The Fruit Flies (Tephritidae) of Ontario

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Abstract. Fourteen species of Tephritidae are newly recorded from Ontario, and alternative format keys are provided to the 31 genera and 73 species of fruit fly now known from, or likely to occur, in the province. Standard dichotomous keys to genera, and simplified field keys to genera and species are provided. Keys are illustrated with approximately 700 color photographs, and species treatments are supplemented with multiple identification aids, including Ontario distribution maps for each species. To aid in identification of immature stages, we have included sequence data (DNA barcodes) for 41 of the 73 species examined.

Introduction

Although best known because of their importance as agricultural pests, Tephritidae are also worthy of attention as generally attractive flies with intricate wing patterns and interesting mating and defensive behaviours. The taxonomy of the North American species is relatively well known, and the entire North American fauna was recently reviewed by Foote et al. (1993), who included distributional data and maps showing 42 species and 19 genera ranging into Ontario. We here review the Ontario fauna, primarily on the basis of specimens in the University of Guelph Insect Collection (DEBU), the Canadian National Collection (CNCI), the Lyman Entomological Museum (LEM), and the Royal Ontario Museum (ROME). The Ontario records in Foote et al. (1993) represent only about 60% of the fauna; we now recognise 67 species and 30 genera in the province, significantly more than previously thought but still a manageable number compared to the roughly 4550 valid species within almost 500 genera of Tephritidae described worldwide.

The keys in Foote et al. (1993) are thorough and richly illustrated, but are necessarily complex because they cover all 300 North American tephritid species. The keys herein are relatively simple because they are limited to the 73 species that occur, or are likely to occur, in the province of Ontario. More than 700 colour photographs are used to support a technical key adapted from Foote et al. (1993), as well as a field key designed for the identification of genera using a hand lens or macro photographs.

Although the keys included in this paper use a variety of characters, wing patterns are particularly important, and colour wing photos are included for all species. Whole specimen photographs are also included, since many species have a distinctive habitus that can confirm identifications. Host data has been included wherever possible, as host information can often expedite speedy and reliable identification.

DNA barcoding (Hebert et al. 2003), a recently developed approach to animal identification, is of potential value to the rapid detection of pest tephritid species, especially immature life stages that may be difficult to identify using morphological characters. DNA barcodes (standardised cytochrome c oxidase 1 sequences) are provided here for 40 of the the 67 Ontario tephritid species as an adjunct to traditional morphological tools for tephritid identification. In order to identify any unknown specimen, barcoding requires a reference database of known DNA sequences for comparison; the barcodes included herein contribute to that reference database for the Tephritidae.

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Materials and Methods

Morphological Work

Character photos were taken using a Microptics Digital Lab XLT imaging system utilizing a Canon EOS 1 Ds camera and Microptics ML-1000 flash fibre optic illumination system. The computer freeware CombineZ (http://www.hadleyweb.pwp.blueyonder.co.uk/CZ5/combinez5.htm) was used to combine multiple photos taken at different focal points into high-resolution images. Pinned specimen habitus shots, plates and some character shots were taken using a Nikon D70s digital camera, a Nikkor 105mm Macro lens, and a Nikon SB800 flash unit. Live habitus photographs were taken using Nikon D70 or D2X cameras, with 105mm or 60mm lenses and various flash combinations. Photos were processed using Adobe Photoshop CS3 (AP CS3) for Windows; the online web pages were designed and built in Microsoft Powerpoint 2003. Further work on the web pages was done using Adobe Fireworks and Adobe Dreamweaver.

Most specimens used in pinned habitus shots are from the University of Guelph Insect Collection, although some specimen photos were of specimens borrowed from the CNCI and LEM. Specimens used for photos have been labeled accordingly and deposited.

Genetic Analysis

Total genomic DNA was extracted from a single leg according to the protocol developed by Ivanova et al. (2006). A 658-bp region near the 5 terminus of the CO1 gene was amplified using primers LepF1 5' ATTCAACCAATCATAAAGATATTGG-3 and LepR1 5'TAAACTTCTGGATGTCCAAAAAATCA-3.

PCRs were carried out in 96-well plates in 12.5- l reaction volumes containing 2.5 mM MgCl2, 5 pmol of each primer, 20 M dNTPs, 10 mM Tris HCl (pH 8.3), 50 mM KCl, 10–20 ng (1–2 l) of genomic DNA, and 1 unit of TaqDNA polymerase using a thermocycling profile of one cycle of 2 min at 94°C; five cycles of 40 sec at 94°C, 40 sec at 45°C, and 1 min at 72°C; followed by 35 cycles of 40 sec at 94°C, 40 sec at 51°C, and 1 min at 72°C, with a final step of 5 min at 72°C. Products were visualized on a 2% agarose E-Gel 96-well system (Invitrogen), and samples containing clean single bands were bidirectionally sequenced by using BIGDYE 3.1 on an ABI 3730 DNA Analyzer (Applied Biosystems). Contigs were assembled by using SEQUENCHER 4.0.5 (Gene Codes).

Sequences, trace files, and field data are available in the Teph (file name) file in the Completed Projects section of the Barcode of Life Database (BOLD; www.barcodinglife.org; Ratnasingham and Hebert, 2007). Additional collection information is deposited in the University of Guelph Insect Collection Database and all sequences have been deposited in the GenBank database (CO1: accession nos. EU484466–EU484568). Sequence divergences were calculated by using the K2P distance model (Kimura, 1980) and an NJ phenogram (Saitou & Nei, 1987) was created (as implemented in BOLD) to provide a graphic representation of the among-species divergences. A table of specimens sequenced for DNA barcoding has been included (Appendix).

Checklist of Tephritidae species occuring or likely to occur in Ontario (classification based on Norrbom et al. 1999)

‡ - New Canadian record
† - New Ontario record
* - Species not yet recorded in Ontario, but likely to occur
◊ - Species recorded from Ontario since Foote et al. (1993)
● – Barcode Acquired

Subfamily Trypetinae
- Tribe Adramini
  - *Euphranta* Loew
  - *Euphranta canadensis* (Loew) ●
- Tribe Carpomyini
- Subtribe Carpomyina
  - *Rhagoletis* Loew
  - *Rhagoletis basiola* (Osten Sacken) ●
  - *Rhagoletis chionanthi* Bush ‡
  - *Rhagoletis cingulata* (Loew) ●
  - *Rhagoletis cornivora* Bush
  - *Rhagoletis fausta* Osten Sacken ●
  - *Rhagoletis juniperina* Marcovitch ◊●
  - *Rhagoletis meigenii* (Loew) †
  - *Rhagoletis mendax* Curran
  - *Rhagoletis pomonella* (Walsh) ●
  - *Rhagoletis striatella* Wulp ●
  - *Rhagoletis suavis* (Loew) ‡●
  - *Rhagoletis tabellaria* (Fitch) ●
  - *Rhagoletis zephyria* Snow
  - *Rhagoletotrypeta* Aczél
  - *Rhagoletotrypeta rohweri* Foote ‡●
  - *Zonosemata* Benjamin
  - *Zonosemata electa* (Say) ●

Tribe Trypetini
Subtribe Chetostomatina
Chetostoma Rondani
Chetostoma californicum Blanc
Paramyiolia Shiraki
Paramyiolia nigricornis (Doane)
Parastenopa Hendel
Parastenopa limata (Coquillett) ‡
Subtribe Trypetina
Euleia Walker
Euleia fratria (Loew) ●
Strauzia Robineau-Desvoidy
Strauzia arculata (Loew) ‡
Strauzia intermedia (Loew)
Strauzia longipennis (Wiedemann) ●
Strauzia perfecta (Loew) ●
Trypeta Meigen
Trypeta flaveola Coquillett ◊●

Subfamily Tephritinae
Tribe Acrotaeniini
Tomoplagia Coquillett
Tomoplagia obliqua (Say) ◊●
Tribe Cecidocharini
Procecidochares Hendel
Procecidochares atra (Loew) ●
Procecidochares gibba (Loew) *
Procecidocharoides Foote
Procecidocharoides penelope (Osten Sacken)
Tribe Dithrycini
Subtribe Eurostina
Eurosta Loew
Eurosta comma Wiedemann ◊●
Eurosta cribrata (Wulp) *
Eurosta fenestrata Snow †
Eurosta latifrons (Loew) *
Eurosta solidaginis solidaginis (Fitch) ●
Tribe Eutretini
Eutreta Loew
Eutreta caliptera (Say)
Eutreta frontalis Curran ●
Eutreta novaeboracensis (Fitch) ●
Stenopa Loew
Stenopa vulnerata (Loew) †●
Xanthomyia Phillips
Xanthomyia platyptera (Loew) ◊●
Tribe Myopitini
Urophora Robineau-Desvoidy
Urophora affinis affinis (Frauenfeld) †
Urophora cardui (Linnaeus) ◊●
Urophora quadrifasciata quadrifasciata (Meigen) ◊●
Tribe Noeetini
Acidogona Loew
Acidogona melanura (Loew) *
Jamesomyia Quisenberry
Jamesomyia geminata (Loew) ◊
Tribe Tephritini
Campiglossa Hendel
Campiglossa albiceps (Loew) ●
Campiglossa farinata (Novak)
Campiglossa genalis (Thomson)
Campiglossa sabroskyi Novak †●
Dioxyna Frey
Dioxyna picciola (Bigot) ●
Euaresta Loew
Euaresta aequalis (Loew) ●
Euaresta bella (Loew) ●
Euaresta festiva (Loew) ●
Euarestoides Benjamin
Euarestoides abstersus (Loew) *
Euarestoides acutangulus (Thomson) *
Neotephritis Hendel
Neotephritis finalis (Loew)
Tephritis Latreille
Tephritis angustipennis (Loew) ●
Tephritis araneosa (Coquillett) ●
Tephritis candidipennis Foote †
Tephritis michiganensis Quisenberry
Tephritis pura (Loew) ●
Tephritis webbii Doane
Trupanea Schrank
Trupanea actinobola (Loew) ●
Trupanea dacetoptera Phillips
Xanthaciura Hendel
Xanthaciura tetraspina (Phillips) ◊●
Tribe Terellini
Neaspilota Osten Sacken
Neaspilota alba (Loew) *
Neaspilota albidipennis (Loew) ◊●
Neaspilota footei Friedberg & Mathis
Neaspilota reticulata Norrbom & Foote ◊
Neaspilota vernoniae (Loew) ◊
Terellia Robineau-Desvoidy
Terellia palposa (Loew) ●
Terellia ruficauda (Fabricius) ●
Tribe Xyphosiini
Icterica Loew
Icterica circinata (Loew) ●
Icterica seriata (Loew) ●

The Utility of DNA Barcoding for Specimen Identification in Tephritidae

COI sequences (DNA Barcodes) were obtained for 128 specimens (out of 202 specimens attempted, see Appendix I), representing 41 species in 22 genera. Of these 128 successful specimens, 44 yielded full DNA Barcodes (658bp), 59 yielded near-complete DNA Barcodes (561bp or more), and 25 specimens yielded sequences of less than 350bp.

When sequences were compared using a neighbor-joining phenogram (Appendix II), most, but not all, specimens formed distinct clusters which accurately reflected morphological species. Two clusters incorrectly "identified" morphologically distinct specimens. *Euaresta festiva* (TEPH012, TEPH098) clustered with a single *Euaresta aequalis* specimen (TEPH010) and a single *Euphranta canadensis* specimen (TEPH014), despite remaining disjunct from the main *Euaresta aequalis* and *Euphranta canadensis* clusters. All sequences in this *Euaresta festiva* cluster were longer than 601bp, so we postulate a possible contamination of the TEPH010 and TEPH014 sequences.

A single *Rhagoletis cingulata* specimen (TEPH 123) was clustered with *Campiglossa sabroskyi* (TEPH0117), while the remaining *R. cingulata* specimens successfully clustered together away from the *Campiglossa* group. This anomaly is possibly an artifact of insufficient data, as the TEPH123 sequence is only 288bp, or perhaps a contaminant.

The sequences identified above as potential cases of contamination were annotated in the BOLD database to reflect these concerns.

In multiple instances, DNA barcodes of closely related species provided insufficient information for distinguishing between these species (i.e. *Tephritis candidipennis* and *T. pura*; *Eutreta frontalis* and *E. novaeboracensis; Urophora affinis* and *U. cardui*). Further taxon sampling and inclusion of more specimens may be required for differentiating these species using DNA Barcodes or use of another marker may be necessary.

The objective of the sequencing component of this project was to contribute to the DNA Barcoding database by providing CO1 sequences based on morphologically identified specimens. This was done to facilitate the potential use of a sequence database as an identification aid, and not to test species concepts and taxon limits. With this in mind, our limited dataset does show that most genera and species of Ontario Tephritidae possess distinct DNA Barcode clusters, and that most haplogroups reflect morphologically defined taxa. The database of fruit fly DNA Barcodes is currently being expanded through an international collaboration of researchers under the Tephritid Barcode Initiative.

Key to the genera of Tephritidae of eastern Canada

Modified from Foote et al. 1993

Urophora cardui

Urophora quadrifasciata

Urophora cardui

Urophora cardui

Strauzia longipennis

Euaresta bella

Rhagoletis pomonella

Rhagoletotrypeta rohweri

Rhagoletis tabellaria

1 Vein CuA2 convex, meeting vein A1 at an angle greater than 90 degrees, posterior apical corner of cell cup not drawn into a point. Wing usually with dark bands forming an M or two inverted V-shaped marks (rarely with 3 unconnected vertical bands). Thorax black with yellow stripe on pleuron and large yellow mark on scutellum

Urophora **Robineau-Desvoidy**

1' Vein CuA2 usually with a distinct bend,always meeting vein A1 at less than 90 degrees; posterior apical corner of cell cup thus produced into at least a small point. Thorax color variable, if black with yellow stripe on pleuron then wing bands either forming an F distally or with V-shaped marks opening in opposite directions; or if wing marked with an M, scutum with medial white stripe

2

Urophora cardui

Urophora quadrifasciata

Urophora cardui

Urophora cardui

Strauzia longipennis

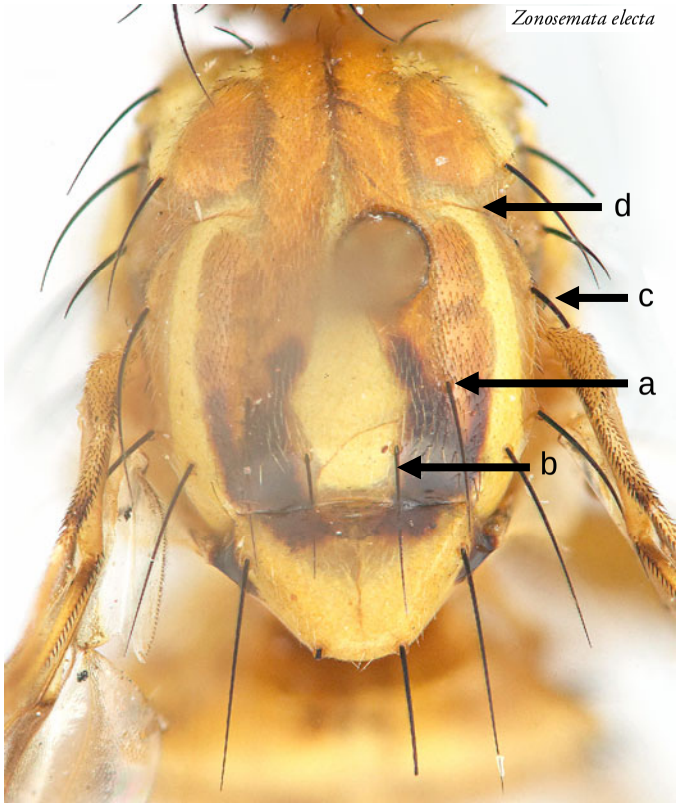
Euaresta bella

Rhagoletis pomonella

Rhagoletis tabellaria

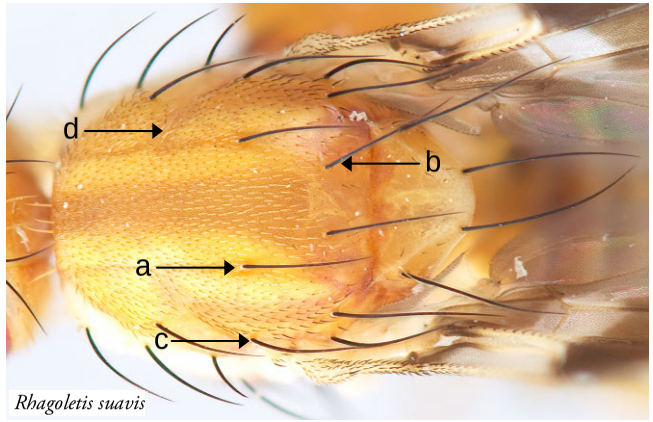
Rhagoletotrypeta rohweri

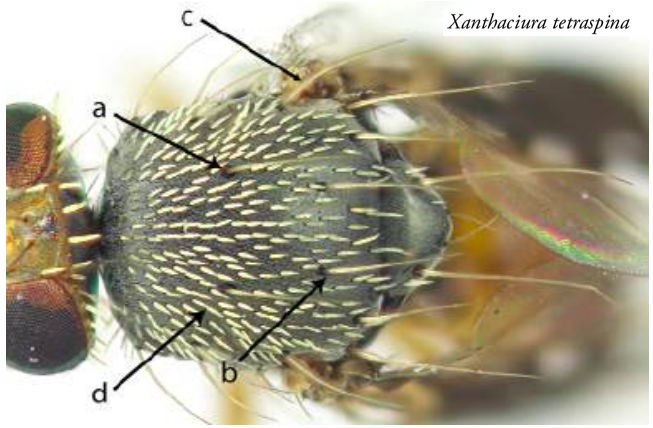
Key to the genera of Tephritidae of eastern Canada



2 Dorsocentral bristles (a) arising closer to acrostichal bristles (b) than postsutural supra-alar bristles (c) or transverse suture (d). Scutum mostly orange with 3 yellow stripes and usually with dark brown or black, often U-shaped mark

Zonosemata **Benjamin**





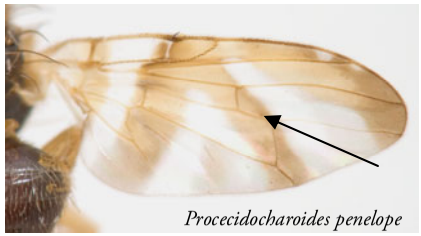
2' Dorsocentral bristles (a) arising closer to either postsutural supra-alar bristles (c) or transverse suture (d) than acrostichal bristles (b). Scutum variously coloured, but not with 3 yellow stripes and dark U-shaped mark

3

Key to the genera of Tephritidae of eastern Canada


Procecidocharoides penelope


Stenopa vulnerata


Procecidocharoides penelope


Rhagoletis pomonella

3 Scutellum completely black, inflated, and polished or subshining (sparsely pruinose). Wing with either heavy banding across entire wing, or with crossveins r-m and dm-cu closely approximated and covered by the same band

4

3' Scutellum variously coloured, never distinctly swollen or polished. Wing various, but if crossveins r-m and dm-cu covered by the same band, then body orange

6

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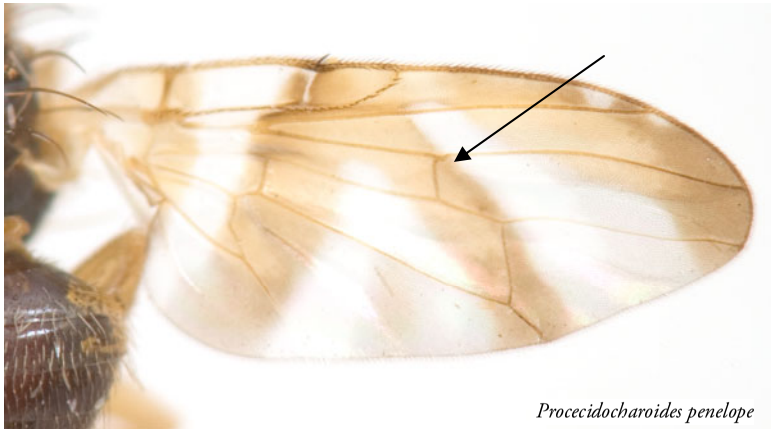
Procecidocharoides penelope

Stenopa vulnerata

Procecidocharoides penelope

Key to the genera of Tephritidae of eastern Canada

Stenopa vulnerata



Procecidocharoides penelope

4 Crossvein r-m situated near middle of cell dm; crossvein dm-cu not covered by the same dark band as crossvein r-m. Wing heavily marked with 6 distinctive, broad and dark bands

***Stenopa* Loew**

4' Crossvein r-m situated distinctly beyond middle of cell dm, closer to vein dm-cu and both crossveins covered by same dark band. Wing with at most 4 dark wing bands

5

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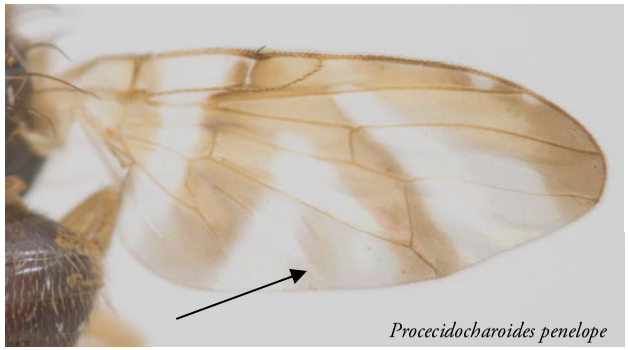
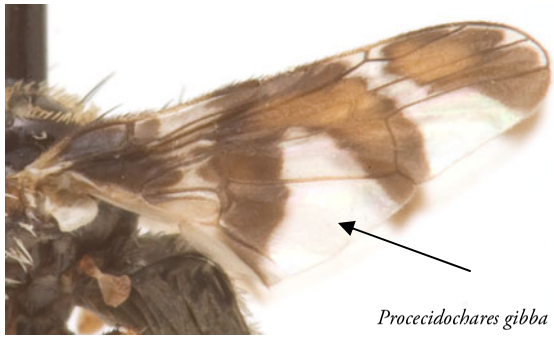
Key to the genera of Tephritidae of eastern Canada



5 Frons with two pairs of orbital bristles, the posterior pair well developed and convergent; cell cuA1 with at least a faint brownish mark present in hyaline area between 2nd and 3rd bands of wing

Procecidocharoides **Foote**



5' Frons with one pair of orbital bristles, sometimes 4, rarely 2 (if two pairs present, posterior pair poorly developed, minute); cell cuA1 entirely hyaline between 2nd and 3rd bands of wing

Procecidochares **Hendel**

Key to the genera of Tephritidae of eastern Canada

Terellia ruficauda

6 Posterior orbital bristles distinctly convergent

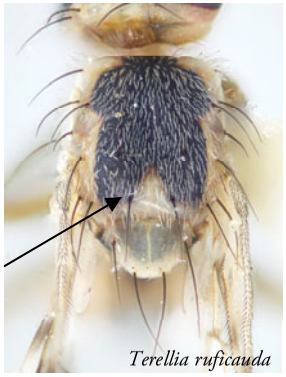
7

Eutreta novaeboracensis

6’ Posterior orbital bristles reclinate or absent

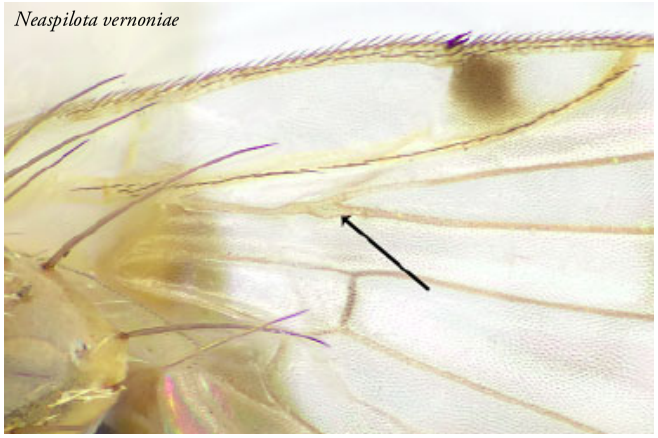
8

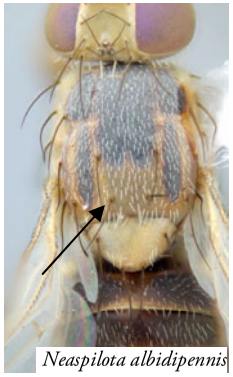
Key to the genera of Tephritidae of eastern Canada



7 One to several setae present on node of vein Rs; wing with extensive markings, apex of cell r4+5 broadly brown. Acrostichal bristles arising from dark lyre-shaped area or dark spots.

Terellia **Robineau-Desvoidy**





7’ Node of vein Rs without setae; apex of cell r4+5 clear or at least with large hyaline subapical or apical spot. Acrostichal bristles arising from pale area.

Neaspilota **Osten Sacken**

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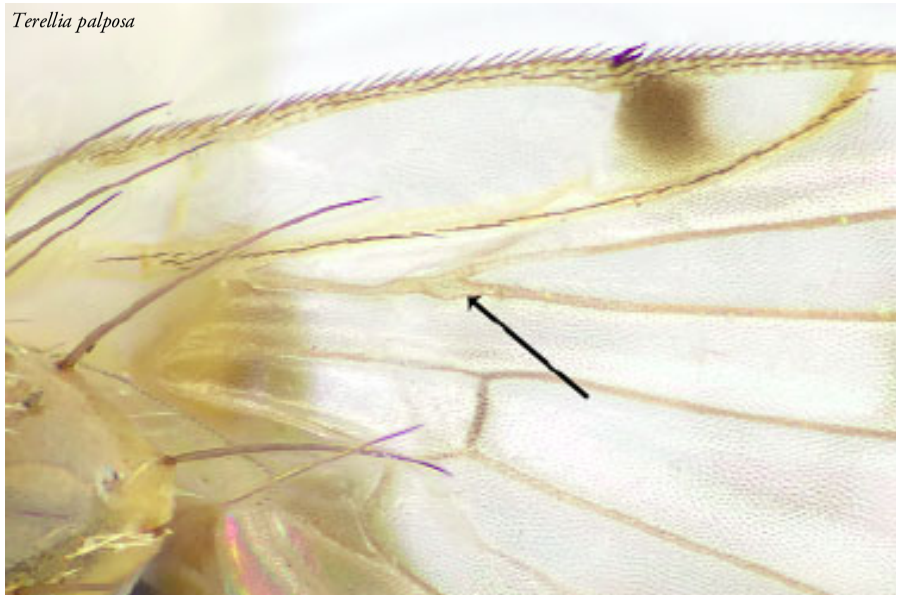
Terellia palposa

Terellia ruficauda

Terellia ruficauda

Terellia palposa



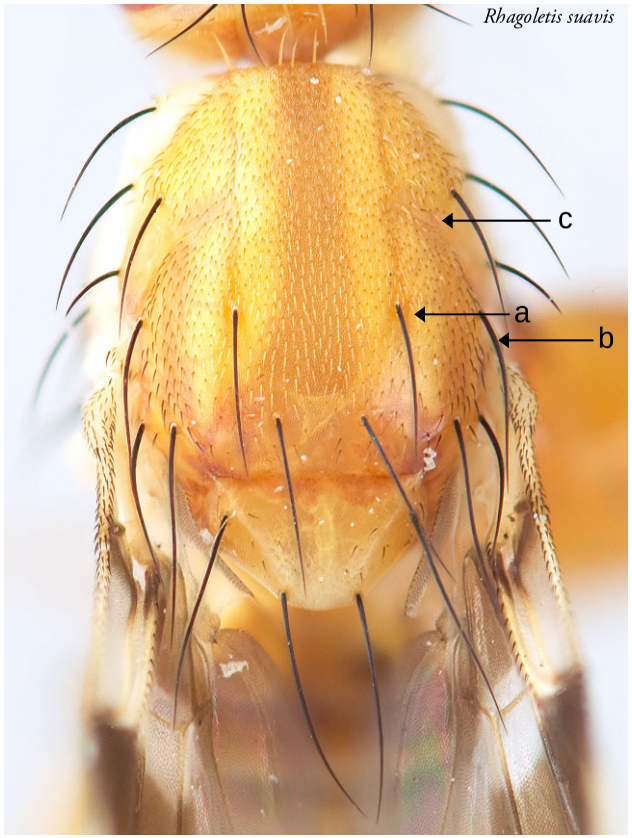
Terellia palposa

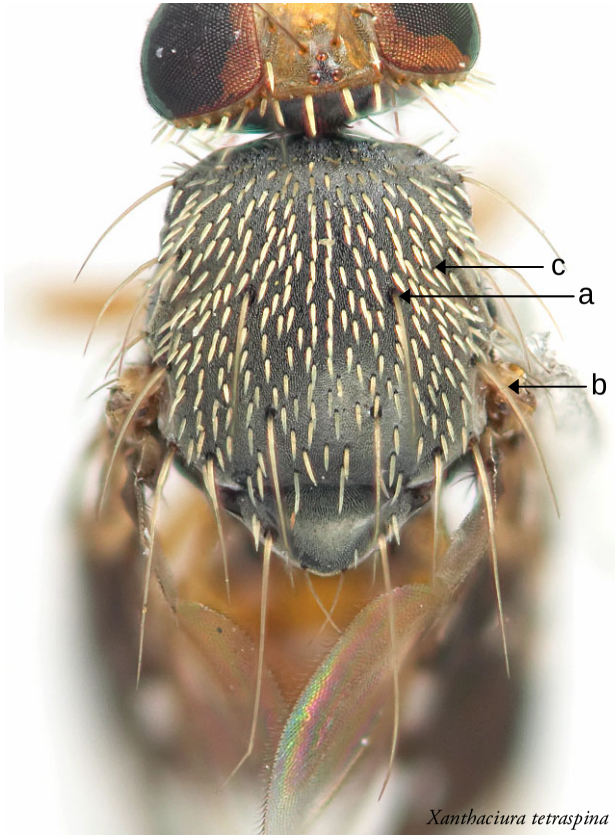
Neaspilota albidipennis

Neaspilota footei

Neaspilota vernoniae

Key to the genera of Tephritidae of eastern Canada





8 Dorsocentral bristles (a) arising closer to postsutural supra-alar bristles (b) than to transverse suture (c)

9

8' Dorsocentral bristles (a) arising closer to transverse suture (c) than to postsutural supra-alar bristles (b)

