An illustrated identification key to the genera of Ulidiidae (Diptera: Tephritoidea) of the United States and Canada

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Abstract

Ulidiidae, the "picture-winged flies," are a family of true flies belonging to the superfamily Tephritoidea. Over 130 of the family's approximately 700 species, and 40 of its 128 genera, have been documented north of Mexico in the United States and Canada. Although the family is primarily saprophagous and commonly found in association with feces or decaying plant tissue, several species are known to be pestiferous on crops significant to agribusiness, primarily in the American southeast. Here the taxonomic key provided in the "Otitidae" chapter of the Manual of Nearctic Diptera (Steyskal 1987) is updated with color photographs, including notes on taxonomy and distribution of species. Specimens from collections at North Carolina State University, the Florida State Collection of Arthropods, and the National Museum of Natural history were photographed using a Canon DSLR and macro lens, and focus stacked using Zerene Stacker. Information on distribution of species was taken from collection records, online databases, and previous publications.

Steyskal, G.C. 1987. Otitidae. *In* Manual of Nearctic Diptera. Volume 2. *Edited by* J.F. McAlpine. Agriculture Canada, Hull, Quebec, Canada. Pp: 799-808.

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Introduction

The "picture-winged flies" (Ulidiidae) are one of the larger families of the Diptera superfamily Tephritoidea, numbering approximately 800 species total, about 135 of which are found in the United States or Canada (Steyskal 1987, Diaz-Fleischer et al. 2000) (some uncertainty remains regarding exact number, due to limited research, taxonomic revisions, and high number of *Euxesta* Loew). They are a family of acalyptrate flies, generally small to medium, and broadly recognizable by the distinctively patterned wings that grant the family its common name, though this trait is neither universal among nor exclusive to them. Traits common to the family are illustrated in Figure 1.

Currently, Ulidiidae is divided into two subfamilies: Ulidiinae and Otitinae, each with three tribes (and an additional *incertae sedis* group of genera in the latter) (Kameneva and Korneyev 2006). These subfamilies are unequally distributed geographically; Otitinae is primarily Holarctic, and represents the slight majority of species documented north of Mexico, whereas Ulidiinae is primarily concentrated in the Neotropical region of Central and South America (Arnett 2000, Kameneva and Korneyev 2006, Galinskaya *et al.* 2014).

Unlike its close relative, Tephritidae, the ulidiids are primarily a saprophagous group (Ferrar 1987; Arnett 2000). The greater number of picture winged flies can be found in association with feces or, more typically, rotting vegetables and fruits, where they commonly oviposit. Some publications (e.g. Arnett 2000) present the family as exclusively associated with plants, but, although there is a clear preference throughout the family for plant tissue, dead or alive, it is not exclusive (Ferrar 1987, Sivinski 2000, Marshall 2012). There is, however, a repeated trend within the Ulidiidae of true and/or opportunistic phytophagy, in which larvae act as primary, secondary, or tertiary invaders on living plant tissue (Kameneva and Korneyev 2010; Goyal *et al.* 2012). This is particularly well documented in those species that act as pests on plants such as sugar beet, onions, or corn (Ferrar 1987; Bjerke *et al.* 1992; Goyal *et al.* 2010, 2011, 2012).

Like the Tephritidae, adult ulidiids commonly use their distinctive wings to engage in often complex mating rituals. Male members of *Callopistromyia* Hendel raise their dappled wings at a 90 degree angle over their abdomen and "strut," while others such as *Delphinia picta* Fabricius make a "rowing" motion while walking over leaves (Sivinski 2000, Marshall 2012). Even more "extreme" examples of novel reproductive strategies can be found in species outside of a Nearctic distribution, as in the stalk-eyed *Plagiocephalus* Wiedemann, or the post-copulatory ejaculate expulsion in females of *Euxesta bilimeki* Hendel (Brunel and Rull 2010, Luis Rodriguez-Enriquez et al. 2013).

Unfortunately, the biology of many ulidiids, even in

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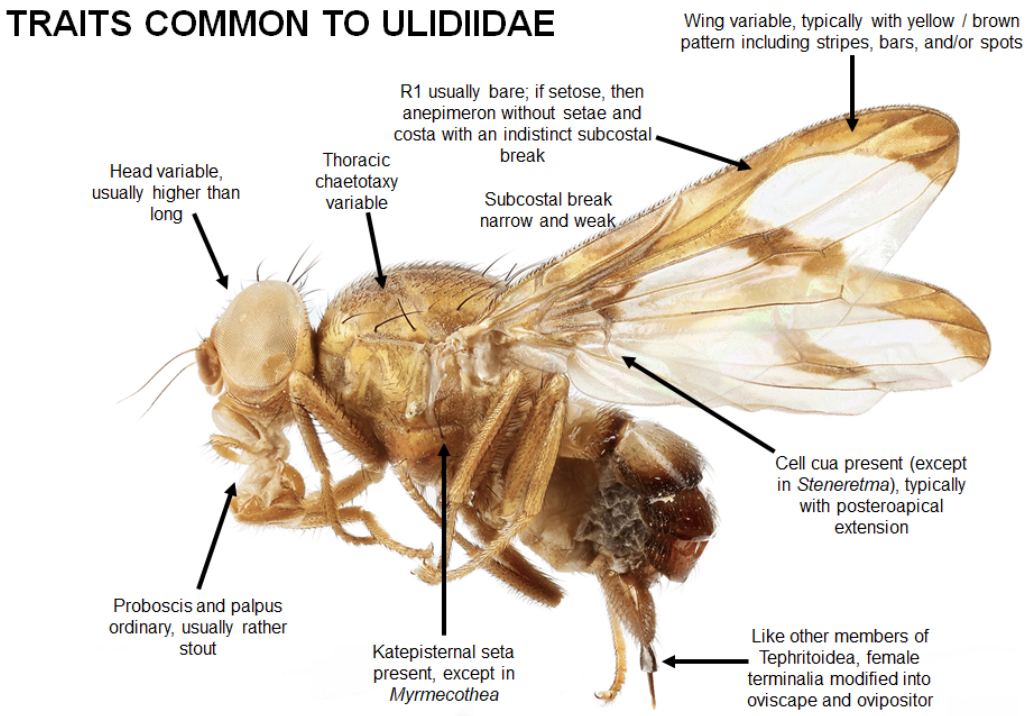


Figure 1: Lateral habitus of *Xanthacrona bipustulata* from the Smithsonian National Museum of Natural History collection, showing morphological traits common to Ulidiidae.

the relatively well-documented North American taxa, remains unknown or understudied. One potential barrier is the near absence of taxonomic tools. There is so far no comprehensive illustrated guide to the taxa of ulidiids of any biogeographical region, and many described species and genera remain to be photographed or otherwise imaged, or else are unavailable to a broad audience. This update to the key will fill some of this void by providing new images of many more taxa than have previously been available.

Materials & Methods

Specimen Acquisition / Taxon Sampling

Specimens and data records were accessed from insect collections at three institutions: the Insect Museum in the Department of Entomology and Plant Pathology at North Carolina State University (NCSU), the Florida State Collection of Arthropods (FSCA) at the University of Florida at Gainesville, and the Diptera Collection in the U.S. National Entomological Collection (USNM) at the National Museum of Natural History (NMNH) of the Smithsonian Institution in Washington, DC.

Location data for taxa represented in the United States and Canada was based primarily on Steyskal's (1987) descriptions, and supplemented with documentation of occurrences in published literature (Arnett 2000, Marshall 2012), the Catalog of Life (Roskov et al. 2017), the website Systema Dipterorum (Pape and Thompson 2017), the Global Biodiversity Information Facility (GBIF), and collection information from the three institutions listed above. Based on available information, none of the represented species are definitively known from Alaska.

In total, Ulidiidae is represented in the United States and Canada by 40 genera and 135 species. Members of all recognized subfamilial, suprageneric categories (Otitinae: Cephaliini, Myennidini, and Otitini; Ulidiinae: Lipsanini, Pterocallini, Seiopterini, Ulidiini), as of the most recent comprehensive taxonomic consideration of the family (Kameneva and Korneyev 2006), are represented by at least one genus, with a bias towards the primarily Holarctic subfamily Otitinae. A list of genera and species with a documentation in North America north of Mexico is available in Table 1, which also specifies the source (i.e. NCSU) of the specimens photographed for this paper.

Additional Notes

In Arnett (2000), *Pseudotephritina* Malloch is treated as a sub-genus of *Pseudotephritis* Johnson. Herein, however, I agree with Steyskal (1987) and Kameneva and Korneyev (2006), in treating it as a genus.

One additional genus, *Prionella* Robineau-Desvoidy, is indicated as appearing in the United States in Arnett (2000), and on Systema Dipterorum (diptera.org). However, it is a genus of unrecognizable identity and is

Table 1: List of all contemporary species of Ulidiidae with a Nearctic distribution. Additional columns indicate species presence in Canada or the United States, as well as origin of specimen photographed ("---" indicates absence of photograph). Abbreviations for repositories: NCSU - Insect Museum in the Department of Entomology and Plant Pathology at North Carolina State University; FSCA - the Florida State Collection of Arthropods at the University of Florida at Gainesville; USNM - Diptera Collection in the U.S. National Entomological Collection at the National Museum of Natural History of the Smithsonian Institution in Washington, DC.

Subfamily	Tribe	Genus	Species #	Species	Canada	USA	Specimen source	USNMENT #
Otitinae	Cephaliini	*Cephalia*	2					
				Cephalia flavoscutellata Becker, 1900	Yes	No	USNM	1396546
				Cephalia rufipes Meigen, 1826	No	Yes	USNM	1396541
		Delphinia	1					
				Delphinia picta Fabricius, 1781	Yes	Yes	NCSU	
		Myiomyrmica	1					
				Myiomyrmica fenestrata Coquillett, 1900	No	Yes	FSCA, USNM	1396545
			1					
				Myrmecothea myrmecoides Loew, 1860	No	Yes	NCSU, USNM	1396639
		Tritoxa	7					
				Tritoxa californica Sinclair et al. 2021	No	Yes	---	
				Tritoxa cuneata Loew, 1873	Yes	Yes	FSCA	
				Tritoxa decipiens Sinclair et al. 2021	Yes	Yes	---	
				Tritoxa flexa Wiedemann, 1830	Yes	Yes	FSCA	
				Tritoxa incurva Loew, 1873	No	Yes	FSCA	
				Tritoxa pollinosa Cole, 1919	No	Yes	FSCA	
				Tritoxa ra Harriot, 1942	No	Yes	---	
	incertae sedis	*Curranops*	2					
				Curranops apicalis Cole & Lovett, 1921	Yes	Yes	---	
				Curranops scutellaris Coquillett, 1900	No	Yes	USNM	
		Diacrita	2					
				Diacrita costalis Gerstaecker, 1860	No	Yes	FSCA, USNM	1396572
				Diacrita plana Steyskal, 1947	No	Yes	USNM	1396516
		Haigia	1					
				Haigia nevadana Steyskal, 1961	No	Yes	USNM	1396491
		Idana	1					
				Idana marginata Say, 1830	Yes	Yes	FSCA	
		Psaeropterella	2					
				Psaeropterella macrocephala Hendel, 1914	No	Yes	USNM	1396496
				Psaeropterella punctifrons Hendel, 1914	Yes	No	USNM	1396536
		Tetropismenus	1					
				Tetropismenus hirtus Loew, 1876	No	Yes	USNM	1396538
		Tujunga	1					
				Tujunga mackenziei Steyskal, 1961	No	Yes	USNM	1396523
	Myennidini	*Callopistromyia*	2					
				Callopistromyia annulipes Macquart, 1855	No	Yes	FSCA	
				Callopistromyia strigula Loew, 1873	Yes	Yes	USNM	1396577
		Dyscrasis	1					
				Dyscrasis hendeli Aldrich, 1932	Yes	Yes	USNM	1396493
		Oedopa	2					
				Oedopa ascriptiva Hendel, 1909	No	Yes	USNM	1396533

			Oedopa capito Loew, 1868	No	Yes	USNM	1396612
	Paroedopa	1					
			Paroedopa punctigera Coquillett, 1900	No	Yes	USNM	1396531
	Pseudotephritina	2					
			Pseudotephritina cribellum Loew, 1873	Yes	Yes	FSCA, USNM	1396597
			Pseudotephritina inaequalis Malloch, 1931	No	Yes	FSCA, USNM	1396629
	Pseudotephritis	4					
			Pseudotephritis approximata Banks, 1914	No	Yes	FSCA	
			Pseudotephritis corticalis Loew, 1873	Yes	Yes	FSCA	
			Pseudotephritis inaequalis Malloch, 1931	No	Yes	---	
			Pseudotephritis vau Say, 1830	Yes	Yes	USNM	1396607
	Stictomyia	2					
			Stictomyia longicornis Bigot, 1885	No	Yes	USNM	1396474
			Stictomyia punctata Coquillett, 1900	No	Yes	USNM	1396473
	Texasa	1					
			Texasa chaetifrons Steyskal, 1961	No	Yes	USNM	
	Ulidiotites	1					
			Ulidiotites dakotana Steyskal, 1961	No	Yes	USNM	1396488
Otitini	*Ceroxys*	1					
			Ceroxys latiusculus Loew, 1873	Yes	Yes	FSCA	
	Herina	4					
			Herina canadensis Johnson, 1902	Yes	Yes	USNM	1396600
			Herina narytia Walker, 1849	No	Yes	USNM	1396562
			Herina nigribasis McAlpine, 1951	Yes	Yes	USNM	1396602
			Herina ruficeps Wulp, 1867	Yes	Yes	FSCA	
	Hiatus	1					
			Hiatus fulvipes Cresson, 1906	No	Yes	---	
	Melieria	6					
			Melieria cana Loew, 1858	Yes	Yes	FSCA	
			Melieria occidentalis Coquillett, 1904	Yes	Yes	FSCA	
			Melieria ochricornis Loew, 1873	Yes	Yes	FSCA	
			Melieria picta Meigen, 1826	No	Yes	USNM	1396486
			Melieria sabuleti Steyskal, 1962	No	Yes	USNM	1396501
			Melieria similis Loew, 1873	Yes	Yes	USNM	1396632
	Otites	7					
			Otites bimaculata Hendel, 1911	Yes	Yes	USNM	1396585
			Otites erythrocephala Hendel, 1911	No	Yes	USNM	1396590
			Otites erythrosceles Steyskal, 1966	No	Yes	---	
			Otites michiganus Steyskal, 1966	Yes	Yes	FSCA	
			Otites pyrrhocephala Loew, 1876	No	Yes	USNM	1396634
			Otites snowi Cresson, 1924	No	Yes	USNM	1396617
			Otites stigma Hendel, 1911	Yes	Yes	FSCA	
	Tetanops	7					
			Tetanops cazieri Harriot, 1942	No	Yes	USNM	1396528
			Tetanops integer Loew, 1873	Yes	Yes	USNM	1396625
			Tetanops luridipennis Loew, 1873	No	Yes	FSCA	
			Tetanops magdalenae Cresson, 1924	No	Yes	USNM	1396624

				Tetanops myopaeformis Roder, 1881	Yes	Yes	FSCA	
				Tetanops parallelus Steyskal, 1970	No	Yes	USNM	1396587
				Tetanops vittifrons Wulp, 1899	No	Yes	---	
Ulidiinae	Lipsanini							
		Acrosticta	6					
				Acrosticta apicalis Williston, 1896	No	Yes	USNM	1396570
				Acrosticta compta Cole, 1912	No	Yes	---	
				Acrosticta dichroa Loew, 1874	No	Yes	USNM	1396503
				Acrosticta fulvipes Coquillett, 1900	No	Yes	USNM	1396511
				Acrosticta rubida Loew, 1876	No	Yes	USNM	1396535
				Acrosticta rufiventris Hendel, 1910	No	Yes	USNM	1396475
		Axiologina	1					
				Axiologina ferrumequinum Hendel, 1909	No	Yes	FSCA	
		Chaetopsis	7					
				Chaetopsis aenea Wiedemann, 1830	No	Yes	FSCA	
				Chaetopsis apicalis Johnson, 1900	No	Yes	FSCA	
				Chaetopsis duplicata Johnson, 1921	No	Yes	---	
				Chaetopsis fulvifrons Macquart, 1855	Yes	Yes	FSCA	
				Chaetopsis magna Cresson, 1924	No	Yes	---	
				Chaetopsis massyla Walker, 1849	Yes	Yes	FSCA	
				Chaetopsis quadrifasciata Curran 1928	No	Yes	USNM	1396490
		Eumetopiella	2					
				Eumetopiella rufipes Macquart, 1847	No	Yes	FSCA	
				Eumetopiella varipes Loew, 1866	No	Yes	USNM	1396506
		Euxesta	33					
				Euxesta abana Curran, 1935	No	Yes	---	
				Euxesta abdominalis Loew, 1868	No	Yes	FSCA	
				Euxesta albitarsis Zetterstedt, 1838	Yes	Yes	---	
				Euxesta anna Harriot, 1942	No	Yes	---	
				Euxesta annonae Fabricius, 1794	No	Yes	FSCA	
				Euxesta atlantica Ahlmark , 1995	No	Yes	USNM	1396576
				Euxesta basalis Walker, 1853	No	Yes	FSCA	
				Euxesta bicolor Cresson, 1906	No	Yes	---	
				Euxesta brookmani Harriot, 1942	No	Yes	---	
				Euxesta contorta Curran, 1935	No	Yes	USNM	1396631
				Euxesta eluta Loew, 1868	No	Yes	FSCA	
				Euxesta fervida Curran, 1935	No	Yes	USNM	1396566
				Euxesta fulvicornis Bigot, 1886	No	Yes	USNM	1396601
				Euxesta juncta Coquillett, 1904	No	Yes	USNM	1396556
				Euxesta luteocesta Foote, 1960	No	Yes	USNM	1396561
				Euxesta lutzi Curran, 1935	No	Yes	USNM	1396551
				Euxesta magdalenae Cresson, 1924	No	Yes	---	
				Euxesta minor Cresson, 1906	No	Yes	USNM	1396621
				Euxesta nigriceps Curran, 1935	No	Yes	---	
				Euxesta nitidiventris Loew, 1873	No	Yes	USNM	1396586
				Euxesta notata Wiedemann, 1830	No	Yes	FSCA	
				Euxesta pacifica Steyskal , 1995	No	Yes	USNM	1396581

			Euxesta pechumani Curran, 1938	No	Yes	FSCA	
			Euxesta pulchella Cresson, 1906	No	Yes	USNM	1396596
			Euxesta quaternaria Loew, 1868	No	Yes	FSCA	
			Euxesta rubida Curran, 1935	No	Yes	USNM	1396591
			Euxesta sanguinea Hendel, 1913	No	Yes	USNM	1396616
			Euxesta scutellaris Curran, 1935	No	Yes	USNM	1396611
			Euxesta spoliata Loew, 1868	No	Yes	USNM	1396606
			Euxesta thomae Loew, 1868	No	Yes	---	
			Euxesta willistoni Coquillett, 1900	No	Yes	---	
			Euxesta xeres Curran, 1935	No	Yes	---	
			Euxesta zacki Steyskal, 1986	No	Yes	---	
		Notogramma	2				
			Notogramma cimiciformis Loew, 1868	No	Yes	FSCA	
			Notogramma purpuratum Cole, 1923	No	Yes	FSCA	
		Stenomyia	3				
			Stenomyia hendeli Johnson, 1913	No	Yes	USNM	1396500
			Stenomyia nasoni Cresson 1913	No	Yes	USNM	1396582
			Stenomyia tenuissima Hendel, 1910	No	Yes	FSCA	
		Zacompsia	1				
			Zacompsia fulva Coquillett, 1901	No	Yes	FSCA	
	Pterocallini						
		Xanthacrona	1				
			Xanthacrona bipustulata Wulp, 1899	No	Yes	USNM	1396615
	Seiopterini						
		Homalocephala	3				
			Homalocephala apicalis Wahlberg, 1839	Yes	Yes	USNM	1396470
			Homalocephala bipunctata Loew, 1854	Yes	Yes	---	
			Homalocephala similis Cresson, 1924	Yes	Yes	---	
		Pseudoseioptera	2				
			Pseudoseioptera albipes Cresson, 1919	Yes	Yes	USNM	1396505
			Pseudoseioptera dubiosa Johnson, 1921	Yes	Yes	---	
		Seioptera	3				
			Seioptera colon Loew, 1868	No	Yes	USNM	1396513
			Seioptera costalis Walker, 1849	Yes	No	---	
			Seioptera vibrans Linnaeus, 1758	Yes	Yes	USNM	1396515
	Ulidiini						
		Physiphora	6				
			Physiphora alceae Preyssler, 1791	Yes	Yes	FSCA	
			Physiphora clausa Macquart, 1843	Yes	Yes	FSCA	
			Physiphora hendeli Johnson, 1913	No	Yes	---	
			Physiphora laticauda Loew, 1873	No	Yes	---	
			Physiphora nasoni Cresson, 1913	No	Yes	---	
			Physiphora tenuis Loew, 1868	No	Yes	---	
		Steneretma	1				
			Steneretma laticauda Loew, 1873	No	Yes	USNM	

therefore excluded.

The terminology used follows the standard set in the "Adult Morphology and Terminology" chapter of the Manual of Afrotropical Diptera (Cumming and Wood 2017). "Frontal index" refers to the ratio of frons height to frons width at base. Figures 2-7 provide pictures of ulidiids from the key with relevant morphological traits labeled.

The bulk of the text in the original dichotomous key is preserved from Steyskal (1987). Where relevant, terms are updated to comply with the terminology from the Manual of Afrotropical Diptera, as in the replacement of "bristle" with "seta." Additional small changes to the original text were made to clarify, correct, or remove redundant and potentially confusing traits. For example, in couplet #30, 30' stated "tibiae usually distinctly banded," but this is contradicted by couplet 32, which clarifies that neither *Pseudotephritina* Malloch nor *Xanthacrona* Wulp possess distinctly banded tibiae.

