



Proceedings of the  
Estonian Academy of Sciences  
2026, **75**, 4, 280–284

<https://doi.org/10.3176/proc.2026.4.02>

[www.eap.ee/proceedings](http://www.eap.ee/proceedings)  
Estonian Academy Publishers

## ENTOMOLOGY

### RESEARCH ARTICLE

Received 10 March 2026  
Accepted 14 May 2026  
Available online 7 September 2026

#### Keywords:

biodiversity discovery, dark taxa,  
entomofauna

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#### Citation:

Bruun, H. H. 2026. A first stab at investigating the Estonian fauna of gall midges (Diptera: Cecidomyiidae: Cecidomyiinae). *Proceedings of the Estonian Academy of Sciences*, **75**(4), 280–284.  
<https://doi.org/10.3176/proc.2026.4.02>

# A first stab at investigating the Estonian fauna of gall midges (Diptera: Cecidomyiidae: Cecidomyiinae)

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## ABSTRACT

Plant-feeding gall midges are reported from Estonia for the first time. A week-long field trip in August 2025 resulted in records of 45 species as new to the country. Adding reliable records of additional species from citizen science portals resulted in a first preliminary checklist of 70 species, two of which were identified to the genus level only. This is but a first stab at investigating the hitherto unknown gall midge fauna of Estonia.

## Introduction

The gall midges (Diptera: Cecidomyiidae) are a speciose insect family showing diverse life histories and feeding niches. Megabarcoding has shown it to be among the least known of insect families (Hebert et al. 2016; Srivathsan et al. 2023). The global checklist of the family presently enumerates 6887 species in 816 genera (Gagné and Jaschhof 2025), but the cited species number has been estimated to represent less than one percent of the true species richness in the family (Meier et al. 2025). The European gall midge fauna is held to be comparatively well known, but with large variation in the level of knowledge between countries and territories.

Skuhravá and Skuhravý (2010) reviewed the existing knowledge of the Cecidomyiidae fauna of all European countries and territories. For Estonia, they found the level of knowledge for the mainly fungus-feeding and wood-inhabiting subfamilies Lestremiinae and Porricondylinae (in the then subfamilial circumscription) to be around average, while knowledge for the mainly plant-feeding subfamily Cecidomyiinae was poor. They stated that ‘no investigations of the subfamily Cecidomyiinae have been done’ (in Estonia). According to Spungis (1998) and Spungis and Jaschhof (2000), the species count for Estonia is 93 in total, with 48 for Lestremiinae, 45 for Porricondylinae and 0 for Cecidomyiinae. Recent results of the Estonian Malaise Trap Project have raised the species count to 152 Cecidomyiidae other than Cecidomyiinae (Sikora et al. 2020).

During late August 2025, I had the opportunity to visit a number of sites in Estonia, spanning a gradient from west to east and covering a suite of habitat types, e.g. alvar grasslands, wooded meadows, salt marshes, floodplain wetlands, swamp forests and urban areas. Here I report the encountered gall midge species (subfamily Cecidomyiinae), most of which were familiar to me from forays in Denmark and other European countries. In addition, I review Estonian gall midge records from citizen science portals, for which photographic documentation has enabled safe species identification, in order to provide a first and preliminary checklist of the gall midge fauna of Estonia.

## Materials and methods

Collection was done at the following sites (given as municipality, sometimes protected area, nearest place name, central geo-coordinates for the finds) and on the following dates:

1. Lääne-Nigula, Rõuma, 58.9642° N, 24.0653° E, 18-viii-2025
2. Saaremaa, Kuressaare, 58.2484° N, 22.4811° E, 18-viii-2025
3. Saaremaa, Mullutu-Loode Nature Reserve, 58.2365° N, 22.4395° E, 19-viii-2025
4. Saaremaa, Mõnnuste, 58.2970° N, 22.2676° E, 19-viii-2025

