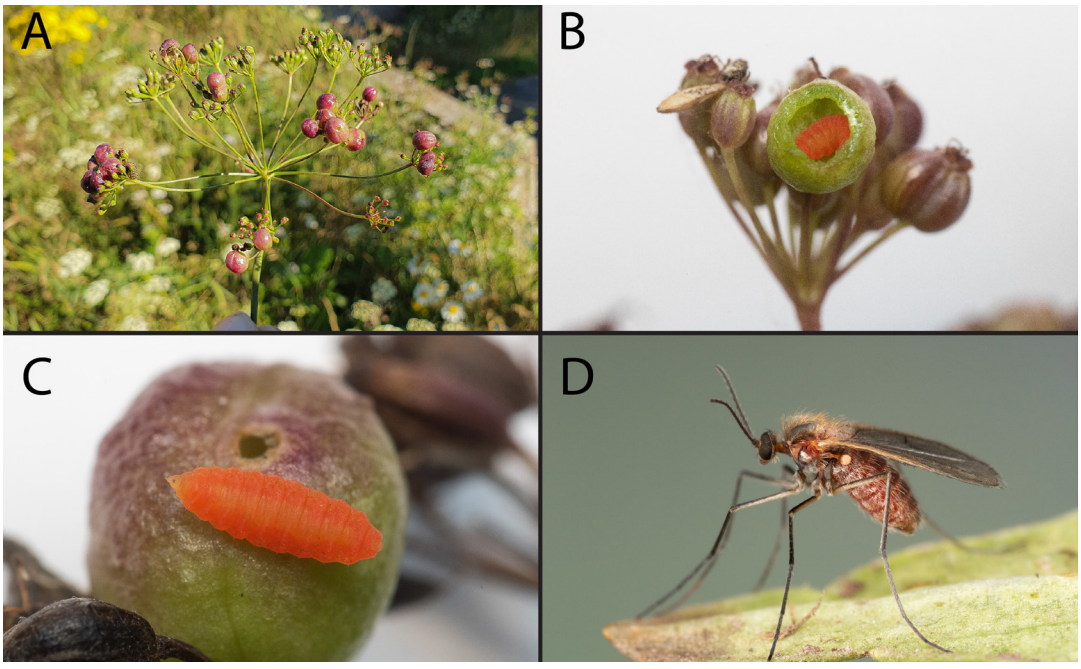

FIGURE 12. *Kiefferia pericarpiicola*. **A.** Galled fruits of *Pimpinella saxifraga*. **B.** Larva in opened gall. **C.** Larva. **D.** Female. Photos: T. Starholm (A), H. Elven (B, C, D).

coll. NHMO.

Biology: The yellow-orange larvae develop in the pods of *Lathyrus* spp. and *Vicia* spp. (Fabaceae). Our records are all from *Lathyrus pratensis*. A single larva occupies the base of the pod, which becomes swollen. The gall chamber is lined with mycelium on the inside. Pupation in the gall. Generally, bivoltine.

Distribution: Widespread in Europe including Norway and Denmark. Western Siberia.

**** Asphondylia sarothamni* (Loew, 1850)**

Material: TEY, Porsgrunn: Eidanger, 59.117762°N 9.717960°E ± 50m, 16 June 2019, bud galls on *Cytisus scoparius*, LPF, leg. SH & HE, BOLD: NHMO-ENT-548100, coll. NHMO.

Biology: The orange larvae develop on *Cytisus* spp. (Fabaceae) in two generations per year. The spring generation develops in a pear-shaped bud gall on the stem; the summer generation develops in the swollen base of a pod. Each gall contains a single larva. The galls are lined with mycelium on the inside. Pupation and hibernation in the gall.

Distribution: Widespread in Europe including Norway, Sweden and Denmark. Algeria.

Genus *Kiefferia* Mik, 1895

The genus includes only three species globally, two of which are restricted to east Asia and one which is widespread in the Palearctic. All three induce fruit galls on various species of Apiaceae. The genus was revised and a key to the species provided by Kim *et al*. (2019).

**** Kiefferia pericarpiicola* (Bremi, 1847)**

(Figure 12)

Material: VE, Larvik: Stavern, Rakke, 58.981108°N 10.025251°E ± 50m, 24 July 2021, L, leg. SH, coll. NHMO; Færder: Sandø S, 59.07196°N 10.46850°E ± 50m, 13 August 2019, L, leg. AF, BOLD: NHMO-ENT-548137, coll. NHMO; **Ø,** Hvaler: Asmaløy, 59.053665°N 10.948056°E ± 25m, 27 July 2020, I, leg. TS, coll. NHMO; Indre Østfold: Mysen, 59.543882°N 11.346328°E ± 50m, 4 August 2022, LF, leg. HE & OS, coll. NHMO.

Biology and notes: The brightly orange-red larvae develop one to three together in galled fruits on a broad range of Apiaceae. Our records are all from *Pimpinella saxifraga*. Infected fruits become greatly enlarged and often have purplish color. Considered univoltine. Pupation and hibernation in the soil. However, we have hatched imagines both before and after hibernation.

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland.

Genus *Placochela* Rübsaamen, 1916

The genus includes only two species and is restricted to the Palearctic. The species are gallers on several plant families.

**** Placochela nigripes* (Löw, 1877)**

(Figure 13)

Material: RI, Suldal: Nesflaten, 59.650602°N 6.814014°E ± 20m, 25 June 2022, on *Sambucus nigra*, LMF, leg. HE, coll. NHMO; **AK,** Oslo: Gressholmen, 59.884711°N 10.722197°E ± 300m, 26 June 2019, on *Ligustrum vulgare*, LMF, leg. HE, ZF & AK, BOLD: NHMO-ENT-548175, coll. NHMO; Ormøya, 59.875082°N 10.760985°E ± 6m, 18 June 2020, on *Sambucus nigra*, 1L, leg. HE & TS, coll. NHMO; 59.874716°N 10.759429°E ± 20m, 18 June 2020, on *Sambucus nigra*, 8L, leg. HE & TS, coll. NHMO.

Biology: The orange larvae develop gregariously in galled flowers of *Ligustrum vulgare* (Oleaceae), *Lonicera xylosteum* (Caprifoliaceae), *Sambucus ebulus and S. nigra* (Viburnaceae). Infected flowers are more or less swollen and do not open. Univoltine; hibernation in the soil. The species is redescribed in Tokuda *et al*. (2005).

Distribution: Widespread in Europe including Norway, Sweden and Denmark. Georgia.

Genus *Schizomyia* Kieffer, 1889

The genus includes 75 species globally. The members are gall makers on a great variety of plants. The females have characteristic, needle-like ovipositors (Figure 14 C). The genus is redescribed in Elsayed *et al*. (2018).

***Schizomyia galiorum* Kieffer, 1889**

(Figure 14)

Material: VE, Larvik: Skutebakken, 58.97265°N 9.88876°E ± 50m, 24 July 2019,

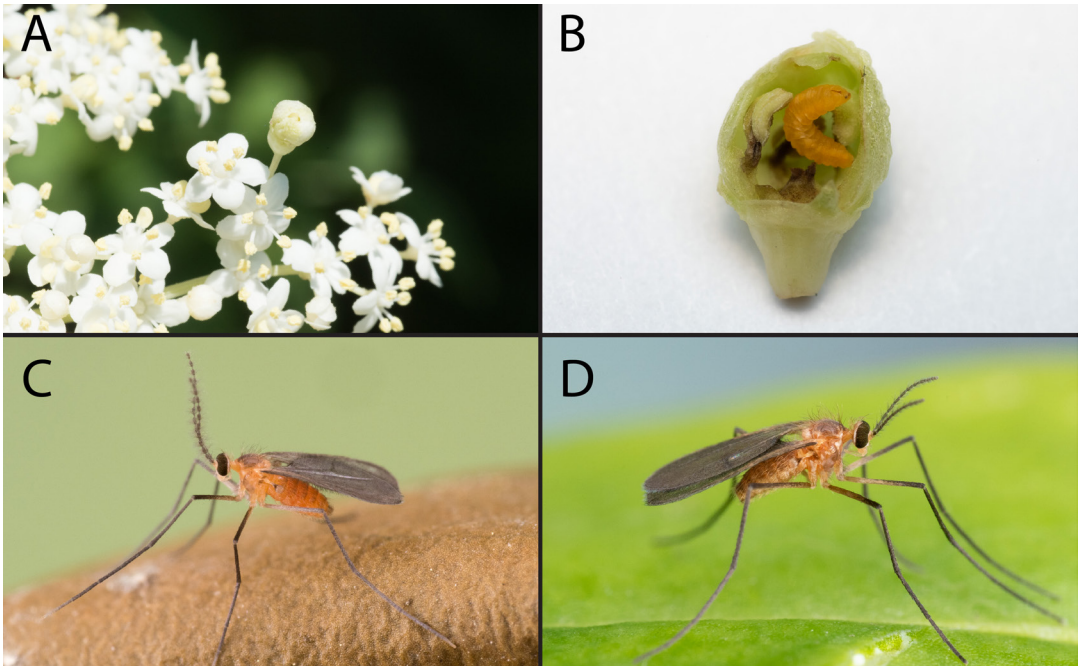

FIGURE 13. *Placochela nigripes*. **A.** Galled flower of *Sambucus nigra*. **B.** Opened gall with larva. **C.** Male hatched from *Ligustrum vulgare*. **D.** Female hatched from *Sambucus nigra*. Photos: H. Elven.

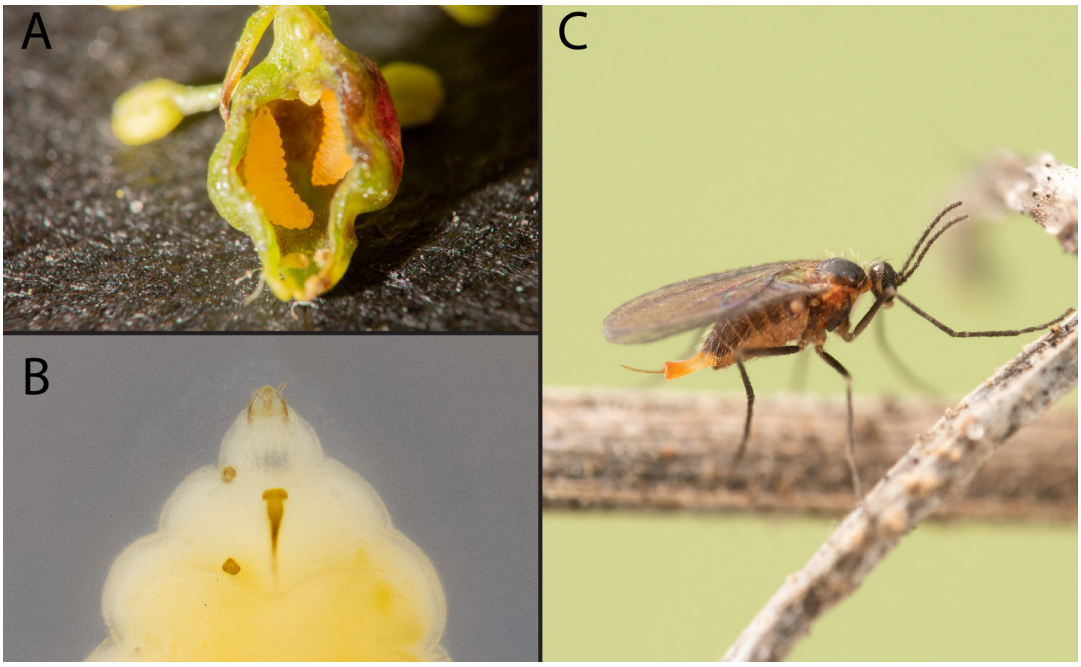

FIGURE 14. *Schizomyia galiorum*. **A.** Larvae in opened flower gall on *Galium verum*. **B.** Front of larva, ventral view. **C.** Female with characteristic, needle-like ovipositor typical of the genus. Photos: T. Starholm (A), H. Elven (B, C).

on *Galium verum*, 4L, leg. AF, BOLD: NHMO-ENT-548131, coll. NHMO; **AK,** Oslo: Sørkedalen, Finnerud, 60.031372°N 10.639183°E ± 150m, 12 August 2020, on *Galium album*, 2L, leg. HE, coll. NHMO; Bleikøya, 59.888634°N 10.736663°E ± 25m, 3 July 2020, on *Galium verum*, 1L, leg. TS & HE, BOLD: NHMO-ENT-548059, coll. NHMO; Rælingen: Årnestangen, 59.890131°N 11.103017°E ± 10m, 13 July 2020, on *Galium verum*, LMF, leg. TS, coll. NHMO; Lillestrøm: Fetsund, W of Jaer, 59.907832°N 11.159329°E ± 25m, 19 July 2020, on *Galium verum*, L, leg. TS, coll. NHMO; Ullensaker: Gardermoen, 60.1933889°N 11.0956111°E ± 40m, 23 July 2021, on *Galium mollugo*, 2L, leg. SH, coll. NHMO.

Biology and notes: Between one and three orange larvae develop in galled flowers of *Asperula* spp., *Cruciata* spp., *Galium* spp. and *Rubia* spp. (Rubiaceae). Infected flowers are strongly swollen and do not open. Bivoltine. Pupation may apparently take place in the gall or in the soil. We mostly collected larvae, but in one case (Årnestangen 2020) hatched imagines in the spring from a sample collected in July the previous summer. The species is redescribed in Fedotova (1997) and Elsayed *et al*. (2018).

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Algeria and Kazakhstan.

TRIBE CECIDOMYIINI

Genus *Anisostephus* Rübsaamen, 1917

The genus includes two species in the Palearctic region, both of which are parenchymal leaf gallers on *Betula* spp. The larvae resemble those of *Contarinia* Rondani, 1860, and like the latter can jump.

***Anisostephus betulinus* (Kieffer, 1889)**

(Figure 15)

Material: NSY, Meløy: Reipå, Fore, 66.903695°N 13.558062°E ± 600m, 20 July 2020, L, leg. HE, coll. NHMO; 7 July 2021, LMF, leg. HE, coll. NHMO; Gildeskål: Laksådalen, 66.944671°N 13.943290°E ± 20m, 25 July 2022, L, leg. HE, coll. NHMO; Inndyr, Høgfjelldalen,

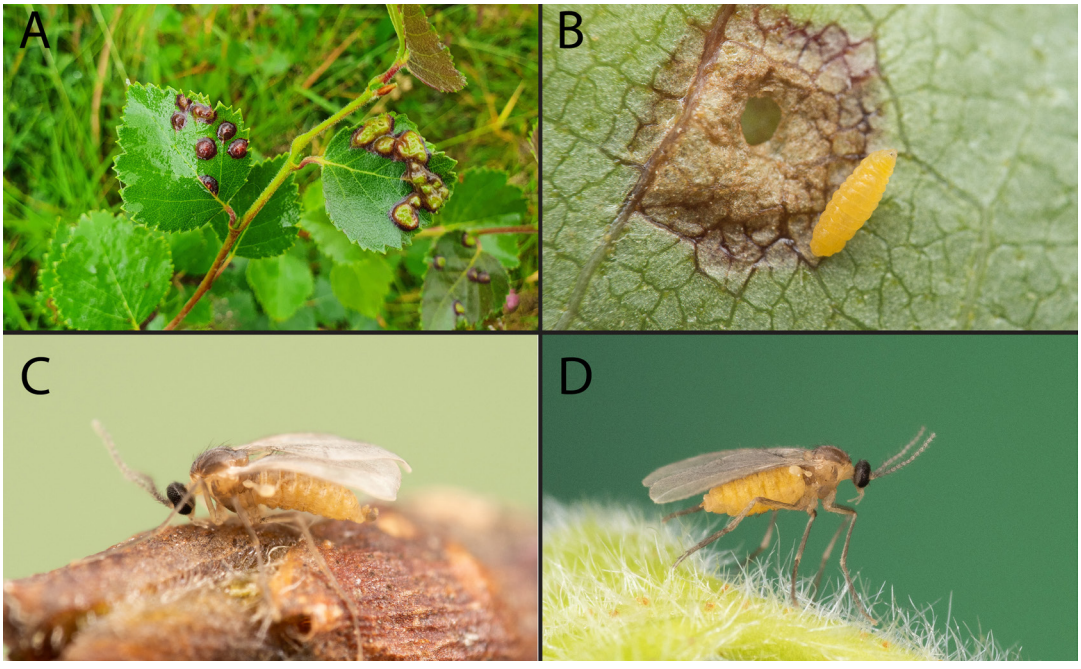

FIGURE 15. *Anisostephus betulinus*. **A.** Galls on *Betula pubescens*. **B.** Larva evacuating from gall. **C.** Male. **D.** Female. Photos: H. Elven.

67.046253°N 14.066552°E ± 100m, 21 July 2019, L, leg. HE, coll. NHMO; Gildeskål kirke, 67.059196°N 14.040487°E ± 200m, 16 July 2022, LI, leg. HE, coll. NHMO; Sund, Sundsvannet, 67.060049°N 14.066206°E ± 5m, 20 July 2019, L, leg. HE, coll. NHMO; Sund, Sundsfjellet, 67.060698°N 14.071423°E ± 3m, 18 July 2020, L, leg. HE, coll. NHMO; Breivika, Breivikdalen, 66.998670°N 14.245940°E ± 5m, 22 July 2020, L, leg. HE, coll. NHMO.

Biology: The white to yellow larvae cause round, parenchymal galls on leaves of *Betula pendula* and *B. pubescens* (Betulaceae). Our records are all from *Betula pubescens*. The galls are usually light green and ringed by red. Univoltine; pupation and hibernation in the soil. The species is redescribed in Askew & Ruse (1974).

Distribution: Widespread Palearctic. Widespread in Europe including Norway, Sweden, Denmark and Finland.

Genus *Contarinia* Rondani, 1860

This large genus includes 318 species globally, most of which develop in galled flowers or in leaf rolls. The larvae are generally capable of jumping. This trait is not unique to *Contarinia*, but it is a useful field trait for separating *Contarinia* larvae from those of e.g., *Dasineura* Rondani, 1840, *Jaapiella* Rübsaamen, 1915 or *Macrolabis* Kieffer, 1892, which are commonly found in similar situations, but which do not jump.

**** Contarinia anthobia* (Löw, 1877)**

Material: AK, Asker: Brønnøya, Sandbukta, 59.857474°N 10.529078°E ± 50m, 29 May 2019, on *Crataegus monogyna*, 4L, leg. HE, coll. NHMO; Oslo: Bogerud, 59.875899°N 10.841138°E ± 5m, 3 June 2020, on *Crataegus rhipidophylla*, 3L, leg. HE, coll. NHMO.

Biology: The white larvae live gregariously in the flower buds of *Crataegus* spp. (Rosaceae), which are swollen and remain closed. Univoltine; hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark. Western Asia.

**** Contarinia arrhenatheri* Kieffer, 1901**

Material: VE, Tønsberg: Tønsberg, 59.280057°N 10.432060°E ± 20m, 15 June 2019, 5L, leg. ZF & AK, coll. NHMO.

Biology: The yellow larvae develop in the flowers of *Arrhenatherum elatius* (Poaceae).

Distribution: Known from a few European countries including Norway and Denmark.

**** Contarinia artemisiae* Rübsaamen, 1917**

Material: AK, Oslo: Ellingsrud, 59.930777°N 10.921095°E ± 10m, 9 August 2019, L, leg. HE, BOLD: NHMO-ENT-547998, coll. NHMO.

Biology: The white to yellow larvae develop in the weakly swollen flowers of *Artemisia vulgaris*. Hibernation in the soil.

Distribution: Known from a few European countries. In Fennoscandia known only from Norway.

**** Contarinia barbichei* (Kieffer, 1890)**

Material: TEI, Seljord: Heggeneset, 59.44055°N 8.78415°E ± 50m, 21 August 2019, Shoot galls on Lotus pedunculatus, 8L, leg. AF, BOLD: NHMO-ENT-548142, coll. NHMO.

Biology: The white to pale yellow larvae live gregariously in galled shoots of *Lotus* spp. (Fabaceae). The topmost internodes are shortened, and the affected leaves thickened and rolled inwards. Multivoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark.

***Contarinia betulicola* (Kieffer, 1889)**

Material: Ø, Indre Østfold: Trøgstad, Gravstjern, 59.634371°N 11.334885°E ± 10m, 4 August 2022, 1L, leg. HE, coll. NHMO; **STI**, Røros: Røros, Granåsen, 62.600349°N 11.456955°E ± 50m, 28 July 2022, 5L, leg. HE, coll. NHMO; **NSY**, Meløy: Reipå, Fore, 66.903695°N 13.558062°E ± 600m, 7 July 2021, 2L, leg. HE, coll. NHMO; Gildeskål: Holmsundfjorden, Sandvikneset, 67.019439°N 14.249978°E ± 20m, 25 July 2020, 3L, leg. HE, coll. NHMO; Sund, Hestvikodden, 67.062185°N 14.089717°E ± 10m, 9 July 2021, 10L M F, leg. HE, coll. NHMO.

Biology: The white to yellow larvae develop in partly unfolded, young leaves at the tip of a shoot

on *Betula pendula* and *B. pubescens* (Betulaceae). Our records are all from *Betula pubescens*. Generally, univoltine. Pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark.

Contarinia campanulae (Kieffer, 1895)

Material: AK, Eidsvoll: SW of Dølihagan, 60.275411°N 11.292015°E ± 25m, 23 July 2020, on *Campanula rotundifolia*, 19L, leg. TS, coll. NHMO.

Biology: The white larvae develop gregariously in galled flowers of *Campanula* spp. (Campanulaceae). Infected flowers are strongly swollen at the base and remain closed. Assumed to be univoltine. Pupation and hibernation in the soil.

Distribution: Known from several European countries including Norway, Sweden and Denmark.

*** *Contarinia chrysanthemi* (Kieffer, 1895)**

Material: Ø, Marker: W of Søndre Røen, 59.547445°N 11.573004°E ± 50m, 4 July 2020, on *Leucanthemum vulgare*, MF, leg. TS, BOLD: NHMO-ENT-548085, coll. NHMO.

Biology: The yellowish larvae live between the achenes in the flowers of *Leucanthemum maximum* and *L. vulgare* (Asteraceae). Infected flowers are somewhat swollen and underdeveloped. Uni- or bivoltine. Pupation and hibernation in the soil.

Distribution: Known from a few European countries including Norway and Denmark. European part of Russia.

*** *Contarinia coryli* (Kaltenbach, 1859)**
(Figure 16)

Material: AK, Oslo: Ellingsrudåsen, 59.936046°N 10.918250°E ± 20m, 25 October 2019, L, leg. HE, BOLD: NHMO-ENT-548018, coll. NHMO; Ellingsrud, 59.931476°N 10.910720°E ± 20m, 6 September 2020, L, leg. HE, coll. NHMO; 59.935982°N 10.918300°E ± 30m, 10 September 2020, LMF, leg. HE, coll. NHMO.

Biology: The white larvae develop in the autumn in male catkins of *Corylus* spp.

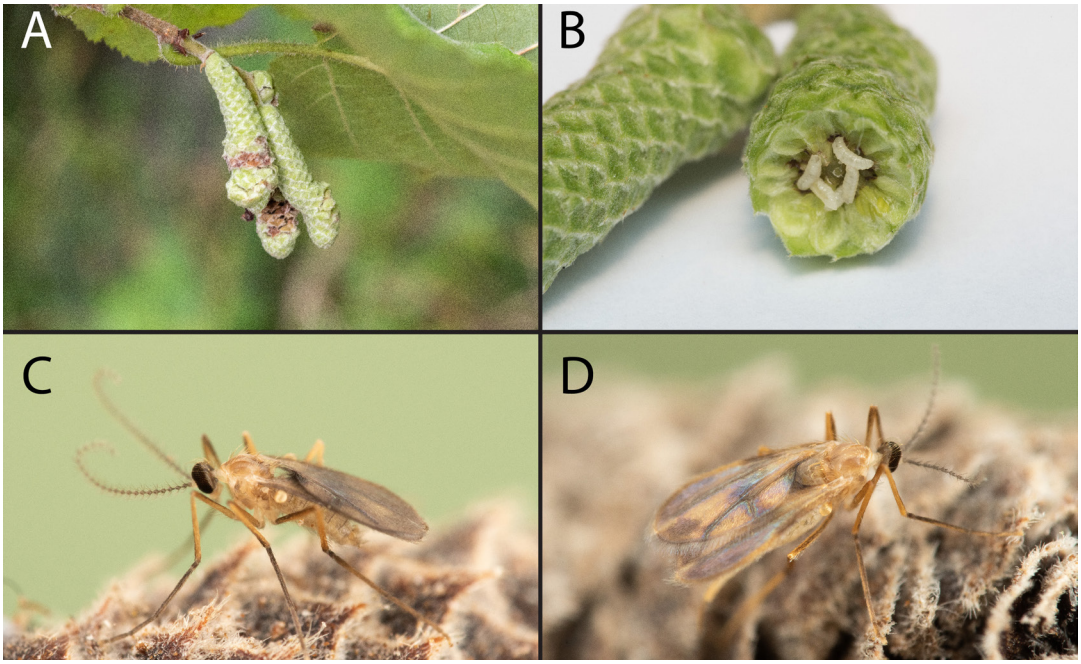

FIGURE 16. *Contarinia coryli*. **A.** Galled male catkins of *Corylus avellana*. **B.** Larvae in opened catkin. **C.** Male. **D.** Female. Photos: H. Elven.

(Betulaceae). Our records are all from *Corylus avellana*. Infected catkins become swollen and disfigured, and the scales turn brown at their bases. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland.

***Contarinia craccae* Loew, 1850**
(Figure 17)

Material: Ø, Hvaler: Skjelsbu, 59.097956°N 10.910847°E ± 25m, 27 July 2020, on *Vicia cracca*, L, leg. TS, coll. NHMO; **VE**, Larvik: Stavern, 58.992262°N 10.032930°E ± 250m, 23 July 2021, on *Vicia cracca*, L, leg. SH, coll. NHMO; **AK**, Asker: Brønnøya, Brønnøyveien 23, 59.856305°N 10.533078°E ± 20m, 28 July 2021, on *Vicia cracca*, L, leg. HE & SH, coll. NHMO; Oslo: Gressholmen, 59.885855°N 10.724669°E ± 20m, 1 July 2020, on *Vicia cracca*, LI, leg. HE, coll. NHMO; Ellingsrud, Munkebekken, 59.929051°N 10.915627°E ± 20m, 3 June 2019, on *Vicia sepium*, L, leg. HE, coll. NHMO; 59.933206°N 10.913415°E ± 20m, 2 July 2020, on *Vicia cracca*, LI, leg. HE, coll. NHMO; Lillestrøm: Fetsund, Jushaugen, 59.905892°N 11.149456°E ± 50m, 19 July 2020, on *Vicia cracca*, L, leg. TS, coll. NHMO; Eidsvoll: SW of Dølihagan, 60.275411°N 11.292015°E ± 25m, 23 July 2020, on *Vicia cracca*, 6l, leg. TS, coll. NHMO; **ON**, Sel: Nord-Sel, 61.848390°N 9.430970°E ± 4m, 13 July 2020, on *Vicia cracca*, LI, leg. HE, coll. NHMO.

Biology: The white to orange-yellow larvae develop in galled flower buds of different species of *Vicia*, primarily *V. cracca* (Fabaceae). Infected buds become strongly swollen and do not open. Uni- or bivoltine. Pupation and hibernation in the soil.

Distribution: Western Palearctic. Widespread in Europe including Norway, Sweden, Denmark and Finland.

*** *Contarinia dipsacearum* Rübsaamen, 1921**

Material: VE, Larvik: Stavern, Rakke, 58.985250°N 10.007056°E ± 300m, 24 July 2021, on *Knautia arvensis*, 3L, leg. SH, coll. NHMO.

Biology: The whitish to orange-yellow larvae

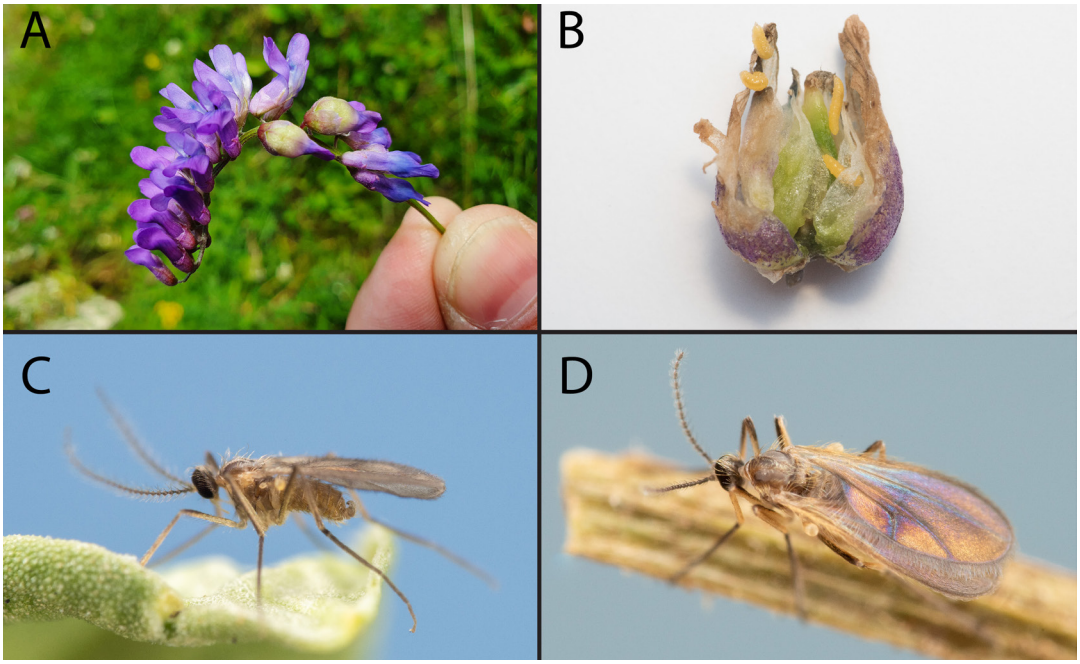

FIGURE 17. *Contarinia craccae*. **A.** Galled flowers of *Vicia cracca*. **B.** Opened gall with larvae. **C.** Male. **D.** Female. Photos: H. Elven.

develop in flower buds of *Knautia* spp. and *Succisa pratensis* (Caprifoliaceae). Infected buds are disfigured and remain closed. Pupation and hibernation in the soil.

Distribution: Known from a few European countries including Norway, Sweden and Denmark. European part of Russia.

**** Contarinia fagi* Rübsaamen, 1921**

Material: AK, Oslo: Blindern, 59.939755°N 10.718249°E ± 10m, 27 August 2019, LI, leg. HE, BOLD: NHMO-ENT-548208, coll. NHMO; 59.938950°N 10.720803°E ± 40m, 15 August 2022, LI, leg. HE, coll. NHMO; Sagene, Nordre gravlund, 59.936448°N 10.745104°E ± 80m, 15 August 2022, LI, leg. HE, coll. NHMO; Tøyen, Botanical Garden, 59.9194722°N 10.7705556°E ± 20m, 19 June 2019, L, leg. SH, BOLD: NHMO-ENT-548113, coll. NHMO.

Biology and notes: The yellowish white larvae develop in the opening leaf buds of *Fagus sylvatica* (Fagaceae), causing the young leaves to become crumpled and disfigured. Multivoltine; pupation and hibernation in the soil. In late summer, the species will often attack the fresh shoots on recently trimmed beech hedges.

Distribution: Widespread in Europe including Norway, Sweden and Denmark.

**** Contarinia festucae* Jones, 1940**

Material: TEY, Porsgrunn: Eidsberg, Olavsberget camping, 59.1111814°N 9.7121003°E ± 100m, 16 June 2019, on *Lolium arundinaceum*, L, leg. ZF & AK, coll. NHMO; **AK**, Lillestrøm: Lillestrøm, Åråsen, 59.966010°N 11.064613°E ± 20m, 29 June 2020, on *Lolium pratense*, L, leg. TS, BOLD: NHMO-ENT-548052, coll. NHMO.

Biology: The yellow larvae develop, often several together, in the florets of *Festuca rubra*, *Lolium arundinaceum and L. pratense* (Poaceae). They do not cause visible galling.

Distribution: Known from a few European countries including Norway and Sweden.

**** Contarinia floriperda* Rübsaamen, 1917**

Material: TEI, Seljord: Blika, 59.5914013°N 8.5615844°E ± 100m, 18 June 2019, L, leg. SH, BOLD: NHMO-ENT-548108, coll. NHMO; **AK**, Asker: Brønnøya, Ostsundveien plot 41/185, 59.866228°N 10.553876°E ± 3m, 3 June 2022, LF, leg. HE, coll. NHMO; Oslo: Ellingsrudåsen, 59.936246°N 10.918709°E ± 10m, 3 June 2019, L, leg. HE, coll. NHMO; 59.936246°N 10.918709°E ± 50m, 12 June 2019, L, leg. HE, coll. NHMO; **OS**, Gran: Bleiken, 60.463291°N 10.504599°E ± 5m, 12 June 2020, L, leg. HE, coll. NHMO; **TRI**, Storfjord: Skibotn, Okseneset, 69.384626°N 20.260924°E ± 300m, 6 July 2019, LM, leg. HE, coll. NHMO.

