

## On the Agromyzidae (Diptera) in Norway, Part 2

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The present paper comments on thirty-one of the ninety-nine species belonging to the Agromyzidae genera *Chromatomyia* Hardy 1849, *Napomyza* Westwood, 1840 and *Phytomyza* Fallén, 1810, and presently known to occur in Norway. Seven species are reported new to the Norwegian fauna; *Napomyza hirticornis* (Hendel, 1932), *N. nigriceps* van der Wulp, 1871, *Phytomyza melana* Hendel, 1920, *P. nigrifemur* Hering, 1934, *P. ranunculicola* Hering, 1949, *P. rhabdophora* Griffiths, 1964, and *P. subrostrata* Frey, 1946. In addition new regional data is given for twenty-four species previously reported from Norway. The biology of the larva, when known, and the distribution in Norway and Europe are commented on for each of the species.

Key words: Agromyzidae, biology, *Chromatomyia*, *Napomyza*, *Phytomyza*, Diptera, distribution, Norway.

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### Introduction

The larvae of Agromyzidae mine in leaves, stems, seeds and roots of plants. Accordingly, many Agromyzidae species are important pests in cultural plants. Recently some data has been published on the Norwegian fauna of Agromyzidae (Andersen & Jonassen 1994, Andersen *et al.* 2004, Andersen 2011, 2012, Hansen & Bjureke 2012), but still the Norwegian fauna of this dipterous family is poorly known.

Agromyzidae is represented in Norway by fifteen genera belonging to two subfamilies, with a total of 200 species recorded so far. This paper is the second in a series on the fauna of Agromyzidae in Norway, and presents new data from the genera *Chromatomyia* Hardy, 1849, *Napomyza* Westwood, 1840 and *Phytomyza* Fallén, 1810.

### Materials and methods

The present report deals with material collected

during several projects and collecting trips in many parts of Norway, but mainly in meadows with a rich flora in South-Eastern Norway. If a species has been found more than once in the same district or EIS square, only data from the first record is given. In such cases the total number of specimens investigated of the species is indicated. Most of the flies were netted by the author, and the material has been stored in 70% ethanol in the author's private collection. In a few cases the flies were caught in a yellow water-trap or in a Malaise-trap. Localities are given using the revised Strand-system (Økland 1986) and the EIS system (Endrestøl 2005).

### The species

Species not previously recorded from Norway are marked with an asterisk (\*). If nothing else is noted, the material has been collected by the author. All the material is deposited in the author's private collection.

GENUS CHROMATOMYIA HARDY, 1849

***Chromatomyia fuscula* (Zetterstedt, 1838)**

(Figure 1)

**New material** (6930 specimens investigated). **Ø**, Aremark: Bøen sætre (EIS 21), 19 May 2011, 29♂♂507♀♀; Sarpsborg: Berntsen gartneri (EIS 20), 2 June 2003, 2♂♂7♀♀; **AK**, Nannestad: Søndre Kringler (EIS 37), 1 June 2011, 111♂♂137♀♀; **HES**, Stange: Stange sentrum (EIS 46), 11 July 2003, 17♂♂; **OS**, Sør-Fron: Frya (EIS 63), 30 May 1996, 2♂♂35♀♀; **ON**, Vinstra: Sødorp (EIS 62), 31 May–26 August 1988, 550 ex; Vågå: Tessanden (EIS 70), 30 June 1996, 4♂♂7♀♀; Dovre: Dombåshaugen (EIS 71), 4 July 2011, 3♂♂5♀♀; **BØ**, Hole: Rytterager gård (EIS 36), 19 June 1996, 1♂1♀; Kongsberg: Ullebergåsen (EIS 27), 2 August 2009, 107♂♂67♀♀; **BV**, Nore og Uvdal: Øygardsgrend (EIS 34), 25 August 2007, 1♂; Rollag: Gvammen (EIS 35), 23 May 2011, 1♂1♀; **VE**, Larvik: Gutterød gartneri (EIS 12), 25 June 2003, 1♂; **TEI**, Nissedal: Fjone (EIS 17), 30 May 1997, 1♂19♀♀; Bø: Bø sentrum (EIS 18), 13 June 2004, 6♂♂; Hjartdal: Ambjørndalen (EIS 26), 9 July 2010, 4♂♂3♀♀; **AAV**, Grimstad: Indre Maløy (EIS 6), 25 June 2011, 7♂♂9♀♀; **VAY**, Flekkefjord: Husøy, Hidra (EIS 4), 3 August 2003, 1♂; **HOY**, Os: Hagavik (EIS 31), 19 June 1995, 1♂; **MRY**, Tingvoll: Holmeide (EIS 85), 5 July 2011, 14♂♂62♀♀; **MRI**, Rauma: Marstein (EIS 77), 6 July 2011, 2♂♂11♀♀; **STY**, Rissa: Rørvik (EIS 92), 28 June 1996, 3♂♂5♀♀; Rissa: Reinskloster (EIS 91), 28 June 1996, 2♂♂6♀♀; **STI**, Meldal: Kløvsteinbakken (EIS 86), 2–9 June 1986, 151 ex; Holtålen: Reitan (EIS 88), 26 June 1996, 12♂♂9♀♀; **NTI**, Stjørdal: Værnes (EIS 92), 25 June 1990, 509♂♂486♀♀; Høylandet: Tverrråa (EIS 107), 11 June 1987, 3♂♂ (caught in Malaise-trap by Terje Jonassen); Levanger: Litlelva, Sunndalen (EIS 97), 15 July 2003, 1♂; **NSY**, Bodø: Straumøy (EIS 131), 16 June 2002, 1♂5♀♀; **NSI**, Beiarn: Arstad (EIS 126), 16 June 2002, 6♂♂14♀♀; **NNØ**, Sørfold: Helland (EIS 132), 15 June 2002, 2♂♂12♀♀; **FV**, Alta: Tverrdalen (EIS 173), 25 June 2004, 3♂♂; **FN**, Porsanger: Lakselv (EIS 174), 24 June 2004, 6♂♂.

**Distribution and biology of larvae.** *C. fuscula* is widespread and very common all over Norway, but least so on the Western and South-Western coast. It is one of the main pest species in cereals and grasses (Andersen 1989). *C. fuscula* is present in most of Europe, including Fennoscandia and Denmark, but less numerous than in Norway (Spencer 1976, Martinez 2012). The larva is oligophagous on Poaceae (Ellis 2012).

***Chromatomyia nigra* (Meigen, 1830)** (Figure 2)

**New material** (316 specimens investigated). **Ø**, Moss: Alby (EIS 19), 12 June 2001, 1♂; **AK**, Ås: UMB (EIS 28), 3 September 2001, 1♂; **BØ**, Lier: Kjellstadveien 42 (EIS 28), 21 June 2003, 2♂♂; **BV**, Nore og Uvdal: Øygardsgrend (EIS 34), 25 August 2007, 1♂; **VE**, Horten: Bastøy (EIS 19), 12 April 2007, 16♂♂2♀♀; Larvik: Gutterød gartneri (EIS 12), 25 June 2003, 1♂; **TEY**, Porsgrunn: Borg (EIS 11), 21 August 2002, 1♂; Skien: Vestre Marker (EIS 18), 13 June 2011, 1♂; **AAV**, Grimstad: Hesnesøy (EIS 6), 3 June 2011, 1♂; **VAY**, Farsund: Lista fyr (EIS 1), 29 July 2003, 1♂; Flekkefjord: Vågen, Hidra (EIS 4), 3 August 2003, 2♂♂; **RY**, Hå: Brusand (EIS 3), 29 April 1996, 1♂1♀ (caught in yellow water-trap by May-Guri Sæthre); **RI**, Forsand: Oanes (EIS 7), 4 August 2003, 1♂; **HOY**, Os: Hagavik (EIS 31), 3 July 1995, 5♂♂; Meland: Flatøy (EIS 39), 29 August 1995, 7♂♂; Bergen: Stend (EIS 30), 20 May 1996, 6♂♂; Lindås: Eikangervåg (EIS 40), 1 July 1996, 2♂♂; **MRI**, Rauma: Isfjorden (EIS 77), 6 July 2011, 2♂♂; Rauma: Staurset (EIS 78), 6 July 2011, 1♂; **NSY**, Bodø: Mjelle (EIS 131), 14 June 2002, 11♂♂; **TRY**, Flakstad: Nusfjord (EIS 133), 5 July 2006, 1♂.

**Distribution and biology of larva.** *C. nigra* has been found in most parts of Norway except furthest north, most common in coastal areas. It is much less common than *C. fuscula* in most areas. It is widespread and common in much of Europe, including Fennoscandia and Denmark (Spencer 1976, Martinez 2012). The larva is oligophagous in very many Poaceae genera (Spencer 1990, Ellis 2012, Pitkin *et al.* 2012).

***Chromatomyia ramosa* (Hendel, 1923)** (Figure 3)

**New material** (497 specimens investigated). **Ø**, Aremark: Bøen sætre (EIS 21), 19 May 2011, 2♂♂; **BØ**, Kongsberg: Ullebergåsen (EIS 27), 23 June 2009, 1♂; Hurum: Verket (EIS 28), 26 May 2002, 2♂♂2♀♀; **BV**, Rollag: Gvammen (EIS 35), 23 May 2011, 2♂♂; **VE**, Horten: Bastøy (EIS 19), 17 May 2007, 7♂♂10♀♀; **TEY**, Bamble: Djupvik (EIS 11), 25 August 2002, 3♂♂; Skien: Vestre Marker (EIS 18), 13 June 2011, 2♂♂; **TEI**, Hjartdal: Ambjørndalen (EIS 26), 20 June 2010, 2♂♂; **AAY**, Risør: Sønedeled (EIS 11), 6 July 2003, 1♂; **MRI**, Rauma: Flatmark (EIS 77), 6 July 2011, 1♂; **NTI**, Frosta: Evenhus (EIS 92), 15 July 2003, 1♂; **TRY**, Flakstad: Nusfjord (EIS 133), 5 July 2006, 1♂1♀.