Specimen Imaging

With the exception of *Hiatus fulvipes* Cresson (represented by non-photographic illustrations) and *Texasa chaetifrons* Steyskal (type: United States Natural Museum, image: Dr. Allen Norrbom), all images in this key were taken by the author. Each final image was produced through focus stacking. Initial photographs were taken using a Canon EOS 6D camera with either the Canon MP-E 65mm 1-5x macro lens or the Laowa 60mm f/2.8 2X Ultra-Macro (used for some of the specimens from the FSCA), at variable magnification and aperture depending on specimen, mounted on a Cognisys StackShot standard macro rail. Images were stacked using the Zerene Stacker system. Additional images of *Texasa chaetifrons, Physiphora clausa* Macquart, and *Tritoxa flexa* Wiedemann were taken with Canon EOS 5DS and MP-E 65mm lens. Edits, to remove blemishes and to correct for color and clarity, were performed using Adobe Photoshop CS6. The specimen identified as *Tritoxa cuneata* Loew was photographed before the publication by Sinclair et al. (2021) describing two new species in the *T. cuneata* species complex; locality information and male genitalia are unavailable to determine whether it is actually *T. californica* Sinclair et al. or *T. decipiens* Sinclair et al. rather than *T. cuneata*. One species, *Hiatus fulvipes*, is known exclusively by several type specimens and was unavailable for photography; it is represented with drawn illustrations. These illustrations were completed by an artist using Plate VI of Cresson (1906) as a reference.

For each trait used diagnostically in the key, an image was attempted; however, several traits were not visible from the available specimens due to the position in which they were pinned.

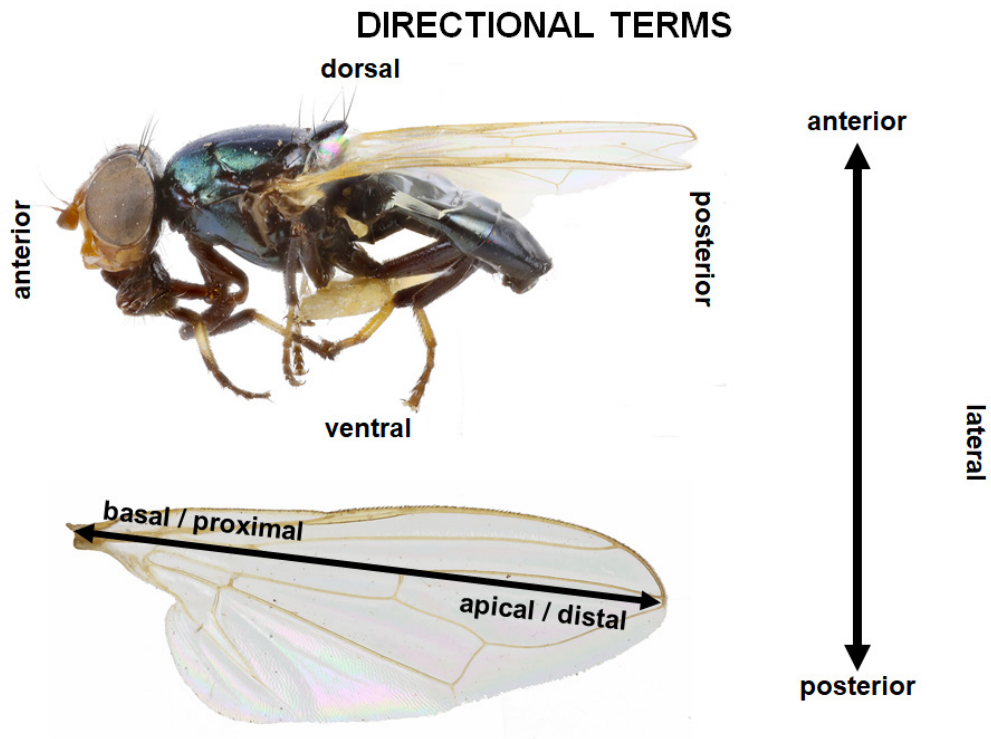


Figure 2: *Physiphora alceae* from the Florida State Collection of Arthropods labeled with directional terms used throughout the text. The double-headed arrow indicates directional terms for dorsal views.

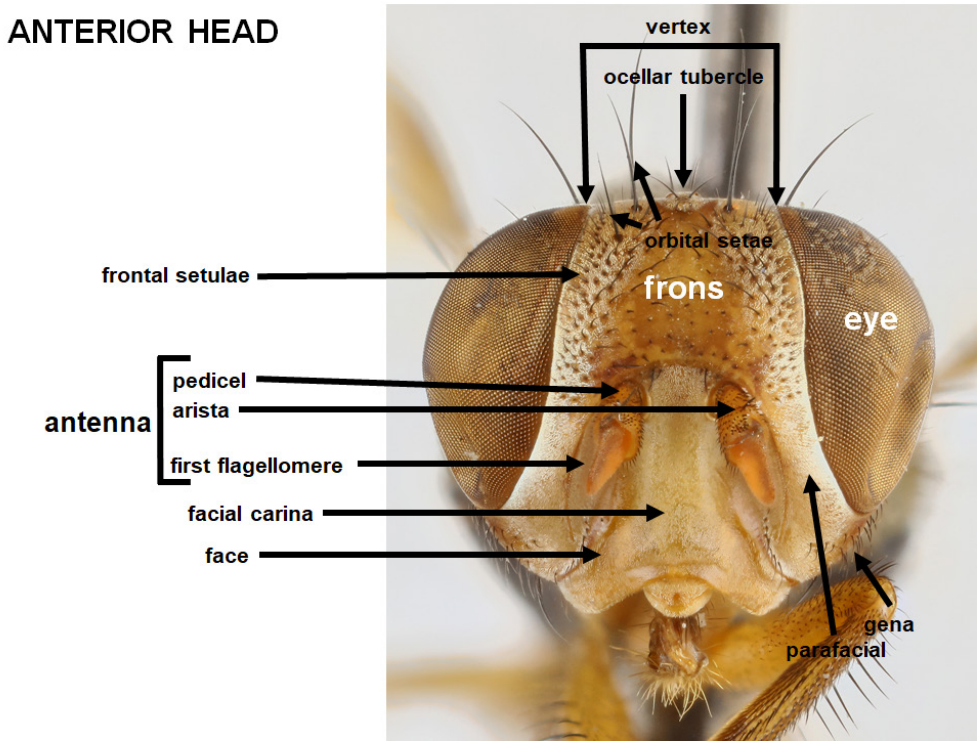


Figure 3: *Ceroxys latiusculus* from the Florida State Collection of Arthropods, labeled with terms for different characters of the head.

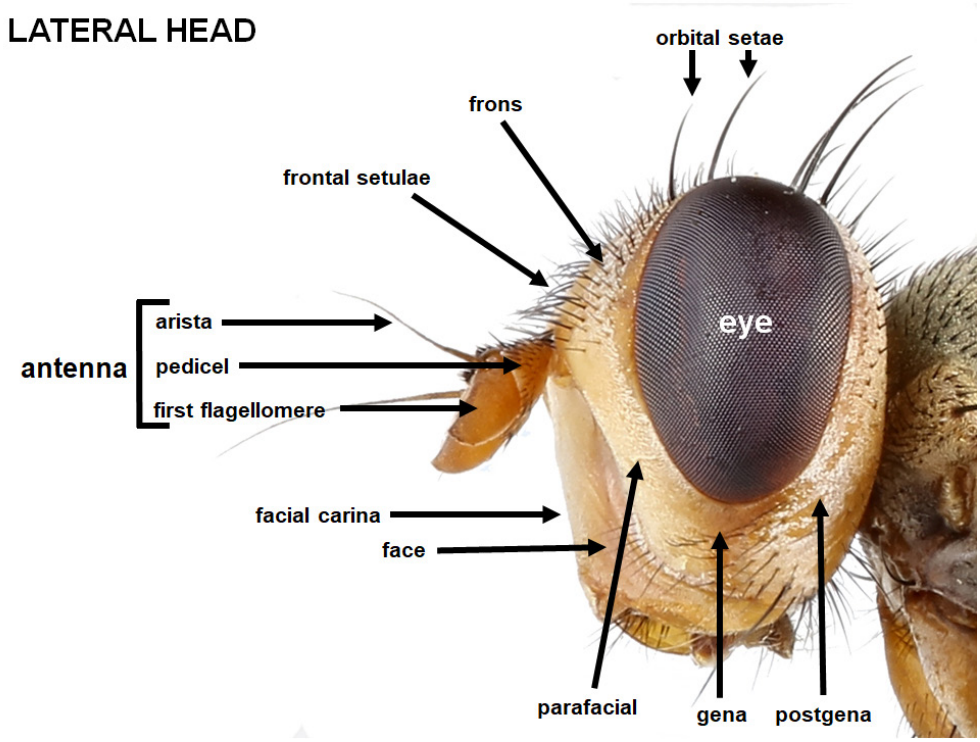


Figure 4: *Ceroxys latiusculus* from the Florida State Collection of Arthropods, labeled with terms for different characters of the head.

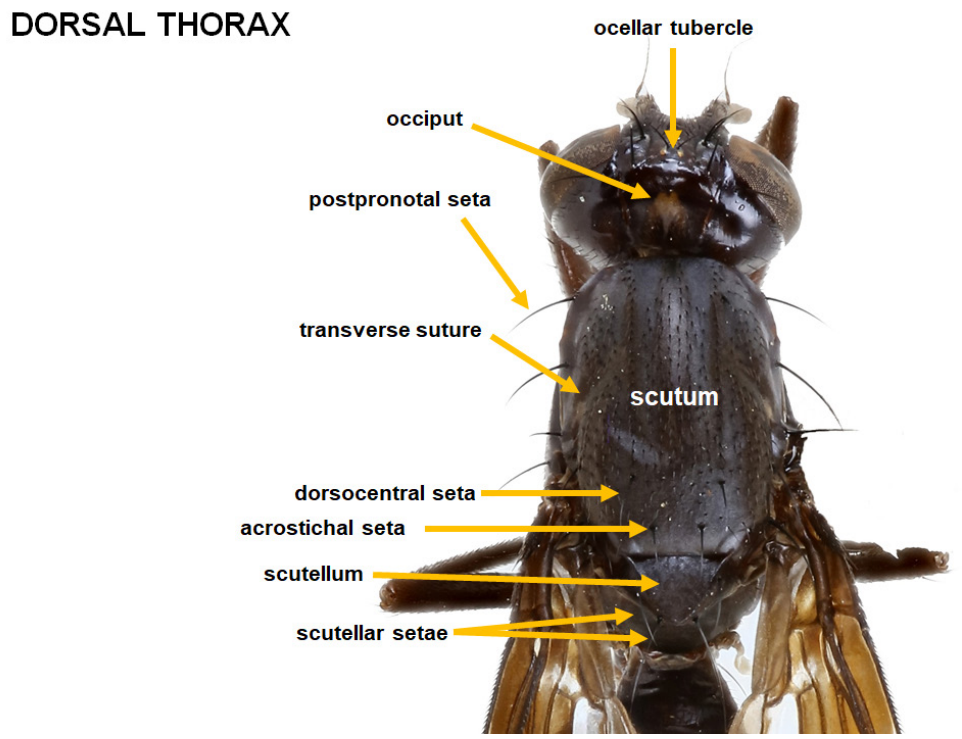


Figure 5: *Tritoxa flexa* from the Florida State Collection of Arthropods, with labels for characters visible dorsally.

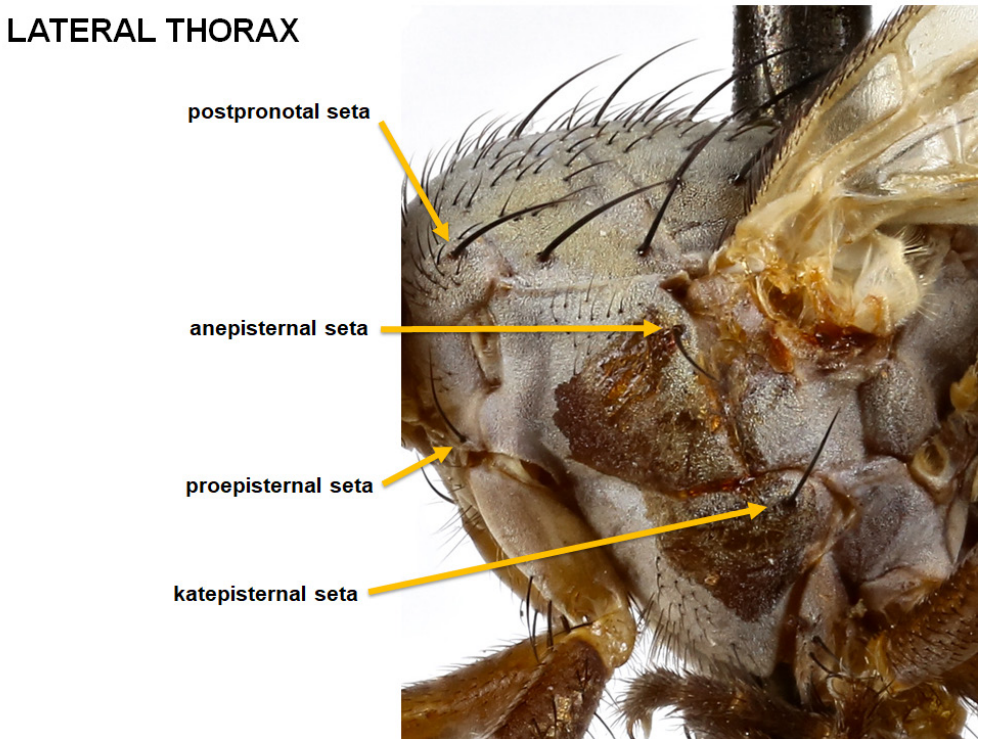


Figure 6: *Melieria picta* from the Smithsonian National Museum of Natural History Collection with thoracic setae used in this key labeled

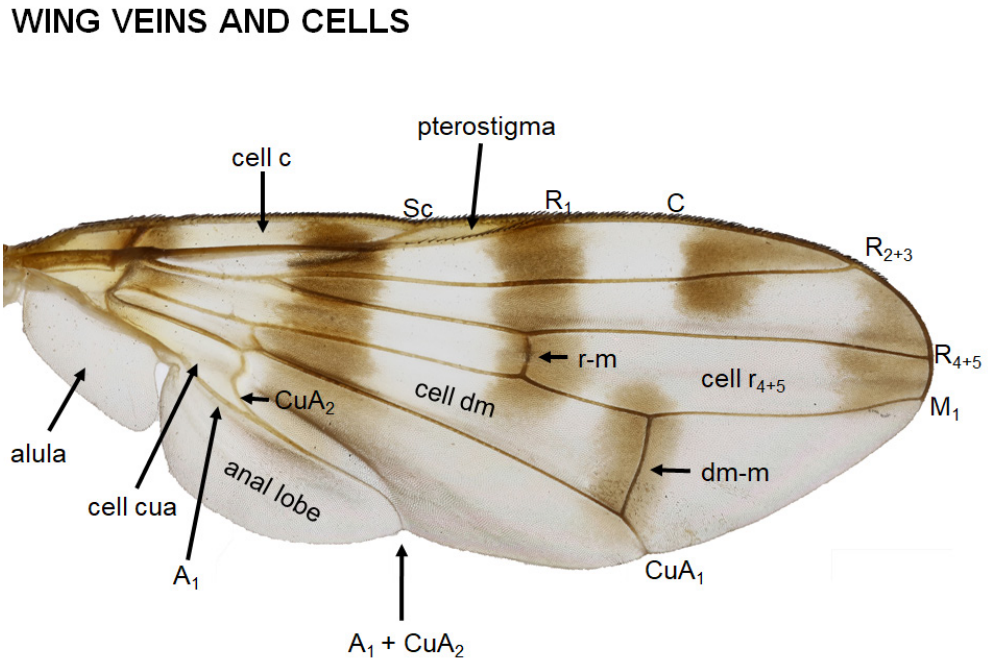


Figure 7: Wing of *Ceroxys latiusculus* from the Florida State Collection of Arthropods with veins, crossveins, and cells used for identification in this key labeled.

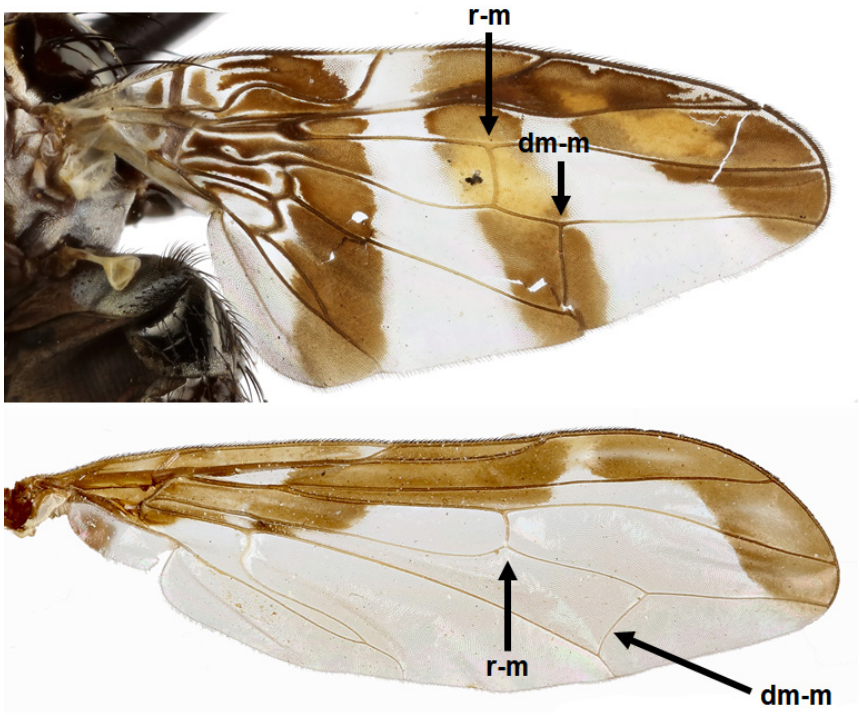
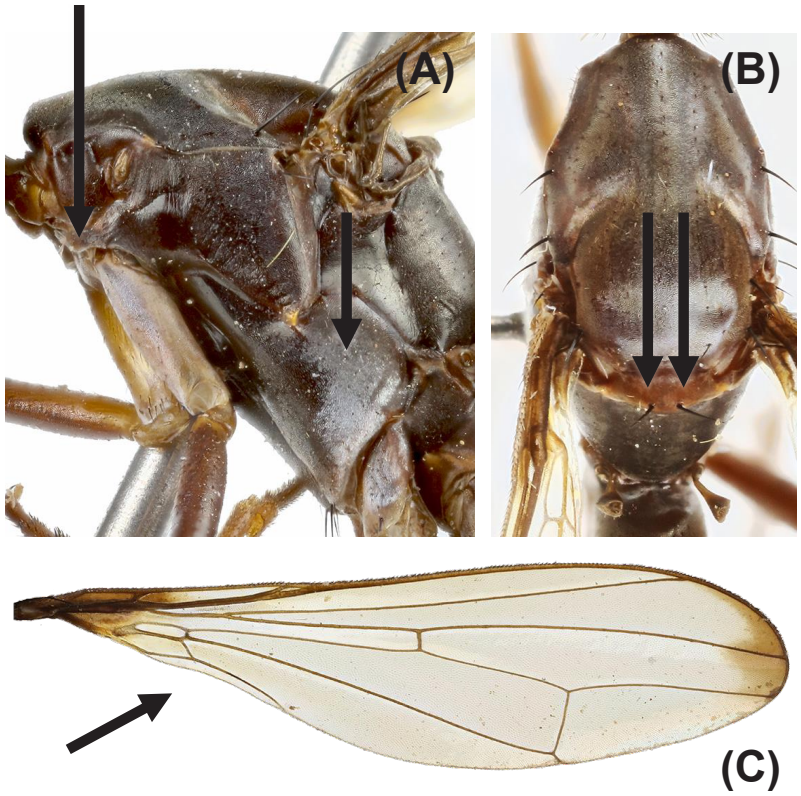


Figure 8: Wings of *Dyscrasis hendeli* (top) and *Diacrita costalis* (bottom) with crossveins r-m and dm-m labeled. In *Dyscrasis hendeli* the two are parallel, which distinguishes it from *Diacrita* spp.

Illustrated key to the genera of Ulidiidae of the United States and Canada



1) Katepisternal seta absent. (Wing narrow, with R_1 setulose apically; alula absent. Proepisternal seta very small; one pair of scutellar setae present. Form ant-like).

Images: *Myrmecothea myrmecoides*. Arrows on the lateral view of the thorax (A) indicate the weak proepisternal and absent katepisternal setae (B) shows singular pair of scutellar setae, and (C) the lack of an alula.

Myrmecothea Hendel

1') Katepisternal seta present, although sometimes weakly so. Other characters variable, but not in the above combination.

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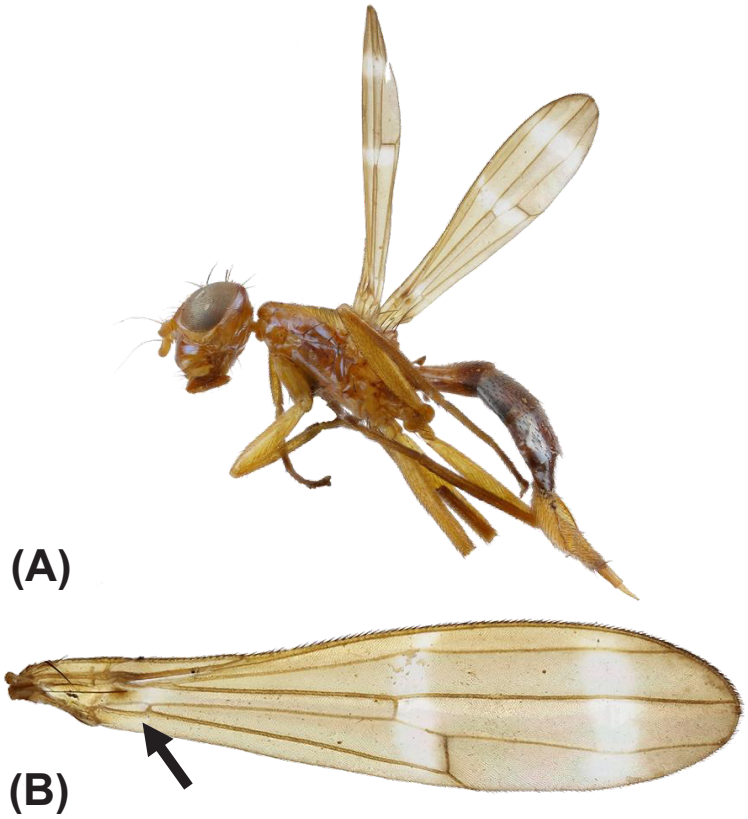
Image: Thorax (lateral view) of *Tritoxa incurva*. Arrow pointed at katepisternal seta.

