

Cluster Flies (Calliphoridae: Polleniinae: *Pollenia*) of North America

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Abstract

The Nearctic cluster flies (Diptera: Calliphoridae: *Pollenia*) are reviewed and the six species of *Pollenia* found in North America are included in an interactive dichotomous key. Distributional maps are provided for all North American *Pollenia* species, with the inclusion of new distributional data based on several thousand records in the University of Guelph Insect Collection, the T. Whitworth collection, and other collections.

Introduction

Pollenia species, or cluster flies, are conspicuously abundant flies best known to the general public for their habit of clustering on walls, and entering the walls and attics of homes to overwinter. When they become active in early spring or on warm winter days they can become nuisance flies in houses, even though they neither bite nor contaminate food. The appearance of large numbers of these conspicuous flies inside houses is often a matter of concern for homeowners and home builders, and the subsequent accumulation of dead adult flies around windows can lead to allergy problems or later issues with dermestid beetles that breed on the dead flies.

Some cluster flies lay their eggs on soil inhabited by earthworms, from whence the newly hatched larvae make their way through the soil in search of earthworm hosts to consume as parasitoids (usually) or predators, but the biology of this group is relatively poorly known and a few have been recorded from other hosts including caterpillars and bees. Cluster fly adults, easily distinguished from other blow flies by their dull colouration and yellow, crinkly thoracic hairs, can be among the most abundant insects visiting flowers and are often extremely common on flowers in urban and agricultural settings.

Despite their importance as nuisance pests and as significant and common pollinators, little is known about the diversity and abundance of *Pollenia* species in North America. In fact, until a few years ago all North American *Pollenia* species were treated as one species, *Pollenia rudis*, and only recently has it been recognized that six members of the genus occur in North America (Rognes, 1991; Whitworth, 2006). The biology of cluster flies in Ontario has been extensively studied (Thompson and

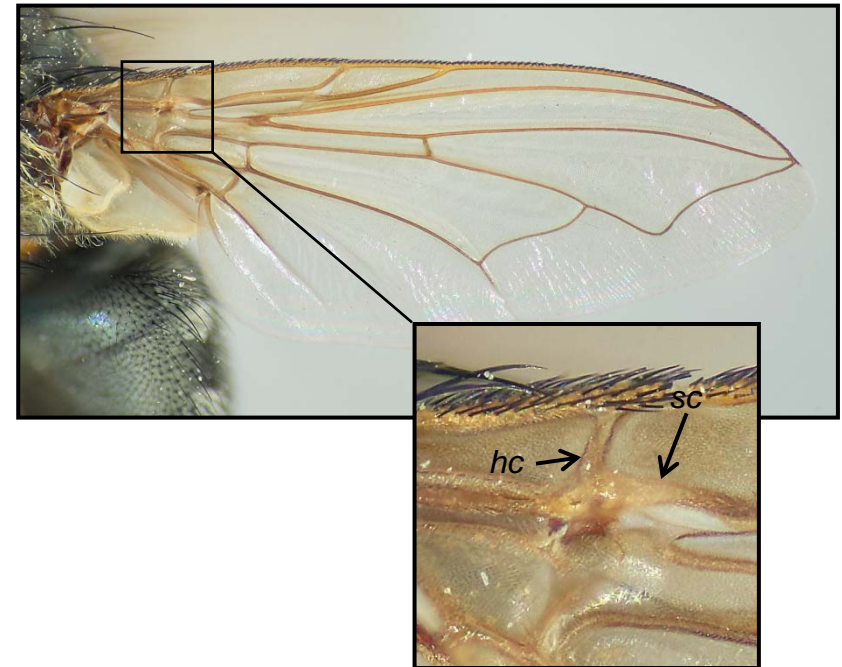
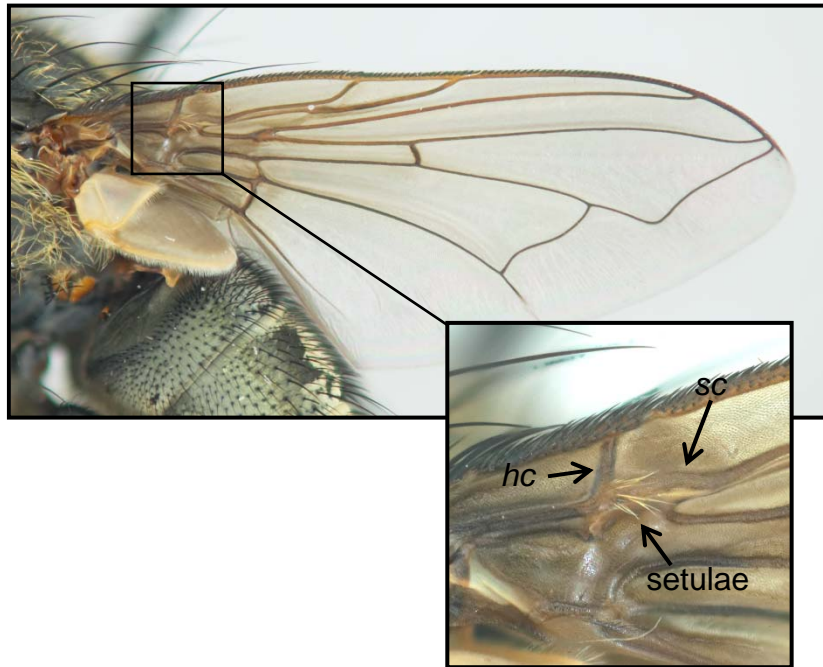
Davies 1973a, 1973b; Yahnke and George 1972) under the name *Pollenia rudis*. It is impossible to know which of the six species in the province were the subjects of this research, but Rognes (1987) indicates that a majority of specimens studied by Yahnke and George were *Pollenia pediculata* (as *P. pseudorudis*).