**Distribution and biology of larva.** *C. ramosa* is present in most of Southern and Middle Norway. In the rest of Europe it is widespread, including Fennoscandia and Denmark (Spencer 1976, Martinez 2012). The larva is oligophagous

on Dipsicaceae (Ellis 2012, Pitkin *et al.* 2012).

GENUS *NAPOMYZA* WESTWOOD, 1840

***Napomyza elegans* (Meigen, 1830)** (Figure 4–5)

**New material.** **ON**, Vågå: Gjende (EIS 61), 23 August 2011, flies and feeding pinholes were observed on *Valeriana sambucifolia* Mik.; **RI**, Forsand: Oanes (EIS 7), 4 August 2003, 1♀; **MRI**, Rauma: Flatmark (EIS 77), 6 July 2011, 1♂; **STI**, Røros: Sølendet (EIS 88), 27 July 2011, 10♂♂9♀♀; **NSY**, Bodø: Bliksvær (EIS 131), 14 June 2002, 4♂♂1♀.

**Distribution and biology of larva.** It has previously been reported from several counties in Norway (Spencer 1976, Andersen & Jonassen 1994). *N. elegans* has been found scattered in most parts of Norway except in the South-East. It is widespread but local in much of Europe, including Fennoscandia and Denmark (Spencer 1976, Martinez 2012, Pitkin *et al.* 2012). The



**FIGURE 5.** *Napomyza elegans* (Meigen, 1830) female and pinholes on *Valeriana sambucifolia* Mik. in Sølendet Nature Reserve 27 July 2011.



larva is reported probably to feed in *Valeriana officinalis* L. (Spencer 1976), and in Sølendet Nature Reserve 27 July 2011 numerous females of *N. elegans* were observed making pinholes in the leaves of *Valeriana sambucifolia* Mik. Mines with larvae of probably this species was also observed in the leaves of the plants, but no flies were hatched. It is the largest and most spectacular Agromyzidae species in Norway.

**\**Napomyza hirticornis* (Hendel, 1932)** (Figure 6)

**Material.** TEY, Kragerø: Jomfruland (EIS 11), 25 August 2002, 1♂1♀.

**Distribution and biology of larva.** *N. hirticornis* has been found only once on the island Jomfruland outside Kragerø on the South-Eastern coast. It is present in much of Europe, including Fennoscandia and Denmark (Martinez 2012, Pitkin *et al.* 2012). The larva has been found to develop in *Jasione montana* L. and *Centaurea nigra* L. (Spencer 1990).

***Napomyza lateralis* (Fallén, 1823)** (Figure 7)

**New material** (799 specimens investigated). Ø, Sarpsborg: Greåker (EIS 20), 6 August 2002, 8♂♂4♀♀; Aremark: Bøen sætre (EIS 21), 19 May 2011, 2♂♂; AK, Nannestad: Søndre Kringler (EIS 37), 1 June 2011, 15♂♂9♀♀; ON, Sel: Otta ungdomskole (EIS 62), 16 September 2003, 1♂; HES, Ringsaker: Moelv (EIS 54), 29 July 2002, 2♂♂2♀♀; BØ, Hole: Røyse (EIS 36), 19 June 1996, 1♂; BV, Sigdal: Solumsmoen (EIS 27), 3 June 2002, 4♂♂4♀♀; VE, Horten: Borrehaugene (EIS 19), 8 June 2002, 5♂♂5♀♀; TEY, Kragerø: Gumø (EIS 11), 24 August 2002, 2♂♂2♀♀; TEI, Bø: Bø sentrum (EIS 18), 13 June 2004, 4♂♂; Hjartdal: Ambjørndalen (EIS 26), 1 June 2010, 2♂♂; AAY, Risør: Sønedeled (EIS 11), 6 July 2003, 1♂1♀; Grimstad: Marievold (EIS 6), 7 July 2003, 2♂♂; VAY, Farsund: Lista fyr (EIS 1), 29 July 2003, 2♂♂1♀; Flekkefjord: Veisdal, Hidra (EIS 4), 12 June 2004, 6♂♂4♀♀; RY, Randaberg: Tungenes (EIS 7), 7 August 2003, 1♂2♀♀; RI, Forsand: Oanes (EIS 7), 4 August 2003, 4♂♂; MRY, Tingvoll: Aksnes (EIS 85), 5 July 2011, 2♂♂; MRI, Rauma: Isfjorden (EIS 77), 6 July 2011, 1♂1♀; STI, Holtålen: Reitan (EIS 88), 26 June 1996, 1♂; NSY, Bodø: Bertnes (EIS 131), 13

June 2002, 2♂♂; NSI, Beiarn: Arstad (EIS 126), 16 June 2002, 1♂4♀♀; Saltdal: Rognan (EIS 127), 15 June 2002, 7♂♂5♀♀; NNØ, Sørfold: Straumen (EIS 132), 15 June 2002, 1♂; TRY, Tromsø: Holt (EIS 162), 21 June 2004, 7♂♂4♀♀; FV, Alta: Tverrdalen (EIS 173), 25 June 2004, 2♂♂; FN, Porsanger: Lakselv (EIS 174), 24 June 2004, 2♂♂1♀.

**Distribution and biology of larva.** *N. lateralis* is widespread and very common all over Norway, as in most of Europe, including Fennoscandia and Denmark (Martinez 2012). The larva is oligophagous on Asteraceae (Spencer 1990, Pitkin *et al.* 2012).

**\**Napomyza nigriceps* van der Wulp, 1871**

(Figure 8)

**Material.** VE, Horten: Borrehaugene (EIS 19), 10 May 2011, 1♂; Horten: Bastøy (EIS 19), 12 May 2011, 1♂.

**Distribution and biology of larva.** So far *N. nigriceps* has been found only in a very small area around the small city Horten, situated by the Oslo fjord. It is widespread but local in Europe, not including Fennoscandia and Denmark (Spencer 1976, Martinez 2012). The larva has been found feeding in *Glechoma hederacea* L. by Michael von Tschirnhaus (Spencer 1990).

GENUS PHYTOMYZA FALLÉN, 1810

***Phytomyza adjuncta* Hering, 1928** (Figure 9)

**New material.** Ø, Moss: Reierbukta (EIS 19), 3 September 1998, 1♂; BØ, Hurum: Storsand (EIS 28), 18 May 2002, 1♂; VE, Horten: Bastøy (EIS 19), 3 August 2007, 2♂♂.

**Distribution and biology of larva.** *P. adjuncta* has been found in only a few places around the inner parts of the Oslo Fjord. It is widespread in Europe, including Fennoscandia and Denmark (Martinez 2012). The larva is monophagous on *Pimpinella* species (Ellis 2012).

***Phytomyza affinis* Fallén, 1823** (Figure 10)

**New material.** Ø, Rygge: Stangarholmen (EIS 19), 29 August 1999, 4♂♂8♀♀; OS, Gausdal: Dokkvannet (EIS 53), 12 July 2003, 1♂; VE, Horten: Vollene (EIS 19), 31 August 2011, 1♂;

**TEY**, Kragerø: Jomfruland (EIS 11), 25 August 2002, 3♂♂; **MRI**, Rauma: Isfjorden (EIS 77), 6 July 2011, 2♂♂; **STI**, Røros: Sølendet (EIS 88), 27 July 2011, 11♂♂; **NSY**, Bodø: Bliksvær (EIS 131), 14 June 2002, 4♂♂4♀♀; **NNØ**, Sørfold: Straumen (EIS 132), 15 June 2002, 1♂.

**Distribution and biology of larva.** *P. affinis* has been found scattered throughout most of Norway. It occurs widespread in most of Europe, including Sweden and Denmark (Pitkin *et al.* 2012, Martinez 2012). The larva is monophagous, eating seeds of *Euphrasia* species (Spencer 1976, 1990).

### *Phytomyza chaerophylli* Kaltenbach, 1856

(Figure 11)

**New material** (317 specimens investigated). **Ø**, Aremark: Bøen sætre (EIS 21), 19 May 2011, 1♂; Sarpsborg: Skjeberg (EIS 20), 2 June 2009, 1♂; **AK**, Nannestad: Søndre Kringler (EIS 37), 1 June 2011, 2♂♂; **BØ**, Hurum: Storsand (EIS 28), 18 May 2002, 4♂♂; **VE**, Horten: Borrehaugene (EIS 19), 24 May 1999, 6♂♂; **HES**, Ringsaker: Moelv (EIS 54), 29 July 2002, 2♂♂; **HEN**, Åmot: Rena (EIS 55), 17 September 2003, 1♂; **TEY**, Bamble: Øvre Hovet (EIS 11), 24 August 2002, 1♂; Skien: Vestre Marker (EIS 18), 14 May 2011, 1♂; **TEI**, Hjartdal: Ambjørndalen (EIS 26), 1 June 2010, 1♂; **AAY**, Risør: Sønedeled (EIS 11), 6 July 2003, 1♂; Grimstad: Indre Maløy (EIS 6), 3 June 2011, 1♂; **MRY**, Tingvoll: Aksnes (EIS 85), 5 July 2011, 3♂♂; **STI**, Trondheim: Byneset kirke (EIS 92), 16 July 2003, 1♂; **NSY**, Bodø: Vågønes (EIS 131), 13 June 2002, 2♂♂; **NSI**, Saltdal: Rognan (EIS 127), 15 June 2002, 1♂ 3♀♀; **TRY**, Tromsø: Holt (EIS 162), 21 June 2004, 10♂♂; **FV**, Alta: Elvestrand (EIS 173), 22 June 2004, 6♂♂; **FN**, Porsanger: Lakselv (EIS 174), 24 June 2004, 1♂.

**Distribution and biology of larva.** *P. chaerophylli* is very common all over Norway. It is widespread and common also in most of Europe, including Fennoscandia and Denmark (Spencer 1976, Martinez 2012). The larva is oligophagous on Apiaceae (Ellis 2012).