22

Key to the genera of Tephritidae of eastern Canada

9 Lower margin of gena with several well-developed setae anterior to genal bristle

Chetostoma **Rondani**

9' Lower margin of gena without such large setae anterior to genal bristle

10

Key to the genera of Tephritidae of eastern Canada

Euphranta canadensis

10 1 pair of orbital bristles present

11

Rhagoletis pomonella

10' Two pairs of orbital bristles present

12

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Key to the genera of Tephritidae of eastern Canada

Euphranta canadensis

Euphranta canadensis

Strauzia longipennis

Strauzia longipennis

11 Presutural supra-alar bristles lacking; some wing bands separate from each other

***Euphranta* Loew**

11' Presutural supra-alar bristles present; all wing bands connected to one another

***Strauzia* Robineau-Desvoidy**

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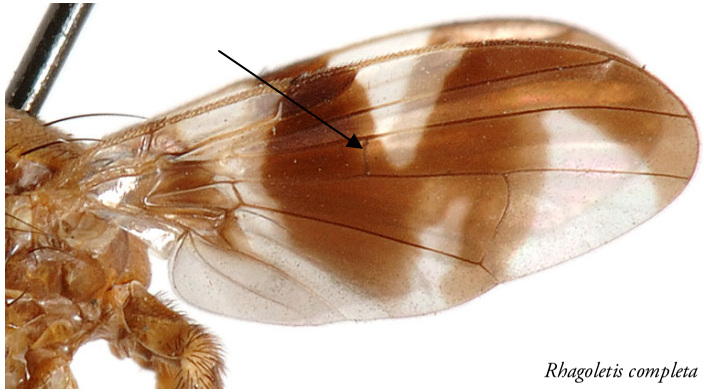
Key to the genera of Tephritidae of eastern Canada



Rhagoletis completa

12 Vein r-m situated near middle of cell dm

13

Eurosta solidaganis

12' Vein r-m situated distinctly beyond middle of cell dm, closer to vein dm-cu

15

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Key to the genera of Tephritidae of eastern Canada

Rhagoletis suavis

13 First flagellomere pointed at dorsal apex

Rhagoletis **Loew**

Trypeta flaveola

13' First flagellomere rounded at dorsal apex

14

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Key to the genera of Tephritidae of eastern Canada

Trypeta flaveola

14 Background colour of body yellow

Trypeta **Meigen**

Rhagoletotrypeta rohweri

14' Background colour of body black or dark brown

Rhagoletotrypeta **Aczél**

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Key to the genera of Tephritidae of eastern Canada

Euleia fratria

15 All postocular bristles dark brown to black

16

Xanthomyia platyptera

15' Some or all postocular bristles whitish or yellowish

18

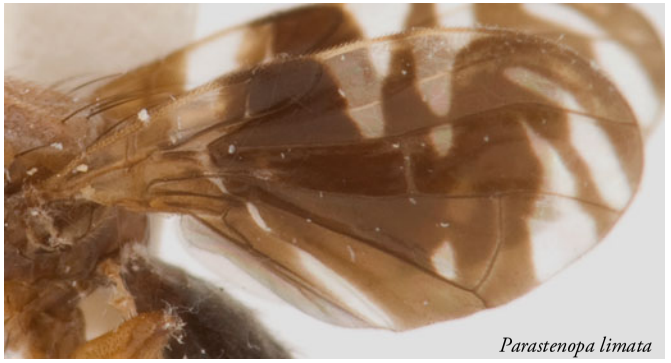
Key to the genera of Tephritidae of eastern Canada


Paramyiolia nigricornis


Paramyiolia nigricornis

16 Distal quarter of wing entirely dark, central part with two round clear spots and single posterior triangle. Male with 2 or 3 greatly enlarged frontal bristles

Paramyiolia **Shiraki**


Parastenopa limata


Parastenopa limata

16' Distal quarter of wing with two transverse clear areas, central area mostly dark. Male with frontal bristles not greatly enlarged

17

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Key to the genera of Tephritidae of eastern Canada

Euleia fratria

Euleia fratria

17 Wing with single wedge-shaped marginal hyaline mark in cells r1 and r2+3; body yellow

***Euleia* Walker**

Parastenopa limata

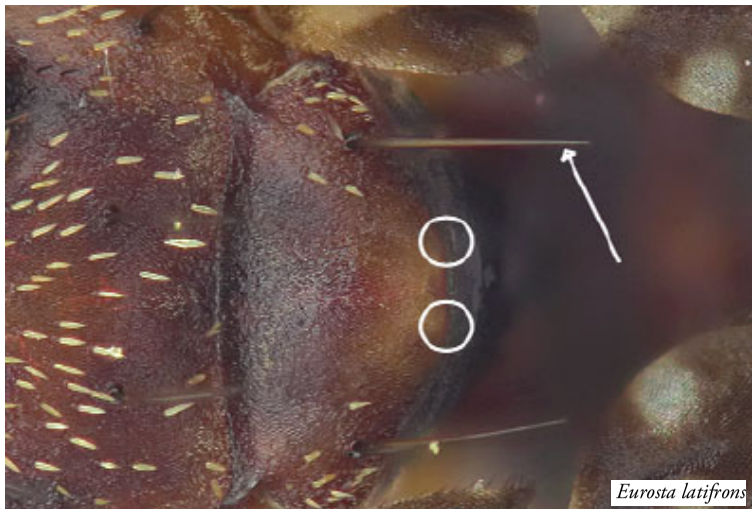
Parastenopa limata

17' Wing with 2 wedge-shaped marginal hyaline marks in cells r1 and r2+3; body brown

***Parastenopa* Hendel**

doi:10.3752/cjai.2011.15

Key to the genera of Tephritidae of eastern Canada



18 Apical pair of scutellar bristles absent or distinctly shorter than basal pair

Eurosta **Loew**

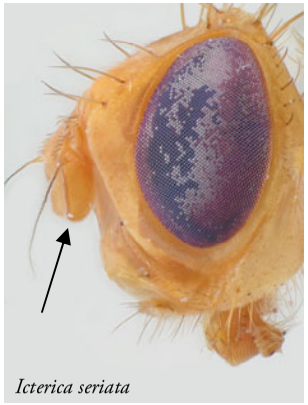
18' Apical pair of scutellar bristles roughly the same length as the basal pair

19

doi:10.3752/cjai.2011.15

Key to the genera of Tephritidae of eastern Canada

Icterica seriata



Icterica seriata

19 Background colour of body yellow. Dorsal apex of first flagellomere rounded; parafacial without brown spot

***Icterica* Loew**

Xanthomyia platyptera

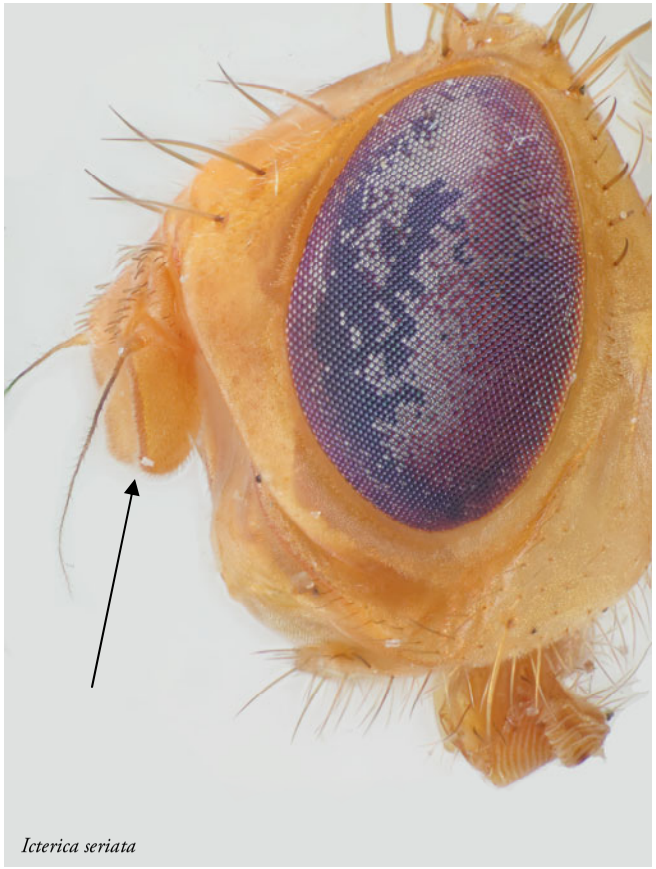
Xanthomyia platyptera

19' Background colour of body black or brown. Dorsal apex of first flagellomere pointed; parafacial usually with small brown spot at level of antenna

20

doi:10.3752/cjai.2011.15

Icterica seriata



Icterica seriata

doi:10.3752/cjai.2011.15

Xanthomyia platyptera

Xanthomyia platyptera

Key to the genera of Tephritidae of eastern Canada

Xanthomyia platyptera

Xanthomyia platyptera

20 Wing broad, subovoid, with 4 marginal hyaline spots in cell r1. Two pairs of frontal bristles

Xanthomyia **Phillips**

Jamesomyia geminata

Jamesomyia geminata

20' Wing narrower, more elongate, with 2 marginal hyaline spots in cell r1. Three or more pairs of frontal bristles

21

doi:10.3752/cjai.2011.15

Xanthomyia platyptera

Xanthomyia platyptera

Jamesomyia geminata

Jamesomyia geminata

Key to the genera of Tephritidae of eastern Canada

Acidogona melaneura

Acidogona melaneura

Jamesomyia geminata

Jamesomyia geminata

21 Wing with hyaline marginal marks in cell r1 similar in size to other hyaline marks. First flagellomere of female at least 2/3 as long as height of eye

***Acidogona* Loew**

21' Wing with hyaline marginal marks in cell r1 much larger than other hyaline marks. First flagellomere of female less than ½ as long as height of eye

***Jamesomyia* Quisenberry**

doi:10.3752/cjai.2011.15

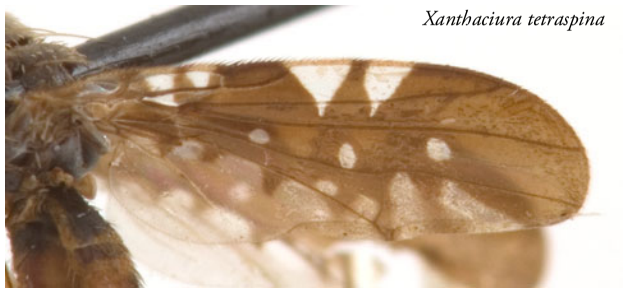
Acidogona melaneura

Acidogona melaneura

Key to the genera of Tephritidae of eastern Canada

Xanthaciura tetraspina

Xanthaciura tetraspina



22 Width of frons at vertex less than or about equal to width of eye. Wing mostly brown, cells r2+3 and r4+5 without marginal hyaline markings, cell r1 with 2 wedge-shaped hyaline marks not extending beyond vein R4+5

Xanthaciura **Hendel**

Euaresta festiva

22' Width of frons at vertex greater than width of eye. Wing various, never as in *Xanthaciura*

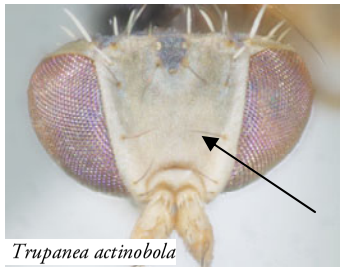
23

doi:10.3752/cjai.2011.15

Key to the genera of Tephritidae of eastern Canada


Trupanea dacetoptera


Trupanea actinobola

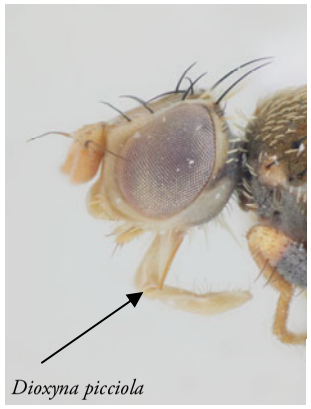

Trupanea actinobola


Trupanea dacetoptera

23 Only 1 pair of scutellar bristles. Three or more pairs of frontal bristles; proboscis straight. Wing pattern stellate, with large subapical brown spot with narrow rays to pterostigma, posterior margin, and apex

***Trupanea* Schrank**


Tephritis pura


Dioxyna picciola

23' Usually two pairs of scutellar bristles, if posterior pair absent, proboscis geniculate (bent). Wing pattern variable

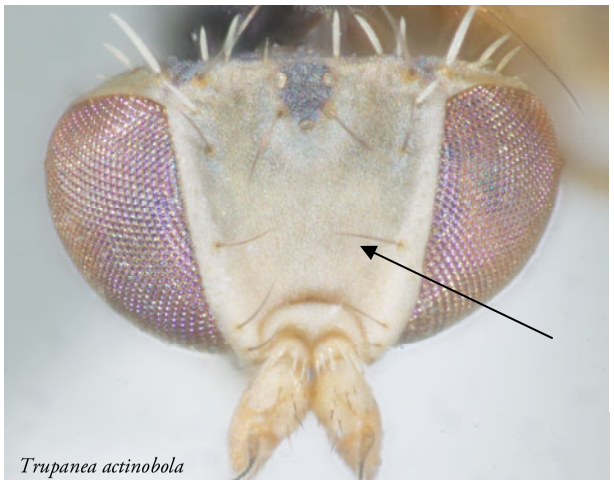
24

doi:10.3752/cjai.2011.15

Trupanea dacetoptera

Trupanea actinobola

Trupanea dacetoptera

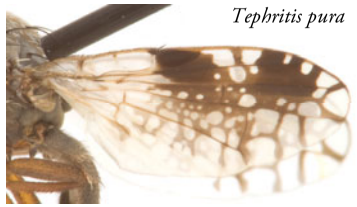


Trupanea actinobola

Key to the genera of Tephritidae of eastern Canada

Tomoplagia obliqua

Euaresta bella



Tephritis pura

Dioxyna picciola

Euarestoides acutangulus

Campiglossa albiceps

Eutreta novaeboracensis

24 Wing clear with 4 strongly oblique yellow and brown bands

Tomoplagia **Coquillett**

24' Wing various, never with strong yellow bands

25

Key to the genera of Tephritidae of eastern Canada

Euaresta festiva

Eutreta novaeboracensis

25 Two pairs of frontal bristles

26

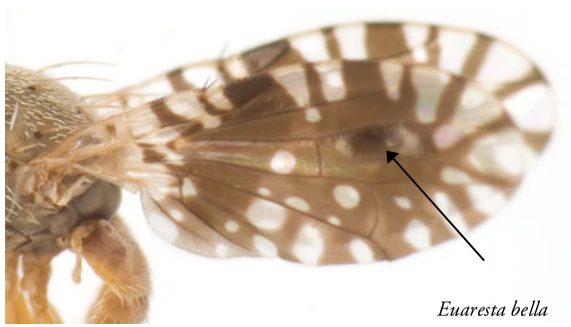
25' Three, rarely four, pairs of frontal bristles

29

doi:10.3752/cjai.2011.15

Key to the genera of Tephritidae of eastern Canada

Euaresta bella



Euaresta bella

26 Thorax yellow or black in background color, covered in whitish tomentum; if thorax black, then wing always with a bulla in cell r4+5; wing pattern radiate

***Euaresta* Loew**

Tephritis pura

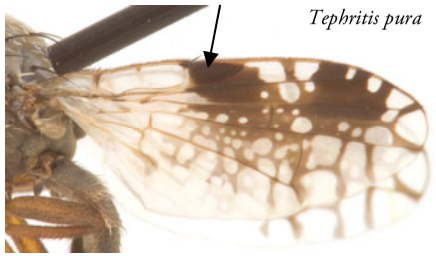
Tephritis pura

26' Thorax black, covered in greyish tomentum, wing without a bulla; wing pattern various

27

Key to the genera of Tephritidae of eastern Canada

Tephritis araneosa



Tephritis pura

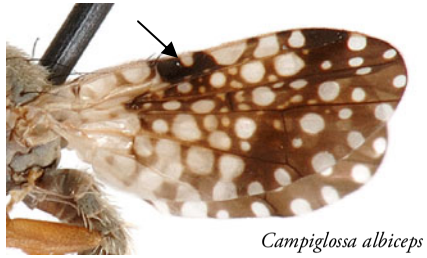
Tephritis pura

Tephritis pura

27 Proboscis short, capitate, not bent at mid-point; pterostigma completely dark. Hind femur with 1 preapical anterodorsal seta. Abdomen without spots

***Tephritis* Latreille**

Dioxyna picciola



Campiglossa albiceps

Dioxyna picciola

Campiglossa albiceps

27' Proboscis long, geniculate (bent at midpoint); pterostigma often with hyaline spot. Hind femur with 2 preapical dorsal setae, 1 anterodorsal, 1 posterodorsal. Abdomen usually with paired, diffuse spots

28

doi:10.3752/cjai.2011.15

Tephritis araneosa

Tephritis pura

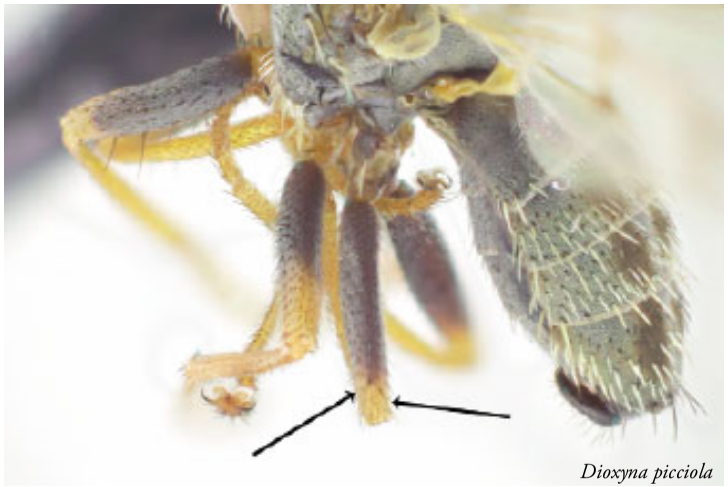
Tephritis pura

Tephritis pura

Dioxyna picciola

Campiglossa albiceps

Campiglossa albiceps

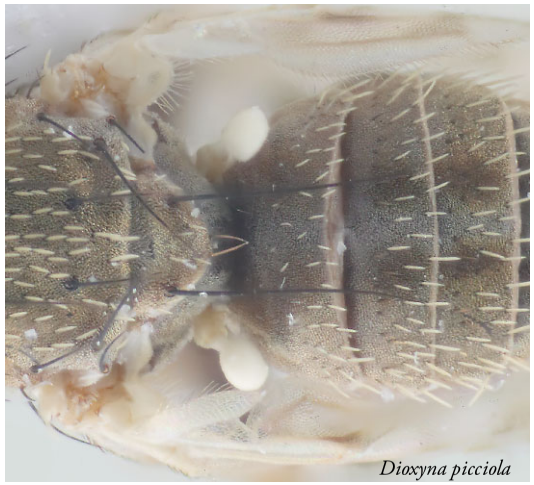


Dioxyna picciola

doi:10.3752/cjai.2011.15

Key to the genera of Tephritidae of eastern Canada

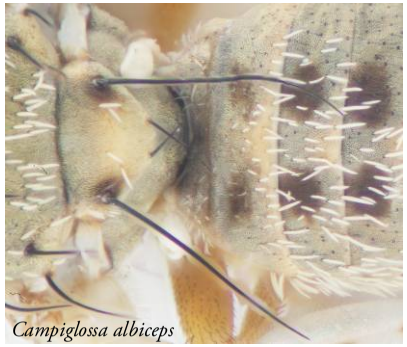

Dioxyna picciola


Dioxyna picciola

28 Head longer than high; apical scutellar seta usually shorter than scutellum

Dioxyna **Frey**


Campiglossa albiceps


Campiglossa albiceps

28' Head rarely longer than high, never markedly so; apical scutellar seta usually at least as long as scutellum

Campiglossa **Hendel**

doi:10.3752/cjai.2011.15

Key to the genera of Tephritidae of eastern Canada

Neotephritis finalis

29 Apex of cell r4+5 dark

Neotephritis **Hendel**

Euarestoides acutangulus

Eutreta novaeboracensis

29' Apex of cell r4+5 with at least a small clear spot, often more broadly clear

30

doi:10.3752/cjai.2011.15

Key to the genera of Tephritidae of eastern Canada

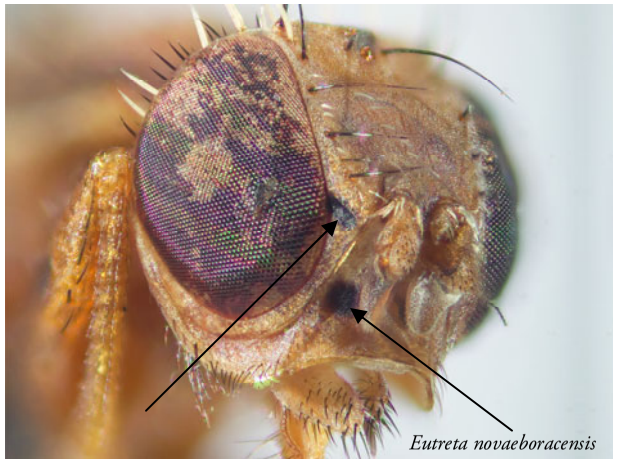
Euarestoides acutangulus

Euarestoides acutangulus

30 Wing mostly clear or lightly marked except for stellate marking in apical third. Face and parafacial without spots

Euarestoides **Benjamin**

Eutreta novaeboracensis



Eutreta novaeboracensis

30' Wing mostly dark with small clear spots and a narrow clear band along apical margin. Face and parafacial with dark spots

Eutreta **Loew**

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

1 Dark wing bands usually forming an M or two inverted V's (rarely with 3 unconnected vertical bands); thorax black with yellow band on pleuron

Urophora **Robineau-Desvoidy**

1' Usually not black with yellow band on pleuron, if so, then wing bands either forming an F distally or with V's opening in opposite directions; or if wing marked with an M, scutum with medial white stripe

2

Field Key to the genera of Tephritidae of eastern Canada

2 Scutum with dark grey or black U-shaped marking and 3 longitudinal yellow stripes

Zonosemata **Benjamin**

2' Scutum variously coloured, but never as in *Zonosemata*

3

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada


Procecidocharoides penelope


Stenopa vulnerata


Procecidocharoides penelope


Rhagoletis pomonella

3 Scutellum completely black, inflated, and polished or subshining (sparsely pruinose); body black, wing boldly banded or bands forming an F-shape distally

4

3' Scutellum not distinctly swollen or polished; if body black and wing bands forming an F distally then scutellum with contrasting yellow colouration

6

Procecidocharoides penelope

Stenopa vulnerata

Procecidocharoides penelope

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

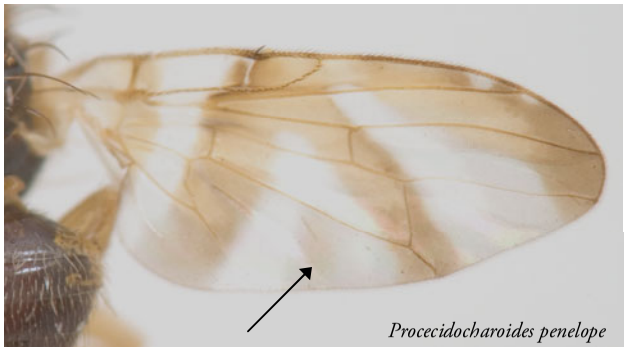
Stenopa vulnerata

Procecidocharoides penelope

4	Wing heavily marked with distinctive black, broad, basal banding	*Stenopa* **Loew**
4’	Wing with fewer bands, or bands not black in colour	**5**

Field Key to the genera of Tephritidae of eastern Canada

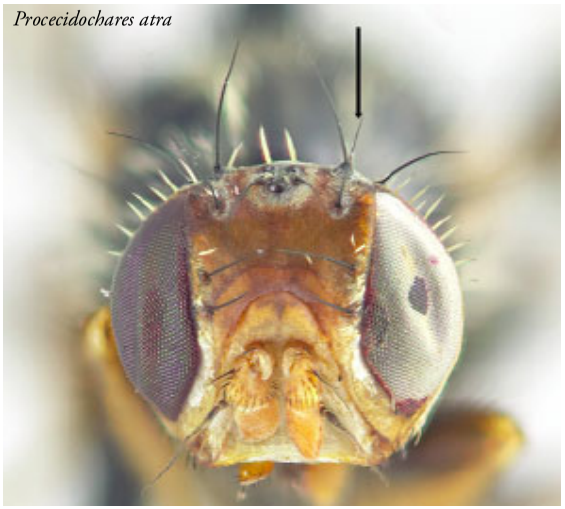
Procecidocharoides penelope



Procecidocharoides penelope

5 Frons with two pairs of orbital bristles, the posterior pair well developed and convergent; at least a faint mark always present in clear area between 2nd and 3rd bands of wing below middle of cell dm

Procecidocharoides **Foote**



Procecidochares atra

Procecidochares gibba

5' Usually one pair of orbital bristles, sometimes four, rarely two (if two pairs present, posterior pair very poorly developed and minute); clear area between 2nd and 3rd bands of wing without dark mark

Procecidochares **Hendel**

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Icterica circinata

Icterica seriata

6 Wing yellow with dark leading and trailing edges and yellow centrally. Body yellow

Icterica **Loew**

Euaresta aequalis

Euaresta festiva

Tomoplagia obliqua

Rhagoletis basiola

6’ Wing pattern various, but never with dark margins and uniformly yellow central area. Body various, but if yellow, wing with distinct hyaline bands or spots

7

doi:10.3752/cjai.2011.15

Euaresta aequalis

Euaresta festiva

Tomoplagia obliqua

Rhagoletis basiola

Field Key to the genera of Tephritidae of eastern Canada

Eutreta novaeboracensis

7 Wing almost entirely dark except for clear crescent around distal edge and some very small clear spots throughout wing

Eutreta **Loew**

Campiglossa albiceps

Eurosta solidaginis

Rhagoletis pomonella

7’ Wing with clear markings throughout in banding patterns or in large spots

8

Field Key to the genera of Tephritidae of eastern Canada

Neaspilota albidipennis

Neaspilota footei

8 Wing clear, pterostigma sometimes shaded

Neaspilota **Osten Sacken** (in part)

Campiglossa albiceps

Eurosta solidaginis

Rhagoletis pomonella

8’ Wing with dark patterning

9

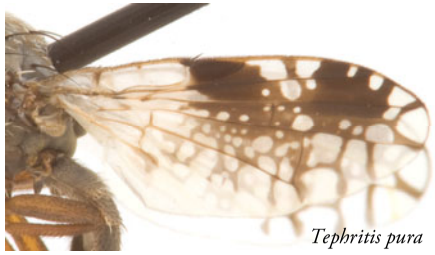
doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Trupanea dacetoptera

9 Wing with dark star-like pattern in distal half, basal half completely without dark patterning

Trupanea **Schrank**



Tephritis pura

Eurosta solidaginis

Rhagoletis pomonella

9' Wing variable, if star-like pattern present, then basal half of wing with at least some dark marks

10

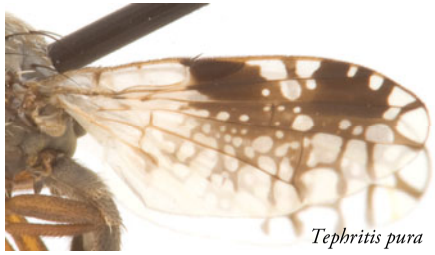
doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Paramyiolia nigricornis

10 Distal 1/4 of wing entirely dark

11



Tephritis pura

Eurosta solidaginis

Rhagoletis pomonella

10' Distal 1/4 of wing with at least some clear areas

12

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Paramyiolia nigricornis

11 Leading edge of wing with 3 clear triangles; anal cell dark with single clear band near distal edge

Paramyiolia **Shirakia**

Xanthaciura tetraspina

11' Leading edge of wing with 4 clear triangles; anal cell almost entirely clear

Xanthaciura **Hendel**

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Terellia palposa

Rhagoletis pomonella

12 At most 2 clear spots in distal 1/3 of wing; dark transverse bands crossing entire wing, distal bands often forming an F or an inverted V

13

Euaresta aequalis

Campiglossa albiceps

Neaspilota vernoniae

12' Distal 1/3 of wing always with at least 3 clear spots, usually more; wing dark with pale spots or pale with various dark markings other than complete bands, distal pattern never forming an F or inverted V shape

24

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Rhagoletis pomonella

Terellia palposa

Trypeta flaveola

13 Dark bands of wing forming a definite F, inverted V, or 3 parallel transverse lines

14

Chetostoma californicum

Terellia ruficauda

Euphranta canadensis

13' Dark markings of wing as in above three photos, not F or V shaped markings; sometimes with 4 parallel bands