The eastern Canadian Calliphoridae other than *Pollenia* were reviewed and keyed by Marshall et al. (2010), but the very distinctive and ecologically distinct Polleniinae were keyed only to genus. We here fill that gap by providing an extensively illustrated key to the North American *Pollenia* species, and by compiling maps that for the first time detail the North American distributions of the six *Pollenia* species known in the Nearctic Region. Our key is based largely on Rognes (1991) and Whitworth (2006); distributional and phenological data are from the University of Guelph Insect Collection's almost 3,000 *Pollenia* specimens, T. Whitworth's personal collection of about 1500 *Pollenia*, and over 5000 specimens from other institutions (Appendix 1).

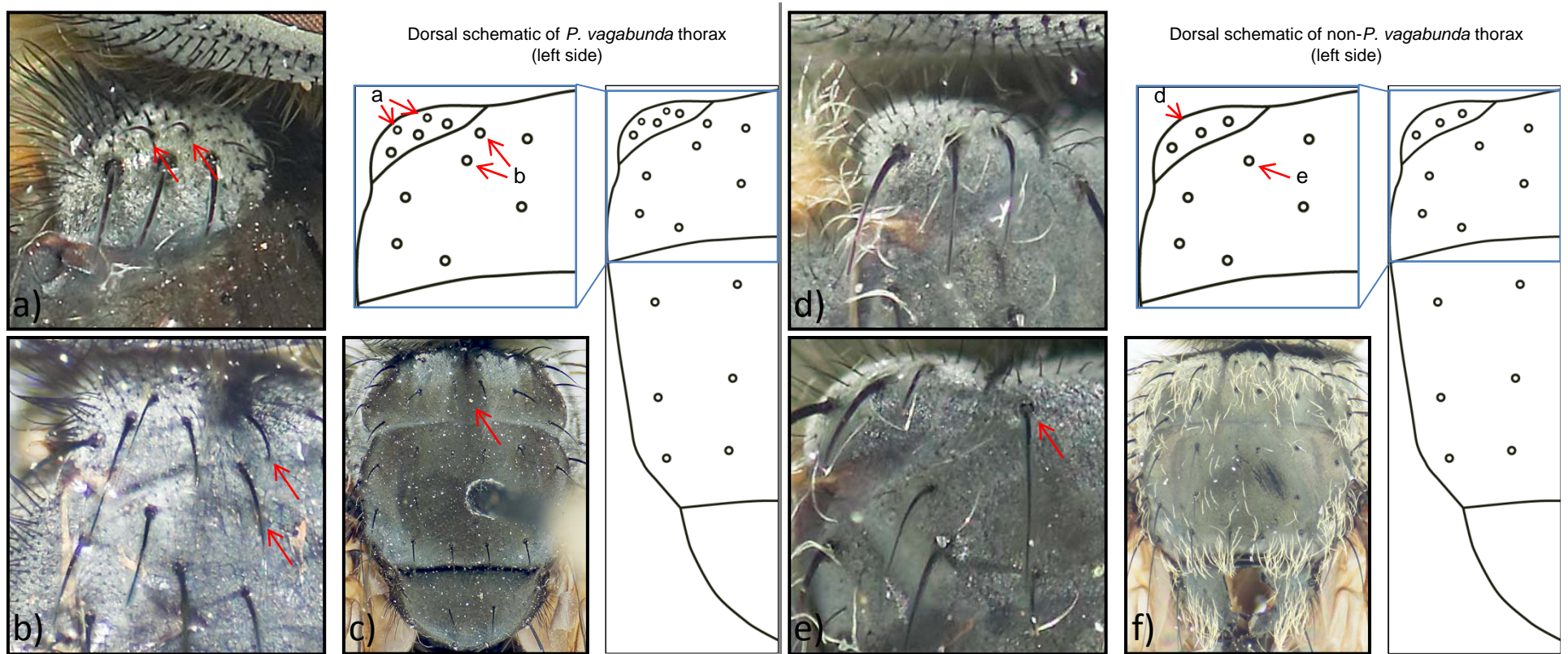
Terminology follows the Manual of Central American Diptera (Cumming and Wood, 2009), differing from the terminology of Rognes (1991) and Whitworth (2006) as follows:

Manual of Central American Diptera (Cumming and Wood, 2009)	Rognes (1991)/ Whitworth (2006)
Postpronotal lobe	Humeral callus
Anterior postpronotal seta(e)	Extra/anterior humeral seta(e)
Presutural anterior intra-alar seta(e)	Inner posthumeral seta(e)
Presutural anterior supra-alar seta(e)	Outer posthumeral seta(e)

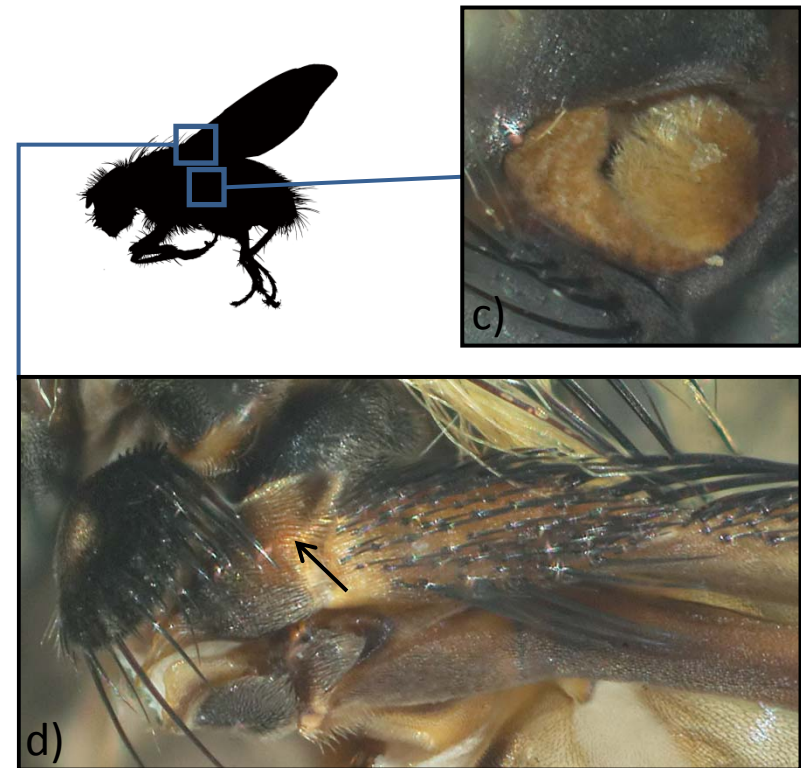
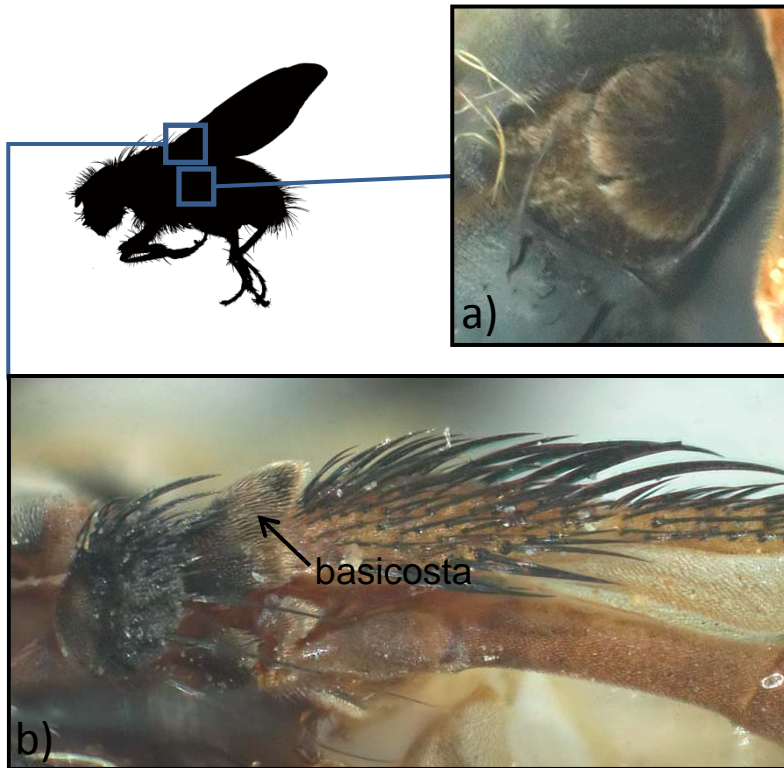
Key to the Cluster Flies of North America