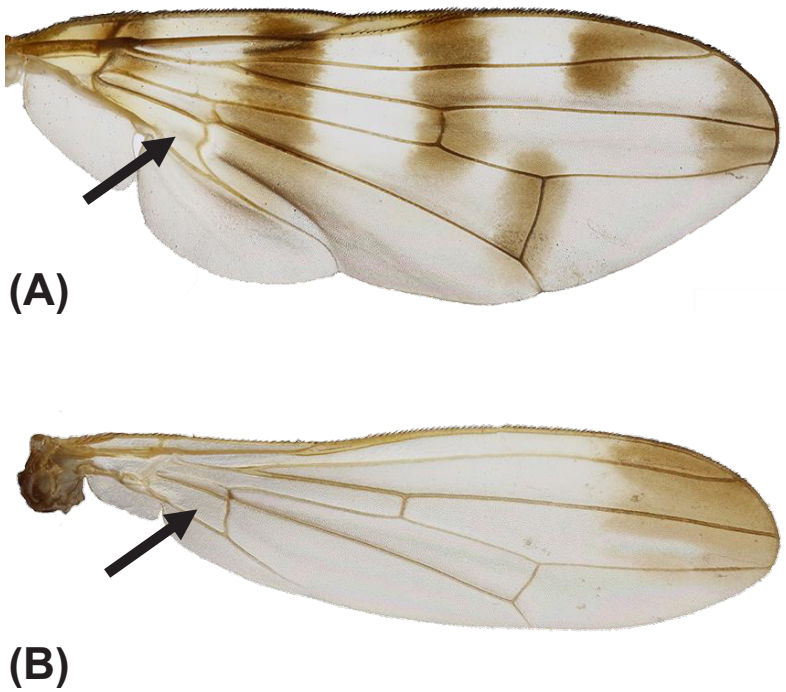
2



2) Cell cua absent; wing more than 3.9 times as long as wide. Form ant-like.

Images: *Steneretma laticauda.* (A) Lateral habitus, (B) wing; arrow indicates absence of cell cua.

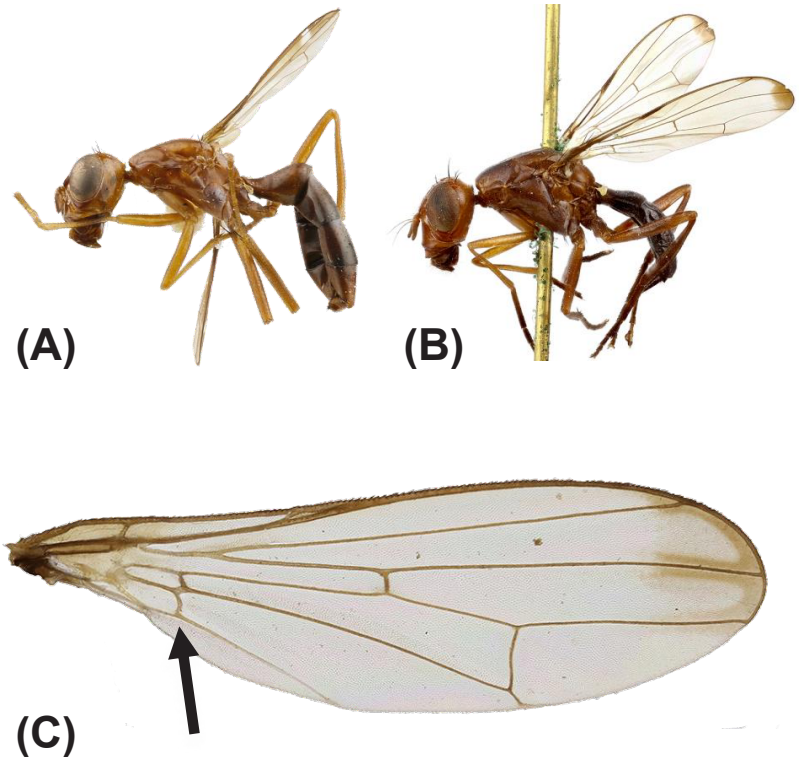
Steneretma Loew



2') Cell cua present; wing less than 3.7 times as long as wide. Form variable, not ant-like (except in *Myiomyrmica*).

Images: (A) Wing of *Ceroxys latiusculus*. (B) Wing of *Eumetopiella rufipes*. Both show arrows pointed at cell cua.

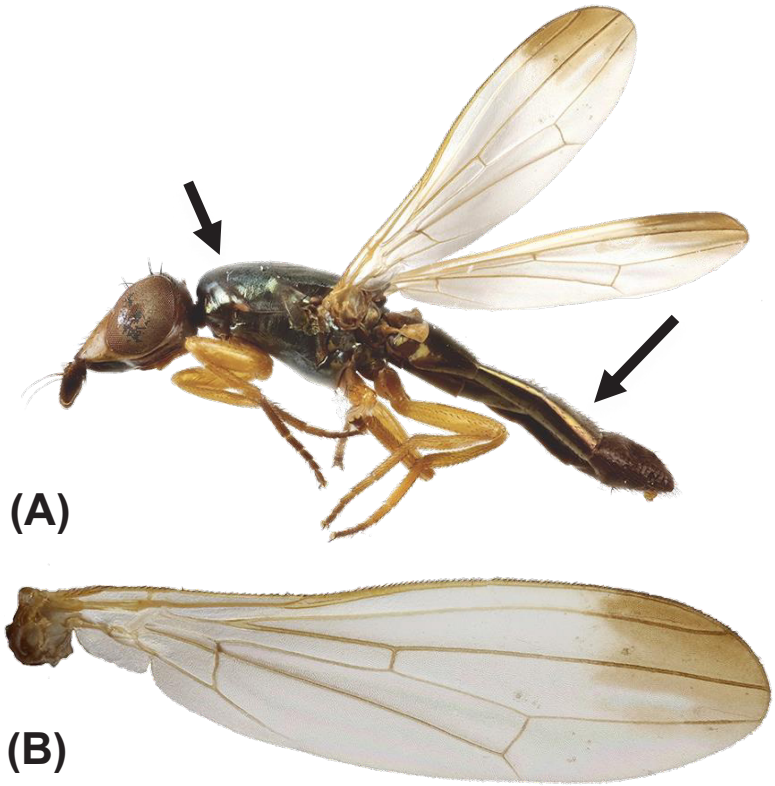
3



3) Wing with little color pattern; cell cua without extension. Proepisternal seta small or lacking. Body without metallic coloration. Body reddish, ant-like.

Images: Lateral habitus of *Myiomyrmica fenestrata* (A) and *Cephalia rufipes* (B). (C) isolated shot of the wing of *Cephalia flavoscutellata;* arrow indicates lack of cell cua extension.

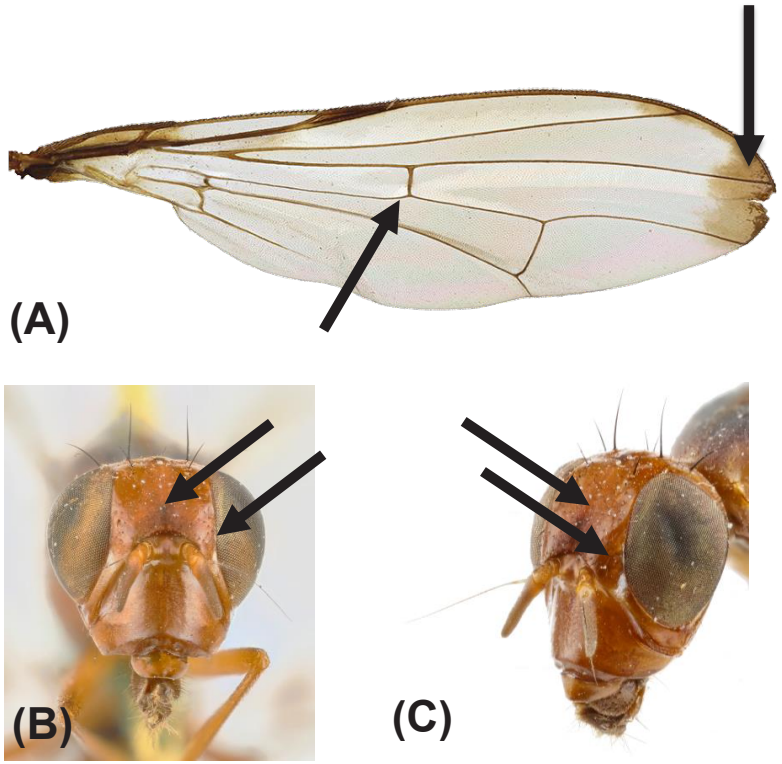
4



3') Wing often with extensive color pattern, cell cua typically with extension. Proepisternal seta present. Body sometimes metallic (as in *Eumetopiella,* pictured). Form not ant-like.

Images: *Eumetopiella rufipes*. (A) Lateral habitus; metallic sheen present across thorax and abdomen. (B) Wing

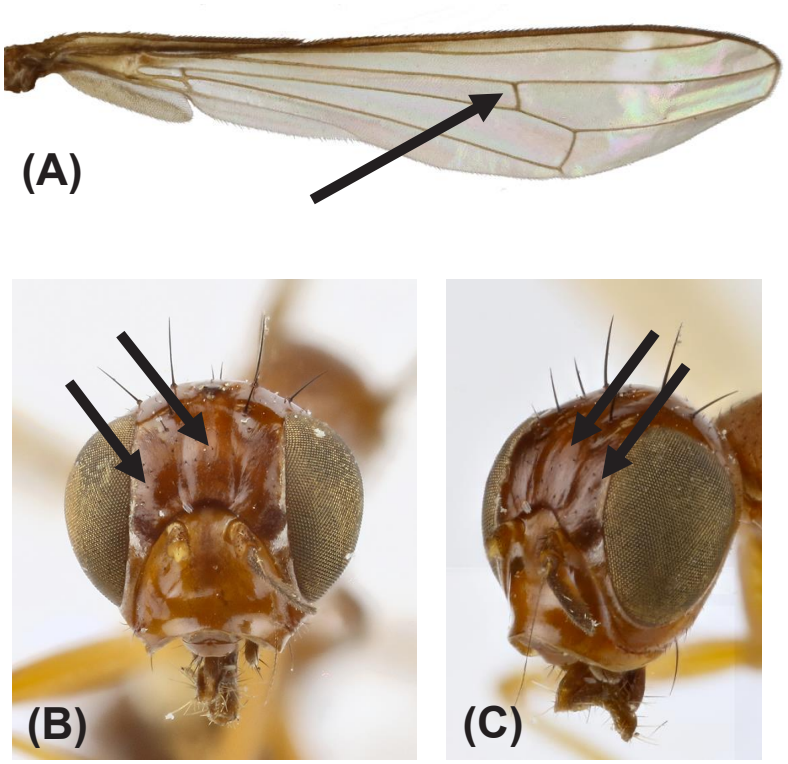
5



4) Frons with narrow but distinct dull median stripe. Wing nearly three times as long as wide; crossvein r-m at midlength of wing; color hyaline, with apical dark spot.

Images: *Cephalia rufipes* (A) Wing, indicating crossvein r-m and apical dark spot. (B-C) show head from two angles; in both, the frons is laterally shining and medially dull.

Cephalia Meigen



4') Frons wholly shining. Wing four times as long as wide; crossvein r-m at 2/3 of distance from base to apex of wing; color brownish with subapical transverse hyaline bar.

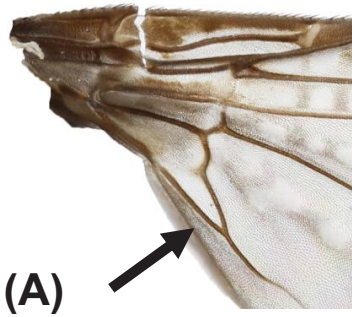
Images: *Myiomyrmica fenestrata.* (A) Wing, indicating crossvein r-m. (B-C) show head from two angles; in both, the frons is shining throughout.

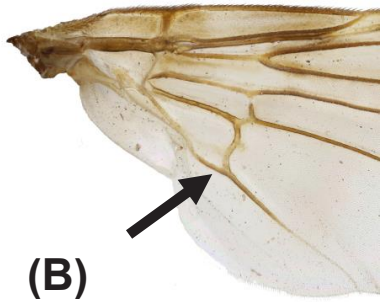
Myiomyrmica Steyskal

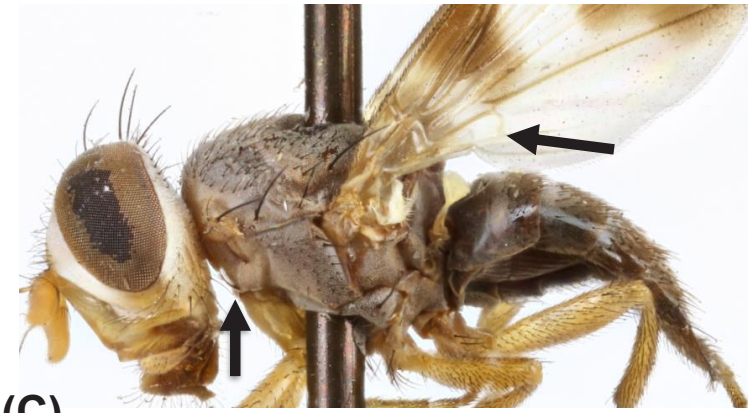
5) Cell cua closed apically by straight or outwardly arcuate vein, and entirely without point or extension in posteroapical corner. Proepisternal seta absent or very small.

Images: Both isolated shots of wings: *Curranops scutellaris* (A) and *Delphinia picta* (B). Arrows indicate absence of posteroapical extension of cell cua, and how it is closed by a straight (A) or outwardly arctuate (B) vein.

6





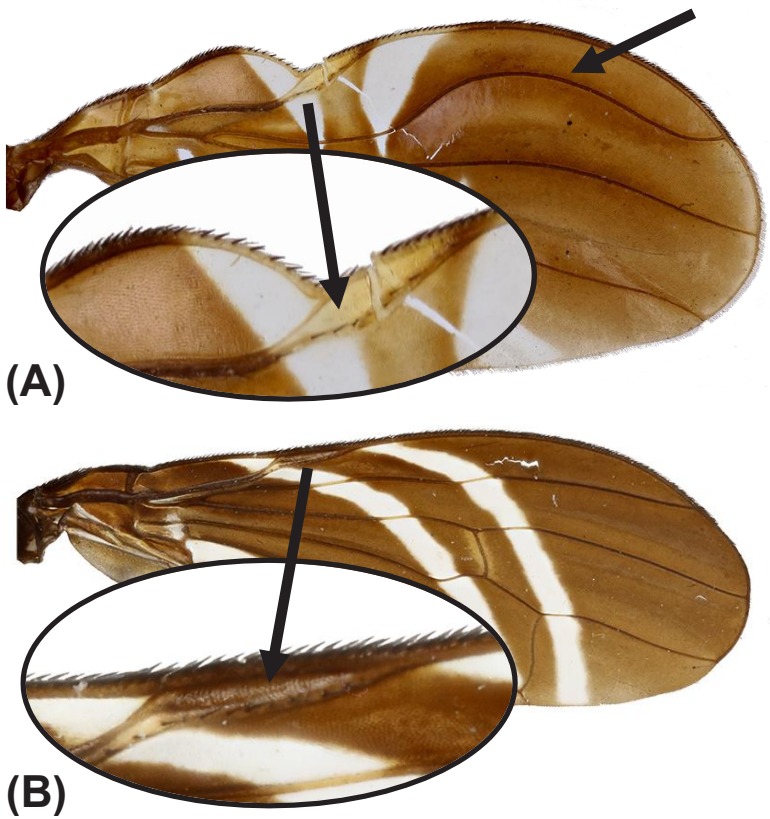


5') Cell cua usually with at least a small point or extension in posteroapical corner. If cell cua wholly without point, proepisternal seta well-developed

Images: A-B closeups of basal portion of wing of *Stictomyia longicornis* (A) and *Tetanops cazieri* (B), showing variability in point/extension in posteroapical corner of cua. (C) shows *Herina narytia*, without point but with well-developed proepisternal bristle.

13

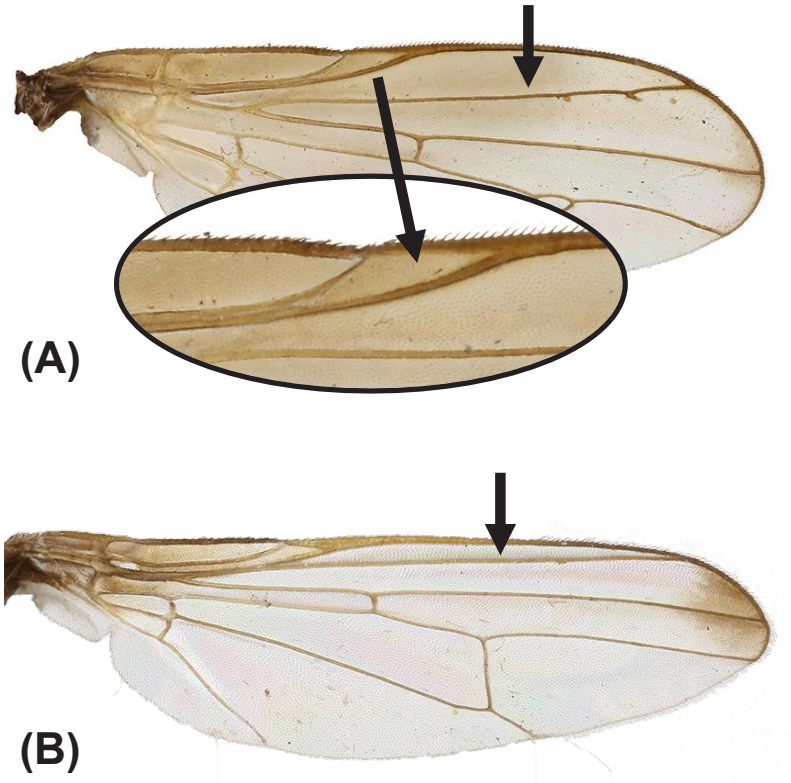
doi:10.3752/cjai.2021.45



6) R_{2+3} usually sinuate. R_1 noticeably setulose apically. Wing mostly pigmented; if R_{2+3} straight, wing with visible pattern of stripes.

Images: Wings of *Delphinia picta* (A) and *Tritoxa flexa* (B). R_{2+3} significantly more sinuate in (A), but further close-ups on both indicate noticeably setulose R_1.

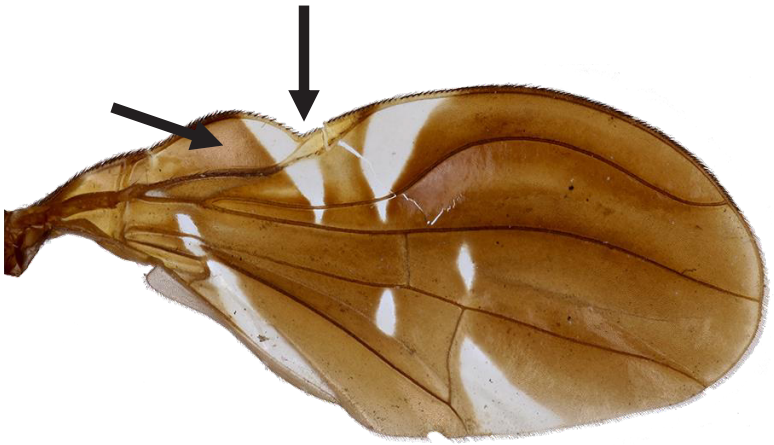
7



6') R_{2+3} straight. R_1 bare or with only several setulae. Wing mostly unpigmented.

Images: Wings of *Psaeropterella macrocephala* (A) and *Curranops scutellaris* (B). R_{2+3} straight in both. Further close-up on (A) shows R_1 bare.

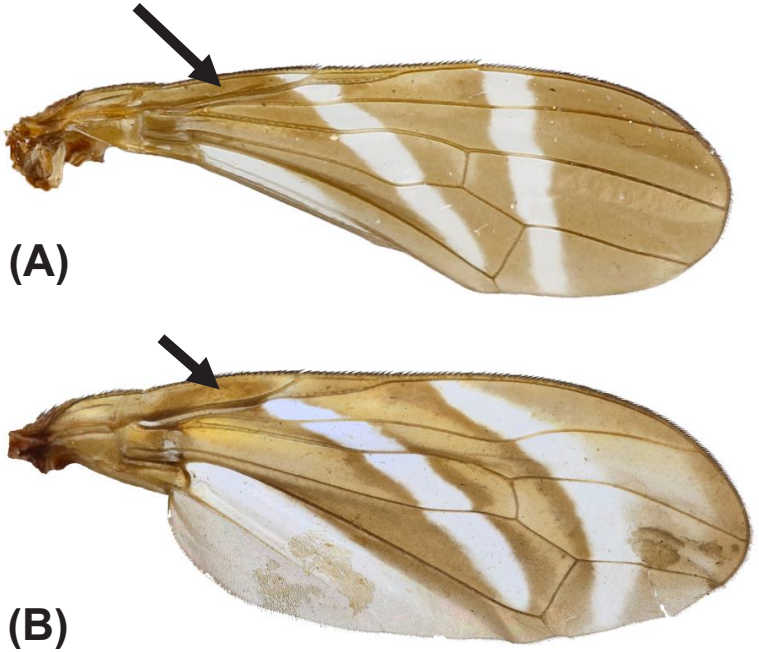
8



7) Cell c wide, convex anteriorly.