22

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

14 Dark bands of wing forming an F-shape in distal half of wing

15

Rhagoletis pomonella

14’ Dark bands of wing forming an inverted V-shape in distal third of wing

18

Terellia palposa

14” Dark bands of wing forming 3 parallel, transverse lines across wing

21

Trypeta flaveola

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Rhagoletis cornivora

Parastenopa limata

15 Body brown to black

16

Strauzia intermedia

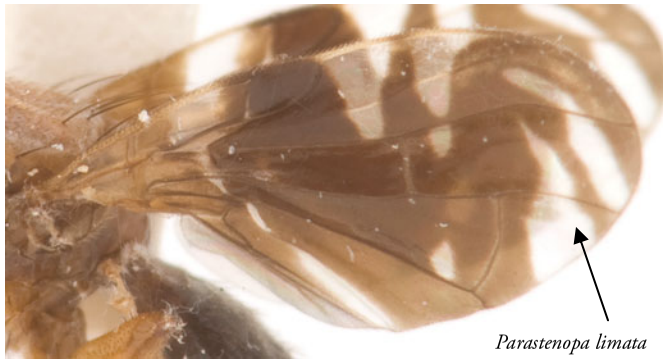
Euleia fratria

15' Body yellow

17

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada



Parastenopa limata

Parastenopa limata

Rhagoletis pomonella

Rhagoletis cornivora

16 Basal two-thirds of wing mostly dark except for two wedge-shaped clear marks along anterior half. Body brown

Parastenopa **Hendel**

16' Basal two-thirds of wing with extensive clear areas not restricted to anterior half. Body usually black, sometimes brownish yellow

Rhagoletis **Loew** (in part)

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

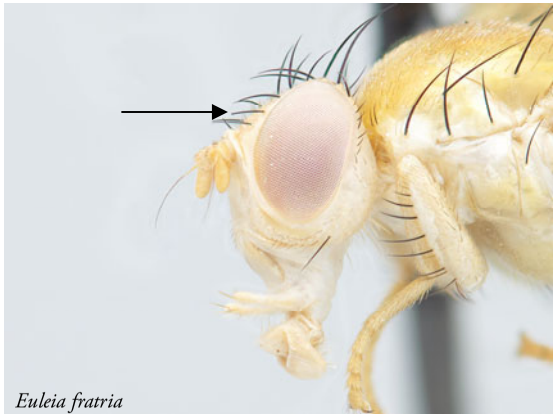
Strauzia arculata

Strauzia longipennis

17 Abdomen elongate; front of head angular in profile; males with greatly enlarged frontal bristles

***Strauzia* Robineau-Desvoidy**

Euleia fratria



Euleia fratria

17' Abdomen globular; front of head rounded in profile; males without greatly enlarged frontal bristles

***Euleia* Walker**

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Tomoplagia obliqua

Tomoplagia obliqua

Rhagoletis basiola

Terellia palposa

18 Body yellow; 2 rows of dark spots on abdominal tergites; wing with four parallel, transverse, darkly-bordered, yellow bands

Tomoplagia **Coquillett**

18' Body variously coloured,if yellow, then abdominal tergites either without spots, or with 4 rows of spots; wing various but never as shown at left

19

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Terellia palposa

Terellia palposa

19 Abdomen with 4 rows of spots, spots sometimes joined by small lateral bands; posterior orbital bristles distinctly convergent

Terellia **Robineau Desvoidy** (in part)

Rhagoletis basiola

Rhagoletis suavis

19' Abdomen sometimes banded but never with spots; posterior orbital bristles reclinate

20

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Rhagoletotrypeta rohweri

Rhagoletotrypeta rohweri

Rhagoletotrypeta rohweri

Rhagoletis pomonella

Rhagoletis pomonella

Rhagoletis basiola

20 Body brown to black, scutum with a light medial longitudinal strip; wing with a rounded M pattern; first flagellomere rounded at dorsal apex

Rhagoletotrypeta Aczél

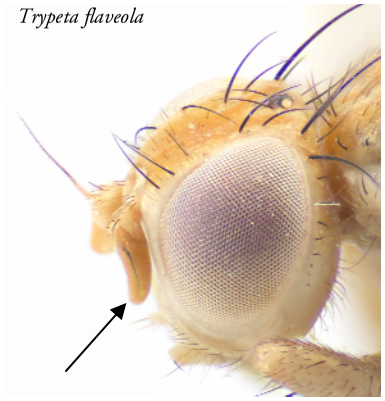
20' Body yellow or black, scutum never with a medial light stripe; wing never with a rounded M pattern; first flagellomere pointed at dorsal apex

Rhagoletis **Loew** (in part)

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Trypeta flaveola



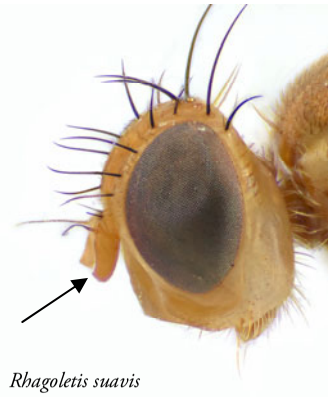
Trypeta flaveola

Trypeta flaveola

21 Body light yellow, scutum with 3 strong, dark stripes running longitudinally; distal wing band crescent-shaped; first flagellomere rounded at dorsal apex

***Trypeta* Meigen**

Rhagoletis meigenii



Rhagoletis suavis

Rhagoletis meigenii

21' Body orangish-brown, scutum usually without 3 dark stripes but stripes weak if present; distal wing band crescent-shaped, inner margin straight; first flagellomere pointed at dorsal apex

***Rhagoletis* Loew** (in part)

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

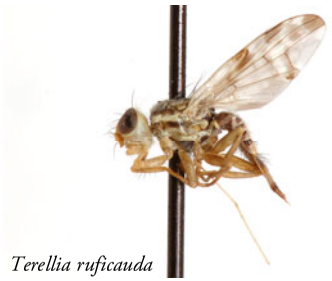
Euphranta canadensis

Euphranta canadensis

22 Thorax and abdomen pale yellow; wing with 4 distinct dark crossbands

Euphranta **Loew**

Chetostoma californicum



Terellia ruficauda

Chetostoma californicum

Terellia ruficauda

22' Thorax orange-brown or greyish blue, wing never with 4 distinct dark crossbands

23

doi:10.3752/cjai.2011.15

Chetostoma californicum

Terellia ruficauda

Chetostoma californicum

Terellia ruficauda

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Chetostoma californicum

Chetostoma californicum

23 Thorax orange, abdomen dark brown to black without spots. Wing membrane clear between dark bands

Chetostoma **Rondani**

Terellia ruficauda

Terellia ruficauda

Terellia ruficauda

23' Thorax greyish-blue, abdomen yellowish with 4 rows of spots, sometimes joined by small lateral bands. Wing membrane with extensively smokey or infuscated areas between dark bands

Terellia **Robineau-Desvoidy** (in part)

doi:10.3752/cjai.2011.15

Terellia ruficauda

Terellia ruficauda

Terellia ruficauda

Field Key to the genera of Tephritidae of eastern Canada

Eurosta solidaginis

Eurosta solidaginis

Eurosta solidaginis

24 Apical third of wings mostly dark with triangular clear area at apex of pterostigma. Scutellum same colour as rest of thorax.

Eurosta **Loew**

Jamesomyia geminata

Jamesomyia geminata

24' If apical third of wing mostly dark, then scutellum different colour than rest of thorax.

25

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Jamesomyia geminata

Jamesomyia geminata

25 Wing mostly dark in apical third; thorax and abdomen light yellow with dark spots

Jamesomyia **Quisenberry**

Xanthomyia platyptera

Campiglossa albiceps

25' Wing various, but apical third with 6 or more large clear spots; thorax and abdomen various

26

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Euaresta aequalis

Euaresta bella

Euaresta bella

Campiglossa albiceps

Tephritis pura

26 Body yellow or grey; wing sometimes with dark bulla (blister-like structure), but if thorax grey then wing always with dark bulla

27

26' Body never yellow and wing never with dark bulla

28

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Neaspilota reticulata

27 Scutum with grey lyre-shaped pattern, abdomen yellow. Host: *Coreopsis tripteris*

Neaspilota **Osten Sacken** (in part)

Euaresta bella

Euaresta festiva

27' Thorax either all yellow or all grey, never with lyre-shaped pattern; thorax and abdomen same colour. Host: *Ambrosia* spp or *Xanthium strumarium*

Euaresta **Loew**

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Acidogona melaneura

28 First flagellomere more than 2/3 length of eye

Acidogona **Loew**

Tephritis pura

28' First flagellomere much less than 2/3 length of eye

29

doi:10.3752/cjai.2011.15

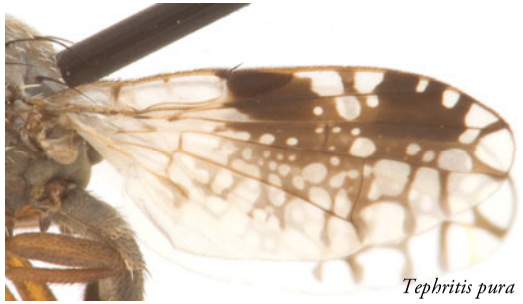
Field Key to the genera of Tephritidae of eastern Canada

Xanthomyia platyptera

Xanthomyia platyptera

29 Wing noticeably broad with many small clear areas interspersed throughout; parafacial with dark spots

Xanthomyia **Phillips**



Tephritis pura

Euarestoides acutangulus

29' Wing narrow and appearing to be mostly clear; parafacial without spots

30

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Euarestoides abstersus

Euarestoides acutangulus

30 Wing with single dark area along leading edge of apical half

Euarestoides **Benjamin**

Tephritis pura

Dioxyna picciola

30' Wing with multiple dark areas or without conspicuous dark areas

31

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Tephritis pura

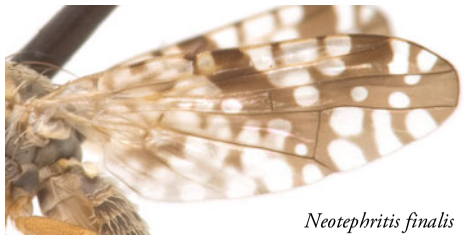
Tephritis candidipennis

31 Wing with 2 distinct dark areas on anterior half

***Tephritis* Latreille**

Campiglossa albiceps

Dioxyna picciola



Neotephritis finalis

31' Wing various, but pattern not dominated by 2 distinct dark areas on anterior half

32

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Dioxyna picciola

Dioxyna picciola

32 Wing largely clear with some dark patterning in apical 1/4; head subquadrate in profile, longer than high

Dioxyna **Frey**

Campiglossa albiceps

Campiglossa albiceps

32' Wing with dark patterning in basal 3/4; head oval in profile, taller than long

33

doi:10.3752/cjai.2011.15

Field Key to the genera of Tephritidae of eastern Canada

Neotephritis finalis

Neotephritis finalis

Campiglossa albiceps

Campiglossa albiceps

33 Tip of wing with uninterrupted dark area; gray part of abdomen without dorsal dark spots

Neotephritis **Hendel**

33' Tip of wing with clear spots in dark area; gray part of abdomen with dorsal dark spots

Campiglossa **Hendek**

doi:10.3752/cjai.2011.15

Genus *Acidogona* Loew

Recognition : The wing pattern of *A. melaneura*, the sole species of *Acidogona* in Ontario, is reticulate, similar to the wing pattern of *Neotephritis* spp., but the position of the dorsocentral setae distinguishes it from that genus. Other useful diagnostic characters for *A. melanura* include: the first flagellomere of the female is large and distinctly pointed, the thoracic setae are usually inserted on dark spots, and the abdomen is usually yellow with large dark brown spots or markings.

1 species likely to occur in Ontario:

Acidogona melaneura

Acidogona melaneura

Continue to *Acidogona melaneura* page

doi:10.3752/cjai.2011.15

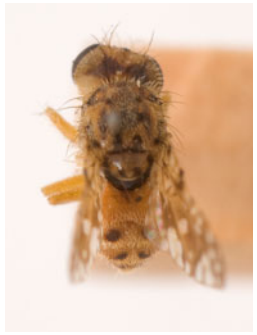
Acidogona melaneura (Loew)

Discussion: This species has not been recorded from Ontario, but one specimen was collected at Duncan Lake near Rupert, Quebec.

Hosts: *Hieracium megacephalon* Nash (= *argyraeum*), *H. gronovii* L., *H. scabrum* Michx., and *H.* sp. (Benjamin 1934, Wasbauer 1972).

Flight Period: Late July - Early August

DNA Barcode Available: No



doi:10.3752/cjai.2011.15

Genus *Campiglossa* Hendel

Recognition : Small to medium-sized, usually black-bodied, with a dense grey or tan tomentum and reticulate brown to grey wings. The wings of all species have a characteristic speckled appearance, lack definitive stripes or bands, and have relatively small and rounded clear spots. The most useful external characters used as the primary criteria for recognizing *Campiglossa* are the geniculate (elbowed) proboscis with a relatively long labellum, head shape (not as elongate as *Dioxyna*), chaetotaxy (2 frontal, 2 orbital, and 2 scutellar setae), and the abdominal colour pattern (in most species grey with diffuse paired brown spots).

4 species occuring in Ontario:
Campiglossa albiceps
Campiglossa farinata
Campiglossa genalis
Campiglossa sabroskyi

Campiglossa albiceps

Continue to *Campiglossa* Species Key

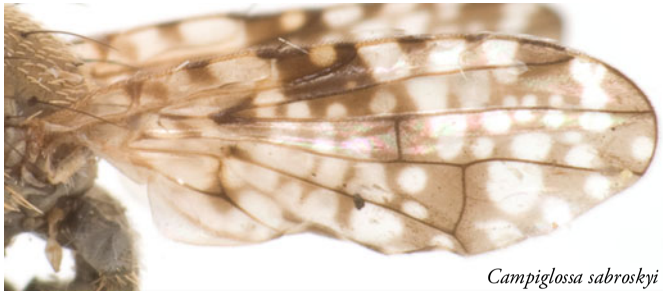
doi:10.3752/cjai.2011.15

Key to the *Campiglossa* species of Ontario

Campiglossa albiceps

Campiglossa albiceps

Campiglossa sabroskyi



Campiglossa sabroskyi

1 Legs yellow to reddish, femora at most with narrow dark marks; wing ovoid with most hyaline spots subcircular

Campiglossa albiceps **(Loew)**

1' At least basal half of all femora with black or bluish ground colour; wing more elongate with hyaline spots often ovoid or subquadrate

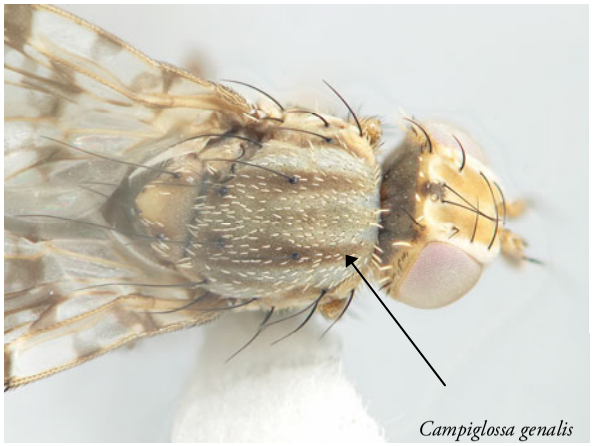
2

Key to the *Campiglossa* species of Ontario

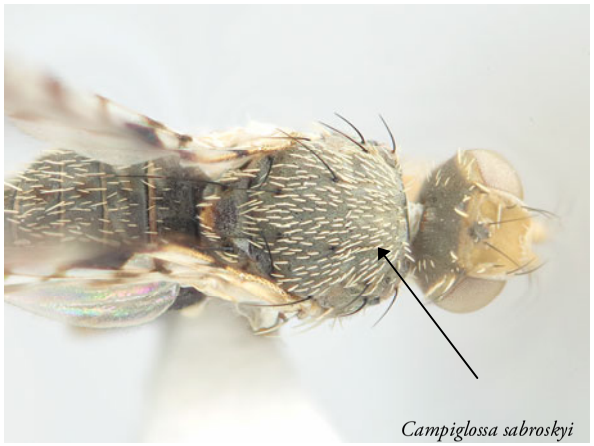
Campiglossa farinata

2 Scutum with narrow brown stripes on bluish white to yellowish background, if brown stripes wholly lacking, body length less than 2.5 mm

Campiglossa farinata **Novak**



Campiglossa genalis



Campiglossa sabroskyi

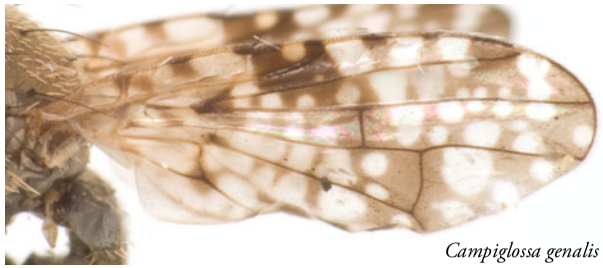
2' Scutum either without stripes or with broad brown stripes; total body length usually exceeding 2.5 mm

3

doi:10.3752/cjai.2011.15

Key to the *Campiglossa* species of Ontario

Campiglossa genalis



Campiglossa genalis

Campiglossa sabroskyi

Campiglossa sabroskyi

3 Scutellum all brown, or brown with amber apex; wing with 3 large clear spots distad of pterostigma broad and close together in both sexes

Campiglossa genalis **(Thomson)**

3' Scutellum grayish tomentose; the 1st of the 3 spots distad of the pterostigma of the male somewhat isolated from the 2nd and with the terminal point directed posterolaterally

Campiglossa sabroskyi **Novak**

doi:10.3752/cjai.2011.15

Campiglossa albiceps (Loew)

Discussion: Easily distinguished from all other species in *Campiglossa* by its entirely reddish yellow legs, *Campiglossa albiceps* is one of the most common fruit flies in Ontario.

Hosts: *Aster laevis* L., *A. novae-angliae* L., *A. pilosus* Willd., *A. praealtus* Poir., *A. puniceus* L., and *A. umbellatus* Mill. (Wasbauer 1972, Novak 1974). The larvae feed in the flowerheads.

Flight Period: Early June to early September

DNA Barcode Available: Yes (Genbank EU484468, EU484467, EU484466)

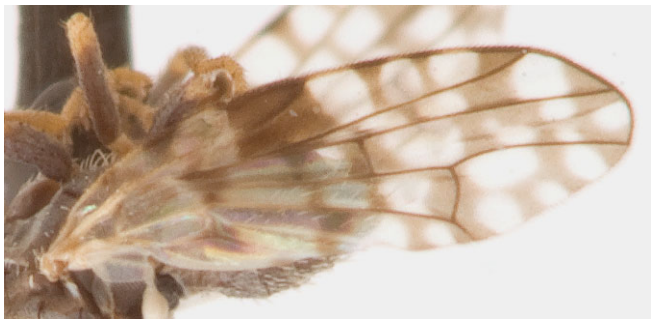
Campiglossa farinata (Novak)

Discussion: *Campiglossa farinata* has been found farther north than most other species in this genus.

Hosts: Novak (1974) listed *Leymus condensatus* (J. Presl) *A. Löve* (= *Elymus condensatus*)(Poaceae) as a host, but Foote et al. (1993) considered that record doubtful (no other Tephritinae are known to breed in grasses).

Flight Period: Early June to late July

DNA Barcode Available: No



doi:10.3752/cjai.2011.15

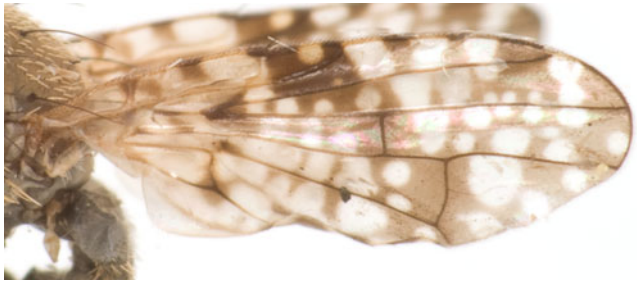
Campiglossa genalis (Thomson)

Discussion: *Campiglossa genalis* can be differentiated from the similar *C. sabroskyi* by scutellum colour; *C. sabroskyi* having a greyish tomentose scutellum, and *C. genalis* having a brown or brown and amber scutellum. Also, markings on the wing of *C. sabroskyi* are darker than those of *C. genalis*.

Hosts: Reported host plants include 42 species of Asteraceae (Goeden and Blanc 1986, Goeden 1994) including 14 species of *Senecio* L., 3 species of *Aster* L., 3 species of *Crepis* L., 3 species of *Ericameria* Nutt., and 3 species of *Eriophyllum* Lag., as well as various other genera.

Flight Period: Early June to mid-July

Barcode Available: No



doi:10.3752/cjai.2011.15

Campiglossa sabroskyi Novak

Discussion: Distinguished from *C. genalis* by scutellum colour; *C. sabroskyi* having a greyish tomentose scutellum, and *C. genalis* having a brown or brown and amber scutellum. *Campiglossa sabroskyi* was previously recorded as occurring as far east as central Manitoba, but we now record it from Ontario on the basis of 3 specimens from Moose Factory.

Host: *Hieracium albiflorum* Hook., *Stephanomeria pauciflora* (Nuttall) Nelson, and *S. virgata* Benth. have been recorded as hosts of *Campiglossa sabroskyi* (Goeden and Blanc 1986, Goeden 1994).

Flight Period: Early June to mid-July

Barcode Available: Yes (GenBank EU484469)

Genus *Chetostoma* Rondani

Recognition : Medium-sized yellowish to brown flies without black body or leg markings except sometimes on abdominal tergites. Wings with four narrow bands on a clear field; all bristles well developed, black; three frontal bristles. Two orbital bristles, the posterior pair reclinate. Dorsocentral bristles (single pair) situated slightly ahead of transverse line through the postsutural supra-alar bristles; scutellum flat; gena with 6-12 well-developed black setae at the anterior oral margin, the longest one-half or more as long as the genal bristle behind them. *Chetostoma* resembles *Euphranta* in wing pattern, but in that genus the presutural supra-alar bristle is absent, the antenna is longer, the wing bands are wider, and the black genal setulae anterior to the genal bristle are absent. The aculeus tip is flattened in the sagittal plane, differing from other Tephritidae known from Ontario except *Paramyiolia*.

1 species found in Ontario:
Chetostoma californicum

Chetostoma californicum

Continue to *Chetostoma californicum* page

doi:10.3752/cjai.2011.15

Chetostoma californicum Blanc

Discussion: Easily distinguished from all other tephritids in Ontario, *Chetostoma californicum* is a mostly western species with a range extending into southern Ontario.

Host: The only recorded host of *Chetostoma californicum* is from Arizona, *Lonicera albiflora* Torr. & Gray (Goeden 1986, as reported by Foote et al., 1993). The larvae feed in the fruit.

Flight Period: Mid-May to early November

Barcode Available: No

doi:10.3752/cjai.2011.15

Genus *Dioxyna* Frey

Recognition : In Ontario, *Dioxyna* is represented by only one species, *Dioxyna picciola* (Bigot), a relatively small fly about 3mm long. This genus is very similar to *Campiglossa* but can be distinguished from it by the longer head, which is longer than high. Other useful diagnostic characters include: proboscis long, geniculate; wing reticulate; chaetotaxy (2 frontal, 2 orbital, and 1-2 scutellar setae, the apical pair small or absent), and the abdominal color pattern (gray with diffuse paired brown spots).

1 species is known from Ontario:
Dioxyna picciola

Dioxyna picciola

Continue to *Dioxyna picciola* page

doi:10.3752/cjai.2011.15

Dioxyna picciola (Bigot)

Discussion: *Dioxyna picciola* resembles species of *Campiglossa*, from which it can be distinguished most readily by the shape of its head, which is distinctly longer than high.

Host: Reported host plants include 23 species of Asteraceae (Benjamin 1934, Wasbauer 1972, Goeden & Blanc 1986) including 10 species of *Bidens* L. and 8 species of *Coreopsis* L., as well as *Aster simmondsii* Small, *Balduina angustifolia* (Pursh) B.L. Robins, *Cosmos bipinnatus* Cav., *Cosmos sp.*, *Helenium flexuosum* Raf. (= *nudiflorum*), and *Tagetes erecta* L.

Flight Period: Mid-June to early September

Barcode Available: Yes *(GenBank EU484474, EU484473, EU484472, EU484471, EU484470)*

Genus *Euaresta* Loew

Recognition : *Euaresta* is one of four Ontario genera made up of generally small flies with a dark wing filled with discrete, fairly large, rounded clear spots. These genera (*Euaresta, Tephritis, Campiglossa* and *Dioxyna*) also share a flat scutellum, two pairs of frontal bristles, two pairs of orbital bristles with the posterior pair yellowish and reclinate, two pairs of scutellar bristles and a single pair of dorsocentral bristles situated very close behind the transverse suture. *Euaresta* is separable from *Campiglossa* and *Dioxyna* by its nongeniculate labellum, and more radiate wing pattern, and from *Tephritis* by its distinctly enlarged male fore femora. *Euaresta* is the only one of the four genera with yellow-bodied species and/or a bulla present in cell r4+5 of the wing.

3 species of *Euaresta* are present in Ontario:
Euaresta aequalis
Euaresta bella
Euaresta festiva

Euaresta bella

Continue to *Euaresta* species key

doi:10.3752/cjai.2011.15

Key to the *Euaresta* species of Ontario

1 Ground colour of thorax dark brown to black, often obscured by whitish or yellowish tomentum

Euaresta bella **(Loew)**

1' Ground colour of thorax yellow

2

doi:10.3752/cjai.2011.15

Key to the *Euaresta* species of Ontario

Euaresta aequalis

2 Wing with many clear spots in centre region; clear spot near apex of cell r4+5 separated from wing margin by a distinct brown band

Euaresta aequalis **(Loew)**

Euaresta festiva

2' Centre region of wing with only a few clear spots; clear spot at apex of cell r4+5 broadly joined to wing margin

Euaresta festiva **(Loew)**

doi:10.3752/cjai.2011.15

Euaresta aequalis (Loew)

Host: The only known host is cocklebur, *Xanthium strumarium* L. (Wasbauer 1972).

Flight Period: Mid-July to mid-August

Barcode Available: Yes (GenBank EU484478, EU484477, EU484476, EU484475)

Euaresta bella (Loew)

Discussion: The only black *Euaresta* species found in Ontario, *Euaresta bella* is by far the most frequently collected fruit fly in the province. Ranging across most of the populated regions of Ontario, *Euaresta bella* has also been recorded from as far south as the Bahamas, Barbados, and Mexico (Foote et al., 1993).

Host: *Ambrosia artemisiifolia* L., common ragweed, is the only known host (Wasbauer, 1972).

Flight Period: Mid-May to early September

Barcode Available: Yes (GenBank EU484487, EU484486, EU484485, EU484484, EU484483, EU484482, EU484481, EU484480, EU484479)

doi:10.3752/cjai.2011.15

Euaresta festiva (Loew)

Host: Wasbauer (1972) lists *Ambrosia trifida* L., giant ragweed, as the only host.

Flight Period: Late July to early September

Barcode Available: Yes (GenBank EU484489, EU484488)

doi:10.3752/cjai.2011.15

Genus *Euarestoides* Benjamin

Recognition : Small, dark flies with a flat scutellum, three pairs of frontal bristles, two pairs of orbital bristles with the posterior pair reclinate, two pairs of scutellar bristles and one pair of dorsocentral bristles situated close behind the transverse suture. The wing has a dark brown stellate mark on the apical half, an extensive brown to yellow-brown reticulate pattern on the basal half, and an apical clear spot at least as long as wide in cell r4+5. The wing of *Euarestoides* resembles the wings of most species of *Trupanea*, but the basal half of the *Euarestoides* wing is almost completely filled with a reticulate pattern. *Euarestoides* is further distinguished from *Trupanea* by the presence of two pairs of scutellar bristles.

2 *Euarestoides* species likely occur in Ontario:
Euarestoides abstersus
Euarestoides acutangulus

Euarestoides acutangulus

Continue to *Euarestoides* species key

doi:10.3752/cjai.2011.15

Key to the *Euarestoides* species of Ontario

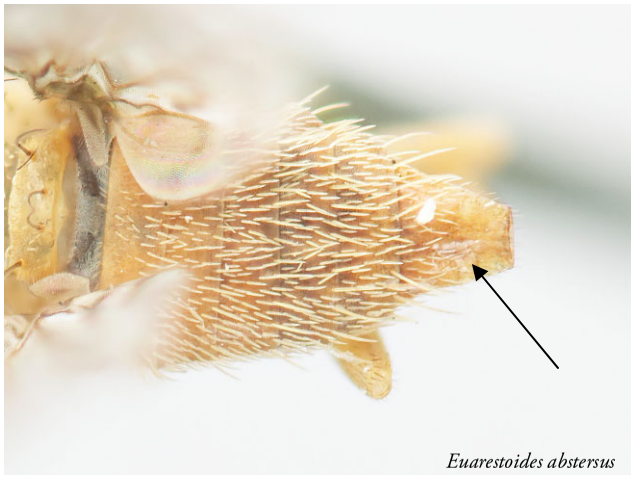
Euarestoides acutangulus

Euarestoides acutangulus

1 Proximal half of wing pattern distinctly paler yellow brown in contrast to the dark brown distal half, the line of demarcation abrupt; dark patch on wing with a clear spot well beyond middle of apical margin; female oviscape yellow with blackened base and apex

Euarestoides acutangulus **(Thomson)**

Euarestoides abstersus



Euarestoides abstersus

1’ Wing pattern almost uniformly brown, slightly fainter on proximal half; dark patch on wing with a clear spot near middle of anterior margin; oviscape entirely yellow, brown, or black, not bicoloured

Euarestoides abstersus **(Loew)**

doi:10.3752/cjai.2011.15

Euarestoides abstersus (Loew)

Discussion: Although not yet recorded from Ontario, this species is known from central Michigan and from the eastern seaboard of New Jersey, New York, and Maryland (not mapped, Foote et al., 1993), so it likely occurs in southern Ontario. *Euarestoides abstersus* is less frequently collected than the similar *E. acutangulus*. These two species are easily distinguished by oviscape colour, wing colour and the location of the hyaline spot within the subapical brown mark (see key).