Biology: The whitish yellow larvae develop gregariously in galled flower buds of *Sorbus* spp. (Rosaceae). Our records are all from *Sorbus aucuparia*. Infected buds become enlarged and do not open. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark.

**** Contarinia gei* Kieffer, 1909**

Material: AK, Oslo: Ellingsrud, Munkebekken, 59.928899°N 10.914365°E ± 60m, 8 June 2019, on *Geum rivale*, 9L, leg. HE, coll. NHMO.

Biology: The white or reddish larvae develop on galled leaves of *Geum* spp. (Rosaceae). Infected leaves become somewhat creased or wrinkled, and the larvae live in the creases on the upper side of the leaf. Multivoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland.

**** Contarinia hypochoeridis* (Rübsaamen, 1891)**

Material: VE, Larvik: Mølen, 58.96799°N 9.85099°E ± 10m, 15 July 2020, on *Hypochaeris radicata*, L, leg. AF, coll. Private.

Biology: The pale yellow larvae live freely in the capitula of *Crepis biennis*, *Hypochaeris* spp. and *Leontodon crispus* (Asteraceae). Infected capitula become somewhat malformed. Bivoltine; pupation and hibernation in the soil.

Distribution: Northern Europe including Norway, Sweden and Denmark.

**** Contarinia jacobaeae (Loew, 1850)***

Material: BØ, Hole: Steinssletta,

60.101385°N 10.288779°E ± 25m, 8 August 2020, on *Jacobaea vulgaris*, L, leg. TS, coll. NHMO.

Biology: The yellowish white or yellow larvae develop gregariously in capitula and stems of *Jacobaea* spp. and *Senecio* spp. (Asteraceae). Infected capitula or stem parts become somewhat swollen and/or distorted. Bi- or multivoltine. Pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark.

*** *Contarinia lonicerearum* (Löw, 1877)**

Material: AK, Asker: Brønnøya, Sandbukta, 59.857474°N 10.529078°E ± 50m, 29 May 2019, L, leg. HE, coll. NHMO; 59.857474°N 10.529061°E ± 50m, 31 May 2020, L, leg. HE & TS, BOLD: NHMO-ENT-548021, coll. NHMO; Brønnøya, Viernveien plot 41/261, 59.861389°N 10.550686°E ± 6m, 29 May 2019, LMF, leg. HE, BOLD: NHMO-ENT-548168, coll. NHMO; Lillestrøm: Branderud, 59.982456°N 11.145206°E ± 10m, 8 June 2020, LF, leg. TS, BOLD: NHMO-ENT-548238, coll. NHMO.

Biology: The orange-yellow larvae develop gregariously in galled flower buds of *Lonicera* spp. (Caprifoliaceae) and possibly also *Viburnum* spp. (Viburnaceae). Our records are all from *Lonicera xylosteum*. Infected buds become strongly swollen and do not open. Probably univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Georgia.

***Contarinia loti* (De Geer, 1776)**

Material: TEY, Porsgrunn: Eidanger, 59.117762°N 9.717960°E ± 50m, 16 June 2019, LI, leg. HE, coll. NHMO; **VE,** Larvik: Kuøya, 59.97772°N 10.01702°E ± 10m, 9 August 2019, L, leg. AF, coll. Private; **AK,** Oslo: Ellingsrud, Munkebekken, 59.933206°N 10.913415°E ± 20m, 2 July 2020, LI, leg. HE, coll. NHMO; Lillestrøm: Fetsund, 59.922275°N 11.154989°E ± 25m, 6 July 2020, 5L, leg. TS, coll. NHMO; Leirsund, SW of Haugli, 59.998878°N 11.095266°E ± 10m, 6 July 2020, L, leg. TS, coll. NHMO; Gjerdrum: Fløtten, 60.030831°N 11.044011°E ± 50m, 25 June 2020, LI, leg. TS, coll. NHMO; Nannestad: Aurmoen, N of Langemyra, 60.243537°N 11.097273°E ± 7m, 7 July 2020, LI, leg. TS & HE, coll. NHMO; Granvoll, 60.223442°N 11.083782°E ± 3m, 7 July 2020, L, leg. TS, coll. NHMO; Eidsvoll: N of Dølihagan, 60.284616°N 11.292134°E ± 10m, 21 July 2020, 6L, leg. TS, coll. NHMO; SW of Dølihagan, 60.275411°N 11.292015°E ± 25m, 23 July 2020, L, leg. TS, coll. NHMO.

Biology: The white to yellow larvae develop gregariously in galled flower buds of *Lotus* spp. (Fabaceae). Our records are all from *Lotus corniculatus*. Infected buds become strongly swollen and reddish, and do not open. Bi- or multivoltine. Pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Georgia.

*** *Contarinia lysimachiae* (Rübsaamen, 1893)**

Material: AK, Oslo: Ellingsrudåsen, 59.936143°N 10.918381°E ± 10m, 7 August 2019, L, leg. HE, BOLD: NHMO-ENT-547989, coll. NHMO; Rælingen: Årnestangen, 59.893061°N 11.119756°E ± 50m, 13 July 2020, LI, leg. TS, coll. NHMO; Lillestrøm: Fetsund, W of Feta, 59.903160°N 11.151711°E ± 50m, 19 July 2020, L, leg. TS, coll. NHMO.

Biology: The yellowish larvae develop gregariously in galled flower buds of *Lysimachia vulgaris* (Primulaceae). Infected buds become somewhat swollen and do not open. Univoltine; pupation and hibernation in the soil.

Distribution: Known from a few European countries including Norway, Sweden and Denmark.

***Contarinia nasturtii* (Kieffer, 1888)**

Material: VE, Larvik: Gurvika, 58.96483°N 9.86307°E ± 50m, 18 August 2019, Galled flowers of *Raphanus raphanistrum*, L, leg. AF, BOLD: NHMO-ENT-548139, coll. NHMO.

Biology: The yellow larvae develop on a wide range of Brassicaceae. They develop gregariously either in the flower buds, which become strongly swollen and remain unopened, or in the terminal shoots, which then become swollen and shortened. Multivoltine; pupation and hibernation in the soil. The species is considered an economically significant pest.

Distribution: Widespread in Europe including

Norway, Sweden, Denmark and Finland. Asia and Northern Africa. Introduced to the Nearctic.

***Contarinia petioli* (Kieffer, 1898)**

Material: AAY, Tvedestrand: Askerøya, Kibbevik, 58.610887°N 9.077196°E ± 4m, 19 June 2021, L, leg. HE, coll. NHMO; **TEI,** Seljord: Blika, 59.5914013°N 8.5615844°E ± 100m, 18 June 2019, L, leg. SH, BOLD: NHMO-ENT-548107, coll. NHMO; **AK,** Asker: Brønnøya, Pilbogen plot 41/177, 59.853934°N 10.527666°E ± 3m, 31 May 2020, L, leg. HE & TS, coll. NHMO; Oslo: Ellingsrud, 59.932221°N 10.906987°E ± 6m, 6 June 2021, L, leg. HE, coll. NHMO; 59.936680°N 10.920363°E ± 50m, 17 June 2022, L, leg. HE, coll. NHMO; 59.929600°N 10.913064°E ± 200m, 19 June 2022, LM, leg. HE, coll. NHMO; Nannestad: Aurmoen, 60.243180°N 11.098261°E ± 500m, 7 July 2020, L, leg. HE & TS, coll. NHMO; **TRI,** Storfjord: Skibotndalen, Lullefjellet, 69.303553°N 20.440693°E ± 700m, 4 July 2019, L, leg. HE, coll. NHMO.

Biology: The bright orange larvae develop in roundish galls on the petioles and leaf bases of *Populus tremula*, rarely also on other *Populus* species (Salicaceae). Our records are all from *Populus tremula*. Each gall may contain a single or several larvae, each in a separate chamber. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland.

*** *Contarinia polygonati* Rübsaamen, 1921**

Material: AK, Asker: Brønnøya, Sandbukta, 59.857474°N 10.529078°E ± 50m, 29 May 2019, L, leg. HE, coll. NHMO; Brønnøya, Kalkovnfaret 3, 59.861092°N 10.537691°E ± 10m, 3 June 2022, LMF, leg. HE, coll. NHMO; Brønnøya, Vendelveien plot 41/180, 59.861711°N 10.542326°E ± 15m, 3 June 2022, L, leg. HE, coll. NHMO.

Biology and notes: The white larvae develop one or several together in galled flower buds of *Convallaria majalis* and *Polygonatum* spp. (Asparagaceae). Our records are all from *Convallaria majalis*. Infected buds do not open. Univoltine; pupation and hibernation in the soil. Note that there is some uncertainty regarding whether midges from *Convallaria* and *Polygonatum* belong to the same species. If they are not conspecific, our identification will need to be revised.

Distribution: Known from a few European countries including Norway, Sweden and Denmark. European part of Russia.

*** *Contarinia pruniflorum* Coutin & Rambier, 1955**

Material: AK, Asker: Brønnøya, Sandbukta, 59.857474°N 10.529078°E ± 50m, 13 May 2019, L, leg. HE, coll. NHMO; 11 May 2020, L, leg. HE, coll. NHMO.

Biology: The yellowish white larvae develop one or several together in galled flower buds of *Prunus* spp. (Rosaceae). Our records are from *P. spinosa*. Infected buds become slightly swollen and do not open properly. Univoltine; pupation and hibernation in the soil.

Distribution: Known from a few European countries including Norway. Turkey.

*** *Contarinia quercina* (Rübsaamen, 1890)**

Material: VE, Larvik: Aske, 58.994287°N 9.946649°E ± 450m, 25 July 2021, on *Quercus robur*, 5L, leg. SH, coll. NHMO.

Biology: The white to yellowish larvae develop gregariously in shoots of *Quercus* spp. (Fagaceae), causing an irregular rosette of malformed leaves. Bilvoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland.

***Contarinia quinquenotata* (F. Löw, 1888)**

Material: AK, Oslo: Tøyen, Botanical Garden, 59.918752°N 10.771581°E ± 20m, 24 June 2019, on *Hemerocallis lilioasphodelus*, LMF, leg. HE, coll. NHMO.

Biology and notes: The white to pale yellow larvae develop gregariously in galled flower buds of *Hemerocallis fulva* (Asphodelaceae). Our record is from *H. lilioasphodelus*, which represents a new host plant. Infected buds do not open and become swollen and disfigured. Univoltine; pupation and hibernation in the soil. This species is alien in our region. Skuhravá & Skuhravý (2012) first reported it from Norway

based on material collected from *Hemerocallis fulva* in Stjørdal i 2003.

Distribution: Native to Asia. Widespread in Europe including Norway, Sweden and Denmark. Introduced to New Zealand and the Nearctic.

***Contarinia rhamni* (Rübsaamen, 1892)**
(Figure 18 A–C)

Material: AAY, Tvedestrand: Risøya, 58.653734°N 9.150944°E ± 4m, 19 June 2021, on *Frangula alnus*, L1M leg. HE, coll. NHMO.

Biology and notes: The yellow larvae develop several together in galled flowers of *Frangula* spp. and *Rhamnus* spp. (Rhamnaceae). Infected flowers are swollen and do not open. Univoltine; pupation and hibernation in the soil. In the galls from Risøya we also found the inquiline *Dasineura frangulae* Rübsaamen, 1917 (Figure 18 D).

Distribution: Known from several European countries including Norway and Denmark. European part of Russia.

*** *Contarinia rubicola* Kieffer, 1909**

Material: VE, Larvik: Rakke, 58.98364°N 10.01791°E ± 50m, 21 June 2019, on *Rubus* sp., 5L, leg. AF, BOLD: NHMO-ENT-548122, coll. NHMO.

Biology: The yellowish white larvae develop gregariously in galled flowers of *Rubus caesius* and *R. fruticosus* (Rosaceae). Infected flowers become swollen and disfigured, and do not open properly. Uni- or bivoltine; pupation and hibernation in the soil.

Distribution: Known from several European countries including Norway, Sweden and Denmark. European part of Russia.

*** *Contarinia solani* (Rübsaamen, 1892)**

Material: VE, Færder: Hvasser, Jørestrand, 59.07151°N 10.45227°E ± 10m, 23 July 2019, L, leg. AF, coll. Private; Mågerø, 59.15244°N 10.43216°E ± 10m, 3 August 2019, L, leg. AF, coll. Private; Verdens Ende, 59.06008°N 10.40624°E ± 10m, 3 August 2019, L, leg. AF, coll. Private; Sandø, 59.08044°N 10.46967°E ± 10m, 13 August 2019, L, leg. AF, coll. Private; **AK,** Oslo: Bleikøya, 59.888620°N 10.735053°E ± 13m, 3 July 2020, L, leg. TS & HE, BOLD: NHMO-

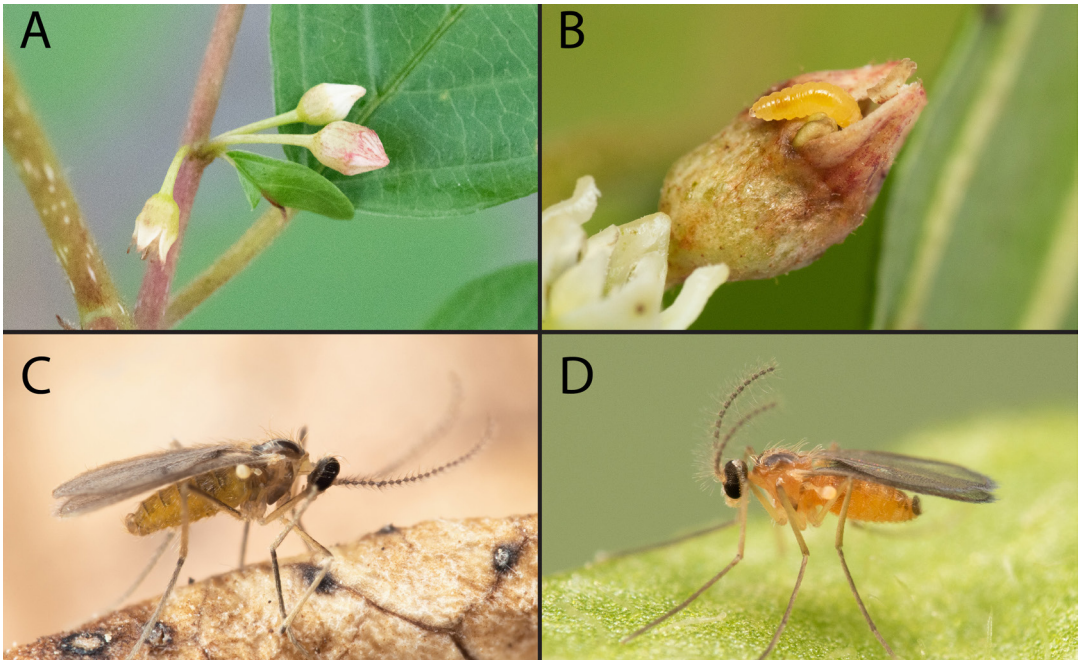

FIGURE 18. *Contarinia rhamni* and its inquiline *Dasineura frangulae*. **A.** Galled flower (middle) on *Frangula alnus*. **B.** Larva of *C. rhamni* leaving gall. **C.** *C. rhamni* male. **D.** *D. frangulae* male. Photos: H. Elven.

ENT-548056,548057, coll. NHMO; Tøyen, 59.9199444°N 10.7692222°E ± 20m, 20 June 2019, L, leg. SH, BOLD: NHMO-ENT-548114, coll. NHMO; 59.914641°N 10.774688°E ± 5m, 21 June 2019, LMF, leg. HE, coll. NHMO; 24 June 2019, LMF, leg. HE, coll. NHMO; 59.914964°N 10.774080°E ± 5m, 1 August 2019, LMF, leg. HE, BOLD: NHMO-ENT-547987,548193, coll. NHMO; 59.915106°N 10.774177°E ± 100m, 8 August 2022, LMF, leg. HE, coll. NHMO; Nordtvet, 59.952070°N 10.873853°E ± 50m, 27 August 2019, LMF, leg. ØE & HE, BOLD: NHMO-ENT-548210, coll. NHMO; Lillestrøm: Lillestrøm, Åråsen, 59.965601°N 11.064892°E ± 6m, 22 June 2020, LMF, leg. TS, BOLD: NHMO-ENT-548245, coll. NHMO; Fetsund, Jushaugen, 59.907037°N 11.154126°E ± 10m, 19 July 2020, L, leg. TS, coll. NHMO; Jørholmen, 59.891109°N 11.162462°E ± 200m, 22 June 2020, L, leg. TS, BOLD: NHMO-ENT-548038, coll. NHMO; Eidsvoll: Hunnsebettet, 60.316040°N 11.241388°E ± 10m, 25 June 2022, L, leg. TS, coll. NHMO.

Biology: The white larvae develop gregariously in galled flowers of *Solanum dulcamara* (Solanaceae). Infected flowers are strongly swollen and disfigured and remain closed. Multivoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark.

***Contarinia sorbi* Kieffer, 1896**

Material: TEY, Porsgrunn: Åsstranda, 59.0946592°N 9.647405°E ± 250m, 16 June 2019, 1L, leg. SH, BOLD: NHMO-ENT-548098, coll. NHMO; **AK,** Oslo: Ellingsrud, 59.930491°N 10.912346°E ± 50m, 19 June 2022, 5L, leg. HE, coll. NHMO.

Biology: The white larvae develop gregariously on galled leaves of *Sorbus* spp. (Rosaceae). Our records are from *Sorbus aucuparia*. Infected leaves are folded up along the midrib, forming a small fold in which the larvae live. Univoltine; pupation and hibernation in the soil.

Distribution: Known from several European countries including Norway, Sweden and Denmark.

***Contarinia steini* (Karsch, 1881)**

Material: VE, Færder: Hvasser, Krukehavn, 59.076776°N 10.452109°E ± 250m, 15 June 2019, on *Silene nutans*, LI, leg. ZF & AK, coll. NHMO; Larvik: Rakke, Fuglevikstranda, 58.979964°N 10.018505°E ± 5m, 24 July 2021, on *Silene latifolia*, L, leg. TS, coll. NHMO

Biology and notes: The whitish to yellow larvae develop gregariously in galled flowers of *Saponaria* spp. and *Silene* spp. (Caryophyllaceae). To our knowledge, *Silene nutans* represents a new host plant for this species. Infected flowers become swollen and do not open. Bivoltine; pupation and hibernation in the soil.

Distribution: Western Palearctic. Widespread in Europe including Norway, Sweden and Denmark.

***Contarinia tiliarum* (Kieffer, 1890)**

Material: AK, Bærum: Sandvika, 59.889952°N 10.527336°E ± 15m, 7 June 2021, on *Tilia cordata*, L, leg. HE, coll. NHMO; Oslo: Ellingsrud, Munkebekken, 59.932207°N 10.914771°E ± 10m, 30 June 2020, on *Tilia x europaea*, L, leg. HE, coll. NHMO; **NSI,** Vefsn: Mosjøen, Kippermoen, 65.832564°N 13.222950°E ± 10m, 27 July 2020, On *Tilia x europaea*, L, leg. HE, coll. NHMO.

Biology: The sulphur yellow larvae develop gregariously in roundish galls on the petioles of *Tilia* spp. (Malvaceae), to a lesser degree also on the leaves and young stems. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Eastern Russia and Japan.

**** Contarinia tremulae* Kieffer, 1909**

Material: TEI, Seljord: Blika, 59.591396°N 8.561577°E ± 100m, 18 June 2019, 6L, leg. HE, coll. NHMO.

Biology: The white larvae develop gregariously in leaf rolls on *Populus tremula* (Salicaceae). The leaf margin on one or both sides of the leaf is rolled upwards and is glabrous and somewhat irregular. Univoltine; pupation and hibernation in the soil.

Distribution: Known from a few European

countries including Norway and Sweden.

*** *Contarinia viburnorum* Kieffer, 1913**

Material: TEY, Porsgrunn: Åsstranda, 59.0946592°N 9.647405°E ± 250m, 16 June 2019, L, leg. SH, BOLD: NHMO-ENT-548099, coll. NHMO; **NSY,** Gildeskål: Sund, 67.073029°N 14.059955°E ± 5m, 20 July 2019, L, leg. HE, BOLD: NHMO-ENT-547977, coll. NHMO; 7 July 2021, L, leg. HE, coll. NHMO; 15 July 2022, L, leg. HE, coll. NHMO.

Biology: The white to sulphur yellow larvae develop gregariously in flowers of *Viburnum* spp. (Viburnaceae). Our records are all from *Viburnum opulus*. Infected flowers become swollen and do not open. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark.

Genus *Drisina* Giard, 1893

The genus includes a single species, which is restricted to and widespread in Europe.

*** *Drisina glutinosa* Giard, 1893** (Figure 19)

Material: AK, Oslo: Gressholmen, 59.883930°N 10.720102°E ± 50m, 1 July 2020, L, leg. HE, coll. NHMO; Bleikøya, 59.888567°N 10.735658°E ± 5m, 3 July 2020, L, leg. HE & TS, coll. NHMO; Lørenskog: Røykås, Mølla, 59.917868°N 10.917558°E ± 20m, 29 July 2021, L, leg. HE, coll. NHMO; 12 September 2021, L, leg. HE, coll. NHMO.

Biology and notes: The white to yellow larvae produce yellow blotch galls on the leaves of *Acer* spp. (Sapindaceae). Our records are from *A. platanoides*. Each larva hangs suspended in a drop of liquid in a shallow depression on the underside of the leaf. Univoltine; pupation and hibernation in the soil. The species is redescribed in Skuhravá & Skuhravý (1986).

Distribution: Widespread in Europe including Norway and Denmark.

Genus *Harmandiola* (Kieffer, 1896)

The genus includes 14 species globally, almost all of which are gallers on leaves of *Populus*. Seven species are known from Europe, and four from Norway. The galls are generally globular and situated on either side of the leaf. The larva exits the gall through a slit on the side of the leaf opposite to the gall. We have had very limited hatching success with this genus. One reason is that the galls fail to open once they are picked, which causes the larvae to be trapped inside. It is possible, however, to help the larvae out by cutting the galls carefully open with a scalpel. We have done this with some success.

***Harmandiola cavernosa* (Rübsaamen, 1899)** (Figure 20)

Material: AAY, Tvedestrand: Askerøya, Kibbevik, 58.610887°N 9.077196°E ± 4m, 19 June 2021, LPF, leg. HE, coll. NHMO; **TEY,** Porsgrunn: Eidsberg, Olavsberget camping, 59.1111814°N 9.7121003°E ± 100m, 16 June 2019, L, leg. SH, BOLD: NHMO-ENT-548095, coll. NHMO; **AK,** Asker: Brønnøya, Pilbogen plot 41/177, 59.853934°N 10.527666°E ± 3m, 31 May 2020, L, leg. HE & TS, coll. NHMO;

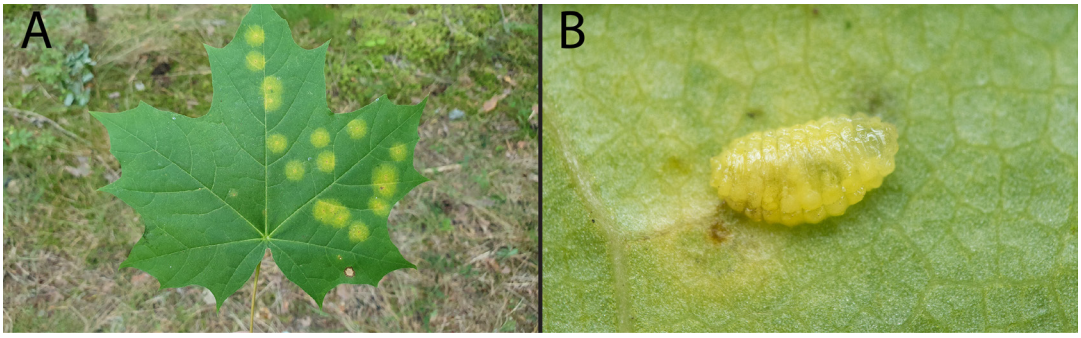

FIGURE 19. *Drisina glutinosa*. **A.** Galled leaf of *Acer platanoides*. **B.** Larva suspended under leaf. Photos: H. Elven.

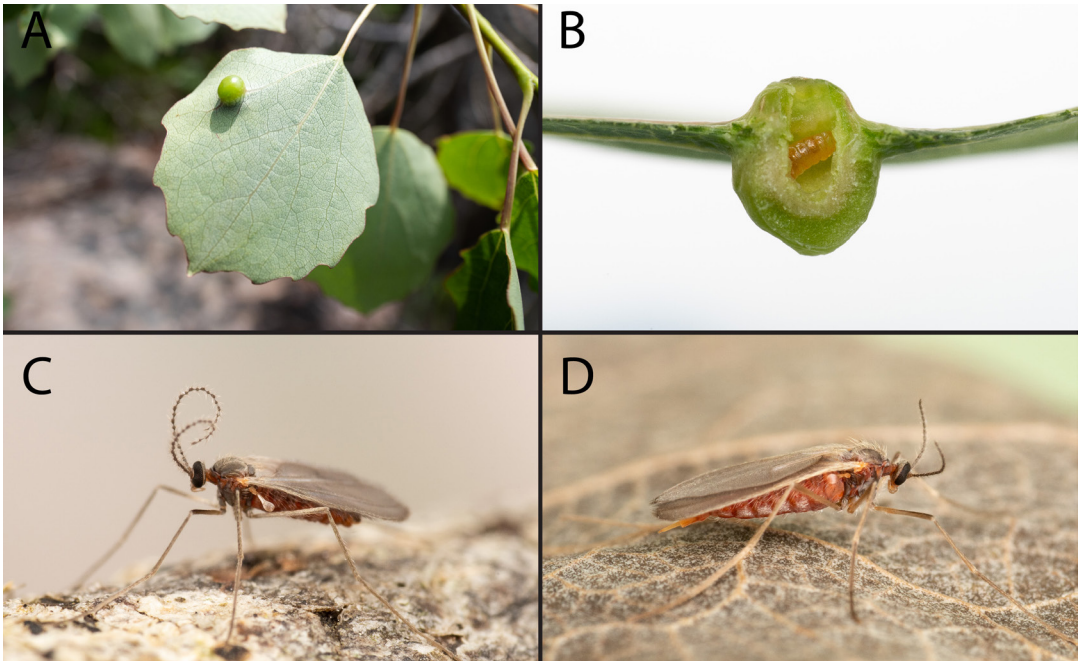

FIGURE 20. *Harmandiola cavernosa*. **A.** Galled leaf of *Populus tremula*. **B.** Larva in opened gall. **C.** Male. **D.** Female. Photos: H. Elven.

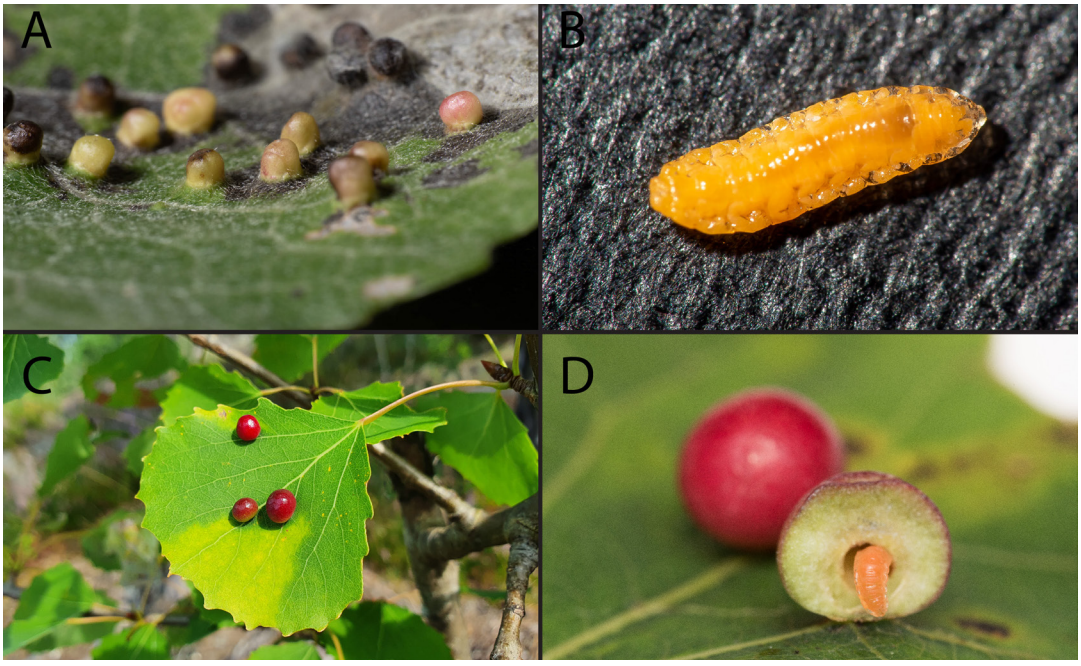

FIGURE 21. A–B. *Harmandiola globuli*. **A.** Leaf galls on *Populus tremula*. **B.** Larva. **C–D.** *Harmandiola tremulae*. **C.** Leaf galls on *Populus tremula*. **D.** Larva in opened gall. Photos: T. Starholm (A, B), H. Elven (C, D).

Oslo: Ellingsrud, 59.936680°N 10.920363°E ± 50m, 17 June 2022, L, leg. HE, coll. NHMO; **NSY,** Gildeskål: Sund, Sundsfjellet, 67.065054°N 14.063000°E ± 4m, 18 July 2020, L, leg. HE, coll. NHMO; Sund, Hestvikodden, 67.062185°N 14.089717°E ± 10m, 9 July 2021, LPMF, leg. HE, coll. NHMO.

Biology: The orange larvae develop in leaf galls on *Populus* spp. (Salicaceae). Our records are all from *P. tremula*. The gall is about 5 mm across, thick walled, and protrudes on both sides of the leaf but mainly on the underside. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Georgia, Kazakhstan and central Siberia.

***Harmandiola globuli* (Rübsaamen, 1889)**
(Figure 21 A–B)

Material: TEY, Porsgrunn: Eidsberg, Olavsberget camping, 59.1111814°N 9.7121003°E ± 100m, 16 June 2019, L, leg. SH, BOLD: NHMO-ENT-548096, coll. NHMO; **AK,** Asker: Brønnøya, Pilbogen plot 41/177, 59.853934°N 10.527666°E ± 3m, 31 May 2020, L, leg. HE & TS, coll. NHMO; Nannestad: Aurmoen, N of Langemyra, 60.243066°N 11.095815°E ± 5m, 7 July 2020, 6L, leg. TS & HE, coll. NHMO.

Biology: The orange larvae develop in leaf galls on *Populus* spp. (Salicaceae). Our records are all from *P. tremula*. The gall is up to about 3 mm across, thin walled, and situated on the upper side of the leaf. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Kazakhstan and central Siberia.

***Harmandiola populi* (Rübsaamen, 1917)**

Material: AK, Oslo: Gressholmen, 59.883657°N 10.719641°E ± 4m, 1 July 2020, on *Populus tremula*, L, leg. HE, coll. NHMO.

Biology: The orange larvae develop in leaf galls on *Populus alba* and *P. tremula* (Salicaceae). The gall is up to about 4 mm across, thin walled, and situated mainly on the underside of the leaf. Univoltine; pupation and hibernation in the soil.

Distribution: Known from several European countries including Norway and Sweden. Kazakhstan and central Siberia.

***Harmandiola tremulae* (Winnertz, 1853)**
(Figure 21 C–D)

Material: AK, Oslo: Ljanskollen, 59.839863°N 10.771831°E ± 250m, 9 August 2020, L, leg. HB & ØE, coll. NHMO; 59.838521°N 10.770813°E ± 400m, 30 July 2021, L, leg. HE, coll. NHMO; Romsås, Steinbruvannet, 59.970434°N 10.886088°E ± 20m, 5 September 2021, L, leg. HE, coll. NHMO; Eidsvoll: Dølihagen, 60.284598°N 11.292169°E ± 50m, 22 August 2020, L, leg. HE, coll. NHMO; N of Dølihagan, 60.284606°N 11.292188°E ± 50m, 15 August 2020, 4L, leg. TS, coll. NHMO; **NSY,** Gildeskål: Sund, Hestvikodden, 67.062185°N 14.089717°E ± 10m, 9 July 2021, L, leg. HE, coll. NHMO.

Biology: The orange-red larvae develop in leaf galls on *Populus alba*, *P. x canescens* and *P. tremula* (Salicaceae). Our records are all from *P. tremula*. The gall is up to about 6 mm across, ball shaped, thin walled, and situated on the upper side of the leaf. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Kazakhstan and parts of Russia.

Genus *Macrodiplosis* Kieffer, 1895

The genus includes 14 species, of which 9 live in the Nearctic and five in the Palearctic region. All species for which the biology is known are gallers on *Quercus* (Fagaceae).

***Macrodiplosis pustularis* (Bremi, 1847)**
(Figure 22)

Material: TEY, Nome: Ulefoss, Klovdal, 59.236580°N 9.378267°E ± 150m, 17 June 2019, L, leg. SH, BOLD: NHMO-ENT-548101,548103,548104, coll. NHMO; **VE,** Larvik: Stavern, Rakke, 58.980422°N 10.033271°E ± 5m, 18 June 2021, L, leg. HE & TS, coll. NHMO.