### *Phytomyza evanescens* Hendel, 1920 (Figure 12)

**New material** (49 specimens investigated).

**AK**, Nannestad: Søndre Kringler (EIS 37), 16 June 2011, 1♂; **BØ**, Kongsberg: Ullebergåsen (EIS 27), 21 June 2008, 1♂; **VE**, Horten: Bastøy (EIS 19), 5 June 2011, 4♂♂; **TEI**, Seljord: Nord-Blika (EIS 26), 20 June 2010, 2♂♂; **AAY**, Grimstad: Indre Maløy (EIS 6), 3 June 2011, 1♂; **VAY**, Kvinesdal: Kvinesdal sentrum (EIS 4), 10 June 2004, 1♂; **MRI**, Rauma: Øvre Åsen gård (EIS 77), 6 July 2011, 1♂; **NSY**, Bodø: Vågønes (EIS 131), 13 June 2002, 2♂♂; **FV**, Alta: Flaten (EIS 173), 22 June 2004, 1♂.

**Distribution and biology of larva.** *P. evanescens* has been found scattered in most of Norway. It is widespread and common in most parts of Europe, including Fennoscandia and Denmark (Martinez 2012). The larva is monophagous on *Ranunculus* species, feeding in the stem (Spencer 1976, Pitkin *et al.* 2012).

### *Phytomyza flavicornis* Fallén, 1823 (Figure 13)

**New material** (43 specimens investigated).

**BØ**, Hurum: Ellingstad (EIS 28), 18 May 2002, 1♀; **TEI**, Seljord: Laukereini, Blika (EIS 26), 1 June 2010, 1♂2♀♀; **TRY**, Tromsø: Kvaløy (EIS 162), 21 June 2004, 1♂; **FV**, Alta: Aronnes (EIS 173), 22 June 2004, 7♂♂9♀♀.

**Distribution and biology of larva.** *P. flavicornis* has been found scattered in most parts of Norway. It is widespread and common in most of Europe, including Fennoscandia and Denmark (Martinez 2012). The larva is a monophagous stemborer on *Urtica dioica* L. (Spencer 1976, Pitkin *et al.* 2012).

### *Phytomyza glabra* Hendel, 1935 (Figure 14)

**New material.** **AK**, Nannestad: Søndre Kringler (EIS 37), 1 June 2011, 1♂; **OS**, Sør-Fron: Gålå (EIS 62), 4 July 1997, 1♂1♀; **VE**, Horten: Bastøy (EIS 19), 17 May 2007, 1♂; Sande: Sande (EIS 28), 15 June 2000, 1♂; **VAY**, Flekkefjord: Langeland, Hydra (EIS 4), 12 June 2004, 1♂; **TRY**, Tromsø: Holt (EIS 162), 21 June 2004, 1♂; **FV**, Alta Granshagens gartneri (EIS 173), 23 June 2004, 1♂1♀; **FN**, Porsanger: Lakselv (EIS 174), 24 June 2004, 2♂♂; Porsanger: Olderfjord (EIS 181), 24 June 2004, 1♂.

**Distribution and biology of larva.** *P. glabra* has been found scattered in many parts of Norway.

It is widespread but local in some European countries, including Finland (Spencer 1976, Martinez 2012). The larva is a monophagous stemborer in *Anthriscus sylvestris* Hoffm. (Spencer 1976, 1990).

***Phytomyza krygeri* Hering, 1949** (Figure 15)

**New material.** BØ, Nedre Eiker: Ryghsetra (EIS 28), 2 June 2011, 6♂♂10♀♀.

**Distribution and biology of larva.** *P. krygeri* has been found only in a very limited area around the inner part of the Oslo fjord. Elsewhere it is widespread in several countries in Northern Europe, including Denmark and Finland (Martinez 2012). The larva is a monophagous seedeater on *Aquilegia vulgaris* L. (Spencer 1976, Pitkin *et al.* 2012).

**\**Phytomyza melana* Hendel, 1920** (Figure 16)

**Material** (57 specimens investigated). Ø, Rygge: Store Sletter (EIS 19), 13 June 2003, 5♂♂; VE, Horten: Bastøy (EIS 19), 12 May 2009, 4♂♂1♀; AAY, Grimstad: Hesnesøy (EIS 6), 25 June 2011, 1♂; MRI, Rauma: Isfjorden (EIS 77), 6 July 2011, 1♂.

**Distribution and biology of larva.** *P. melana* has been found in a few localities in South-Eastern and Western Norway, common only on the island Bastøy in the Oslo Fjord. Elsewhere it has been found in a few countries in Northern Europe, not including Fennoscandia and Denmark (Martinez 2012). The larva is monophagous on *Pimpinella* species (Spencer 1990, Ellis 2012).

**\**Phytomyza nigrifemur* Hering, 1934** (Figure 17)

**Material** (39 specimens investigated). AK, Frog: Håøya (EIS 28), 27 June–22 July 1984, 1♂ (caught in Malaise-trap by Fred Midtgaard); Aurskog-Høland: Mikkeldrud (EIS 29), 16 June 2011, 1♂; BØ, Kongsberg: Ullebergåsen (EIS 27), 21 June 2008, 9♂♂.

**Distribution and biology of larva.** *P. nigrifemur* has been found only in a few localities in a small area around the inner part of the Oslo fjord. However, the species was common at Ullebergåsen Nature Reserve in Buskerud county, where it was collected during four consecutive years (2008–2011). It is widespread and common

in much of Europe, including Sweden and Finland (Martinez 2012). The host plant of the larva is unknown, but possibly it is *Melampyrum nemorosum* L., as the flies have been caught on this species (Spencer 1976).

***Phytomyza nigripennis* Fallén, 1823** (Figure 18)

**New material** (141 specimens investigated). Ø, Sarpsborg: Skjeberg (EIS 20), 5 June 2001, 2♂♂1♀; Aremark: Bøen særtre (EIS 21), 19 May 2011, 4♂♂; AK, Nannestad: Søndre Kringler (EIS 37), 1 June 2011, 1♂; BØ, Kongsberg: Ullebergåsen (EIS 27), 24 May 2009, 4♂♂2♀♀; VE, Horten: Borrehaugene (EIS 19), 24 May 1999, 1♂; TEY, Skien: Vestre Marker (EIS 18), 14 May 2011, 3♂♂1♀; TEI, Seljord: Blika (EIS 26), 1 June 2010, 2♂♂2♀♀.

**Distribution and biology of larva.** *P. nigripennis* has been found widespread in South-Eastern Norway, and in one locality in South-Western Norway. It is widespread and common in most of Europe, including Fennoscandia and Denmark (Spencer 1976, Martinez 2012). The larva is monophagous on *Anemone nemorosa* L., mining in the stem (Spencer 1990).

***Phytomyza obscurella* Fallén, 1823** (Figure 19)

**New material.** Ø, Moss: Reierbukta (EIS 19), 3 September 1998, 2♂♂.

**Distribution and biology of larva.** *P. obscurella* has been found only in a few localities around the inner part of the Oslo fjord. It is widespread in much of Europe, including Fennoscandia and Denmark (Martinez 2012). The larva is monophagous on *Aegopodium podagraria* L. (Spencer 1976, Ellis 2012).

***Phytomyza pimpinellae* Hendel, 1924** (Figure 20)

**New material** (54 specimens investigated). Ø, Moss: Reier gartneri (EIS 19), 27 June 2003, 1♂; TEI, Hjartdal: Ambjørndalen (EIS 26), 26 June 2011, 1♂; MRI, Rauma: Marstein (EIS 77), 6 July 2011, 19♂♂5♀♀; Rauma: Staurset (EIS 78), 6 July 2011, 10♂♂2♀♀; NTI, Frosta: Evenhus (EIS 92), 15 July 2003, 1♂.

**Distribution and biology of larva.** *P. pimpinellae* has been found scattered in Southern and Middle Norway. It is widespread in Europe,

but mainly in the Northern parts, including Sweden (Martinez 2012). The larva is monophagous on *Pimpinella* species (Spencer 1976, Ellis 2012, Pitkin *et al.* 2012).

***Phytomyza plantaginis* Robineau-Desvoidy, 1851** (Figure 21)

**New material** (602 specimens investigated). Ø, Sarpsborg: Greåker (EIS 20), 6 August 2002, 1♂; AK, Ås, UMB (EIS 28), 5 August–10 September 2002, 8♂♂4♀♀; ON, Sel: Otta ungdomsskole (EIS 62), 16 September 2003, 1♂; BØ, Lier: Sandaker gartneri (EIS 28), 21 June 2003, 1♂; TEY, Bamble: Djupvik (EIS 11), 23 August 2002, 4♂♂2♀♀; TEI, Hjartdal: Ambjørndalen (EIS 26), 9 July 2010, 8♂♂8♀♀; AAY, Grimstad: Larvik (EIS 6), 7 July 2003, 1♂; RY, Randaberg: Tungesnes (EIS 7), 7 August 2003, 3♂♂3♀♀; MRI, Rauma: Isfjorden (EIS 77), 6 July 2011, 7♂♂8♀♀; NSY, Bodø: Ausvika (EIS 131), 14 June 2002, 1♂.

**Distribution and biology of larva.** *P. plantaginis* has been found quite common in much of Norway except in the furthest north. It is widespread and common all over Europe, including Fennoscandia and Denmark (Martinez 2012). The larva is monophagous on *Plantago* species (Spencer 1976, Ellis 2012, Pitkin *et al.* 2012).

***Phytomyza ptarmicae* Hering, 1937** (Figure 22)

**New material.** Ø, Eidsberg: Slitu (EIS 29), 27 May 1999, 1♂.

**Distribution and biology of larva.** *P. ptarmicae* has been found only in a few localities in a restricted area around the inner part of the Oslo fjord. It is present in some countries in Northern Europe, including Sweden and Finland (Martinez 2012). The larva is monophagous on *Achillea* species (Ellis 2012).