5. Saaremaa, Viidumäe Nature Reserve, 58.2982° N, 22.0987° E, 19-viii-2025
6. Saaremaa, Kaugatoma-Lõu Landscape Protection Area, 58.1005° N, 22.1799° E, 19-viii-2025
7. Saaremaa, Rahuste Nature Reserve, 58.0785° N, 22.1055° E, 19-viii-2025
8. Saaremaa, Tahula-Reo Conservation Area, 58.2997° N, 22.6437° E, 20-viii-2025
9. Saaremaa, Nihatu Conservation Area, 58.5574° N, 22.8044° E, 20-viii-2025
10. Muhu, Kallaste, 58.6674° N, 23.2396° E, 20-viii-2025
11. Tori, Rätsepa, 58.4910° N, 24.9427° E, 21-viii-2025
12. Tori, Soomaa National Park, Meiekose, 58.4438° N, 25.0134° E, 21-viii-2025
13. Viljandi, Oiu Harbour, 58.3978° N, 25.9772° E, 21-viii-2025
14. Tartu City, 58.3790° N, 26.7161° E, 22-viii-2025
15. Põlva, Peetri, 58.2553° N, 27.1576° E, 23-viii-2025
16. Põlva, Kastmekoja, 58.2439° N, 27.1882° E, 23-viii-2025
17. Kastre, Järvselja Nature Reserve, 58.2784° N, 27.3250° E, 23-viii-2025
18. Rae, Lehmja, 59.3599° N, 24.874° E, 24-viii-2025

Identification was obtained mainly through a combination of larval characters and gall morphology and using standard

reference works (e.g. Roskam 2019; Skuhravá and Skuhravý 2021). In many cases, larvae were collected. The collected material is kept in the private collection of the author but will eventually be deposited at the Natural History Museum of Denmark.

In order to produce a first checklist of the Estonian gall midge fauna, verifiable (i.e. with photos and notes about host plant, etc.) records on the citizen science platforms iNaturalist and eElurikkus, and in the Global Biodiversity Information Facility (GBIF) database, were reviewed, and species additional to those found by me were identified.

## Results

The 2025 investigations resulted in 58 records of 45 species found at one or more sites. One of these is a distinct species, inducing leaf galls on *Filipendula vulgaris*, that is still awaiting formal description (see Harris 2010), while two others are members of genera in which species circumscription and host relations are highly uncertain, namely a species of the rust midges, genus *Mycodiplosis*, and a member of the predacious genus *Lestodiplosis*. The records of encountered species appear in Table 1A.

**Table 1. A.** Results of faunistic investigations in sites 1–18 in Estonia in August 2025; **B.** Additional species recorded on GBIF or citizen science portals with sufficient documentation for safe identification

