New records of gall midges (Diptera: Cecidomyiidae) from Denmark

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Nye fund af galmyg fra Danmark.
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Abstract

We report the first records to Denmark of fifteen gall midge species: *Arthrocnodax fraxinellus* (Meade), *Contarinia anthophthora* (F. Löw), *C. nicolayi* (Rübsaamen), *C. rumicis* (Loew), *C. umbellatarum* Rübsaamen, *Dasineura cardaminis* (Winnertz), *D. dactylidis* Metcalfe, *D. inflata* Stelter, *D. kiefferi* Marchal, *Jaapiella volvens* Rübsaamen, *Macrolabis lonicerae* Rübsaamen, *Planetella gallarum* (Rübsaamen), *P. tarda* (Rübsaamen), *Sitodiplosis dactylidis* Barnes and *Wachtliella krumbholzi* Stelter. With the reported records, the Danish gall midge fauna is known to comprise 320 named species and 24 species identified to the genus level only.

Sammendrag

Første danske fund af femten arter af galmyg dokumenteres, nemlig: *Arthrocnodax fraxinellus* (Meade), der er prædator på askeblomstgalmider på ask, *Contarinia anthophthora* (F. Löw), *C. nicolayi* (Rübsaamen), *C. rumicis* (Loew), *C. umbellatarum* Rübsaamen og *Dasineura cardaminis* (Winnertz), der fremkalder galler i blomsterknopper af henholdsvis mørk kongelys, almindelig bjørneklo, almindelig pimpinelle, vandkarse og vedbend, *Dasineura dactylidis* Metcalfe og *Sitodiplosis dactylidis* Barnes, der lever i blomsterstande af hundegræs, *Dasineura inflata* Stelter, der danner galler af frugthylstre på sylt-star, *Planetella gallarum* (Rübsaamen) og *P. tarda* (Rübsaamen), der begge fremkalder galler på bladskeder af tue-star, *Jaapiella volvens* Rübsaamen og *Macrolabis lonicerae* Rübsaamen, der danner galler i rullede blade af henholdsvis gul fladbælg og almindelig gedeblad, og endelig *Wachtliella krumbholzi* Stelter, der lever i svagt misdannede frugter af vrietorn. Med de fundne arter består den kendte danske galmyg-fauna af 320 fuldt identificerede arter, samt yderlige 24 arter, hvis identitet indtil videre kun er kendt på slægtsniveau.

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Introduction

In the recent decade, the fauna of gall midges in Denmark has received attention anew. Intensive investigations were carried out on the island of Læsø by Jørgen Jørgensen during the years 1993-2005 (and later), and similarly in North East Zealand in 2002 by Marcela Skuhravá and Václav Skuhravý. A main result of these investigations, reported by Skuhravá et al. (2006), was records of 73 species as new to Denmark. This revitalized the interest in this group of insects and lead to new discoveries (Jørgensen 2009, Bruun & Skuhravá 2011, Bruun et al. 2012). In this report, records of 15 species new to Denmark and found during the years 2011-2014 are presented.

The new finds have been brought about through a mainly opportunistic survey strategy, under which the three first authors have made investigations at sites convenient from external points of view, but not following a systematic plan for faunistic investigation. For this reason, the geographic coverage is biased towards a few areas that have received special attention, most notably Læsø (investigations first reported by Jørgensen (1997) and continued subsequently), Odsherred in NW Zealand (specifically the sites Bjergene, Kårup Skov and Veddinge Bakker), and finally urban parks in Copenhagen. However, a lively citizen science forum at the website *Fugleognatur.dk* has added many records of gall midges outside the said areas, especially of species inducing conspicuous galls. The collection sites are shown in Fig. 13, which also shows the faunistic districts referred to in the species accounts.

There is no doubt that a well-designed, geographically extensive faunistic survey would result in a much more detailed checklist of species, that could serve as a baseline for future investigations of changes to the gall midge fauna of Denmark. Obviously, the species number known to an area is crucially dependent on the intensity of investigations. However, the experience and knowledge of researchers is of paramount importance to investigations of insects with relatively hidden lifestyles, like most gall midges.