Images: Wing of *Delphinia picta*. Arrows indicate significant width of cell c, and its anterior convexness.

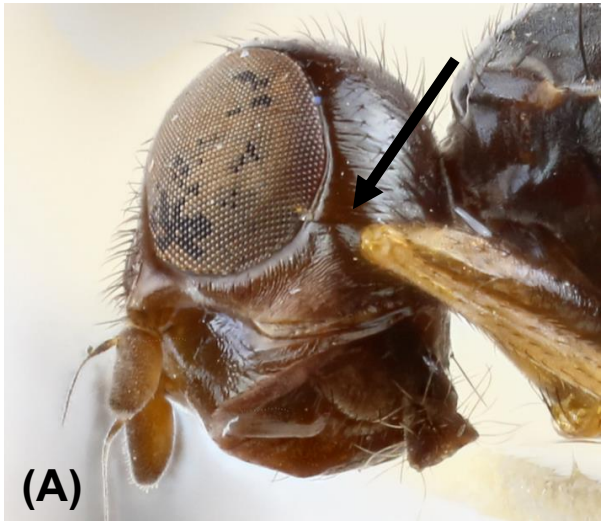
Delphinia Robineau-Desvoidy



7') Cell c narrow, with anterior edge straight.

Images: Wings of *Tritoxa cuneata* (A) and *Tritoxa incurva* (B). Arrows show no especial width to cell c and absence of the anterior dip present in *Delphinia picta*.

Tritoxa Loew



8) Scutellum with one pair of setae. R_1 setulose or bare. Gena more than ¼ height of eye; postgena swollen, shining; upper parafacial often transversely wrinkled.

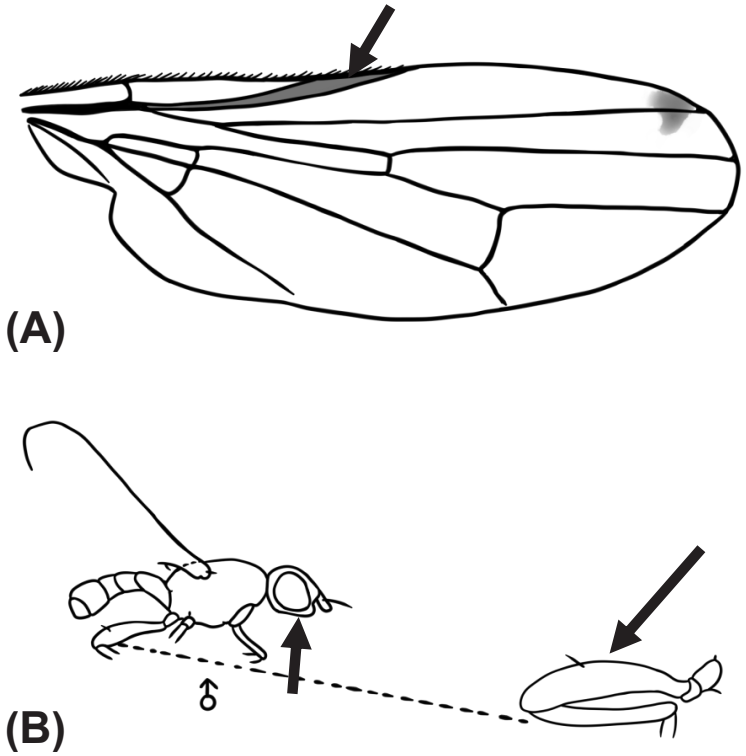
Images: Both pictures of *Curranops scutellaris*, head (A) and wing (B). Arrow in (A) indicating swollen postgena.

Curranops Harriot

8') Scutellum with two pairs of setae. Otherwise various.

Images: Dorsal shot of the thorax of *Haigia nevadana;* arrows indicate two pairs of scutellar setae.

9



9) Gena less than ¼ height of eye. Hind femur thickened, actuate in male, with middorsal bristle. (R_1 setulose. Three dorsocentral setae).

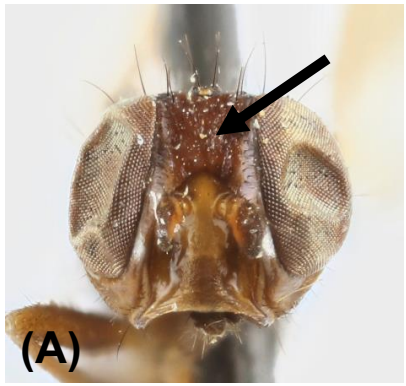
Images: *Hiatus fulvipes*. (A) indicates R_1 on wing; (B) points arrows at the slim gena and male hind femur, bearing middorsal bristle.

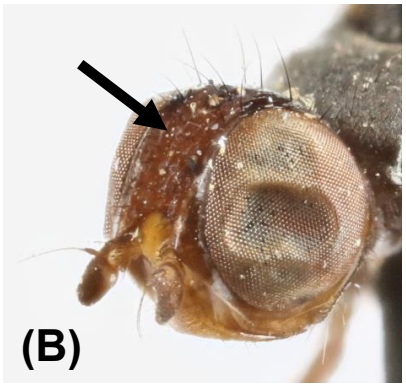
Hiatus Cresson

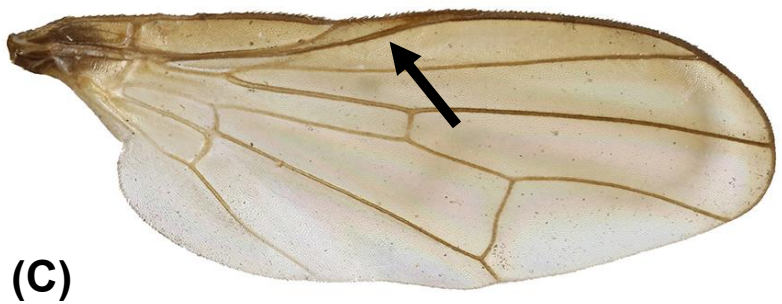
9') Gena ¼ - 1/3 height of eye. Hind femur not thickened.

Images: Lateral habitus of *Psaeropterella macrocephala*. Arrows indicate relative width of gena and un-thickened hind femur.

10



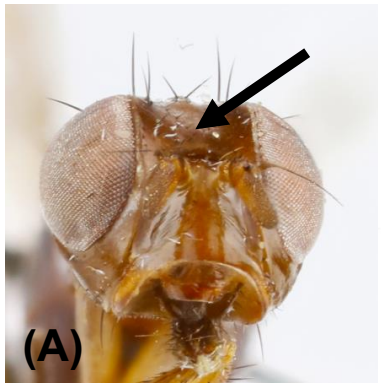


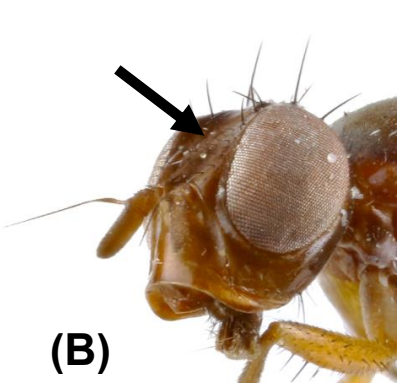


10) Frons dull. Wing without color pattern. R_1 bare or with only one or two setulae near tip.

Images: *Tujunga mackenziei.* A-B show head from different perspectives, arrow pointed at the frons. (C) shows the wing lacking color pattern; arrow pointed at R_1.

Tujunga Steyskal





10') Frons wholly shining or dull medially. Wing with color pattern. R_1 with several setulae.

Images: *Haigia nevadana*. A-B show head from different perspectives, arrow pointed at the frons. (C) shows wing bearing a pattern of dots.

11

11) Pedicel fully as long as high. Frons dull medially, shining laterally.

Images: Head of *Psaeropterella macrocephala*; two arrows pointed at the center and edge of frons, showing it shining laterally. Closeup on antenna shows pedicel as long as high.

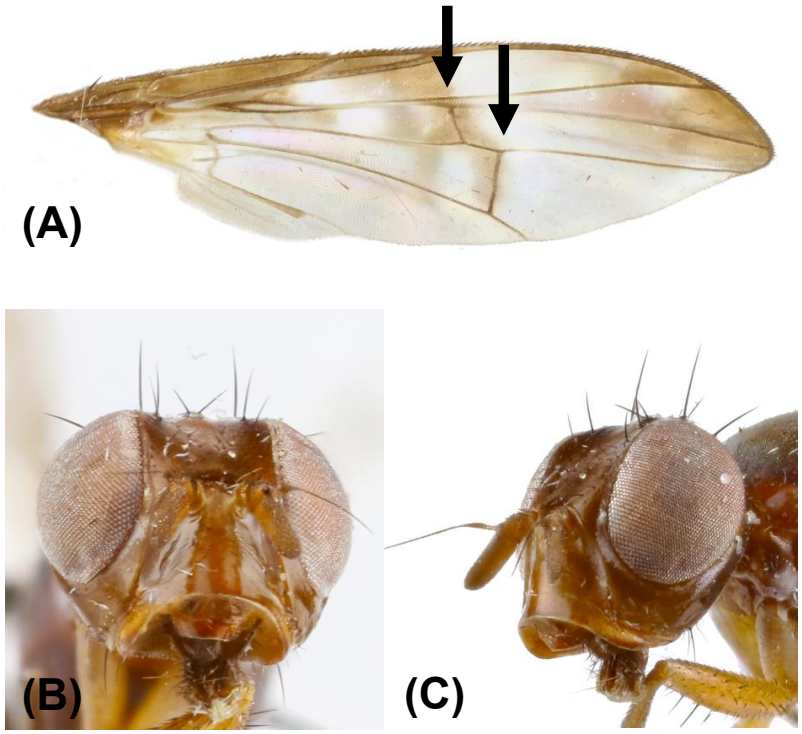
Psaeropterella Hendel

11') Pedicel clearly shorter than high. Frons wholly shining.

Image: Head of *Homalocephala albitarsis* (not a Nearctic species; included to illustrate character). Arrow pointed at pedicel shows it to be relatively broader, shorter than it is high.

12

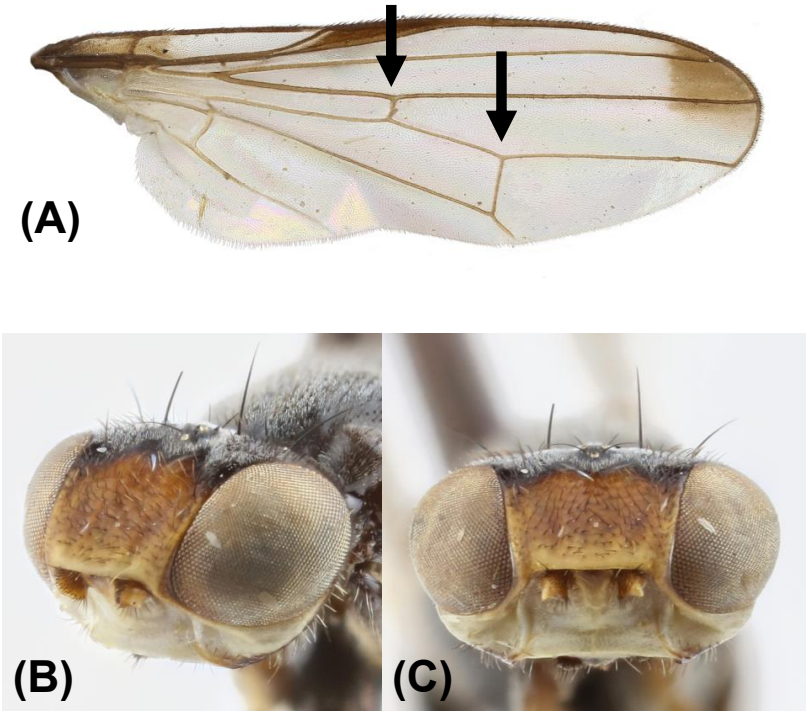
doi:10.3752/cjai.2021.45



12) Crossveins r-m and dm-m closer together than length of crossvein dm-m. Head about as high as wide.

Images: *Haigia nevadana.* Arrows in (A) indicate crossveins r-m and dm-m, closer together than length of the latter. B-C show head, about as high as wide.

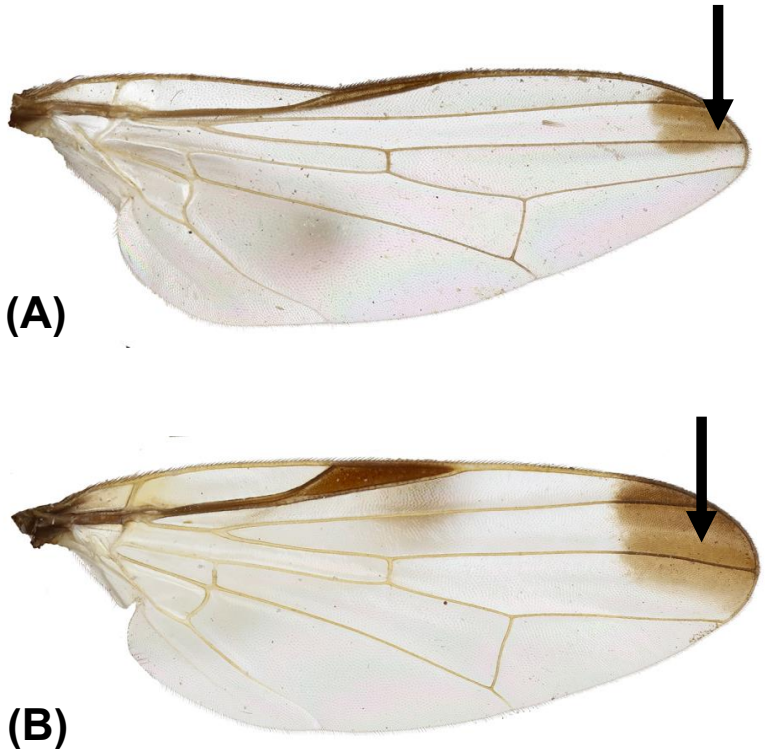
Haigia Steyskal



12') Crossveins r-m and dm-m widely separated. Head distinctly broader than high.

Image: (A) wing of *Homalocephala apicalis* showing length between crossveins longer than in *Haigia*. B-C show head of *Homalocephala biumbrata* (not a Nearctic species; included to illustrate character).

Homalocephala Zetterstedt



13) Anepisternal seta absent (image of thorax on next page). Wing hyaline with apical brown spot and

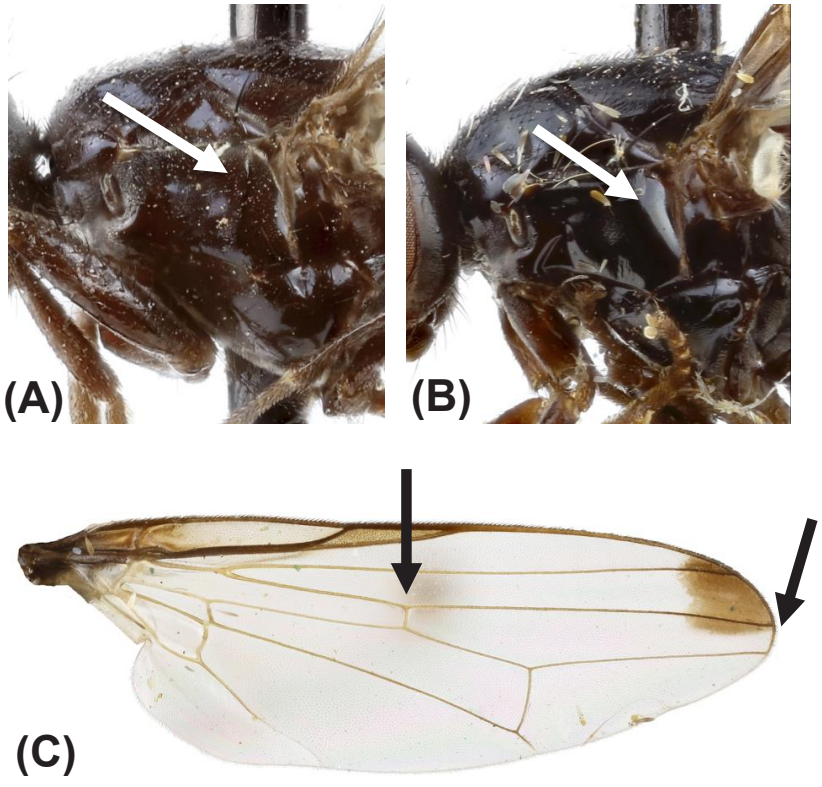
Images: Wings of *Seioptera vibrans* (A) and *Pseudoseioptera albipes* (B), both with apical dark spot indicated by arrows.

14

13') Anepisternal seta present. Wing marking variable.

Image: *Acrosticta fulvipes*. Wing of *Acrosticta fulvipes* has apical dark spot, as do other members of the genus, but can be distinguished from *Seioptera* and *Pseudoseioptera* by the presence of anepisternal seta.

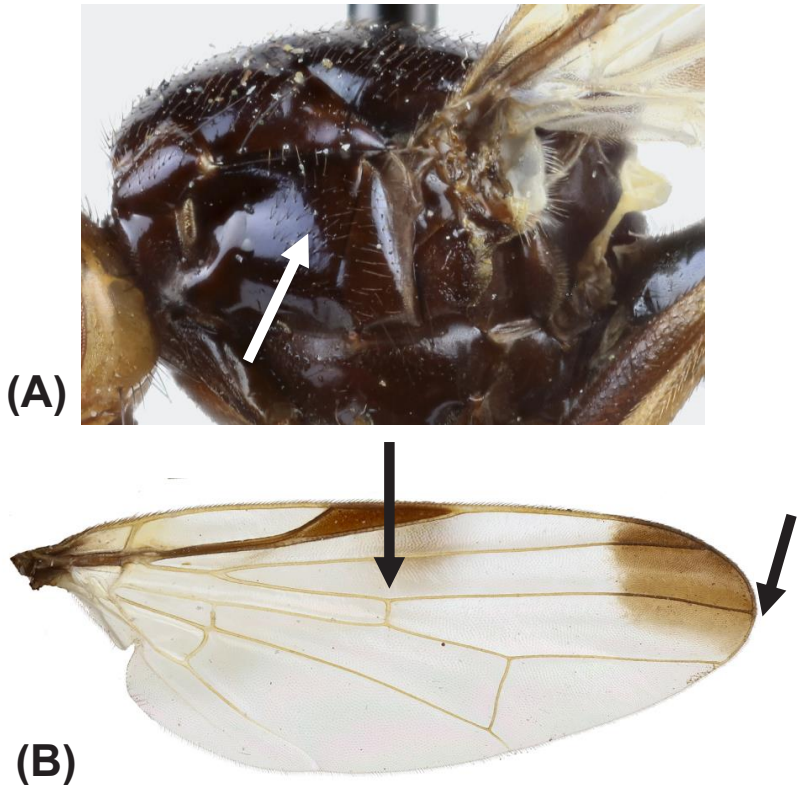
15



14) Anepisternum with rather dense extremely fine white pile, or bare. Wing with cell r_{4+5} strongly narrowed, to no more than slightly wider at tip than length of crossvein r-m; R_1 bare.

Images: A-B close-up lateral thorax of *Seioptera vibrans* (A) and *Seioptera colon* (B); arrows in both point to bare anepisternum. Wing in (C) of *Seioptera colon* points to crossvein r-m and narrow opening of cell r_{4+5} at wing tip.

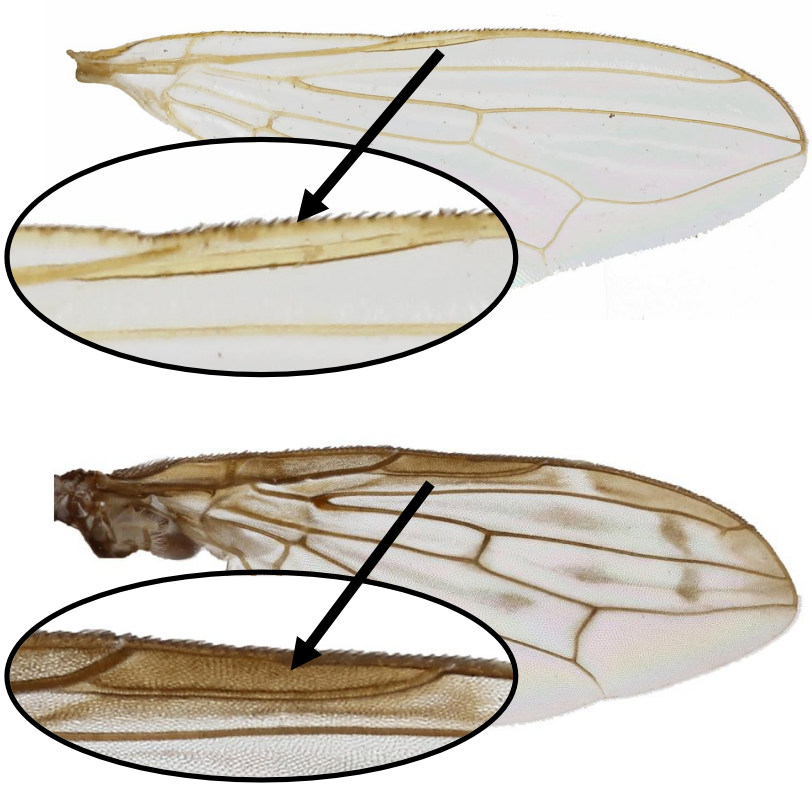
Seioptera Kirby



14') Anepisternum with short coarse blackish or dark brown setae. Cell r_{4+5} apically parallel-sided or nearly so, about twice as wide at tip as length of crossvein r-m; R_1 with at least a few setulae near tip.