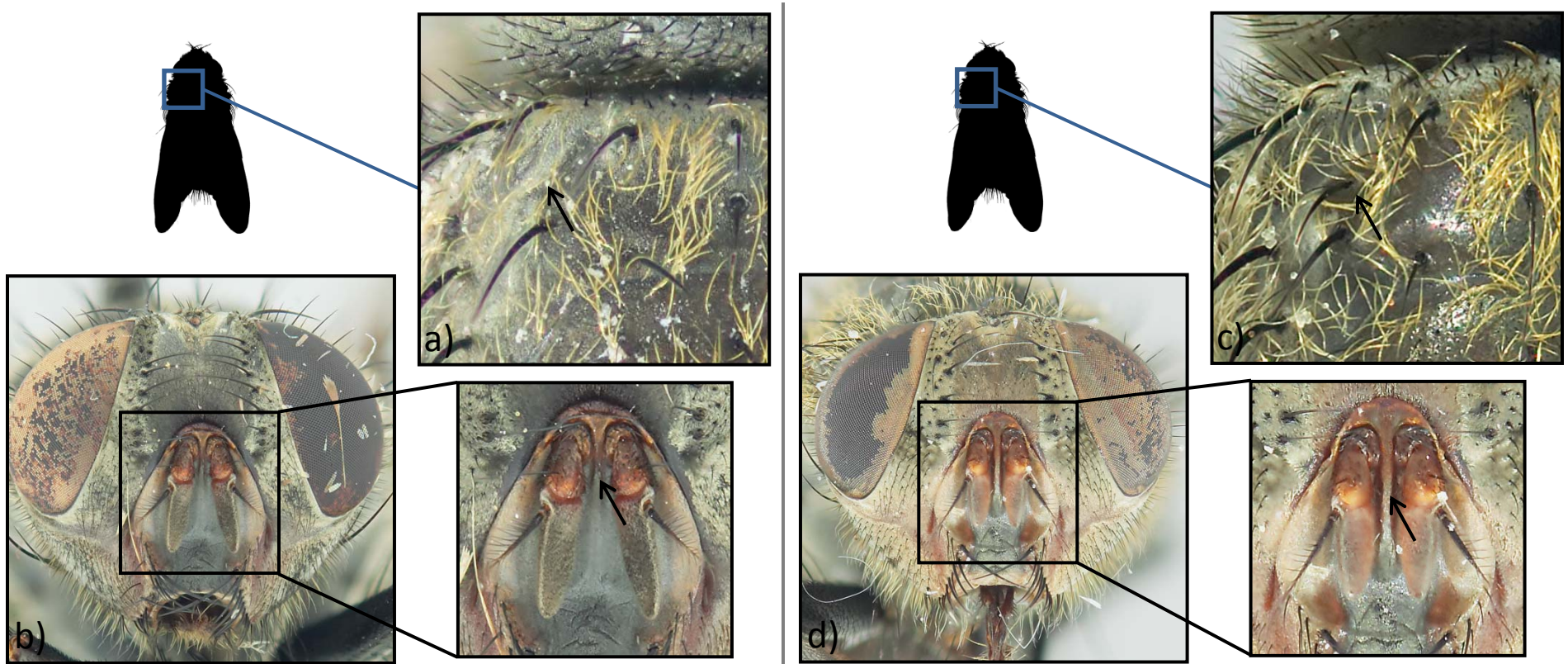
1	Underside of wing with tuft of pale setulae at intersection of subcosta (sc) and humeral crossvein (hc).	<u><i>Pollenia pediculata</i></u>
-	Underside of wing without tuft of pale setulae at intersection of subcosta (sc) and humeral crossvein (hc).	<u>2</u>