***Phytomyza ranunculi* (Shrank, 1803)** (Figure 23)

**New material** (921 specimens investigated). Ø, Sarpsborg: Skjeberg (EIS 20), 5 June 2001, 5♂♂6♀♀; Aremark: Bøen sætre (EIS 21), 19 May 2011, 3♂♂5♀♀; AK, Nannestad: Søndre Kringler (EIS 37), 1 June 2011, 3♂♂2♀♀; HES, Stange: Stange (EIS 46), 11 July 2003, 1♂; HEN, Åmot:

Rena (EIS 55), 17 September 2003, 2♂♂1♀; ON, Sel: Otta ungdomsskole (EIS 62), 16 September 2003, 1♂; Dovre: Dombåshaugen (EIS 71), 4 July 2011, 1♂1♀; BØ, Ringerike: Sokna (EIS 36), 12 July 1995, 1♂; BV, Røllag: Gvammen (EIS 35), 23 May 2011, 5♂♂4♀♀; Sigdal: Solumsmoen (EIS 27), 3 June 2002, 1♂1♀; TEY, Skien: Vestre Marker (EIS 18), 13 June 2011, 8♂♂6♀♀; TEI, Seljord: Blika (EIS 26), 1 June 2010, 6♂♂4♀♀; AAY, Grimstad: Hesnesøy (EIS 6), 3 June 2011, 2♂♂4♀♀; VAY, Flekkefjord: Veisdal, Hidra (EIS 4), 12 June 2004, 2♂♂2♀♀; RY, Stavanger: Forus (EIS 7), 22 May 1996, 1♂; HOY, Os: Hagavik (EIS 31), 6 June 1995, 5♂♂; Meland: Flatøy (EIS 39), 19 June 1995, 4♂♂1♀; Bergen: Stend (EIS 30), 17 June 1996, 1♂; Lindås: Eikangervåg (EIS 40), 1 July 1996, 11♂♂4♀♀; MRI, Rauma: Isfjorden (EIS 77), 6 July 2011, 1♂; Rauma: Staurset (EIS 78), 6 July 2011, 1♂5♀♀; STI, Røros: Sølendet (EIS 88), 27 July 2011, 1♂; NSY, Bodø: Straumøy (EIS 131), 16 June 2002, 1♂2♀♀; Brønnøy: Brønnøysund (EIS 114), 2 July 2006, 6♂♂4♀♀; NSI, Fauske: Nes (EIS 132), 15 June 2002, 17♂♂14♀♀; Beiarn: Storjord (EIS 126), 16 June 2002, 5♂♂5♀♀; Skjerstad: Vesterli (EIS 127), 16 June 2002, 1♂4♀♀; NNØ, Sørfold: Straumen (EIS 132), 15 June 2002, 2♂♂2♀♀; TRY, Flakstad: Nusfjord (EIS 133), 5 July 2006, 17♂♂16♀♀; FV, Alta: Flaten (EIS 173), 22 June 2004, 3♂♂1♀; FN, Porsanger: Lakselv (EIS 174), 22 June 2004, 2♂♂; Porsanger: Olderfjord (EIS 181), 22 June 2004, 1♂.

**Distribution and biology of larva.** *P. ranunculi* has been found very common all over the country. It is widespread and common also all over Europe, including Fennoscandia and Denmark (Martinez 2012, Pitkin *et al.* 2012). The larva is oligophagous on Ranunculaceae (Ellis 2012).

**\**Phytomyza ranunculicola* Hering, 1949** (Figure 24)

**Material** (14 specimens investigated). BØ, Kongsberg: Ullebergåsen (EIS 27), 6 June 2009, 1♂; TEY, Skien: Vestre Marker (EIS 18), 13 June 2011, 1♂; TEI, Seljord: Hjartdal: Ambjørndalen (EIS 26), 20 June 2010, 3♂♂; TRY, Tromsø: Holt (EIS 162), 21 June 2004, 1♂.



**Distribution and biology of larva.** *P. ranunculicola* has been found in low numbers in two parts of Norway: in several localities in the South-East, and in one locality in Northern Norway. Possibly the species appear spread, but overlooked also between the two widely separated areas. It has been reported from several European countries, including Denmark (Martinez 2012, Pitkin *et al.* 2012). The larva is monophagous on *Ranunculus* species (Ellis 2012).

**\*Phytomyza rhabdophora Griffiths, 1964**  
(Figure 25)

**Material** (124 specimens investigated). **Ø**, Eidsberg: Slitu (EIS 29), 24 August 1999, 2♂♂; Moss: Reier (EIS 19), 3 September 1998, 2♂♂; Sarpsborg: Greåker (EIS 20), 6 August 2002, 1♂; **AK**, Enebakk: Orderud (EIS 29), 18 August 1998, 1♂; Ås: UMB (EIS 28), 5 September 2001, 1♂; Eidsvoll: Feiring (EIS 46), 9 July 1996, 4♂♂; **HES**, Løten: Løten kirke (EIS 46), 14 September 2003, 2♂♂5♀♀; **HEN**, Åmot: Rena (EIS 55), 17 September 2003, 2♂♂5♀♀; **OS**, Gausdal: Kittilbu (EIS 54), 12 July 2003, 1♂1♀; **ON**, Sel: Otta ungdomskole (EIS 62), 16 September 2003, 1♂6♀♀; **BØ**, Hurum: Tofte (EIS 28), 18 May 2002, 1♂; **VE**, Horten: Borrehaugene (EIS 19), 8 June 2002, 2♂♂3♀♀; Larvik: Gutterød (EIS 12), 25 June 2003, 2♂♂; **TEY**, Kragerø: Kalstadkilen (EIS 11), 24 August 2002, 4♂♂; **TEI**, Hjørtedal: Ambjørndalen (EIS 26), 20 June 2010, 3♂♂; **AAV**, Grimstad: Hesnesøy (EIS 6), 25 June 2011, 1♂1♀; **VAY**, Farsund: Lista fyr (EIS 1), 29 July 2003, 1♂; Flekkefjord: Vågen, Hidra (EIS 4), 3 August 2003, 2♂♂; **STI**, Trondheim: Byneset kirke (EIS 92), 16 July 2003, 1♂; Røros: Sølendet (EIS 88), 27 July 2011, 1♂4♀♀; **NSI**, Skjerstad: Kvikstad (EIS 131), 16 June 2002, 1♂; Beiarn: Storjord (EIS 126), 16 June 2002, 1♂; **NNØ**, Sørfold: Helland (EIS 132), 15 June 2002, 1♂; **TRY**, Tromsø: Straumhella, Kvaløy (EIS 162), 21 June 2004, 1♂; **FV**, Alta: Bossekop (EIS 173), 23 June 2004, 1♂.

**Distribution and biology of larva.** *P. rhabdophora* has been found widespread and relatively common all over Norway. It is widespread also in several countries in Northern Europe, including Fennoscandia and Denmark

(Martinez 2012). The host plant of the larva is unknown, but possibly it is *Leontodon* species (Tschirnhaus 1969).

**Phytomyza rufipes Meigen, 1830** (Figure 26)

**New material** (25 specimens investigated). **Ø**, Eidsberg: Slitu (EIS 29), 3 August 1999, 1♂; **BØ**, Lier: Sandaker gartneri (EIS 28), 21 June 2003, 1♀.

**Distribution and biology of larva.** *P. rufipes* has been found spread in Southern and Middle Norway. It is widespread in most of Europe, including Fennoscandia and Denmark (Martinez 2012, Pitkin *et al.* 2012). The larva is oligophagous on Brassicaceae (Ellis 2012).

**Phytomyza rydeni Hering, 1934** (Figure 27)

**New material.** **Ø**, Bøen sætre (EIS 21), 12 June 2011, 1♂2♀♀; **AK**, Nannestad: Søndre Kringler (EIS 37), 1 June 2011, 1♂1♀; Aurskog-Høland: Mikkeldrud (EIS 29), 30 May 2011, 1♂1♀; **BØ**, Kongsberg: Ullebergåsen (EIS 27), 21 June 2008, 1♂; **BV**, Rollag: Gvammen (EIS 35), 23 May 2011, 6♂♂; **AAV**, Grimstad: Homborøy (EIS 6), 3 June 2011, 1♂3♀♀; **MRI**, Rauma: Kroksetgjerdet (EIS 77), 6 July 2011, 1♂.

**Distribution and biology of larva.** *P. rydeni* has been found in several locations in South-Eastern Norway and in one locality on the Western coast. It is widespread in some countries in Northern Europe, including Denmark and Sweden (Martinez 2012, Pitkin *et al.* 2012). The larva is monophagous on *Ranunculus acris* L. (Ellis 2012, Pitkin *et al.* 2012).

**\*Phytomyza subrostrata Frey, 1946** (Figure 28)

**Material** (18 specimens investigated). **FV**, Alta: Tverrdalen (EIS 173), 25 June 2004, 3♂♂4♀♀.

**Distribution and biology of larva.** *P. subrostrata* was quite common in Alta, Northern Norway in June 2004, collected in several locations. Elsewhere it has been found in Sweden, Finland and some Baltic countries (Martinez 2012). The larva is feeding in the flowerheads of *Trollius europaeus* L. (Spencer 1976).



***Phytomyza tanacetii* Hendel, 1923** (Figure 29)

**New material.** AK, Oslo: Skullerud (EIS 28), 1♂, 21 June 2003; VE, Horten: Bastøy (EIS 19), 27 May 2010, 2♂♂4♀♀.

**Distribution and biology of larva.** *P. tanacetii* has been found in only a few localities in South-Eastern and Western Norway, mainly in coastal areas. It appears widespread in most of Europe, including Fennoscandia and Denmark (Martinez 2012). The larva is oligophagous on Asteraceae (Ellis 2012).