| Scientific name                                       | Host plant identity                                          | Site No. / Database |
|-------------------------------------------------------|--------------------------------------------------------------|---------------------|
| <b>A.</b>                                             |                                                              |                     |
| <i>Ametrodiplosis thalictricola</i> (Rübsaamen, 1895) | <i>Thalictrum lucidum</i>                                    | 12                  |
| <i>Asphondylia hornigi</i> Wachtl, 1880               | <i>Origanum vulgare</i>                                      | 8                   |
| <i>Asphondylia serpylli</i> Kieffer, 1898             | <i>Thymus serpyllum</i>                                      | 4, 6                |
| <i>Clinodiplosis cilicrus</i> (Kieffer, 1889)         | Phytosaprophagous in capitulum of <i>Pentanema salicinum</i> | 3                   |
| <i>Contarinia loti</i> (De Geer, 1776)                | <i>Lotus corniculatus</i>                                    | 3, 4                |
| <i>Contarinia medicaginis</i> Kieffer, 1895           | <i>Medicago sativa</i>                                       | 4, 7                |
| <i>Contarinia tiliarum</i> (Kieffer, 1890)            | <i>Tilia</i> sp. (urban tree)                                | 2                   |
| <i>Dasineura epilobii</i> (F. Löw, 1889)              | <i>Epilobium angustifolium</i>                               | 11                  |
| <i>Dasineura myosotidis</i> (Kieffer, 1902)           | <i>Myosotis scorpioides</i>                                  | 13                  |
| <i>Dasineura plicatrix</i> (Loew, 1850)               | <i>Rubus caesius</i>                                         | 3, 6                |
| <i>Dasineura populeti</i> (Rübsaamen, 1889)           | <i>Populus tremula</i>                                       | 5                   |
| <i>Dasineura pteridicola</i> (Kieffer, 1901)          | <i>Pteridium aquilinum</i>                                   | 5                   |
| <i>Dasineura pustulans</i> (Rübsaamen, 1889)          | <i>Filipendula ulmaria</i>                                   | 5, 17               |
| <i>Dasineura rosae</i> (Bremi, 1847)                  | <i>Rosa cinnamomea</i>                                       | 1                   |
| <i>Dasineura serotina</i> (Winnertz, 1853)            | <i>Hypericum perforatum</i>                                  | 6                   |
| <i>Dasineura</i> sp. A sensu Harris (2010)            | <i>Filipendula vulgaris</i>                                  | 6                   |
| <i>Dasineura thomasiana</i> (Kieffer, 1888)           | <i>Tilia</i> sp. (urban tree)                                | 2, 14               |
| <i>Dasineura tiliae</i> (Schränk, 1803)               | <i>Tilia</i> sp. (urban tree)                                | 2                   |
| <i>Dasineura tortilis</i> (Bremi, 1847)               | <i>Alnus glutinosa</i>                                       | 9                   |
| <i>Dasineura ulmaria</i> (Bremi, 1847)                | <i>Filipendula ulmaria</i>                                   | 3, 11               |
| <i>Dasineura urticae</i> (Perris, 1840)               | <i>Urtica dioica</i>                                         | 6                   |
| <i>Didymomyia tiliacea</i> (Bremi, 1847)              | <i>Tilia cordata</i>                                         | 17                  |
| <i>Diodaulus linariae</i> (Winnertz, 1853)            | <i>Linaria vulgaris</i>                                      | 6                   |
| <i>Geocrypta braueri</i> (Handlirsch, 1884)           | <i>Hypericum perforatum</i>                                  | 4                   |
| <i>Geocrypta galii</i> (Loew, 1850)                   | <i>Galium mollugo</i>                                        | 3, 12               |
| <i>Jaapiella cirsiicola</i> Rübsaamen, 1916           | <i>Cirsium arvense</i>                                       | 7                   |
| <i>Jaapiella inulicola</i> Fedotova, 1993             | <i>Pentanema salicinum</i>                                   | 1                   |
| <i>Jaapiella veronicae</i> (Vallot, 1827)             | <i>Veronica chamaedrys</i>                                   | 13, 14, 16          |
| <i>Kiefferia pericarpiicola</i> (Bremi, 1847)         | <i>Pimpinella saxifraga</i>                                  | 1, 4, 5, 8          |