Host: *Carphephorus paniculatus* (J.F. Gmel.) Herbert is the only well documented host plant (Benjamin 1934, as *Trilisa paniculata*). The larvae feed in the flowerheads.

Flight Period: Specimens from the eastern seaboard of U.S.A. were collected in early September; the specimen collected from Michigan was collected in mid-May.

Barcode Available: No

Euarestoides acutangulus (Thomson)

Discussion: Although it probably occurs in the province, *Euarestoides acutangulus* has yet to be recorded from Ontario, despite being the most commonly collected *Euarestoides* species in North America (Foote et al., 1993).

Hosts: Reported host plants for *Euarestoides acutangulus* include 10 species of *Ambrosia* L., and 11 other species of Asteraceae (Wasbauer 1972, Foote et al. 1993).

Flight Period: Mid-June to mid-July

Barcode Available: No

Genus *Euleia* Walker

Recognition : The single species of *Euleia* found in Ontario superficially resembles *Strauzia*, *Euphranta*, *Trypeta*, and some *Rhagoletis* species. *Euleia* is distinguishable from *Strauzia* by the presence of two pairs of orbital bristles; from *Euphranta* by the presence of presutural supra-alar bristles, two pairs of orbital bristles, and the relatively short antennae; from *Trypeta* by the presence of a distinct rounded spot in the distal half of cell dm and the more distal position of vein r-m along cell dm; and from *Rhagoletis* by the apically rounded first flagellomere. Specimens of *Euleia* and *Trypeta* frequently have tiny dark spots on the integument, especially on the posterior half of the scutum and on the scutellum.

There is 1 *Euleia* species known from Ontario:
Euleia fratria

Euleia fratria

Continue to *Euleia fratria* page

doi:10.3752/cjai.2011.15

Euleia fratria (Loew)

Discussion: Also known as the Parsnip Leaf Miner, *Euleia fratria* has been known to infest parsnip in the United States, but it appears to be a minor pest with only occasional records of damage (Foote et al., 1993).

Hosts: Besides parsnip (*Pastinaca sativa* L.), *Euleia fratria* has also been recorded from *Angelica atropurpurea* L., *Apium graveolens* L., *Conium maculatum* L., *Cryptotaenia canadensis* (L.) DC., *Heracleum lanatum* Michx., *Heraclum* sp. *Oenanthe sarmentosa* Presl., and *Prenanthes canadense* (Wasbauer, 1972).

Flight Period: Late May to mid-July

Barcode Available: Yes (GenBank EU484491, EU484490)

Genus *Euphranta* Loew

Recognition : Medium-sized flies with a largely unmarked light yellow body, banded wings, and black setae. In older specimens, the abdominal tergites may be darkened but normally lack patterns. Presutural supra-alar bristles are absent, the dorsocentral bristles are closer to a line through the postsutural supra-alar bristles than through the acrostichal bristles, the posterior orbital bristles are absent, the scutellum is flat and the apex of the first flagellomere nearly attains the oral margin. The wing pattern of *Euphranta* somewhat resembles that of several species of *Rhagoletis* in exhibiting the four *Rhagoletis*-like bands, but it differs from those species and all other Ontario genera in that the discal band terminates in the anterior wing margin distinctly distad of the pterostigma, and the subapical band terminates at or just anterior to vein R4+5.

1 species of *Euphranta* is found in Ontario:
Euphranta canadensis

Euphranta canadensis

Continue to *Euphranta canadensis* page

doi:10.3752/cjai.2011.15

Euphranta canadensis (Loew)

Discussion: Also known as the Currant Fly, Currant Fruit Fly, Yellow Currant Fly, or the mouche du groseillier, *Euphranta canadensis* is a pest of many species of currants, including the commonly cultivated blackcurrant (*Ribes nigrum*) and redcurrant (*Ribes rubrum*) (Wasbauer, 1972).

Hosts: Wasbauer (1972) lists seven *Ribes* sp. that are used by *E. canadensis*: *Ribes alpinum* L., *R. aureum* Pursh, *R. nigrum* L., *R. oxycanthoides* L., *R. rubrum* L., *R. triste* Pallas, and *R.* sp.

Flight Period: Late May to late June

Barcode Available: Yes (Genbank EU484493, EU484492)

Genus *Eurosta* Loew

Recognition : Members of *Eurosta* are characteristically dark, stout-bodied flies of medium size. The wing is quite dark with light or clear spots that sometimes coalesce to form larger light areas. The frons is setulose and very broad, there are one or two pairs of orbital bristles, two to four pairs of frontal bristles, all the postocular bristles are whitish, and the first flagellomere is very short. The dorsocentral bristles are closer to the postsutural supra-alar bristles than to the transverse suture, and the apical scutellar bristles are usually absent or, if present, much shorter than the basal pair.

5 species of *Eurosta* occur or are likely to occur in Ontario:
Eurosta comma
Eurosta cribrata
Eurosta fenestrata
Eurosta latifrons
Eurosta solidaginis solidaginis

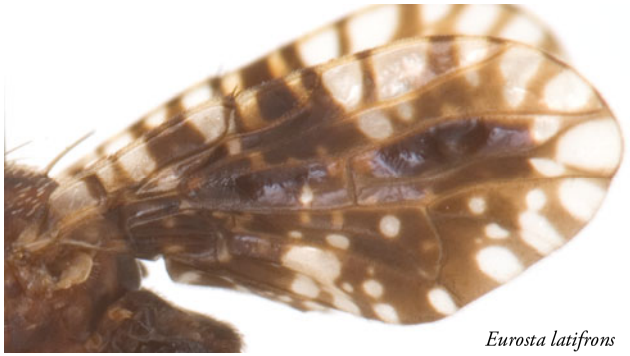
Eurosta solidaginis

Continue to *Eurosta* species key

doi:10.3752/cjai.2011.15

Key to the *Eurosta* species of Ontario

Eurosta cribrata



Eurosta latifrons

1 Scutum with patches of darker brown to black setulae among the light-coloured setulae; wing apex with large, distinct clear spots separated by dark markings

2

Eurosta solidaginis

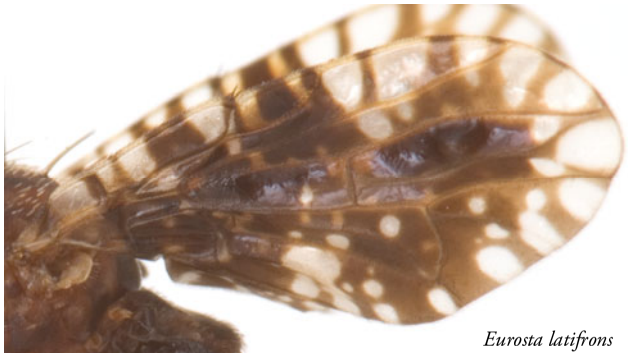
Eurosta solidaginis

1' Scutum with unicolourous golden to whitish setulae; wing apex with an uninterrupted crescent-shaped clear area or with small more or less coalesced spots

3

Key to the *Eurosta* species of Ontario

Eurosta latifrons



Eurosta latifrons

Eurosta cribrata

Eurosta cribrata

2 One pair of scutellar bristles; wing cell bc almost completely clear

Eurosta latifrons **(Loew)**

2' Two pairs of scutellar bristles; wing cell bc entirely infuscated or with small basal transparent spot

Eurosta cribata **(Wulp)**

doi:10.3752/cjai.2011.15

Key to the *Eurosta* species of Ontario

Eurosta solidaginis

3 Apex of wing with large, semicircular reticulate clear area or with several large, rounded clear spots often narrowly touching, or isolated from, wing margin

Eurosta solidaginis solidaginis **(Fitch)**

Eurosta fenstrata

Eurosta comma

3' Apex of wing with narrow, crescent-shaped transparent mark; if transparent area broken into several small spots by darkening at middle of cell r4+5 or at apices of veins R4+5 or M the spots are extremely small and/or wider than long and broadly touching wing margin

4

Key to the *Eurosta* species of Ontario

Eurosta fenstrata

Eurosta comma

4 Cell c with multiple large hyaline spots; apex of vein A1+CuA2 with a single large distinct clear spot; clear spot longer than wide, usually devoid of any dark markings, margins sharply defined

Eurosta fenestrata **Snow**

4' Cell c completely shaded; clear area around apex of vein A1+CuA2 composed of many small clear spots, margins of clear spots not distinctly separated

Eurosta comma **(Wiedemann)**

doi:10.3752/cjai.2011.15

Eurosta comma (Wiedemann)

Discussion: Recorded recently from Ontario by Paiero et al. (2010), *Eurosta comma* closely resembles *E. fenestrata*. The size and shape of the clear mark at the apex of vein A1+CuA2 is the best character to distinguish these two species, with *E. comma* having a small uninterrupted clear area compared to *E. fenestrata*'s tall, clear marking.

Hosts: *Solidago juncea* Ait. and *S. rugosa* P. Mill. are host plants of *E. comma* (Wasbauer 1972). The larvae feed in rhizome galls.

Flight Period: Late August to late September

Barcode Available: Yes (GenBank EU484496, EU484495, EU484494)

Eurosta cribrata (Wulp)

Discussion: *Eurosta cribrata* is not yet recorded from Ontario, but it is known from Michigan, Ohio, New York, and Manitoba. *Eurosta cribrata* and *E. latifrons* have similar wing patterns, but *E. cribrata* differs from *E. latifrons* and all other *Eurosta* species in Ontario in having only two pairs of scutellar bristles.

Hosts: *Solidago sempervirens* L. in Florida and Ohio and *S. juncea* Ait. in Massachusetts and Ohio have been recorded as hosts for *Eurosta cribrata* (Benjamin 1934, Novak and Foote 1980). The larvae feed in root or root crown galls.

Flight Period: Early June to early July

Barcode Available: No

doi:10.3752/cjai.2011.15

Eurosta fenestrata Snow

Discussion: *Eurosta fenestrata* is here recorded for the first time from Ontario on the basis of 8 specimens from the Ottawa region. As mentioned in the discussion of *Eurosta comma*, *E. fenestrata* closely resembles *E. comma*. The clear region at the apex of vein A1+CuA2 in *E. fenestrata* is taller and devoid of dark markings throughout, as opposed to *E. comma* where the clear area is short and wide and often broken up with dark markings.

Hosts: Unknown, although Ming (1989) suggests that *Solidago* L. is the most likely host as it is the host for the closely related species *Eurosta comma* and *E. floridensis*, and *Solidago* spp. are the host records for all *Eurosta* spp. in which the host is well known.

Flight Period: Late July to early August

Barcode Available: No

doi:10.3752/cjai.2011.15

Eurosta latifrons (Loew)

Discussion: *Eurosta latifrons* has been recorded from southeastern Michigan and northwestern Vermont (Foote et al., 1993), making it another likely southwestern Ontario resident.

Host: Unknown

Flight Period: Mid-June to mid-July

Barcode Available: No

Eurosta solidaginis solidaginis (Fitch)

Discussion: The distinctive ball-shaped goldenrod stem galls induced by this common fly are familiar to most residents of southern Ontario. Probably the easiest species of *Eurosta* to recognize in Ontario, *Eurosta solidaginis solidaginis* is characterized by 3 or 4 large clear areas in the wing. There are two subspecies known from North America, but it appears that only *Eurosta solidaginis solidaginis* is found in Ontario.

Hosts: The only reliably documented host plants are *Solidago canadensis* L. var. *hargeri* Fern., var. *salebrosa* (Piper) M.E. Jones, and var. *scabra* Torr. & Gray (= *S. altissima*) and *S. gigantea* Ait. (= *S. serotina*) (Abrahamson & Weis 1997). The larvae feed in stem galls.

Flight Period: Early May to late August

Barcode Available: Yes (GenBank EU484503, EU484502, EU484501, EU484500, EU484499, EU484498, EU484497)

Genus *Eutreta* Loew

Recognition : These dark-winged flies range in size from about 3 mm to over 8 mm. Most species are quickly recognized as *Eutreta* by their dark brown to black wings, in which the dark colour extends completely to the wing base, and which have a spattering of small, white or silvery round spots and an apical white crescent. Other distinctive characters include three pairs of frontal bristles, two pairs of orbital bristles with the posterior pair reclinate and white or yellowish, two pairs of scutellar bristles, one pair of dorsocentral bristles which are situated closer to the transverse suture than to the level of the postsutural supra-alar bristles, and a scutellum that is never swollen or polished. The wing vein R4+5 is bare or with only a few setae dorsally, and the apex of cell cup is elongated at its lower corner. The femora are usually concolourous with the thorax; the tibiae and tarsi are commonly lighter but in some species are concolourous with the thorax.

3 species occur in Ontario:
Eutreta caliptera
Eutreta fenestra
Eutreta novaeboracensis

Eutreta novaeboracensis

Continue to *Eutreta* species key

doi:10.3752/cjai.2011.15

Key to the *Eutreta* species of Ontario

Eutreta frontalis

1 Base of wing with some clear spots coalesced, especially in anal lobe and cell cua1; host *Aster* sp.

Eutreta frontalis **Curran**

Eutreta novaeboracensis

Eutreta caliptera

1' All clear spots of wing clearly separated, not forming a single light area near base of wing; host never *Aster* sp.

2

doi:10.3752/cjai.2011.15

Key to the *Eutreta* species of Ontario

Eutreta caliptera

Eutreta caliptera

Eutreta novaeboracensis

Eutreta novaeboracensis

2 Body dark brown to grayish brown; clear spot on costa at pterostigma narrow, not extending into cell r1; host various, never *Solidago* sp.

Eutreta caliptera **(Say)**

2' Body often slightly reddish to yellow brown; clear spot on costa at pterostigma broader, usually extending as a small wedge into cell r1; host *Solidago* sp.

Eutreta novaeboracensis **(Fitch)**

doi:10.3752/cjai.2011.15

Eutreta caliptera (Say)

Discussion: Although similar to *Eutreta novaeboracensis*, *E. caliptera* is smaller, with a body length of between 4 mm and 6.5 mm, compared to *E. novaeboracensis* which is longer than 6.5 mm (Foote et al., 1993). Otherwise, the size of the clear spot on the costa at the apex of the pterostigma is also useful for distinguishing between these two species.

Hosts: *Eutreta caliptera* has been found to cause stem galls on *Ambrosia* sp., *Bidens frondosa* L., *Chrysanthemum* sp., *Erichtites hieraciafolia* (L.) Raf., *Helianthus annuus* L., *H. giganteus* L., *H. tuberosus* L., and *Vernonia baldwinii* Torr. ssp. *interior* (Small) Faust, *V. gigantea* (Walter) Trel. ex Branner & Coville, and *V. novaeboracensis* L. (Stoltzfus 1977, Sutton et al. 2003).

Flight Period: Mid-June to late August

Barcode Available: No

Eutreta frontalis Curran

Discussion: *Eutreta frontalis* can be easily distinguished from other Ontario *Eutreta* species by the coalesced clear spots in the anal lobe and cell cup of the wing.

Hosts: *Eutreta frontalis* forms crown galls on *Aster simplex* Willd. and *A. laevis* L. (Stoltzfus, 1977).

Flight Period: Late May to late September

Barcode Available: Yes (GenBank EU484504)

Eutreta novaeboracensis (Fitch)

Discussion: *Eutreta novaeboracensis* is the largest *Eutreta* species in Ontario, as well as the most common. It can usually be differentiated from the similar *E. caliptera* by its body length (more than 6.5 mm; *E. caliptera* is between 4 and 6.5 mm) and its reddish-brown colour.

Hosts: *Eutreta novaeboracensis* larvae feed in rhizome galls on *Solidago canadensis* L. (= *altissima*). *Solidago rugosa* P. Mill. is also a reported host for this species (Stoltzfus, 1977).

Flight Period: Mid-May to mid-September

Barcode Available: Yes (GenBank EU484508, EU484507, EU484506, EU484505)

Genus *Icterica* Loew

Recognition : The two *Icterica* species are modest-sized flies with largely unmarked yellow-brown bodies and legs. They have two to four pairs of frontal bristles, two pairs of reclinate orbital bristles, and a frons covered with fine setae. The single pair of dorsocentral bristles are on a transverse line through the postsutural supra-alar bristles, the scutellum is flat and never polished, and there are two pairs of scutellar bristles. Wing vein r-m is distinctly distad of the midpoint of the cell dm, the border of the wing is distinctly brown with clear spots, and the disk has a central area of massively fused yellowish spots making that area appear as if covered by irregularly-shaped dark brown spots against a yellowish background. This wing pattern is unique amongst Ontario Tephritidae.

2 species occur in Ontario:
Icterica circinata
Icterica seriata

Icterica seriata

Continue to *Icterica* species key

doi:10.3752/cjai.2011.15

Key to the species of *Icterica* found in Ontario

Icterica circinata

1 Nonmarginal part of wing with circular brown marks on yellowish to hyaline background; base and apex of pterostigma yellow, centre with a dark spot

Icterica circinata **(Loew)**

Icterica seriata

1' Nonmarginal part of wing with dotlike dark brown spots on yellow background; pterostigma darkened along almost its entire posterior border

Icterica seriata **(Loew)**

doi:10.3752/cjai.2011.15

Icterica circinata (Loew)

Discussion: The wing characters given in the key should be sufficient to distinguish between this species and *Icterica seriata*. *I. circinata* appears to be less commonly collected than *I. seriata*.

Host: Wasbauer (1972) lists *Bidens cernua* L. as the only host. The larvae feed in the flowerheads.

Flight Period: Mid-July to early September

Barcode Available: Yes (GenBank EU484509)

Icterica seriata (Loew)

Discussion: *Icterica seriata* appears to be more frequently collected than *I. circinata* in Ontario.

Host: *Bidens aristosa* (Michx.) Britton, *B. coronata* (L.) Britton, *B. frondosa* L. and *B. tripartita* L. are all listed as hosts by Wasbauer (1972). The larvae feed in the flowerheads.

Flight Period: Late July to early September

Barcode Available: Yes (GenBank EU484511, EU484510)

doi:10.3752/cjai.2011.15

Genus *Jamesomyia* Quisenberry

Recognition : The basal one-fifth of the wing in this monotypic genus is clear, the remainder dark and peppered with indistinctly bordered clear spots somewhat reminiscent of *Eurosta* and *Eutreta*. The setae found on the head are lightly-coloured, and a parafacial spot is present. The dorsocentral bristles are situated almost exactly in a line between the postsutural supra-alar bristles, and arise from small dark spots that contrast markedly with the lighter, brownish thoracic tomentum.

One species occurs in Ontario:
Jamesomyia geminata

Jamesomyia geminata

Continue to *Jamesomyia geminata* page

doi:10.3752/cjai.2011.15

Jamesomyia geminata (Loew)

Discussion: First recorded from Ontario by Paiero & Marshall (2001) on the Bruce Peninsula, this is a distinctive species that is easily recognized but rarely collected.

Host: The only recorded host is *Lactuca canadensis* (Wasbauer, 1972). The larvae feed in the flowerheads.

Flight Period: July

Barcode Available: No

doi:10.3752/cjai.2011.15

Genus *Neaspilota* Osten Sacken

Recognition : Flies of the genus *Neaspilota* are small and yellowish with convergent posterior orbital bristles. The dorsocentral bristles are found approximately in line with the postsutural supra-alar bristles, the scutum is often heavily tomentose, and there is a dark lyre-shaped pattern on the otherwise yellow scutum. In these characters, the genus most closely resembles the Ontario species of *Terellia*, from which it may be distinguished by the generally smaller body size, the usual absence of setae on the node of vein Rs and (in most species) the asymmetric fifth tarsomere of the male foreleg. In contrast to all Ontario *Terellia* species, cell r4+5 is clear or only very narrowly clouded apically in *Neaspilota*.

5 species occur or are likely to occur in Ontario:
Neaspilota alba
Neaspilota albidipennis
Neaspilota footei
Neaspilota reticulata
Neaspilota vernoniae

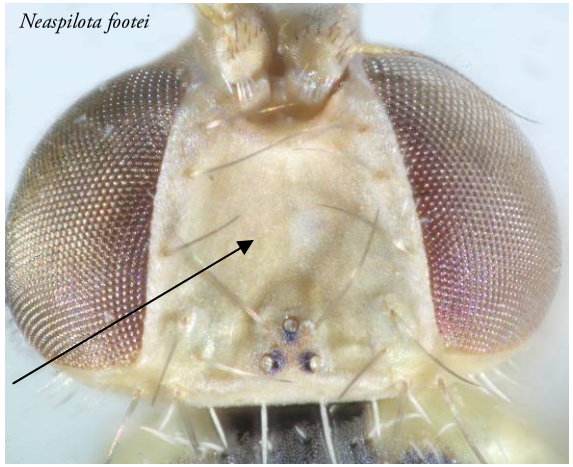
Neaspilota albidipennis

Continue to *Neaspilota* species key

doi:10.3752/cjai.2011.15

Key to the *Neaspilota* species of Ontario

Neaspilota footei

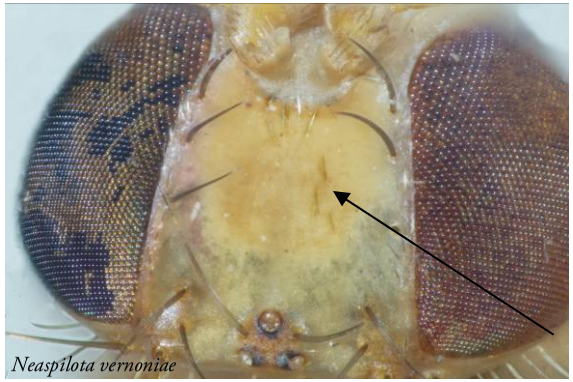


Neaspilota footei

1 Frontofacial angle distinctly projecting in profile, making head appear squarish; frontal vitta bare

Neaspilota footei **Friedberg & Mathis**

Neaspilota vernoniae



Neaspilota vernoniae

1' In profile, frontofacial angle rounded, barely projecting anterior to eye, making head appear somewhat oval; frontal vitta with at least 2-4 minute setulae medially

2

Key to the *Neaspilota* species of Ontario

Neaspilota vernoniae

Neaspilota reticulata

2 Wing with dark markings in addition to pterostigma shading

3

Neaspilota alba

Neaspilota albidipennis

2’ Wing entirely clear or with only the pterostigma darkened

4

doi:10.3752/cjai.2011.15

Key to the *Neaspilota* species of Ontario

Neaspilota reticulata

Neaspilota vernoniae

3 Wing mostly dark with clear spots; pterostigma dark except for basal posterior corner; host *Coreopsis tripteris*

Neaspilota reticulata **Norrbom & Foote**

3' Wing mostly clear but with dark banding in apical third; pterostigma mostly clear with small basal dark area; host *Vernonia* spp.

Neaspilota vernoniae **(Loew)**

doi:10.3752/cjai.2011.15

Key to the *Neaspilota* species of Ontario

Neaspilota albidipennis

Neaspilota albidipennis

4 Abdominal setulae mostly brown, fine; body predominantly black; pterostigma uniformly dark, usually brown

Neaspilota albidipennis **(Loew)**

Neaspilota alba

Neaspilota alba

4' Abdominal setulae mostly whitish, coarse; body predominantly yellow; pterostigma clear to yellowish

Neaspilota alba **(Loew)**

doi:10.3752/cjai.2011.15

Neaspilota alba (Loew)

Discussion: *Neaspilota alba* has not yet been recorded from Ontario, but it likely occurs in the southwestern part of the province.

Hosts: Foote et al. (1993) list *Vernonia baldwinii* ssp. *baldwinii* Torr., *V. baldwinii* ssp. *interior* (Small) Faust (= *V. interior*), *and V.* sp. as hosts for *Neaspilota alba*.

Flight Period: Mid-May to early August

Barcode Available: No

Neaspilota albidipennis (Loew)

Discussion: *Neaspilota albidipennis* was recently recorded from Ontario by Paiero et al. (2010).

Hosts: Friedberg & Mathis (1986) list *Vernonia baldwinii* ssp. *baldwinii* Torr., *V. baldwinii* ssp. *interior* (Small) Faust (= *V. interior*), *V. novaeboracensis* (L.) and *V.* sp. as hosts for *Neaspilota albidipennis*.

Flight Period: Late July to early August

Barcode Available: Yes (GenBank EU484515, EU484514, EU484513, EU484512)

Neaspilota footei Friedberg & Mathis

Discussion: *Neaspilota footei* is one of the most commonly collected *Neaspilota* species in southwestern Ontario.

Hosts: Friedberg & Mathis (1986) and Goeden (2001) reported *Aster occidentalis* (Nuttall) Torr. & Gray, *Conyza canadensis* (L.) Cronquist and *Chrysothamnus* sp. as hosts.

Flight Period: Mid-May to mid-August

Barcode Available: No

Neaspilota reticulata Norrbom & Foote

Discussion: Unique among Ontario *Neaspilota* for its mostly dark wings and for its association with hosts in the tribe Heliantheae (Asteraceae), *Neaspilota reticulata* was first reported from Ontario by Paiero et al. (2010) based on specimens from the Windsor region.

Host: Norrbom & Foote (2000) and Sutton et al. (2003) reported that *Neaspilota reticulata* was reared from *Coreopsis tripteris* L. and *C. major* Walt. The larvae feed in the flowerheads.

Flight Period: August

Barcode Available: No

Neaspilota vernoniae (Loew)

Discussion: First recorded from Ontario by Paiero et al. (2010), *Neaspilota vernonia* has patterned wings that make it relatively easy to identify. Other *Neaspilota* species either lack dark markings outside of the pterostigma, or have extensively dark wings as in *N. reticulata*.

Hosts: Foote et al. (1993) list the hosts of *Neaspilota vernoniae* as *Vernonia baldwinii* Torr. ssp. *interior* (Small) Faust and *V.* sp.

Flight Period: July to August

Barcode Available: No

doi:10.3752/cjai.2011.15

Genus *Neotephritis* Hendel

Recognition : The only species of *Neotephritis* likely to occur in Ontario is a small fly with black bristles and grey to yellowish-gray body tomentum. There are three pairs of frontal bristles, two pairs of orbital bristles, two pairs of scutellar bristles, and the single pair of dorsocentral bristles is situated just behind the transverse suture. Neotephritis is easy to distinguish from similar Ontario genera with reticulate wings, by the lack of an apical or subapical hyaline spot in cell r4+5.

1 species is likely to occur in Ontario:
Neotephritis finalis

Neotephritis finalis

Continue to *Neotephritis finalis* page

doi:10.3752/cjai.2011.15

Neotephritis finalis (Loew)

Discussion: Although not yet collected from Ontario, *Neotephritis finalis* has been collected in Michigan (not mapped here, Foote et al. 1993) and central Manitoba, and its range is likely to extend to Ontario.

Hosts: Reported hosts include 25 species of Asteraceae, including 9 species of *Helianthus* (Goeden et al. 1987).

Flight Period: Mid-June to mid-September

Barcode Available: No

doi:10.3752/cjai.2011.15

Genus *Paramyiolia* Shiraki

Recognition : The single Ontario species is a moderately sized fly with heavily marked wings, dark brown body, and greatly enlarged frontal bristles in the male. The face is receding and lacks a projecting oral margin, while the gena lacks elongated setae other than the genal bristle. All of the postocular bristles are brown to black, there are three pairs of frontal bristles, and two pairs of orbital bristles with the posterior pair reclinate. The thorax has one pair of dorsocentral bristles situated at or behind a transverse line through the postsutural supra-alar bristles, sometimes closer to the acrostichal bristles than to the supra-alars, and there are two pairs of scutellar bristles on a flat, usually yellowish scutellum. Wing vein r-m is close to vein dm-cu, distinctly distal to the middle of cell dm, and cell cup is drawn out to an elongated point. The aculeus tip is flattened in the sagittal plane, differing from other Tephritidae known from Ontario except *Chetostoma*.

1 species occurs in Ontario:
Paramyiolia nigricornis

Paramyiolia nigricornis

Continue to *Paramyiolia nigricornis* page

doi:10.3752/cjai.2011.15

Paramyiolia nigricornis (Doane)

Discussion: The males of this species are easily recognized by the brown body and greatly enlarged frontal bristles.

Host: Unknown

Flight Period: Mid-June to mid-July

Barcode Available: No

doi:10.3752/cjai.2011.15

Genus *Parastenopa* Hendel

Recognition : The single Ontario species of *Parastenopa* is a moderately sized fly with heavily marked wings, and a dark brown body. The face is receding and lacks a projecting oral margin, while the gena lacks elongated setae other than the genal bristle. All postocular bristles are brown to black, there are three pairs of frontal bristles, and there are two pairs of orbital bristles with the posterior pair reclinate. The thorax has one pair of dorsocentral bristles situated at or behind a transverse line through the postsutural supra-alar bristles, sometimes closer to the acrostichal bristles than to the postsutural supra-alar bristles, and there are two pairs of scutellar bristles on a flat, usually yellowish scutellum. Wing vein r-m is close to vein dm-cu, distinctly distal to the middle of cell dm, and cell cup is drawn out to an elongated point.