***Phytomyza tenella* Meigen, 1830** (Figure 30)

**New material.** STI, Røros: Sølendet (EIS 88), 27 July 2011, 1♂1♀; NSY, Bodø: Vågones (EIS 131), 13 June 2002, 1♂.

**Distribution and biology of larva.** *P. tenella* has been found in a few localities in Middle and Northern Norway. It is widespread in much of Europe, including Fennoscandia and Denmark (Martinez 2012). The larva is monophagous on *Pedicularis* species (Ellis 2012).

***Phytomyza varipes* Macquart, 1835** (Figure 31)

**New material** (463 specimens investigated). Ø, Aremark: Bøen sætre (EIS 21), 12 June 2011, 1♀; AK, Aurskog-Høland: Mikkeldrud (EIS 29), 16 June 2011, 18♂♂12♀♀; OS, Gausdal: Dokkvann (EIS 53), 12 July 2003, 1♂; VE, Horten: Bastøy (EIS 19), 4 June 2010, 2♂♂; TEI, Seljord: Blika (EIS 26), 20 June 2010, 55♂♂28♀♀; VAY, Flekkefjord: Husøy, Hydra (EIS 4), 3 August 2003, 1♂; MRI, Rauma: Isfjorden (EIS 77), 6 July 2011, 8♂♂; STI, Trondheim: Klett (EIS 92), 16 July 2003, 1♂1♀; Røros: Sølendet (EIS 88), 27 July 2011, 3♂♂; NTI, Levanger: Litløya (EIS 97), 15 July 2003, 5♂♂6♀♀; NSY, Bodø: Bliksvær (EIS 131), 14 June 2002, 21♂♂19♀♀; NSI, Beiarn: Storjord (EIS 126), 16 June 2002, 14♂♂23♀♀.

**Distribution and biology of larva.** *P. varipes* has been found relatively common in most of Norway. The unusually long female ovipositor makes this a spectacular species. It is widespread in most of Europe, including Fennoscandia and Denmark (Martinez 2012, Pitkin et al. 2012). The larva is feeding in the seedheads of *Rhinanthus* species (Spencer 1976).

***Phytomyza wahlgreni* Rydén, 1944** (Figure 32)

**New material.** Ø, Moss: Alby (EIS 19), 12 June 2001, 14♂♂17♀♀; HES, Løten: Løten kirke (EIS 46), 14 September 2003, 1♂4♀♀; HEN, Åmot: Rena (EIS 55), 17 September 2003, 1♂4♀♀; ON, Dovre: Dombåshaugen (EIS 71), 4 July 2011, 15♂♂8♀♀; BØ, Nedre Eiker: Ryghsetra (EIS 28), 2 June 2011, 1♂; VE, Larvik: Stavern (EIS 12), 16 August 2001, 5♂♂25♀♀; TEY, Kragerø: Jomfruland (EIS 11), 25 August 2002, 1♂11♀♀; Skien: Vestre Marker (EIS 18), 13 June 2011, 15♂♂7♀♀; TEI, Seljord: Blika (EIS 26), 20 June 2010, 1♂; AAY, Risør: Sønedeled (EIS 11), 6 July 2003, 1♂4♀♀; Grimstad: Hesnesøy (EIS 6), 3 June 2011, 19♂♂6♀♀; VAY, Flekkefjord: Veisdal, Hydra (EIS 4), 12 June 2004, 1♂; VAI, Sirdal: Tonstad (EIS 8), 13 June 2004, 1♂; RY, Hå: Brusand (EIS 3), 24 June 1996, 1♂; Sola: Røyneberg (EIS 7), 18 June 1996, 1♂; HOY, Bergen: Stend (EIS 30), 15 July 1996, 3♂♂; Lindås: Eikangervåg (EIS 40), 1 July 1996, 1♂; MRY, Tingvoll: Holmeide (EIS 85), 5 July 2011, 2♂♂7♀♀; MRI, Rauma: Venja (EIS 77), 6 July 2011, 7♂♂17♀♀; Rauma: Staurset (EIS 78), 6 July 2011, 3♂♂1♀; Sunndal: Svøu (EIS 79), 5 July 2011, 16♂♂5♀♀; NSY, Bodø: Straumøy (EIS 131), 16 June 2002, 4♂♂2♀♀; Brønnøy: Brønnøysund (EIS 114), 2 July 2006, 2♂♂2♀♀; NSI, Fauske: Nes (EIS 132), 15 June 2002, 2♂♂1♀; NNØ, Sørfold: Helland (EIS 132), 15 June 2002, 1♂; TRY, Tromsø: Holt (EIS 162), 21 June 2004, 1♂; Flakstad: Nusfjord (EIS 133), 5 July 2006, 6♂♂1♀.

**Distribution and biology of larva.** *P. wahlgreni* is widespread and very common all over Norway, as in the rest of Europe, including Fennoscandia and Denmark (Martinez 2012). The larva is monophagous on *Taraxacum officinale* Wigg. (Ellis 2012).

**Conclusions**

The Norwegian fauna of Agromyzidae has increased to 206 species when the species reported in this paper are included. Still it is reasonable to assume that a large percentage of the species present in Norway has not been discovered.

Spencer reported 385 Agromyzidae species present in Denmark and Fennoscandia (Spencer 1976). The areas in Western, Middle and Northern Norway need the most to be investigated. Also mountainous areas are generally less investigated than coastal areas.

**Acknowledgements.** As part of various research projects, Øystein Kjos has been most helpful in collecting agromyzid flies. Two specimens of *Chromatomyia nigra* (Meigen, 1830) included here were caught by May-Guri Sæthre, one male *Phytomyza nigrifemur* Hering, 1934 was caught by Fred Midtgaard and 3 males of *Chromatomyia fuscula* (Zetterstedt, 1838) was caught by Terje Jonassen and handed over to me, of which I am grateful. Part of the field work was supported by grants from The Research Council of Norway.

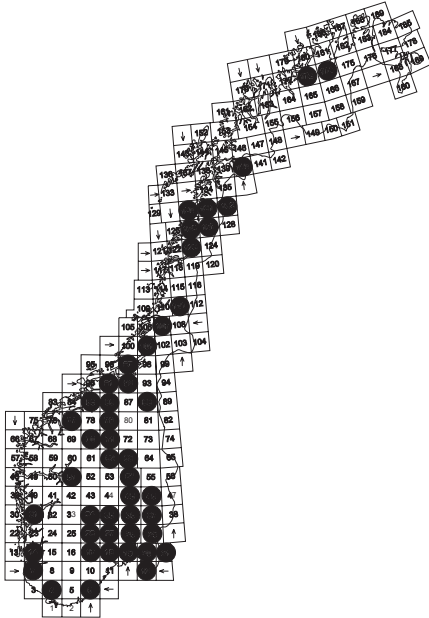
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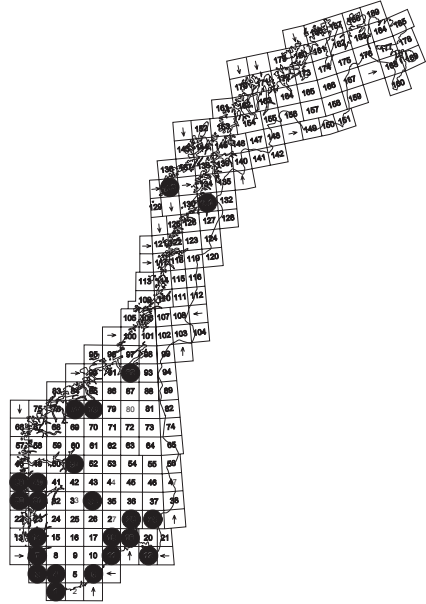
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**APPENDIX.** Distribution maps of 31 species of Agromyzidae in the genera *Chromatomyia* Hardy 1849, *Napomyza* Westwood, 1840 and *Phytomyza* Fallén, 1810 from Norway. The distribution is given as EIS-grid maps (European Invertebrate Survey).

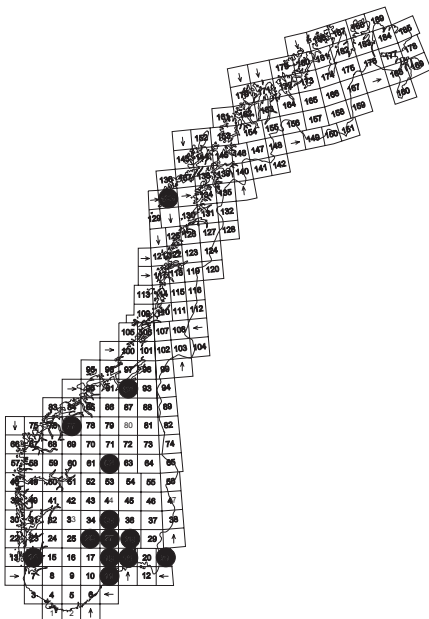
**FIGURE 1.** Distribution of *Chromatomyia fuscata* (Zetterstedt, 1838) in Norway.



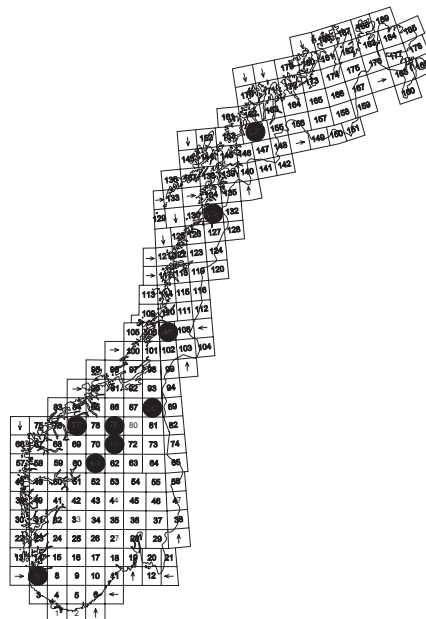
**FIGURE 2.** Distribution of *Chromatomyia nigra* (Meigen, 1830) in Norway.