In addition to the obvious geographic preferences of the authors, some host plants have received special attention, i.e. *Dactylis glomerata* (JJ) and *Carex* spp. (HHB).

Results

Entries for each newly recorded species are given below. For phytophagous species, the entries contain a description of gall appearance and the name of the host plant on which the new record was made, larval colour and gregariousness. Some details on rearing of adults are given. However, rearing of adults was, for some species, not attempted or failed. Consequently, the identification of such collections has been based on larval morphology and host plant identity. The distribution of each species in Europe is given, with special focus on territories neighbouring Denmark. The materials, on which the records are based, are kept in the collection of MS, except for *Arthrocnodax fraxinellus*.

Arthrocnodax fraxinellus (Meade, 1888)

Larvae predate on *Aceria fraxinovora* (Nalepa) (Acari: Eriophyidae) in galls in inflorescences of *Fraxinus excelsior* L. (Oleaceae) and related species. Overwintering and pupation take place in the gall, in which gregarious papery cocoons are easily observable (Fig. 1). Two generations develop per year. The species has probably been overlooked due to its hidden life style.

Material examined: NEZ: Amager Fælled, urban »wilderness«, 14.ii.2013 and 31.i. 2014, leg. SH; Copenhagen, Søndermarken, urban park, 02.ii.2014, leg. SH; Copenha-

Fig. 1 Gregarious *Arthrocnodax fraxinellus* larvae in white cocoons inside last year's galls induced by its prey, the gall mite *Aceria fraxinovora* on *Fraxinus excelsior*. Amager Fælled. Photo: SH.
Fig. 1 Larver af *Arthrocnodax fraxinellus* i papirstynde hvide kokoner indeni fjorgamle galler frembragt af galmiden *Aceria fraxinovora* på ask (*Fraxinus excelsior*). Foto: SH.

Fig. 2 Flower bud galls induced by *Contarinia anthophthora* on *Verbascum nigrum*. Jydelejet. Photo: HHB.
Fig. 2 *Contarinia anthophthora*, galle i blomsterknop af mørk kongelys (*Verbascum nigrum*). Jydelejet. Foto: HHB.

gen, Universitetsparken, urban park (*Fraxinus* cf. *pennsylvanicus*), 21.ii.2014, leg. HHB. SZ: Vordingborg, Ornebjerg, 09.ii.2014, leg. SH. F: Faaborg, Grubbemøllegyden, 23.ii. 2014, leg. Gunnar Knudsen (GK); Korinth, 04.iii.2014, leg. GK; Katterød, 04.iii. 2014, leg. GK; Faaborg, Nabgyden, 04.iii.2014, leg. GK; Faaborg, urban park, 04.iii.2014, leg.

GK. Details on this species will be given in a separate paper (Harris, in prep.). A few adult males have emerged 20.iii.2014 (SH) and 28.iii.2014 (HHB).

Distribution: Hitherto only known from the UK and Ireland (Ashe & O'Connor, 2005). An ill-documented record from northern Germany (Schliesske 1992) is very doubtful and by all probability belongs to another species of *Arthrocnodax*.

Contarinia anthophthora (F. Löw, 1880)

Whitish larvae found in swollen and purplish discoloured flower buds of *Verbascum nigrum* L. (Scrophulariaceae) (Fig. 2).

Material examined: LFM: Jydelejet, scrub-cleared patch in old species-rich grassland, 20.vii.2012, leg. HHB. This locality is known for isolated occurrences of many plant and animal species with southern or continental distribution. Rearing of adults not attempted, as only few galls were found.

Distribution: Europe; Austria, Czech Republic, France, Germany and Hungary. In Germany, the species is probably common, with five known records (Skuhravá et al. 2014).

Contarinia nicolayi (Rübsaamen, 1895)

Whitish larvae found in swollen unopened flowers of *Heracleum sphondylium* L. (Apiaceae) (Fig. 3)

Material examined: SJ: Skomagerhus in Kollund Skov, tall-herb meadow, 17.vii.2012, leg. HHB. Rearing of adults failed due to too few larvae found.