1 species occurs in Ontario:
Parastenopa limata

Parastenopa limata

Continue to *Parastenopa limata* page

doi:10.3752/cjai.2011.15

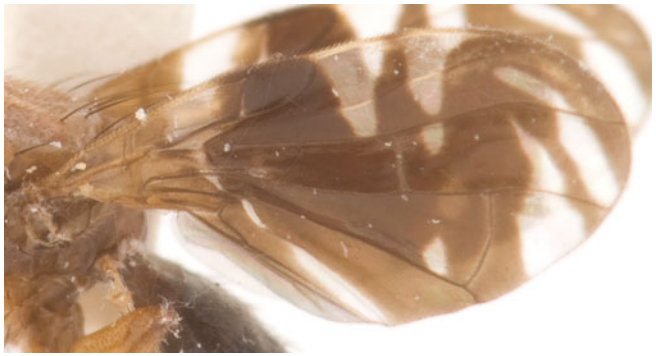
Parastenopa limata (Coquillett)

Discussion: This is the first time that *Parastenopa limata* has been recorded from Ontario or Canada.

Hosts: The only reported hosts are species of *Ilex*, including *I. ambigua* (Michx.) Torr. (= *caroliniana*), *I. cassine* L. (= *I. decidua*), *I. glabra* (L.) Gray, *I. lucida, I. opaca* Ait., and *I. vomitoria* Sol. (Wasbauer 1972). The larvae feed in the fruit.

Flight Period: Late July to mid-August

Barcode Available: No



doi:10.3752/cjai.2011.15

Genus *Procecidochares* Hendel

Recognition : Species of *Procecidochares* are small to medium-sized flies with a yellowish head, black thorax, dark brown to black abdomen, and in the Ontario species black femora. The wing is clear with four prominent, brown transverse bands, the basal one usually very short. There are two to five frontal bristles, some of them not strictly paired, and in the Ontario species only one pair of orbital bristles or a cluster of 2-4 setae (P. gibba). The scutellum is shining black, prominently swollen, and rounded dorsally. The scutum has one or two pairs of dorsocentral bristles and two paired, shining black, areas laterally before and behind the transverse suture. The thorax and abdomen have numerous contrasting, flattened, white or yellowish setae in various patterns. One species, *Procecidochares gibba*, has a supernumerary vein that extends between the costa and vein R2+3 (a unique feature among Ontario Tephritidae). Goeden & Norrbom (2001) provided the most recent key to the U.S. and Canadian species.

2 species occur or are likely to occur in Ontario:
Procecidochares atra
Procecidochares gibba

Procecidochares atra

Continue to *Procecidochares* species key

doi:10.3752/cjai.2011.15

Key to the *Procecidochares* species of Ontario


Procecidochares gibba


Procecidochares gibba


Procecidochares gibba


Procecidochares gibba


Procecidochares atra


Procecidochares atra


Procecidochares atra


Procecidochares atra

1 Supernumerary crossvein present between costa and vein R2+3 beyond pterostigma; anepisternum with small nonmicrotrichose shiny area anterodorsally; scutum with row of postsutural intra-alar setulae; anterior notopleural and postsutural supra-alar setae usually absent; scutellum with white setulae near basal seta; frons with cluster of 2-4 orbital setae

Procecidochares gibba **(Loew)**

1' No supernumerary crossvein; anepisternum with large nonmicrotrichose shiny area anterodorsally and anteroventrally; scutum without row of postsutural intra-alar setulae; anterior notopleural and postsutural supra-alar setae present; scutellum without white setulae near basal seta; frons with 1 orbital seta

Procecidochares atra **(Loew)**

doi:10.3752/cjai.2011.15

Procecidochares gibba

Procecidochares gibba

Procecidochares gibba

Procecidochares gibba

doi:10.3752/cjai.2011.15


Procecidochares atra


Procecidochares atra


Procecidochares atra


Procecidochares atra

Procecidochares atra (Loew)

Discussion: This species is the most commonly collected species of *Procecidochares* in Ontario. Some specimens possess two pairs of dorsocentral bristles, one in front of and one behind the transverse suture.

Hosts: *Solidago canadensis* var. *scabra* Torr. & Gray (= *S. altissima*), *S. erecta* Pursh, *S. nemoralis* Ait., *S. odora* Ait., and *S.* sp. are recorded as hosts (Wasbauer 1972, Sutton et al. 2003); Wasbauer also cites a record of *Aster* sp. as a host, but this record is questioned by both he and Foote et al. (1993). The larvae feed in leafy stem and apical galls.

Flight Period: Mid-June to mid-September

Barcode Available: Yes (GenBank EU484522, EU484521, EU484520)

Procecidochares gibba (Loew)

Discussion: Not yet recorded from Ontario but a likely resident, *Procecidochares gibba* is easy to distinguish from *Procecidochares atra* by the presence of the supernumerary vein extending between the costa and vein R2+3, a unique trait amoung Ontario tephritids. In this species, the white setulae on the facial ridge and parafacial are more lanceolate than in most other *Procecidochares* species.

Host: Wasbauer (1972) lists *Ambrosia artemisiifolia* L., *A. psilostachya* DC., *A.trifida* L., and *A.* sp. as hosts for *Procecidochares gibba*.

Flight Period: Mid-May to mid-June

Barcode Available: No

Genus *Procecidocharoides* Foote

Recognition : This is a small fly with three pairs of frontal bristles and two pairs of orbital bristles with the posterior pair convergent. There are two pairs of scutellar bristles and two pairs of dorsocentral bristles, one anterior and one posterior to the transverse suture. The scutellum is slightly swollen, and usually shining or subshining. Wing crossvein r-m is situated well distad of the centre of cell dm, and is covered by the same band that covers crossvein dm-cu. The wing pattern includes at least four prominent bands as follows: a small sub-basal band covering crossvein h, a discal band traversing the pterostigma and crossvein bm-cu, an apical band on the anterior apical margin of the wing, and a subapical band extending diagonally from the vicinity of the pterostigma to the apex of vein CuA1 including crossveins r-m and dm-cu. In addition, a slight clouded mark is always present in cell cua1 between the discal and subapical bands, although it is often faint and diffuse in the Ontario species. This genus is distinguished from the similar *Procecidochares* by the presence of well-developed posterior orbital bristles and the mark between the discal and subapical bands.

1 species occurs in Ontario:
Procecidocharoides penelope

Procecidocharoides penelope

Continue to *Procecidocharoides penelope* species page

doi:10.3752/cjai.2011.15

Procecidocharoides penelope (Osten Sacken)

Discussion: This species is the only *Procecidocharoides* species found in Ontario. As mentioned, *Procecidocharoides penelope* is similar to *Procecidochares atra*, from which it differs in having paler and narrower wing markings and an additional triangular pale brownish marking in the middle of wing cell cu1.

Host: Foote et al. (1993) report that *Ageratina altissima* (L.) R. M. King & H. Rob. (= *Eupatorium rugosum*) is the only known host for *Procecidocharoides penelope*. The larvae feed in the flowerheads.

Flight Period: Mid-July to mid-August

Barcode Available: No

Genus *Rhagoletis* Loew

Recognition : Flies of the genus *Rhagoletis* have a black or yellowish brown thorax and abdomen, yellow legs, and prominently banded wings. One of the most distinctive features is the apically pointed first flagellomere, a character *Rhagoletis* shares with only a few genera in Ontario: *Acidogona, Euarestoides, Jamesomyia, Xanthomyia,* and *Zonosemata. Rhagoletis* may be distinguished from *Acidogona* and *Euarestoides* by its unicolourous (rather than mixed black and white) bristles and setulae, and from the latter three genera by the position of the dorsocentral bristles anterior to the midpoint between the acrostichal and postsutural supra-alar bristles. Vein r-m in *Rhagoletis* is situated near the midpoint of cell dm, the scutellum has two pairs of scutellar bristles, and there are three pairs of frontal bristles and two pairs of orbital bristles with the posterior pair reclinate. The scutellum is never swollen and the black-bodied species always have a prominent white or yellow spot.

This is the largest tephritid genus in Ontario, with 13 species:

Rhagoletis basiola
Rhagoletis chionanthi
Rhagoletis cingulata
Rhagoletis cornivora
Rhagoletis fausta
Rhagoletis juniperina
Rhagoletis meigenii
Rhagoletis mendax
Rhagoletis pomonella
Rhagoletis striatella
Rhagoletis suavis
Rhagoletis tabellaria
Rhagoletis zephyria

Rhagoletis pomonella

Continue to *Rhagoletis* species key

doi:10.3752/cjai.2011.15

Key to the *Rhagoletis* species of Ontario

Rhagoletis basiola

Rhagoletis pomonella

1 Background colour of body yellow

2

1’ Background colour of body black or dark brown

4

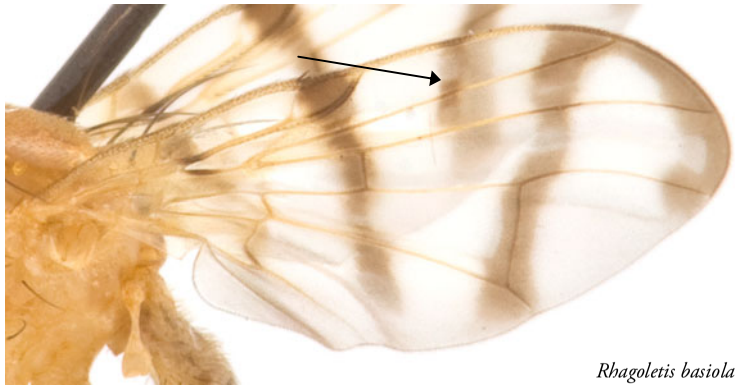
doi:10.3752/cjai.2011.15

Key to the *Rhagoletis* species of Ontario

Rhagoletis suavis

2 Wing pattern without an intercalary band; host *Juglans* spp.

Rhagoletis suavis **(Loew)**



Rhagoletis basiola

Rhagoletis meigenii

2 Wing pattern with small intercalary band between discal and subapical crossbands; host *Rosa* spp. or *Berberis vulgaris* fruits

3

Key to the *Rhagoletis* species of Ontario

Rhagoletis basiola

3 Subapical wing band joined to apical wing band along anterior margin; host hips of *Rosa* spp.

Rhagoletis basiola **(Osten Sacken)**

Rhagoletis meigenii

3’ Subapical wing band separate from apical wing band; host fruits of *Berberis vulgaris*

Rhagoletis meigenii **(Loew)**

doi:10.3752/cjai.2011.15

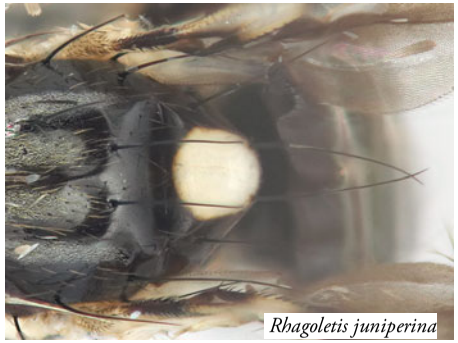
Key to the *Rhagoletis* species of Ontario


Rhagoletis fausta


Rhagoletis fausta

4 Scutellum entirely yellow; discal band and subapical band joined in cell dm, subapical band with large hyaline spot; host *Prunus* spp.

Rhagoletis fausta **(Osten Sacken)**


Rhagoletis juniperina


Rhagoletis striatella


Rhagoletis pomonella

4' Scutellum black basally and laterally, with V-shaped, ovoid or trapezoidal yellow or white medial area; dark area of wing without isolated clear spot; hosts various

5

doi:10.3752/cjai.2011.15

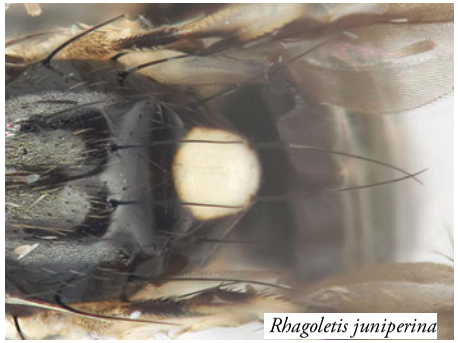
Key to the *Rhagoletis* species of Ontario

Rhagoletis striatella

Rhagoletis striatella

5 Scutellum with yellow or white medial area V-shaped; wing with two bands in basal half and an apical F pattern; host *Physalis* spp.

Rhagoletis striatella **Wulp**



Rhagoletis juniperina

Rhagoletis pomonella

Rhagoletis tabellaria

5' Scutellum with yellow or white medial area ovoid or trapezoidal; if wing with an F, only 1 band basally

6

doi:10.3752/cjai.2011.15

Key to the *Rhagoletis* species of Ontario

Rhagoletis cingulata

Rhagoletis chionanthis

6 Apical band of wing forked or with separated spot

7

Rhagoletis pomonella

Rhagoletis tabellaria

6’ Apical band of wing continuous and not forked

8

doi:10.3752/cjai.2011.15

Key to the *Rhagoletis* species of Ontario

Rhagoletis cingulata

7 Apex of anterior arm of apical band often forming an isolated spot; host *Prunus* spp. including *P. serotina*

Rhagoletis cingulata **(Loew)**

Rhagoletis chionanthis

7' Apex of anterior arm of apical band always connected; host *Chionanthus* spp.

Rhagoletis chionanthi **Bush**

doi:10.3752/cjai.2011.15

Key to the *Rhagoletis* species of Ontario

Rhagoletis juniperina

8 Subbasal crossband and discal crossband separated; host *Juniperus* spp.

Rhagoletis juniperina **Marcovitch**

Rhagoletis pomonella

Rhagoletis taballeria

8' Subbasal crossband and discal crossband connected posteriorly; host various other plants

9

doi:10.3752/cjai.2011.15

Key to the *Rhagoletis* species of Ontario

Rhagoletis taballeria

Rhagoletis pomonella

9 Wing with subapical band but lacking posterior apical band

Rhagoletis tabellaria **(Fitch)**

9' Subapical band absent, posterior apical bands present and joined to discal band and anterior apical band to form an F-shaped pattern

10

doi:10.3752/cjai.2011.15

Key to the *Rhagoletis* species of Ontario

Rhagoletis zephyria

Rhagoletis pomonella

10 Wing with posterior apical band usually at least half as wide as discal band; host *Symphoricarpos* spp.

Rhagoletis zephyria **Snow**

10' Posterior apical band usually less than half as wide as discal band; host never *Symphoricarpos* spp. in the wild

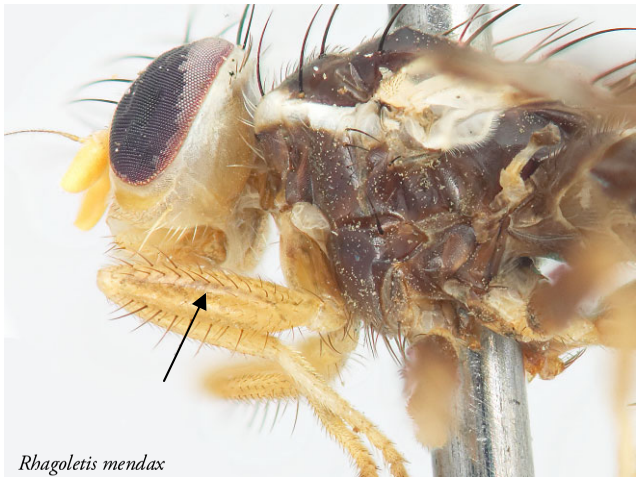
11

doi:10.3752/cjai.2011.15

Key to the *Rhagoletis* species of Ontario

Rhagoletis pomonella

Rhagoletis pomonella



Rhagoletis mendax

11 Posterior surface of fore femur often with heavy dark brown to black shading; host Rosaceae

Rhagoletis pomonella **(Walsh)**

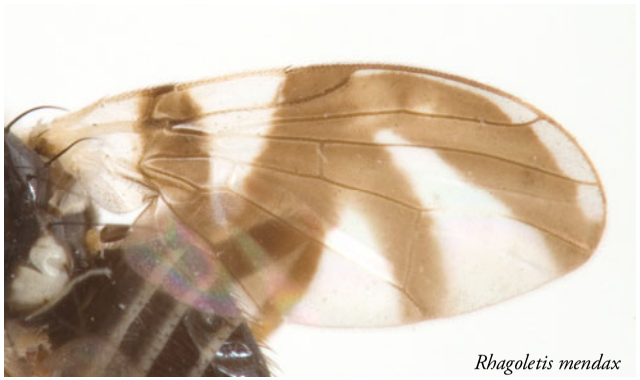
11' Posterior surface of fore femur entirely yellow; host plants other than Rosaceae

12

doi:10.3752/cjai.2011.15

Key to the *Rhagoletis* species of Ontario

Rhagoletis mendax



Rhagoletis mendax

12 Infesting fruits of Ericaceae; aculeus 0.75-0.85 mm long

Rhagoletis mendax **Curran**

Rhagoletis cornovora

Rhagoletis cornovora

12' Infesting fruits of *Cornus* spp.; aculeus more than 0.9 mm long

Rhagoletis cornivora **Bush**

doi:10.3752/cjai.2011.15

Rhagoletis basiola (Osten Sacken)

Discussion: Also known as the Rose Hip Maggot, *Rhagoletis basiola* is one of four yellow bodied *Rhagoletis* species in Ontario. It can be differentiated from the other yellow bodied *Rhagoletis* by its wing pattern as indicated in the key.

Host: Wasbauer (1972) lists 21 host plants, all within the genus *Rosa*: *Rosa acicularis* Lindl., *R. acicularis* var. *bourgeauiana*, *R. arkansana* Porter, *R. blanda* Ait., *R. canina* L., *R. carolina* L., *R. carolina* var. *villosa* (Best) Rehd., *R. eglanteria* L., *R. gallica* L., *R. marginata*, *R. nitida* Willd., *R. nutkana* K. Presl, *R. nutkana* var. *hispida* Fern. (= *R. spaldingii*), *R. palustris* Marsh., *R. rugosa* Thunb., *R. setigera* Michx., *R. virginiana* P. Mill., *R. woodsii* Lindl., *R. woodsii* var. *ultramontane* (S. Wats.) Jepson, *R. woodsii* var. *woodsii* Lindl. (= *R. macounii*), and *R.* sp. The larvae feed in the fruit.

Flight Period: Late June to early August

Barcode Available: Yes (GenBank EU484524, EU484523)

Rhagoletis chionanthi Bush

Discussion: Previously recorded from southwestern North Carolina and Florida, this is a new Canadian and Ontario record for this species. *Rhagoletis chionanthi* is distinguished from the similar species *Rhagoletis cingulata* by an anterior arm of the apical wing band connected to the subapical band, and by host plant. It appears to be much less common than *R. cingulata*.

Host: The only known host plant is *Chionanthus virginicus* L. (Wasbauer, 1972). The larvae feed in the fruit.

Flight Period: Early July to mid-August

Barcode Available: No

Rhagoletis cingulata (Loew)

Discussion: Also known as the Cherry Fruit Fly, the Cherry Maggot, Eastern Cherry Fruit Fly, the Whitebanded Cherry Fruit Fly, or the Trypete des Cerises, *Rhagoletis cingulata* is a pest of black cherry crops (*Prunus serotina*) in Ontario. As discussed for *Rhagoletis chionanthi*, the key should separate *R. cingulata* from other *Rhagoletis* species dependably. The isolated anterior arm of the apical band provides a solid character to easily disinguish this species from all other *Rhagoletis* in Ontario.

Host: As well as *Prunus serotina* Ehrh., Wasbauer (1972) lists the following other *Prunus* species as hosts: *P. avium* (L.) L., *P. cerasus* L., *P. mahaleb* L., *P. pensylvanica* L. f., *P. virginiana* L., and *P.* sp., although *P. pensylvanica*, *P. serotina*, and *P. virginiana* are native hosts. The larvae feed in the fruit.

Flight Period: Late June to early August

Barcode Available: Yes (GenBank EU484528, EU484527, EU484526, EU484525)

Rhagoletis cornivora Bush

Discussion: *Rhagoletis cornivora* is in the *pomonella* species complex, and is hard to distinguish from the other cryptic species in that group without host plant data. The *R. pomonella* complex is the only group of tephritids in Ontario where examination of genitalic morphology is often necessary for routine species identification in the absence of host data.

Host: Wasbauer (1972) lists *Cornus amomum* Mill., *C. canadensis* L., *C. obliqua* Raf., and *C. stolonifera* Michx. as known host plants. The larvae feed in the fruit.

Flight Period: Mid- to late July

Barcode Available: No

doi:10.3752/cjai.2011.15

Rhagoletis fausta (Osten Sacken)

Discussion: Easily recognized by its entirely cream-coloured scutellum, *Rhagoletis fausta* is also known as the Black Cherry Fruit Fly, the Black-bodied Cherry Fruit Fly, and the trypete noire des cerises.

Hosts: Foote et al. (1993) report that *Prunus pensylvanica* L. f. (the pin or fire cherry) is the preferred host for this species in eastern North America, and Wasbauer (1972) lists *Prunus avium* (L.) L., *P. cerasus* L., *P. emarginata* (Douglas ex Hook.) Eaton, *P. mahaleb* L., *P. serotina* Ehrh., *P. virginiana* L., *P. virginiana* var. *demissa* (Nutt.) Torr., and *P.* sp. as other known hosts. The larvae feed in the fruit.

Flight Period: Mid-June to early July

Barcode Available: No

Rhagoletis juniperina Marcovitch

Discussion: First found in Ontario by Paiero & Marshall (2001).

Host: The only known hosts are *Juniperus* species. Wasbauer (1972) listed *Juniperus monosperma* (Engelm.) Sarg., *J. virginiana* L., and *J.* sp., but Foote et al. (1993) note that the range of this fly exceeds the range of the known hosts, implying there are other host plants used. The larvae feed in the fruit.

Flight Period: Mid-June to mid-August

Barcode Available: Yes (GenBank EU484532, EU484531, EU484530, EU484529)

Rhagoletis meigenii (Loew)

Discussion: A new Ontario record, this is an invasive species from northern, central and eastern Europe. Foote et al. (1993) first reported this species in North America from coastal New Hampshire beginning in 1986, and Norrbom et al. (1999) reported it from Maine and Nova Scotia, but we here record that *R. meigenii* has been collected in Montreal, Quebec in 1956 and 1967, and in Oakville, Ontario in 1977, suggesting a much earlier arrival from Europe.

Hosts: Foote et al. (1993) report that *Rhagoletis meigenii* breeds in fruits of *Berberis vulgaris* in Europe. Both the fly and host plant are introduced to North America. The larvae feed in the fruit.

Flight Period: Late June to late July

Barcode Available: No

Rhagoletis mendax Curran

Discussion: A member of the *pomonella* complex, *Rhagoletis mendax* (Blueberry Maggot, Blueberry Fruit Fly, or Mouche de L'airelle), can be difficult to identify without host information.

Hosts: Wasbauer (1972) lists *Gaultheria procumbens* L., *Gaylussacia baccata* (Wangenh.) K. Koch, *G. dumosa* (Andr.) Torr. & Gray, *G. frondosa* (L.) Torr. & Gray ex. Torr., *G.* sp., *Vaccinium angustifolium* Ait., *V. arboreum* Marsh., *V. corymbosum* L., *V. formosum* Andr., *V. macrocarpon* Ait., *V. myrtilloides* Michx., *V. ovatum* Pursh, *V. pallidum* Ait., *V. vitis-idaea* ssp. *minus* (Lodd.) Hultén, and *V.* spp. as hosts for *Rhagoletis mendax*. The larvae feed in the fruit.

Flight Period: Late May to early September

Barcode Available: No

doi:10.3752/cjai.2011.15

Rhagoletis pomonella (Walsh)

Discussion: *Rhagoletis pomonella*, also known as the Apple Maggot, the Apple Maggot Fly, the Apple Fruit Fly, the Apple Worm, the Railroad Worm, or the Mouche de la Pomme, is the most economically important fruit fly in Ontario, and although it is one of the most commonly collected and extensively studied *Rhagoletis* species, it can be difficult to distinguish from other members of the *pomonella* complex in the absence of host data. The dark marking on the posterior surface of the front femur is sometimes obvious and distinguishes this species from similar *Rhagoletis*, but in other specimens the mark is obscure and easily overlooked.

Hosts: Wasbauer (1972) lists the following as hosts for *R. pomonella*: *Amelanchier bartramiana* (Tausch) M. Roemer, *A. stolonifera* Wieg. *(= A. spicata)*, *A.* spp., *Cotoneaster* Medik. sp., *Crataegus X anomala* Sarg. (pro sp.), *C. macrosperma* Ashe, *C. malloides*, *C. mollis* Scheele, *C. pedicellata* Sarg., *C. pentagyna*, *C. pruinosa* (Wendl. f.) K. Koch, *C. punctata* Jacq., *C. scabrida* Sarg.,*C. succulenta* Schrad. ex Link (= *C. macracantha*), *Malus baccata* (L.) Borkh., *M. domestica* Borkh. (= *M. pumila, sylvestris*), *Photinia pyrifolia* (Lam.) Robertson & Phipps (= *Aronia arbutifolia*), *P. melanocarpo* (Michx.) Robertson & Phipps (= *Aronia melanocarpo*), *Prunus angustifolia* Marsh., *P. armeniaca* L., *P. cerasus* L., *P. domestica* L., *P. persica* (L.) Batsch., *P. umbellata* Ell., *P.* spp., *Pyracantha* M. Roemer sp., *Pyrus communis* L., *Sorbus americana* Marsh., and *Symphoricarpos albus* var. *albus* (L.) Blake (= *S. racemosus*) (forced laboratory host). The larvae feed in the fruit.

Flight Record: Late June to late August

Barcode Available: Yes
(GenBank EU484534, EU484533)

Rhagoletis striatella Wulp

Discussion: *Rhagoletis striatella* can be easily distinguished from the other *Rhagoletis* species in Ontario by the V-shaped cream mark on the scutellum.

Hosts: Three specis of *Physalis* (Solanaceae) have been reported as host plants (Smith & Bush 1999). The larvae feed in the fruit.

Flight Period: Late June to mid-August

Barcode Available: Yes (GenBank EU484535)

Rhagoletis suavis (Loew)

Discussion: This is the first record of *Rhagoletis suavis* in both Canada and Ontario. Also known as the Northern Walnut Husk Fly or the Walnut Husk Maggot, *Rhagoletis suavis* has a very distinctive wing pattern compared to the wing patterns of the rest of the *Rhagoletis* from Ontario. Because of this, plus its yellow colour, *R. suavis* is easily distinguished from congeners.

Hosts: Wasbauer (1972) lists several *Juglans* species (*J. ailanthifolia* Carr., *J. cinerea* L., *J. nigra* L., *J. regia* L., and *J.* sp.) and *Prunus persica* (L.) Batsch as hosts for *Rhagoletis suavis*. The larvae feed in the husk of the walnut fruit.

Flight Period: Mid-June to late September

Barcode Available: Yes (GenBank EU484536)

Rhagoletis tabellaria (Fitch)

Hosts: Wasbauer (1972) lists *Cornus amomum* P. Mill., *C. sericea* ssp. *sericea* L., *C.* sp., *Vaccinium macrocarpon* Ait., and *V.* sp. as hosts for *Rhagoletis tabellaria*. According to Bush (1966) the eastern populations of *R. tabellaria* attack only *Cornus* spp., while the western populations prefer *Vaccinium* spp. as hosts. The larvae feed in the fruit.

Flight Period: Early June to late August

Barcode Available: Yes (GenBank EU484540, EU484539, EU484538, EU484537)

Rhagoletis zephyria Snow

Discussion: *Rhagoletis zephyria* (the Snowberry Maggot) was first recorded from Ontario in 2007 by Gavrilovic et al. It can be difficult to distinguish from other members of the *pomonella* complex *(*especially *Rhagoletis pomonella*, *R. cornivora,* and *R. mendax)* without host plant information.

Hosts: *Rhagoletis zephyria* is limited to *Symphoricarpos albus* var. *laevigatus* (Fern.) Blake in western Canada, and *S. albus* variety *albus* (L.) Blake in Ontario and Eastern Canada (Gavrilovic et al., 2007), but has also been recorded from *S. occidentalis* Hooker (Gavrilovic et al., 2007), *S. racemosus* Michx., *S. rivularis* Suksdorf, and *S.* sp. (Wasbauer, 1972). The larvae feed in the fruit.

Flight Period: Mid-July to mid-August.

Barcode Available: No

doi:10.3752/cjai.2011.15

Genus *Rhagoletotrypeta* Aczél

Recognition : The single Ontario species resembles many species of *Rhagoletis* in having a predominantly black thorax and abdomen with whitish markings and a clear wing with dark to black transverse bands. The genus *Rhagoletotrypeta* can be distinguished from the genus *Rhagoletis* by the apically rounded first flagellomere (pointed in *Rhagoletis*), the scutum with a prominent median white stripe that widens posteriorly, and the oviscape that is almost bulbous basally but narrows abruptly apically.

1 species occurs in Ontario:
Rhagoletotrypeta rohweri

Rhagoletotrypeta rohweri

Continue to *Rhagoletotrypeta rohweri* species page

doi:10.3752/cjai.2011.15

Rhagoletotrypeta rohweri Foote

Discussion: This is the first record of *Rhagoletotrypeta rohweri* from Canada and Ontario. The last known records of this species are prior to 1962 (Foote et al., 1993).

Hosts: Larvae presumed to be this species were found in a *Celtis* sp., which is presumed to be the host for *Rhagoletotrypeta rohweri*, although no adults have actually been reared (Foote et al. 1993). *Celtis* spp. are the only known hosts for other species of this genus.