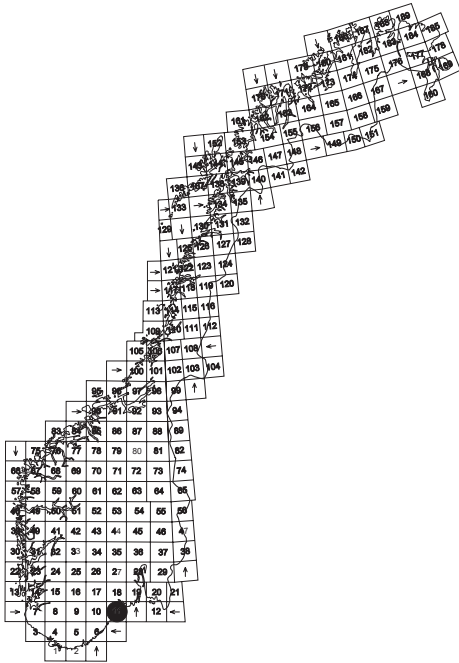
**FIGURE 3.** Distribution of *Chromatomyia ramosa* (Hendel, 1923) in Norway.



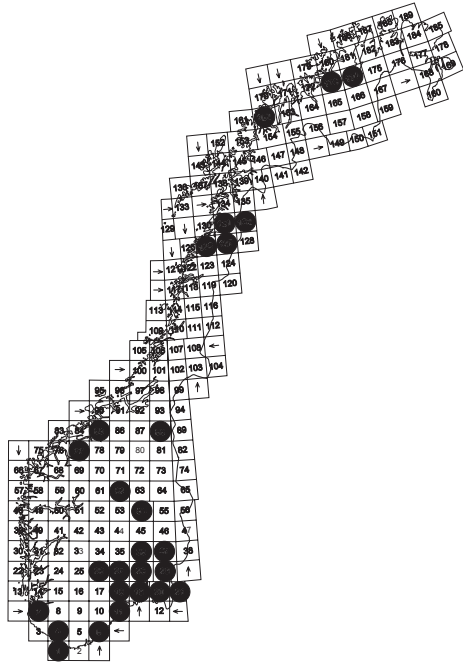
**FIGURE 4.** Distribution of *Napomyza elegans* (Meigen, 1830) in Norway.



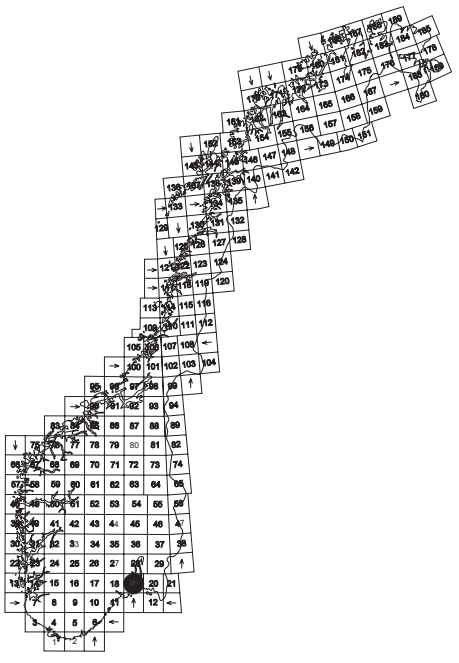
**FIGURE 6.** Distribution of *Napomyza hirticornis* (Hendel, 1932) in Norway.



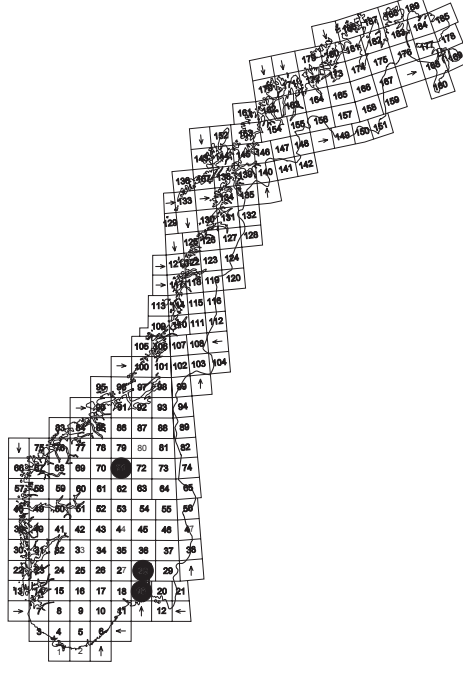
**FIGURE 7.** Distribution of *Napomyza lateralis* (Fallen, 1823) in Norway.



**FIGURE 8.** Distribution of *Napomyza nigriceps* van der Wulp, 1871 in Norway.

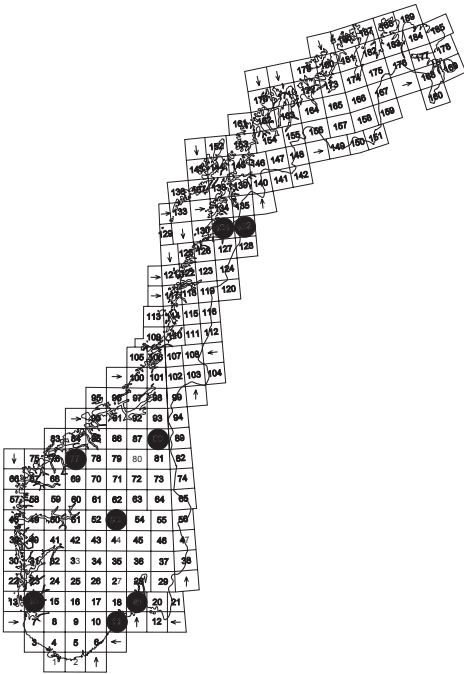


**FIGURE 9.** Distribution of *Phytomyza adjuncta* Hering, 1928 in Norway.

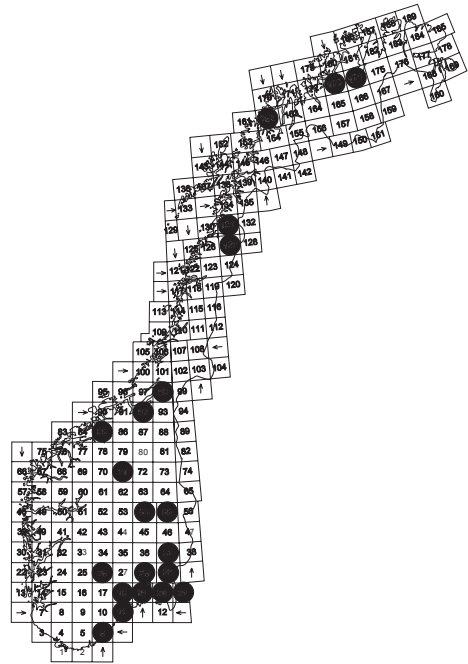




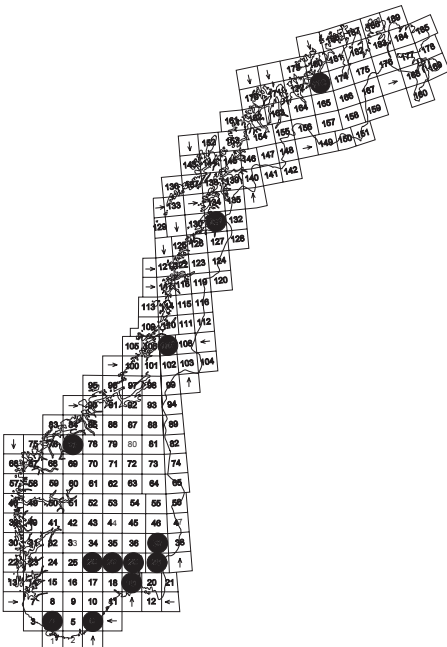
**FIGURE 10.** Distribution of *Phytomyza affinis* Fallén, 1823 in Norway.



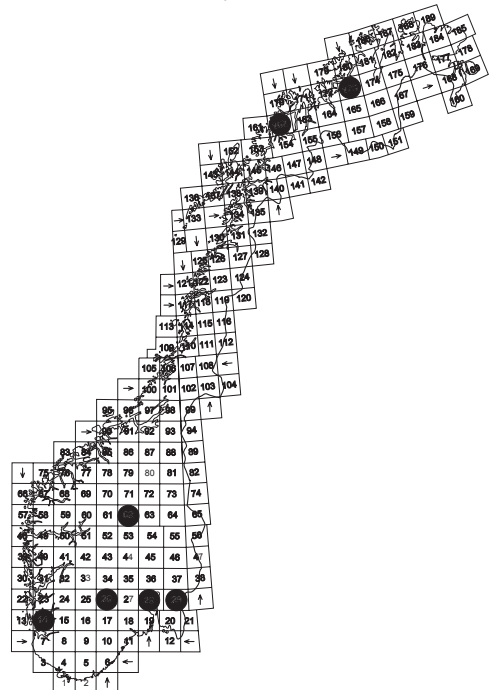
**FIGURE 11.** Distribution of *Phytomyza chaerophylli* Kaltenschmidt, 1856 in Norway.



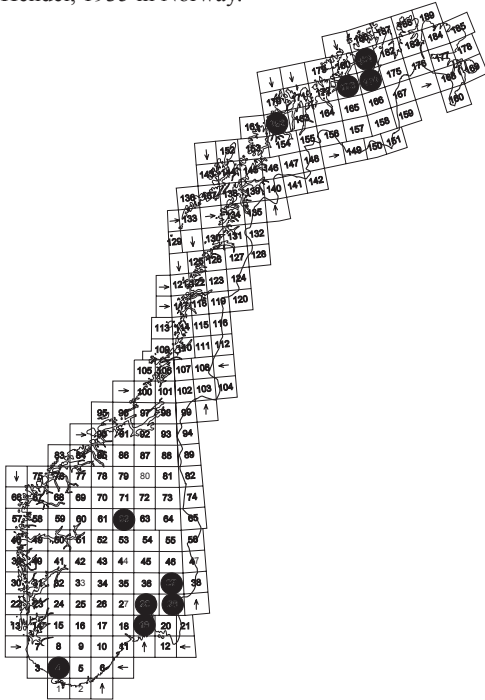
**FIGURE 12.** Distribution of *Phytomyza evanescens* Hende, 1920 in Norway.