Distribution: Europe; known from 11 countries – of these five are new compared to the list given in Skuhravá (1986). In Germany, *C. nicolayi* appears to be widespread (16 literature records, Skuhravá et al. 2014).

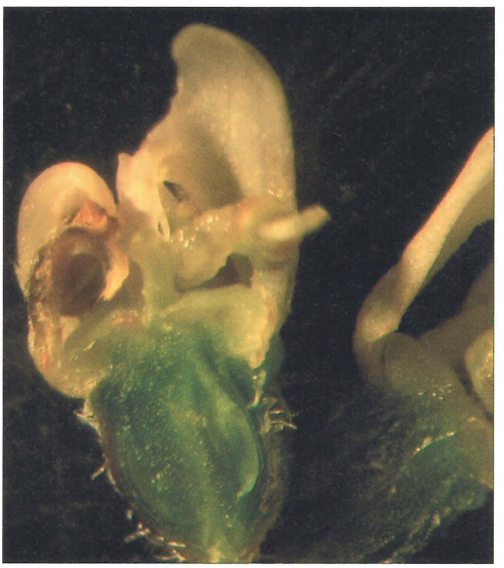

Fig. 3 Flower bud galls induced by *Contarinia nicolayi* on *Heracleum sphondylium* ssp. *sphondylium*. Kollund Skov. Foto: HHB.

Fig. 3 *Contarinia nicolayi*, galler i blomsterknopper af almindelig bjørneklo (*Heracleum sphondylium* ssp. *Sphondylium*). Kollund Skov. Foto: HHB.

Fig. 4 Gall induced by *Contarinia rumicis* on flowers and fruits of *Rumex obtusifolius*; normal flowers on the left, galled on the right. Universitetsparken, Copenhagen. Photo: HHB.
Fig. 4 *Contarinia rumicis*, galler i blomster og frugter af butbladet skræppe (*Rumex obtusifolius*); til venstre normale blomster, til højre to galler. Universitetsparken, København. Foto: HHB.

Contarinia rumicis (Loew, 1850)

Galls in flowers and fruits of *Rumex obtusifolius* L. (Polygonaceae). The galls involve both the perianth (inner tepals) and the nutlets. The tepals are enlarged, abnormally concave and reddish discoloured (Fig. 4), containing the gregarious, whitish larvae.

Fig. 5 Flower bud galls induced by *Contarinia umbellatarum* on *Pimpinella saxifraga*. Glænø. Photo: HHB.
Fig. 5 *Contarinia umbellatarum*, blomsterknopgaller på almindelig pimpinelle (*Pimpinella saxifraga*). Glænø. Foto: HHB.

The nutlets, normally triangular in cross section, are stunted and flattened (see also Harris 2003).

Material examined: NEZ: Copenhagen, Universitetsparken, urban park, 09.vii.2012, leg. HHB; Copenhagen, Fælledparken, urban park, 10.vii.2012, leg. HHB (>200 adults emerged within a week from the collection date); Klampenborg, urban park, 07.vii.2013, leg. HHB. SJ: Bov near Padborg, oldfield, 17.vii.2012, leg. HHB (>100 adults emerged within a week). Distribution: Europe, introduced to North America (Gagné & Jaschhof 2014). This species was found scattered in several countries in Europe. In Germany, it is considered very rare (only one literature record, Skuhravá et al. 2014).

Contarinia umbellatarum Rübsaamen, 1910

Pale orange yellow larvae found in swollen, unopened flowers of *Pimpinella saxifraga* L. (Apiaceae), often many flowers in the same umbel are attacked (Fig. 5). Later in summer, the empty galls are still visible, while the larvae have left to pupate in the soil.

Material examined: NWZ: Rævebjerg near Dragsholm, old grassland, 30.vii.2012, leg. HHB; same locality and collector, 30.vii.2013; Disbjerg near Veddinge, old grassland, 03.viii.2012, leg. HHB; SWZ: Overdrevet on Glænø, 13.viii.2012, leg. HHB. Rearing of adults failed in all cases despite abundant larvae.