Image: *Pseudoseioptera albipes*, in lateral close-up on thorax (A) and isolation of wing (B). Arrows in (A) points to short setae on anepisternum and in (B) to crossvein r-m and opening of cell r_{4+5}.

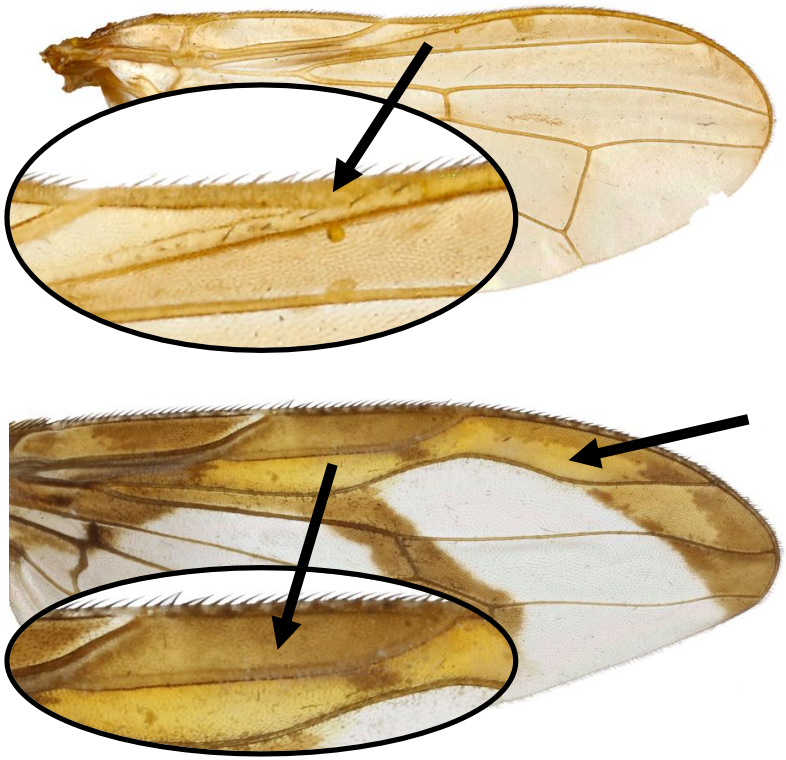
Pseudoseioptera Stackelberg



15) R_1 bare (except in a few species of *Euxesta* in which R_{2+3} not sinuate, see couplet 28).

Images: Wings of *Physiphora alceae* (A) and *Notogramma purpuratum* (B), both with close-ups of vein R_1.

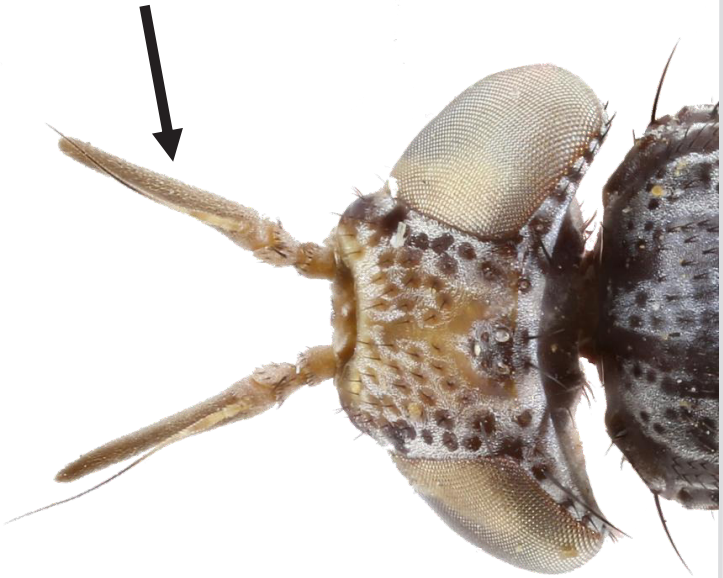
16



15') R_1 usually with at least a few setulae near tip; if bare, R_{2+3} sinuate.

Images: Wings of *Tetanops luridipennis* (A) and *Xanthacrona bipustulata* (B), both with further close-ups of vein R_1. In (B), R_{2+3} shown to be sinuate and R_1 bare.

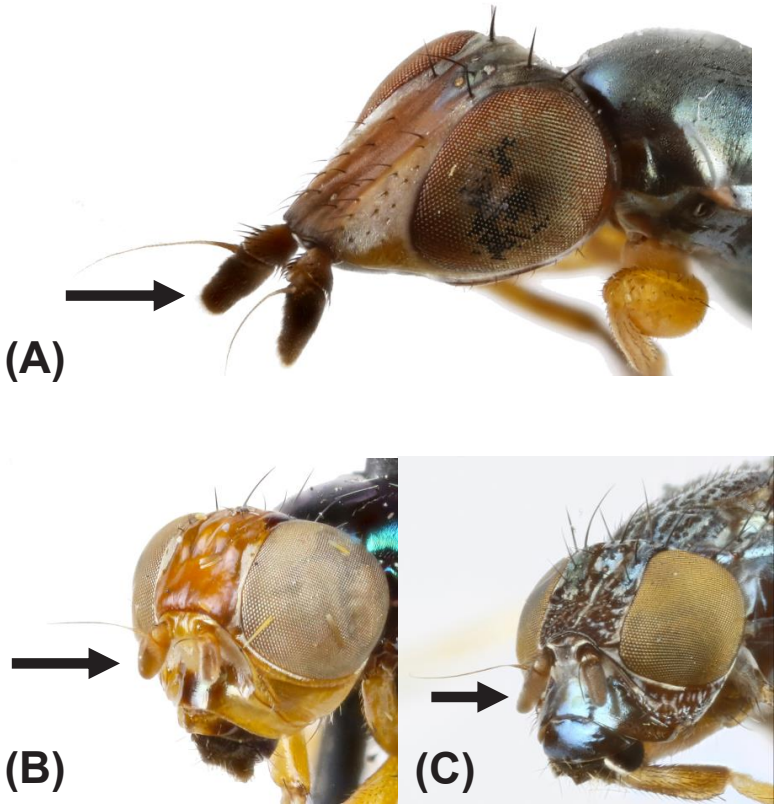
29



16) First flagellomere more than 3.5 times as long as wide.

Images: Head of *Stictomyia longicornis* viewed dorsally; first flagellomere clearly much longer than wide.

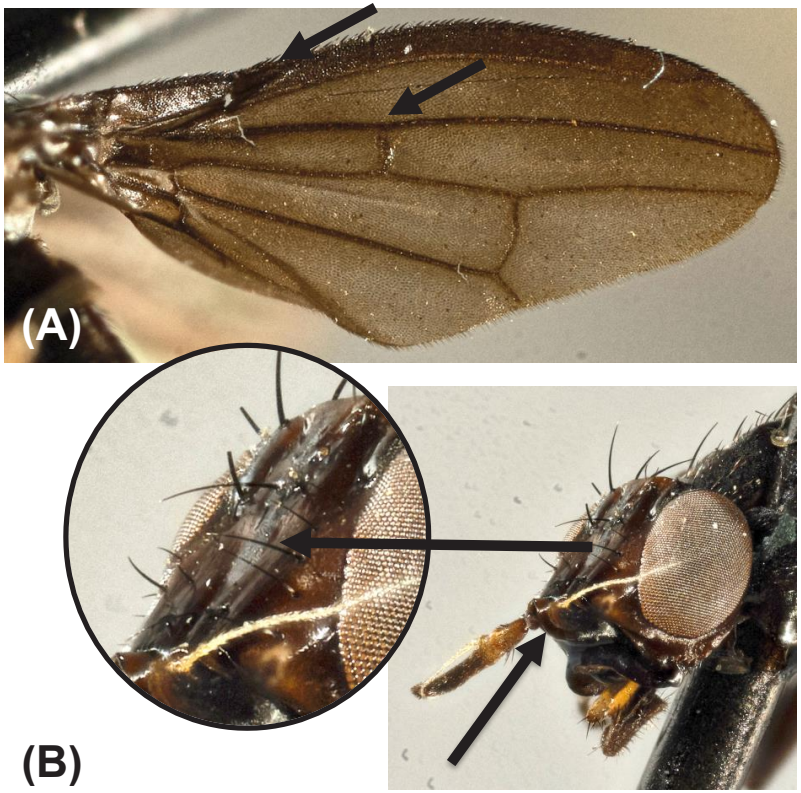
17



16') First flagellomere less than 3.5 (usually 1.5-2.5) times as long as wide.

Images: Heads of *Eumetopiella rufipes* (A), *Physiphora clausa* (B), and *Notogramma purpuratum* (C), arrows pointed at first flagellomere. Length is variable, but not 3x longer than wide.

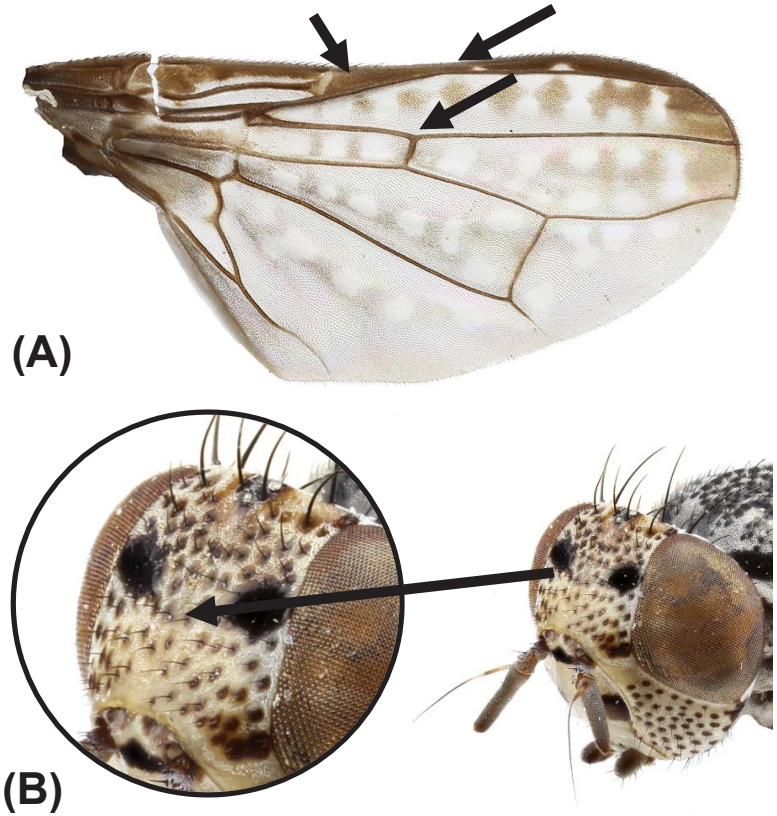
18



17) R_1 not nearly extending to level of crossvein r-m; pterostigmal section of C very short; wing uniformly brownish. Face protruding between antennae; gena lower than 1/3 height of eye; frons with strong setae.

Images: Wing (A) and head (B) of *Texasa chaetifrons*. Arrows in (A) at R_1 and r-m. Closeup on frons in (B) shows strong setae.

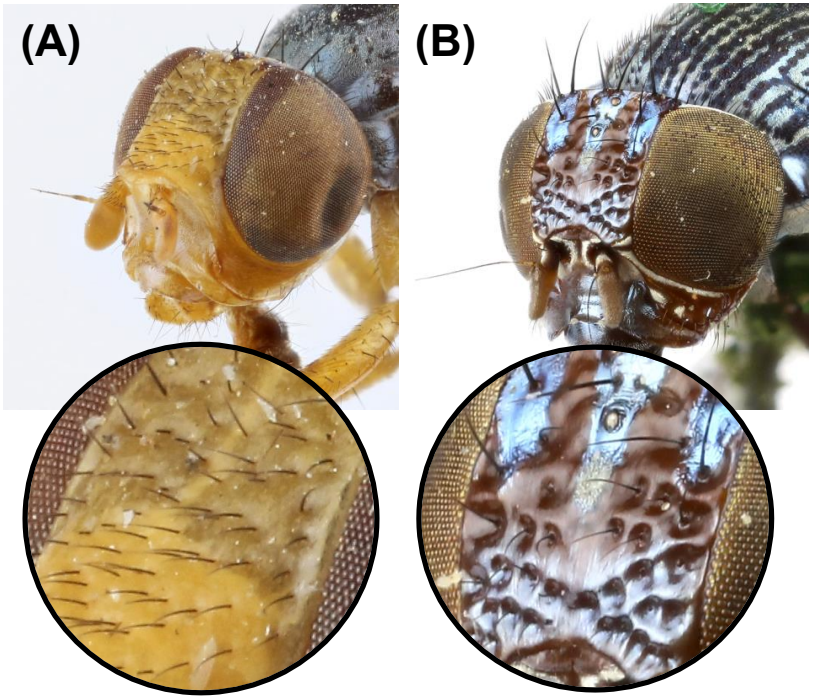
Texasa Steyskal



17') R_1 extending to level of crossvein r-m; pterostigmal section of C much longer than greatest width of cell c; wing with light and dark spots. Face not protruding between antennae; setulae of frons short and weak.

Images: Wing of *Stictomyia longicornis* (A), with arrows pointing at pterostigmal section of C, and at R_1 and r-m. Head in (B) of *Stictomyia punctata* shows short, weak setae on frons.

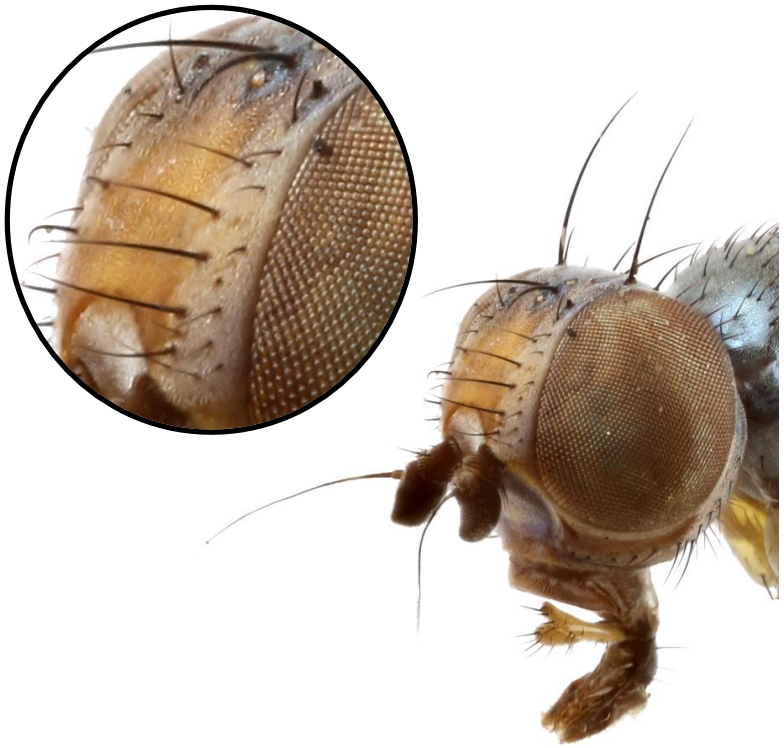
Stictomyia Bigot



18) Frons pitted or strongly wrinkled.

Images: Heads of *Acrosticta rufiventris* (A) and *Notogramma cimiciforme* (B), with close-ups on frons, shown to be pitted at base of setae (A) or strongly wrinkled (B).

19



18') Frons smooth or only slightly pitted at bases of setae.

Images: Head of *Chaetopsis apicalis*, with additional close-up on its frons, shown to be smooth.

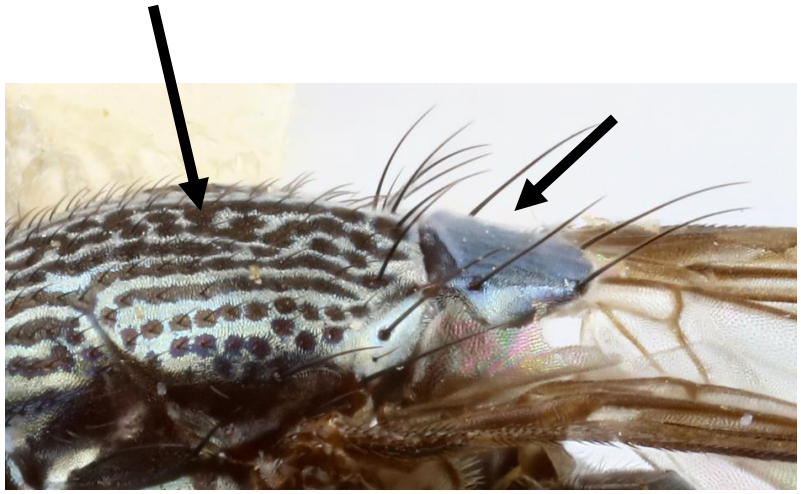
20

doi:10.3752/cjai.2021.45

19) Disc of scutellum convex. Vertex rounded. Mesonotal scutum without dotted/speckled pattern.

Images: Lateral view of scutum and scutellum of *Acrosticta apicalis,* showing scutellum to be convex. Scutum without pattern.

Acrosticta Loew

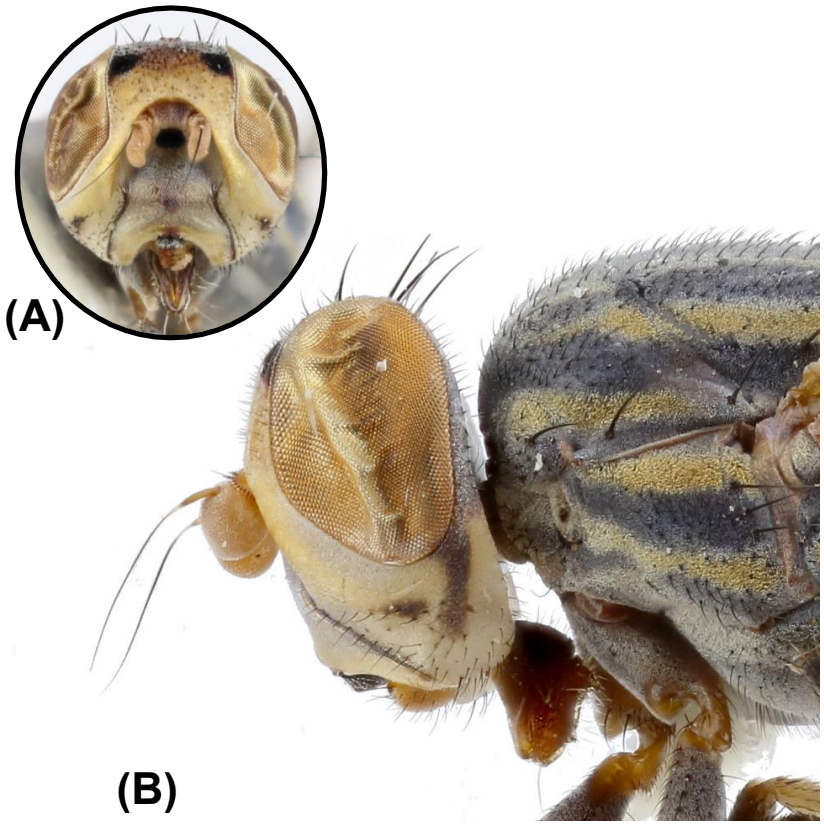


19') Disc of scutellum flattened. Vertex acute. Mesonotal scutum with dotted/speckled pattern.

Images: Lateral view of scutum and scutellum of *Notogramma purpuratum,* showing scutellum to be flattened. Scutum dotted.

Notogramma Loew

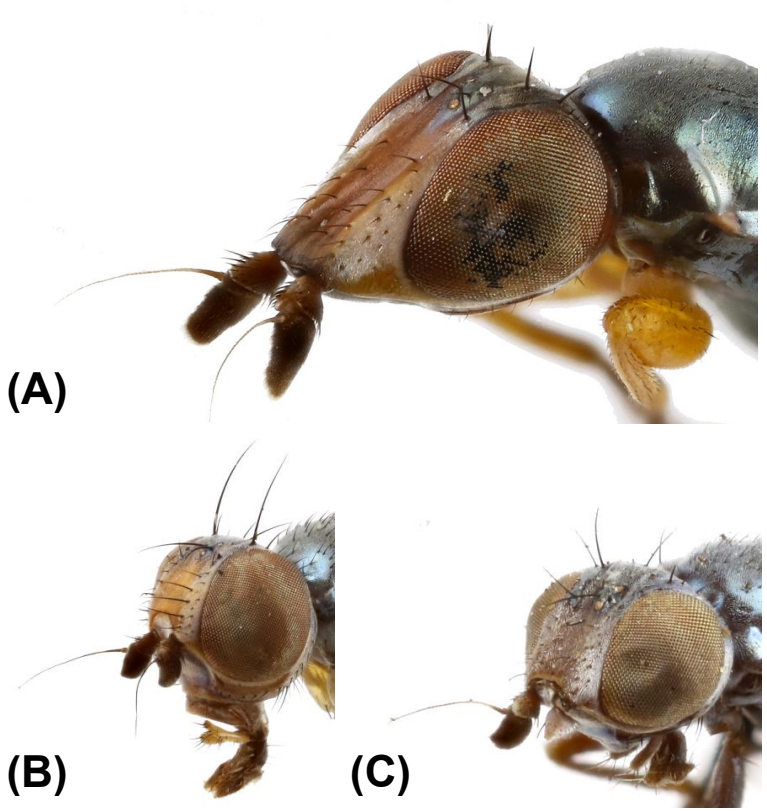
doi:10.3752/cjai.2021.45



20) Head not longer than high (i.e. flat in profile). Body heavily pale pruinose.

Images: Anterior head (A) and lateral view of head and part of thorax (B) of *Paroedopa punctigera;* shows body pale pruinose.