Biology: The larvae develop gregariously in leaf galls on *Quercus* spp. (Fagaceae). Our records are from *Quercus robur*. The leaf lobes are folded downwards and often miscolored yellowish green.

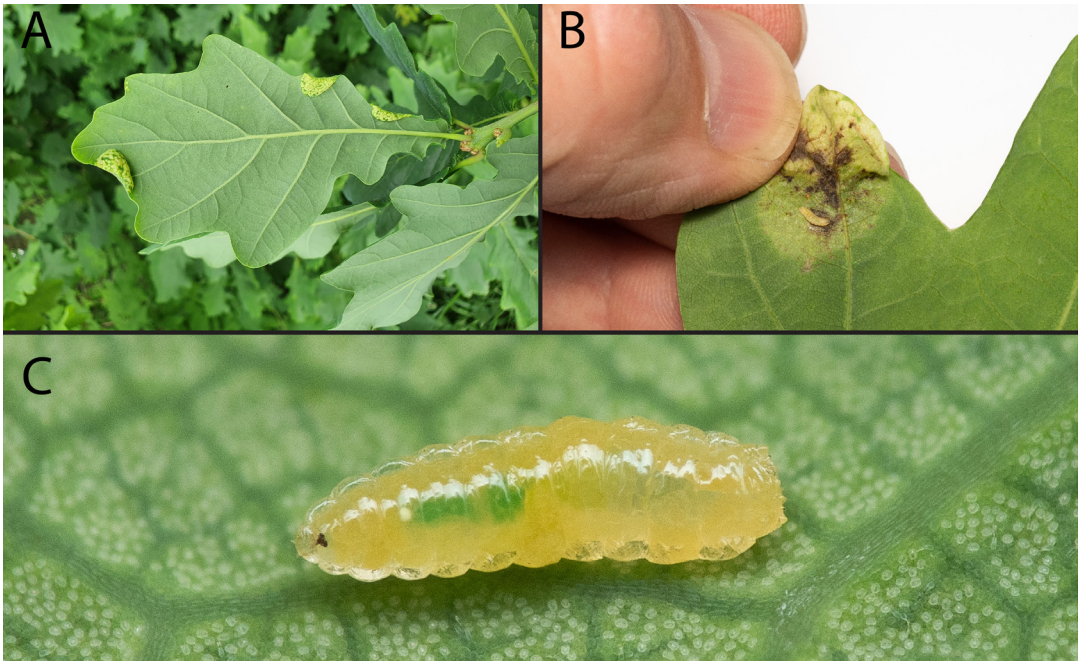

FIGURE 22. *Macrodiplosis pustularis*. **A.** Leaf galls on *Quercus robur*. **B.** Larva in opened gall. **C.** Larva. Photos: H. Elven.

The larvae are initially white, later dirty orange, and have green gut content. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland.

Genus *Xylodiplosis* Kieffer, 1895

The genus includes five species in the Holarctic and Oriental regions. At least three of the species develop in the xylem vessels of freshly cut or damaged hardwood trees. Material collected in southern Norway seems to belong to at least two, possibly three species, distinguishable by morphology, flight time, and/or DNA barcodes. Only one species is reported at this point, as the remaining material requires further study.

**** Xylodiplosis nigritarsis* (Zetterstedt, 1850)**
(Figure 23)

Material: VE, Færder: Mågerølia, 59.15097°N 10.43579°E ± 50m, 25 July 2019, ovipositing on *Quercus* sp. stump, F, leg. AF, coll. NHMO; Mågerø, Ødegården, 59.14901°N 10.42712°E ± 50m, 15 August 2019, Ovipositing on *Quercus* sp. stump, F, leg. AF, coll. NHMO; Mågerø, 59.15217°N 10.43257°E ± 10, 16 August 2019, Ovipositing on *Quercus robur* stump, F, leg. AF, coll. Private; Larvik: Rakke, 58.98286°N 10.02129°E ± 10m, 27 October 2022, Larvae leaving *Quercus robur* xylem, L, leg. AF, coll. Private.

Biology and notes: The very slender, yellowish white larvae develop in the xylem vessels of freshly cut stumps of *Fraxinus excelsior* (Oleaceae) and *Quercus* spp. (Fagaceae). Studies done in southern Norway indicate that the females hatch in May and seek out fresly cut trees to oviposit in the exposed vessel openings. The larvae develop over some 4–5 weeks before leaving the xylem, usually during a rainy period, to pupate in the ground. Several generations per year with ovipositing stretching into late autumn. The species was identified by the dark colour of the tarsi as well as the colour of the larvae.

Distribution: Known from a few European countries including Norway, Denmark and Finland.

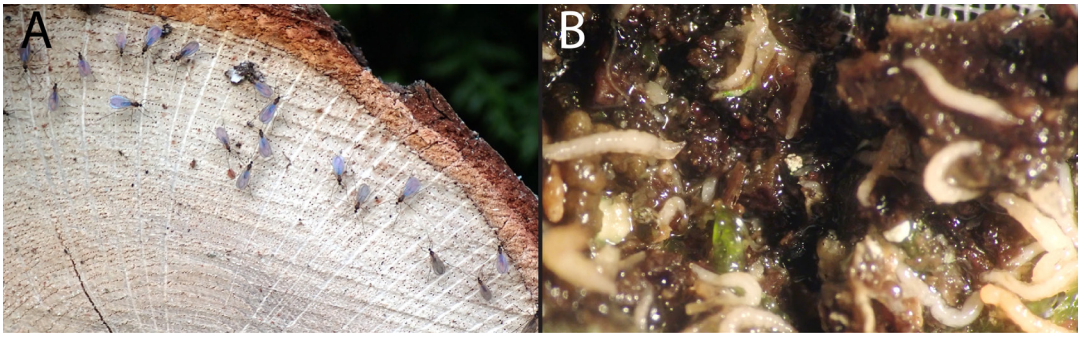

FIGURE 23. *Xylodiplosis nigritarsis*. **A.** Females ovipositing in *Quercus* stump. **B.** Mature larvae evacuated from the xylem. Photos: A. Fjellberg.

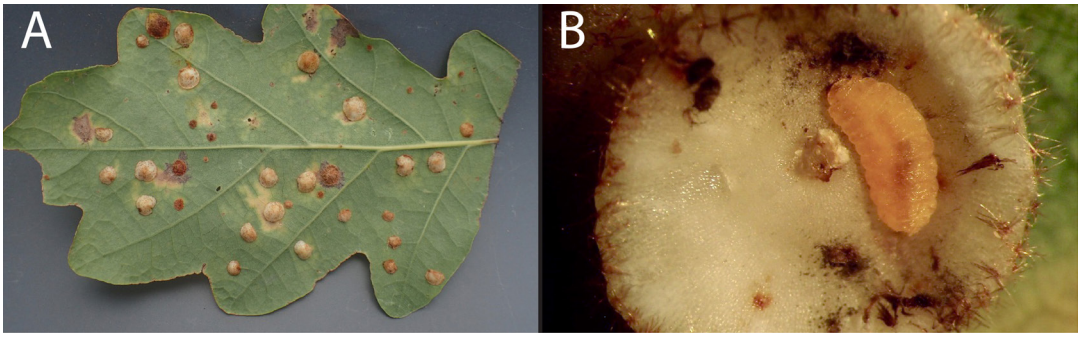

FIGURE 24. *Parallelodiplosis galliperda*. This species is an inquiline of *Neuroterus quercusbaccarum* (Hymenoptera, Cynipidae) on *Quercus* spp. **A.** Galls of the host on underside of *Quercus* leaf. **B.** Larva of *P. galliperda* on detached gall. The larvae hide in the narrow space between the disc-shaped host gall and the leaf. Photos: A. Fjellberg.

TRIBE CLINODIPLOSINI

Genus *Clinodiplosis* Kieffer, 1894

This large, cosmopolitan genus comprising 109 species contains both gall makers, mycophages, saprivores and some predators. Many *Clinodiplosis* species have been described from Europe, but Skuhravá (1973) synonymized most of these under the name *Clinodiplosis cilicrus* (Kieffer, 1889). Currently, only 13 species are recognized from Europe (Gagné & Jaschhof 2021), and many of these have dubious status. *Clinodiplosis cilicrus* in the current understanding is a widely distributed generalist which feeds on many sorts of decaying organic matter. It can be found in many different situations, such as wilting flowers, rotting nut shells and the vacated galls of other insects. According to Skuhravá & Skuhravý (2012), the species may also infect living plant tissue, causing it to die and to start decaying. We have collected *Clinodiplosis* from a range of different flowers (mostly of Asteraceae) and from various galls of other midges. Most of this material awaits examination, but DNA barcoding of ten specimens collected from the flowers of seven different plant species resulted in four distinct barcode clusters, indicating that there may yet be a complex of species hiding under the name *cilicrus*.

***Clinodiplosis cilicrus* (Kieffer, 1889)**

Material: AK, Oslo: Lindøya south, 59.888402°N 10.715293°E ± 4m, 4 April 2019, wilted flower stalks of *Centaurea jacea*, LMF, leg. HE, coll. NHMO; Gressholmen, 59.884464°N 10.721112°E ± 200m, 3 May 2019, wilted flower stalks of *Centaurea jacea*, L, leg. HE, coll. NHMO.

Biology and notes: The orange larvae live as saprophages on dead plant tissue. They can

be found in many different situations, including in wilting flowers and in the abandoned galls of other species. The two records reported here were identified based on the morphology of the larvae and/or the imagines, but see note on the genus on the challenges regarding *Clinodiplosis*. The species is redescribed in Skuhravá (1973).

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland.

Genus *Hyperdiplosis* Felt, 1908

The genus includes 11 species in the Holarctic and Oriental regions. It is assumed to be an artificial assemblage of unrelated species.

**** Hyperdiplosis bryanti* Felt, 1913**

Material: VE, Færder: Mågerø, 59.15231°N 10.43254°E ± 10m, 10 August 2021, Swarming around fresh *Quercus robur* stumps, 3M, leg. AF, coll. Private.

Biology: Nothing seems to be known about the biology of this species. Our specimens (three males) were captured in the evening, swarming around freshly cut oak stumps where also females of *Xylodiplosis* sp. were ovipositing. The species was identified based on the characteristic aedeagus, which is long and narrow with a three-forked apex (illustrated in Plakidas (2019) under the name *Hyperdiplosis acuminata*).

Distribution: UK, Germany, Norway and the USA. The species is possibly alien in Europe.

Genus *Parallelodiplosis* Rübsaamen, 1910.

The genus includes 20 species globally, some of which are independent gall makers whereas others are inquilines in the galls of insects from several different orders.

**** Parallelodiplosis galliperda* (F Löw, 1889)**

(Figure 24)

Material: VE, Færder: Saltbukta, Mågerø, 59.15258°N 10.43235°E ± 50m, 7 September 2019, 8L, leg. AF, BOLD: NHMO-ENT-548149, coll. NHMO; Moutmarka, 59.06872°N 10.39833°E ± 50m, 8 September 2019, 6L, leg. AF, BOLD: NHMO-ENT-548150,548151, coll. NHMO.

Biology: The yellow to orange larvae are inquilines in the leaf galls of the wasps *Neuroterus albipes* (Schenck, 1863) and *N. quercusbaccarum* (Linnaeus, 1758) (Hymenoptera: Cynipidae) on *Quercus petraea* and *Q. robur* (Fagaceae). Our records are from galls of *N. quercusbaccarum* on *Quercus* sp. The larvae live in the narrow space between the disc-shaped gall of the host and the lower surface of the leaf. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark.

TRIBE HORMOMYIINI

Genus *Planetella* Westwood, 1840

The genus includes 52 species globally. All are gallers on *Carex* or *Cyperus* (Cyperaceae). Our material and observations include at least five different species, but only two have so far been possible to assign a name to. The European species of *Planetella* were recently revised by Ševčík *et al*. (2023).

**** Planetella arenariae* (Rübsaamen, 1899)**

(Figure 25 A–B)

Material: VE, Færder: Sandø, 59.08434°N 10.46712°E ± 50m, 13 August 2019, on *Carex arenaria*, 4L, leg. AF, BOLD: NHMO-ENT-548138, coll. NHMO.

Biology: The larvae develop in small egg-shaped galls situated mostly underground on the root collar of *Carex* spp. (Cyperaceae). The plant above the gall site becomes stunted. Usually bivoltine. Pupation and hibernation in the gall.

Distribution: Widespread in Europe including Norway, Sweden and Denmark.

**** Planetella gallarum* (Rübsaamen, 1899)**

(Figure 25 C–D)

Material: TEY, Kragerø: Stråholmen, 58.89992°N 9.64763°E ± 20m, 26 September 2022, L, leg. AF, coll. Private; **VE,** Færder: Moutmarka, 59.06457°N 10.40060°E ± 20m, 28 September 2022, MF, leg. AF, coll. Private.

Biology: The white larvae develop in oblong, smooth, brown galls situated on the lower part of the stem or on the ground leaves of *Carex* spp. (Cyperaceae). Our records are from *Carex* cf.

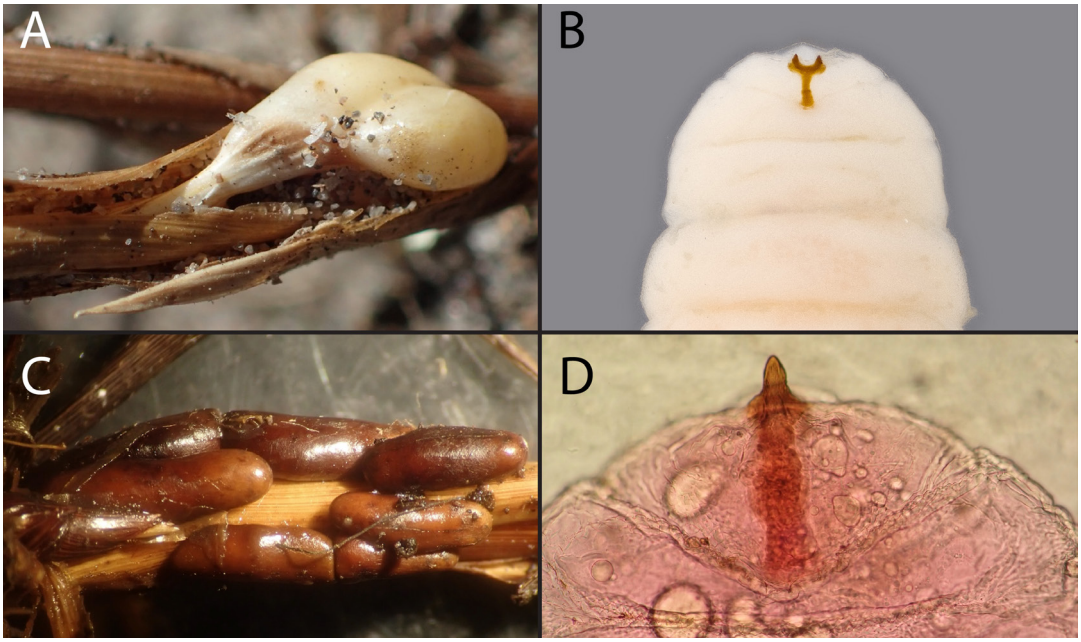

FIGURE 25. **A–B.** *Planetella arenariae*. **A.** Galls on root collar of *Carex arenaria*. **B.** Front of larva, ventral view, showing forked sternal spatula. **C–D.** *Planetella gallarum*. **C.** Galls on root collar of *Carex* cf. *nigra*. **D.** Front of larva, ventral view, showing single-toothed sternal spatula. Photos: A. Fjellberg (A, C, D), H. Elven (B).

nigra which grew in wet situation (pondside). Univoltine; pupation and hibernation in the gall.

Distribution: Known from several European countries including Norway and Denmark.

TRIBE LESTODIPLOSINI

Genus *Arthrocnodax* Rübsaamen, 1895

The genus includes 49 species globally. The members are among the smallest cecidomyiids. The larvae are predators, mostly on mites.

*** *Arthrocnodax coryligallarum* (Targioni-Tozzetti, 1887)**

Material: AK, Asker: Nesøya, Vendla, 59.860466°N 10.523555°E ± 4m, 13 May 2019, L, leg. HE, coll. NHMO; Brønnøya, Sandbukta, 59.857474°N 10.529078°E ± 50m, 13 May 2019, F, leg. HE, coll. NHMO; 29 May 2019, P, leg. HE, coll. NHMO.

Biology: The larvae are predators on the gall mite *Phytoptus avellanae* Nalepa, 1889 (Acari: Phytoptidae), which induces bud galls on *Corylus avellana* (Betulaceae). They develop in the galls of the host and pupate there in a white cocoon.

Distribution: Widespread in Europe including Norway and Denmark.

*** *Arthrocnodax fraxinellus* (Meade, 1888)**

(Figure 26)

Material: VE, Tønsberg: Sem, 59.28387°N 10.33223°E ± 10m, 24 February 2020, L, leg. AF, coll. Private; **AK,** Asker: Brønnøya, Pilodden plot 41/458, 59.854564°N 10.526731°E ± 3m, 2 April 2019, 1F, leg. HE, coll. NHMO; Oslo: Tøyen, Botanical Garden, 59.918494°N 10.769993°E ± 5m, 27 April 2017, M, leg. HE & AL, coll. NHMO; 16 October 2017, L, leg. HE, coll. NHMO.

Biology: The larvae are predators on the gall mite *Aceria fraxinivora* (Nalepa, 1909) (Acari: Eriophyidae), which induces galls on the female flower stalks of *Fraxinus excelsior* (Oleaceae). They develop in the galls of the host, hibernate there, and pupate there in the spring in a white cocoon.

Distribution: Only known from a few European countries including Norway and Denmark.

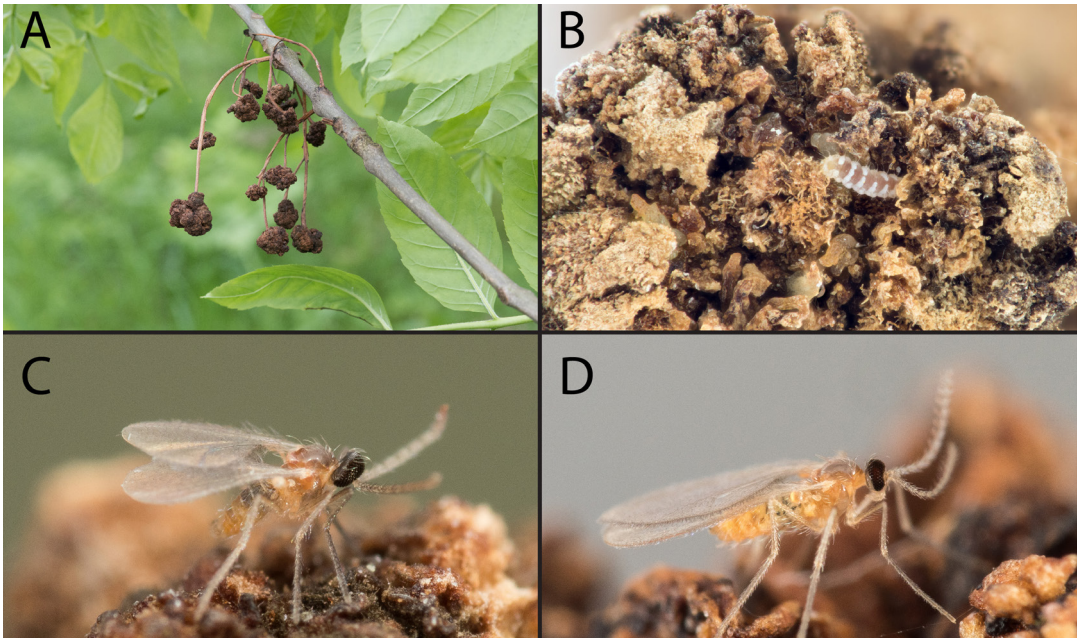

FIGURE 26. *Arthrocnodax fraxinellus*. This species is a predator of the gall mite *Aceria fraxinivora* on *Fraxinus excelsior*. **A.** Galls of the host mite. **B.** Larva in host gall. **C.** Male. **D.** Female. Photos: H. Elven.

Genus *Lestodiplosis* Kieffer, 1894

The genus includes 184 described species, but many of these are probably synonyms. The members are predators of other insects, mites, and, in one case, a millipede. Most species are predators of other gall midges. We have hatched *Lestodiplosis* from a range of other gall midge species, but most of this material awaits examination, and only three species are reported here based on host associations.

**** Lestodiplosis tarsonemi* Rübsaamen, 1895**

(Figure 27 A–B)

Material: AK, Asker: Sætrepollen, N of Grytnes, 59.678368°N 10.538581°E ± 50m, 31 October 2020, LI, leg. TS, coll. NHMO.

Biology and notes: The red, glabrous larvae are predators of the mite *Steneotarsonemus phragmitidis* (von Schlechtendal, 1898) (Acari: Tarsonemidae), which forms galls on *Phragmites australis* (Poaceae). Probably univoltine. The larvae in our case hibernated in the mite gall and pupated there in the spring. Several species of *Lestodiplosis* are associated with gallers on *Phragmites australis*. We have identified this species based on a clear association with the host mite. The larvae were numerous inside the galls of the mite (Figure 27 A).

Distribution: Known only from Netherlands, Germany and Norway.

**** Lestodiplosis vasta* (Möhn, 1955)**

(Figure 27 C)

Material: VE, Larvik: Rakke, 58.98361°N 10.01825°E ± 20m, 8 June 2021, L, leg. AF, coll. Private.

Biology and notes: This unique species is a predator of the millipede *Polyxenus lagurus* (Linnaeus, 1758) (Myriapoda). One to three red, glabrous midge larvae attach themselves to the millipede and suck nutrients from it (Möhn, 1955c). According to Skuhravá & Skuhravý (2021), the attacked millipede dies shortly after the attack. Multivoltine; pupation takes place directly on the prey according to Möhn (1955c). The species has been observed several places in Vestfold, infesting *P. lagurus* living under the bark on *Quercus robur*. We have attempted to hatch the

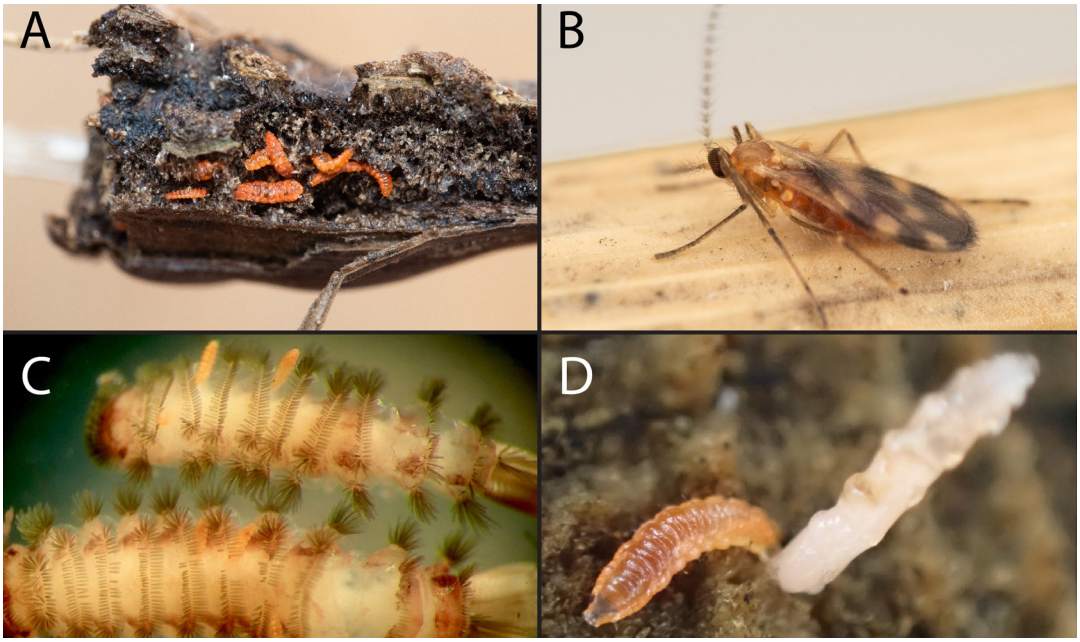

FIGURE 27. *Lestodiplosis* spp. The members of this genus are predators on various other arthropods. **A.** Larvae of *Lestodiplosis tarsonemi* in the opened gall of their host; the gall mite *Steneotarsonemus phragmitidis* in straw of *Phragmites australis*. **B.** Female of *Lestodiplosis tarsonemi*. **C.** Young larvae of *Lestodiplosis vasta* attached to the host *Polyxenus lagurus* (Myriapoda). **D.** Larva of *Lestodiplosis xylodiplosuga* (red) attached to a white larva of the host, *Xylodiplosis* sp. (Cecidomyiidae). Photos: H. Elven (A, B), A. Fjellberg (C, D).

adults, but so far without success.

Distribution: Known only from Germany and Norway.

*** *Lestodiplosis xylodiplosuga* Skuhravá, 2001**
(Figure 27 D)

Material: VE, Færder: Mågerø, 59.15244°N 10.43216°E ± 10m, 20 September 2021, *Quercus robur* stumps with *Xylodiplosis* sp. L, leg. AF, coll. Private.

Biology and notes: The red, glabrous larvae are predators of gall midges of the genus *Xylodiplosis*. The females oviposit on freshly cut stumps of *Fraxinus excelsior* (Oleaceae) and *Quercus* spp. (Fagaceae). The larvae seek out larvae of the host, which develop in the xylem vessels in the wood, and attach themselves to them to suck nutrients. Attacked larvae die within hours (Skuhravá & Dengler 2001). Bi- or multivoltine. The larvae are active throughout the winter.

Distribution: Known only from Germany and Norway.

CECIDOMYIIDI UNPLACED TO TRIBE

Genus *Massalongia* Kieffer, 1897
The genus includes six species in the Holarctic region, all of which are gallers on *Betula* (Betulaceae). The genus is revised in Elsayed *et al*. (2020).

***Massalongia rubra* (Kieffer, 1890)**
(Figure 28)

Material: NSY, Meløy: Reipå, Fore, 66.903695°N 13.558062°E ± 600m, 20 July 2020, L, leg. HE, coll. NHMO; Gildeskål: Inndyr, Holmvatnet, 67.046585°N 14.068125°E ± 13m, 18 July 2020, L, leg. HE, coll. NHMO; Gildeskål kirke, 67.059196°N 14.040487°E ± 200m, 21 July 2020, L, leg. HE, coll. NHMO; **FØ,** Sør-Varanger: Svanhovd, 69.45386°N 30.04046°E ± 10m, 18 August 2021, L, leg. AF, coll. Private.

Biology and notes: The initially white, later red larvae develop in the midrib or thicker side veins of leaves of *Betula pendula* and *B. pubescens*

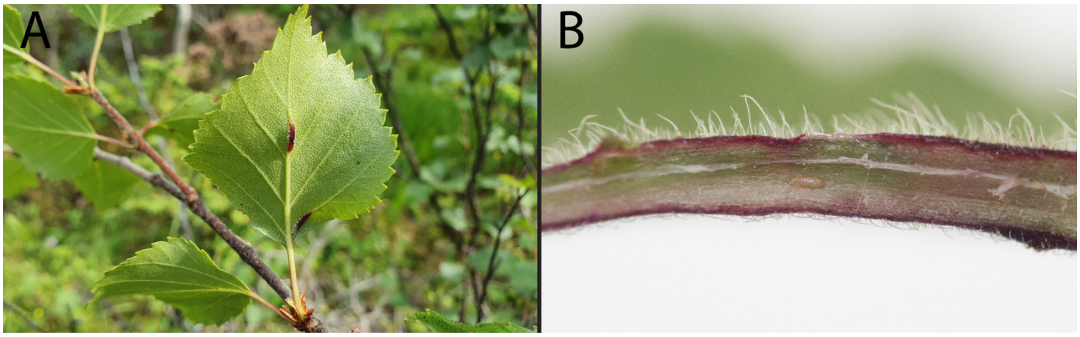

FIGURE 28. *Massalongia rubra*. **A.** Galled leaf of *Betula pubescens*. **B.** Opened gall with microscopic larva. Photos: H. Elven.

(Betulaceae). Our records are from *B. pubescens*. Infected veins are swollen on the underside of the leaf and miscolored red. Univoltine; pupation and hibernation in the soil. The species appears to be common in northern Norway but rather rare in the south. The species is redescribed in Elsayed *et al*. (2020).

Distribution: Western Palearctic. Widespread in Europe including Norway, Sweden, Denmark and Finland.

Genus *Monarthropalpus* Rübsaamen, 1892

The genus contains a single species, which is native to western Asia and southern Europe, but which has also been introduced to the rest of the Palearctic and the Nearctic. In Norway it has status as an introduced species.

*** *Monarthropalpus flavus* (Schrank, 1776)**

(Figure 29)

Material: AK, Oslo: Tøyen, Botanical Garden, 59.919524°N 10.770906°E ± 5m, 13 May 2020, L, leg. HE, coll. NHMO; 6 June 2020, PMF, leg. HE, coll. NHMO.

Biology and notes: The white to yellow larvae develop in leaves of *Buxus* spp. (Buxaceae). Our records are from *Buxus sempervirens*. Each larva forms a circular, blister-like, somewhat discolored mine in the leaf. Several mines may be fused together. Univoltine; hibernation as larva in the leaf, followed by pupation in the leaf in the spring. We have investigated a number of *Buxus sempervirens* in the wider Oslo area, but the species has so far only been found in the small hedge just outside the DNA lab in Robert Collett's house in the botanical garden in Oslo. It was first found there by Lars Ove Hansen, but his material awaits processing.

Distribution: Western Palearctic. Widespread in Europe including Norway, Sweden and Denmark. Introduced to USA. Although native to Europe, the species has most likely been introduced to Norway with plant import, and it is thus an alien species in Norway.

Genus *Monodiplosis* Rübsaamen, 1910.

The genus contains a single species, which is widespread in Europe. It is an inquiline in the galls of *Macrodiplosis* spp. on *Quercus* (Fagaceae).

*** *Monodiplosis liebeli* (Kieffer, 1889)**

(Figure 30)

Material: TEY, Nome: Ulefoss, Klovdal, 59.236580°N 9.378267°E ± 150m, 17 June 2019, L, leg. SH, BOLD: NHMO-ENT-548102, coll. NHMO; **VE,** Larvik: Stavern, Rakke, 58.980422°N 10.033271°E ± 5m, 18 June 2021, 2L3F, leg. HE & TS, coll. NHMO.

Biology: The pale orange larvae live as inquilines in the galls of *Macrodiplosis pustularis* and *M. roboris* on the leaves of *Quercus petraea* and *Q. robur* (Fagaceae). Our records are from the galls of *M. pustularis* on *Q. robur*. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark.

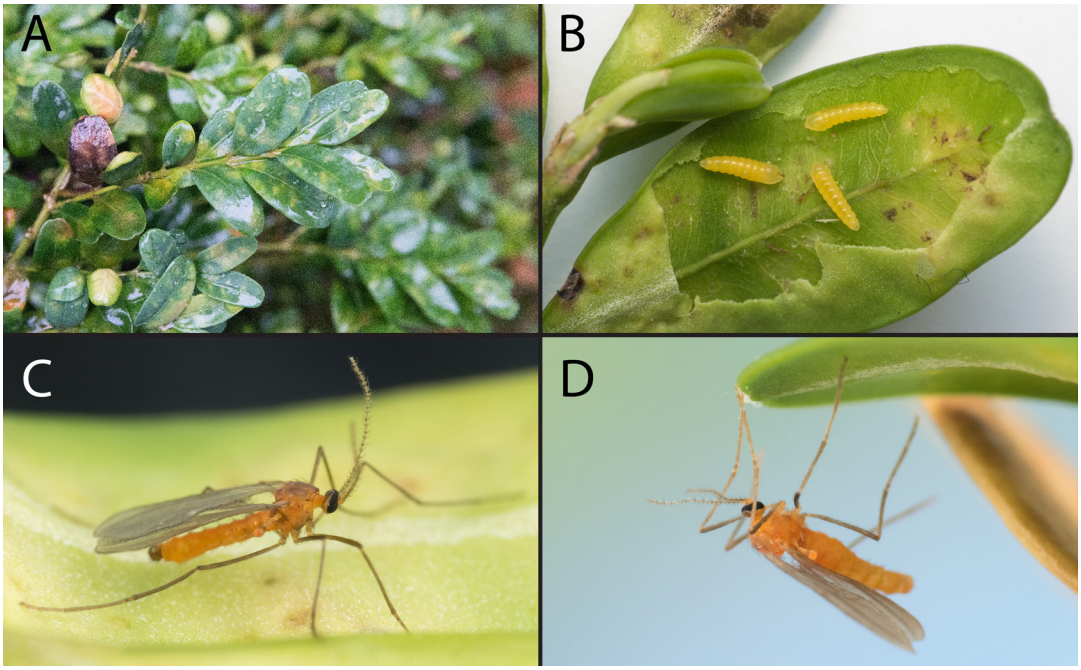

FIGURE 29. *Monarthropalpus flavus*. This is an alien species in our fauna. **A.** Galled leaves of *Buxus sempervirens*. **B.** Larvae in opened leaf. **C.** Male. **D.** Female. Photos: H. Elven.