Continued on the next page

Table 1. Continued

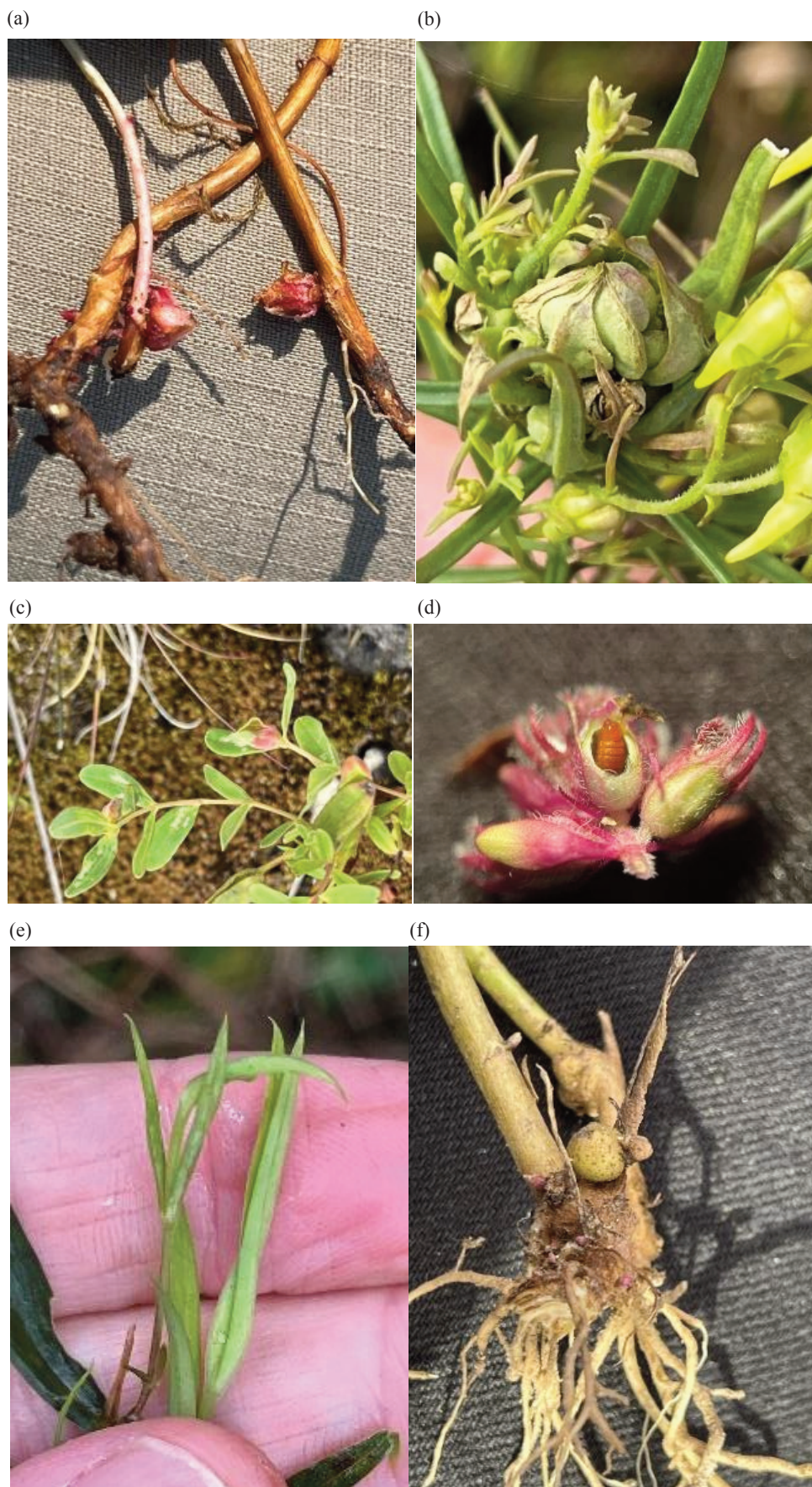
| Scientific name                                       | Host plant identity                                                      | Site No. / Database |
|-------------------------------------------------------|--------------------------------------------------------------------------|---------------------|
| <b>A.</b>                                             |                                                                          |                     |
| <i>Kiefferia pericarpiicola</i> (Bremi, 1847)         | <i>Daucus carota</i>                                                     | 4                   |
| <i>Lasioptera carophila</i> F. Löw, 1874              | <i>Pimpinella saxifraga</i>                                              | 1                   |
| <i>Lasioptera rubi</i> (Schrank, 1803)                | <i>Rubus idaeus</i>                                                      | 16                  |
| <i>Lathyromyza florum</i> Rübsaamen, 1916             | <i>Lathyrus pratensis</i>                                                | 12                  |
| <i>Lestodiplosis</i> sp.                              | Capitula of <i>Achillea millefolium</i> with <i>Macrolabis achilleae</i> | 1                   |
| <i>Macrodiplosis pustularis</i> (Bremi, 1847)         | <i>Quercus robur</i>                                                     | 3                   |
| <i>Macrodiplosis roboris</i> (Hardy, 1854)            | <i>Quercus robur</i>                                                     | 3                   |
| <i>Macrolabis achilleae</i> Rübsaamen, 1893           | <i>Achillea millefolium</i>                                              | 1                   |
| <i>Macrolabis holostae</i> Rübsaamen, 1917            | <i>Stellaria holostea</i>                                                | 17                  |
| <i>Mycodiplosis</i> sp.                               | <i>Puccinia poarum</i>   <i>Tussilago farfara</i>                        | 15                  |
| <i>Ozirkhincus millefolii</i> (Wachtl, 1884)          | <i>Achillea millefolium</i>                                              | 1                   |
| <i>Physemocercis hartigi</i> (Liebel, 1892)           | <i>Tilia cordata</i>                                                     | 17                  |
| <i>Rhopalomyia baccarum</i> (Wachtl, 1883)            | <i>Artemisia vulgaris</i>                                                | 18                  |
| <i>Rondaniola bursaria</i> (Bremi, 1847)              | <i>Glechoma hederacea</i>                                                | 14                  |
| <i>Semudobia skuhravae</i> Roskam, 1977               | <i>Betula pendula</i>                                                    | 10                  |
| <i>Semudobia tarda</i> Roskam, 1977                   | <i>Betula pendula</i>                                                    | 10                  |
| <i>Wachtliella krumbholzi</i> Stelter, 1975           | <i>Rhamnus cathartica</i>                                                | 8                   |
| <b>B.</b>                                             |                                                                          |                     |
| <i>Anisostephus betulinus</i> (Kieffer, 1889)         | <i>Betula pendula</i>                                                    | GBIF                |
| <i>Contarinia baeri</i> (Prell, 1931)                 | <i>Pinus sylvestris</i>                                                  | GBIF                |