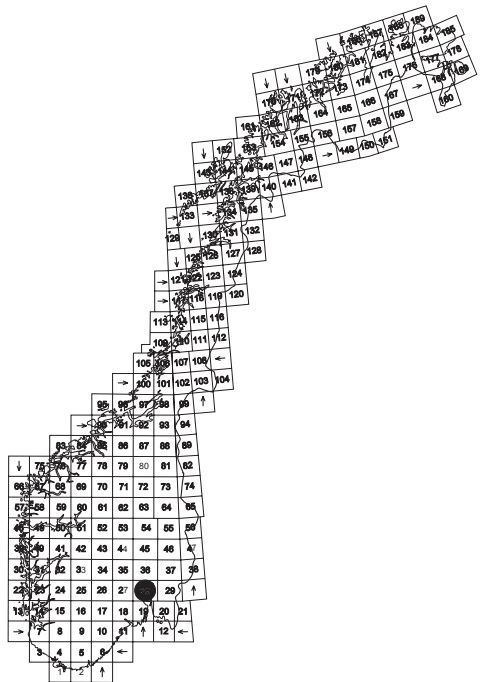
**FIGURE 13.** Distribution of *Phytomyza flavicornis* Fallén, 1823 in Norway.



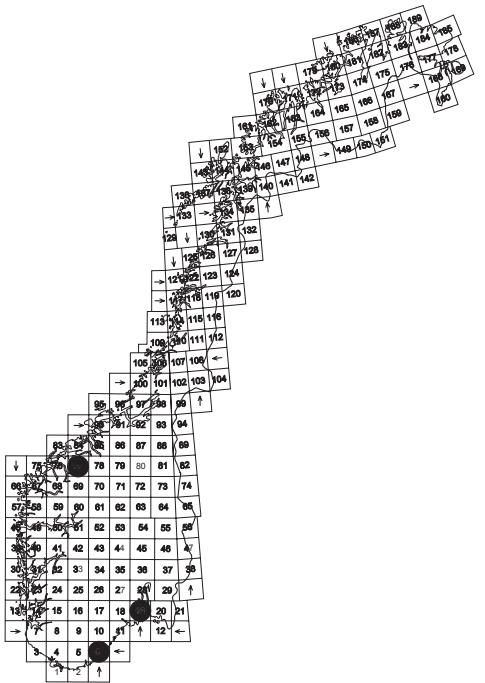
**FIGURE 14.** Distribution of *Phytomyza glabra* Hendel, 1935 in Norway.



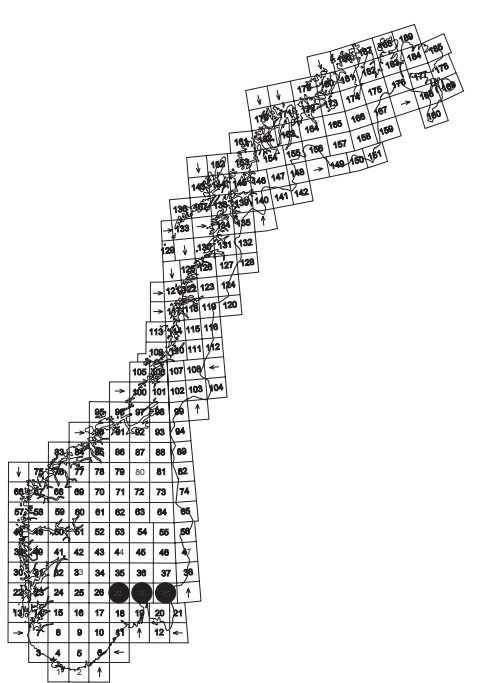
**FIGURE 15.** Distribution of *Phytomyza krygeri* Hering, 1949 in Norway.



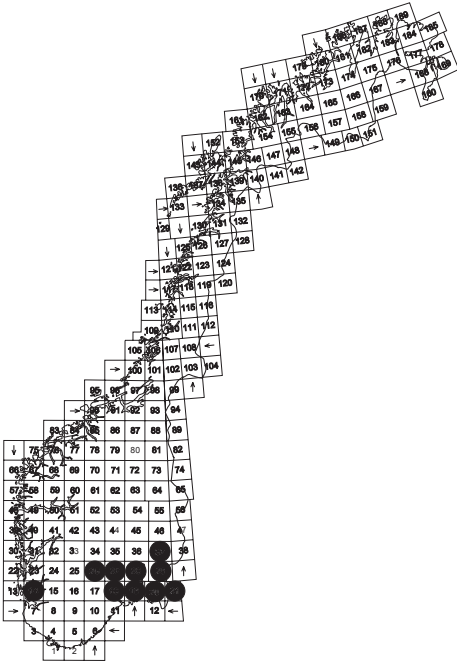
**FIGURE 16.** Distribution of *Phytomyza melana* Hendel, 1920 in Norway.



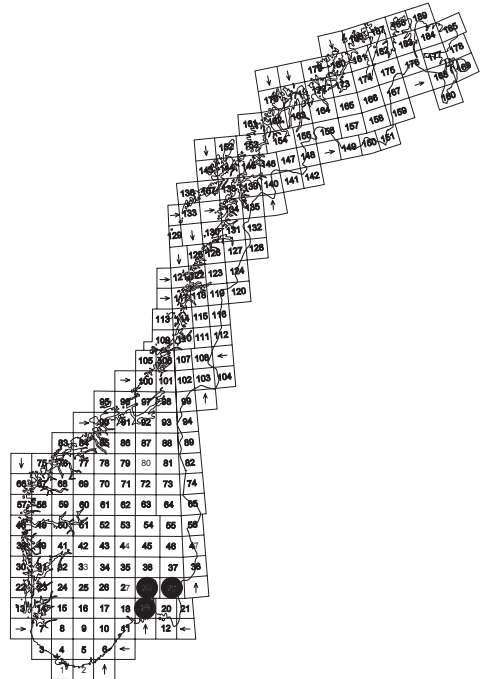
**FIGURE 17.** Distribution of *Phytomyza nigrifemur* Hering, 1934 in Norway.



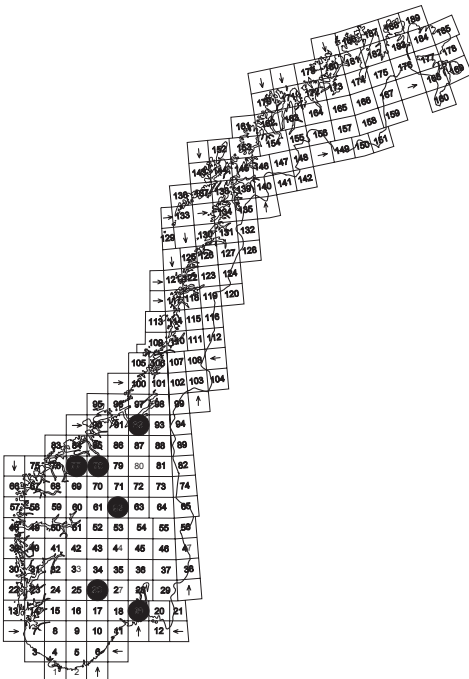
**FIGURE 18.** Distribution of *Phytomyza nigripennis* Fallén, 1823 in Norway.



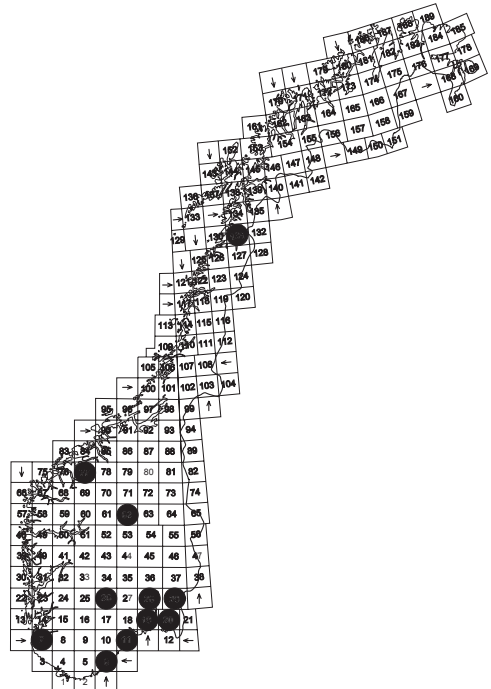
**FIGURE 19.** Distribution of *Phytomyza obscurella* Fallén, 1823 in Norway.



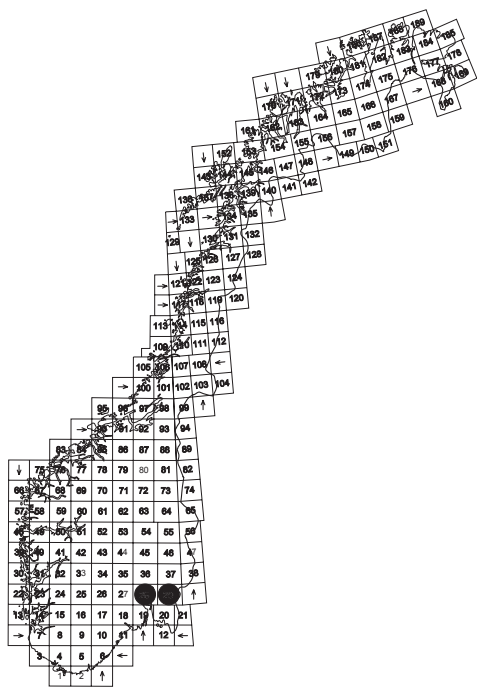
**FIGURE 20.** Distribution of *Phytomyza pimpinellae* Hendl, 1924 in Norway.