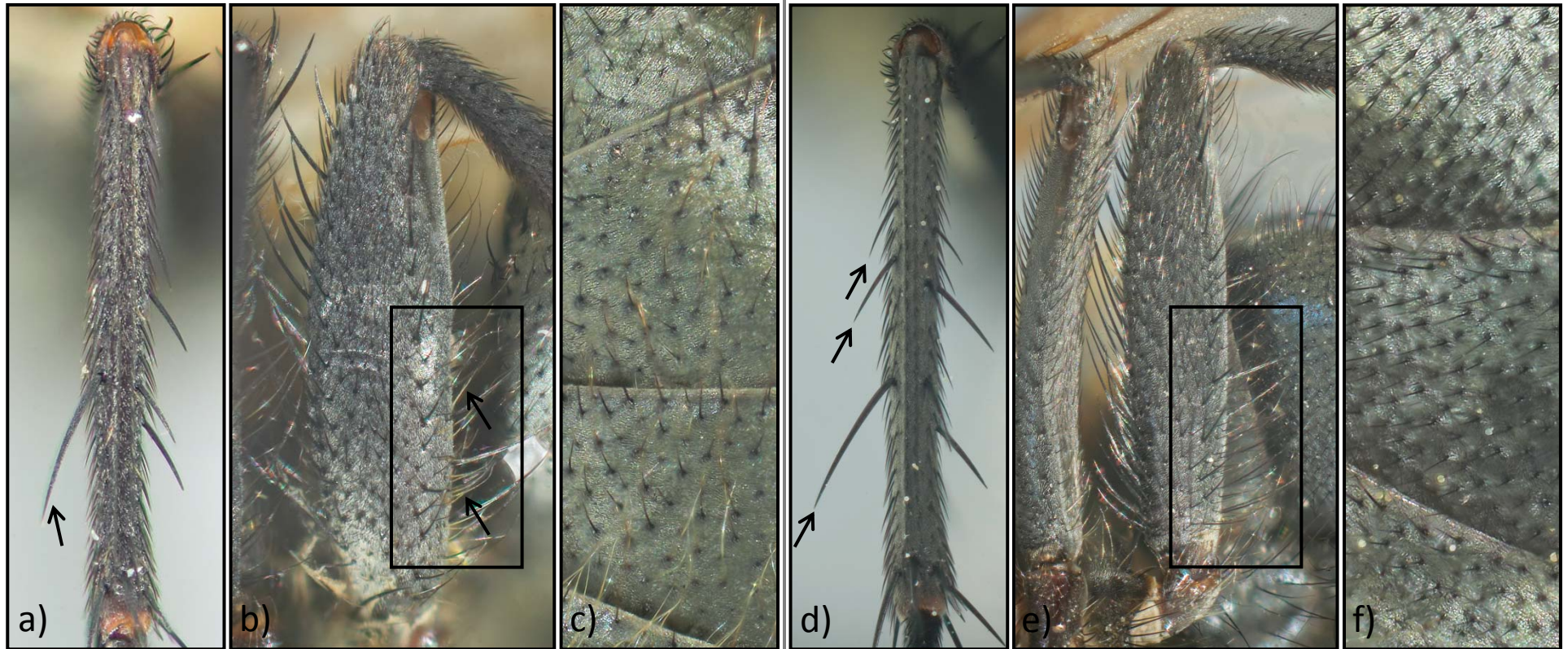
2 (<u>1</u>)	Postpronotal lobe with 1 or more anterior setae (a); presutural area with 2 anterior intra-alar setae (b); thorax usually with mid-dorsal stripe (c).	<u><i>Pollenia vagabunda</i></u>
-	No anterior postpronotal setae (d); presutural area with only 1 anterior intra-alar seta (e); thorax without mid-dorsal stripe (f).	<u>3</u>



3 (2)	Lappets of posterior thoracic spiracle (anterior to halter) dark brown (a); basicosta dark brown to black (b).	<u><i>Pollenia labialis</i></u>
-	Lappets of posterior thoracic spiracle (anterior to halter) tan, yellow, or orange in colour (c); basicosta brown, light brown or tan (d).	<u>4</u>



4 (3)	Presutal anterior supra-alar seta (just posterior to postpronotal lobe) absent (a); facial carina between antennae reduced or absent (b).	<i>Pollenia griseotomentosa</i>
-	Presutal anterior supra-alar seta present (c); facial carina between antennae prominent, not reduced (d).	<u>5</u>