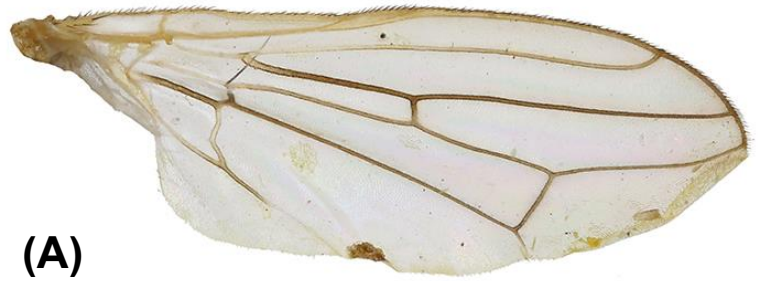
21

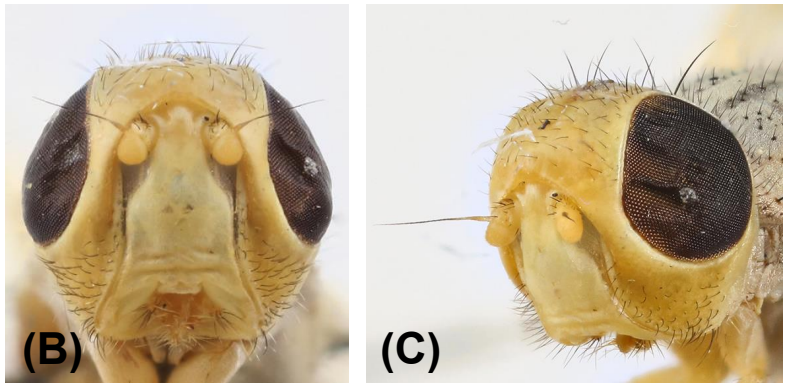


20') Head longer than high (i.e. minor to pronounced forward projection of the face in profile). Body not heavily pale pruinose, frequently metallic.

Images: Heads of *Eumetopiella rufipes* (A), *Chaetopsis apicalis* (B), and *Stenomyia nasoni* (C), in three quarters profile.

23

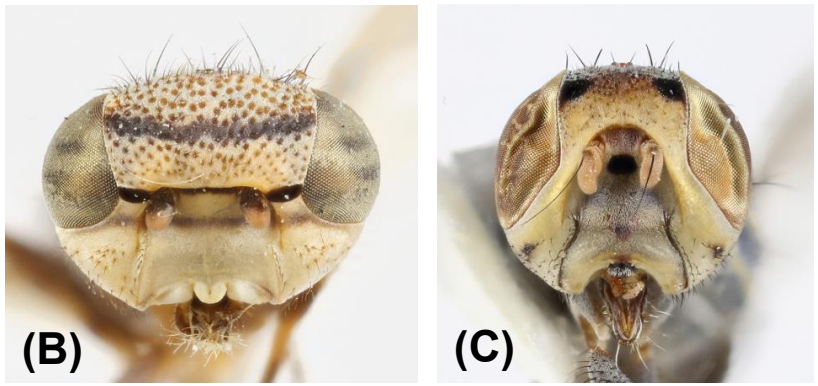




21) Wing unpatterened, not at all spotted. Face without brown to black bar or spot.

Images: Wing (A) and head (B-C) of *Ulidiotites dakotana*, showing no pattern, spots, or bars (apparent spots the result of specimen aging, not pigmentation).

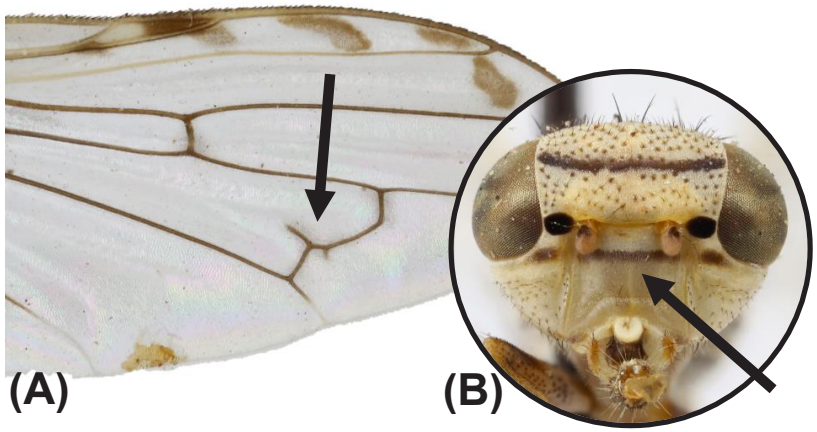
Ulidiotites Steyskal

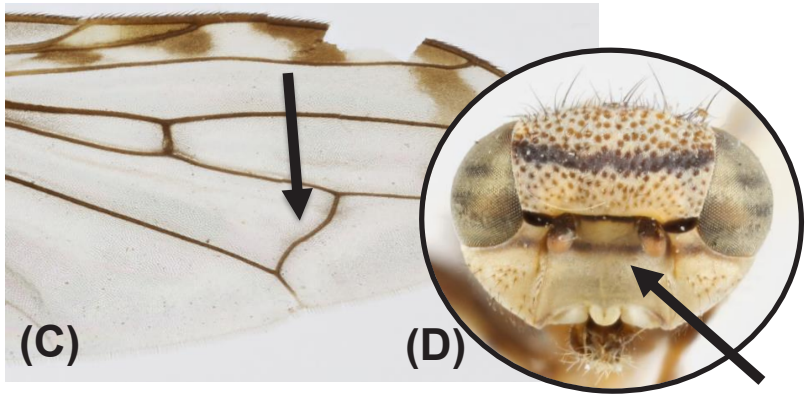


21') Wing with a few dark spots anteroapically. Face with brown to black bar or spot.

Images: Wing of *Oedopa capito* (A) with arrows pointed at anteroapical dark spots. Head of *Oedopa ascriptiva* (A), showing a dark bar, and *Paroedopa punctigera* (C), showing a black spot.

22

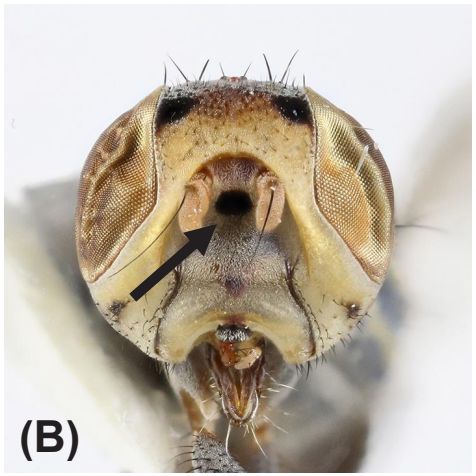




22) Crossvein dm-m biangulate or sinuate, not straight. Face with brown bar across middle.

Images: *Oedopa capito* (A, B) and *Oedopa ascriptiva* (C, D). (A) shows dm-m biangulate and (C) sinuate. Brown bar across face shown in (B) and (D).

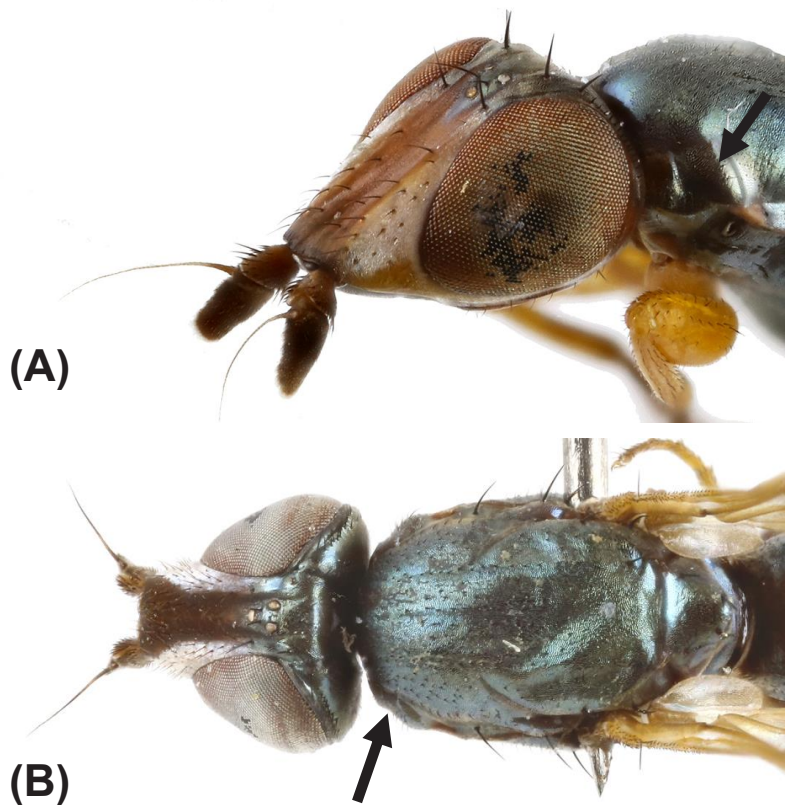
Oedopa Loew



22') Crossvein dm-m straight. Face with central black spot.

Images: Wing (A) and head (B) of *Paroedopa punctigera.* Arrow in (A) pointed at dm-m, straight.

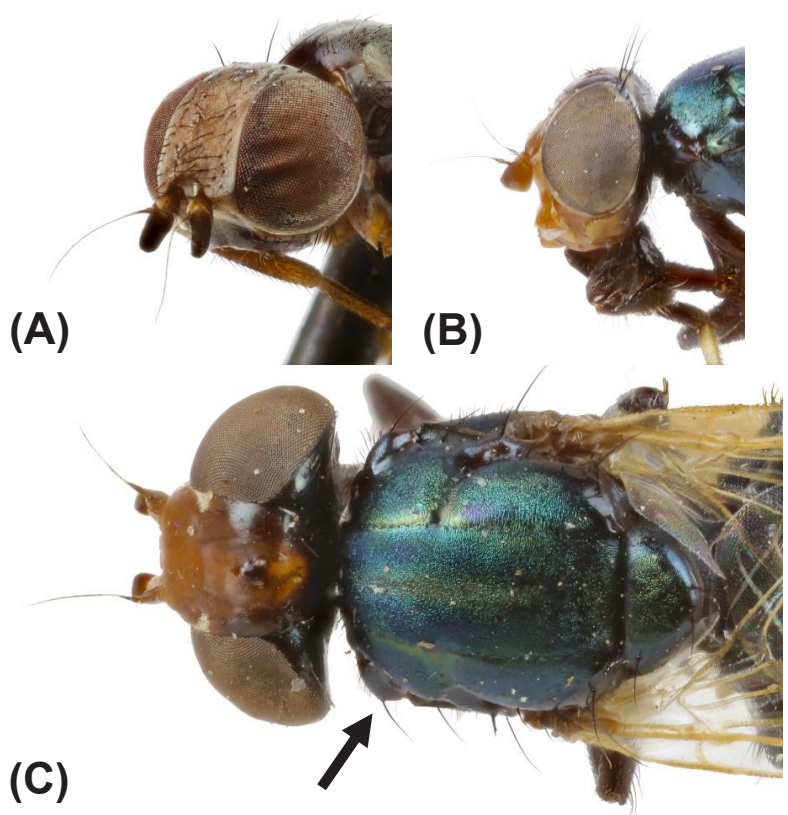
Paroedopa Coquillett



23) Head nearly twice as long as high; face strongly retreating. Postpronotal seta absent.

Images: Head shown to be significantly elongated in *Eumetopiella rufipes* (A) and *Eumetopiella varipes* (B). Arrow in both images pointed at postpronotal lobe, lacking a bristle.

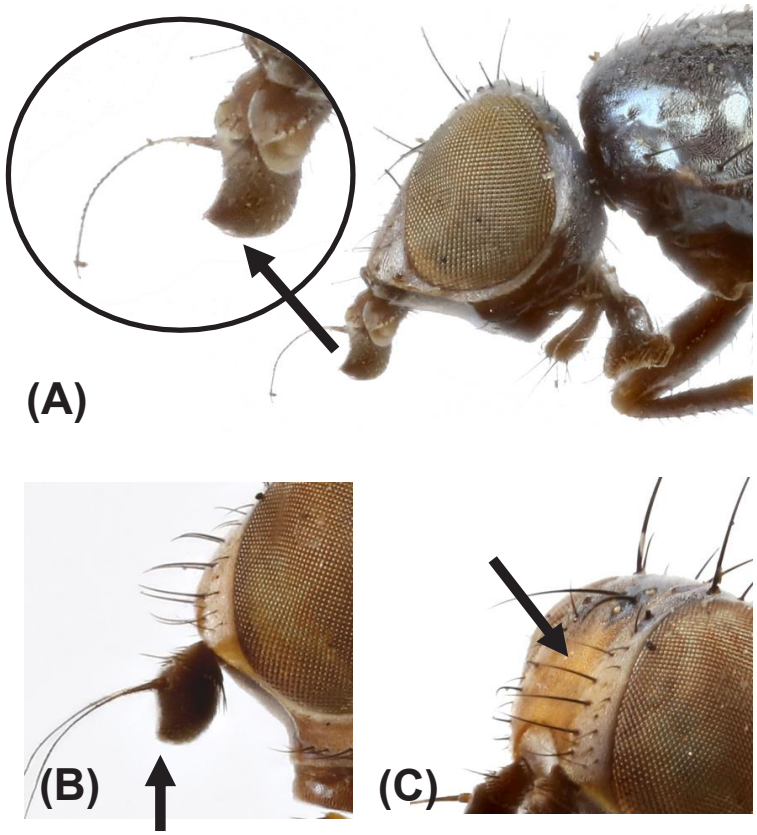
Eumetopiella Hendel



23') Head at most a little longer than high. Postpronotal seta present.

Images: *Stenomyia hendeli* (A) and *Physiphora alceae* (B-C). Head slightly elongated in (A) but not at all in (B-C). Well-developed postpronotal seta indicated in (C).

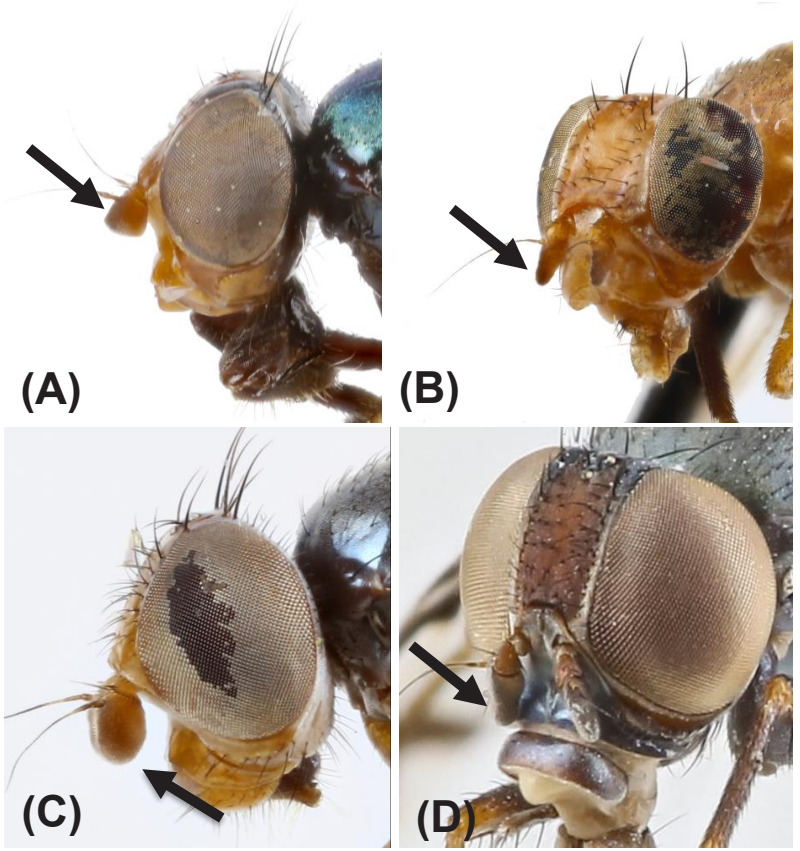
24



24) First flagellomere with upper apex angulate or pointed. Frontal vitta bare or with a few pairs of cruciate interfrontal setae. Ovipositor broad and depressed, thin and laminar apically.

Images: Head of *Stenomyia nasoni* shown in profile, with closer view of antennae, showing pointed first flagellomere. (B-C) *Chaetopsis apicalis*, showing first flagellomere pointed but somewhat less so (B), and frontal vitta bare (C).

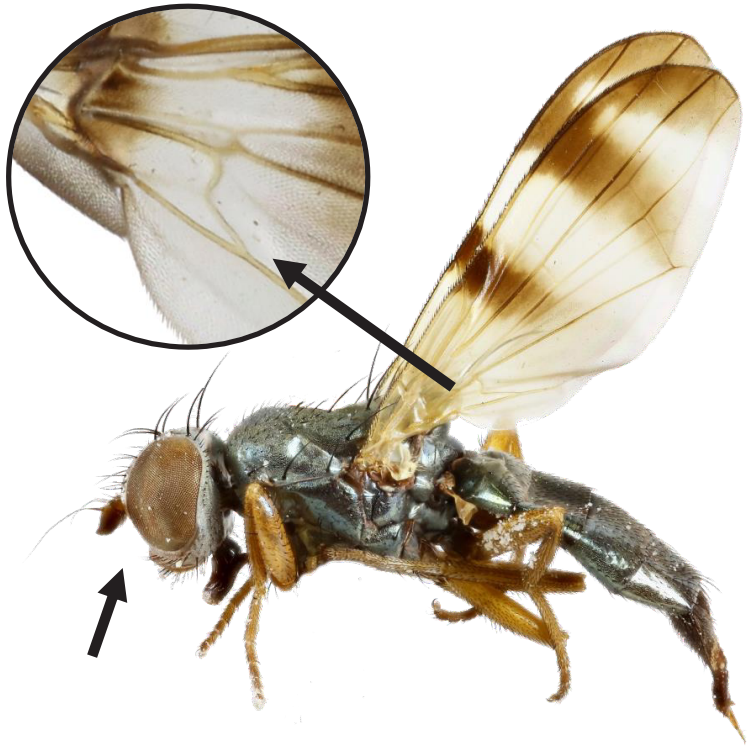
25



24') First flagellomere usually rounded at upper apex; if this segment somewhat angulate, frontal vitta with many scattered setulae or setae and ovipositor narrow, soft, not laminar apically.

Images: *Physiphora alceae* (A), *Zacompsia fulva* (B), *Euxesta basalis* (C), *Axiologina ferrumequinum* (D); first flagellomere rounded at upper apex.

26



25) Front of head rounded in profile. Posteroapical extension of cell cua two or three times as long as width at base.

Images: *Chaetopsis massyla*, in lateral view, with close-up on cell cua of the wing showing posteroapical extension longer than in *Stenomyia,* to the right.

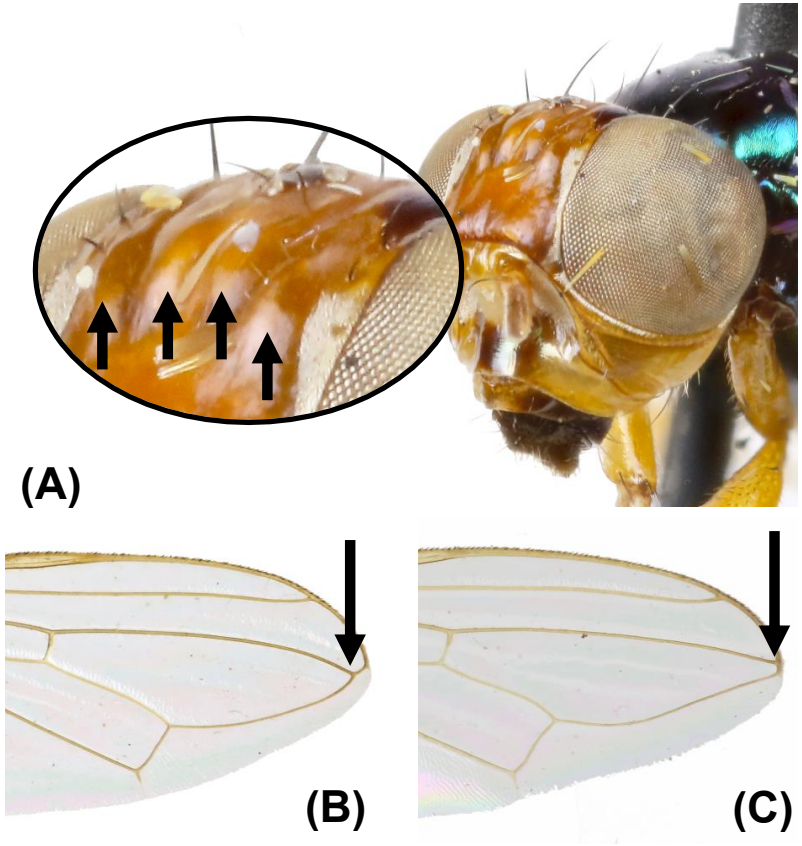
Chaetopsis Loew

25') Front of head angulate and produced; face distinctly retreating. Posteroapical extension of cell cua scarcely longer than width at base.

Images: *Stenomyia nasoni*, in lateral view, with close-up on cell cua of the wing showing posteroapical extension relatively short, especially compared to *Chaetopsis*, to the left.