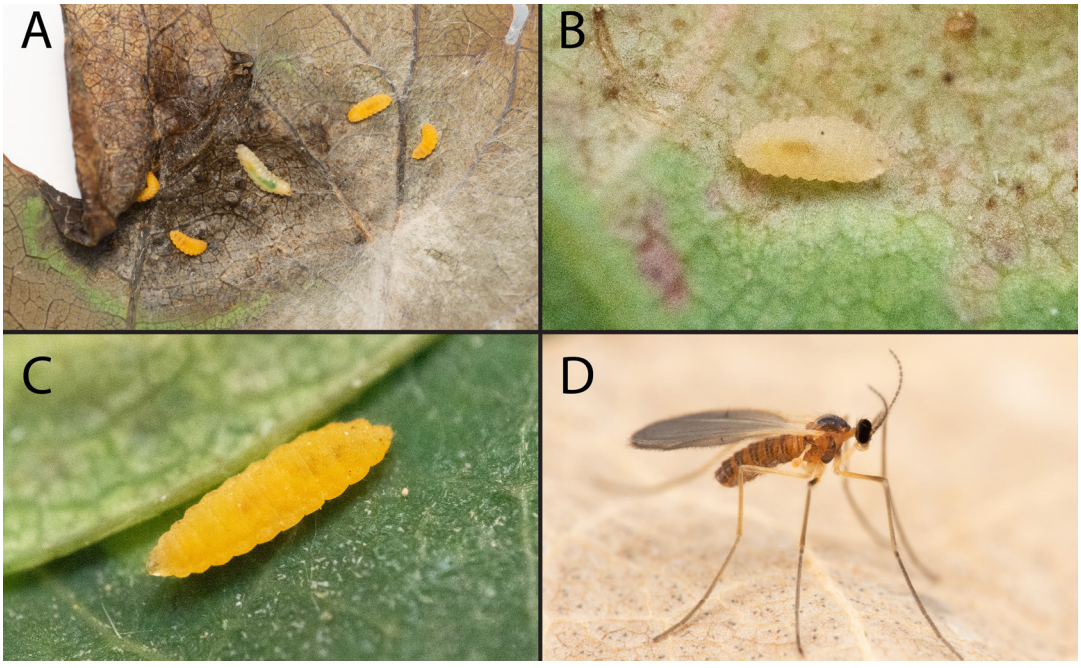

FIGURE 30. *Monodiplosis liebeli*. This species is an inquiline in the galls of *Macrodiplosis* spp. on *Quercus* spp. **A.** Larvae in the opened gall of *Macrodiplosis pustularis* on *Quercus robur*. The larger larva with green gut content belongs to the host. **B.** Immature larva. **C.** Mature larva. **D.** Female. Photos: H. Elven.

Genus *Mycocecis* Edwards, 1922

The genus contains a single species with European distribution. It is a fungivore, and it is one of very few known examples of a gall midge making what can be described as a gall on fungi.

**** Mycocecis ovalis* Edwards, 1922**

(Figure 31)

Material: VE, Færder: Mågerø, 59.15511°N 10.43520°E ± 10m, 9 April 2022, *Fraxinus excelsior* log with *Hypoxylon* sp. L, leg. AF, coll. Private; **AK,** Asker: Slemmestad, Bøsnipa, 59.769351°N 10.468419°E ± 100m, 15 May 2012, Dead *Corylus avellana* log with *Hypoxylon rubiginosum*, 5L, leg. BN, coll. NHMO; **NTY,** Indre Fosen: Hasselvika, Junkeren, 63.630692°N 9.823644°E ± 50m, 15 September 2020, Rotten log with fungus, LPMF, leg. JW, BOLD: NHMO-ENT-548162, coll. NHMO.

Biology and notes: The white larvae develop on the fungus *Hypoxylon rubiginosum* (Ascomycota: Hypoxylaceae) on rotting logs of various deciduous trees. Each larva develops in an oval chamber made presumably of a mixture of fungal hyphae, frass and silk. The larva hibernates in the chamber and pupates there in the spring. The adult midge emerges by pushing against the cap of the chamber, which will often open like a hinged lid. This species has been encountered in Norway from time to time by mycologists but has not been officially reported from Norway until now. Here we report three records from 2012, 2020 and 2022 respectively. From one of the samples, which was collected in the autumn, we succeeded in hatching adults in the following spring. DNA barcoding was attempted on one adult specimen from this sample, but without success. The species is reviewed in Evans (1970) and Spooner (2010).

Distribution: Known from a few European countries including Norway, Sweden and Denmark. European part of Russia.

Genus *Tricholaba* Rübsaamen, 1917

The genus includes five species in the Palearctic region. All species are associated with Fabaceae. The larvae develop either in galled leaves or galled flowers. Some species are independent gall makers, some are inquilines in the galls of

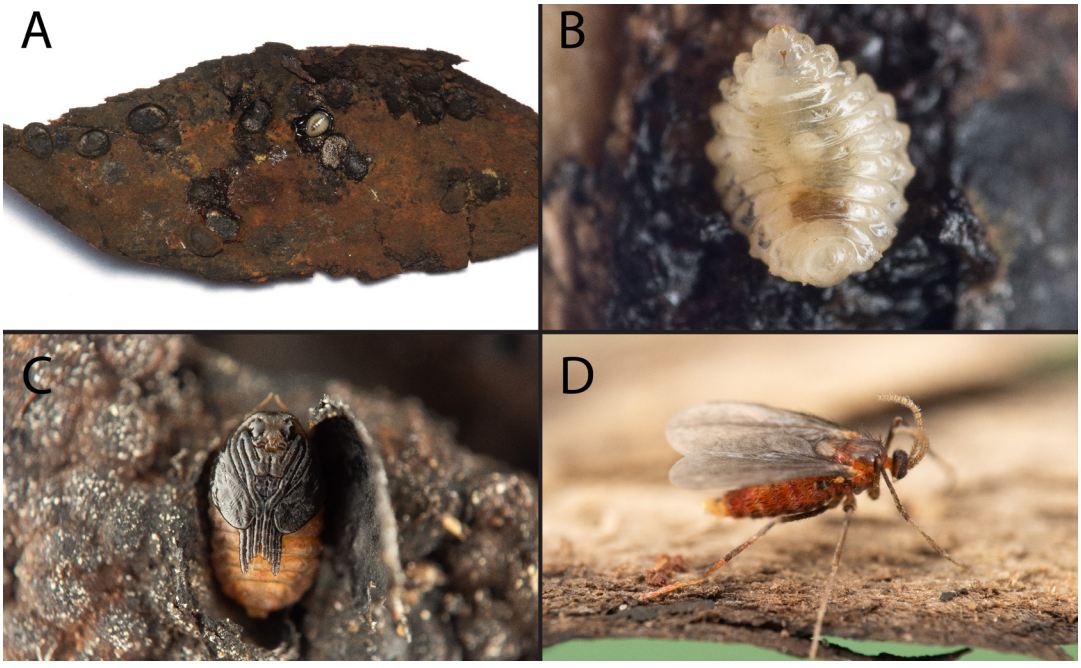

FIGURE 31. *Mycocecis ovalis*. This is one of very few gall midges that make something qualifying as galls on fungi. **A.** Galls on fungus-infected piece of wood. **B.** Larva. **C.** Pupa in partly opened gall. **D.** Female. Photos: H. Elven.

Dasineura spp., and some appear to be able to act both as independent gall makers and as inquilines. The larvae can make weak jumps. We have collected *Tricholaba* from leaf and flower galls from various species of *Vicia*, *Trifolium*, *Lathyrus* and *Astragalus*. Most of this material requires further study, but two species are reported here.

*** *Tricholaba trifolii* Rübsaamen, 1917**
(Figure 32)

Material: VE, Larvik: Stavernshallen, 58.991849°N 10.027331°E ± 5m, 23 July 2021, leaf galls on *Trifolium repens*, 5L, leg. TS, coll. NHMO; **Ø,** Marker: W of Søndre Røen, 59.547190°N 11.575940°E ± 3m, 6 August 2021, leaf galls on *Trifolium pratense*, L, leg. TS, coll. NHMO; **AK,** Oslo: Blindern, 59.940044°N 10.717459°E ± 10m, 15 September 2020, leaf galls on *Trifolium pratense*, LMF, leg. HE, coll. NHMO; Tøyen, Botanical Garden, 59.916840°N 10.768152°E ± 10m, 27 July 2021, leaf galls on *Trifolium pratense*, L, leg. HE & SH, coll. NHMO; Ellingsrud, 59.932462°N 10.920727°E ± 5m, 10 September 2022, galls of *Dasineura trifolii* on leaves of *Trifolium repens*, L, leg. HE, coll. NHMO; 59.932163°N 10.920907°E ± 10m, 12 September 2022, leaf galls on *Trifolium pratense*, L, leg. HE, coll. NHMO; Ullensaker: Gardermoen, 60.1933889°N 11.0956111°E ± 40m, 23 July 2021, leaf galls on *Trifolium pratense*, L, leg. SH, coll. NHMO.

Biology and notes: The yellow to pale orange larvae develop on *Trifolium medium*, *T. pratense* and *T. repens* (Fabaceae). The species, as currently understood, has several different modes of attack. It may develop either in the capitula or in galled leaflets. In the latter case, the species may either make galls of its own or it may live as an inquiline in the galls of *Dasineura trifolii* (F. Löw, 1874). In both cases, the gall consists of a leaflet folded up over the midrib, with the larvae living in the fold. If the galler is *Dasineura trifolii*, the galled leaflet is weakly inflated near the midrib to form a shallow pouch. If the galler is *Tricholaba trifolii*, the inflation is lacking, and the leaflet is often somewhat bent (Figure 32 A). Bi- or multivoltine. Pupation and hibernation in the soil.

We here report the species from leaf galls on

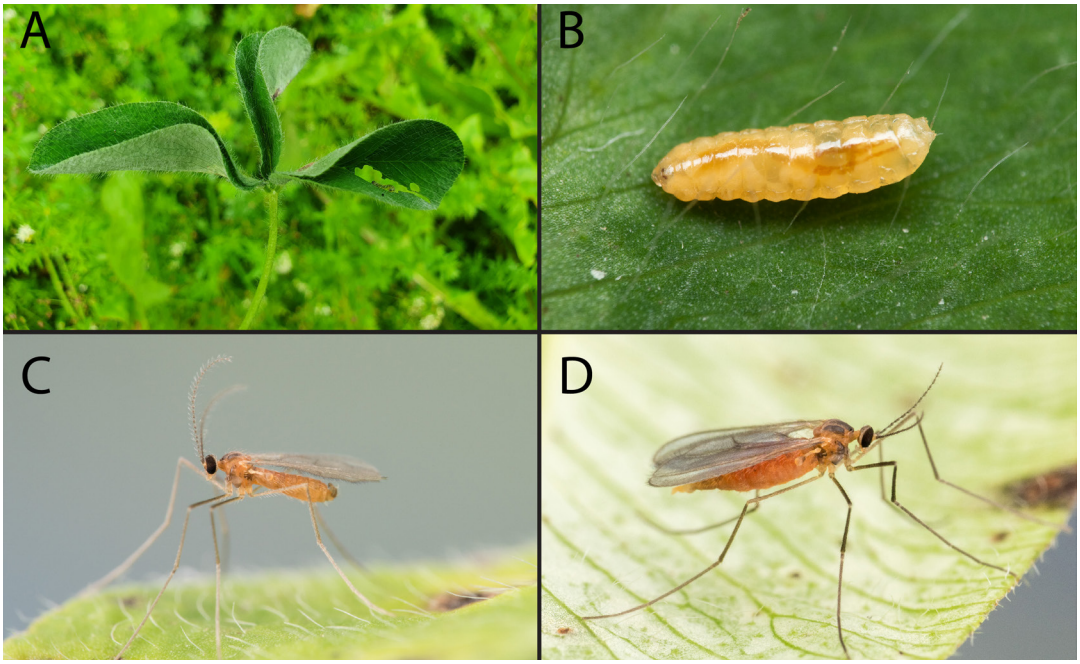

FIGURE 32. *Tricholaba trifolii*. **A.** Galled leaflets of *Trifolium pratense*. **B.** Mature larva. **C.** Male. **D.** Female. Photos: H. Elven.

Trifolium pratense and *T. repens*. We have also collected *Tricholaba* from the flowers of all the three known *Trifolium* hosts, but our preliminary barcoding results indicate that there may be more than one *Tricholaba* species involved in the flowers. It should be noted that Milne (1960) found differences in the male and female antennae between *Tricholaba* collected from the flowers and specimens collected from leaf galls, leading him to describe those from the flowers as a distinct species, *T. barnesi*. Stelter (1988a), however, could not confirm these differences, and *T. barnesi* is currently considered a synonym of *T. trifolii*. Pending closer study, it seems premature to report our material from flowers as *T. trifolii*. Ufortunately, we have not yet had a chance to barcode specimens from leaf galls for comparison.

Distribution: Western palearctic. Known from several European countries including Norway and Sweden.

*** *Tricholaba viciobia* Stelter, 1988**

Material: NSY, Gildeskål: Forstranda, 66.997170°N 13.885166°E ± 4m, 19 July 2022, LMF, leg. HE, coll. NHMO; Sund, Sundsfjellet, 67.066157°N 14.059922°E ± 5m, 21 July 2022, LMF, leg. HE, coll. NHMO.

Biology and notes: The white to orange larvae develop in galled leaflets of *Vicia sylvatica* (Fabaceae). Infected leaflets are folded up over the midrib and hardened to form a pod-like gall. Bi- or multivoltine. Pupation and hibernation in the soil. In the sample from Sundsfjellet, we also found white larvae of *Macrolabis* sp. living together with *Tricholaba viciobia*. This species is mentioned in Roskam (2019) but is apparently undescribed.

Distribution: Only known from Germany, Czech Republic and Norway.

SUPERTRIBE LASIOPTERIDI
TRIBE DASINEURINI

Genus *Cupressatia* Gagné, 2013

The genus includes only two species, both of which develop in the cones of Cupressaceae. The genus is native to North America, but *C. Siskiyou* has been introduced to Europe.

*** *Cupressatia siskiyou* (Felt, 1917)**
(Figure 33)

Material: AK, Oslo: Blindern, 59.940034°N 10.716814°E ± 10m, 10 October 2019, LMF, leg. HE, BOLD: NHMO-ENT-548225, coll. NHMO; Brattlikollen, Steingrims vei, 59.883526°N 10.802032°E ± 5m, 9 April 2020, LMF, leg. HE, coll. NHMO.

Biology and notes: The yellowish to orange larvae develop in cones of *Chamaecyparis lawsoniana* (Cupressaceae). Infected cones become somewhat disfigured and tend to stay greenish and closed throughout the winter. Each larva develops in a small depression on a seed. It hibernates in the cone in a white silk cocoon and pupates there in the spring. Univoltine. Descriptions of the species are provided in de Meijere (1935), Stelter (1988b) and Gagné (2013).

Distribution: Native to the Nearctic but introduced to Europe. Known from several European countries including Norway and Denmark. The first European record was made in the Netherlands in 1931 (de Meijere 1935).

Genus *Cystiphora* Kieffer, 1892

The genus includes eight species globally, all forming leaf galls on Asteraceae (Yukawa *et al.* 2021).

***Cystiphora sanguinea* (Bremi, 1847)**
(Figure 34)

Material: TEY, Nome: Ulefoss, Klovdal, 59.236580°N 9.378267°E ± 150m, 17 June 2019, on *Hieracium* sp., L, leg. SH, BOLD: NHMO-ENT-548106, coll. NHMO; **AK,** Bærum: Grimsøya, 59.875770°N 10.589658°E ± 5m, 11 June 2019, on *Hieracium* section *Hieracium*, L, leg. HE, coll. NHMO; Oslo: Sørkedalen, Finnerud, 60.029718°N 10.640770°E ± 20m, 18 August 2020, on *Hieracium* section *Vulgata*, LI, leg. HE, coll. NHMO; Nannestad: Aurmoen, 60.243029°N 11.100980°E ± 7m, 12 July 2019, on *Hieracium* section *Hieracium*, LMF, leg. TS, BOLD: NHMO-ENT-548179, coll. NHMO; 60.242610°N 11.103627°E ± 200m, 7 July 2020, on *Hieracium* section *Vulgata*, LF, leg. HE & TS, coll. NHMO; Aurmoen, NE of Langemyra, 60.242952°N 11.100740°E ± 7m, 7 July 2020,

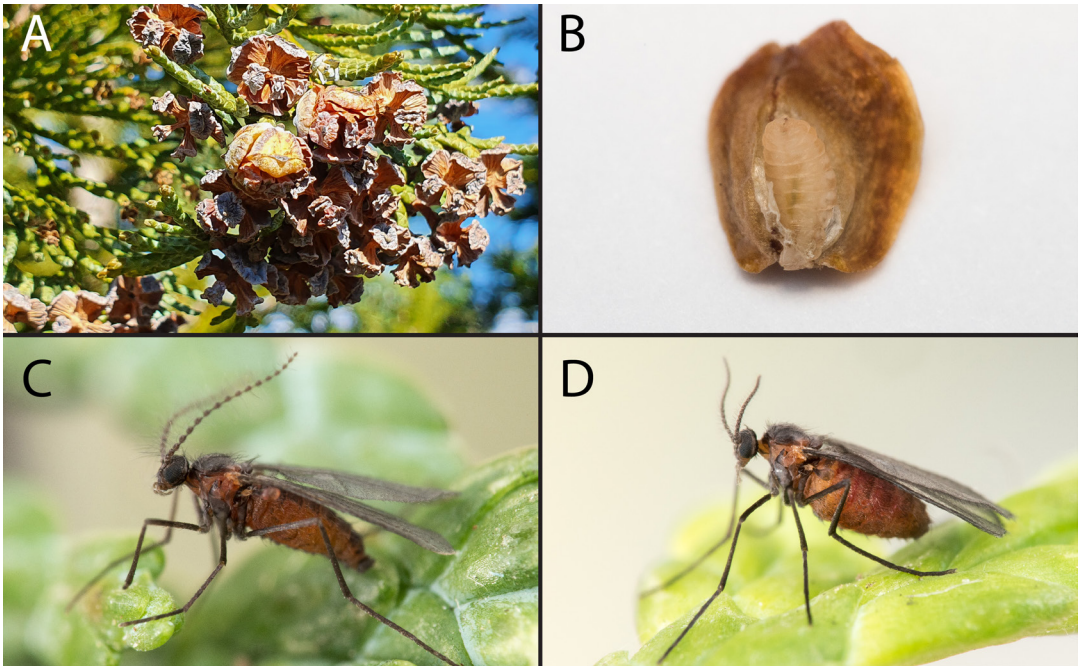

FIGURE 33. *Cupressatia siskiyou*. This is an alien species in our fauna. **A.** Galled cone (middle) on *Chamaecyparis lawsoniana*. **B.** Seed with larva. **C.** Male. **D.** Female. Photos: H. Elven.

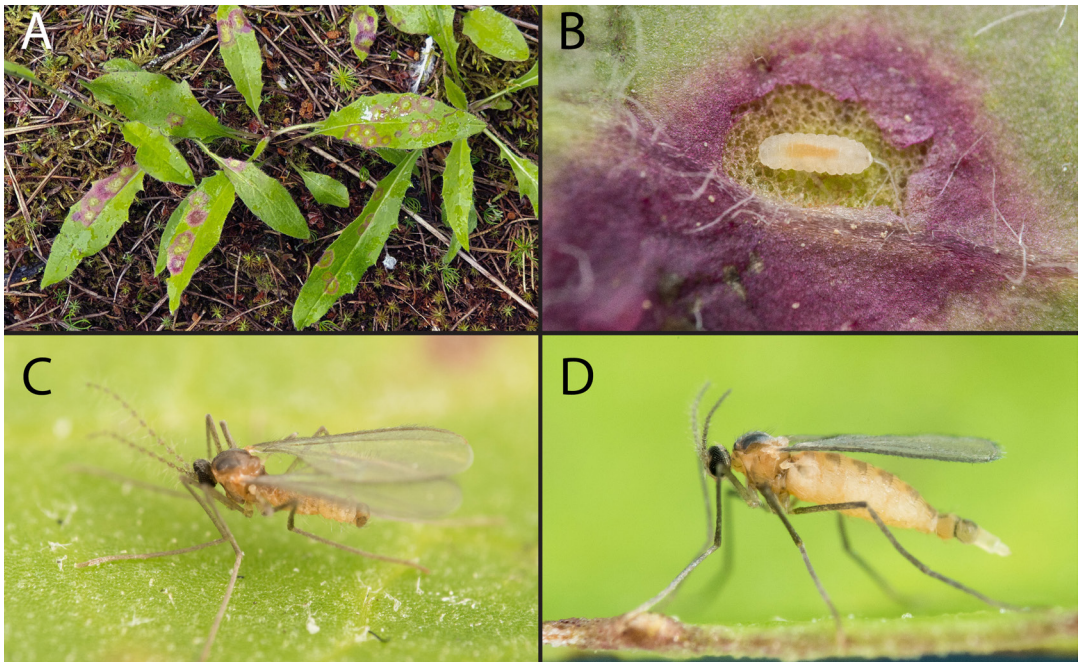

FIGURE 34. *Cystiphora sanguinea*. **A.** Galled leaves of *Hieracium* section *Vulgata*. **B.** Larva in opened gall. **C.** Male. **D.** Female. Photos: T. Starholm (A), H. Elven (B, C, D).

on *Hieracium* section *Vulgata*, LI, leg. TS & HE, coll. NHMO.

Biology: The white to orange or pinkish larvae develop in parenchymal galls on the leaves of *Hieracium* spp. and *Pilosella* spp. (Asteraceae). Each larva develops inside a blotch which is often strongly discolored red to purple. There are often many galls per leaf. Multivoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland.

**** Cystiphora sonchi* (Vallot, 1827)**

Material: Ø, Marker: W of Søndre Røen, 59.547447°N 11.572916°E ± 50m, 10 August 2020, LI, leg. TS, coll. NHMO; 59.547572°N 11.571581°E ± 3m, 6 August 2021, LI, leg. TS, coll. NHMO; **AK,** Eidsvoll: Sneisrud, 60.305448°N 11.248935°E ± 5m, 7 August 2021, LI, leg. TS, coll. NHMO.

Biology and notes: The white to yellow-orange or pinkish larvae develop in parenchymal galls on the leaves of *Sonchus* spp. (Asteraceae). Our records are all from *Sonchus arvensis*. Each larva develops inside a blotch which may be strongly discolored red to purple. There are often many galls per leaf. Bi- or multivoltine. Pupation sometimes in the gall, sometimes in the soil. This species is not previously published from Norway, but some records exist in Artskart, the first from Larvik 18. July 2013.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Western Asia. Introduced to USA and Australia.

Genus *Dasineura* Rondani, 1840

This very large and heterogeneous genus includes 483 species globally. Most species are gall makers, but a fair number are inquilines in the galls of other species.

**** Dasineura acrophila* (Winnertz, 1853)**

Material: TEY, Nome: Ulefoss, Klovdal, 59.236580°N 9.378267°E ± 150m, 17 June 2019, L, leg. HE, coll. NHMO; **VE,** Larvik: Rakke, 58.97890°N 10.02301°E ± 10m, 25 June 2019, L, leg. AF, coll. Private; **AK,** Asker: Konglungen, Spirebukta, 59.832968°N 10.495180°E ± 5m, 3 June 2022, L, leg. HE, coll. NHMO; Nesøya, Vendla, 59.860185°N 10.527596°E ± 5m, 29 May 2019, L, leg. HE, coll. NHMO; 59.860168°N 10.527577°E ± 5m, 31 May 2020, L, leg. HE & TS, BOLD: NHMO-ENT-548019,548020, coll. NHMO; 59.860303°N 10.527530°E ± 5m, 4 June 2021, L, leg. HE, coll. NHMO; Brønnøya, Brønnøyveien 26, 59.855107°N 10.534147°E ± 6m, 4 June 2021, L, leg. HE, coll. NHMO; Bærum: Fornebu, Rolfstangen, 59.890374°N 10.633679°E ± 10m, 18 June 2022, L, leg. HE & TS, coll. NHMO; Oslo: Malmøya, Solvik, 59.863699°N 10.750400°E ± 5m, 2 June 2022, LF, leg. HE, coll. NHMO; Ekebergskråningen, 59.894861°N 10.760137°E ± 4m, 15 May 2019, L, leg. HE, coll. NHMO; 59.891800°N 10.761405°E ± 4m, 15 May 2019, L, leg. HE, coll. NHMO.

Biology: The larvae develop gregariously in galled leaves of *Fraxinus* spp. (Oleaceae). Our records are all from *F. excelsior*. Infected leaves are folded upwards over the midrib, forming a pod-like gall usually at the base of the leaf. The larvae are white with green gut content. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark. Georgia, Iran and Algeria.

**** Dasineura affinis* (Kieffer, 1886)**

Material: AK, Oslo: Sørkedalen, Finnerud, 60.031434°N 10.640012°E ± 20m, 10 August 2021, on *Viola canina*, LI, leg. HE, coll. NHMO.

Biology: The white to orange larvae develop gregariously in galled leaves of *Viola* spp. (Violaceae). The margins on either or both sides of the leaf are rolled upwards and somewhat thickened, creating a space for the larvae. Multivoltine; pupation in the gall.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Around the Mediterranean.

**** Dasineura aucupariae* (Kieffer, 1909)**

Material: AK, Asker: Brønnøya, Ostsundveien plot 41/185, 59.866228°N 10.553876°E ± 3m, 3 June 2022, LMF, leg. HE, coll. NHMO; **OS,** Gran: Bleiken, 60.463291°N 10.504599°E ± 5m, 12 June 2020, L, leg. HE, coll. NHMO.

Biology: The white to vaguely orange larvae are inquilines in the galls of *Contarinia floriperda* on *Sorbus* spp. (Rosaceae). Our records are from *Sorbus aucuparia*. Univoltine; pupation and hibernation in the soil.

Distribution: Known from France, Switzerland, Italy, Czech Republic and Norway.

***Dasineura berti* Sylvén, 1993**
(Figure 35)

Material: ON, Lom: Utløpet Bøvertunvatn, 61.64613°N 8.09829°E ± 50m, 17 July 2019, 7L, leg. AF, BOLD: NHMO-ENT-548152, coll. NHMO.

Biology and notes: This species, which develops on *Astragalus alpinus* (Fabaceae), is known only from Norway. To our knowledge, the species has only been recorded twice before. Trail (1889) first found the galls on the road from Eidfjord ("Oifjord") to Vøringsfossen ("Voringfos") in Eidfjord municipality in 1878. He described the galls as "inflated, conduplicate, yellowish-green, rather fleshy, isolated leaflets, or terminal swellings on the young stems, made up of a mass of ill-formed young leaves of the bud, the whole mass being often about the size of a large pea". The species was formally described more than 100 years later by Sylvén based on material collected at Kongsvold in 1988 (Sylvén & Tastás-Duque 1993). Sylvén described the larval color as cadmium orange. We collected the species in Lom in 2019. The color of the living larvae was not noted, but the preserved larvae are pale yellowish orange (Figure 35 B). The galls are shown in Figure 35 A. The leaflets are miscolored reddish and are folded up over the midrib so that they form a closed pod. Our larvae collected in July proceeded to hatch without diapause, indicating that the species is at least partially bivoltine. Pupation and hibernation in the soil.

Distribution: Known only from Norway.

*** *Dasineura bistortae* (Kieffer, 1909)**

Material: ON, Lom: Utløpet Bøvertunvatn, 61.64515°N 8.09764°E ± 50m, 17 July 2019, on *Bistorta vivipara*, 1L, leg. AF, BOLD: NHMO-ENT-548153, coll. NHMO.

Biology and notes: The white to yellowish red larvae develop in downward leaf rolls on *Bistorta officinalis* and *B. vivipara* (Polygonaceae). We found a single reddish larva in a leaf roll on *B. vivipara*. The larva was dead and somewhat damaged when found, probably due to a parasitoid, and it was not so easy to study. The DNA barcode placed it among *Dasineura*, however, supporting the identification.

Distribution: Widespread in Europe, but in Fennoscandia known only from Norway. Kazakhstan.

*** *Dasineura chrysanthemi* Heath, 1962**

Material: AK, Oslo: Bleikøya, 59.890256°N 10.741698°E ± 6m, 3 July 2020, 1L, leg. TS & HE, BOLD: NHMO-ENT-548067, coll. NHMO.

Biology and notes: According to the original description in Barnes *et al*. (1962), pink larvae develop in the capitula of *Leucanthemum vulgare* (Asteraceae). It is not stated whether they cause

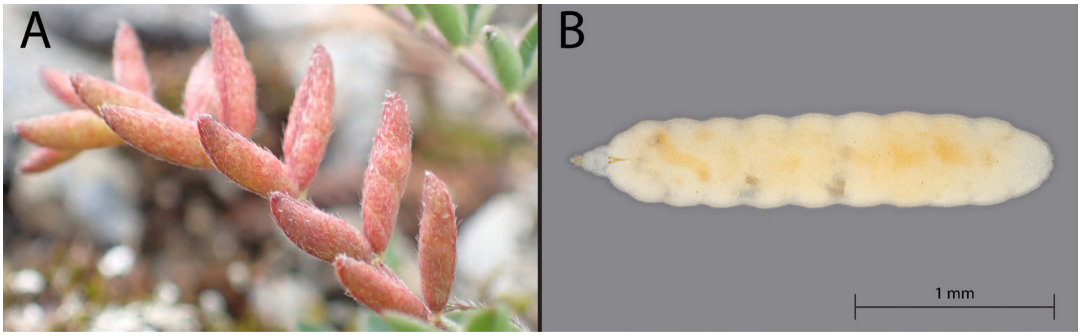

FIGURE 35. *Dasineura berti*. **A.** Galled leaves of *Astragalus alpinus*. **B.** Larva in alcohol, ventral view. Photos: A. Fjellberg (A), H. Elven (B).

visible damage. The species can be either uni- or bivoltine, and pupation and hibernation take place in the soil. We obtained a single, yellowish white larva from capitula of *Leucanthemum vulgare*. It was dead when found and may have been pinker when alive. Larval habitus and DNA barcoding places it among *Dasineura*, and we have identified it as *Dasineura chrysanthemi* based on this. Barnes *et al*. (1962) unfortunately did not describe the larva in further detail.

Distribution: Only known from UK, Norway and Denmark.

***Dasineura engstfeldi* (Rübsaamen, 1889)**

Material: NSY, Gildeskål: Inndyr, Svartdalen, 67.044190°N 14.060473°E ± 6m, 24 July 2022, on *Filipendula ulmaria*, 5L, leg. HE, coll. NHMO.

Biology and notes: The white, later pink, larvae develop on galled leaves of *Filipendula* spp. (Rosaceae). Infected leaves are locally wrinkled and sometimes discolored red. The leaf veins are swollen in the infected parts, and the larvae live on the underside of the leaf, often several together, in the nooks and spaces created by the wrinkles and swollen veins. Univoltine; pupation and hibernation in the soil. The galls that we have found match the description of the galls, but the larvae do not seem to turn pink at maturity, instead remaining white. The species appears to be rather common on *Filipendula ulmaria* in the northern part of the country. Only one sample has been processed so far, but we have observed the species in several other places.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland.

***Dasineura epilobii* (F. Löw, 1889)**

(Figure 36)

Material: Ø, Indre Østfold: Berg, 59.556066°N 11.232754°E ± 6m, 6 August 2021, L, leg. TS, coll. NHMO; **AK,** Lillestrøm: Branderud, Kongsrudveien 4, 59.983797°N 11.145042°E ± 3m, 4 July 2020, LMF, leg. TS, coll. NHMO; Nannestad: Aurmoen, W of Flatnertjernet, 60.241261°N 11.105473°E ± 5m, 7 July 2020, LMF, leg. TS, HE & ØE, coll. NHMO.

Biology: The pale orange-red larvae develop gregariously in galled flower buds of

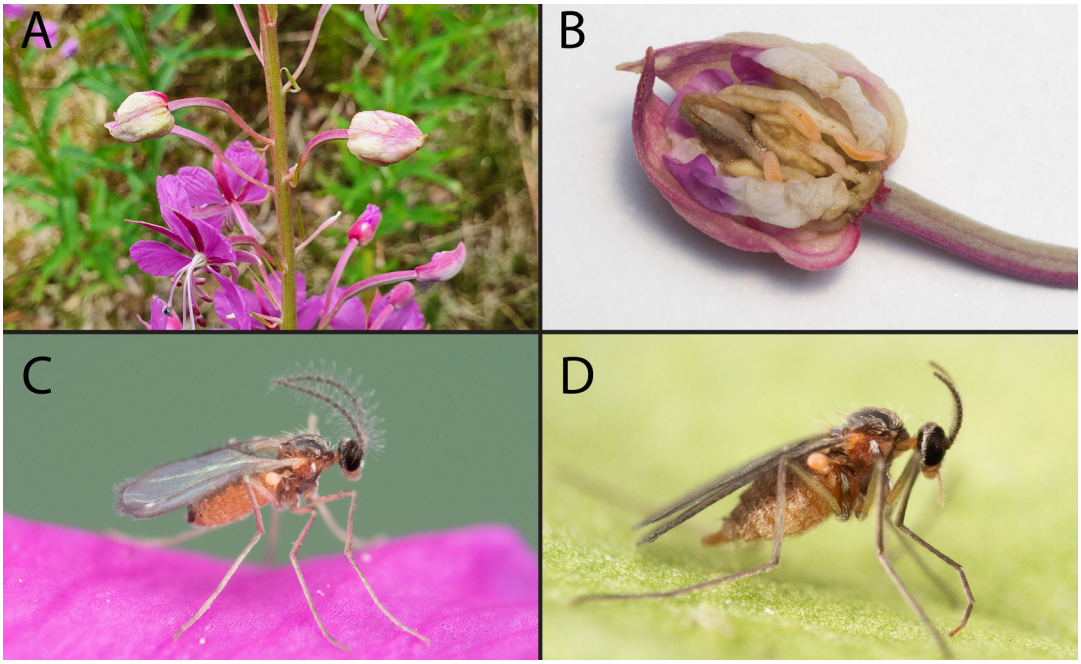

FIGURE 36. *Dasineura epilobii*. **A.** Galled flowers of *Chamaenerion angustifolium*. **B.** Opened gall with larvae. **C.** Male. **D.** Female. Photos: H. Elven.