5 (4)	Mid-tibia with one anterodorsal seta (a); mid- and hind femur with pale yellowish setulae on posteroventral surface (b); male ventral abdominal vestiture sparse, about half as dense as in <i>P. rudis</i> (c).	<u><i>Pollenia angustigena</i></u>
-	Mid-tibia with 2-3 anterodorsal setae (d); mid- and hind femur with only dark brown or black setulae on posteroventral surface (e); male ventral abdominal vestiture dense, about twice as dense as in <i>P. angustigena</i> (f).	<u><i>Pollenia rudis</i></u>

Pollenia labialis Robineau-Desvoidy, 1863



Pollenia labialis is easily distinguished from other species of *Pollenia* by the dark-brown lappets of the posterior thoracic spiracle. The basicosta of the wing is frequently dark-brown to black rather than the usual light-tan or brown colouration observed in other species. This species is found across the continent but is often only locally abundant. Our distribution records indicate that *P. labialis* was first collected in 1969 in North America, and it was likely introduced from Europe in the past century. Ontario database records show highest abundance of *P. labialis* in July.

Male genitalia
(Appendix 2)

Pollenia labialis Robineau-Desvoidy, 1863



Earliest North American
specimen examined: 1969

Pollenia griseotomentosa (Jacentkovský, 1944)



Pollenia griseotomentosa is a relatively small species, differing from other North American *Pollenia* species by the absence of a presutural anterior supra-alar seta. Atypical specimens of *Pollenia angustigena* also lack this seta, but these two species differ in male genitalic structures. *Pollenia griseotomentosa* has more hook-shaped surstyli and more basally-slender cerci than *P. angustigena* (see male terminalia [Appendix 3]). North American records of this species are mostly from the northeast, with a few exceptions collected in British Columbia. Whitworth (2006) stated *P. griseotomentosa* was found in Washington State, Wisconsin and Maine; he has since determined this was an error, and that they were aberrant *P. angustigena*. Specimens have been collected between April and October; most Ontario records are from the month of August.

Male genitalia
(Appendix 2)

Pollenia griseotomentosa (Jacentkovský, 1944)