Distribution: Europe, known only from Germany and the UK. In Germany, it appears to be widespread (5 literature records, Skuhravá et al. 2014).

Fig. 6 Flower bud galls induced by *Dasineura cardaminis* on *Cardamine amara*. Hald. Photo: Hans Øllgaard.
Fig. 6 *Dasineura cardaminis*, blomsterknopgaller på vandkarse (*Cardamine amara*). Hald. Foto: Hans Øllgaard.

Dasineura cardaminis (Winnertz, 1853)

Red larvae found in swollen and unopened flower buds of *Cardamine amara* L. (Brassicaceae) (Fig. 6).

Material examined: EJ: Gjelbro Eng near Hald Sø, meadow restoration site, 05.vi. 2013, leg. Hans Øllgaard. Rearing of adults not attempted. This species has probably been overlooked previously, despite forming conspicuous and easily recognizable galls and despite active search efforts by at least JJ and HHB.

Distribution: Europe; known from 16 countries, including Finland, Germany and Sweden (many regions throughout the country; Coulianos & Holmåsen 1991). In Germany, it appears to be widespread (12 literature records, Skuhravá et al. 2014). In the Czech Republic, it is regionally extinct and included in the national red list (Skuhravá 2005). The usual host is *Cardamine pratensis* L., but it has also been recorded on *C. amara* in Sweden (Coulianos & Holmåsen 1991).

Dasineura dactylidis Metcalfe, 1933

Solitary pinkish larvae develop in infructescences of *Dactylis glomerata* L. (Poaceae). The larvae suck the ovules and developing seed, with one larva per seed encapsulated in the flower bracts. One generation develops per year.

Material examined: NEJ: Læsø, 01.vii.2013, leg. JJ. In the summer of 2012, approximately 400 panicles of *Dactylis glomerata* were collected at the site »Vejen« in the area Klitten on Læsø during the period 26.vi – 20.vii.2012. From these, 11 non-jumping larvae were retrieved and transfered to clean sand in pots. After overwintering outdoors, adult midges emerged 01.vii.2013. These belonged to *D. dactylidis* and *Sitodiplosis dactylidis* (see below).

Fig. 7 Galls of *Dasineura inflata* in fruits of *Carex otrubae*. Odden. Photo: HHB.
Fig. 7 Galler af *Dasineura inflata* i frugthylstre af sylt-star (*Carex otrubae*). Odden. Foto: HHB.

Distribution: Europe, only known from England, the Czech Republic and Russia.

Dasineura inflata Stelter, 1986

Yellow larvae found in the utricles of *Carex otrubae* Podb. (Cyperaceae), which are inflated to around twice normal size and somewhat distorted (Fig. 7). Pupation takes place in the gall (Stelter, 1986). One generation develops per year.

Material examined: NWZ: Havnemark on Asnæs, salt meadow, 30.vi.2013, leg. HHB. SZ: Odden near Køge, salt meadow, 03.viii.2011, leg. HHB. These are the first records after the description of the species. Unfortunately, rearing of adults failed for both collections.

Distribution: Known hitherto only from the type locality in Germany: Kirch-Baggendorf near Grimmen, Mecklenburg-Vorpommern (Stelter, 1986).

Dasineura kiefferi Marchal, 1896

White-orange larvae found in slightly swollen flower buds of *Hedera helix* L. (Araliaceae) (Fig. 8), which remain unopened. Galls detach and fall to the ground after a short time, a property reducing visibility and probably recording frequency. Larvae are white when young and pale orange when older.

Material examined: NEZ: Copenhagen, Landbohøjskolens Have, urban park, 04.ix. 2013, leg. SH. Rearing of adults was not initiated due to scarcity of material.

Distribution: Europe, known from France, Spain, Germany (near Dresden, 2009, leg. Hans Buhr), Georgia (Skuhravá et al. 2013) and the UK.

Fig. 8 Flower bud gall (far right) induced by *Dasineura kiefferi* on *Hedera helix*, left and centre are healthy flower buds and open flowers. Landbohøjskolens Have, Copenhagen. Photo: SH.