Chamaenerion angustifolium and *Epilobium* spp. (Onagraceae). Our records are from *Chamaenerion angustifolium.* Infected flowers become strongly swollen and misshapen, and do not open. Bivoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland.

*** *Dasineura frangulae* Rübsaamen, 1917**
(Figure 18 D)

Material: AAY, Tvedestrand: Risøya, 58.653734°N 9.150944°E ± 4m, 19 June 2021, L2M leg. HE, coll. NHMO.

Biology and notes: The pinkish yellow larvae live in galled flowers on *Frangula alnus* (Rhamnaceae). The species is assumed to be an obligate inquiline of *Contarinia rhamni*. Probably univoltine. Pupation and hibernation in the soil. We found the species together with the host in galled flowers of *Frangula alnus* collected in Tvedestrand, and successfully hatched males of both species. The males of *Dasineura frangulae* were bright orange, which is unusual for *Dasineura* but typical for *Macrolabis*. The male gonocoxites were small, however, ruling out *Macrolabis*, and the general build and chaetotaxy confirm the placement in *Dasineura* (Figure 18 D).

Distribution: Only known from UK, Germany, Norway and Sweden.

***Dasineura fraxinea* Kieffer, 1907**

Material: AK, Asker: Konglungen, Spirebukta, 59.832968°N 10.495180°E ± 5m, 3 June 2022, L, leg. HE, coll. NHMO; Bærum: Borøya, 59.878060°N 10.559628°E ± 5m, 7 June 2021, L, leg. HE, coll. NHMO; Oslo: Gressholmen, 59.882863°N 10.717849°E ± 5m, 1 July 2020, L, leg. HE, coll. NHMO; Bleikøya, 59.889358°N 10.739685°E ± 300m, 3 July 2020, L, leg. TS & HE, BOLD: NHMO-ENT-548060, coll. NHMO.

Biology: The white larvae develop in parenchymal galls on the leaves of *Fraxinus* spp. (Oleaceae). Our records are all from *F. excelsior*. Each larva lives in a roundish gall evident by a small bulge on the upper side of the leaf. The gall is hardly miscolored while occupied but turns brown after the larva has left it. Univoltine; pupation and hibernation in the soil.

Distribution: Western Palearctic. Widespread in Europe including Norway, Sweden, Denmark and Finland.

***Dasineura fraxini* (Bremi, 1847)**

Material: VE, Holmestrand: Helland, Snekkestad, 59.452733°N 10.354787°E ± 20m, 23 June 2022, L, leg. HE, coll. NHMO; **AK,** Asker: Konglungen, Spirebukta, 59.832968°N 10.495180°E ± 5m, 3 June 2022, L, leg. HE, coll. NHMO; 59.833411°N 10.495699°E ± 4m, 11 August 2022, L, leg. HE, coll. NHMO; Bærum: Grimsøya, 59.873088°N 10.588583°E ± 6m, 11 June 2019, L, leg. HE, coll. NHMO; Fornebu, Rolfstangen, 59.890374°N 10.633679°E ± 10m, 18 June 2022, L, leg. HE & TS, coll. NHMO; Oslo: Sørkedalen, Strøm, 59.977053°N 10.623344°E ± 10m, 11 August 2022, L, leg. HE, coll. NHMO; Gressholmen, 59.886052°N 10.724000°E ± 3m, 1 July 2020, L, leg. HE, coll. NHMO; Bleikøya, 59.889878°N 10.744520°E ± 3m, 3 July 2020, L, leg. HE & TS, coll. NHMO; Lillestrøm: Lillestrøm, Åråsen, 59.966010°N 11.064613°E ± 20m, 29 June 2020, L, leg. TS, BOLD: NHMO-ENT-548053, coll. NHMO.

Biology and notes: The yellow larvae develop in galled leaves of *Fraxinus* spp. (Oleaceae). Our records are all from *F. excelsior*. Infected leaves are folded upwards over the midrib, forming one or more pod-like galls along the length of the leaf. Also, the leaf stalks can be galled. Each gall contains several larvae, but each larva is more or less confined to a separate chamber. Uni- or bivoltine. Pupation or hibernation in the soil. We suspect that the species is always univoltine in Norway, but larvae seem to mature and leave the galls over a very long period stretching from June to September.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Iran and Algeria.

*** *Dasineura fructum* (Rübsaamen, 1895)**

Material: VE, Færder: Hvasser, Krukehavn, 59.076776°N 10.452109°E ± 250m, 15 June

2019, on *Cerastium fontanum*, 4L, leg. SH & HE, BOLD: NHMO-ENT-548094, coll. NHMO.

Biology: The orange larvae develop gregariously in fruits of *Cerastium* spp. (Caryophyllaceae). Infected fruits are slightly enlarged. It is not stated whether the species has one or more generations per year. Pupation takes place in the soil.

Distribution: Known from a few European countries including Norway and Denmark.

***Dasineura geranii* (Kieffer, 1907)**

Material: TEY, Porsgrunn: Brevik, Dammane, 59.057437°N 9.683015°E ± 5m, 23 June 2022, LF, leg. HE, coll. NHMO; **VE,** Larvik: Ødegården, 59.14732°N 10.42644°E ± 50m, 12 June 2019, L, leg. AF, BOLD: NHMO-ENT-548119, coll. NHMO; **AK,** Bærum: Fornebu, Rolfstangen, 59.890374°N 10.633679°E ± 10m, 18 June 2022, LMF, leg. HE & TS, coll. NHMO.

Biology and notes: The white to pale or bright orange-red larvae develop on *Erodium cicutarium*, *Geranium sanguineum* and *G. sylvaticum* (Geraniaceae). Our records are all from *G. sanguineum*. Two different modes of development have been described for this species. Either, the larvae can develop solitarily in the fruits, which become swollen, or they can develop gregariously in the flower buds, which remain closed, develop black rot on the inside, and gradually dry up. It seems more than likely that these two descriptions refer to two different species, but this has not yet been confirmed. All records from Norway are of the latter variety which develops in the unopened flower buds (see also Skuhravá & Skuhravý 2012). The species is univoltine. Pupation and hibernation in the soil.

Distribution: Known from several European countries including Norway and Sweden.

***Dasineura kiefferiana* (Rübsaamen, 1891)**

Material: AK, Nannestad: Aurmoen, 60.243224°N 11.092049°E ± 7m, 7 July 2020, LF, leg. HE & TS, coll. NHMO; **NSI,** Grane: Trofors, Motangen, 65.596769°N 13.381253°E ± 7m, 15 July 2020, L, leg. HE, coll. NHMO.

Biology: The white to cream colored or yellowish larvae develop in leaf rolls on *Chamaenerion angustifolium* (Onagraceae). The leaf margin on one or both sides of the leaf is rolled downwards and often more or less miscolored red. Uni- or bivoltine. Pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland.

***Dasineura leguminicola* (Lintner, 1879)**

Material: AK, Frogn: Kaholmene, 59.675784°N 10.605837°E ± 360m, 11 July 2019, on *Trifolium pratense*, L, leg. HE, BOLD: NHMO-ENT-547971, coll. NHMO; Oslo: Gressholmen, 59.883650°N 10.719498°E ± 5m, 1 July 2020, on *Trifolium pratense*, LI, leg. HE, coll. NHMO; Lillestrøm: Lillestrøm, Åråsen, 59.965965°N 11.064628°E ± 10m, 22 June 2020, on *Trifolium medium*, LI, leg. TS, BOLD: NHMO-ENT-548042,548246, coll. NHMO.

Biology and notes: The white to pink larvae develop in galled flowers of *Trifolium* spp. (Fabaceae). Each flower contains a single larva feeding on the seed, but many flowers in the same capitulum may be attacked, giving the whole capitulum an untidy appearance. Two or more generations per year. Pupation and hibernation in the soil. The species is redescribed in Milne (1960).

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Nearctic, possibly as a result of introduction from Europe.

*** *Dasineura miki* (Kieffer, 1909)**

Material: VE, Larvik: Stavern, Rakke, 58.980596°N 10.021179°E ± 300m, 24 July 2021, on *Centaurea* sp., L, leg. SH, coll. NHMO; **AK,** Oslo: Sørkedalen, Finnerud, 60.030507°N 10.639427°E ± 10m, 7 August 2019, on *Centaurea jacea*, LMF, leg. HE, BOLD: NHMO-ENT-547994, coll. NHMO; 60.031721°N 10.640008°E ± 15m, 11 August 2022, on *Centaurea jacea*, LMF, leg. HE, coll. NHMO; **OS,** Jevnaker: SE of Ragnhildrud, 60.267528°N 10.478284°E ± 10m, 8 August 2020, on *Centaurea jacea*, L, leg. TS, coll. NHMO.

Biology and notes: The orange-yellow larvae live freely among the florets in the capitula of *Centaurea scabiosa* and *C. nigra* (Asteraceae).

Infected flowers become somewhat stunted. Probably univoltine. Pupation and hibernation in the soil. Our material does not fit this description perfectly, as it was collected from *Centaurea jacea*, and our larvae were pink rather than orange-yellow. However, DNA barcoding of one larva collected at Finnerud in 2019 gave 100% blast match with *Dasineura miki* collected from *Centaurea nigra* in the UK (Dorchin *et al*. 2019, supplementary material), and larvae from Denmark identified as *Dasineura miki* are also pink. We interpret our material as belonging to *Dasineura miki* and propose *Centaurea jacea* as a new host plant for this species.

Distribution: Only known from UK, Austria, Norway and Denmark.

*** *Dasineura myosotidis* (Kieffer, 1902)**

Material: VE, Færder: Hvasser, Krukehavn, 59.076776°N 10.452109°E ± 250m, 15 June 2019, on *Myosotis arvensis*, 4L, leg. ZF & AK, coll. NHMO.

Biology: The white or yellowish larvae develop several together in galled flowers of *Myosotis* spp. (Boraginaceae). Infected flowers become somewhat inflated and do not open. Probably univoltine. Pupation and hibernation in the soil.

Distribution: Known from several European countries including Norway, Sweden and Denmark.

*** *Dasineura oxyacanthae* Rübsaamen, 1914**

Material: VE, Færder: Fynstranda, 59.07871°N 10.45112°E ± 50m, 13 June 2019, 4L, leg. AF, BOLD: NHMO-ENT-548120, coll. NHMO; **AK,** Asker: Brønnøya, Pilodden 1, 59.856802°N 10.530494°E ± 20m, 29 May 2019, 5L, leg. HE, coll. NHMO.

Biology: The red larvae develop gregariously in galled flowers on *Crataegus* spp. (Rosaceae). Our records are from *C. monogyna*. Univoltine; pupation and hibernation in the soil.

Distribution: Western Palearctic. Widespread in Europe including Norway, Sweden and Denmark.

***Dasineura populeti* (Rübsaamen, 1889)**

Material: Ø, Indre Østfold: Nordkapp, 59.545897°N 11.242732°E ± 5m, 6 August 2021, L, leg. TS, coll. NHMO; **AK,** Oslo: Ellingsrudåsen, 59.935133°N 10.920524°E ± 10m, 9 August 2019, LF, leg. ØE & HE, BOLD: NHMO-ENT-548202, coll. NHMO; Nordmarka, Trehørningen, 60.106043°N 10.738904°E ± 50m, 10 July 2020, L, leg. HE, coll. NHMO; Nannestad: Aurmoen, 60.243308°N 11.102082°E ± 10m, 12 July 2019, L, leg. HE, BOLD: NHMO-ENT-547972, coll. NHMO; Eidsvoll: Dølihagen, 60.284598°N 11.292169°E ± 50m, 22 August 2020, LMF, leg. HE, coll. NHMO; N of Dølihagan, 60.284606°N 11.292188°E ± 50m, 15 August 2020, L, leg. TS, coll. NHMO; 60.284606°N 11.292188°E ± 10m, 6 September 2020, I, leg. TS, coll. NHMO.

Biology: The white larvae develop gregariously in leaf rolls on *Populus tremula*, rarely also on other *Populus* species (Salicaceae). Our records are all from *P. tremula*. Infected leaves are rolled upwards along their margins and tend to be abnormally hairy. Multivoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Central Siberia.

***Dasineura pustulans* (Rübsaamen, 1889)**

Material: TEY, Porsgrunn: Brevik, Dammane, 59.058112°N 9.681024°E ± 16m, 20 June 2021, L, leg. HE & TS, coll. NHMO; **AK,** Oslo: Gressholmen, 59.880571°N 10.715979°E ± 7m, 1 July 2020, L, leg. HE, coll. NHMO; Ellingsrud, Munkebekken, 59.928199°N 10.914307°E ± 5m, 29 June 2020, LI, leg. HE, coll. NHMO; Lillestrøm: Branderud, Kongsrudveien 4, 59.983797°N 11.145042°E ± 3m, 12 July 2020, L, leg. TS, coll. NHMO; S of Stampetjernet, 59.985942°N 11.144571°E ± 10m, 30 August 2020, L, leg. TS, coll. NHMO; **NSY,** Gildeskål: Sund, 67.073048°N 14.060138°E ± 20m, 23 July 2022, LMF, leg. HE, coll. NHMO.

Biology: The white larvae produce yellowish green blotch galls on the leaves of *Filipendula ulmaria* (Rosaceae). Each larva hangs suspended in a drop of liquid in a small depression on the underside of the leaf. Bivoltine; pupation and

hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland.

***Dasineura rosae* (Bremi, 1847)**

Material: VE, Larvik: Stavern, 58.992262°N 10.032930°E ± 250m, 23 July 2021, on *Rosa canina*, L, leg. SH, coll. NHMO; Færder: Hvasser, Krukehavn, 59.076776°N 10.452109°E ± 250m, 15 June 2019, on *Rosa* sp., LM, leg. HE, coll. NHMO; **AK,** Asker: Brønnøya, Sandbukta, 59.857474°N 10.529078°E ± 50m, 28 July 2021, on *Rosa* sp., LM, leg. HE & SH, coll. NHMO; Oslo: Gressholmen, 59.884711°N 10.722197°E ± 300m, 26 June 2019, on *Rosa* sp., L, leg. HE, ZF & AK, coll. NHMO.

Biology: The orange larvae develop gregariously in galled leaves of *Rosa* spp. (Rosaceae). Infected leaves are folded over the midrib, forming a pod that is often miscolored red. Bi- or multivoltine. Pupation and hibernation in the soil.

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland.

***Dasineura saussureae* Fedotova, 1996**

Material: STI, Røros: Røros, Granåsen, 62.601000°N 11.456210°E ± 100m, 29 July 2019, LMF, leg. HE, BOLD: NHMO-ENT-547986,548189, coll. NHMO; **FØ,** Sør-Varanger: Skjellbekken, 69.36310°N 29.45837°E ± 10m, 25 August 2021, L, leg. AF, coll. Private.

Biology and notes: The orange larvae live freely among the florets in the capitula of *Saussurea latifolia* and *S. alpina*. (Asteraceae). Our records are from *S. alpina*. Infected capitula do not show outward signs of damage. Probably univoltine. Pupation and hibernation in the soil. Our material does not fit this description perfectly, as the larvae collected by us were white rather than orange, even when mature. Skuhravá & Skuhravý (2012) collected the species from *S. alpina* in Trøndelag county, not very far from one of our localities, and described their larvae as being orange. Sylvén & Lindberg (1998) also described larvae from northern Sweden as being orange. We postulate that there is some variation in the color of the larvae in this species, and that our material can be referred to *Dasineura saussureae*, but this may need to be revised later. Our material clearly belongs to *Dasineura*. This is confirmed by the habitus of the larvae and adults and by DNA barcoding.

Distribution: Only known from Kazakhstan, Norway and Sweden.

**** Dasineura schulzei* Rübsaamen, 1917**

Material: VE, Larvik: Rakke, 58.97975°N 10.01886°E ± 10m, 9 June 2019, L, leg. AF, coll. Private; **AK,** Bærum: Grimsøya, 59.872782°N 10.587908°E ± 4m, 11 June 2019, LMF, leg. HE, coll. NHMO; 59.875368°N 10.596160°E ± 20m, 11 June 2019, PF, leg. HE, coll. NHMO; Lilleøya, S-end, 59.892877°N 10.596481°E ± 20m, 30 May 2022, LMF, leg. HE & HK, coll. NHMO.

Biology: The orange larvae develop gregariously in shoot galls on *Euphorbia* spp. (Euphorbiaceae). Our records are all from *E. palustris*. The leaves of the infected shoot remain rolled together, forming a spool-shaped gall that is sometimes miscolored red. Multivoltine. The early generations pupate in the gall. The larvae of the last generation leave the gall to hibernate in the soil.

Distribution: Only known from a few European countries including Norway and Sweden.

**** Dasineura serotina* (Winnertz, 1853)**

Material: TEY, Porsgrunn: Åsstranda, 59.093447°N 9.646956°E ± 50m, 16 June 2019, on *Hypericum perforatum*, L, leg. HE, coll. NHMO; 59.0946592°N 9.647405°E ± 250m, 16 June 2019, on *Hypericum perforatum*, L, leg. ZF & AK, coll. NHMO; **VE,** Larvik: Stavern, Rakke, 58.980596°N 10.021179°E ± 300m, 24 July 2021, on *Hypericum* sp., L, leg. SH, coll. NHMO; Færder: Hvasser, Krukehavn, 59.076776°N 10.452109°E ± 250m, 15 June 2019, on *Hypericum perforatum*, L, leg. HE, coll. NHMO; **AK,** Oslo: Gressholmen, 59.884711°N 10.722197°E ± 300m, 26 June 2019, on *Hypericum perforatum*, L, leg. HE, ZF & AK, coll. NHMO; 59.885855°N 10.724669°E ± 20m, 1 July 2020, on *Hypericum perforatum*, 3L3F, leg. HE, coll. NHMO; Abildsø, Bakkehavn, 59.875438°N 10.832323°E ± 30m, 28 August

2020, on *Hypericum maculatum*, LF, leg. HE, coll. NHMO.

Biology and notes: The white larvae develop gregariously in shoots of *Hypericum* spp. (Hypericaceae). The apical leaves of the infected shoots are bundled together and often miscolored red. Probably multivoltine. Pupation and hibernation in the soil. In several cases, we found the larvae living together with yellow larvae of *Macrolabis* sp. The latter may represent an undescribed species.

Distribution: Western Palearctic. Widespread in Europe including Norway, Sweden and Denmark.

*** *Dasineura silvestris* (Kieffer, 1909)**

Material: TEI, Seljord: Heggeneset, 59.44055°N 8.78415°E ± 50m, 21 August 2019, on *Lathyrus sylvestris*, L, leg. AF, BOLD: NHMO-ENT-548143, coll. NHMO.

Biology: The white to reddish larvae develop in galled flower buds of *Lathyrus* spp. (Fabaceae). Infected buds remain closed. Pupation and hibernation in the soil.

Distribution: Known from several European countries and from Western Siberia. In Fennoscandia only known from Norway.

*** *Dasineura similis* (Löw, 1888)**

Material: AK, Oslo: Ellingsrud, Solberg, 59.927110°N 10.916929°E ± 50m, 13 October 2020, LMF, leg. HE, coll. NHMO; Lillestrøm: S of Farshatten, 59.990562°N 11.150464°E ± 8m, 21 June 2020, MF, leg. TS, BOLD: NHMO-ENT-548242, coll. NHMO; Eidsvoll: N of Dølihagan, 60.284758°N 11.292253°E ± 5m, 21 July 2020, F, leg. TS, coll. NHMO.

Biology: The orange larvae develop gregariously in galled shoots of *Veronica* spp. (Plantaginaceae). Our records are from *V. officinalis*. The topmost pair of leaves are thickened and pressed against each other to form a chamber. Probably univoltine. Pupation and hibernation normally in the gall but also sometimes in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland.

*** *Dasineura sisymbrii* (Schrank, 1803)**

Material: TEY, Porsgrunn: Åsstranda, 59.0946592°N 9.647405°E ± 250m, 16 June 2019, LI, leg. ZF & AK, coll. NHMO; 59.093447°N 9.646956°E ± 50m, 16 June 2019, PMF, leg. HE, coll. NHMO; **AK,** Asker: Konglungen, Spirebukta, 59.832584°N 10.495020°E ± 10m, 3 June 2022, LMF, leg. HE, coll. NHMO.

Biology: The orange-red larvae develop gregariously in galled flower buds or stems on a range of Brassicaceae. Our records are all from *Barbarea vulgaris*. The infected parts form a strongly inflated, yellow, spongy mass. Bi- or multivoltine. Pupation in the gall.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Kazakhstan.

*** *Dasineura spadicea* Rübsaamen, 1917**

Material: VE, Færder: Sandø S, 59.07196°N 10.46850°E ± 50m, 13 August 2019, on *Vicia sylvatica*, 5L, leg. AF, BOLD: NHMO-ENT-548135,548136, coll. NHMO.

Biology and notes: The yellow larvae develop singly or several together in galled leaflets of different species of *Vicia*, mainly *Vicia cracca* (Fabaceae). Infected leaflets are folded up over the midrib. The internodes are not shortened. Bivoltine; pupation and hibernation in the soil. Our record is from *Vicia sylvatica*. The color of the living larvae was not noted, but the specimens preserved in alcohol vary from white to pale yellowish. DNA barcoding places them among *Dasineura*.

Distribution: Widespread in Europe including Norway, Sweden and Denmark. Western Siberia.

*** *Dasineura thomasiana* (Kieffer, 1888)**

Material: AK, Oslo: Hvervenbukta, 59.836637°N 10.776602°E ± 10m, 20 June 2020, 3L, leg. HE, coll. NHMO; Ellingsrud, Munkebekken, 59.932207°N 10.914771°E ± 10m, 30 June 2020, 10L2F, leg. HE, coll. NHMO; Rådhuset, 59.912163°N 10.732097°E ± 30m, 1 July 2020, LMF, leg. HE, coll. NHMO.

Biology: The white to orange-red larvae attack the bursting shoots of *Tilia* spp. (Malvaceae). Our records are from *T.* x *europaea*. Usually, the soft

shoots that grow from the root or from the lower part of the stem are preferred. The unfolding leaves become crumpled, and the larvae live in the creases. Bivoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland.

***Dasineura tiliae* (Schrank, 1803)**

Material: AK, Asker: Brønnøya, Brønnøyveien 26, 59.855214°N 10.534224°E ± 6m, 4 June 2021, on *Tilia cordata*, L, leg. HE, coll. NHMO; Bærum: Sandvika, 59.889952°N 10.527336°E ± 15m, 7 June 2021, on *Tilia cordata*, L, leg. HE, coll. NHMO; Oslo: Malmøya, 59.865230°N 10.753480°E ± 7m, 18 June 2020, on *Tilia platyphyllos*, L, leg. TS & HE, BOLD: NHMO-ENT-548030, coll. NHMO; Tøyen, Botanical Garden, 59.917909°N 10.770784°E ± 5m, 5 June 2019, on *Tilia cordata*, L, leg. HE, coll. NHMO; 27 May 2020, on *Tilia cordata*, L, leg. HE, coll. NHMO; Lillestrøm: S of Farshatten, 59.991073°N 11.150497°E ± 7m, 21 June 2020, on *Tilia cordata*, L, leg. TS, BOLD: NHMO-ENT-548034, coll. NHMO.

Biology and notes: The orange larvae develop gregariously in leaf rolls on *Tilia* spp. (Malvaceae). The leaf margin is rolled upwards along part of the leaf and is often miscolored red. Univoltine; pupation and hibernation in the soil. We have on several occasions found white larvae of *Macrolabis* sp. living together with the orange larvae of *Dasineura tiliae*. These may represent an undescribed species.

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland.

***Dasineura tortilis* (Bremi, 1847)**

Material: AK, Oslo: Ellingsrud, 59.931150°N 10.910236°E ± 10m, 19 June 2022, L, leg. HE, coll. NHMO; **SFI,** Aurland: Nærøyfjorden, Gudvangen, 60.877730°N 6.837950°E ± 1000m, 23 June 2019, L, leg. ZF & AK, coll. NHMO; **NSY,** Gildeskål: Breivika, Breivikdalen, 66.998698°N 14.246214°E ± 3m, 22 July 2020, L, leg. HE, coll. NHMO.

Biology: The yellow to orange-red larvae develop gregariously in galled leaves of *Alnus* spp. (Betulaceae). Our records are from *A. incana*. The larvae attack the bursting leaves, which then do not unfold properly and develop a small pouch at the base, in which the larvae live. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland.

*** *Dasineura trailli* (Kieffer, 1909)**

Material: TEY, Porsgrunn: Eidsberg, Olavsberget camping, 59.1111814°N 9.7121003°E ± 100m, 16 June 2019, L, leg. SH, BOLD: NHMO-ENT-548097, coll. NHMO; Nome: Ulefoss, Klovdal, 59.236580°N 9.378267°E ± 150m, 17 June 2019, LMF, leg. ZF, AK & HE, BOLD: NHMO-ENT-548165, coll. NHMO; Seljord: Blika, 59.5914013°N 8.5615844°E ± 100m, 18 June 2019, L, leg. SH, BOLD: NHMO-ENT-548115, coll. NHMO; 59.591396°N 8.561577°E ± 100m, 18 June 2019, L, leg. HE, coll. NHMO; 59.5910908°N 8.5577975°E ± 200m, 18 June 2019, L, leg. ZF & AK, coll. NHMO; **AK,** Asker: Konglungen, Spirebukta, 59.833857°N 10.495969°E ± 8m, 3 June 2022, LMF, leg. HE, coll. NHMO; Oslo: Ellingsrud, 59.933969°N 10.919597°E ± 20m, 23 June 2020, L, leg. HE, coll. NHMO; Eidsvoll: Dølihagan, 60.284500°N 11.292072°E ± 10m, 25 June 2022, L, leg. TS, coll. NHMO; **SFI,** Aurland: Flåm, 60.857940°N 7.110750°E ± 1000m, 23 June 2019, L, leg. ZF & AK, coll. NHMO; **TRI,** Storfjord: Skibotndalen, Skibotn feltstasjon, 69.346631°N 20.363566°E ± 20m, 3 July 2019, L, leg. HE, coll. NHMO; 69.346932°N 20.352836°E ± 3m, 3 July 2019, L, leg. HE, coll. NHMO.

Biology: The white larvae develop gregariously in galled flower buds of *Ranunculus* spp. (Ranunculaceae). Our records are all from *R. acris*. Infected buds become slightly misshapen, develop brownish rot on the inside, and do not open. Apparently univoltine. Pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark. North-west Russia.

***Dasineura trifolii* (F. Löw, 1874)**

Material: AK, Oslo: Ellingsrud, 59.932462°N

10.920727°E ± 5m, 10 September 2022, on *Trifolium repens*, LMF, leg. HE, coll. NHMO.

Biology and notes: The yellowish to orange larvae develop in galled leaves of *Trifolium* spp. (Fabaceae). Infected leaves are folded up over the midrib and are slightly inflated along the midrib to form a shallow pouch, in which the larvae live. Multivoltine. The early generations pupate in the gall. The larvae of the last generation leave the gall to hibernate in the soil. The gall strongly resembles that of *Tricholaba trifolii*, but the latter does not have a pouch-like inflation. Both species seem to be common in southern Norway, but *Dasineura trifolii* possibly less so than *Tricholaba trifolii*. The species is redescribed in Skuhravá & Skuhravý (1960).

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland. Introduced to the USA.

***Dasineura ulmaria* (Bremi, 1847)**

Material: TEY, Porsgrunn: Åsstranda, 59.093124°N 9.646811°E ± 20m, 16 June 2019, L, leg. HE, coll. NHMO; **AK,** Oslo: Gressholmen, 59.880571°N 10.715979°E ± 7m, 1 July 2020, L, leg. HE, coll. NHMO; Lillestrøm: Branderud, Kongsrudveien 4, 59.983797°N 11.145042°E ± 3m, 12 July 2020, L, leg. TS, coll. NHMO; Fetsund, Jushaugen, 59.906664°N 11.150579°E ± 10m, 19 July 2020, L, leg. TS, coll. NHMO; Rælingen: Årnestangen, 59.893061°N 11.119756°E ± 50m, 13 July 2020, LI, leg. TS, coll. NHMO; **NSI,** Vefsn: Mosjøen sentrum, 65.842440°N 13.200932°E ± 5m, 15 July 2020, LMF, leg. HE, coll. NHMO; **NSY,** Gildeskål: Gildeskål kirke, 67.059360°N 14.040917°E ± 100m, 22 July 2019, LMF, leg. HE, BOLD: NHMO-ENT-548181, coll. NHMO.

Biology and notes: The orange larvae develop in leaf galls on *Filipendula ulmaria* and *F. lobata* (Rosaceae). Our records are all from *F. ulmaria*. Each larva develops in a small gall which forms a small dome on the upper side of the leaf and projects nozzle-like on the underside. Multivoltine. Pupation is known to take place inside the gall, but we have on several occasions also had mature larvae evacuating the galls and burrowing into the soil to pupate.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Russia to the Far East.

***Dasineura urticae* (Perris, 1840)**

Material: TEY, Kragerø: Stråholmen SE, 58.89985°N 9.64756°E ± 50m, 27 June 2019, L, leg. AF, BOLD: NHMO-ENT-548123, coll. NHMO; **AK,** Oslo: Skullerud, Smeden, 59.874709°N 9.050760°E ± 7m, 10 July 2022, LF, leg. HE, coll. NHMO; Ellingsrud, 59.934081°N 10.913179°E ± 5m, 13 September 2020, LMF, leg. HE, coll. NHMO; 59.923287°N 10.918551°E ± 100m, 4 July 2022, L, leg. HE, coll. NHMO; Ellingsrud, Munkebekken, 59.929579°N 10.914512°E ± 16m, 4 October 2020, LI, leg. HE, coll. NHMO.

Biology and notes: The white larvae develop in leaf galls on *Urtica dioica* and *U. urens* (Urticaceae). Our records are all from *U. dioica*. The base of the leaf is folded downwards to form a closed pouch. Often also other parts of the leaf blade or stem are affected. Multivoltine; pupation and hibernation in the soil. We have on several occasions found white larvae of *Macrolabis* sp. living together with *Dasineura urticae*. These may represent an undescribed species.

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland.

***Dasineura viciae* (Kieffer, 1888)**

Material: VE, Horten: Reverumpa, 59.43743°N 10.45587°E ± 50m, 24 August 2019, L, leg. AF, BOLD: NHMO-ENT-548145, coll. NHMO; **AK,** Oslo: Ellingsrud, Munkebekken, 59.929089°N 10.915504°E ± 20m, 17 August 2020, LMF, leg. HE, coll. NHMO.

Biology: The white larvae develop gregariously in galled leaflets of *Vicia* spp. (Fabaceae). Our records are from *V. sepium*. Infected leaflets are folded up over the midrib, forming a closed pod. Often also the internodes are shortened so that the leaflets form a dense knot. Bi- or multivoltine. Pupation and hibernation in the soil.

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland.

**** Dasineura violae* (Löw 1880)**

Material: VE, Stokke: Gjennestadvannet, 59.23475°N 10.23846°E ± 10m, 11 September 2019, on *Viola arvensis*, L, leg. AF, coll. Private; **AK,** Lillestrøm: Branderud, Kongsrudveien 4, 59.983537°N 11.145007°E ± 5m, 5 August 2021, on *Viola tricolor*, LI, leg. TS, coll. NHMO.

Biology: The orange-red larvae develop in galled leaves and shoots of *Viola* spp. (Violaceae). Infected plant organs form a dense bundle and are abnormally hairy. Bi- or multivoltine. Pupation in the gall.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland.

**** Dasineura vulgatiformiae* Sylvén, 1998**

Material: BØ, Drammen: Miletjern, 59.746477°N 10.041469°E ± 20m, 19 June 2019, on *Hieracium* section *Hieracium*, L, leg. ZF & AK, coll. NHMO.

Biology: The orange larvae develop in the capitula of *Hieracium* spp. (Asteraceae). Assumed to be univoltine. Pupation and hibernation probably in the soil.

Distribution: Only known from Norway and Sweden.

Genus *Geocrypta* Kieffer, 1913

The genus includes six species in the Palearctic region. They are gallers on plants in the families Campanulaceae, Fabaceae, Hypericaceae and Rubiaceae, and may attack either flowers, leaves, buds, stems, or roots.