Earliest North American
specimen examined: 1925

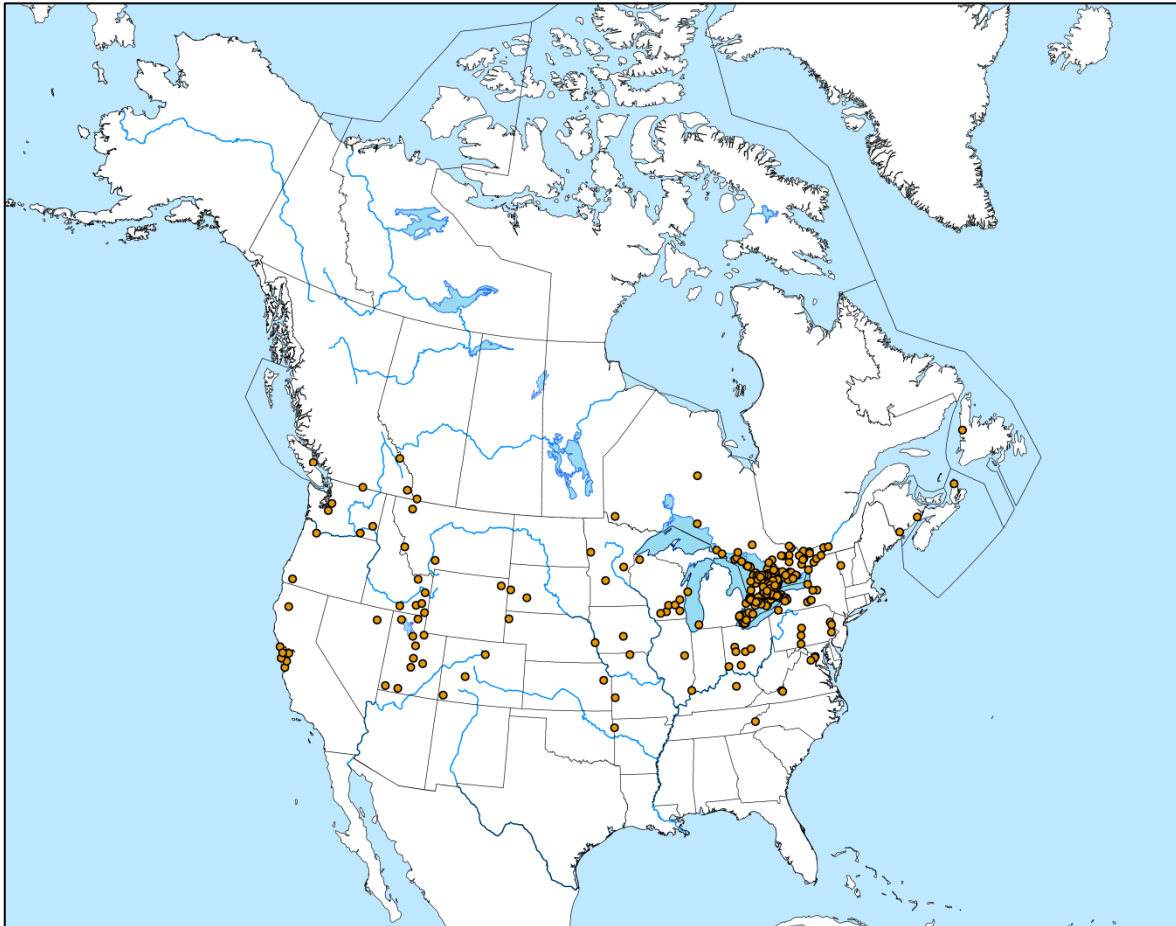
Pollenia pediculata Macquart, 1834



Pollenia pediculata differs from congeners in having a tuft of pale setulae at the intersection of the humeral crossvein and subcosta on the underside of the wing. *Eisenia rosea*, a common earthworm, is recorded as a host for larvae of *P. pediculata* (Rognes, 1991). *Pollenia pediculata* is widespread in the United States (Whitworth, 2006), and was first recorded in Canada under the now-obsolete synonym *P. pseudorudis* (Rognes, 1987). This species and *P. rudis* are the most common cluster flies in North America. *Pollenia pediculata* is either native or long established in North America based on its initial collection year of 1904. Collected year-round in North America; Ontario records show peak populations in the summer months and winter occurrences in houses.

[Male genitalia](#)
(Appendix 2)

Pollenia pediculata Macquart, 1834



Earliest North American
specimen examined: 1904

Pollenia vagabunda (Meigen, 1826)



Pollenia vagabunda can be recognized by having at least two anterior postpronotal setae and two anterior intra-alar setae, neither of which occur in any other *Pollenia*. Additionally, a mid-dorsal stripe on the thorax (visible in the photo above) can verify identification, but the stripe is indistinct in some specimens. *P. vagabunda* is relatively uncommon in North America, and was not previously recorded from Ontario. Previous Canadian records are from B.C., P.E.I., and N.S.; it also occurs in the northeastern and northwestern states, and one recent specimen was recorded from New Mexico. First collected in North America in 1958, *P. vagabunda* was likely a recent introduction from Europe.

[Male genitalia](#)
(Appendix 2)

Pollenia vagabunda (Meigen, 1826)



Earliest North American
specimen examined: 1958

Pollenia rudis (Fabricius, 1794)



Pollenia rudis differs from the similar *P. angustigena* in having two or three anterodorsal setae on the mid-tibiae, rather than one. Specimens in poor condition may lack setae, causing them to resemble *P. angustigena*, particularly females. In this case, the number of anterodorsal tibial setal sockets can be examined to determine the specimen. Until recently thought to be the only species of *Pollenia* in North America, *P. rudis* is one of the two most common cluster fly species in Ontario (along with *P. pediculata*). Other species are still frequently misidentified as *Pollenia rudis*. Ontario populations tend to show abundance peaks in April and June.

[Male genitalia](#)
(Appendix 2)

Pollenia rudis (Fabricius, 1794)



Earliest North American
specimen examined: 1913

Pollenia angustigena Wainwright, 1940



Pollenia angustigena resembles the extremely common species *Pollenia rudis* but differs in having only one anterodorsal seta on the mid-tibia (*P. rudis* has two or three). This species had been previously recorded from both northeastern and northwestern North America, including British Columbia, Ontario, and Quebec (Rognes, 1987). Very rarely, *P. angustigena* may lack the anterior supra-alar seta as in *P. griseotomentosa*. In these cases, males of the two species can easily be separated by examining male genitalia. *Pollenia angustigena* has more basally-robust cerci as well as surstyli that are less hook-shaped when compared to *P. griseotomentosa* (see [male terminalia \[Appendix 3\]](#)). Abundance of *P. angustigena* peaks in August, according to Ontario database records.

[Male genitalia](#)
(Appendix 2)

Pollenia angustigena Wainwright, 1940



Earliest North American
specimen examined: 1906

Acknowledgements

We would like to thank Mehrdad Parchami-Araghi for his assistance with curation of the University of Guelph *Pollenia* collection, Morgan D. Jackson for preparing the document for publishing, and David Cheung for providing advice on design and specimen photography. We would also like to thank CANPOLIN for financing the first author during the course of the project.