| <i>Contarinia coryli</i> (Kaltenbach, 1859)           | <i>Corylus avellana</i>                                                  | GBIF                |
| <i>Contarinia petioli</i> (Kieffer, 1898)             | <i>Populus tremula</i>                                                   | iNaturalist         |
| <i>Contarinia quinquenotata</i> (F. Löw, 1888)        | <i>Hemerocallis fulva</i>                                                | GBIF                |
| <i>Craneiohia corni</i> (Giraud, 1863)                | <i>Cornus sanguinea</i>                                                  | eElurikkus          |
| <i>Cystiphora sonchi</i> (Vallot, 1827)               | <i>Sonchus arvensis</i>                                                  | GBIF                |
| <i>Cystiphora taraxaci</i> (Kieffer, 1888)            | <i>Taraxacum</i> sp.                                                     | iNaturalist         |
| <i>Dasineura acrophila</i> (Winnertz, 1853)           | <i>Fraxinus excelsior</i>                                                | GBIF                |
| <i>Dasineura auritae</i> Rübsaamen, 1916              | <i>Salix caprea</i>                                                      | GBIF                |
| <i>Dasineura fraxini</i> (Bremi, 1847)                | <i>Fraxinus excelsior</i>                                                | iNaturalist         |
| <i>Dasineura hygrophila</i> (Mik, 1883)               | <i>Galium palustre</i>                                                   | GBIF                |
| <i>Dasineura pteridis</i> (Müller, 1871)              | <i>Pteridium aquilinum</i>                                               | GBIF                |
| <i>Dasineura sisymbrii</i> (Schrank, 1803)            | <i>Rorippa palustris</i>                                                 | iNaturalist         |
| <i>Harmandiola cavernosa</i> (Rübsaamen, 1899)        | <i>Populus tremula</i>                                                   | iNaturalist         |
| <i>Harmandiola globuli</i> (Rübsaamen, 1889)          | <i>Populus tremula</i>                                                   | GBIF                |
| <i>Harmandiola tremulae</i> (Winnertz, 1853)          | <i>Populus tremula</i>                                                   | iNaturalist         |
| <i>Iteomyia capreae</i> (Winnertz, 1853)              | <i>Salix caprea</i>                                                      | GBIF                |
| <i>Kaltenbachiola strobili</i> (Winnertz, 1853)       | <i>Picea abies</i>                                                       | GBIF                |
| <i>Macrolabis incolens</i> Rübsaamen, 1895            | <i>Veronica chamaedrys</i>                                               | GBIF                |
| <i>Plemeliella abietina</i> Seitner, 1908             | <i>Picea abies</i>                                                       | GBIF                |
| <i>Rabdophaga salicis</i> (Schrank, 1803)             | <i>Salix</i> sp.                                                         | GBIF                |
| <i>Thecodiplosis brachyntera</i> (Schwägrichen, 1835) | <i>Pinus sylvestris</i>                                                  | GBIF                |
| <i>Wachtliella caricis</i> (Loew, 1850)               | <i>Carex disticha</i>                                                    | GBIF                |
| <i>Wachtliella persicariae</i> (Linnaeus, 1767)       | <i>Persicaria amphibia</i>                                               | GBIF                |