Stenomyia Loew

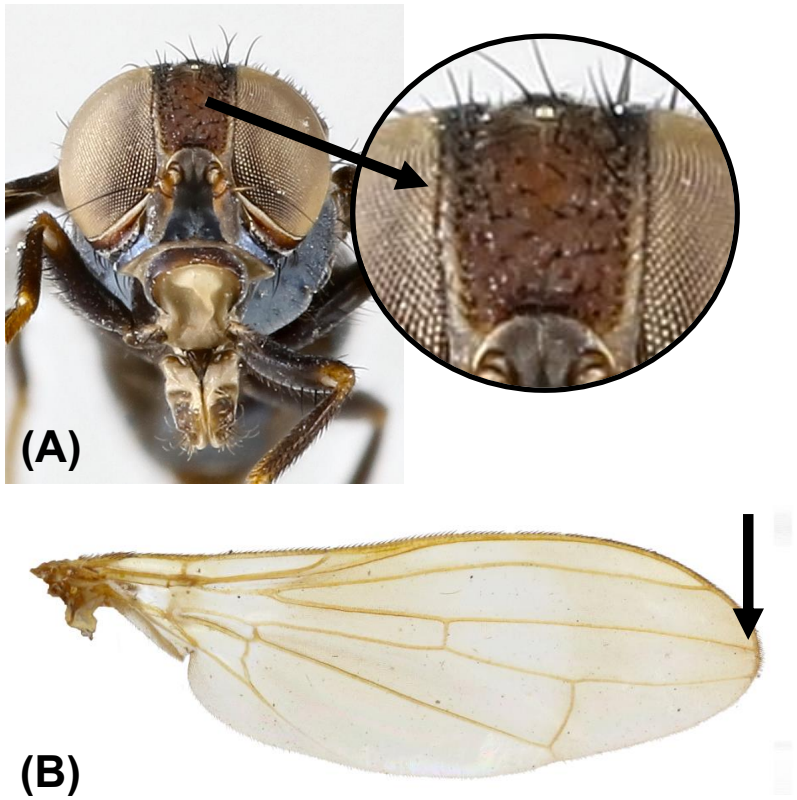
doi:10.3752/cjai.2021.45



26) Frontal vitta bare, with four low longitudinal swellings in upper part. Cell r_{4+5} closed or nearly so; apical section of the costal vein at most half as long as r-m.

Images: *Physiphora clausa* (A-B) and *Physiphora alceae* (C). Close-up on head in (A) with arrows pointing to four swellings. In wings, cell r_{4+5} closed (B) or nearly so (C).

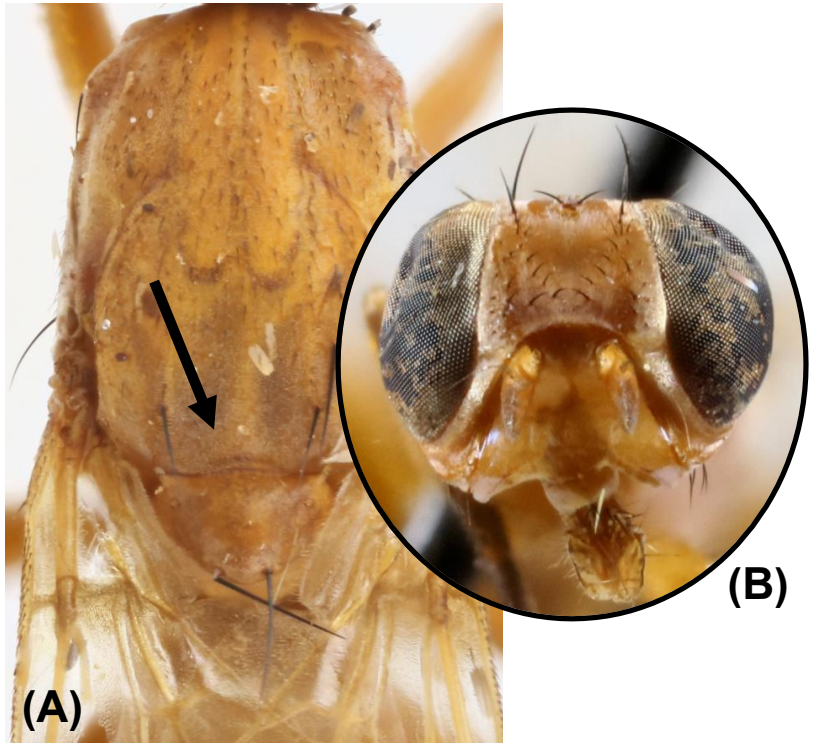
Physiphora Fallen



26') Frontal vitta with hairs or setae, uniformly flat throughout. Cell r_{4+5} broadly open; apical section of the costal vein as long as r-m.

Images: Close-up on head of *Axiologina ferrumequinum* (A) shows flat frontal vitta covered in small hairs. Wing of *Zacompsia fulva* (B) indicates broad opening to cell r_{4+5}.

27



27) Frons 1.5 times as wide as an eye. Body in Nearctic species wholly reddish, nonmetallic. Prescutellar acrostichal setae absent.

Images: *Zacompsia fulva,* in dorsal view of thorax (A) and direct view of head (B). Both images show reddish body color. (A) indicates absence of prescutellar acrostichal setae.

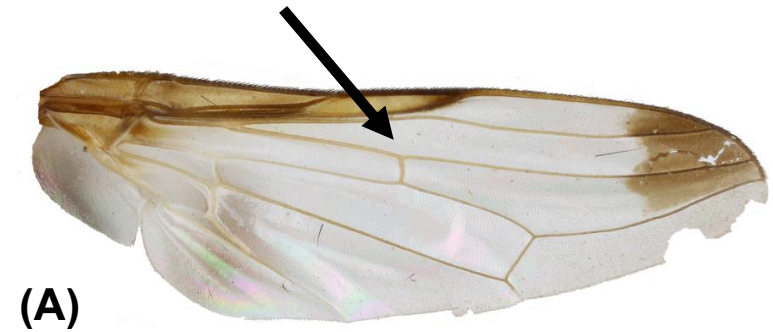
Zacompsia Coquillett

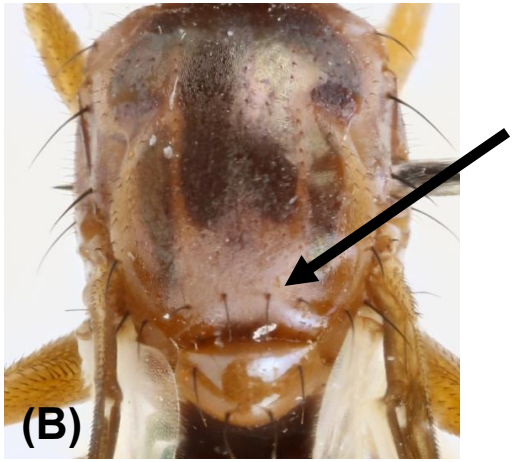
27') Frons not wider than an eye. Body often metallic. Prescutellar acrostichal setae present or absent.

Images: *Axiologina ferrumequinum*, with arrow pointed towards frons, not wider than an eye. Metallic coloration apparent on face and thorax.

28

doi:10.3752/cjai.2021.45

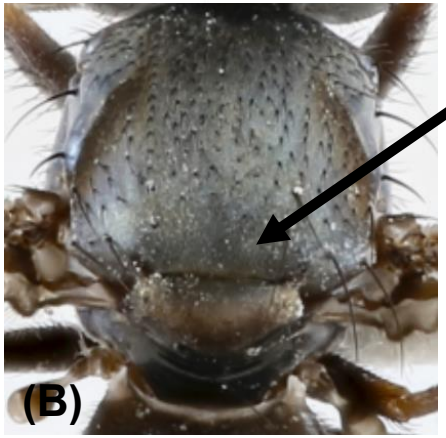




28) Crossvein r-m at or beyond middle of cell dm. Prescutellar acrostichal setae present.

Images: Wing of *Euxesta rubida* (A), with arrow indicating position of crossvein r-m beyond middle of cell dm. Dorsal view of thorax of *Euxesta lutzi* (B) indicating presence of acrostichal setae.

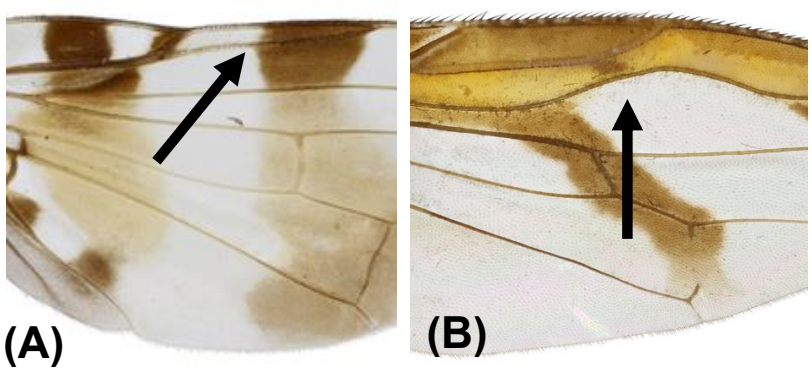
Euxesta Loew



28') Crossvein r-m before basal one-third of cell cm. Prescutellar acrostichal setae absent.

Images: *Axiologina ferrumequinum*, with isolated shot of wing (A) and dorsal view of thorax (B). Arrows indicate presence of r-m near base of cell dm (A) and absence of acrostichal setae (B).

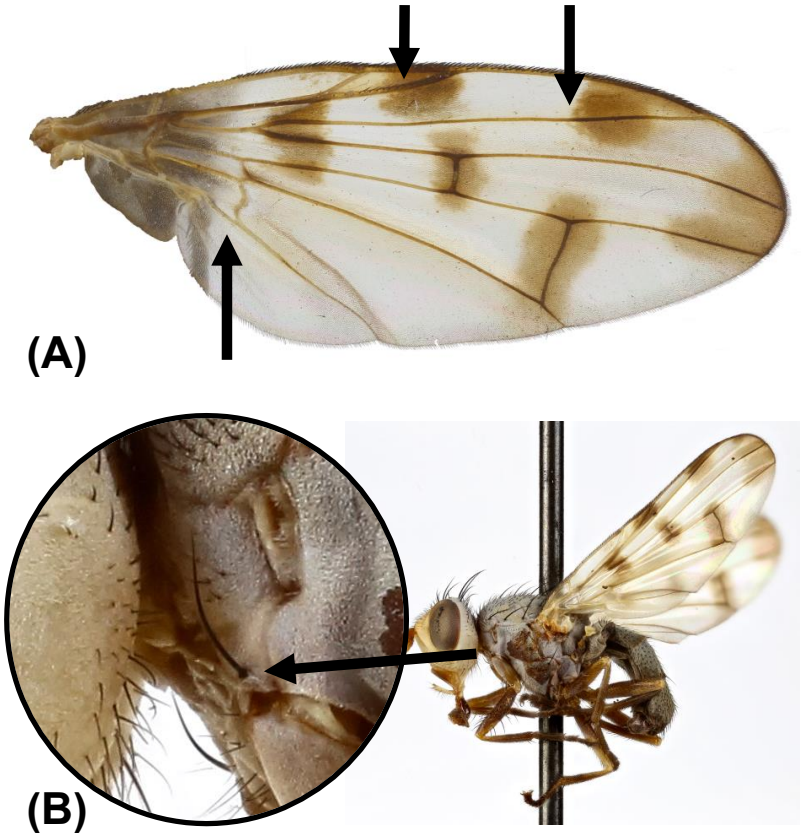
Axiologina Hendel



29) One or more of the following characters present: pterostigmal section of C long; R_{2+3} distinctly sinuate; cell cua with long extension, as long or longer than A1 + CuA2. Proepisternal seta small or absent.

Images: Portions of the wing of *Pseudotephritis vau* (A), *Xanthacrona bipustulata* (B), and *Callopistromyia annulipes* (C) indicating the first three characters, in order. Close-up on thorax of *Dyscrasis hendeli* (D), indicating small proepisternal bristle.

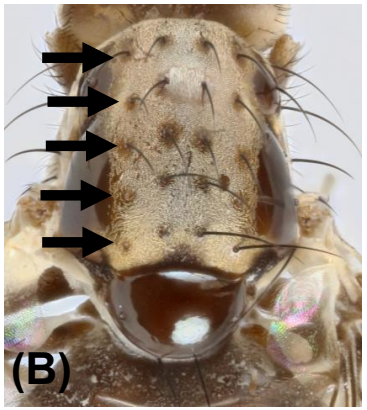
30

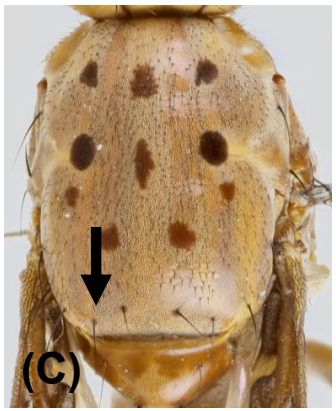


29') None of first three characters mentioned above present. Proepisternal seta well-developed, except in *Idana, Tetanops* and *Tetropismenus.*

Images: *Melieria picta* (A-B). Arrows on wing (A) indicate relatively short pterostigmal section, straight R_{2+3}, and short extension of cell cua. Close-up on proepisternum in later view shows well-developed bristle.

35





30) Extension of cell cua much longer than A_1 + CuA_2. Five dorsocentral setae present, one of which is presutural, or else only one dorsocentral seta present, located close to scutellum.

Images: *Diacrita costalis* (A, C) and *Dyscrasis hendeli* (B). Arrow on wing (A) indicates much longer extension than length of A_1 + CuA_2. Dorsocentral setae present in five (B) or single pair (C).

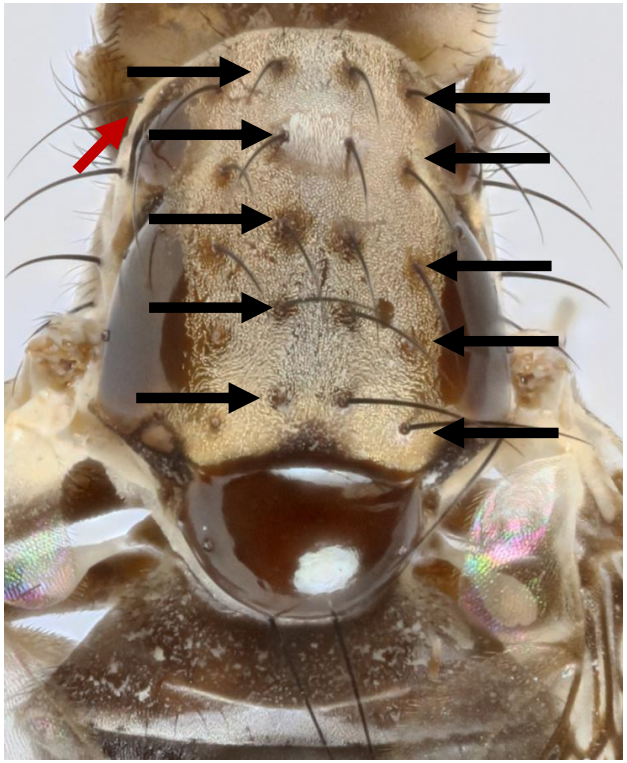
31

30') Extension of cell cua at most as long as A_1 + CuA_2. Two dorsocentral setae present, sometimes preceded by one or two much finer setae, all postsutural.

Images: Wing of *Callopistromyia strigula* (A) indicates long extension of cell cua but not longer than vein A_1 + CuA_2. Thorax of *Pseudotephritis approximata* (B) shows two pairs of setae.

32

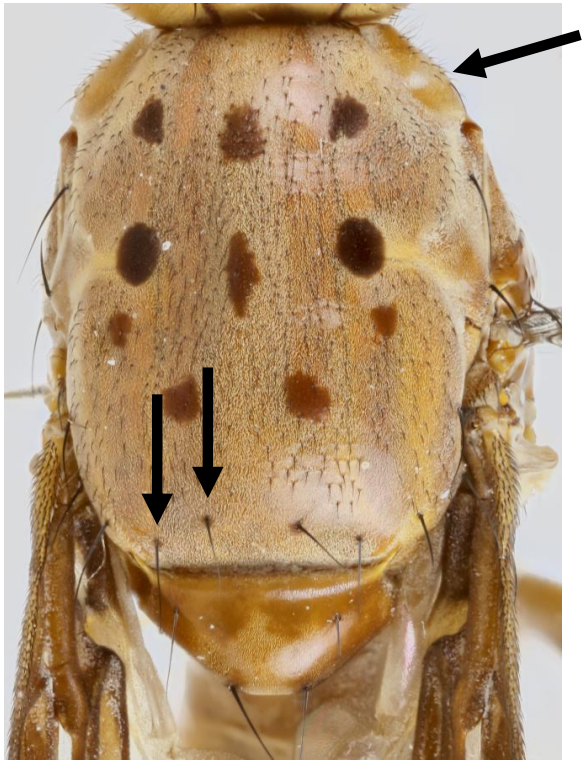
doi:10.3752/cjai.2021.45



31) Five dorsocentral and five acrostichal setae present, one of each presutural. Crossveins r-m and dm-m parallel (*wing comparison on linked slide*). Postpronotal seta strong.

Images: Dorsal view of thorax of *Dyscrasis hendeli* shows five pairs of acrostichal (left set of arrows) and dorsocentral (right set of arrows) setae. Additional red arrow indicates postpronotal bristle.

Dyscrasis Aldrich

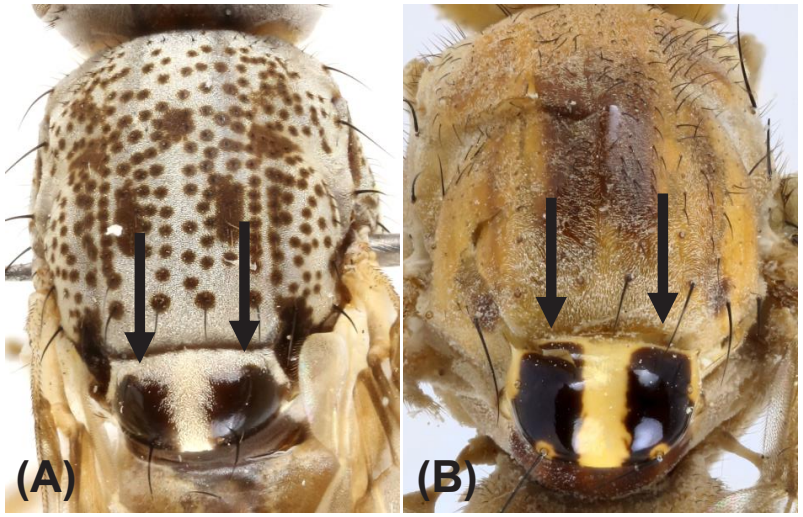


31') One dorsocentral and one acrostichal seta present, both postsutural and located close to scutellum. Crossveins r-m and dm-m strongly divergent. Postpronotal seta weak or absent.

Images: Dorsal view of thorax of *Diacrita costalis* shows singular pair of dorsocentral and acrostichal setae, as well as absence of well-developed seta on postpronotal lobe.

Diacrita Gerstacker

doi:10.3752/cjai.2021.45



32) Scutellum laterally with pair of extensive shining black areas. Tibiae not distinctly banded, at most with lightly infuscated subbasal and apical sections.

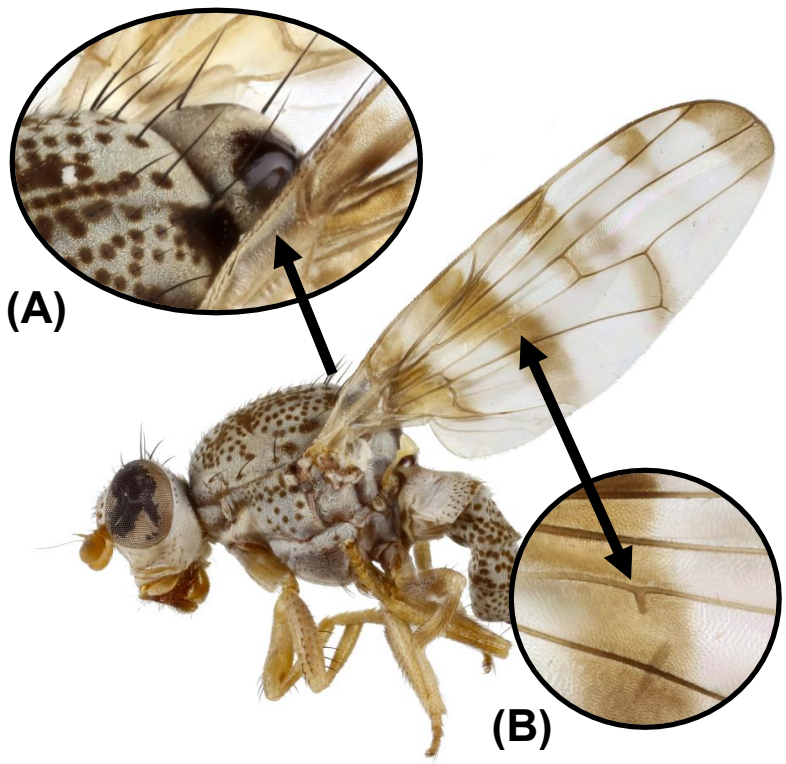
Images: Pairs of shining black lateral areas on scutellum on *Pseudotephritina inequalis* (A) and *Xanthacrona bipustulata* (B).

33

32') Scutellum covered in setulae, gray and brown. Tibiae distinctly banded.

Images: Lateral habitus of *Pseudotephritis approximata* with additional close-up dorsal view of scutellum, showing pair of spots that are brown, and not lateral or shining. Alternating grey/black arrows indicate bandedness on hind tibia.

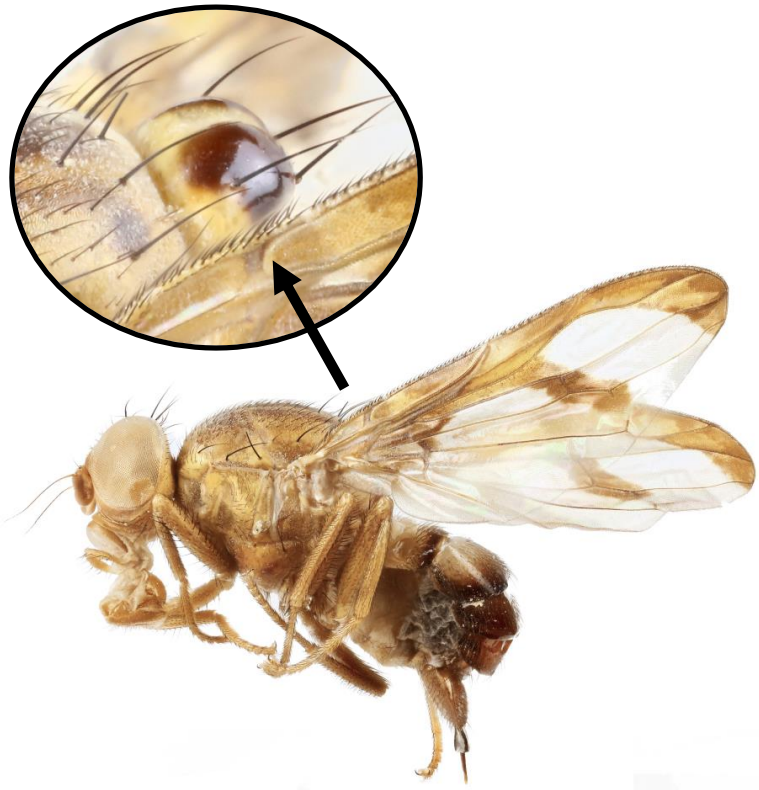
34



33) Scutellum scarcely swollen. Frons and thorax whitish with conspicuous dark dots. Wing with brown crossbands and with the anterior border alternately hyaline and brown; small stump vein projecting from M_{1+2} into cell dm.