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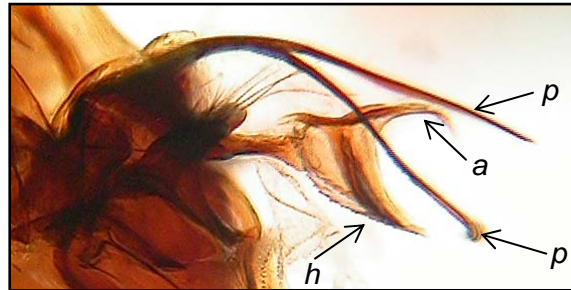
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Appendix 1: List of specimen sources

- University of Guelph Insect Collection
- Terry Whitworth Collection
- Biodiversity Institute of Ontario
- Canadian National Collection of Insects, Arachnids, and Nematodes
- California Academy of Sciences
- Florida State Collection of Arthropods
- Oregon State University
- Utah State University Insect Collection
- United States National Museum
- University of British Columbia
- University of California, Berkeley
- University of California, Davis
- University of California, Riverside
- University of Wisconsin-Madison
- Washington State University, Pullman

Appendix 2: Male genitalia plates (distiphallus in lateral view)

P. angustigena



P. pediculata



P. griseotomentosa



P. rudis



P. labialis



P. vagabunda

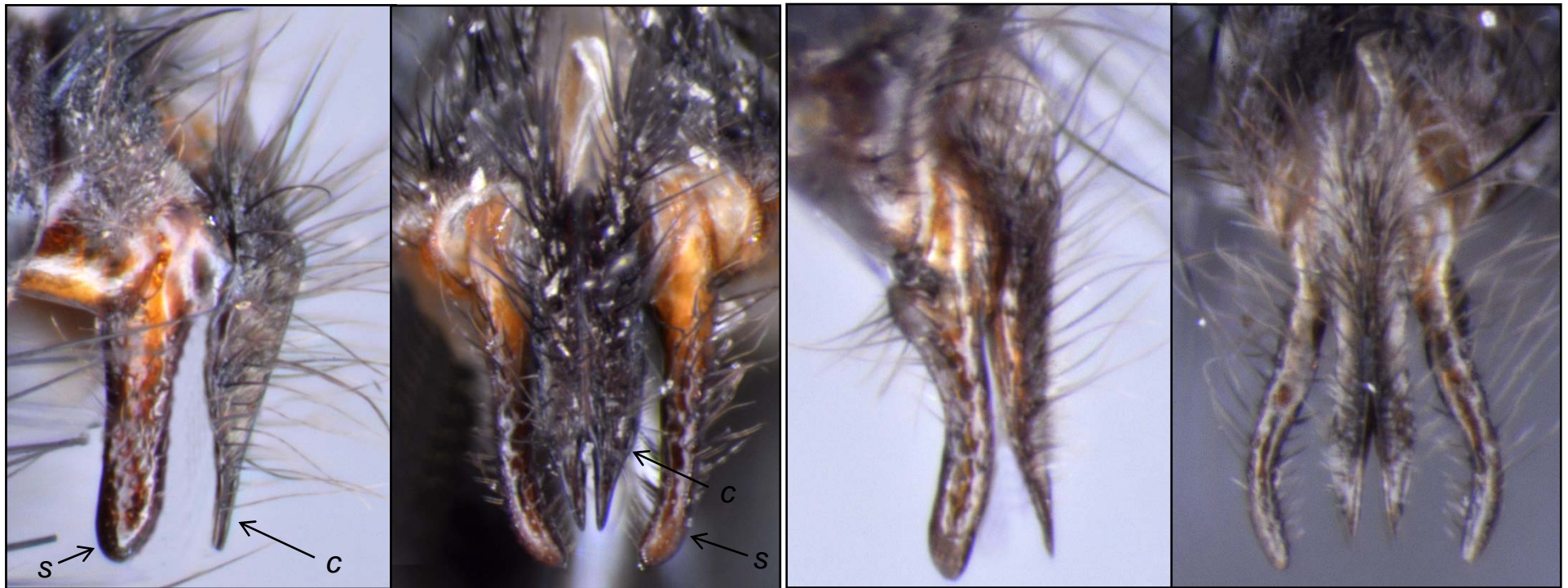


a: acrophallus; *h*: hypophallic lobe; *p*: paraphallus

Appendix 3: Male terminalia (*P. angustigena* vs *P. griseotomentosa*)

P. angustigena

P. griseotomentosa



Lateral

Posterior

Lateral

Posterior

c: cercus; s: surstylus