The addition of species from other reliable sources (Table 1B) produced a preliminary checklist of 70 species, three of which were identified at the genus level only. Of these species, 37 are known from Finland (Jaschhof et al. 2014), 55 are known from Latvia (Spungis 2003) and 40 are known from the Leningrad Province, Russia, these being the regions immediately neighbouring Estonia. Eight species unknown from all three adjacent territories were recorded as new to Estonia, viz. *Dasineura myosotidis*, *D. serotina*, *D. sp.* A sensu Harris (2010), *Diodaulus linariae*, *Geocrypta braueri*,

*Lathyromyza florum*, *Semudobia skuhravae* and *S. tarda*. In addition, *Dasineura auritae*, recorded on GBIF but not found by me, is known from none of the three neighbouring territories. Figure 1 shows a few examples of galls induced by the species encountered.

## Discussion

Most of the 45 gall midge species of the subfamily Cecidomyiinae here reported as new to Estonia could be con-



**Fig. 1.** Examples of galls induced by species found during the 2025 investigation: (a) *Geocrypta braueri*, the larvae live gregariously in galled subterranean rejuvenation buds on *Hypericum perforatum*; (b) *Diodaulus linariae*, the larvae live gregariously in large artichoke galls involving the inflorescence of *Linaria vulgaris*; (c) *Dasineura serotina*, the larvae live gregariously in galled apical buds on *Hypericum perforatum*; (d) *Asphondylia serpylli*, an individual larva lives and later pupates in a galled flower bud of *Thymus serpyllum* (the photo shows a galled flower bud to the right and a dissected gall, revealing a pupa, in the centre); (e) *Macrolabis holostea*, one or a few larvae live in a hypertrophied apical leaf pair on *Stellaria holostea*; (f) *Rhopalomyia baccarum*, an individual larva lives in a pea-sized, fleshy gall in an axillary bud on the root collar of *Artemisia vulgaris*. Photos taken by the author.

sidered likely members of the Estonian fauna, as inferred from their occurrence in the three neighbouring territories: Latvia, Finland and the Leningrad Province, Russia. Even the eight species that were new to Estonia, and had not been recorded from any neighbouring territory, could be considered expected species based on their known biogeographical distribution, which for all species includes Scandinavia. Most gall midge species have inconspicuous lifestyles, making them easily go undetected by human observers. Experience from other countries suggests, however, that the accessibility of digital cameras and citizen science portals, opening up for easy knowledge sharing, has led to an upsurge in the recording of gall midges and other insect groups for which the threshold of traditional taxonomic knowledge is high.

The recording of 45 gall midge species new to Estonia in just seven days, and even the preliminary checklist of just 70 taxa, illustrate how poorly known the Estonian gall midge fauna is. This calls for intensified faunistic recording, using an array of methods, both classic (e.g. Spungis 2003; Fedotova 2025) and modern DNA-barcode-based (e.g. Hartop et al. 2022) in combination.

#### Data availability statement

All data used are presented in the paper.

#### Acknowledgements

I wish to extend my gratitude to professors Kadri Runnel and Asko Lõhmus for inviting me to visit the University of Tartu, an invitation that gave rise to the field trip as a pleasant side effect, and specifically for taking me to Järvselja Nature Reserve; to professor Triin Reitalu for showing me Viidumäe Nature Reserve; and to my wife Bente Petersen for accompanying me in the field. The publication costs of this article were partially covered by the Estonian Academy of Sciences.

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## Esimesed andmed Eesti taimtoiduliste pahksääsklaste (Diptera: Cecidomyiidae: Cecidomyiinae) kohta

Hans Henrik Bruun

Artiklis esitatakse esimest korda andmed Eesti taimtoiduliste pahksääsklaste kohta. Nädal aega kestnud välitöödel 2025. aasta augustis tuvastati Eestis 45 uut pahksääsklaste liiki. Lisades kodanikuteaduse portaalidest pärinevad usaldusväärsed andmed teiste liikide kohta, koostati esialgne 70 liigist koosnev nimekiri, milles kaks taksonit on määratud ainult perekonna tasemele. See on esmakordne katse uurida senitundmatut Eesti pahksääsklaste faunat.