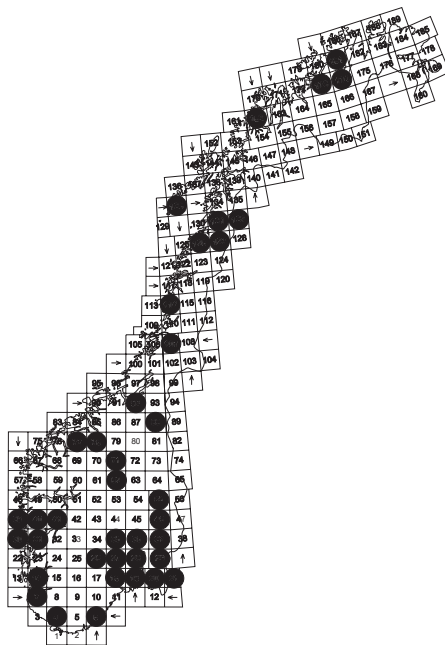
**FIGURE 21.** Distribution of *Phytomyza plantaginis* Robineau-Desvoidy, 1851 in Norway.



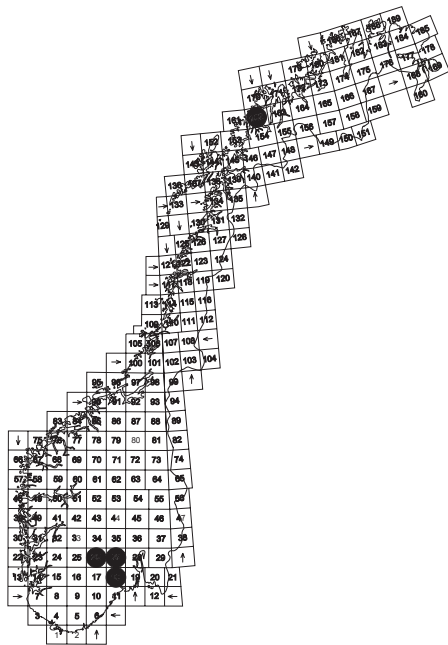
**FIGURE 22.** Distribution of *Phytomyza ptarmicae* Hering, 1937 in Norway.



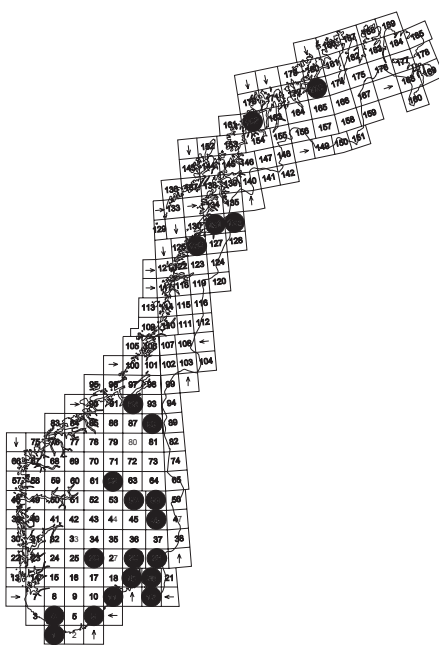
**FIGURE 23.** Distribution of *Phytomyza ranunculi* (Schrank, 1803) in Norway.



**FIGURE 24.** Distribution of *Phytomyza ranuncolicola* Hering, 1949 in Norway.

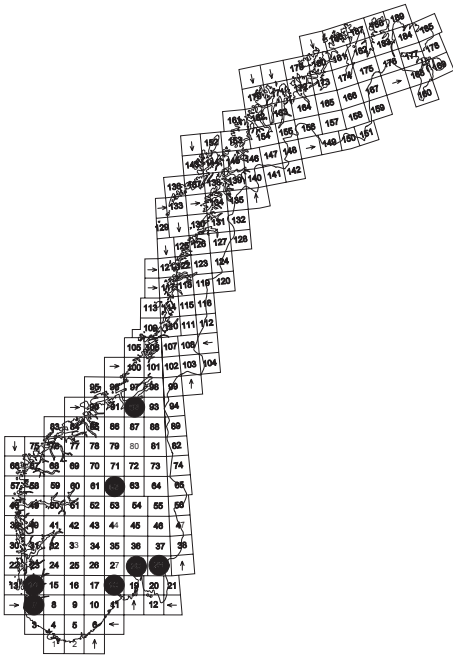


**FIGURE 25.** Distribution of *Phytomyza rhabdophora* Griffiths, 1964 in Norway.

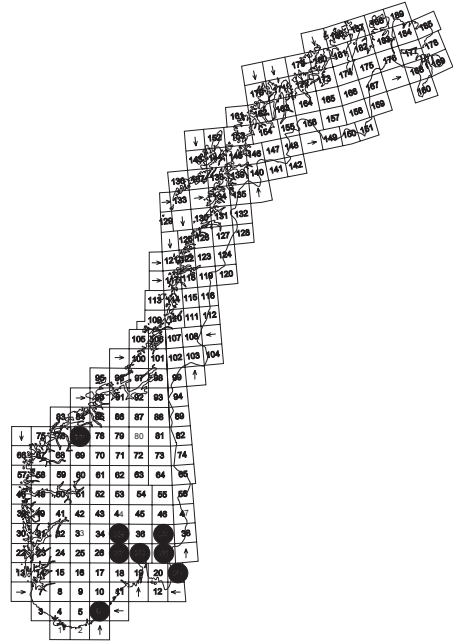




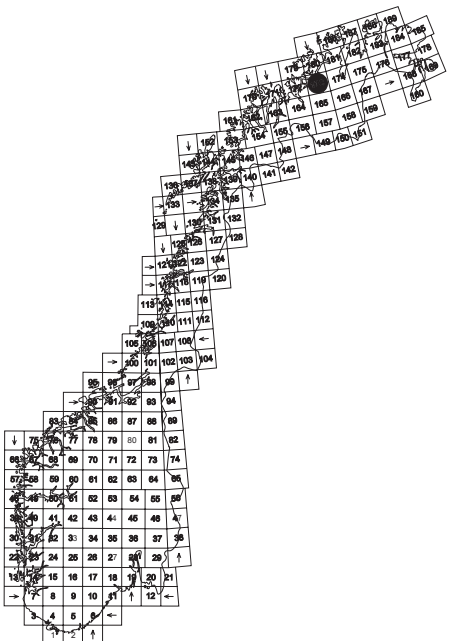
**FIGURE 26.** Distribution of *Phytomyza rufipes* Meigen, 1830 in Norway.



**FIGURE 27.** Distribution of *Phytomyza rydeni* Hering, 1934 in Norway.



**FIGURE 28.** Distribution of *Phytomyza subrostrata* Frey, 1946 in Norway.



**FIGURE 29.** Distribution of *Phytomyza tanacetii* Hendel, 1923 in Norway.

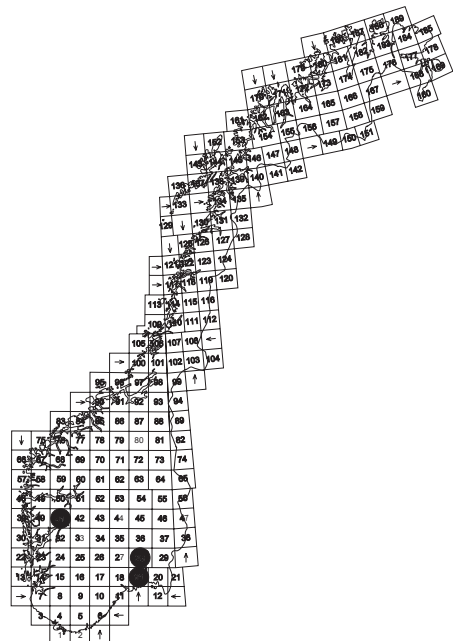


FIGURE 30. Distribution of *Phytomyza tenella* Meigen, 1830 in Norway.

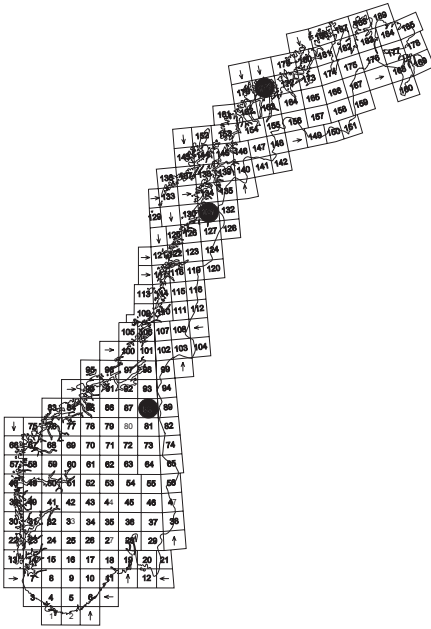


FIGURE 31. Distribution of *Phytomyza varipes* Macquart, 1835 in Norway.

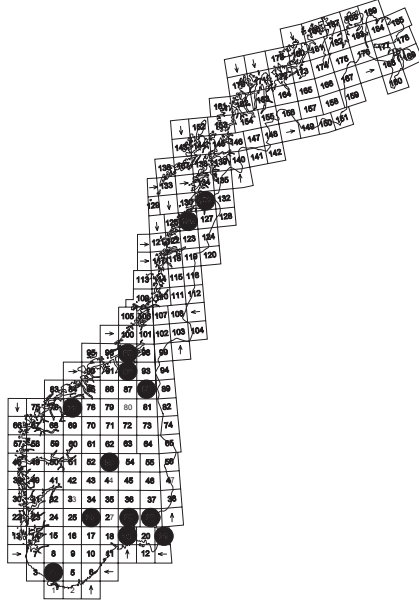


FIGURE 32. Distribution of *Phytomyza wahlgreni* Ryden, 1944 in Norway.