Flight Period: Early June to early August

Barcode Available: Yes (GenBank EU484542, EU484541)

Genus *Stenopa* Loew

Recognition : A moderately large, brown to black fly with many stout white and black setae, yellow legs, and prominently banded wings. There are three pairs of frontal bristles, two pairs of orbital bristles, and two pairs of black bristles on a subshining, black, inflated scutellum. The single pair of dorsocentral bristles arise well anterior to the midpoint between the acrostichal and postsutural supra-alar bristles. The very broad, dark wing bands of *Stenopa* resemble some species of *Rhagoletis* but *Stenopa* has an apically rounded first flagellomere, stout white postocular bristles and scutal setae, and dark cells bc and c.

1 species found in Ontario:
Stenopa vulnerata

Stenopa vulnerata

Continue to *Stenopa vulnerata* page

doi:10.3752/cjai.2011.15

Stenopa vulnerata (Loew)

Discussion: *Stenopa vulnerata* is newly recorded from Ontario. These flies have distinctive heavily banded wings, and should be easily distinguished from other Ontario species.

Host: *Senecio aureus* L. is the only known host (Wasbauer, 1972). The larvae feed in stem galls.

Flight Period: Mid-July to mid-August

Barcode Available: Yes
(GenBank EU484544, EU484543)

Genus *Strauzia* Robineau-Desvoidy

Recognition : *Strauzia* species are relatively large yellowish flies superficially similar to *Euleia* species, from which they are readily distinguished by characters given in the key to genera. *Strauzia* is characterized by the presence of an elongated cell cup, a flat scutellum, the absence of orbital bristles, the absence of well-developed setae on the anterior oral margin, and a distinctive wing pattern. The dorsocentral bristles vary in location but are situated no more anterior than the level of the postsutural supra-alar bristles and no further posterior than a point halfway between the supra-alar and acrostichal bristles.

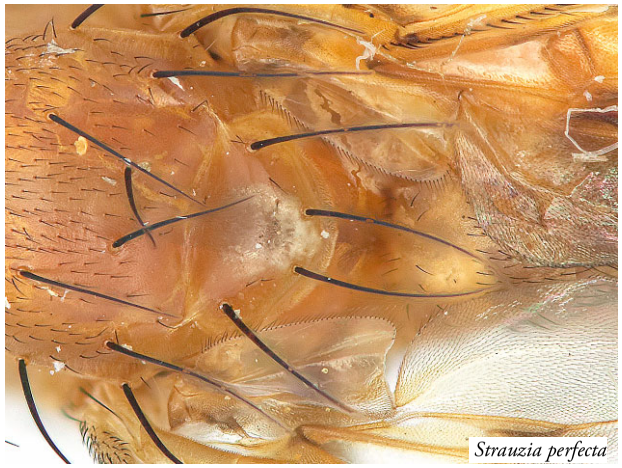
4 species are found in Ontario:
Strauzia arculata
Strauzia intermedia
Strauzia longipennis
Strauzia perfecta

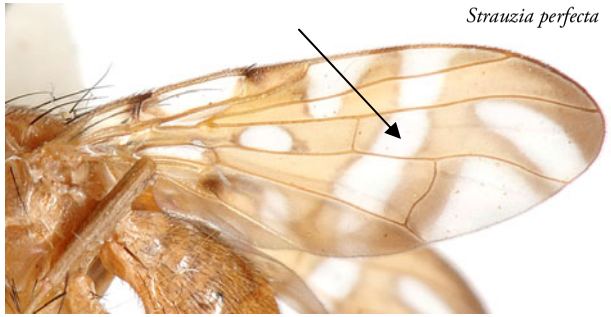
Strauzia longipennis

Continue to *Strauzia* species key

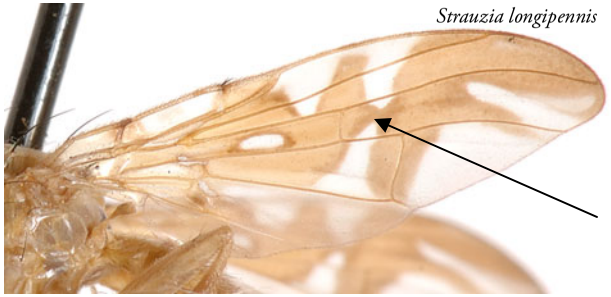
doi:10.3752/cjai.2011.15

Key to the *Strauzia* species of Ontario


Strauzia perfecta


Strauzia perfecta


Strauzia longipennis


Strauzia longipennis

1 Scutellum entirely yellow, without dark markings; clear band between veins r-m and dm-cu present and continuous from costa into cell cua1; hosts *Ambrosia* spp.

Strauzia perfecta **(Loew)**

1' Scutellum yellow with lateral corners dark brown to black; clear band between veins r-m and dm-cu, if present, usually not entering cell cua¬1; not associated with *Ambrosia* spp.

2

doi:10.3752/cjai.2011.15

Key to the *Strauzia* species of Ontario

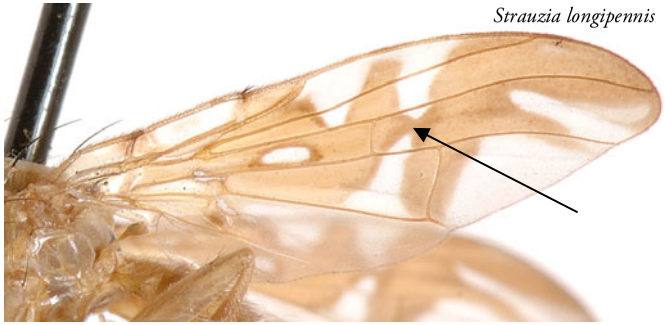
Strauzia intermedia

Strauzia intermedia

2 Fifth tarsomere largely blackish; wing with clear transverse band running along stem of 'F' mark, extending from CuA1 to anterior wing margin; host *Rudbeckia laciniata*

Strauzia intermedia **(Loew)**

Strauzia longipennis

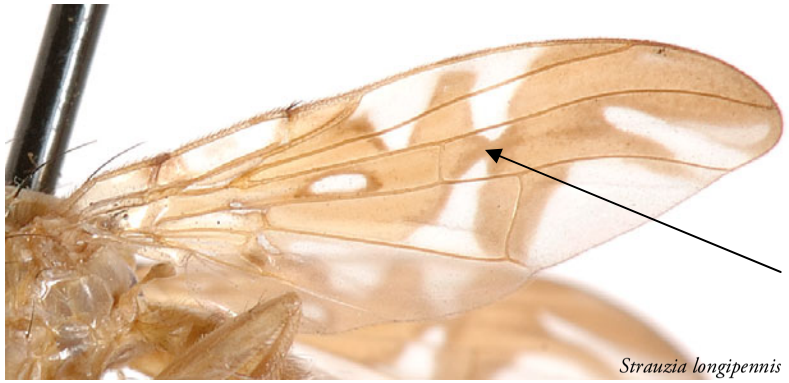


Strauzia longipennis

2' Fifth tarsomere yellowish, at most slightly darkened at apex; wing markings variable, but clear transverse band along stem of 'F' either crossing CuA1, not reaching anterior wing margin, or broken between CuA1 and wing margin; not associated with *Rudbeckia* spp.

3

Key to the *Strauzia* species of Ontario



3 Clear band between veins r-m and dm-cu (along stem of 'F') present but not extending to costa; pterostigma 3 times as long as wide at base; hosts *Helianthus grosseserratus*

Strauzia arculata **(Loew)**

3' Clear band between veins r-m and dm-cu (along stem of 'F'), if present, extending anteriorly to costa but sometimes broken in the middle; pterostigma not as elongated; hosts *Smallanthus uvedalia, Ageratina altissima*, and *Helianthus* spp.

Strauzia longipennis **(Wiedemann)**

doi:10.3752/cjai.2011.15

Strauzia arculata (Loew)

Discussion: This is the first record of *Strauzia arculata* from Canada and Ontario.

Hosts: Steyskal (1986) records *Helianthus grosseserratus* M. Martens as the only known host. As in other *Strauzia* species, the larvae are stem miners.

Flight Period: Mid June to mid-July

Barcode Available: No

doi:10.3752/cjai.2011.15

Strauzia intermedia (Loew)

Discussion: This species is recognized by the black fifth tarsomeres on each leg. Males of this species have enlarged, blunt-tipped frontal bristles.

Host: Steyskal (1986) records *Rudbeckia laciniata* L. as the only known host. The larvae are stem miners.

Flight Period: Late March to early May

Barcode Available: No

doi:10.3752/cjai.2011.15

Strauzia longipennis (Wiedemann)

Discussion: Also known as the Sunflower Maggot or the Mouche du Tournesol, *Strauzia longipennis* is the most commonly collected *Strauzia* species in Ontario. Steyskal (1986) acknowledged the presence of numerous varieties, several of which were elevated to full species status by Stoltzfus (1988). However, Foote et al. (1993) argued that the differences recognized by Stoltzfus were extreme intraspecific variation in wing patterning and ultimately supported Steyskal's classification. Recently, Axen et al. (2010) noted a high level of CO1 sequence diversity between two sympatric populations matching different varieties, but did not conclude that these populations represented distinct species. Our DNA barcode results also display an unsettling discrepancy with respect to intraspecific variation between *S. longipennis vittigera* and *S. l. longipennis*, but our sample size is too small to make any species hypotheses. Further study is certainly required with regards to this species and its varieties.

Host: Among the hosts listed by Steyskal (1986) and Wasbauer (1972), the following records pertain to *Strauzia longipennis*: *Helianthus tuberosus* L., *H. annuus* L., and possibly *H. maximiliani* Schrad. Foote et al. (1993) indicate that *Strauzia longipennis* may use other species of *Helianthus* as hosts. The larvae are stem miners.

Flight Period: Mid-June to mid-July

Barcode Available: Yes (GenBank EU484548, EU484547, EU484546, EU484545)

Strauzia perfecta (Loew)

Discussion: *Strauzia perfecta* is recognized by its completely yellow scutellum which lacks dark markings on the corners and posterior surface.

Hosts: Steyskal (1986) and Sutton et al. (2003) recorded two species of ragweeds, *Ambrosia trifida* L. and *A. artemisiifolia* L., as hosts for *Strauzia perfecta*. The larvae are stem miners.

Flight Period: Late June to mid-July

Barcode Available: Yes (GenBank EU484549)

Genus *Tephritis* Latreille

Recognition : The species of *Tephritis* may be confused with those of similar small, grayish tephritine genera such as *Dioxyna*, *Campiglossa*, *Euaresta*, *Euarestoides*, or *Trupanea*. They differ from the first two genera in having a nongeniculate proboscis and lacking the dark spots usually present on the abdomen in *Campiglossa* and *Dioxyna*. They differ from *Euaresta* in lacking the bulla in cell r4+5 often present in the latter genus and in the shape of the male epandrium (not exceptionally wide and grooved as in *Euaresta*). They differ from *Euarestoides* and *Trupanea* in having two pairs of frontal bristles, and differ further from *Trupanea* in having 2 pairs of scutellar bristles. The hind femur has one or two preapical anterodorsal setae, but lacks the preapical posterodorsal seta usually present in other tephritine genera. There are two pairs of orbital bristles (the posterior pair usually white or yellowish and reclinate) and one pair of dorsocentral bristles, situated very close to the transverse suture. The wing pattern is usually extensively reticulate but nearly always has narrow rays to the apices of veins R4+5 and M and in cell m. The pterostigma is dark without a hyaline spot and this dark area extends posteriorly into at least cells r1, r2+3 and br.

6 species occur or are likely to occur in Ontario:
Tephritis angustipennis
Tephritis araneosa
Tehpritis candidipennis
Tephritis michiganensis
Tephritis pura
Tephritis webbii

Tephritis pura

Continue to *Tephritis* species key

doi:10.3752/cjai.2011.15

Key to the *Tephritis* species of Ontario

Tephritis araneosa

1 Abdominal setae white

2

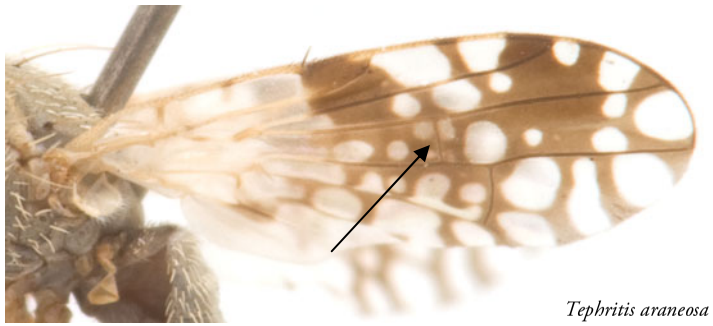
Tephritis pura

1’ Abdominal setae dark

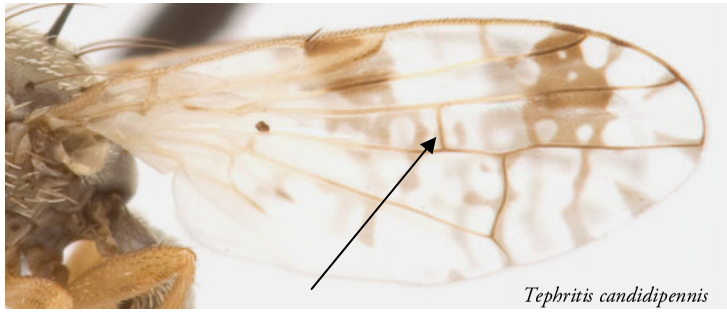
3

doi:10.3752/cjai.2011.15

Key to the *Tephritis* species of Ontario



Tephritis araneosa



Tephritis candidipennis

2 Wing predominantly dark, vein r-m covered by dark mark

***Tephritis araneosa* (Coquillet)**

2' Wing predominantly hyaline, vein r-m not covered by dark mark

***Tephritis candidipennis* Foote**

doi:10.3752/cjai.2011.15

Key to the *Tephritis* species of Ontario

Tephritis michiganensis

Tephritis pura

3 Scutellum with wide, lateral brown bands; basal scutellar setae originating within brown bands

4

3' Scutellum without or with weak brown bands; basal scutellar setae never originating within brown bands, always in gray area

5

doi:10.3752/cjai.2011.15

Key to the *Tephritis* species of Ontario

Tephritis michiganensis

Tephritis webbii

4 Wing cell bc hyaline, at most small dark spot at wing margin

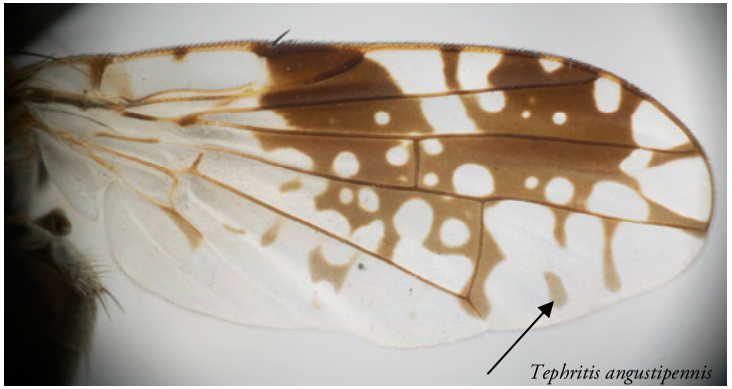
Tephritis michiganensis **Quisenberry**

4' Wing cell bc heavily shaded on basal and apical margins, large centre dark spot

Tephritis webbii **Doane**

doi:10.3752/cjai.2011.15

Key to the *Tephritis* species of Ontario



5 Dark pattern in wing cell m never attaining posterior margin of that cell

Tephritis angustipennis (Loew)

5' Dark pattern in wing cell m always extending to posterior margin of that cell

Tephritis pura **(Loew)**

doi:10.3752/cjai.2011.15

Tephritis angustipennis (Loew)

Discussion: This Holarctic species is found throughout Ontario but is infrequently collected.

Hosts: The only species known to be hosts for *Tephritis angustipennis* are *Achillea ptarmica* L. and *Symphyotrichum spathulatum* (Lindl.) Nesom var. *intermedium* (Gray) Nesom (= *Aster occidentalis* var. *intermedius*) (Wasbauer, 1972). The larvae feed in the flowerheads.

Flight Period: Late March to mid-June

Barcode Available: Yes

doi:10.3752/cjai.2011.15

Tephritis araneosa (Coquillet)

Discussion: *Tephritis araneosa* is a mostly western species that is infrequently collected in Ontario.

Hosts: Reported hosts of *Tephritis araneosa* include 5 species of *Artemisia,* 3 species of *Chrysothamnus*, 2 species of *Ericameria*, and species of *Baccharis*, *Erigeron*, and *Grindelia* (Wasbauer 1972. Goeden 1993). The larvae feed in the flowerheads.

Flight Period: Mid-June to early August

Barcode Available: Yes (GenBank EU484550)

Tephritis candidipennis Foote

Discussion: This is the first record of *Tephritis candidipennis* in Ontario.

Host: Two species of *Tanacetum, T. camphoratum* Less. and *T. huronense* Nutt., are host plants for *Tephritis candidipennis* (Wasbauer 1972). Other reported host records were probably based on misidentifications (Goeden 1993).

Flight Period: Late June

Barcode Available: No

doi:10.3752/cjai.2011.15

Tephritis michiganensis Quisenberry

Discussion: Similar to *Tephritis pura*, *Tephritis michiganensis* can be distinguished by the characters given in the key.

Hosts: The only reported host for *Tephritis michiganensis* is *Machaeranthera canescens* (Pursh) Gray (Goeden 1993). The larvae feed in the flowerheads.

Flight Period: Early July to late August

Barcode Available: No

doi:10.3752/cjai.2011.15

Tephritis pura (Loew)

Discussion: *Tephritis pura* is one of the most commonly collected fruit flies in Ontario. This species is similar in appearance to *Tephritis michiganensis* and *T. webbii*, but can be distinguished reliably with the characters given in the key.

Host: *Tephritis pura* has been reared from indistinct apical stem swellings on *Solidago gigantea* Ait., from *Solidago canadensis* L. var. *scabra* Torr. & Gray, and from flowerheads of *Vernonia noveboracensis* and/or *V. gigantea* (Sutton et al. 2003).

Flight Period: Mid-April to late October

Barcode Available: Yes (GenBank EU484555, EU484554, EU484553, EU484552, EU484551)

Tephritis webbii Doane

Discussion: *Tephritis webbii* is a rarely collected species in Ontario, but is is relatively common in the western United States. Similar in appearance to *Tephritis pura*, it can be distinguished by the degree of dark patterning surrounding vein CuA1 (as discussed in the key).

Host: The only known host of *Tephritis webbii* is a *Solidago* sp. (Wasbauer, 1972). The larvae feed in a flowerhead gall.

Flight Period: Late April to early August

Barcode Available: No

Genus *Terellia* Robineau-Desvoidy

Recognition : Medium-sized yellowish flies with the body marked with black and the wing marked with light to dark brown bands or spots. The frons is bare, but there are two or three pairs of frontal bristles and two pairs of orbital bristles, the posterior pair of which are well developed and strongly convergent. The thorax has a single pair of dorsocentral bristles situated on a transverse line between the postsutural supra-alar bristles, as well as two pairs of scutellar bristles. The genus is similar to *Neaspilota* in general habitus and in having convergent posterior orbital bristles, but *Neaspilota* species are smaller, lack the small dark brown spot at the base of acrostichal bristle, often have the wing unmarked except in the vicinity of the pterostigma, and usually have a setulose frons.

2 species are found in Ontario:
Terellia palposa
Terellia ruficauda

Terellia ruficauda

Continue to *Terellia* species key

doi:10.3752/cjai.2011.15

Key to the *Terellia* species of Ontario

Terellia ruficauda

Terellia ruficauda

1 Body mostly grey; wing with apical costal band and preapical band (covering vein dm-cu) never connected, each usually also interrupted by various clear areas in cells r1, r2+3, and r4+5

Terellia ruficauda **(Fabricius)**

Terellia palposa

Terellia palposa

1' Body mostly yellow; apical and preapical bands complete and usually united with each other in cell r1

Terellia palposa **(Loew)**

doi:10.3752/cjai.2011.15

Terellia palposa (Loew)

Discussion: *Terellia palposa* is the least common species of *Terellia* collected in Ontario, and is easily distinguished from *Terellia ruficauda* by the wing patterns described in the key.

Host: Several *Cirsium* species have been reported as host plants for *Terellia palposa*: *Cirsium horridulum* Michx., *C. texanum* Buckl., *C. undulatum* (Nutt.) Spreng., and *C. pumilum* Spreng. (Wasbauer 1972, Steck 1981). The larvae feed in the flowerheads.

Flight Period: Lat July to late August

Barcode Available: Yes (GenBank EU484517, EU484516)

Terellia ruficauda (Fabricius)

Discussion: *Terellia ruficauda* is a northern European species presumably accidentally introduced to North America along with its host, the thistle *Cirsium arvense*.

Host: Seven species of *Cirsium* have been reported as hosts of *T. ruficauda* in Europe, but *C. arvense* (L.) Scop. is the only recorded host in North America (Wasbauer, 1972). The larvae feed in the flowerheads.

Flight Period: Early June to early August

Barcode Available: Yes (GenBank EU484519, EU484518)

Genus *Tomoplagia* Coquillett

Recognition : The single Ontario species is a small fly with a yellow body marked with distinct black spots on its thorax and abdomen, yellow to light brown bristles and setae, and yellow, unmarked legs. It has three pairs of frontal bristles, two pairs of orbital bristles, two pairs of scutellar bristles (apical pair nearly as long as basal pair), and one pair of dorsocentral bristles situated closer to the transverse suture than to a transverse line through the postsutural supra-alar bristles. *Tomoplagia obliqua* is further characterized by a pair of round black spots at the lateral ends of the posterior three or four abdominal tergites, forming a lateral row of spots on each side of the abdominal tergum. The wings are distinctive among all Ontario tephritids in bearing yellow and light brown bands that lie at a roughly 45° angle to the longitudinal axis of the wing.

1 species is found in Ontario:
Tomoplagia obliqua

Tomoplagia obliqua

Continue to *Tomoplagia obliqua* page

doi:10.3752/cjai.2011.15

Tomoplagia obliqua (Say)

Discussion: First recorded from Ontario by Paiero et al. (2010), *Tomoplagia obliqua* is found in southwestern Ontario. This species wing pattern is distinctive among Ontario tephritids and this species is easy to identify by eye in the field.

Host: Wasbauer (1972) lists *Vernonia angustifolia* Michx. ssp. *scaberrima* (Nutt.) S.B. Jones & Faust, *V. baldwinii* Torr. (including ssp. *interior* (Small) Faust), *V. blodgettii* Small, *V. gigantea* (Walter) Trel. (= *V. altissima*), and *V.* sp. as well as *Aster* sp. as hosts for *Tomoplagia obliqua.* Foote et al. (1993) treat the *Aster* host record as questionable. The larvae feed in the flowerheads.

Flight Period: Late July to late August

Barcode Available: Yes (GenBank EU484557, EU484556)

Genus *Trupanea* Schrank

Recognition : *Trupanea* species are small flies with yellowish head and legs and dense grayish tomentum covering the scutum, scutellum, and abdomen. The wings of most species have a are characteristic stellate pattern, being mostly hyaline with a dark brown area in the anterior distal quarter of the disk and narrow dark rays extending to the wing border from the dark patch. All Ontario species have three pairs of frontal bristles, two pairs of orbital bristles, and one pair of scutellar bristles. The dorsocentral bristles are situated very close to the transverse suture and are distantly removed from the postsutural supra-alar bristles. *Trupanea* species have a superficial resemblance to some *Tephritis* species but differ most obviously in having only one pair of scutellar bristles.

2 species are found in Ontario:
Trupanea actinobola
Trupanea dacetoptera

Trupanea actinobola

Continue to *Trupanea* species key

doi:10.3752/cjai.2011.15

Key to the *Trupanea* species of Ontario

Trupanea dacetoptera

Trupanea actinobola

1 Two dark rays extending into cell dm, the proximal ray crossing vein CuA1

Trupanea dacetoptera **Phillips**

1' One finger-like dark ray extending into cell dm but not reaching vein CuA1

Trupanea actinobola **(Loew)**

doi:10.3752/cjai.2011.15

Trupanea actinobola (Loew)

Discussion: Found across much of North America, *Trupanea actinobola* can be distinguished from the other Ontario *Trupanea* species by the presence of only one dark ray extending into cell dm.

Host: Recorded hosts include 31 species in 19 genera of Asteraceae, including 5 species of *Erigeron*, 4 species of *Gutierrezia*, and 4 species of *Solidago* (Wasbauer 1972, Goeden et al. 1998). The larvae feed in the flowerheads.

Flight Period: Mid-June to early August

Barcode Available: Yes (GenBank EU484559, EU484558)

Trupanea dacetoptera Phillips

Discussion: This is the first Ontario record of *Trupanea dacetoptera*, although it has been frequently collected in Michigan and New York.*Trupanea dacetoptera* can be distinguished from similar species by having two dark rays extending through cell dm.

Host: *Gnaphalium obtusifolium* L. and *Pityopsis graminifolia* (Michx.) Nutt. (= *Heterotheca microcephala*) are the only known hosts (Wasbauer 1972). The larvae feed in the apical part of stems.

Flight Period: June

Barcode Available: No

doi:10.3752/cjai.2011.15

Genus *Trypeta* Meigen

Recognition : The single Ontario species of *Trypeta* is a medium-sized yellowish to brown fly with no outstanding dark body markings. It can be distinguished from similar species by its dark brown to black setae and bristles, including three pairs of frontal bristles and two pairs of orbital bristles (posterior pair reclinate). There are two pairs of scutellar bristles and the dorsocentral bristles are aligned closest to the postsutural supra-alar bristles. In profile, the face lacks a distinct cavity and is usually receding, sometimes markedly so. The first flagellomere is rounded apically, and the ocellar bristles are frequently small, sometimes smaller than the postocular bristles. Like *Euleia*, the body often has quite small dark spots, especially on the scutellum, but the two genera can be differentiated based on the position of vein r-m; in *Trypeta* it is near the midlength of cell dm, while in *Euleia* it is apicad of the centre and distinctly closer to vein dm-cu.

1 species is found in Ontario:
Trypeta flaveola

Trypeta flaveola

Continue to *Trypeta flaveola* page

doi:10.3752/cjai.2011.15

Trypeta flaveola Coquillett

Discussion: Recorded from Ontario first by Paiero & Marshall (2001) and later by Han & Norrbom (2005), *Trypeta flaveola* resembles *Euleia fratria*, but the characters given in the key and in the generic diagnosis will distinguish the two genera easily.

Host: Han and Norrbom (2005) list *Senecio aureus* L. as the only known host in Eastern North America. The larvae are leaf miners.

Flight Period: Mid-July to early August

Barcode Available: Yes (GenBank EU484561, EU484560)

Genus *Urophora* Robineau-Desvoidy

Recognition : Generally dark, small to medium-sized flies, usually with a shining or tomentose black thorax and abdomen. There are two pairs of frontal bristles, one pair of orbital bristles, two pairs of scutellar bristles, and the dorsocentral bristles lie close to, or on a transverse line through, the postsutural supra-alar bristles or between the postsutural supra-alar bristles and the acrostichal bristles. *Urophora* is distinguished from all other Ontario tephritid genera by the straight or outwardly convex shape of vein CuA2, which closes cell cup transversely with no sign of an extension in the lower corner.

3 species are found in Ontario:
Urophora affinis
Urophora cardui
Urophora quadrifasciata

Urophora cardui

Continue to *Urophora* species key

doi:10.3752/cjai.2011.15

Key to the *Urophora* species of Ontario

Urophora affinis affinis

1 Wing bands weak, not connected along leading edge of wing.

Urophora affinis affinis **(Frauenfeld)**

Urophora cardui

Urophora quadrifasciata

1' Wing bands strong and connected along the leading edge of wing; wing bands forming either an M or two inverted V's.

2

doi:10.3752/cjai.2011.15

Key to the *Urophora* species of Ontario

Urophora cardui

Urophora quadrifasciata

2 Discal and subapical bands fused in cells dm and cua1 at posterior wing margin, forming an M pattern; host *Cirsium arvense*

Urophora cardui **(Linnaeus)**

2' Discal and subapical bands distinctly separated (Fig. 402); host *Centaurea* spp.

Urophora quadrifasciata quadrifasciata **(Meigen)**

doi:10.3752/cjai.2011.15

Urophora affinis affinis (Fraeunfeld)

Discussion: Although introduced to Hastings County, Ontario in 1970 to control invasive knapweeds, this species was not thought to have become established after the second season (Harris & Meyers, 1984). A recently collected specimen from Midhurst (Simcoe County) shows that this species has since spread and has indeed become established, although likely in small numbers.

Host: *Urophora affinis affinis* was introduced to control *Centaurea diffusa* Lam. and *C.* cf. *maculosa* Canada, and the larvae form galls in the seedheads..

Flight Period: Early July

Barcode Available: No

doi:10.3752/cjai.2011.15

Urophora cardui (Linnaeus)

Discussion: Introduced to several locations in North America from Europe as a biocontrol agent for Canada thistle (*Cirsium arvense*), the colony introduced near Belwood, Ontario in 1975 (Laing, 1977) has since become established and expanded its range dramatically within Ontario. It is easily identified by its M-shaped wing pattern.

Host: The only known host for *Urophora cardui* in Ontario is *Cirsium arvense* (L.) Scop. (Foote et al., 1993). The larvae feed in large stem galls.

Flight Period: Early June to mid-July

Barcode Available: Yes (GenBank EU484563, EU484562)

Urophora quadrifasciata quadrifasciata (Meigen)

Discussion: Introduced as a biocontrol agent of spotted knapweed (*Centaurea maculosa* Lam.) and diffuse knapweed (*Centaurea diffusa* Lam.) (Julien & Griffiths, 1998), *Urophora q. quadrifasciata* was recorded as occurring in Ontario by Paiero & Marshall (2001) and subsequently by Wheeler & Varady-Szabo (2002).