***Geocrypta galii* (Loew, 1850)**

(Figure 37)

Material: VE, Færder: Hvasser, Krukehavn, 59.076776°N 10.452109°E ± 250m, 15 June 2019, L, leg. AF, coll. NHMO; **AK,** Oslo: Gressholmen, 59.885855°N 10.724669°E ± 20m, 1 July 2020, L, leg. HE, coll. NHMO.

Biology: The orange larvae develop in stem galls on a long range of *Galium* spp. (Rubiaceae). Our records are from *G. verum*. The galls are bladder-like and colored green to reddish. Several larvae per gall, but each in a separate chamber. Multivoltine; pupation and hibernation in the soil. The species is redescribed in Fedotova (1997).

Distribution: Widespread Palearctic, includ-

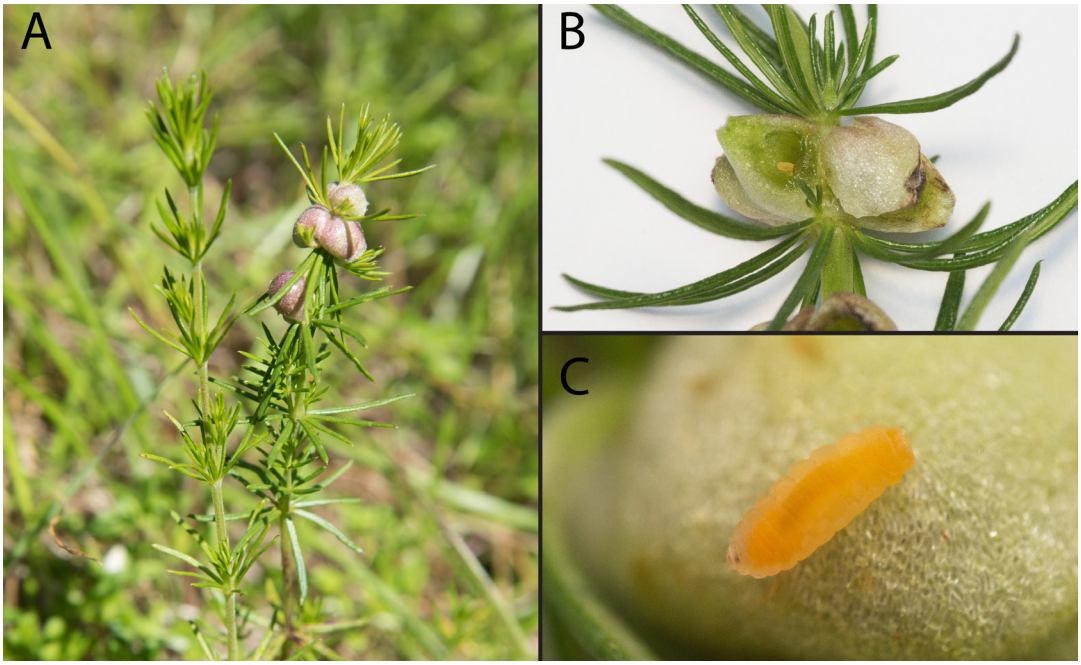

FIGURE 37. *Geocrypta galii*. **A.** Galled stem of *Galium verum*. **B.** Opened gall on *Galium verum*. **C.** Larva. Photos: H. Elven.

ing Norway, Sweden, Denmark and Finland.

Genus *Giraudiella* Rübsaamen, 1915

The genus includes two Palearctic species, one of which has also been introduced to the Nearctic. They develop on Poaceae and Cyperaceae respectively.

*** *Giraudiella inclusa* (Frauenfeld, 1862)**

(Figure 38)

Material: VE, Larvik: Rakke, 58.97805°N 10.02280°E ± 50m, 15 December 2019, L, leg. AF, coll. NHMO; Færder: Kjøye, 59.08710°N 10.39844°E ± 50m, 23 December 2019, L, leg. AF, coll. NHMO; **AK,** Asker: Sætrepollen, N of Grytnes, 59.678368°N 10.538581°E ± 50m, 31 October 2020, MF, leg. TS, coll. NHMO; Brønnøya, Sandbukta, 59.857333°N 10.528840°E ± 30m, 2 April 2019, F, leg. HE, coll. NHMO; Oslo: Frogner, Frognerkilen, 59.916498°N 10.689375°E ± 250m, 19 January 2020, LMF, leg. KB, coll. NHMO; Bogstadvannet, 59.967062°N 10.636685°E ± 30m, 2 February 2020, MF, leg. KB, coll. NHMO.

Biology and notes: The beige-white to pinkish larvae develop in stems of *Phragmites australis* (Poaceae). Each larva develops in a gall the size and shape of a rice grain fastened to the inner wall of the stem. It pupates in the gall and emerges through a small slit in the wall of the stem. Bivoltine. We have collected galls from late autumn to late spring and have several times hatched adults in the spring from overwintered galls.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. North Africa and Asia as far east as China. Introduced to the USA.

Genus *Iteomyia* Kieffer, 1913

The genus includes five species globally, all of which are gallers on leaves of *Salix*. We have had no success hatching this genus so far. One reason is that the galls, like those of *Harmandiola*, fail to open once they are picked, causing the larvae to be trapped inside.

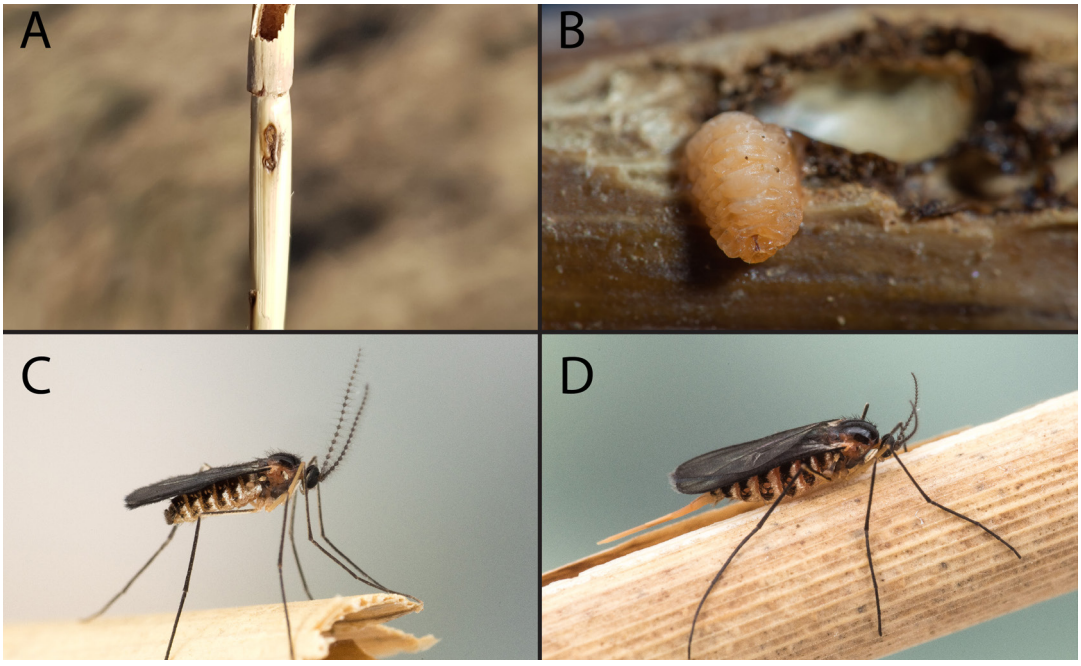

FIGURE 38. *Giraudiella inclusa*. **A.** Stem of *Phragmites australis*, with a slit-like opening revealing the existence of a gall within. **B.** Larva in opened gall. **C.** Male. **D.** Female. Photos: H. Elven (A, C, D), T. Starholm (B).

***Iteomyia capreae* (Winnertz, 1853)**
(Figure 39 A–B)

Material: AK, Oslo: Ellingsrud, Kjerringmyr, 59.925967°N 10.913982°E ± 20m, 4 September 2022, on *Salix aurita*, L, leg. HE, coll. NHMO; Nittedal: Hakadal, Burås, 60.114236°N 10.817595°E ± 7m, 9 July 2020, on *Salix caprea*, L, leg. HE, coll. NHMO; **NTI,** Levanger: Fætta, 63.564802°N 10.939929°E ± 5m, 14 July 2020, on *Salix caprea*, L, leg. HE, coll. NHMO; **NSI,** Vefsn: Mosjøen, Kippermoen, 65.834005°N 13.213303°E ± 10m, 27 July 2020, on *Salix caprea*, L, leg. HE, coll. NHMO.

Biology: The white, later orange or red larvae develop in leaf galls on a wide range of *Salix* spp. (Salicaceae). Each larva develops in a globular, up to 2 mm wide gall which protrudes equally on both sides of the leaf and has a circular exit on the underside. The galls are usually spread out over the surface of the leaf and for the most part do not coalesce. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland.

***Iteomyia major* (Kieffer, 1898)**
(Figure 39 C–D)

Material: NSI, Saltdal: Saltdalen, Dalmo, 66.873827°N 15.293076°E ± 50m, 16 July 2020, on *Salix myrsinifolia*, L, leg. HE, coll. NHMO; **NSY,** Gildeskål: Breivika, Breivikdalen, 66.997495°N 14.278931°E ± 4m, 22 July 2020, on *Salix lanata*, L, leg. HE, coll. NHMO.

Biology: The orange to red larvae develop in leaf galls on a wide range of *Salix* spp. (Salicaceae). Each larva develops in a globular, up to 5 mm wide gall which protrudes equally on both sides of the leaf and has a circular exit on the underside. Unlike the previous species, the galls are usually concentrated along the midrib or thick side veins and are usually fused together to form a single irregular gall structure. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark. Morocco.

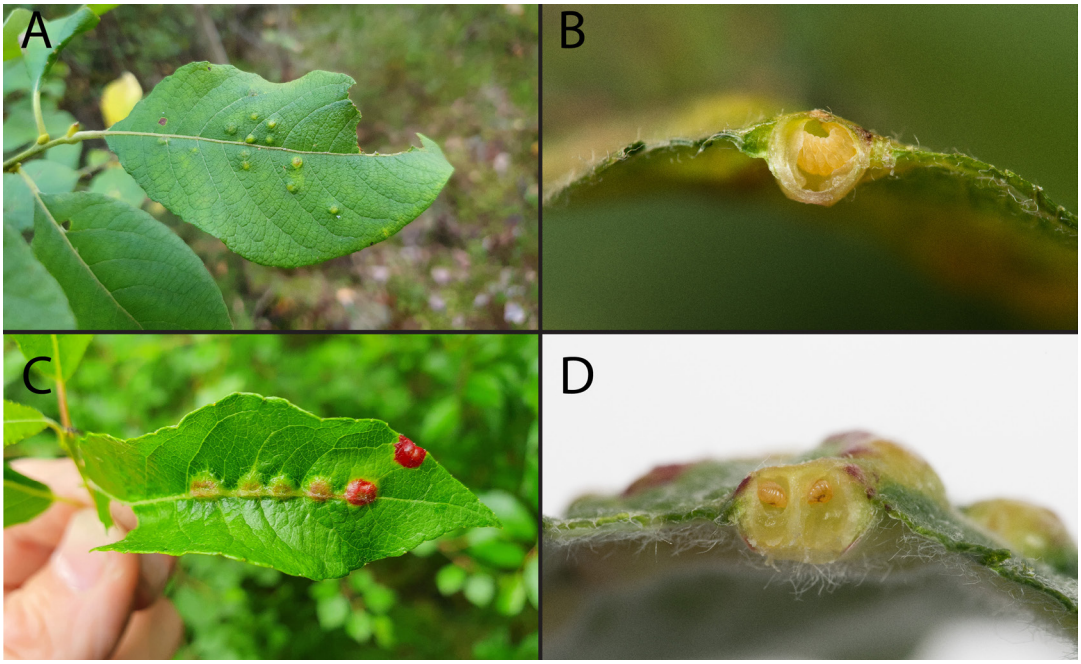

FIGURE 39. A–B. *Iteomyia capreae*. **A.** Leaf galls on *Salix caprea*. **B.** Larva in opened gall on *Salix aurita*. **C–D.** *Iteomyia major*. **C.** Leaf galls on *Salix myrsinifolia*. **D.** Larvae in opened galls on same. Photos: H. Elven.

Genus *Jaapiella* Rübsaamen, 1915

The genus includes 82 species globally. Most species are gallers, but some are inquilines in the galls of other species. The distinction between *Jaapiella* and *Dasineura* is fuzzy, and *Jaapiella* is likely not monophyletic.

*** *Jaapiella chelidonii* Fedotova, 2008**

(Figure 40)

Material: VE, Larvik: Kjose Stasjon, 59.10713°N 9.91824°E ± 50m, 2 August 2019, L, leg. AF, BOLD: NHMO-ENT-548132, coll. NHMO; **AK,** Asker: Brønnøya, Brønnøyveien 18, 59.857423°N 10.531147°E ± 20m, 4 June 2021, LMF, leg. HE, coll. NHMO; Brønnøya, Brønnøyveien 32, 59.853628°N 10.535436°E ± 5m, 4 June 2021, LMF, leg. HE, coll. NHMO.

Biology and notes: The white to pink or orange larvae develop gregariously in galled flower buds of *Chelidonium majus* (Papaveraceae). Infected buds are disfigured and do not open. The larval color is described as pink in the original description, but our larvae tended more towards orange. We collected larvae both in June and August. Larvae collected in June proceeded to hatch the same year without diapause. From this we infer that the species is at least bivoltine. Pupation takes place in the soil, and hibernation probably also takes place there.

Distribution: Known from Germany, Norway, Sweden, Denmark and Russia (Middle Volga region). Probably also from Serbia (Simova-Tošić *et al*. 2000).

*** *Jaapiella cirsiicola* Rübsaamen, 1916**

Material: VE, Færder: Mågerø, 59.15258°N 10.43235°E ± 50m, 25 August 2019, L, leg. AF, BOLD: NHMO-ENT-548146, coll. NHMO; **AK,** Aurskog-Høland: Bunes, Søndre Bunes, 59.650826°N 11.496856°E ± 25m, 4 July 2020, L, leg. TS, BOLD: NHMO-ENT-548082, coll. NHMO.

Biology: The red larvae develop freely in the capitulum of *Cirsium* spp. (Asteraceae). Our records are from *C. arvense*. Infected flowers become somewhat disfigured. Bivoltine; pupation and hibernation in the soil. The species is redescribed in Fedotova (1996) and Sylvén &

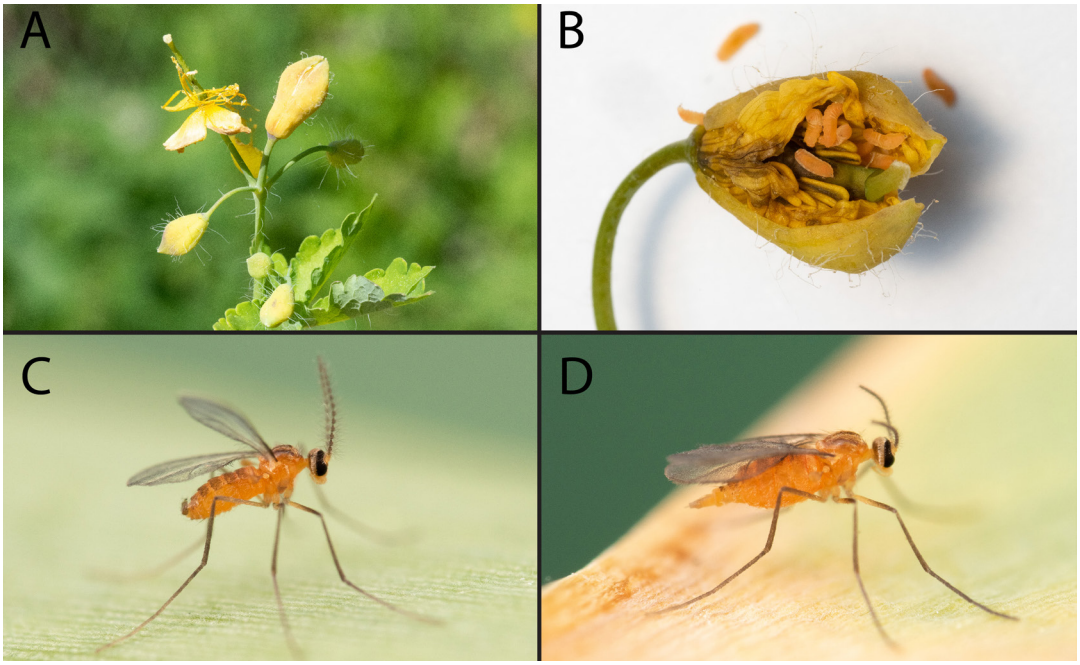

FIGURE 40. *Jaapiella chelidonii*. **A.** Galled flowers of *Chelidonium majus*. **B.** Larvae in opened gall **C.** Male. **D.** Female. Photos: H. Elven.

Lindberg (1998).

Distribution: Palearctic. Widespread in Europe including Norway, Sweden and Denmark. Introduced to the USA.

*** *Jaapiella floriperda* (Löw, 1888)**

Material: ON, Vågå: Fellese, 61.86764°N 9.05569°E ± 50m, 10 July 2019, on *Silene vulgaris*, 3L, leg. AF, BOLD: NHMO-ENT-548128, coll. NHMO.

Biology: The yellowish to red larvae develop gregariously in galled flower buds of *Silene* spp. (Caryophyllaceae). Infected buds are strongly swollen, disfigured, and do not open. Bi- or multivoltine. Pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway and Denmark. Kazakhstan.

*** *Jaapiella inflatae* (Rübsaamen, 1914)**

Material: TEI, Seljord: Flatdal, 59.5671667°N 8.5679167°E ± 20m, 18 June 2019, L, leg. SH, BOLD: NHMO-ENT-548112, coll. NHMO; **AK,** Frogn: Søndre Kaholmen, 59.674463°N 10.606679°E ± 250m, 11 July 2019, L, leg. HE, BOLD: NHMO-ENT-547968, coll. NHMO; **ON,** Vågå: Fellese, 61.86764°N 9.05569°E ± 50m, 10 July 2019, L, leg. AF, BOLD: NHMO-ENT-548129, coll. NHMO.

Biology and notes: This species is an inquiline in the galls of *Jaapiella floriperda* on *Silene* spp. (Caryophyllaceae). All our records are from *S. vulgaris*. Bi- or multivoltine. Pupation and hibernation in the soil. The larvae are distinguished from those of the host by being white rather than yellowish to red. This is not always a reliable distinguishing trait, as immature larvae of the host may also be white. We DNA barcoded one pink and three white larvae from three different samples and found that the pink and the white larvae were indeed different species. One sample (Vågå, Fellese) contained both species, while the two others contained only white larvae which then can be referred to *Jaapiella inflatae*.

Distribution: Only known from UK, Germany, Latvia and Norway.

*** *Jaapiella inulicola* Fedotova, 1993**

(Figure 41)

Material: AK, Oslo: Bleikøya, 59.890087°N 10.740885°E ± 4m, 3 July 2020, LMF, leg. TS & HE, BOLD: NHMO-ENT-548062,548063, 548065,548066, coll. NHMO; 59.890437°N 10.742977°E ± 3m, 3 July 2020, LMF, leg. TS & HE, BOLD: NHMO-NT-548068,548069,548074,548075, 548077,548078, coll. NHMO.

Biology and notes: The pink to orange larvae develop in the capitula of *Pentanema salicinum* (Asteraceae). Infected flowers do not show outward signs of damage. Pupation and hibernation take place in the soil. We collected larvae in July. Some of these proceeded to hatch without diapause, whereas the majority hatched after hibernation. This indicates that the species is at least partly bi- or multivoltine. From the same flowers, we hatched at least three other species of gall midge. These await further examination, but one species belonged to *Clinodiplosis*, whereas the remaining species may be predators and/or fungivores.

Distribution: Only known from Norway, Sweden, Denmark and Kazakhstan.

*** *Jaapiella moraviae* (Wachtl, 1883)**

Material: AK, Lillestrøm: Lillestrøm, Åråsen, 59.966081°N 11.064653°E ± 10m, 9 June 2020, LMF, leg. TS, BOLD: NHMO-ENT-548029,548240, coll. NHMO.

Biology: The yellowish to red larvae develop gregariously in galled flower buds of *Viscaria vulgaris* (Caryophyllaceae). Infected buds are inflated and do not open. Univoltine; pupation and hibernation in the soil.

Distribution: Only known from the Czech Republic and Norway.

*** *Jaapiella rubicundula* (Rübsaamen, 1891)**

Material: VE, Færder: Hvasser, Krukehavn, 59.076776°N 10.452109°E ± 250m, 15 June 2019, on *Rumex acetosa*, LF, leg. HE, coll. NHMO; **SFI,** Aurland: Flåm, 60.857940°N 7.110750°E ± 1000m, 22-23 June 2019, on *Rumex acetosella* and *Rumex acetosa*, LI, leg. ZF & AK, coll. NHMO.

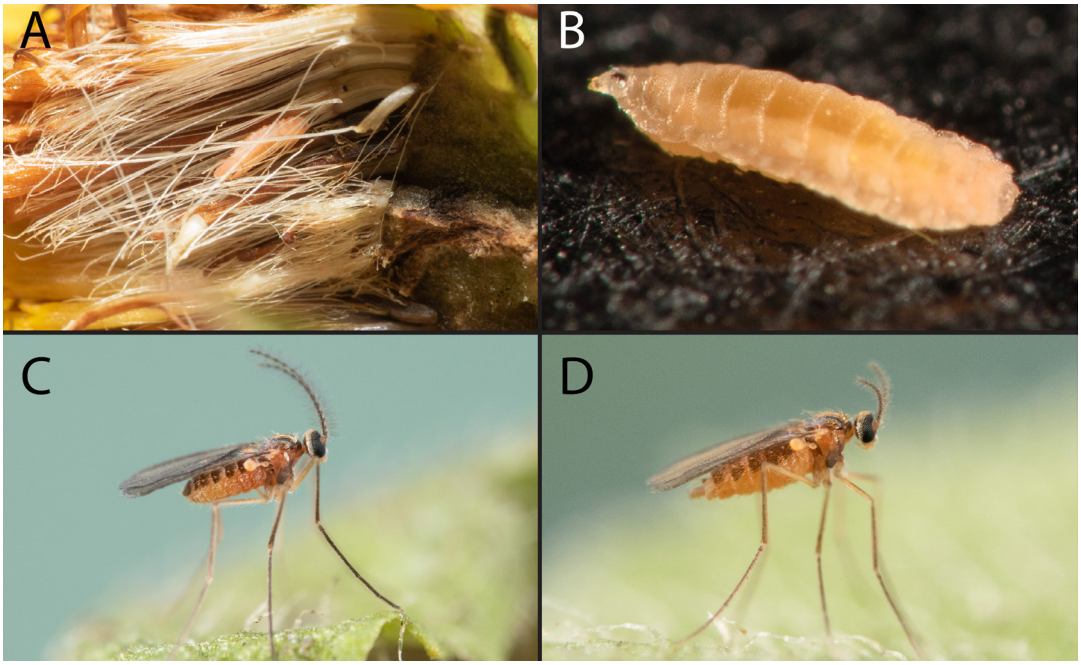

FIGURE 41. *Jaapiella inulicola*. **A.** Larva in capitulum of *Pentanema salicinum*. **B.** Larva. **C.** Male. **D.** Female. Photos: T. Starholm (A, B), H. Elven (C, D).

Biology: The reddish larvae develop solitarily in galled flower buds of *Rumex acetosa* and *R. acetosella* (Polygonaceae). Infected buds remain closed. At least bivoltine. Pupation and hibernation in the soil.

Distribution: Known from a few European countries and from the European part of Russia. In Fennoscandia only known from Norway.

**** Jaapiella schmidti* (Rübsaamen, 1912)**

Material: VE, Færder: Hvasser, Krukehavn, 59.076776°N 10.452109°E ± 250m, 15 June 2019, on *Plantago lanceolata*, LMF, leg. ZF, AK & HE, BOLD: NHMO-ENT-548163, coll. NHMO.

Biology: The orange-red larvae develop in the inflorescences of *Plantago* spp. (Plantaginaceae). Each larva infects a single flower, feeding on the fruit. Bi- or multivoltine. Pupation and hibernation believed to always take place in the gall.

Distribution: Widespread in Europe including Norway, Sweden and Denmark. European part of Russia.

***Jaapiella veronicae* (Vallot, 1827)**

Material: AK, Oslo: Gressholmen, 59.883430°N 10.717753°E ± 5m, 1 July 2020, L, leg. HE, coll. NHMO; Ellingsrud, Munkebekken, 59.928726°N 10.914517°E ± 10m, 29 June 2020, LPI, leg. HE, coll. NHMO; 59.928742°N 10.914625°E ± 5m, 30 September 2020, I, leg. HE, coll. NHMO; Lillestrøm: Branderud, S of Nilserud, 59.985434°N 11.143212°E ± 10m, 6 June 2020, LMF, leg. TS, BOLD: NHMO-ENT-548026,548237, coll. NHMO.

Biology: The orange larvae develop gregariously in galled shoots and buds of *Veronica* spp. (Plantaginaceae). Our records are all from *V. chamaedrys*. Infected shoots are inflated and often hairy. Several overlapping generations per year. Some larvae pupate in the gall in a white cocoon, whereas others leave the gall to hibernate in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. European part of Russia, Georgia and Kazakhstan.

Genus *Lathyromyza* Rübsaamen, 1915.
The genus includes four species, all restricted to the Palearctic region. The three species where the biology is known are all associated with Fabaceae.

*** *Lathyromyza abruptis* Fedotova, 1991**

Material: AK, Oslo: Ellingsrud, Munkebekken, 59.928824°N 10.915811°E ± 50m, 2 August 2021, LMF, leg. HE, coll. NHMO; Lillestrøm: Jørholmen, Furusand, 59.887666°N 11.175715°E ± 10m, 22 June 2020, L, leg. TS, BOLD: NHMO-ENT-548037, coll. NHMO; Lillestrøm, Åråsen, 59.965965°N 11.064628°E ± 10m, 22 June 2020, L, leg. TS, BOLD: NHMO-ENT-548040, coll. NHMO; 59.966103°N 11.064959°E ± 20m, 22 June 2020, L, leg. TS, BOLD: NHMO-ENT-548046, coll. NHMO; Aurskog-Høland: NW of Salstrokken, 59.671296°N 11.486692°E ± 5m, 28 June 2020, L, leg. ØH, BOLD: NHMO-ENT-548049, coll. NHMO; **ON,** Sel: Nord-Sel, 61.848390°N 9.430970°E ± 4m, 13 July 2020, LMF, leg. HE, coll. NHMO.

Biology and notes: The pinkish larvae develop gregariously in flowers of *Vicia cracca* (Fabaceae). They do not appear to cause visible galling. In some cases, we have found the species together with *Contarinia craccae*, but it is not clear whether they occupied the same or different flowers. Some of the larvae proceeded to hatch without diapause, while others hatched after hibernation, indicating that the species is bi- or multivoltine. Pupation and hibernation take place in the soil.

Distribution: Known only from Kazakhstan and Norway.

*** *Lathyromyza florum* Rübsaamen, 1916**

Material: AK, Oslo: Ellingsrud, Munkebekken, 59.928623°N 10.915441°E ± 100m, 19 June 2020, LI, leg. HE, coll. NHMO; 59.928298°N 10.914295°E ± 10m, 29 June 2020, LI, leg. HE, coll. NHMO; Gjerdrum: Fløtten, 60.030831°N 11.044011°E ± 50m, 25 June 2020, L, leg. TS, BOLD: NHMO-ENT-548047, coll. NHMO.

Biology and notes: The red larvae live gregariously in galled flower buds of *Lathyrus pratensis* and *L. sylvestris* (Fabaceae). Our records are from *L. pratensis*. Infected flowers are swollen and remain closed. Bivoltine; pupation and hibernation in the soil. It should be noted that we did not notice any galling of the flowers in our samples, and the larvae were white to slightly yellow or pink rather than red. However, the habitus of the adults matches *Lathyromyza*, and the three species of *Lathyromyza* grouped together in the barcoding tree.

Distribution: Known only from the Czech Republic, Germany, Norway, Denmark and the Middle Volga region in Russia.

***Lathyromyza schlechtendali* (Kieffer, 1886)**
(Figure 42)

Material: Ø, Marker: Store Le, Rørvik Camping, 59.370086°N 11.740893°E ± 20m, 25 May 2019, LPMF, leg. HE, coll. NHMO; **AK,** Lørenskog: Møllerstua, 59.917318°N 10.918886°E ± 10m, 7 June 2020, LI, leg. HE, coll. NHMO; Lillestrøm: Branderud, S of Nilserud, 59.985576°N 11.143346°E ± 25m, 6 June 2020, L, leg. TS, BOLD: NHMO-ENT-548027, coll. NHMO; S of Stampetjernet, 59.985942°N 11.144571°E ± 10m, 27 August 2020, L, leg. TS, coll. NHMO; 30 August 2020, L, leg. TS, coll. NHMO.

Biology: The white to pink larvae develop gregariously in galled leaves of *Lathyrus* spp. and *Vicia cracca* (Fabaceae). Our records are from *Lathyrus linifolius*. The leaflets are rolled upwards to form a loose spool. Bivoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark. Kazakhstan and parts of Russia (Middle Volga region, Western Siberia).

Genus *Macrolabis* Kieffer, 1892
The genus includes 214 species and is almost entirely restricted to the Palearctic region. Most species are inquilines in the galls of other gall midges, while some are independent gall makers. The adult males have conspicuously large genitalia. We have barcoded 10 specimens of *Macrolabis* collected from seven different plants/galls. Of these, *M. fagicola* Barnes, 1939, nested far from the others in the barcoding tree,

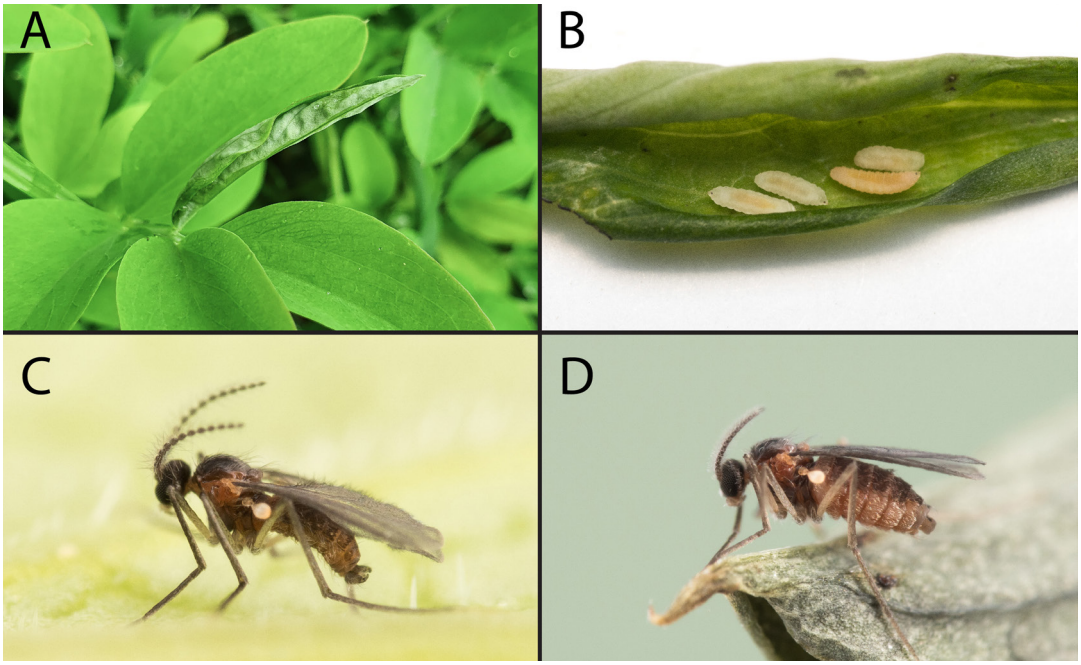

FIGURE 42. *Lathyromyza schlechtendali*. **A.** Galled leaf of *Lathyrus linifolius*. **B.** Larvae in opened gall. **C.** Male. **D.** Female. Photos: H. Elven.

indicating that it may not belong in *Macrolabis*. This is discussed further under the species.

***Macrolabis achilleae* Rübsaamen, 1893**

Material: AK, Lillestrøm: Leirsund, SW of Haugli, 59.998878°N 11.095266°E ± 10m, 6 July 2020, on *Achillea millefolium*, L, leg. TS, coll. NHMO; **NSI,** Vefsn: Fustvatnet, Aspnes, 65.907643°N 13.361411°E ± 100m, 18 July 2019, on *Achillea ptarmica*, L, leg. HE, BOLD: NHMO-ENT-547975, coll. NHMO; **TRI,** Storfjord: Skibotn, Okseneset, 69.384626°N 20.260924°E ± 300m, 6 July 2019, on *Achillea millefolium*, MF, leg. HE, BOLD: NHMO-ENT-548176, coll. NHMO.

Biology and notes: The yellow larvae live freely in the capitula of *Achillea millefolium* and *A. ptarmica* (Asteraceae). Infected capitula are not visibly damaged. Univoltine. The species is previously known only from *A. millefolii*, but we have also found it on *A. ptarmica*, which thus represents a new host plant. Barcoding of specimens from both plants confirms that the midges belong to the same species.