Fig. 8 *Dasineura kiefferi* på vedbend (*Hedera helix*), helt til højre ses en blomsterknopgalle, til venstre og i midten normale blomsterknopper og åbne blomster. Landbohøjskolens Have, København. Foto: SH.

Fig. 9 Galls induced by *Macrolabis lonicerae* in leaves of *Lonicera periclymenum*. Kårup Skov. Photo: HHB.
Fig. 9 *Macrolabis lonicerae*, galler på blade af *Lonicera periclymenum*. Kårup Skov. Foto: HHB.

Jaapiella volvens Rübsaamen, 1917

Whitish larvae encountered in rolled, but not swollen or discoloured, leaflets of *Lathyrus pratensis* L. (Fabaceae). The larvae are usually first yellow-white, later reddish.

Material examined: NEZ: Gribskov, Toggerup Enghave, cattle-grazed forest meadow, 07.ix.2013, leg. HHB. Rearing of adults not attempted, due to too scanty material.

Distribution: Palaearctic; known from many countries of Europe, from western Siberia, Armenia and Kazakhstan. In Germany it occurs frequently (Skuhravá et al. 2014).

Macrolabis lonicerae Rübsaamen, 1912

Fig. 10 Gall induced *Planetella gallarum* on leaf sheath of *Carex cespitosa*. Gribskov. Photo: HHB.
Fig. 10 *Planetella gallarum*, galle på bladskede af tue-star (*Carex cespitosa*). Gribskov. Foto: HHB.

A single whitish larva found on *Lonicera periclymenum* L. (Caprifoliaceae), young leaves on fresh sprouts formed after cutting of the plant, leaves rolled upwards from the margin, with the affected areas pale and slightly thickened (Fig. 9).

Material examined: NWZ: Kårup Skov, summer cottage area with mixed forest and grassland, 02.viii.2013, leg. HHB. No rearing of adults attempted.

Distribution: Europe; occurring scattered in several countries. In Germany, it is considered relatively frequent (4 literature records, Skuhravá et al. 2014).

Planetella gallarum (Rübsaamen, 1899)

Galls on the basal leaf sheaths of *Carex cespitosa* L., thick-walled, shiny, chestnut brown, ovoid, somewhat flattened towards the leaf, and with a central attachment to the latter. Galls are unilocular, with a single whitish larva (Fig. 10). Pupation takes place in the gall.

Material examined: NEZ: Gribskov, Toggerup Enghave, cattle-grazed forest meadow, 21.viii.2012, leg. HHB. Larvae identified on the basis of the spatula sternalis, which has a very peculiar shape with only one large tooth on the anterior part (Möhn 1955, Fig. 3 on Plate 5). Last year's galls collected 13.iii.2013, from which 2 females hatched ca. 04.iv.2013. Identified based on the shape of the ovipositor.

Distribution: Europe; recorded from 12 countries. In Germany, it is considered frequent (10 literature records, Skuhravá et al. 2014). This species has been recorded from a number of *Carex* spp.

Fig. 11 Gall induced *Planetella tarda* on leaf sheath of *Carex cespitosa*. Gribskov. Photo: HHB.
Fig. 11 *Planetella tarda*, galle på bladskede af tue-star (*Carex cespitosa*). Gribskov. Foto: HHB.

Planetella tarda (Rübsaamen, 1914)

Galls found on leaf sheaths of *Carex cespitosa* L. (Cyperaceae), thin-walled, opaque, whitish or greenish depending on light exposure, elongated, attached in the upper end, the lower end being pointed. Galls are unilocular, with a single orange larvae (Fig. 11). Pupation takes place in the gall.

Material examined: NEZ: Gribskov, Toggerup Enghave, cattle-grazed forest meadow, 21.viii.2012, leg. HHB; same site and collector, 08.ix.2013. Rearing of adults was unsuccessful despite plenty of material.

Distribution: Europe, known from several localities in northern Germany (4 literature records, Skuhravá et al. 2014), but from no other countries. The usual host is *Carex vesicaria* L.