Hosts: *Urophora q. quadrifasciata* is known to infest seedheads of *Centaurea diffusa* and *C. cf. maculosa* in North America (Foote et al., 1993; Wheeler & Varady-Szabo, 2002). There is also evidence to suggest that *Urophora q. quadrifasciata* may be able to utilize other knapweeds such as *Centaurea nigra* L., *C.montana* L., *C. dubia* Suter, and *C. jacea* L. (Wheeler & Varady-Szabo, 2002).

Flight Period: Mid-June to mid-September

Barcode Available: Yes (GenBank EU484565, EU484564)

doi:10.3752/cjai.2011.15

Genus *Xanthaciura* Hendel

Recognition : *Xanthaciura* is one of the most easily recognized tephritid genera in Ontario. The frons is very narrow (width at the vertex less than the width of an eye) and there are three pairs of frontal bristles and two pairs of orbital bristles of which the anterior pair are comparatively long. The first flagellomere is at least two times as long as wide, its apex attaining the anterior oral margin. The single pair of dorsocentral bristles is close to the transverse suture, there are two pairs of scutellar bristles, the legs are entirely yellow and unmarked and the posterior two or three abdominal tergites are entirely brown. The wing pattern differs from most other Ontario tephritid species other than *Paramyiolia nigricornis*, from which it is easily separated using other characters.

1 species is found in Ontario:
Xanthaciura tetraspina

Xanthaciura tetraspina

Continue to *Xanthaciura tetraspina* page

doi:10.3752/cjai.2011.15

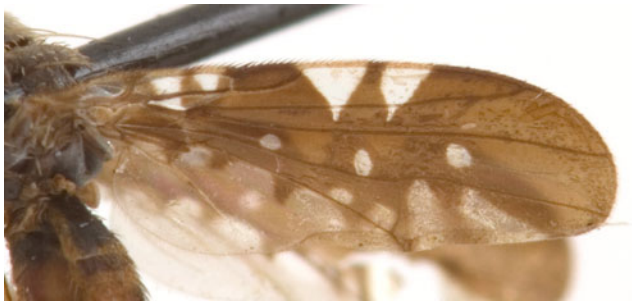
Xanthaciura tetraspina (Phillips)

Discussion: This distinctive and easily recognised species was first recorded from southwestern Ontario by Paiero et al. (2010).

Hosts: Reported host plants include *Ageratina petiolaris* (Moc. ex DC.) R.M. King & H. Rob. (= *Eupatorium petiolare*), *Ageratum houstonianum* Mill., *Conoclinium coelestinum* (L.) DC., and *Eupatoriadelphus maculatus* (L.) R. M. King & H. Rob. (Wasbauer 1972). The larvae feed in the flowerheads.

Flight Period: Late May to late June

Barcode Available: Yes (GenBank EU484566)



Genus *Xanthomyia* Phillips

Recognition : Small flies with reticulate wing patterns, a short but pointed first flagellomere, two pairs of frontal bristles, two pairs of orbital bristles with the anterior pair very strong, a very wide frons, and a dark mark on the parafacial between the face and the anterior margin of the compound eye. *Xanthomyia* resembles *Eurosta, Eutreta*, and *Jamesomyia* in many morphological characters but can be distinguished from *Eurosta* and *Eutreta* by the pattern of clear spots in the wing, and from *Jamesomyia* by the presence of only two pairs of frontal bristles.

1 species found in Ontario:
Xanthomyia platyptera

Xanthomyia platyptera

Continue to *Xanthomyia platyptera* page

doi:10.3752/cjai.2011.15

Xanthomyia platyptera (Loew)

Discussion: First recorded from Ontario by Skevington et al. (2000), and subsequently by Paiero et al. (2010), *Xanthomyia platyptera* appears to reach its most northerly range in southwestern Ontario.

Host: Host plants are unknown for *Xanthomyia platyptera* (Foote et al., 1993).

Flight Period: Late May to late August

Barcode Available: Yes (GenBank EU484568, EU484567)

Genus *Zonosemata* Benjamin

Recognition : The single Ontario species of *Zonosemata* is a predominantly yellowish fly of moderate size with cream-coloured and dark brown to black body markings and wing bands. The dorsocentral bristles are located closer to the acrostichal bristles than to the postsutural supra-alar bristles, a trait unique among Ontario tephritids. The frontal bristles are usually in four pairs, the posterior orbital bristles are reclinate, cell cu*p* is drawn out into a prominent apical point and the first flagellomere is distinctly pointed. *Rhagoletis* also have a pointed first flagellomere, but lack the medial yellow scutal stripe found in *Zonosemata* and are densely microtrichose on the scutum. Ontario *Rhagoletis* species other than *R. basiola* and *R. meigenii* also lack the intercalary wing band present in *Zonosemata*.

1 species can be found in Ontario:
Zonosemata electa

Zonosemata electa

Continue to *Zonosemata electa* page

doi:10.3752/cjai.2011.15

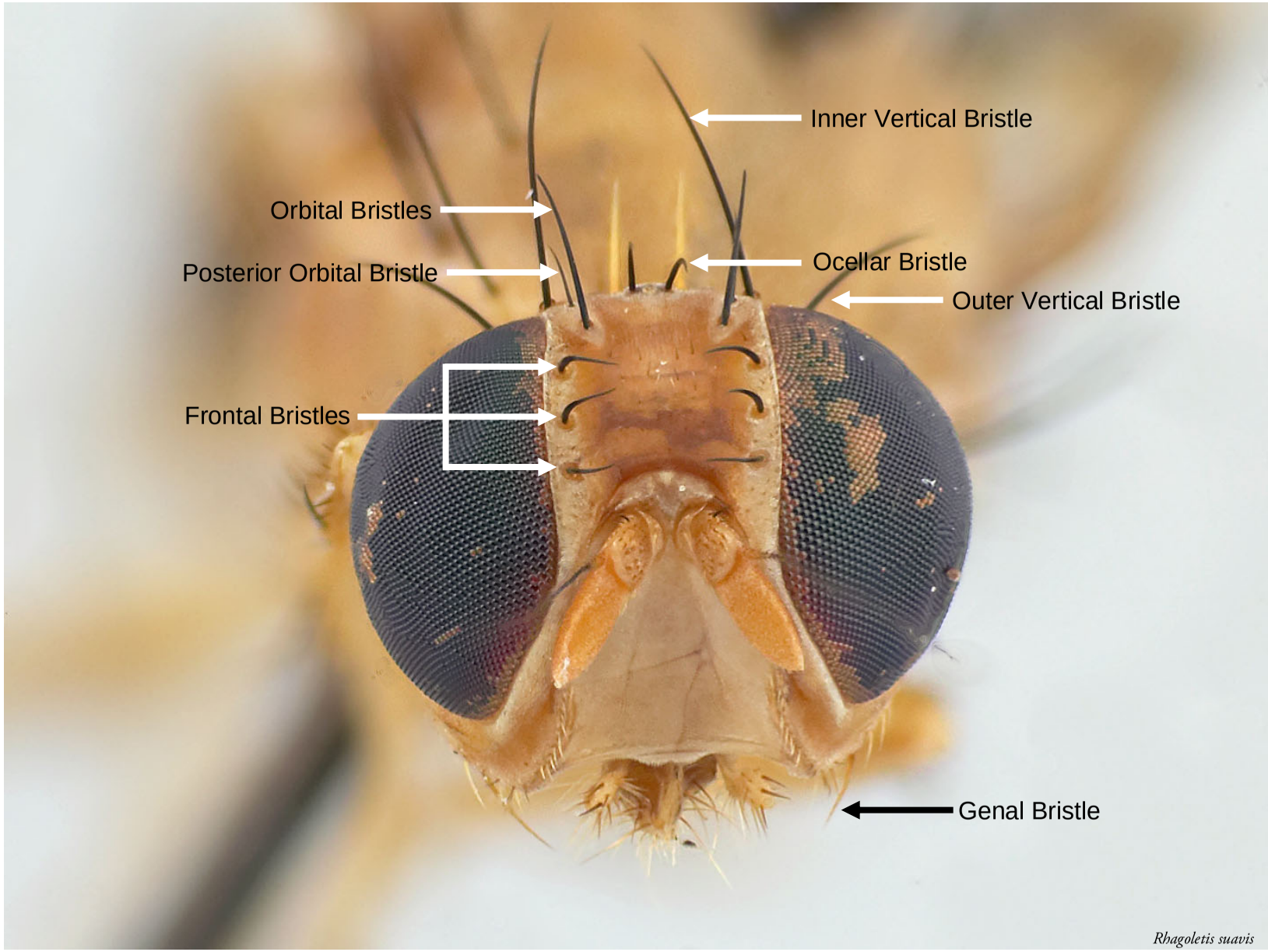
Zonosemata electa (Say)

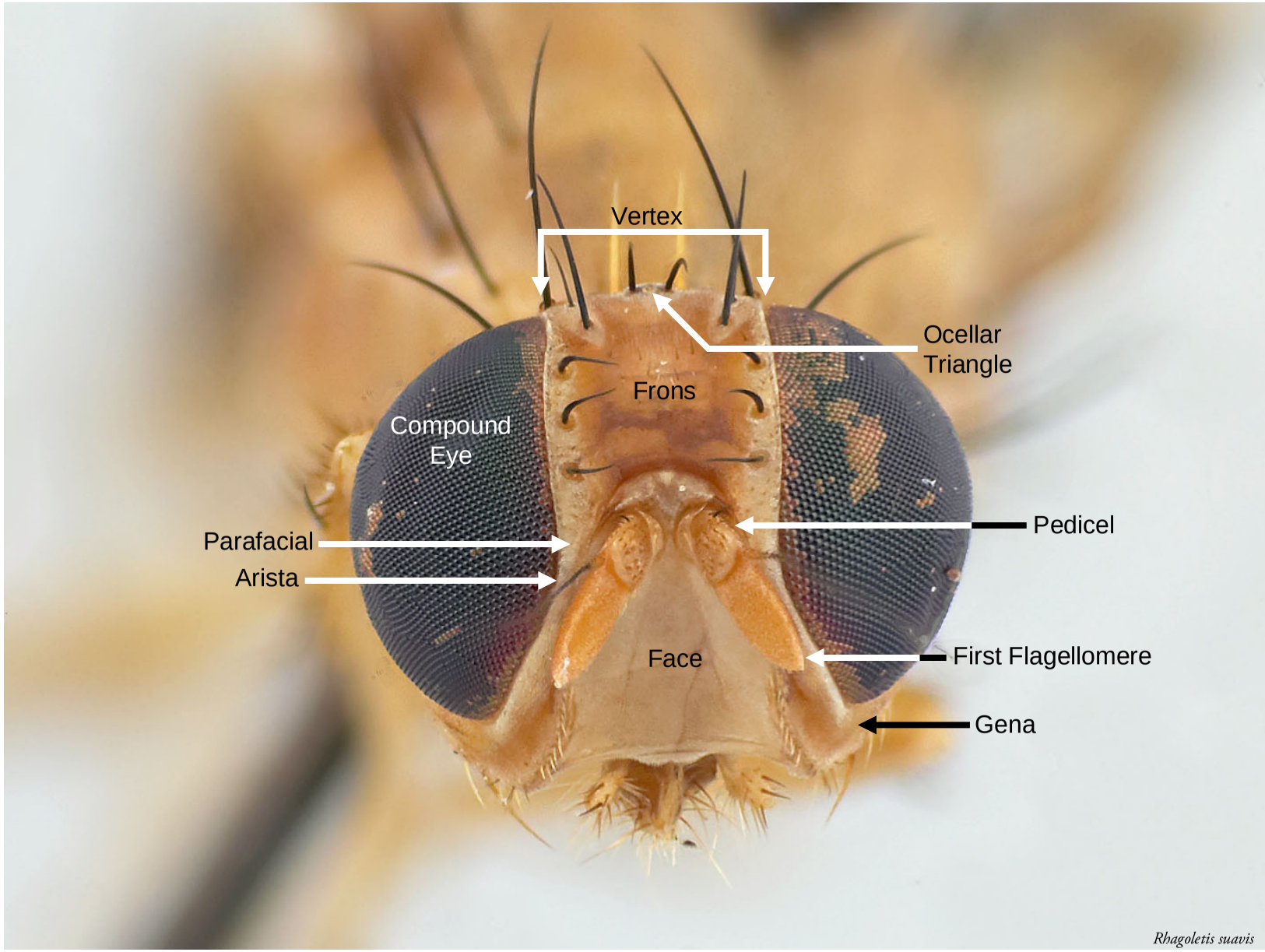
Discussion: Known as the Pepper Maggot or the Mouche du Piment, *Zonosemata electa* is an economically important pest of pepper and eggplant in southern Ontario.

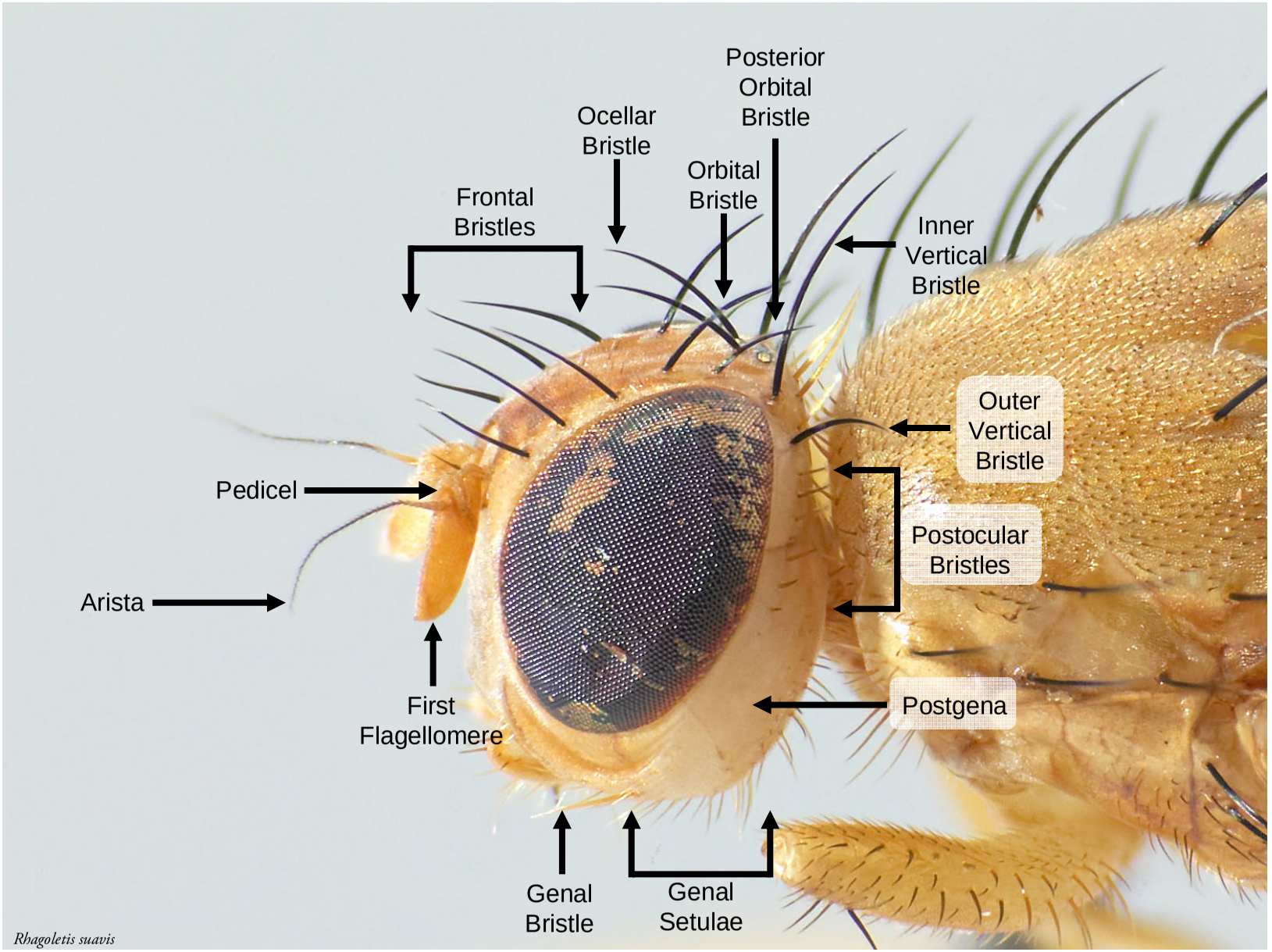
Host: Reported hosts include *Capsicum annum* L., *C. frutescens* L., *C.* sp., *Lycopersicon esculentum* Mill. (rare host), *Physalis longifolia* Nutt. var. *subglabrata* (Mack. & Bush) Cronquist (rare host), *Solanum aculeatissimum* Jacq., *S. carolinense* L., *S. melongena* L., *S. scabrum* Mill. (= *S. melanocerasum* All.), and *Solanum* sp. (Wasbauer 1972). Foote et al. (1993) treated the record of *Zonosemata electa* from *Rosa* sp. in Wasbauer as a misidentification of *Rhagoletis basiola*. The larvae feed in the fruit.

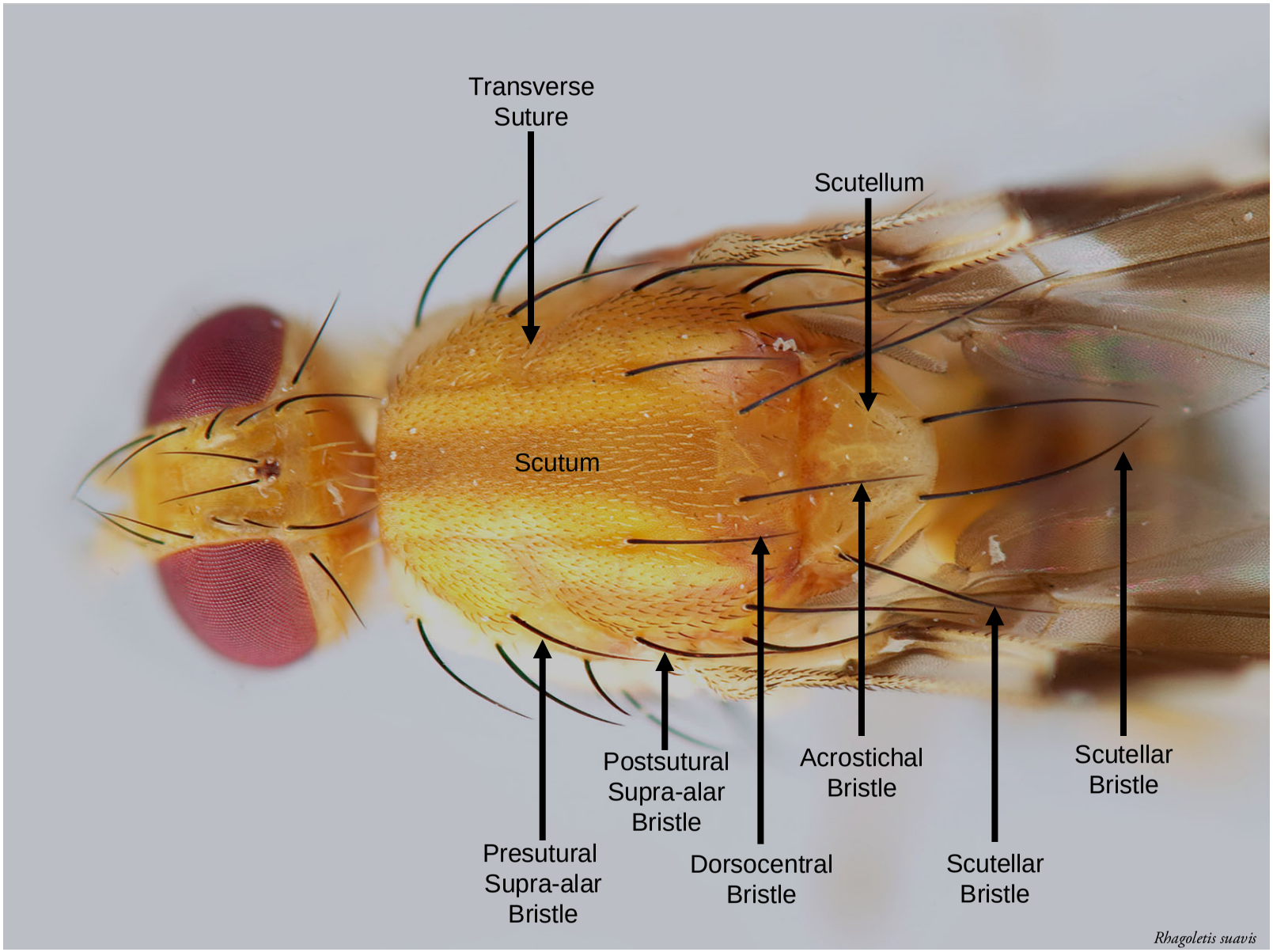
Flight Period: Early July to late August

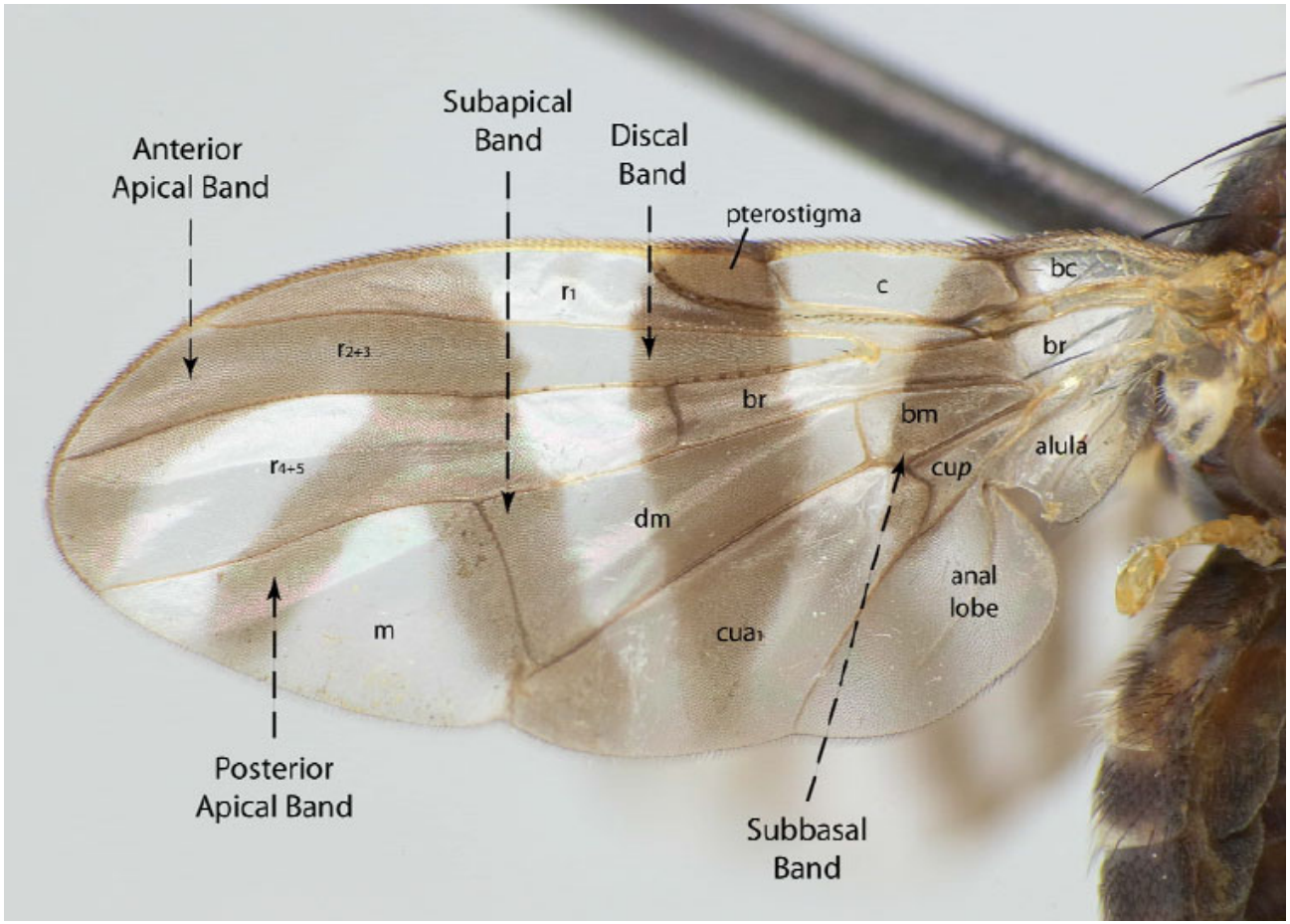
Barcode Available: No


Inner Vertical Bristle
Orbital Bristles
Posterior Orbital Bristle
Ocellar Bristle
Outer Vertical Bristle
Frontal Bristles
Genal Bristle
Rhagoletis suavis

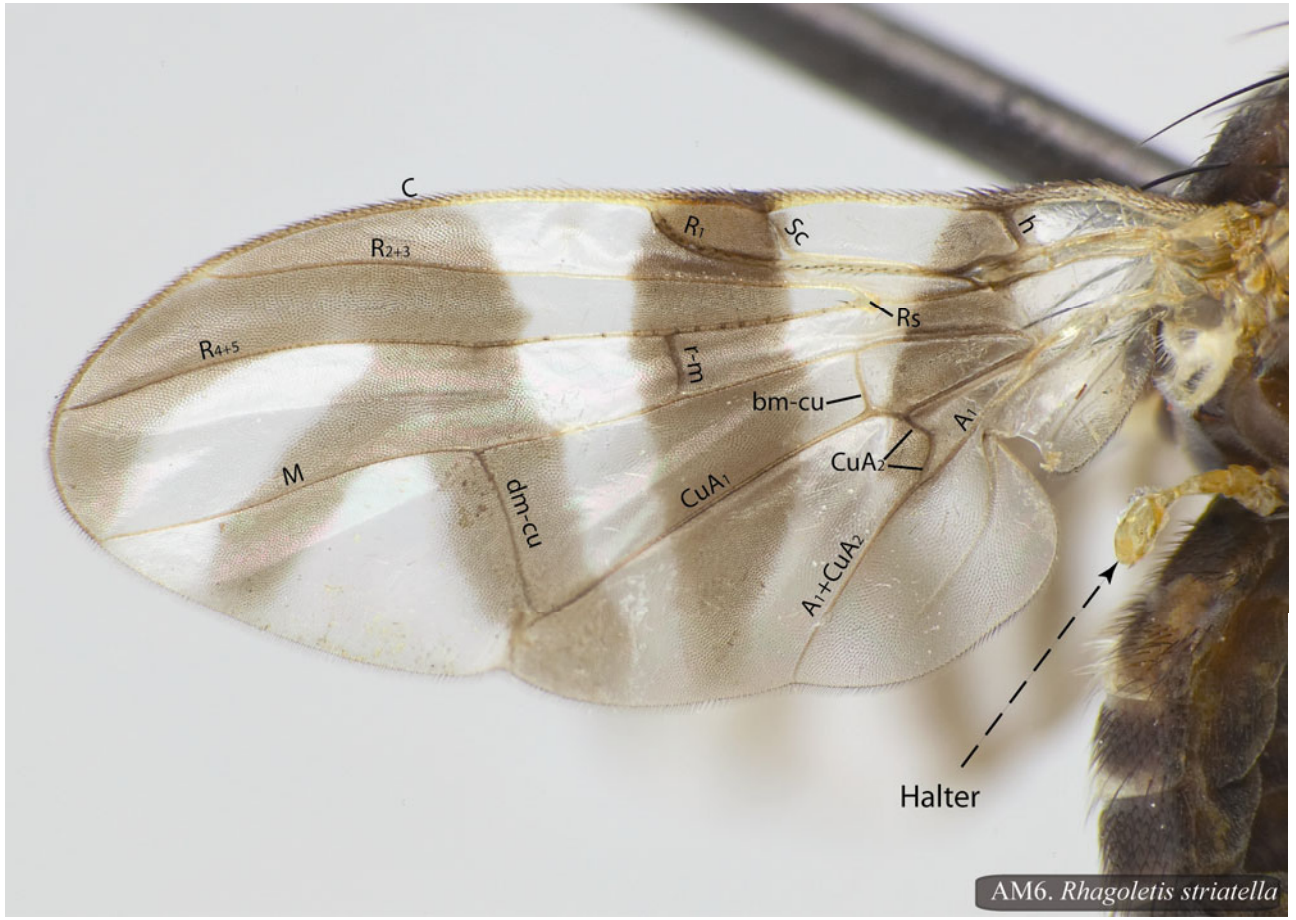

Vertex
Ocellar Triangle
Frons
Compound Eye
Pedicel
Parafacial
Arista
Face
First Flagellomere
Gena
Rhagoletis suavis


Posterior Orbital Bristle
Ocellar Bristle
Orbital Bristle
Frontal Bristles
Inner Vertical Bristle
Outer Vertical Bristle
Pedicel
Postocular Bristles
Arista
First Flagellomere
Postgena
Genal Bristle
Genal Setulae
Rhagoletis suavis


Transverse Suture
Scutellum
Scutum
Postsutural Supra-alar Bristle
Acrostichal Bristle
Scutellar Bristle
Presutural Supra-alar Bristle
Dorsocentral Bristle
Scutellar Bristle
Rhagoletis suavis



allula – axillary lobe
anal lobe – anal lobe
bc – basal costal cell
bm – basal medial cell
bm-cu – basal medial-cubital crossvein
br – basal radial cell
c – costal cell
cua1 – anterior cubital cell
cu*p* – posterior cubital cell
dm – discal medial cell
m – medial cell
pterostigma – expanded end of subcostal cell
r1 – anterior radial cell
r2+3 – second plus third radial cell
r4+5 – fourth plus fifth radial cell



AM6. *Rhagoletis striatella*

A1 – 1st anal vein
A1 + CuA2 – 2nd branch of anterior cubital vein and 1st anal vein
bm-cu – basal medial-cubital crossvein
C – costa
CuA1 – 1st branch of anterior cubital vein
CuA2 – 2nd branch of anterior cubital vein
dm-cu – discal medial-cubital crossvein
h – humeral crossvein
M – medial vein
r-m – radial-medial crossvein
Rs – sectoral branch of radial vein
R1 – first branch of Radius
R2+3 – second plus third branches of Radius
R4+5 – forth plus fifth branches of Radius
Sc – subcostal vein

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Glossary

bulla: a dark, blister-like bubbling of the wing membrane.

coxa: basal leg segment

flagellum: the third and largest part of the antenna, divided into a large first flagellomere and a hair-like arista (made up of barely distinguishable separate flagellomeres)

femur: third leg segment (the first of the two long parts of the leg); located between the trochanter and the tibia.

geniculate: elbowed.

labellum: the terminal part of the proboscis (derived from the lower lip, or labium).

oviscape: tube-like tip of the female abdomen; used to sheath the ovipositor.

pleuron: the lateral part of the thorax.

proboscis: the visible mouthparts projecting below the head.

reticulate: net-like pattern.

scutum, **scutellum**: The visible top of the thorax (the mesonotum) is divided into a main part (scutum) and a small, shelf-like hind part (scutellum).

seta: bristle.

setae: multiple bristles.

setulae: small setae.

subquadrate: almost square in shape.

tarsus: the distal (last) leg segment, subdivided into 5 tarsomeres.

tergites: dorsal plates of the abdominal segments.

tibia: fourth leg segment, located between the femur and the tarsomeres.

tomentum: dense coat of short hairs.

trochanter: second leg segment, located between the coxa basally and the femur distally.

vertex: the dorsal-most region of the head containing the ocellar triangle.