Distribution: Widespread in Europe including Norway and Denmark.

*** *Macrolabis cirsii* (Rübsaamen, 1890)**

Material: NSI, Vefsn: Fustvatnet, Aspnes, 65.907643°N 13.361411°E ± 100m, 18 July 2019, on *Cirsium heterophyllum*, 2L, leg. HE, BOLD: NHMO-ENT-547974, coll. NHMO.

Biology and notes: The yellow larvae live freely in the capitula of *Cirsium* spp. (Asteraceae). Infected capitula show little or no outward sign of damage. Our larvae were white, but this is likely because they were immature. DNA barcoding of one specimen placed it with *Macrolabis*.

Distribution: Known from several European countries including Norway and Finland.

*** *Macrolabis fagicola* Barnes, 1939**

(Figure 43)

Material: AK, Oslo: Blindern, 59.939755°N 10.718249°E ± 10m, 27 August 2019, M, leg. HE, BOLD: NHMO-ENT-548004,548209, coll. NHMO; 59.938950°N 10.720803°E ± 40m, 15 August 2022, LMF, leg. HE, coll. NHMO; Sagene,

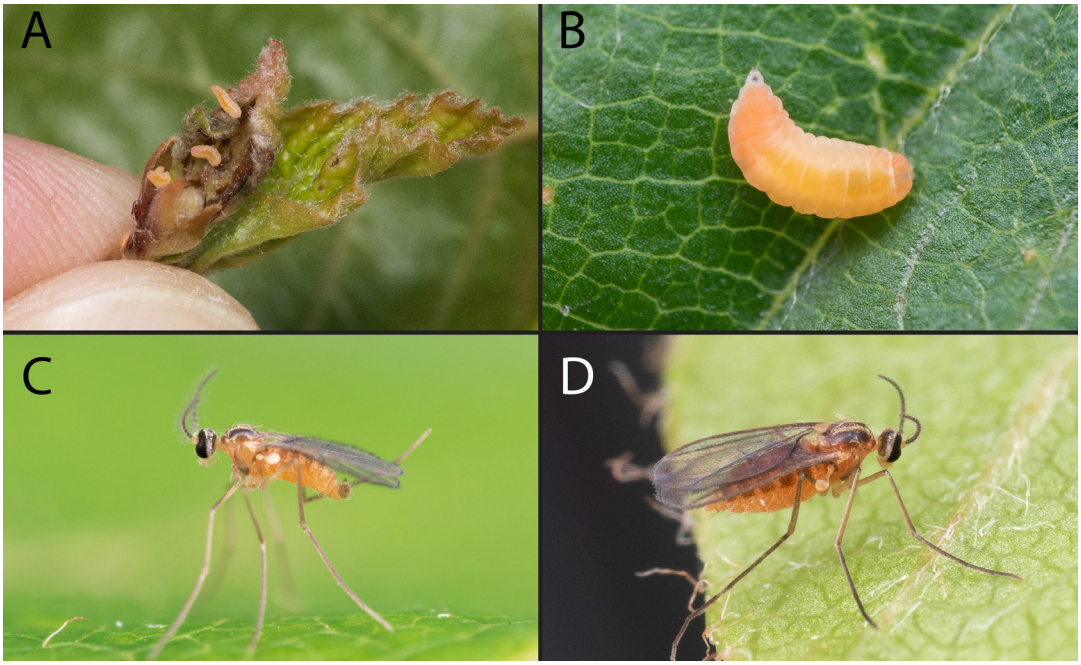

FIGURE 43. *Macrolabis fagicola*. This species is an inquiline in the galls of *Contarinia fagi* on *Fagus sylvatica*. It is currently placed in the genus *Macrolabis*, but our DNA barcoding indicates a placement in *Dasineura*. **A.** Larvae in the gall of the host. **B.** Larva. **C.** Male. **D.** Female. Photos: H. Elven.

Nordre gravlund, 59.936448°N 10.745104°E ± 80m, 15 August 2022, 5L1F, leg. HE, coll. NHMO.

Biology and notes: The larvae live as inquilines in the shoot galls of *Contarinia fagi* on *Fagus sylvatica* (Fagaceae). Bi- or multivoltine; pupation and hibernation in the soil. We collected larvae in the autumn, and some proceeded to hatch the same year without diapause, whereas others hibernated and hatched in the spring. The color of the larvae has not previously been described, but our larvae were pale pink to orange, reddening towards the ends (Figure 43 B). The larvae were furthermore broad and very dull due to dense microsculpture. This species nested far from other *Macrolabis* in our barcode tree, grouping instead with *Dasineura*. Already in the original description, Barnes (1939) pointed out that this species has traits connecting it to both *Macrolabis* and *Dasineura*. The adult males have the enlarged gonocoxites typical of *Macrolabis*, but the flagellomeres in the male antennae have short but distinct necks, a trait found in a.o. *Dasineura* but not in *Macrolabis*. Barnes (1939) himself tentatively placed the species in *Dasineura*. Möhn (1961) later erected a new genus for it, *Schueziella* Möhn, 1961, and proposed that it stood close to *Macrolabis*. Gagné (2004) subsequently synonymized *Schueziella* with *Macrolabis*. Although our barcode tree does not constitute a rigid phylogeny, it lends support to Barnes' original suspicion that this species belongs in *Dasineura*.

Distribution: Known from several European countries including Norway, Sweden and Denmark.

*** *Macrolabis incolens* Rübsaamen, 1895**

Material: AK, Oslo: Ellingsrud, Munkebekken, 59.928742°N 10.914625°E ± 5m, 30 September 2020, M, leg. HE, coll. NHMO.

Biology and notes: The white to whitish yellow larvae are inquilines in the shoot galls of *Jaapiella veronicae* on *Veronica chamaedrys* (Plantaginaceae). Bivoltine; pupation and hibernation in the soil. Our sample was collected

in late autumn, but both host and inquiline proceeded to hatch directly without diapause.

Distribution: Known from several European countries including Norway, Sweden and Denmark. European part of Russia.

***Macrolabis luceti* Kieffer, 1899**

Material: VE, Larvik: Stavern, 58.992262°N 10.032930°E ± 250m, 23 July 2021, on *Rosa canina*, 1L, leg. SH, coll. NHMO; **AK,** Asker: Brønnøya, Sandbukta, 59.857474°N 10.529078°E ± 50m, 28 July 2021, on *Rosa* sp., LMF, leg. HE & SH, coll. NHMO.

Biology and notes: The white larvae live as inquilines in the galls of *Dasineura rosae* on *Rosa* spp. (Rosaceae). Bi- or multivoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway and Denmark.

*** *Macrolabis pavida* (Winnertz, 1853)**
(Figure 44)

Material: AK, Asker: Konglungen, Spirebukta, 59.832968°N 10.495180°E ± 5m, 3 June 2022, LMF, leg. HE, coll. NHMO.

Biology and notes: The white larvae live as inquilines in the leaf galls of *Dasineura acrophila* on *Fraxinus excelsior* (Oleaceae). They can be distinguished from the larvae of the host by having beige rather than green gut content (Figure 44 A–B). Univoltine; pupation and hibernation in the soil. We have collected the host *Dasineura acrophila* several times but have only encountered this inquiline once. In that one case, the inquiline was far more numerous in the galls than the host, outnumbering the host about six to one. In the same galls, both red and white predatory gall midge larvae were found. The red larvae were observed attacking the larvae of *M. pavida*. The material of predators has not been examined more closely though. The larvae of *M. pavida* hibernated before hatching.

Distribution: Known from several European countries including Norway and Sweden.

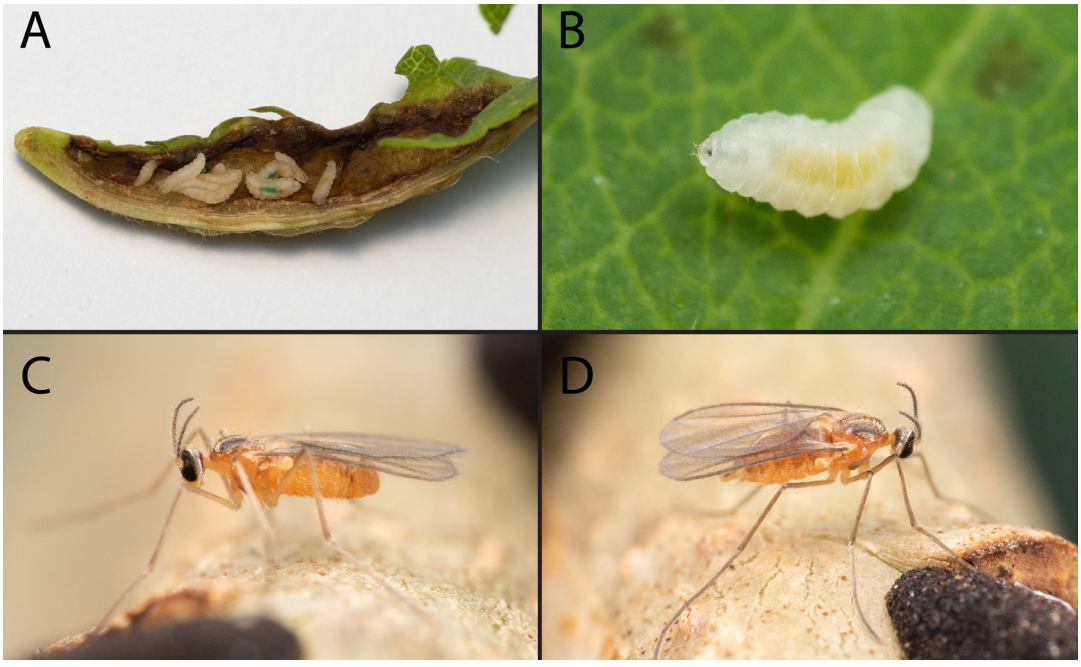

FIGURE 44. *Macrolabis pavida*. This species is an inquiline in the galls of *Dasineura acrophila* on *Fraxinus excelsior*. **A.** Larvae in the opened gall of the host. The larvae with green gut content belong to the host. **B.** Larva. **C.** Male, with the large gonocoxites typical of the genus. **D.** Female. Photos: H. Elven.

*** *Macrolabis vicicola* Stelter, 1992**

Material: VE, Horten: Reverumpa, 59.43743°N 10.45587°E ± 50m, 24 August 2019, L, leg. AF, BOLD: NHMO-ENT-548144, coll. NHMO; **AK,** Oslo: Ellingsrud, Munkebekken, 59.929089°N 10.915504°E ± 20m, 17 August 2020, LMF, leg. HE, coll. NHMO.

Biology and notes: The white larvae are inquilines in leaf galls of other midge species on *Vicia* spp. (Fabaceae). Apparently, it can inhabit the galls of several species, including *Dasineura spadicea* and *D. viciae*. We here report the species from leaf galls of *Dasineura viciae* on *Vicia sepium*.

Distribution: Known only from the Czech Republic, Germany, Norway and Denmark.

Genus *Mikiola* Kieffer, 1896

The genus includes four species and is restricted to the Palearctic. All species are gallers on *Fagus* (Fagaceae).

***Mikiola fagi* (Hartig, 1839)**

(Figure 45)

Material: VE, Færder: Hvasser, Kvieveien, 59.07917°N 10.44670°E ± 10m, 15 September 2022, L, leg. AF, coll. Private; **AK,** Oslo: Blindern, 59.938941°N 10.720767°E ± 50m, 8 August 2019, L, leg. HE, BOLD: NHMO-ENT-547997, coll. NHMO; 59.938666°N 10.719786°E ± 10m, 12 September 2019, L, leg. HE, coll. NHMO; 59.938453°N 10.720348°E ± 5m, 18 August 2020, L, leg. HE, coll. NHMO; 16 September 2020, L, leg. HE, coll. NHMO; 59.938766°N 10.720454°E ± 5m, 8 September 2020, L, leg. HE, coll. NHMO; 59.938679°N 10.720198°E ± 30m, 23 September 2021, L, leg. HE, coll. NHMO; 59.938941°N 10.720767°E ± 50m, 17 October 2022, LPMF, leg. HE, coll. NHMO.

Biology and notes: The white larvae develop individually in pointed, bottle shaped galls on the upper side of the leaves of *Fagus sylvatica* (Fagaceae). The galls form in early spring, but the larvae do not mature until the fall. In late autumn, the galls detach from the leaves and fall on the

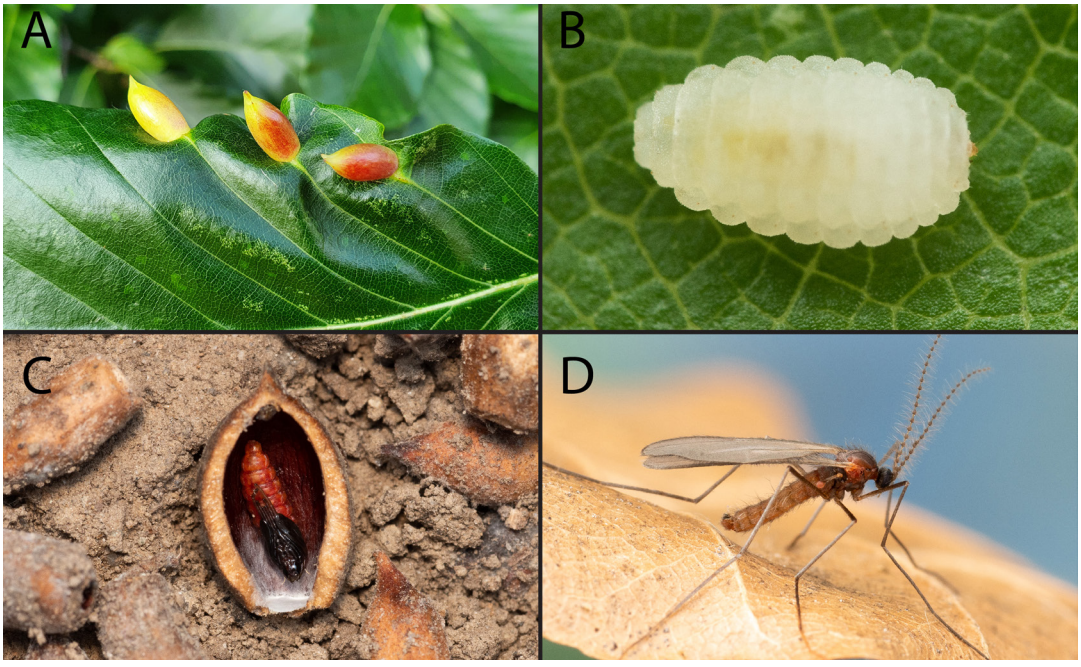

FIGURE 45. *Mikiola fagi*. This species is alien in Norway. **A.** Leaf galls on *Fagus sylvatica*. **B.** Larva extracted from gall. **C.** Opened gall with pupa. **D.** Male. Photos: H. Elven.

ground, and the larvae pupate and hibernate in the galls. We have tried to hatch this species several times, but we were unsuccessful as long as we brought the hatching cups inside in late winter to force hatching. When the cups were left outside until spring, we succeeded. Hatching then took place in the beginning of April when there was still a good layer of snow on the ground. This species was published new to Norway by Hagen *et al*. (2012), who in 2012 found it in two undisclosed sites in the Oslo area. At one site (a plant nursery), they found it on imported beeches intended for sale. At the other site (an island), they found it in large numbers on (presumably) planted beeches. The species has since been recorded several places along both sides of the Oslo Fiord, in Rogaland, in Vestlandet and in Møre & Romsdal.

Distribution: Western Palearctic. Widespread in Europe including Norway, Sweden, Denmark and Finland. Although native to Europe, the species has most likely been introduced to Norway with plant import, and it is thus an alien species in Norway.

Genus *Oligotrophus* Latreille, 1804

The genus includes ten species in the Holarctic region, all of which are gallers on *Juniperus* (Cupressaceae). The genus is revised in Harris *et al*. (2006).

***Oligotrophus juniperinus* (Linnaeus, 1758)**

(Figure 46)

Material: VE, Færder: Hvasser, Krukehavn, 59.076776°N 10.452109°E ± 250m, 15 June 2019, L, leg. HE, coll. NHMO; **AK,** Oslo: Ellingsrud, Munkebekken, 59.928740°N 10.912298°E ± 25m, 6 April 2020, L, leg. HE, coll. NHMO; Ellingsrud, 59.932185°N 10.905159°E ± 5m, 1 January 2022, LFM, leg. HE, coll. NHMO; Djupdalen, 59.952077°N 10.950801°E ± 6m, 19 March 2020, L, leg. HE, coll. NHMO; Lillestrøm: Branderud, 59.982254°N 11.144906°E ± 5m, 29 May 2020, PF, leg. TS, BOLD: NHMO-ENT-548230, coll. NHMO; **OS,** Etnedal: Jomfruslettfjellet, 61.041793°N 9.674305°E ± 100m, 4 October 2022, L, leg. HE, coll. NHMO; **TRI,** Storfjord: Skibotndalen, Lullefjellet, 69.303553°N 20.440693°E ± 700m, 4 July 2019, L, leg. HE,

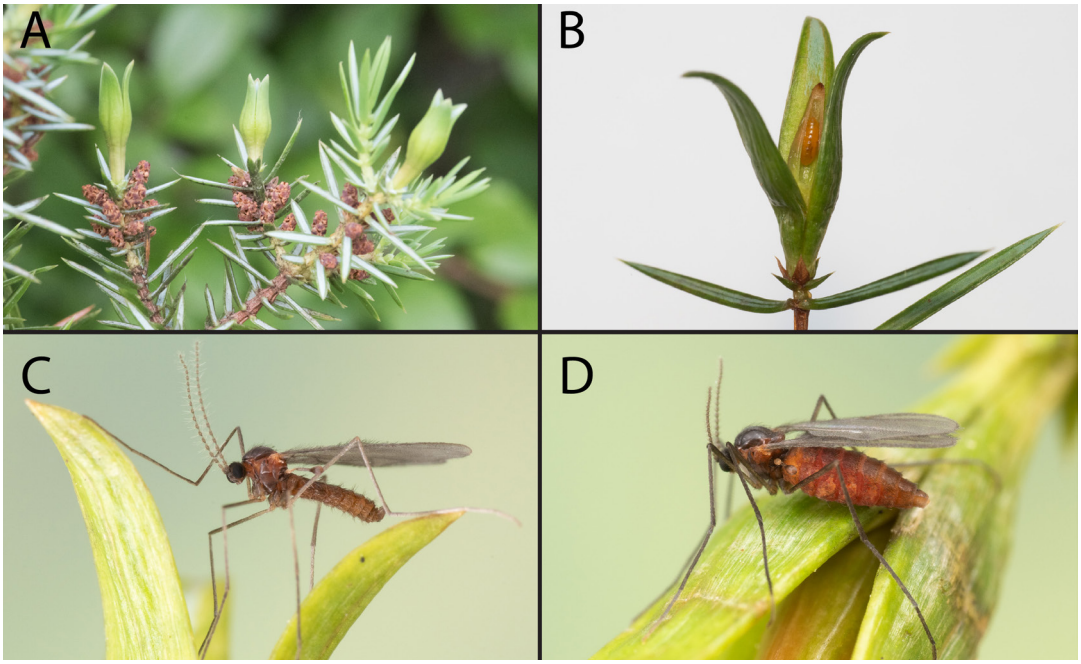

FIGURE 46. *Oligotrophus juniperinus*. **A.** Shoot galls on *Juniperus communis*. **B.** Opened gall with immature larva. **C.** Male. **D.** Female. Photos: H. Elven.

coll. NHMO; **NSY,** Gildeskål: Sund, Sundsvannet, 67.060049°N 14.066206°E ± 5m, 20 July 2019, L, leg. HE, BOLD: NHMO-ENT-547976, coll. NHMO; 67.059823°N 14.065962°E ± 6m, 25 July 2020, L, leg. HE, coll. NHMO.

Biology and notes: The orange larvae produce bottle-shaped galls on lateral and terminal shoots of *Juniperus communis* (Cupressaceae). Each gall consists of an inner and an outer whorl of needles, each made up of three needles. The three outer needles are broad and have diverging tips. The inner ones are more or less fused, forming a central chamber for the larva. Univoltine; the larva hibernates in the gall and pupates there in the spring. This species is extremely common all over Norway. A second species of the genus, *Oligotrophus panteli* Kieffer, 1898, was recorded in Norway by Skuhravá & Skuhravý (2012). Several other species of *Oligotrophus* may occur in Norway.

Distribution: Western Palearctic. Widespread in Europe including Norway, Sweden, Denmark and Finland. More common at high altitudes and high latitudes.

Genus *Physemocecis* Rübsaamen, 1914

The genus includes only two species and is restricted to Europe and the Middle East. The species are gallers on *Tilia* spp. (Malvaceae) and *Ulmus* spp. (Ulmaceae) respectively.

***Physemocecis ulmi* (Kieffer, 1909)**

(Figure 47)

Material: AK, Bærum: Fornebu, Rolfstangen, 59.890374°N 10.633679°E ± 10m, 18 June 2022, 3L, leg. HE & TS, coll. NHMO; Oslo: Gressholmen, 59.884572°N 10.721779°E ± 7m, 1 July 2020, 5L, leg. HE, coll. NHMO; Lillestrøm: Lillestrøm, Åråsen, 59.965767°N 11.064616°E ± 6m, 22 June 2020, 4L, leg. TS, BOLD: NHMO-ENT-548039, coll. NHMO; 59.966010°N 11.064613°E ± 20m, 29 June 2020, 2L, leg. TS, BOLD: NHMO-ENT-548054, coll. NHMO.

Biology and notes: The white larvae develop in lenticular leaf galls on *Ulmus* spp. (Ulmaceae). Our records are all from *Ulmus glabra*. The gall protrudes slightly on the upper side of the leaf and is surrounded by a yellowish ring, which often develops only after the larva has left the gall. Univoltine; pupation and hibernation in the soil. One of our larvae was barcoded. Surprisingly, it nested among *Macrolabis* in the barcode tree.

Distribution: Widespread in Europe including Norway, Sweden and Denmark.

Genus *Piceacecis* Gagné 2014

This genus includes two species; one restricted to the Nearctic, and one native to Europe but introduced to the USA. The species are gallers on *Picea* spp. The genus is reviewed in Gagné & Graney (2014).

**** Piceacecis abietiperda* (Henschel, 1880)**

Material: VE, Færder: Mågerø, 59.14901°N 10.43672°E ± 50m, 25 November 2019, L, leg. AF, coll. NHMO.

Biology: The orange to red larvae develop in multichambered swellings on young twigs of

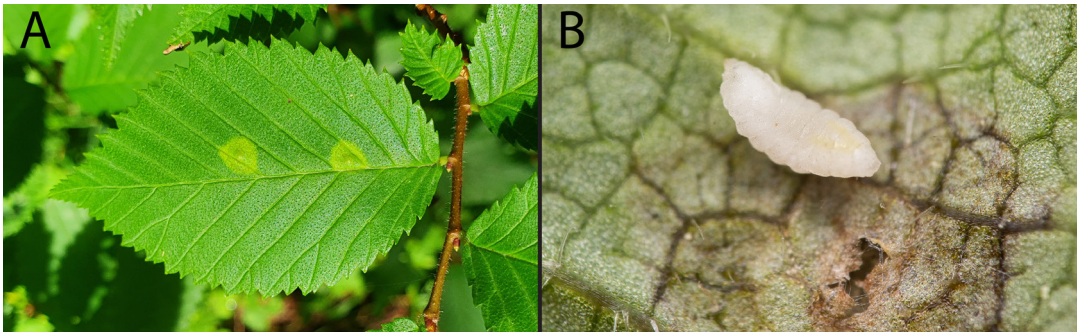

FIGURE 47. *Physemocecis ulmi*. **A.** Galled leaf of *Ulmus glabra*. **B.** Larva outside gall (exit hole visible below it). Photos: H. Elven.

Picea abies (Pinaceae). Univoltine; hibernation in the gall.

Distribution: Widespread in Europe including Norway and Denmark. Japan. Introduced to the USA.

Genus *Rabdophaga* Westwood, 1847

The genus includes 77 species from the Holarctic region. All species except two are associated with *Salix* (Salicaceae). Most species form galls in the stems, shoots or buds of the host plant. Some live as inquilines in the galls of other species of *Rabdophaga*. We have collected and reared *Rabdophaga* from a wide variety of galls from a range of *Salix* species. Unfortunately, most of this material has not yet been identified, and the task is made difficult by the large number of candidate species. Only a few specimens have so far been attempted barcoded, and barcoding failed for all of them. For this reason, only four species of *Rabdophaga* are reported in this paper. Large rosette galls found on a variety of *Salix* species are generally believed to belong to *Rabdophaga rosaria* (Loew, 1850). Whether *R. rosaria* truly is a single species or a complex of species remains to be properly investigated. The galls of *R. rosaria* are also home to many inquilines belonging to both *Rabdophaga* and other midge genera. The host larva occupies a chamber centrally in the rosette, while the inquilines live either between the leaves in the periphery of the rosette, or inside the wooden substance at its base. In the following, we have treated all larger rosette galls from various species of *Salix* as belonging to *Rabdophaga rosaria*, provided we were able to secure the primary galler from the central chamber. From the same galls we have also obtained numerous inquilines. These are not reported at this time but have been kept for further study.

***Rabdophaga iteobia* (Kieffer, 1890)**

Material: Ø, Indre Østfold: Trøgstad, Gravstjern, 59.633786°N 11.334418°E ± 10m, 4 August 2022, on *Salix caprea*, 12L, leg. HE, coll. NHMO.

Biology: The orange larvae develop gregariously in galled shoots of *Salix* spp. (Salicaceae). The leaves of the infected shoots are more or less bundled together, though without forming a proper "willow rose", and are abnormally hairy. Univoltine; pupation and hibernation in the soil.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland.

***Rabdophaga marginemtorquens* (Bremi, 1847)**

Material: STI, Røros: Killingdalen, Sjursvollen, 62.750150°N 11.431276°E ± 3m, 29 July 2020, on *Salix lapponum*, LMF, leg. HE, coll. NHMO.

Biology: The yellowish to orange larvae develop gregariously in downward leaf rolls on a range of *Salix* spp. (Salicaceae). The leaf rolls are often miscolored red. Bi- or multivoltine. Pupation in the gall.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Kazakhstan and possibly Japan.

***Rabdophaga rosaria* (Loew, 1850)**

(Figure 48)

Material: AK, Oslo: Ellingsrud, 59.929119°N 10.922717°E ± 50m, 16 March 2019, on *Salix myrsinifolia*, 2L, leg. HE, coll. NHMO; 59.934042°N 10.912729°E ± 4m, 22 April 2022, on *Salix caprea*, 2P2F, leg. HE, coll. NHMO; Ellingsrud, Dammen, 59.916141°N 10.916457°E ± 200m, 2 February 2020, on *Salix myrsinifolia*, 10L1F, leg. HE, coll. NHMO; 59.912015°N 10.914252°E ± 250m, 7 April 2020, on *Salix myrsinifolia*, LPMF, leg. HE, coll. NHMO; Ellingsrud, Munkebekken, 59.930954°N 10.911424°E ± 10m, 18 March 2021, on *Salix myrsinifolia*, 3L1P2F, leg. HE, coll. NHMO; Ellingsrud, Solberg, 59.924384°N 10.919133°E ± 10m, 27 March 2021, on *Salix myrsinifolia*, 1M1F, leg. HE, coll. NHMO; Ellingsrud, Nuggerud, 59.917136°N 10.916639°E ± 300m, 7 August 2022, on *Salix myrsinifolia*, 15L, leg. HE, coll. NHMO; Lørenskog: Losby, Sagenga, 59.881757°N 10.988064°E ± 100m, 11 April 2021, on *Salix myrsinifolia*, 2L1P1M2F, leg. HE, coll. NHMO; Mønevann, 59.871258°N 10.990403°E ± 5m, 15 August 2020, on *Salix myrsinifolia*, 3L, leg. HE, coll. NHMO; **OS,** Ringebu: Venabygd, Trabelia, 61.617229°N 10.078661°E ± 25m, 11 April 2022, on *Salix glauca*, 5L1F, leg. HE, coll.

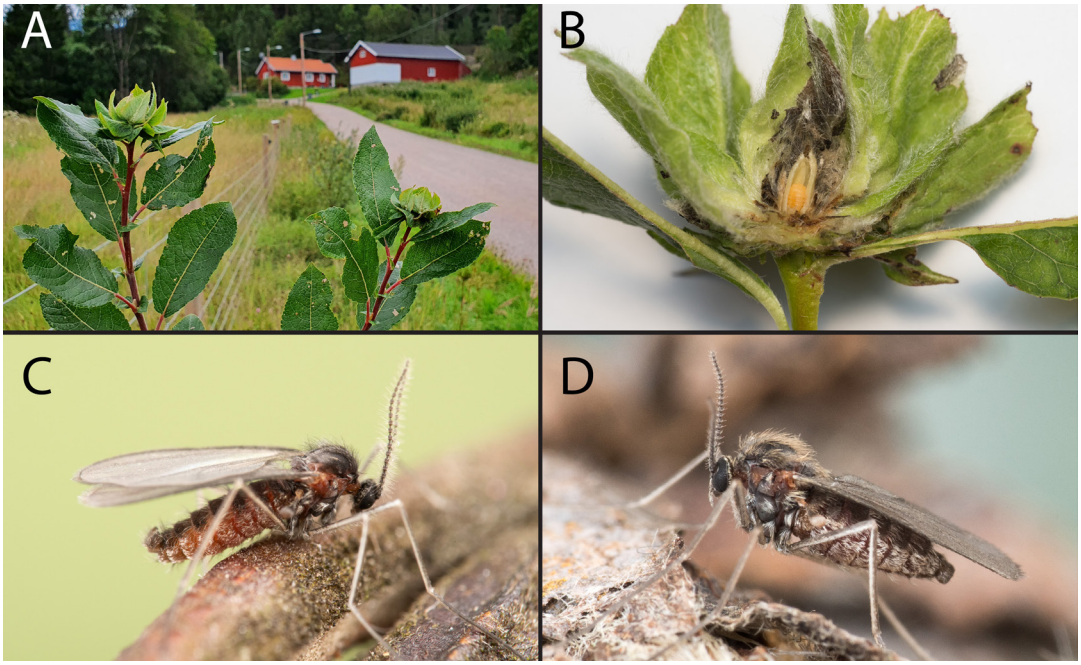

FIGURE 48. *Rabdophaga rosaria*. **A.** Rosette galls on *Salix myrsinifolia*. **B.** Opened gall on *S. myrsinifolia* showing the orange larva in the central chamber. **C.** Male. **D.** Female. Photos: H. Elven.

NHMO; Venabu, 61.649495°N 10.089998°E ± 150m, 11 April 2022, on *Salix lapponum*, LPMF, leg. HE, coll. NHMO; Dovre: Tverrfjell gruver, 62.227355°N 9.518426°E ± 25m, 6 August 2020, on *Salix lapponum*, 2L, leg. TS, coll. NHMO; Vågå: SE of Gamelsætre, 61.606149°N 8.993648°E ± 200m, 12 September 2020, on *Salix glauca*, 2L, leg. TS, coll. NHMO; **STI,** Røros: Røros, Granåsen, 62.600349°N 11.456955°E ± 50m, 28 July 2022, on *Salix hastata*, 2L, leg. HE, coll. NHMO; on *Salix phylicifolia* x *myrsinifolia*, 3L, leg. HE, coll. NHMO; **NSI,** Saltdal: Saltdalen, Dalmo, 66.873827°N 15.293076°E ± 50m, 16 July 2020, on *Salix myrsinifolia*, 4L, leg. HE, coll. NHMO; **NSY,** Gildeskål: Sund, 67.070311°N 14.053941°E ± 18m, 19 July 2020, on *Salix caprea*, 3L, leg. HE, coll. NHMO; Sund, Sundsfjellet, 67.065849°N 14.060831°E ± 3m, 22 July 2022, on *Salix hastata*, 10L, leg. HE, coll. NHMO; Breivika, Breivikdalen, 66.997495°N 14.278931°E ± 4m, 22 July 2020, on *Salix lanata*, 4L, leg. HE, coll. NHMO.

Biology: The orange larvae form rosette galls on the apical shoots on a wide range of *Salix* spp. (Salicaceae). The galls are typically a couple of centimeters in diameter and consist of numerous diverging leaves that become gradually smaller and more deformed towards the apex/centre of the gall. The barrel-shaped larva sits in a central chamber enclosed by several narrow, scale-like leaves. Galls containing inquilines often become more compact (ball shaped). Univoltine. The larva hibernates in the gall and pupates there in the spring. The galls are often heavily preyed on by birds during the winter.

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland.

***Rabdophaga rosariella* (Kieffer, 1897)**

Material: AK, Rælingen: Purkeryggen, 59.908902°N 11.046131°E ± 20m, 5 April 2021, 1L2I, leg. HE, coll. NHMO; Lillestrøm: Leirsund, Kopperud, 59.978501°N 11.152514°E ± 5m, 15 April 2021, 2L2P7F, leg. HE & TS, coll. NHMO.

Biology: The orange larva develops in lateral buds on *Salix aurita* and *S. cinerea* (Salicaceae). Our records are from *S. aurita*. The infected bud develops into a miniature rosette gall. Univoltine.

The larva hibernates in the gall and pupates there in the spring. The larva lacks the sternal spatula, which is unusual among *Rabdophaga*.