Sitodiplosis dactylidis Barnes, 1940

Solitary orange to red larvae develop in florets of *Dactylis glomerata* L. (Poaceae). Larvae feed on the developing seeds. One generation develops a year.

Material examined: NEJ: Læsø, 01.vii.2013, leg. JJ (details are given under *Dasineura dactylidis*).

Distribution: Europe, only known from the UK.

Wachtliella krumbholzi Stelter, 1975

Orange larvae found in the interior of fruits of *Rhamnus cathartica* L. (Rhamnaceae) (Fig. 12), where they suck on developing seeds. Infected fruits are slightly enlarged, irregularly shaped and turn dark red in flecks. Further, attacked fruits stay green longer than healthy ones. Pupation is external and only one generation develops per year.

Material examined: NEZ: Copenhagen, Landbohøjskolens Have, urban park, 13.x. 2013, leg. SH. Rearing of adults not tried.

Distribution: Europe, known from the Czech Republic, Germany, Latvia and Serbia.

Fig. 12 Fruit of *Rhamnus cathartica* with slight deformation and discolouration induced by *Wachtliella krumbholzi*. Landbohøjskolens Have, Copenhagen. Photo: SH.
Fig. 12 Frugt af vrietorn (*Rhamnus cathartica*) svagt deformeret og misfarvet af *Wachtliella krumbholzi*. Landbohøjskolens Have, København. Photo: SH.

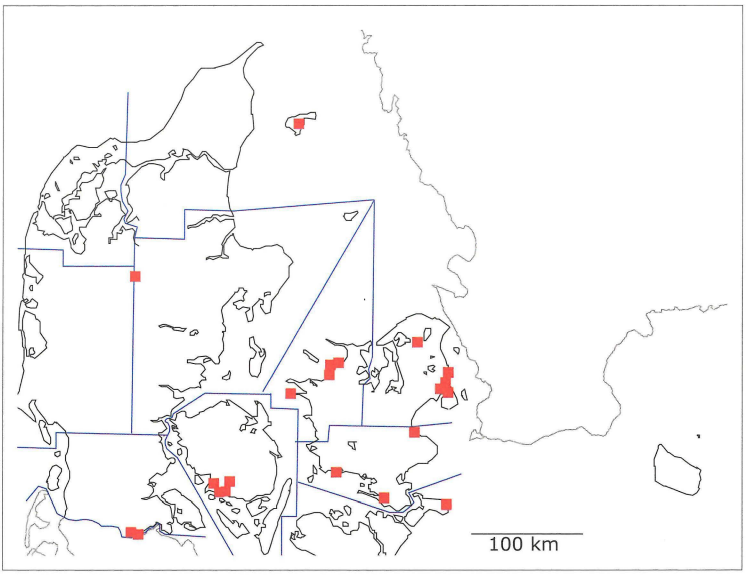

Fig. 13 Location of the collections sites.
Fig. 13 Fundsteder for de beskrevne arter.

Discussion

With the reported records, the Danish gall midge fauna comprises 320 named species and 24 species identified to the genus level only. This number includes two species not enumerated by Skuhravá et al. (2006), viz. *Contarinia lonicerearum* (F. Löw, 1877), which was mentioned by Henriksen & Tuxen (1944) as *Syndiplosis lonicerearum*, but at some point synonymized with *C. sambuci* (Kaltenbach, 1873), a synonymization recently reverted (Skuhravá 2009), and *Semudobia tarda* Roskam, 1977, which was recorded from Denmark in the original publication (Roskam 1977), based on a find near NJ: Hirtshals in 1973 (Hans Roskam, pers. comm. 2014).

Of the 15 species here recorded as new to Denmark, 12 species are known to occur in Germany – however, only 6 of these from Schleswig-Holstein (Pichinot & Meyer 1998). Similarly, 11 of the species are known from Great Britain, 9 from the Czech Republic, 6 from Poland and 6 from France. Perhaps more surprisingly, only one of the species has previously been recorded from Sweden (i.e. *Dasineura cardaminis*). Similarly, one species is known from Finland and Lithuania, and 2 from Latvia. None of the 15 species have been found in Norway (Skuhravá & Skuhravý 2012).

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