Appendix I

BOLD Database (Ratnasingham & Hebert, 2007) identifiers for specimens sequenced for DNA Barcoding.

Species Identification	Sample ID	Museum ID	Process ID	Specimen Voucher Deposit Location	GenBank Accession No.
Campiglossa albiceps	TEPH059	debu00226256	TEPH059-07	University of Guelph Insect Collection	EU484468
Campiglossa albiceps	TEPH060	debu00170257	TEPH060-07	University of Guelph Insect Collection	EU484467
Campiglossa albiceps	TEPH061	debu01008992	TEPH061-07	University of Guelph Insect Collection	
Campiglossa albiceps	TEPH062	debu01008993	TEPH062-07	University of Guelph Insect Collection	
Campiglossa albiceps	TEPH063	debu01008994	TEPH063-07	University of Guelph Insect Collection	
Campiglossa albiceps	TEPH064	debu00226214	TEPH064-07	University of Guelph Insect Collection	EU484466
Campiglossa farinata	TEPH119	debu01009032	TEPH119-07	University of Guelph Insect Collection	
Campiglossa genalis	TEPH118	debu01009031	TEPH118-07	University of Guelph Insect Collection	
Campiglossa sabroskyi	TEPH117	debu01009030	TEPH117-07	University of Guelph Insect Collection	EU484469
Dioxyna picciola	TEPH022	debu01110638	TEPH022-07	University of Guelph Insect Collection	
Dioxyna picciola	TEPH023	debu01109501	TEPH023-07	University of Guelph Insect Collection	
Dioxyna picciola	TEPH024	debu00255088	TEPH024-07	University of Guelph Insect Collection	
Dioxyna picciola	TEPH093	debu00219509	TEPH093-07	University of Guelph Insect Collection	EU484474
Dioxyna picciola	TEPH094	debu01115971	TEPH094-07	University of Guelph Insect Collection	
Dioxyna picciola	TEPH095	debu01009011	TEPH095-07	University of Guelph Insect Collection	
Dioxyna picciola	TEPH189	debu00286588	TEPH189-07	University of Guelph Insect Collection	EU484473
Dioxyna picciola	TEPH190	debu00286589	TEPH190-07	University of Guelph Insect Collection	EU484472
Dioxyna picciola	TEPH191	debu00286590	TEPH191-07	University of Guelph Insect Collection	EU484471
Dioxyna picciola	TEPH192	debu00286591	TEPH192-07	University of Guelph Insect Collection	EU484470
Euaresta aequalis	TEPH008	debu00198267	TEPH008-07	University of Guelph Insect Collection	EU484478
Euaresta aequalis	TEPH009	debu00198563	TEPH009-07	University of Guelph Insect Collection	EU484477
Euaresta aequalis	TEPH010	debu01008965	TEPH010-07	University of Guelph Insect Collection	EU484476
Euaresta aequalis	TEPH096	debu01009012	TEPH096-07	University of Guelph Insect Collection	
Euaresta aequalis	TEPH097	debu01009013	TEPH097-07	University of Guelph Insect Collection	
Euaresta aequalis	TEPH196	debu01009078	TEPH196-07	University of Guelph Insect Collection	EU484475
Euaresta bella	TEPH001	debu01008961	TEPH001-07	University of Guelph Insect Collection	EU484487
Euaresta bella	TEPH002	debu00137199	TEPH002-07	University of Guelph Insect Collection	EU484486
Euaresta bella	TEPH003	debu01008962	TEPH003-07	University of Guelph Insect Collection	EU484485
Euaresta bella	TEPH004	debu01008963	TEPH004-07	University of Guelph Insect Collection	EU484484
Euaresta bella	TEPH005	debu01113013	TEPH005-07	University of Guelph Insect Collection	
Euaresta bella	TEPH006	debu00274179	TEPH006-07	University of Guelph Insect Collection	EU484483

Species Identification	Sample ID	Museum ID	Process ID	Specimen Voucher Deposit Location	GenBank Accession No.
Euaresta bella	TEPH007	debu01008964	TEPH007-07	University of Guelph Insect Collection	EU484482
Euaresta bella	TEPH161	debu01009058	TEPH161-07	University of Guelph Insect Collection	EU484481
Euaresta bella	TEPH162	debu01009059	TEPH162-07	University of Guelph Insect Collection	EU484480
Euaresta bella	TEPH163	debu01009060	TEPH163-07	University of Guelph Insect Collection	EU484479
Euaresta festiva	TEPH011	debu01008966	TEPH011-07	University of Guelph Insect Collection	
Euaresta festiva	TEPH012	debu01008967	TEPH012-07	University of Guelph Insect Collection	EU484489
Euaresta festiva	TEPH013	debu01008968	TEPH013-07	University of Guelph Insect Collection	
Euaresta festiva	TEPH098	debu01009014	TEPH098-07	University of Guelph Insect Collection	EU484488
Euaresta festiva	TEPH195	debu01009077	TEPH195-07	University of Guelph Insect Collection	
Euleia fratria	TEPH101	debu00071205	TEPH101-07	University of Guelph Insect Collection	EU484491
Euleia fratria	TEPH102	debu01009017	TEPH102-07	University of Guelph Insect Collection	EU484490
Euphranta canadensis	TEPH014	debu01008969	TEPH014-07	University of Guelph Insect Collection	EU484493
Euphranta canadensis	TEPH015	debu00084816	TEPH015-07	University of Guelph Insect Collection	EU484492
Euphranta canadensis	TEPH099	debu01009015	TEPH099-07	University of Guelph Insect Collection	
Euphranta canadensis	TEPH100	debu01009016	TEPH100-07	University of Guelph Insect Collection	
Eurosta comma	TEPH025	debu01008972	TEPH025-07	University of Guelph Insect Collection	EU484496
Eurosta comma	TEPH026	debu00137244	TEPH026-07	University of Guelph Insect Collection	
Eurosta comma	TEPH027	debu00137243	TEPH027-07	University of Guelph Insect Collection	EU484495
Eurosta comma	TEPH028	debu01113923	TEPH028-07	University of Guelph Insect Collection	EU484494
Eurosta comma	TEPH029	debu01008973	TEPH029-07	University of Guelph Insect Collection	
Eurosta solidaginis	TEPH030	debu01008974	TEPH030-07	University of Guelph Insect Collection	EU484503
Eurosta solidaginis	TEPH031	debu01008975	TEPH031-07	University of Guelph Insect Collection	EU484502
Eurosta solidaginis	TEPH032	debu01008976	TEPH032-07	University of Guelph Insect Collection	
Eurosta solidaginis	TEPH033	debu01113266	TEPH033-07	University of Guelph Insect Collection	
Eurosta solidaginis	TEPH103	debu01009018	TEPH103-07	University of Guelph Insect Collection	EU484501
Eurosta solidaginis	TEPH104	debu01009019	TEPH104-07	University of Guelph Insect Collection	EU484500
Eurosta solidaginis	TEPH105	debu01009020	TEPH105-07	University of Guelph Insect Collection	EU484499
Eurosta solidaginis	TEPH106	debu01009021	TEPH106-07	University of Guelph Insect Collection	EU484498
Eurosta solidaginis	TEPH107	debu01009022	TEPH107-07	University of Guelph Insect Collection	EU484497
Eurosta solidaginis	TEPH108	debu01009023	TEPH108-07	University of Guelph Insect Collection	
Eutreta frontalis	TEPH034	debu01008977	TEPH034-07	University of Guelph Insect Collection	
Eutreta frontalis	TEPH109	debu01009024	TEPH109-07	University of Guelph Insect Collection	
Eutreta frontalis	TEPH110	debu01009025	TEPH110-07	University of Guelph Insect Collection	EU484504
Eutreta novaeboracensis	TEPH035	debu01008978	TEPH035-07	University of Guelph Insect Collection	
Eutreta novaeboracensis	TEPH036	debu01008979	TEPH036-07	University of Guelph Insect Collection	

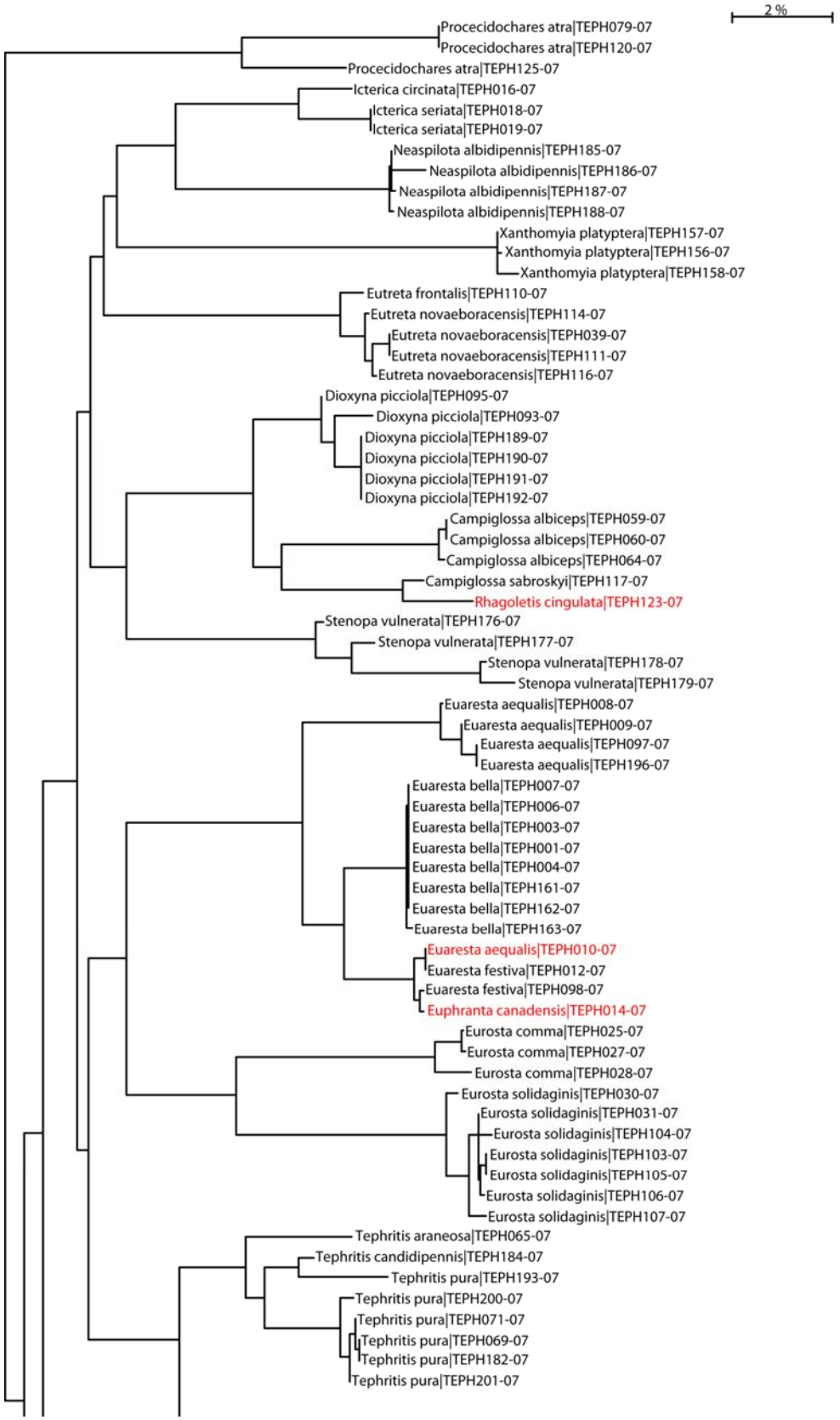
Species Identification	Sample ID	Museum ID	Process ID	Specimen Voucher Deposit Location	GenBank Accession No.
Eutreta novaeboracensis	TEPH037	debu01008980	TEPH037-07	University of Guelph Insect Collection	
Eutreta novaeboracensis	TEPH038	debu01123054	TEPH038-07	University of Guelph Insect Collection	
Eutreta novaeboracensis	TEPH039	debu01108921	TEPH039-07	University of Guelph Insect Collection	EU484508
Eutreta novaeboracensis	TEPH040	debu01008981	TEPH040-07	University of Guelph Insect Collection	
Eutreta novaeboracensis	TEPH041	debu01008982	TEPH041-07	University of Guelph Insect Collection	
Eutreta novaeboracensis	TEPH042	debu00241303	TEPH042-07	University of Guelph Insect Collection	
Eutreta novaeboracensis	TEPH111	debu01112094	TEPH111-07	University of Guelph Insect Collection	EU484507
Eutreta novaeboracensis	TEPH112	debu01103764	TEPH112-07	University of Guelph Insect Collection	
Eutreta novaeboracensis	TEPH113	debu01009026	TEPH113-07	University of Guelph Insect Collection	
Eutreta novaeboracensis	TEPH114	debu01009027	TEPH114-07	University of Guelph Insect Collection	EU484506
Eutreta novaeboracensis	TEPH115	debu01009028	TEPH115-07	University of Guelph Insect Collection	
Eutreta novaeboracensis	TEPH116	debu01009029	TEPH116-07	University of Guelph Insect Collection	EU484505
Eutreta novaeboracensis	TEPH199	debu01009081	TEPH199-07	University of Guelph Insect Collection	
Icterica circinata	TEPH016	debu01124485	TEPH016-07	University of Guelph Insect Collection	EU484509
Icterica seriata	TEPH017	debu01008970	TEPH017-07	University of Guelph Insect Collection	
Icterica seriata	TEPH018	debu00254779	TEPH018-07	University of Guelph Insect Collection	EU484511
Icterica seriata	TEPH019	debu00240980	TEPH019-07	University of Guelph Insect Collection	EU484510
Jamesomyia geminata	TEPH020	debu00084817	TEPH020-07	University of Guelph Insect Collection	
Jamesomyia geminata	TEPH021	debu01008971	TEPH021-07	University of Guelph Insect Collection	
Neaspilota albidipennis	TEPH185	debu00286568	TEPH185-07	University of Guelph Insect Collection	EU484515
Neaspilota albidipennis	TEPH186	debu00286569	TEPH186-07	University of Guelph Insect Collection	EU484514
Neaspilota albidipennis	TEPH187	debu00286570	TEPH187-07	University of Guelph Insect Collection	EU484513
Neaspilota albidipennis	TEPH188	debu00286571	TEPH188-07	University of Guelph Insect Collection	EU484512
Procecidochares atra	TEPH078	debu01138272	TEPH078-07	University of Guelph Insect Collection	
Procecidochares atra	TEPH079	debu01138266	TEPH079-07	University of Guelph Insect Collection	EU484522
Procecidochares atra	TEPH120	debu01141520	TEPH120-07	University of Guelph Insect Collection	EU484521
Procecidochares atra	TEPH125	debu00216490	TEPH125-07	University of Guelph Insect Collection	EU484520
Rhagoletis basiola	TEPH121	debu01009033	TEPH121-07	University of Guelph Insect Collection	EU484524
Rhagoletis basiola	TEPH133	debu00173517	TEPH133-07	University of Guelph Insect Collection	EU484523
Rhagoletis basiola	TEPH134	debu00118861	TEPH134-07	University of Guelph Insect Collection	
Rhagoletis basiola	TEPH135	debu01009042	TEPH135-07	University of Guelph Insect Collection	
Rhagoletis cingulata	TEPH085	debu01009004	TEPH085-07	University of Guelph Insect Collection	
Rhagoletis cingulata	TEPH086	debu01138319	TEPH086-07	University of Guelph Insect Collection	EU484528
Rhagoletis cingulata	TEPH087	debu01009005	TEPH087-07	University of Guelph Insect Collection	
Rhagoletis cingulata	TEPH088	debu01009006	TEPH088-07	University of Guelph Insect Collection	

Species Identification	Sample ID	Museum ID	Process ID	Specimen Voucher Deposit Location	GenBank Accession No.
Rhagoletis cingulata	TEPH089	debu01009007	TEPH089-07	University of Guelph Insect Collection	EU484527
Rhagoletis cingulata	TEPH122	debu01009034	TEPH122-07	University of Guelph Insect Collection	EU484526
Rhagoletis cingulata	TEPH123	debu01009035	TEPH123-07	University of Guelph Insect Collection	
Rhagoletis cingulata	TEPH124	debu01009036	TEPH124-07	University of Guelph Insect Collection	EU484525
Rhagoletis cornivora	TEPH080	debu01008999	TEPH080-07	University of Guelph Insect Collection	
Rhagoletis cornivora	TEPH081	debu01009000	TEPH081-07	University of Guelph Insect Collection	
Rhagoletis cornivora	TEPH082	debu01009001	TEPH082-07	University of Guelph Insect Collection	
Rhagoletis cornivora	TEPH083	debu01009002	TEPH083-07	University of Guelph Insect Collection	
Rhagoletis cornivora	TEPH084	debu01009003	TEPH084-07	University of Guelph Insect Collection	
Rhagoletis fausta	TEPH090	debu01009008	TEPH090-07	University of Guelph Insect Collection	
Rhagoletis fausta	TEPH091	debu01009009	TEPH091-07	University of Guelph Insect Collection	
Rhagoletis fausta	TEPH092	debu01009010	TEPH092-07	University of Guelph Insect Collection	
Rhagoletis fausta	TEPH131	debu01009040	TEPH131-07	University of Guelph Insect Collection	
Rhagoletis fausta	TEPH132	debu01009041	TEPH132-07	University of Guelph Insect Collection	
Rhagoletis juniperina	TEPH136	debu00237659	TEPH136-07	University of Guelph Insect Collection	EU484532
Rhagoletis juniperina	TEPH137	debu00235895	TEPH137-07	University of Guelph Insect Collection	EU484531
Rhagoletis juniperina	TEPH138	debu00237582	TEPH138-07	University of Guelph Insect Collection	EU484530
Rhagoletis juniperina	TEPH140	debu00237654	TEPH140-07	University of Guelph Insect Collection	EU484529
Rhagoletis pomonella	TEPH126	debu01009037	TEPH126-07	University of Guelph Insect Collection	EU484534
Rhagoletis pomonella	TEPH141	debu01009043	TEPH141-07	University of Guelph Insect Collection	
Rhagoletis pomonella	TEPH142	debu01009044	TEPH142-07	University of Guelph Insect Collection	
Rhagoletis pomonella	TEPH143	debu01009045	TEPH143-07	University of Guelph Insect Collection	
Rhagoletis pomonella	TEPH144	debu01009046	TEPH144-07	University of Guelph Insect Collection	
Rhagoletis pomonella	TEPH145	debu01009047	TEPH145-07	University of Guelph Insect Collection	
Rhagoletis pomonella	TEPH146	debu01009048	TEPH146-07	University of Guelph Insect Collection	
Rhagoletis pomonella	TEPH147	debu01009049	TEPH147-07	University of Guelph Insect Collection	EU484533
Rhagoletis pomonella	TEPH148	debu00224167	TEPH148-07	University of Guelph Insect Collection	
Rhagoletis pomonella	TEPH149	debu01009050	TEPH149-07	University of Guelph Insect Collection	
Rhagoletis pomonella	TEPH150	debu01009051	TEPH150-07	University of Guelph Insect Collection	
Rhagoletis pomonella	TEPH151	debu01009052	TEPH151-07	University of Guelph Insect Collection	
Rhagoletis pomonella	TEPH152	debu01009053	TEPH152-07	University of Guelph Insect Collection	
Rhagoletis striatella	TEPH173	debu01009065	TEPH173-07	University of Guelph Insect Collection	
Rhagoletis striatella	TEPH174	debu01009066	TEPH174-07	University of Guelph Insect Collection	
Rhagoletis striatella	TEPH175	debu01110948	TEPH175-07	University of Guelph Insect Collection	EU484535
Rhagoletis suavis	TEPH165	debu00218039	TEPH165-07	University of Guelph Insect Collection	EU484536

Species Identification	Sample ID	Museum ID	Process ID	Specimen Voucher Deposit Location	GenBank Accession No.
Rhagoletis suavis	TEPH166	debu01009061	TEPH166-07	University of Guelph Insect Collection	
Rhagoletis suavis	TEPH167	debu01009062	TEPH167-07	University of Guelph Insect Collection	
Rhagoletis suavis	TEPH168	debu00192612	TEPH168-07	University of Guelph Insect Collection	
Rhagoletis tabellaria	TEPH139	debu00255089	TEPH139-07	University of Guelph Insect Collection	
Rhagoletis tabellaria	TEPH169	debu00182545	TEPH169-07	University of Guelph Insect Collection	EU484540
Rhagoletis tabellaria	TEPH170	debu00222897	TEPH170-07	University of Guelph Insect Collection	EU484539
Rhagoletis tabellaria	TEPH171	debu01009063	TEPH171-07	University of Guelph Insect Collection	EU484538
Rhagoletis tabellaria	TEPH172	debu01009064	TEPH172-07	University of Guelph Insect Collection	EU484537
Rhagoletotrypeta rohweri	TEPH180	debu00006142	TEPH180-07	University of Guelph Insect Collection	EU484542
Rhagoletotrypeta rohweri	TEPH181	debu01009071	TEPH181-07	University of Guelph Insect Collection	EU484541
Stenopa vulnerata	TEPH176	debu01009067	TEPH176-07	University of Guelph Insect Collection	
Stenopa vulnerata	TEPH177	debu01009068	TEPH177-07	University of Guelph Insect Collection	
Stenopa vulnerata	TEPH178	debu01009069	TEPH178-07	University of Guelph Insect Collection	EU484544
Stenopa vulnerata	TEPH179	debu01009070	TEPH179-07	University of Guelph Insect Collection	EU484543
Strauzia longipennis	TEPH130	debu01101981	TEPH130-07	University of Guelph Insect Collection	EU484548
Strauzia longipennis	TEPH153	debu01101968	TEPH153-07	University of Guelph Insect Collection	EU484547
Strauzia longipennis	TEPH154	debu01009054	TEPH154-07	University of Guelph Insect Collection	EU484546
Strauzia longipennis	TEPH155	debu01009055	TEPH155-07	University of Guelph Insect Collection	EU484545
Strauzia longipennis	TEPH194	debu01009076	TEPH194-07	University of Guelph Insect Collection	
Strauzia longipennis	TEPH197	debu01009079	TEPH197-07	University of Guelph Insect Collection	
Strauzia longipennis	TEPH198	debu01009080	TEPH198-07	University of Guelph Insect Collection	
Strauzia perfecta	TEPH129	debu01114245	TEPH129-07	University of Guelph Insect Collection	EU484549
Tephritis angustipennis	TEPH183	debu01009073	TEPH183-07	University of Guelph Insect Collection	
Tephritis araneosa	TEPH065	debu00184132	TEPH065-07	University of Guelph Insect Collection	EU484550
Tephritis araneosa	TEPH066	debu01008995	TEPH066-07	University of Guelph Insect Collection	
Tephritis araneosa	TEPH067	debu01008996	TEPH067-07	University of Guelph Insect Collection	
Tephritis candidipennis	TEPH184	debu01009074	TEPH184-07	University of Guelph Insect Collection	
Tephritis pura	TEPH068	debu01008997	TEPH068-07	University of Guelph Insect Collection	
Tephritis pura	TEPH069	debu00080118	TEPH069-07	University of Guelph Insect Collection	EU484555
Tephritis pura	TEPH070	debu00205093	TEPH070-07	University of Guelph Insect Collection	
Tephritis pura	TEPH071	debu00113232	TEPH071-07	University of Guelph Insect Collection	EU484554
Tephritis pura	TEPH072	debu01008998	TEPH072-07	University of Guelph Insect Collection	
Tephritis pura	TEPH182	debu01009072	TEPH182-07	University of Guelph Insect Collection	
Tephritis pura	TEPH193	debu01009075	TEPH193-07	University of Guelph Insect Collection	EU484553
Tephritis pura	TEPH200	debu00264218	TEPH200-07	University of Guelph Insect Collection	EU484552

Species Identification	Sample ID	Museum ID	Process ID	Specimen Voucher Deposit Location	GenBank Accession No.
Tephritis pura	TEPH201	debu00264219	TEPH201-07	University of Guelph Insect Collection	EU484551
Terellia palposa	TEPH052	debu01008987	TEPH052-07	University of Guelph Insect Collection	EU484517
Terellia palposa	TEPH053	debu01008988	TEPH053-07	University of Guelph Insect Collection	
Terellia palposa	TEPH054	debu01008989	TEPH054-07	University of Guelph Insect Collection	EU484516
Terellia ruficauda	TEPH055	debu01008990	TEPH055-07	University of Guelph Insect Collection	
Terellia ruficauda	TEPH056	debu00226404	TEPH056-07	University of Guelph Insect Collection	EU484519
Terellia ruficauda	TEPH057	debu01140012	TEPH057-07	University of Guelph Insect Collection	EU484518
Terellia ruficauda	TEPH058	debu01008991	TEPH058-07	University of Guelph Insect Collection	
Tomoplagia obliqua	TEPH073	debu01117438	TEPH073-07	University of Guelph Insect Collection	EU484557
Tomoplagia obliqua	TEPH074	debu00173125	TEPH074-07	University of Guelph Insect Collection	EU484556
Trupanea actinobola	TEPH075	debu01139627	TEPH075-07	University of Guelph Insect Collection	EU484559
Trupanea actinobola	TEPH076	debu01139594	TEPH076-07	University of Guelph Insect Collection	EU484558
Trypeta flaveola	TEPH077	debu00070568	TEPH077-07	University of Guelph Insect Collection	EU484561
Trypeta flaveola	TEPH164	debu00250251	TEPH164-07	University of Guelph Insect Collection	EU484560
Urophora affinis	TEPH202	debu00300911	TEPH202-10	University of Guelph Insect Collection	
Urophora cardui	TEPH043	debu00226495	TEPH043-07	University of Guelph Insect Collection	EU484563
Urophora cardui	TEPH044	debu00226496	TEPH044-07	University of Guelph Insect Collection	EU484562
Urophora cardui	TEPH045	debu01008983	TEPH045-07	University of Guelph Insect Collection	
Urophora cardui	TEPH046	debu01008984	TEPH046-07	University of Guelph Insect Collection	
Urophora quadrifasciata	TEPH047	debu01008985	TEPH047-07	University of Guelph Insect Collection	
Urophora quadrifasciata	TEPH048	debu01008986	TEPH048-07	University of Guelph Insect Collection	
Urophora quadrifasciata	TEPH049	debu00225813	TEPH049-07	University of Guelph Insect Collection	EU484565
Urophora quadrifasciata	TEPH050	debu00224128	TEPH050-07	University of Guelph Insect Collection	
Urophora quadrifasciata	TEPH051	debu00218038	TEPH051-07	University of Guelph Insect Collection	EU484564
Xanthaciura tetraspina	TEPH127	debu01009038	TEPH127-07	University of Guelph Insect Collection	EU484566
Xanthomyia platyptera	TEPH156	debu01110387	TEPH156-07	University of Guelph Insect Collection	EU484568
Xanthomyia platyptera	TEPH157	debu01111432	TEPH157-07	University of Guelph Insect Collection	
Xanthomyia platyptera	TEPH158	debu01111355	TEPH158-07	University of Guelph Insect Collection	EU484567
Zonosemata electa	TEPH128	debu01009039	TEPH128-07	University of Guelph Insect Collection	
Zonosemata electa	TEPH159	debu01009056	TEPH159-07	University of Guelph Insect Collection	
Zonosemata electa	TEPH160	debu01009057	TEPH160-07	University of Guelph Insect Collection	

Appendix II - Neighbor Joining Cladogram of Tephritidae COI Sequences (DNA Barcodes)



Appendix II - Neighbor Joining Cladogram of Tephritidae COI Sequences (DNA Barcodes) cont'd