Distribution: Widespread in Europe. In Fennoscandia only known from Norway.

Genus *Rhopalomyia* Rübsaamen, 1892

This large genus includes 267 species globally. Most of the species are gallers on Asteraceae.

*** *Rhopalomyia baccarum* (Wachtl, 1883)**

Material: VE, Færder: Grepan, 59.06535°N 10.41284°E ± 20m, 2 August 2021, on *Artemisia vulgaris*, L, leg. AF, coll. Private.

Biology: The orange larvae develop in bud galls on stems and roots of *Artemisia* spp. (Asteraceae). Infected buds are usually situated at the very base of the plant, sometimes underground, and are swollen berry-like. Bivoltine; pupation and hibernation in the gall.

Distribution: Widespread in Europe including Norway, Sweden and Denmark. Georgia and Japan.

*** *Rhopalomyia foliorum* (Löw, 1850)**

(Figure 49)

Material: VE, Larvik: Rakke, 58.98399°N 10.01903°E ± 20m, 10 September 2021, L, leg. AF, coll. Private; **AK,** Oslo: Ellingsrud, 59.930984°N 10.921089°E ± 10m, 27 June 2022, PMF, leg. HE, coll. NHMO.

Biology: The dirty yellow larvae develop singly in bud-like galls on the stems and leaves of *Artemisia* spp. (Asteraceae). Our records are from *Artemisia vulgaris*. The galls are only about two millimeter long and brown to yellowish or purplish. Multivoltine. The early generations pupate in the gall. The larvae of the last generation leave the gall to hibernate in the soil.

Distribution: Widespread in Europe including Norway, Sweden and Denmark. Japan.

*** *Rhopalomyia millefolii* (Löw, 1850)**

Material: VE, Larvik: Stavern, Doktorodden, 58.98835°N 10.03401°E ± 50m, 14 October 2019, on *Achillea millefolium*, 5L, leg. AF, BOLD: NHMO-ENT-548154, coll. NHMO.

Biology: The yellow larvae develop singly in small, bud-like galls on the stems, leaves and capitula of *Achillea* spp. (Asteraceae). Multivoltine. Pupation and hibernation in the gall.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Georgia, Egypt and India.

*** *Rhopalomyia palearum* (Kieffer, 1890)**

Material: VE, Larvik: Oddanesand, 58.96754°N 9.85292°E ± 50m, 18 August 2019, 8L, leg. AF, BOLD: NHMO-ENT-548140, coll. NHMO.

Biology: The white, later orange larvae develop singly in galled bracts of *Achillea ptarmica* (Asteraceae). Infected capitula show no outward sign of damage. It is not stated whether the species has one or more generations per year. Pupation and hibernation presumably take place in the gall.

Distribution: Known from a few European countries including Norway and Denmark.

FIGURE 49. *Rhopalomyia foliorum*. **A.** Gall on midrib of leaf of *Artemisia vulgaris*. **B.** Female. Photos: H. Elven.

Genus *Rondaniola* Hedicke, 1938

The genus includes a single species which is widespread in Europe. It forms leaf galls on *Glechoma* spp. (Lamiaceae).

***Rondaniola bursaria* (Bremi, 1847)**

(Figure 50)

Material: TEY, Porsgrunn: Åsstranda, 59.093124°N 9.646811°E ± 20m, 16 June 2019, 3L, leg. SH & HE, coll. NHMO; **VE,** Færder: Mågerø, 59.15511°N 10.43520°E ± 20m, 18 July 2020, L, leg. AF, coll. Private; **AK,** Oslo: Bleikøya, 59.888583°N 10.735123°E ± 10m, 3 July 2020, 1L, leg. HE & TS, coll. NHMO; Ellingsrud, 59.934081°N 10.913179°E ± 5m, 10 September 2020, 4L, leg. HE, coll. NHMO.

Biology: The white larvae develop in leaf galls on *Glechoma hederacea* and *G. hirsuta* (Lamiaceae). Our records are all from *G. hederacea*. The larvae develop singly in hairy, upright, up to 4 mm long cylindrical galls on the upper side of the leaf. The gall eventually detaches from the leaf, leaving a circular hole. Pupation takes place in the gall or in the soil. Bi- or multivoltine.

Distribution: Widespread in Europe including Norway, Sweden and Denmark.

Genus *Wachtliella* Rübsaamen, 1915.

he genus includes nine species in the Palearctic region. The species are gallers on plants from many different families.

**** Wachtliella persicariae* (Linnaeus, 1767)**

(Figure 51)

Material: VE, Larvik: Fuglevikstranda, 58.98032°N 10.01810°E ± 50m, 9 August 2019, LP, leg. AF, BOLD: NHMO-ENT-548134, coll. NHMO; Stavern, Rakke, 58.980284°N 10.017766°E ± 50m, 24 July 2021, LPMF, leg. HE, coll. NHMO.

Biology: The white to orange larvae develop in

FIGURE 50. *Rondaniola bursaria*. **A.** leaf galls on *Glechoma hederacea*. **B.** Opened gall with larva. Photos: H. Elven.

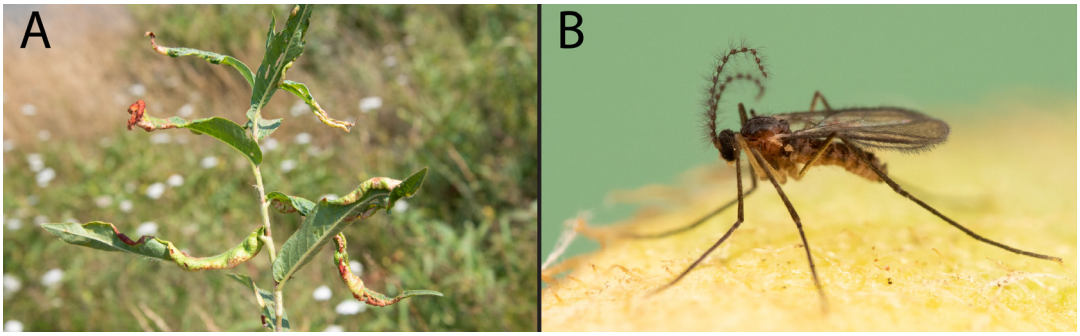

FIGURE 51. *Wachtliella persicariae*. **A.** Galled leaves of *Persicaria amphibica*. **B.** Male. Photos: H. Elven.

galled leaves of *Bistorta* spp. and *Persicaria* spp. (Polygonaceae), rarely also on other members of the family. Our records are from *P. amphibia*. The infected leaves are rolled downwards and often strongly twisted and miscolored red. Multivoltine; pupation in the gall in a white cocoon.

Distribution: Widespread in Europe including Norway, Sweden, Denmark and Finland. Western Asia.

Genus *Zygiobia* Kieffer, 1913

The genus includes only two species native to Europe. Both are associated with *Carpinus betulus,* one also with *Ostrya carpinifolia* (Betulaceae).

*** *Zygiobia carpini* (Löw, 1874)**

(Figure 52)

Material: AK, Oslo: Tøyen, Botanical Garden, 59.919333°N 10.771755°E ± 5m, 20 August 2021, on *Carpinus betulus*, 4L, leg. HE, coll. NHMO.

Biology and notes: The white larvae develop in galled leaves of *Carpinus betulus* and *Ostrya carpinifolia* (Betulaceae). The leaf has distinct swellings on the underside along the midrib and the basal part of the side veins. The larvae live entirely inside the swellings. We have only encountered this species once, despite much searching. Only a single galled leaf was found, and the larvae were immature and almost microscopic, but the very characteristic gall formation leaves little doubt about the species. Differentiating morfological features are given in Stelter (1992). Although native to Europe, the species has most likely been introduced to Norway with plant import and is thus an alien species in Norway.

Distribution: Widespread in Europe including Norway, Sweden and Denmark. Also in Georgia and Iran.

TRIBE LASIOPTERINI

Genus *Lasioptera* Meigen, 1818

The genus includes 129 species globally. The majority form galls in plant stems. Many of these have symbiosis with fungi, which line the inside of the galls.

***Lasioptera carophila* F. Löw, 1874**

(Figure 53)

Material: VE, Færder: Jørestrand, 59.07533°N 10.45360°E ± 50m, 10 June 2019, on *Anthriscus sylvestris*, L, leg. AF, BOLD: NHMO-ENT-548118, coll. NHMO; **Ø,** Indre Østfold: Mysen, 59.543882°N 11.346328°E ± 50m, 4 August 2022, on *Pimpinella saxifraga*, LF, leg. HE & OS, coll. NHMO.

Biology: The orange larvae develop in stem galls on a broad range of Apiaceae. The stem is swollen at the branching point of the main umbel or one of the umbellets, and contains a chamber with a single larva in it. Bivoltine; pupation and hibernation in the gall. The species is redescribed in Dorchin & Freidberg (2011).

Distribution: Western Palearctic. Widespread in Europe including Norway, Sweden and Denmark.

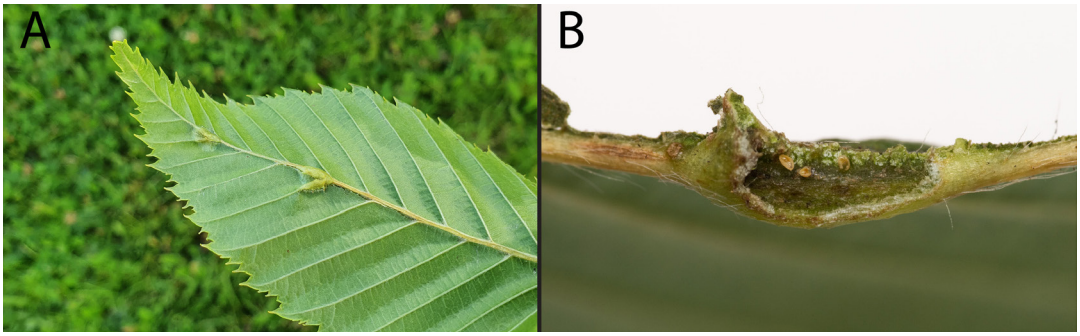

FIGURE 52. *Zygiobia carpini*. This species is alien in Norway. **A.** Galled leaf of *Carpinus betulus*. **B.** Opened gall with microscopic larvae. Photos: H. Elven.

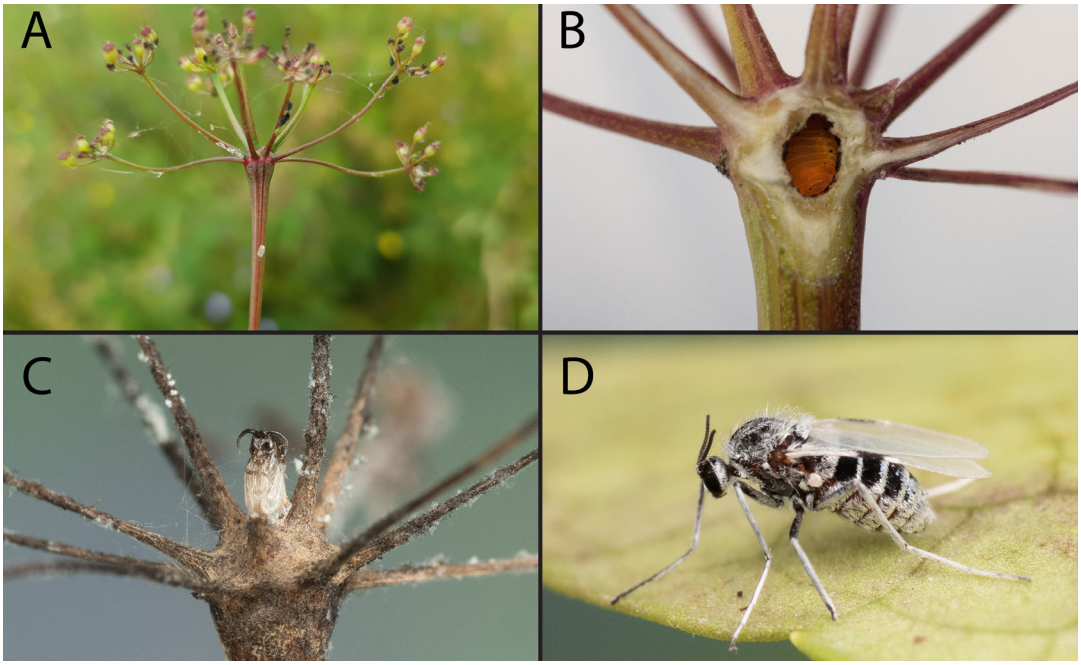

FIGURE 53. *Lasioptera carophila*. **A.** Galled stem of *Pimpinella saxifraga*. **B.** Larva in opened gall. **C.** Empty exuvium protruding from gall. **D.** Female. Photos: H. Elven.

*** *Lasioptera flexuosa* Winnertz, 1853**
(Figure 54)

Material: VE, Larvik: Rakke, 58.97805°N 10.02280°E ± 50m, 15 December 2019, L, leg. AF, coll. NHMO; **Ø,** Marker: Store Le, Rørvik Camping, 59.368581°N 11.742409°E ± 15m, 25 May 2019, LMF, leg. HE, coll. NHMO; **AK,** Asker: Brønnøya, Sandbukta, 59.857333°N 10.528840°E ± 30m, 2 April 2019, LMF, leg. HE, coll. NHMO; Oslo: Lindøya, near Skytterbrygga, 59.891713°N 10.718288°E ± 10m, 4 April 2019, LMF, leg. HE, coll. NHMO.

Biology: The orange larvae develop gregariously in stems of *Phragmites australis* (Poaceae). Infected stems show little outward sign of damage but are lined with black mycelium on the inside. The larvae hibernate in the stem and in the spring pupate either in the stem or in the soil. The species is redescribed in Skuhravá & Skuhravý (1981).

Distribution: Known from the Czech Republic, Hungary, Germany, Belgium, Norway, Denmark and western parts of Russia.

***Lasioptera rubi* (Schrank, 1803)**

Material: TEY, Nome: Ulefoss, Klovdal, 59.236580°N 9.378267°E ± 150m, 17 June 2019, L, leg. SH, BOLD: NHMO-ENT-548105, coll. NHMO; **AK,** Oslo: Ellingsrud, Munkebekken, 59.929337°N 10.914516°E ± 10m, 24 March 2020, LI, leg. HE, coll. NHMO; Lillestrøm: Fetsund lenser, 59.921076°N 11.152532°E ± 15m, 13 April 2020, LI, leg. HE & TS, coll. NHMO; Branderud, Kongsrudveien 4, 59.983792°N 11.144773°E ± 5m, 15 May 2020, LMF, leg. TS, BOLD: NHMO-ENT-548228, coll. NHMO; Branderud, 59.974783°N 11.149692°E ± 10m, 27 December 2021, L, leg. TS, coll. NHMO.

Biology: The yellow to orange larvae develop gregariously in stem galls on *Rubus* spp. (Rosaceae). Our records are all from *R. idaeus*. The galls form large, brown, usually one-sided lumps, usually on the lower part of the stem. They are lined with black mycelium on the inside. Univoltine; pupation and hibernation within the gall. The species is considered a horticultural pest of low impact (Trandem 2017).

Distribution: Widespread Palearctic, includ-

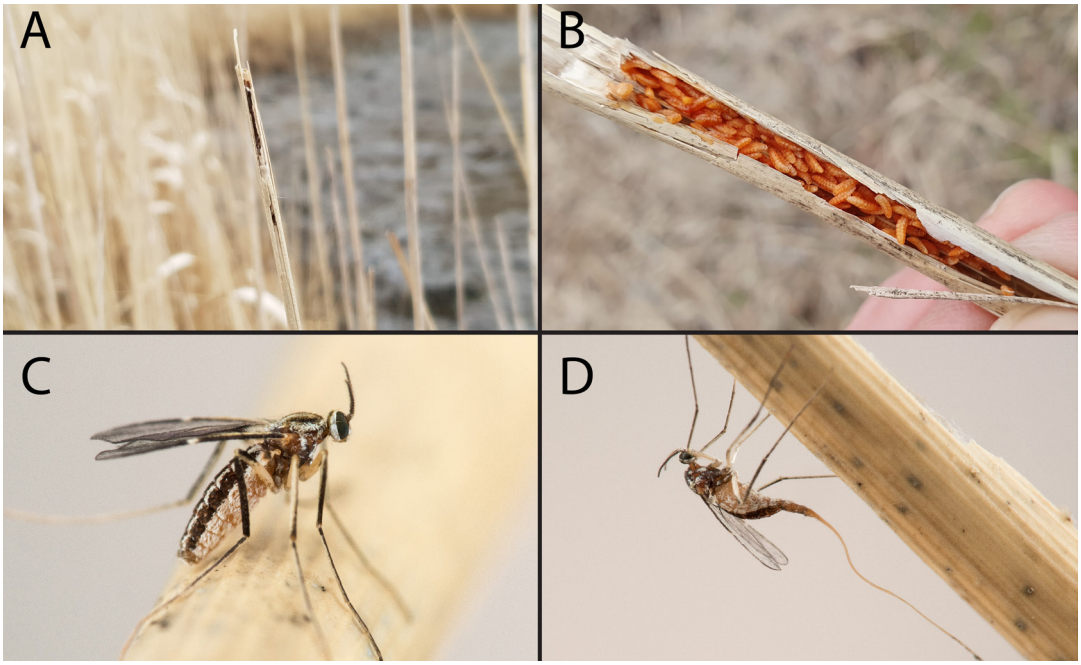

FIGURE 54. *Lasioptera flexuosa*. **A.** Galled straw of *Phragmites australis*. Infected straws show no outward sign of galling, but the inside is lined with black mycelium. **B.** Overwintered larvae in opened straw. **C.** Male. **D.** Female with ovipositor fully extended. Photos: H. Elven.

ing Norway, Sweden, Denmark and Finland.

Genus *Ozirhincus* Rondani, 1840

The genus includes four species native to the Palearctic, one of which is also introduced to the Nearctic. All species develop in achenes in the capitula of Asteraceae. The genus was recently revised by Dorchin *et al*. (2015).

*** *Ozirhincus hungaricus* Möhn, 1968**

(Figure 55 A–B)

Material: TEY, Nome: Ulefoss, Øra, 59.28319°N 9.27241°E ± 50m, 21 August 2019, LPMF, leg. AF, BOLD: NHMO-ENT-548161, coll. NHMO; **AK,** Oslo: Ellingsrud, Munkebekken, 59.931138°N 10.915389°E ± 10m, 6 August 2019, LMF, leg. HE, BOLD: NHMO-ENT-548194,548195, coll. NHMO.

Biology: The orange larvae develop singly in achenes of *Tanacetum* spp. and *Tripleurospermum inodorum* (Asteraceae). Our records are from *Tanacetum vulgare*. The infected achenes are strongly swollen, but the capitulum as a whole shows no outward sign of damage. Bivoltine; pupation and hibernation in the gall.

Distribution: Widespread in Europe including Norway and Denmark. Western parts of Russia.

*** *Ozirhincus longicollis* Rondani, 1840**

Material: VE, Færder: Mågerøveien 168, 59.15258°N 10.43234°E ± 50m, 27 August 2019, on *Leucanthemum vulgare*, 12L, leg. AF, BOLD: NHMO-ENT-548147,548148, coll. NHMO; **Ø,** Marker: W of Søndre Røen, 59.547445°N 11.573004°E ± 50m, 4 July 2020, on *Leucanthemum vulgare*, L, leg. TS, BOLD: NHMO-ENT-548084, coll. NHMO; **AK,** Lillestrøm: Lillestrøm, Åråsen, 59.966010°N 11.064613°E ± 20m, 29 June 2020, on *Tripleurospermum inodorum*, 1L, leg. TS, BOLD: NHMO-ENT-548055, coll. NHMO.

Biology: The orange larvae develop singly in achenes of *Anthemis* spp., *Leucanthemum vulgare* and *Tripleurospermum inodorum* (Asteraceae). The infected achenes are strongly swollen, but the capitulum as a whole shows no outward sign of damage. Bivoltine; pupation and hibernation in

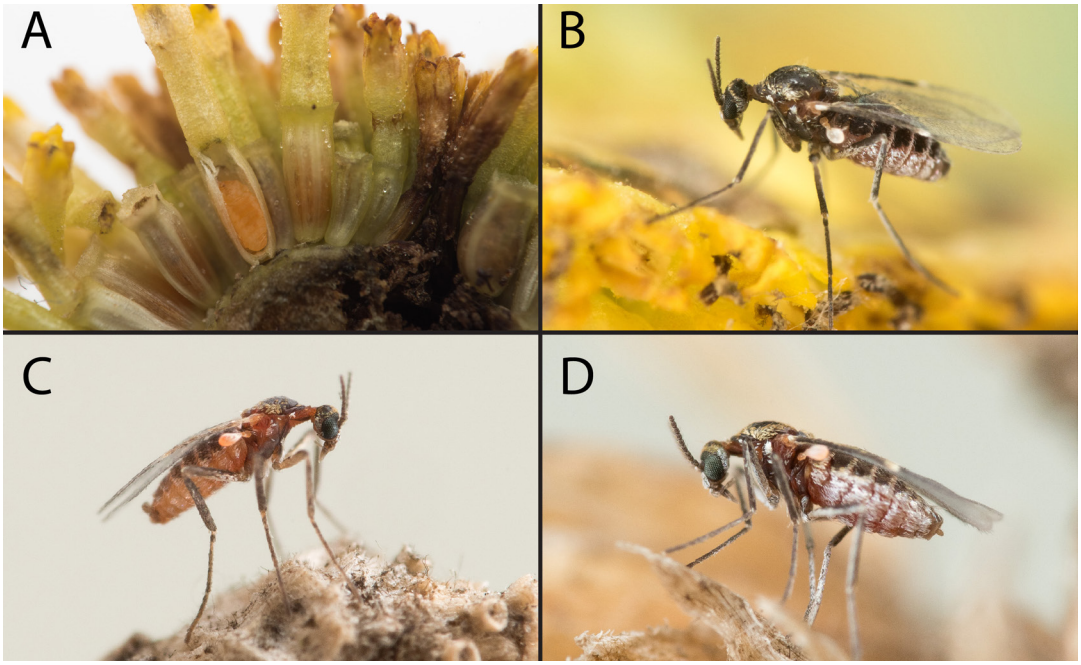

FIGURE 55. A–B. *Ozirhincus hungaricus*. **A.** Larvae in galled achenes of *Tanacetum vulgare*. **B.** Female. **C–D.** *Ozirhincus millefolii*. **C.** Male. **D.** Female. Photos: H. Elven.

the gall.

Distribution: Widespread in the Western Palearctic including Norway, Sweden and Denmark.

***Ozirhincus millefolii* (Wachtl, 1884)**
(Figure 55 C–D)

Material: TEI, Notodden: Nystul, 59.55068°N 9.13674°E ± 50m, 21 August 2019, L, leg. AF, coll. Private; **VE,** Larvik: Oddanesand, 58.96947°N 9.85008°E ± 20m, 18 August 2019, L, leg. AF, coll. Private; Færder: Tjøme, Grepan, 59.06377°N 10.41484°E ± 20m, 23 August 2019, L, leg. AF, coll. Private; **Ø,** Hvaler: Skipstadkilen, 59.04770°N 10.94045°E ± 20m, 2 September 2919, L, leg. AF, coll. Private; **AK,** Frogn: Kaholmene, 59.675784°N 10.605837°E ± 360m, 11 July 2019, MF, leg. HE, BOLD: NHMO-ENT-548178, coll. NHMO; Oslo: Gressholmen, 59.884464°N 10.721112°E ± 200m, 3 May 2019, MF, leg. HE, coll. NHMO; **SFI,** Aurland: Flåm, 60.857940°N 7.110750°E ± 1000m, 22-23 June 2019, 3L, leg. ZF & AK, coll. NHMO.

Biology: The yellow larvae develop singly in achenes of *Achillea* spp. Our records are from *A. millefolium* (Asteraceae). The infected achenes are strongly swollen, but the capitulum as a whole shows no outward sign of damage. Bi- or multivoltine. Pupation and hibernation in the gall.

Distribution: Widespread Palearctic, including Norway and Denmark. Introduced to the Nearctic.

LASIOPTERIDI UNPLACED TO TRIBE

Genus *Didymomyia* Rübsaamen, 1912.
The genus includes a single species, which is widespread in the Palearctic region.

***Didymomyia tiliacea* (Bremi, 1847)**
(Figure 56)

Material: AK, Asker: Brønnøya, Brønnøyveien 26, 59.855214°N 10.534224°E ± 6m, 4 June 2021, L, leg. HE, coll. NHMO; Brønnøya, Brønnøyveien 46, 59.851991°N 10.535628°E ± 4m, 10 June 2022, L, leg. HE, coll. NHMO.

Biology and notes: The white to pale yellow larvae develop in leaf galls on *Tilia* spp.

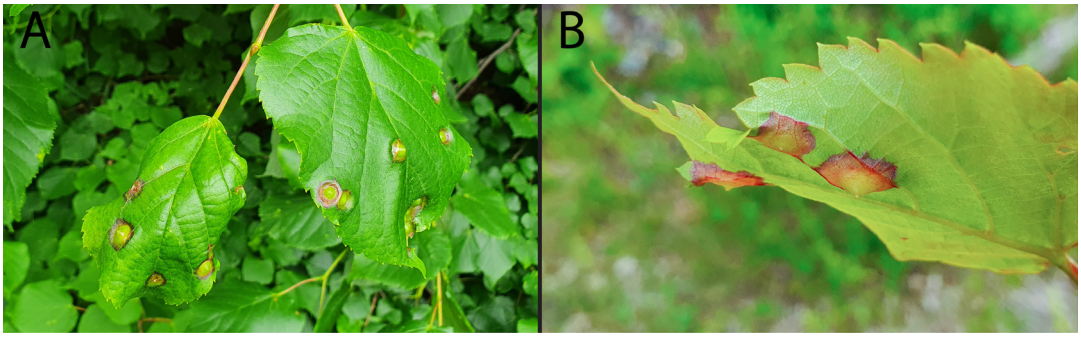

FIGURE 56. *Didymomyia tiliacea*. **A.** Galled leaves of *Tilia cordata*. **B.** Underside of galls. Photos: H. Elven.

(Malvaceae). Our records are from *T. cordata*. The galls protrude on both sides of the leaf and are often surrounded by a red ring. The larva develops inside an inner gall, which eventually detaches from the main gall and falls to the ground. Hibernation takes place as a pupa within the inner gall. We collected immature galls in the spring. The larvae were then extremely small, but the species could be identified by the very characteristic galls. The species is redescribed in Skuhravá & Skuhravý (1960).

Distribution: Widespread Palearctic, including Norway, Sweden and Denmark.

Genus *Semudobia* Kieffer, 1913

The genus includes seven species from the Holarctic region. All species develop in the seeds or, in one case, in the catkin scales of *Betula* spp. (Betulaceae). The European species are reviewed in Roskam (1977, 1979).

***Semudobia betulae* (Winnertz, 1853)**

(Figure 57 A)

Material: AK, Oslo: Ellingsrud, Munkebekken, 59.931515°N 10.913550°E ± 20m, 14 March 2019, on *Betula pendula*, LMF, leg. HE, coll. NHMO; 23 February 2021, on *Betula pendula*, MF, leg. HE, coll. NHMO; **NSY,** Gildeskål: Inndyr, Holmvatnet, 67.053984°N 14.072232°E ± 100m, 21 July 2019, on *Betula pubescens*, L, leg. HE, BOLD: NHMO-ENT-547978, coll. NHMO.

Biology: The orange larvae develop individually in seeds of *Betula nana*, *B. pendula* and *B. pubescens* (Betulaceae). Infected seeds are swollen, have reduced wings, are partly covered with a felt-like pubescence, and have a round, thin-walled "window" on one side, from which the midge will emerge. Univoltine. The larva hibernates in the gall and pupates there in the spring.

Distribution: Widespread Palearctic, including Norway, Sweden, Denmark and Finland. Introduced to the Nearctic.

***Semudobia skuhravae* Roskam, 1977**

(Figure 57 B)

Material: AK, Oslo: Ellingsrud, Munkebekken, 59.931515°N 10.913550°E ± 20m, 14 March 2019, L, leg. HE, coll. NHMO; 23 February 2021, MF, leg. HE, coll. NHMO.

Biology: The orange larvae develop in female catkins of *Betula pendula* and *B. pubescens* (Betulaceae). Our records are from *B. pendula*. Each larva develops in an oval gall at the base of a catkin scale, fusing the scale to the stalk of the catkin. The corresponding seed becomes stunted. Univoltine. The larva hibernates in the gall and pupates there in the spring.

Distribution: Widespread Holarctic, including Norway and Denmark.

**** Semudobia tarda* Roskam, 1977**

(Figure 57 C–E)

Material: AK, Oslo: Ellingsrud, Munkebekken, 59.931515°N 10.913550°E ± 20m, 23 February 2021, *Betula pendula*, MF, leg. HE, coll. NHMO.

Biology: The orange larvae develop individually in seeds of *Betula pendula* and *B. pubescens* (Betulaceae). Infected seeds are swollen, somewhat

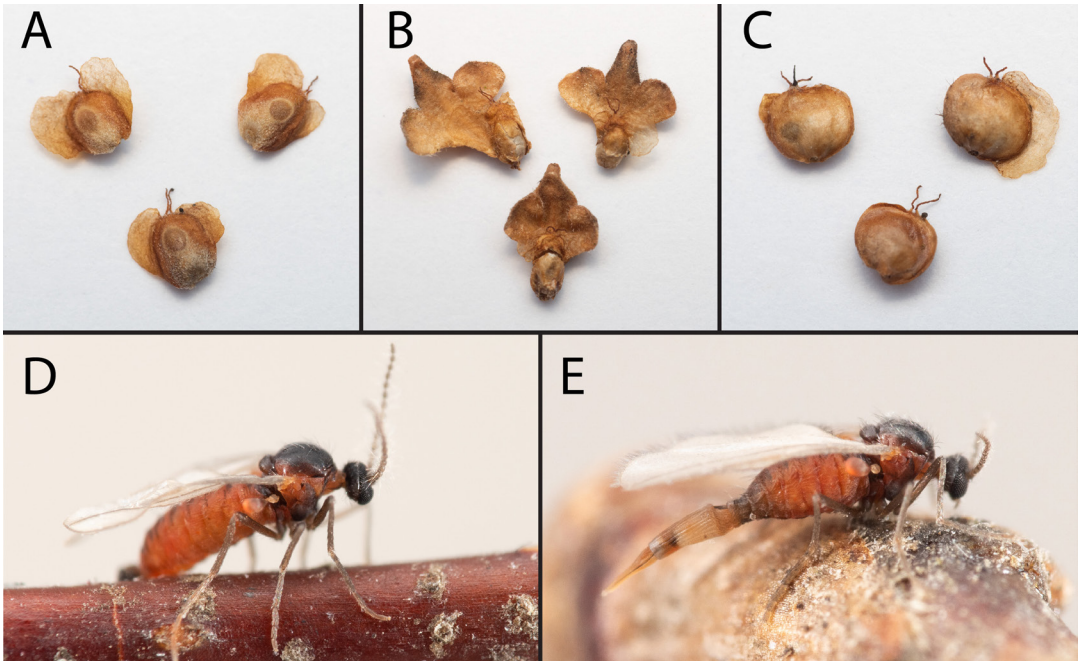

FIGURE 57. *Semudobia* spp. The members of this genus develop in the catkins of *Betula* spp. **A.** *Semudobia betulae*. Galled seeds of *Betula pendula*. **B.** *Semudobia skuhravae*. Galled catkin scales of *Betula pendula*. **C–E.** *Semudobia tarda*. **C.** Galled seeds of *Betula pendula*. **D.** Male. **E.** Female. Photos: H. Elven.

glabrous, have strongly reduced or missing wings, and have a small, round, thin-walled "window" on one side, from which the midge will emerge. Univoltine. The larva hibernates in the gall and pupates there in the spring.

Distribution: Widespread Palearctic, including Norway and Denmark. Introduced to the Nearctic.

Conclusion

This paper documents 156 species of gall midges from the Norwegian fauna, including 93 that are reported from Norway for the first time. This is the first comprehensive study of gall midges in Norway since the momentous papers of Jaschhof & Jaschhof (2009) and Skuhravá & Skuhravý (2012). At the same time, the species reported in this paper only comprise a small part of the substantial material collected between 2019 and 2022. It is our plan to process and publish more of the material in the coming years. Since we expect more results, we also felt it would be premature at this point to publish a full checklist over Norwegian gall midges. We have therefore, with a few exceptions, limited this paper to our own records. At a later point, an updated checklist will be called for.

Whereas the species published in this paper are for the most part well studied gallers and inquilines, the remaining, unprocessed material is of a more challenging nature. Many of the remaining midges are predators, fungivores or saprophages that are just more or less loosely associated with the galls that they have been collected from. A significant number of the species come from flowers collected "blindly", a sampling method not much used by gall midge researchers. The biology and host associations of these species are generally poorly studied, and many of the species are likely to be undescribed. These groups have largely been avoided by gall midge researchers, but our preliminary barcoding results bring hope that DNA barcoding can contribute to solve some of the many questions regarding these

midges. The barcoding success rate was overall very high, and the CO1 barcode sequences did prove highly useful both for distinguishing closely related species and for getting a good idea of their affinities at the genus level.

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