Images: *Pseudotephritina inequalis* with additional shots of scutellum (A) and small stump projecting into cell dm (B).

Pseudotephritina Malloch

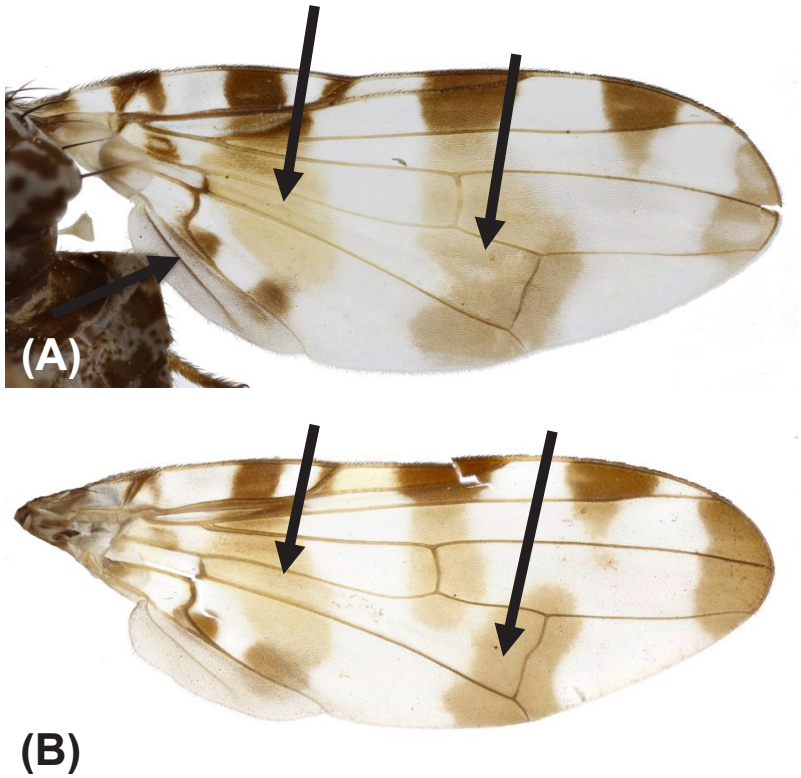


33') Scutellum strongly swollen. Frons and thorax tawny, not conspicuously spotted. Wing with broad anterior border wholly yellowish to brown, without stump vein.

Images: *Xanthacrona bipustulata,* with additional close-up of significantly swollen scutellum. Wing shows distinctive yellowish/brown pattern.

Xanthacrona Wulp

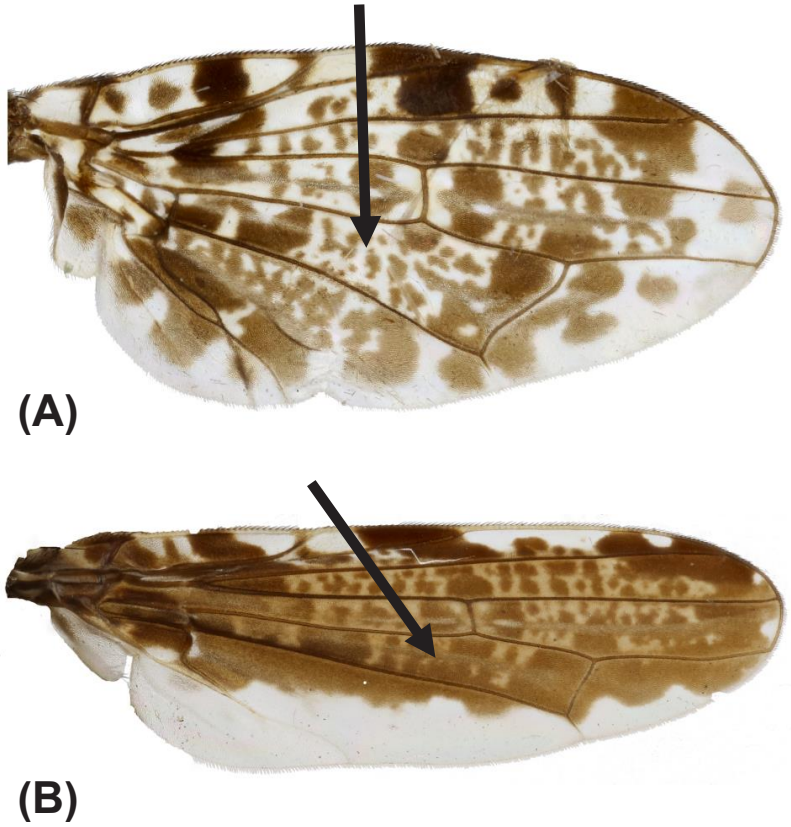
doi:10.3752/cjai.2021.45



34) Cell dm with extensive areas of solid color.

Images: Wing of *Pseudotephritis vau* (A) and *Pseudotephritis approximate* (B). Arrows indicate solid color areas in cell dm.

Pseudotephritis Johnson



34') Cell dm largely mottled dark brown.

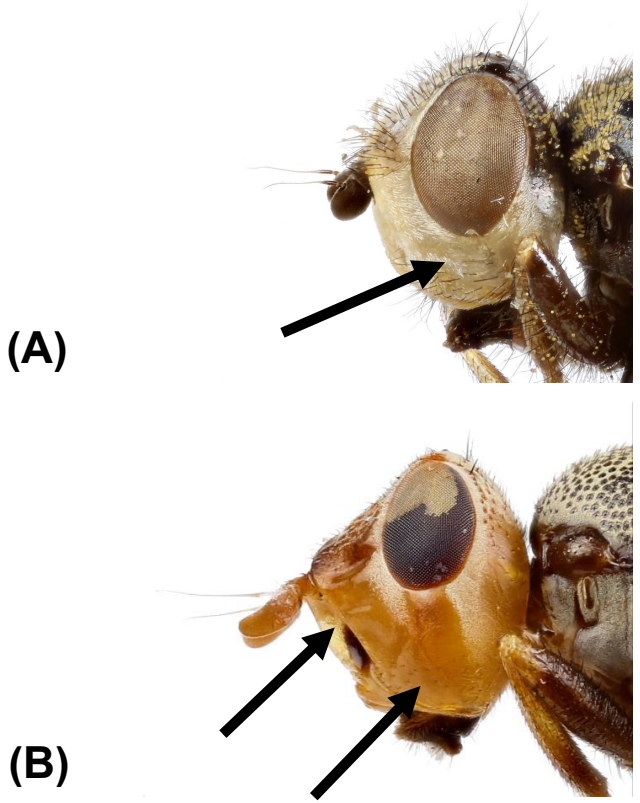
Images: Wings of *Callopistromyia annulipes* (A) and *Callopistromyia strigula* (B). Arrows indicate cell dm, with mottled dark brown pattern.

Callopistromyia Hendel

35) Gena less than 1/3 as high as eye; parafacial and fronto-orbital plate never wrinkled. Two (or abnormally three) pairs of scutellar setae present; proepisternal seta usually well-developed, but this seta small and weak in *Idana* and some species of *Otites*.

Image: Lateral view of head of *Melieria similis*; arrow indicates reduce length of gena compared to eye relative to opposing couplet.

36

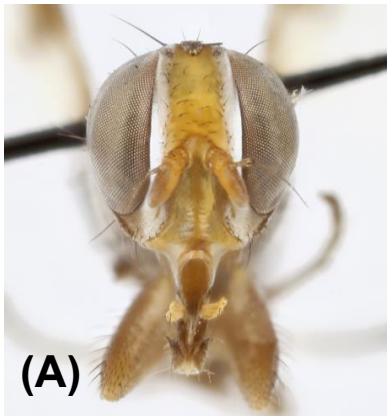


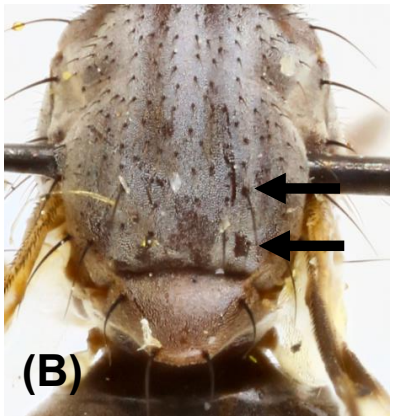
35') Gena more than 1/3 as high as eye; parafacial and fronto-orbital plate often wrinkled (in *Tetanops*). Four pairs scutellar setae sometimes present; proepisternal seta small or absent.

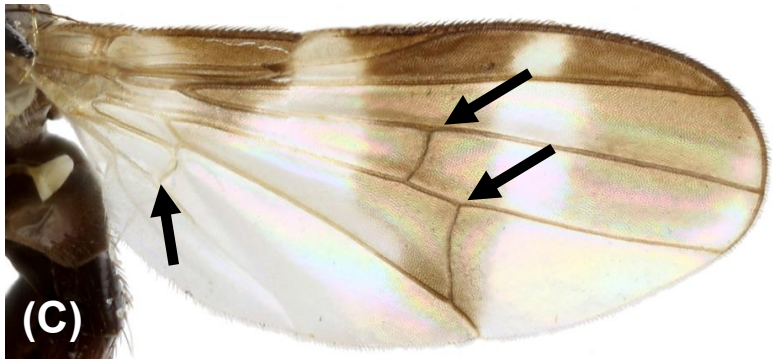
Images: Lateral view of head of *Tetropismenus hirtus* (A) and *Tetanops luridipennis* (B); arrows in both indicate greater height of gena than in *Melieria* (left). Wrinkled parafacial visible in (B).

40

doi:10.3752/cjai.2021.45







36) Frontal index 1.3-1.4. Cell cua without an extension in posteroapical corner. Two dorsocentral setae present. Size small, less than 4mm long. (In North American species, crossveins r-m and dm-m seldom separated by more than length of crossvein dm-m, and with dark fascia covering both crossveins).

Images: *Herina canadensis*, head (A), thorax (B), and wing (C). Arrows in (B) indicate two pairs of dorsocentral setae, and in (C) lack of extension of cua (left), and crossveins r-m and dm-m.

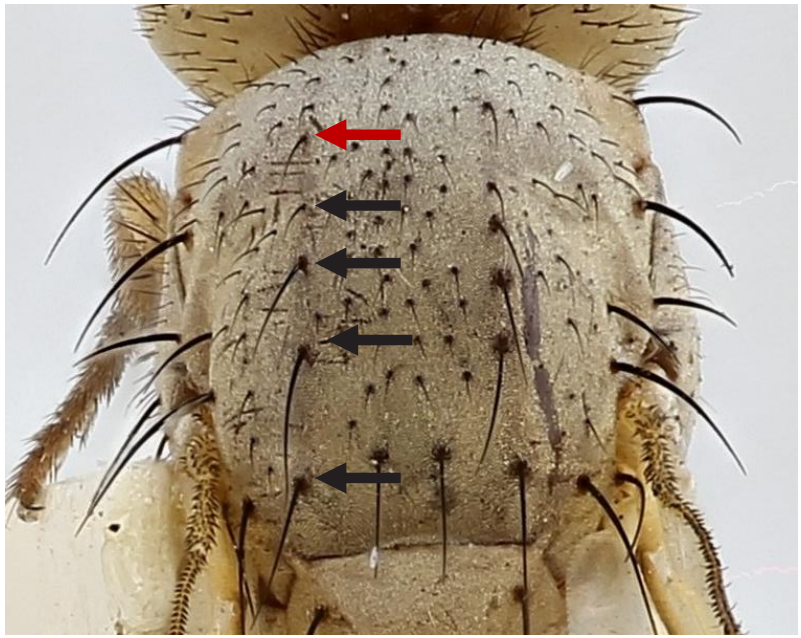
Herina Robineau-Desvoidy

36') Frontal index less than 1.2. Size larger than 4mm.

Images: Heads of *Melieria cana* (A), *Idana marginata* (B), *Otites erythrocephala* (C), and *Ceroxys latiusculus* (D), showing frontal vitta wider than in *Herina*, left.

37

doi:10.3752/cjai.2021.45



37) Dorsocentral setae in five or six pairs, one pair presutural. Wing with dark bars and spots.

Images: Dorsal view of thorax of *Melieria ochricornis*; arrows indicate five pairs of dorsocentral setae, red arrow indicates presutural pair.

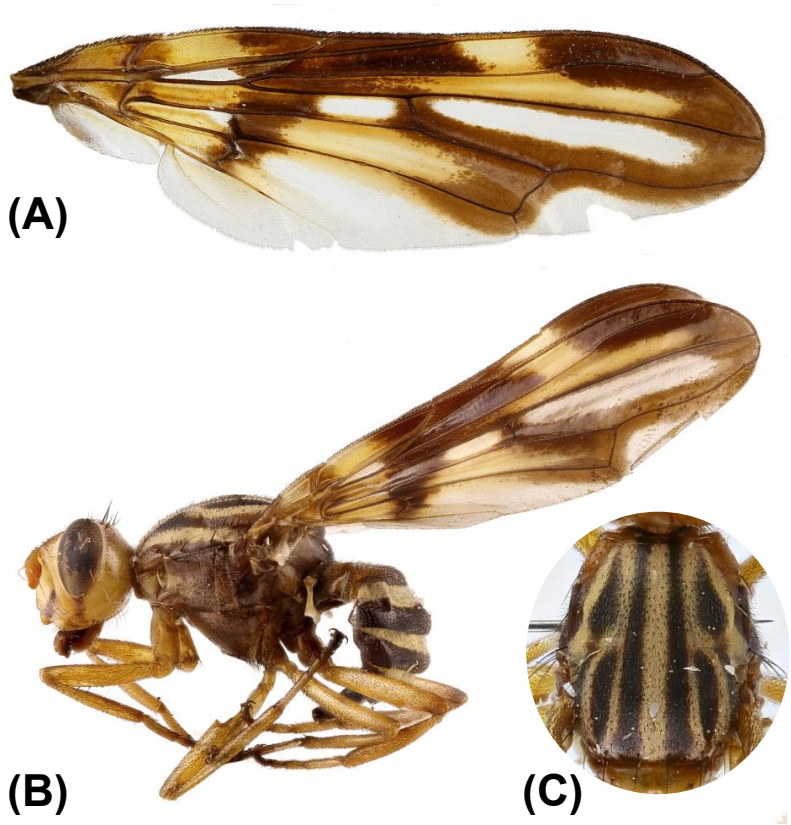
Melieria Robineau-Desvoidy

37') Dorsocentral setae in one or two pairs, none of which is presutural. Body and wing variable.

Images: Dorsal view of thorax of *Idana marginata*; arrows indicate singular pair of dorsocentral setae close to scutellum.

38

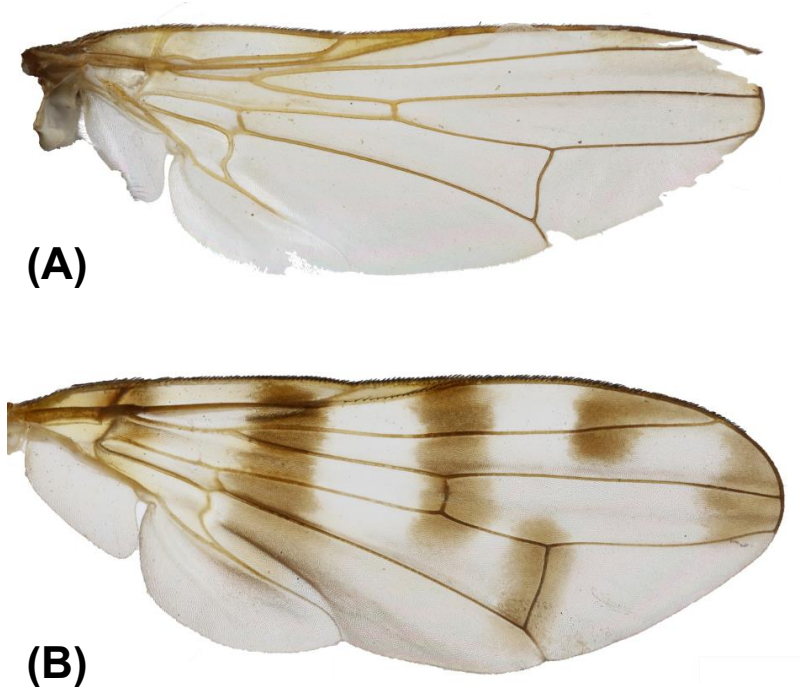
doi:10.3752/cjai.2021.45



38) Wing with extensive dark pattern not consisting of spots or short bars. Thorax and abdomen black, with contrasting yellow pruinose dorsal stripes.

Images: *Idana marginata*, wing (A), full profile (B), and dorsal view of thorax (C). (A) shows wing with distinctive pattern, (B-C) show abdomen and thorax with alternating black and yellow stripes.

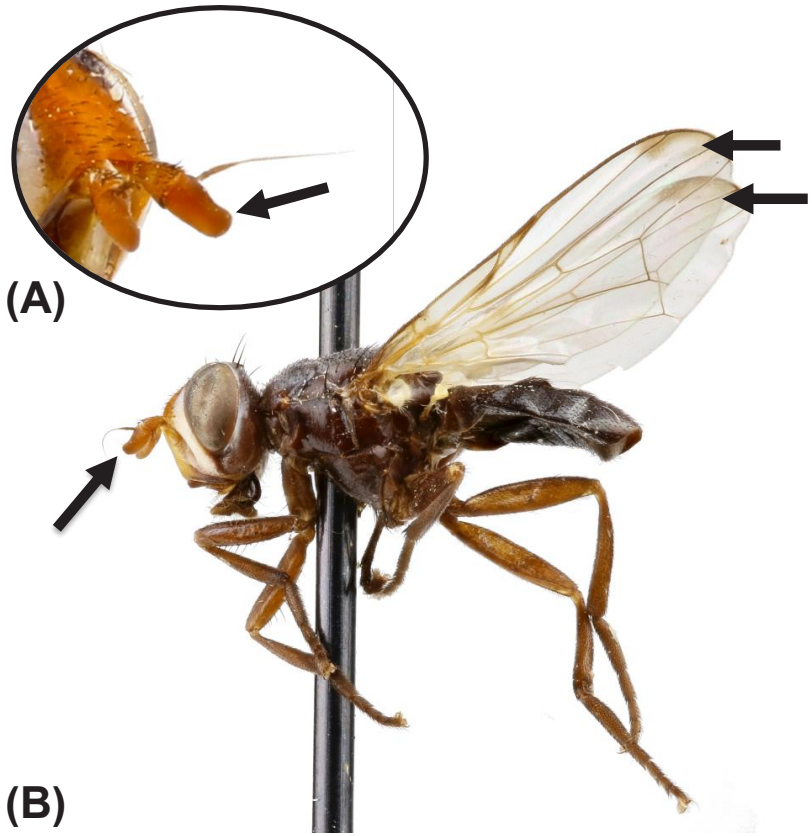
Idana Loew



38') Wing with very little pattern, or patterned with spots and short bars. Dorsum of thorax without contrasting pattern.

Images: Wings of *Otites snowi* (A), with very little pattern, and *Ceroxys latiusculus* (B), with spots and short bars.

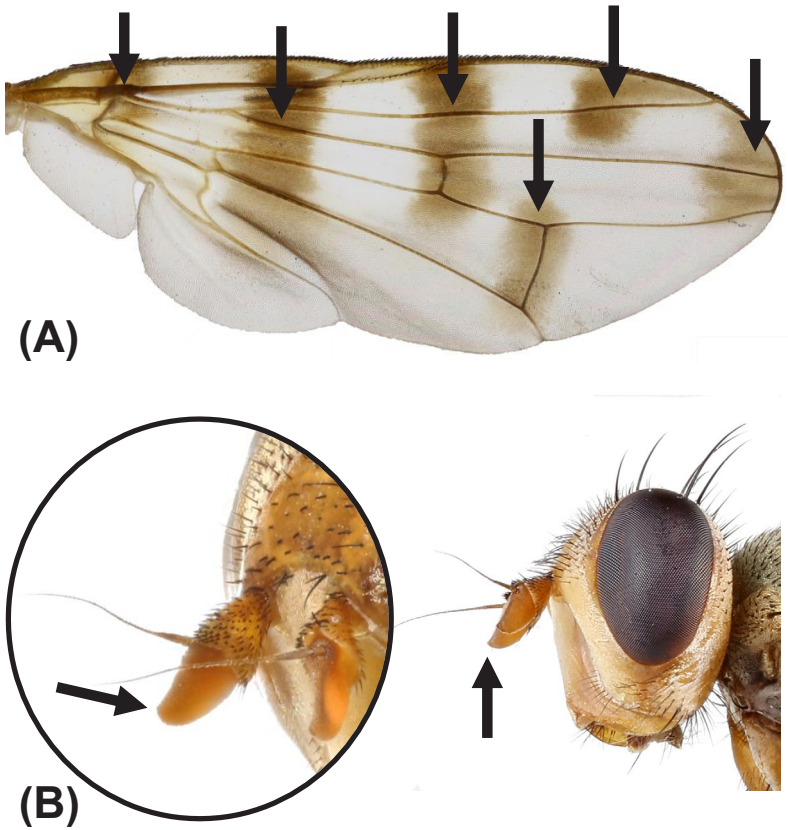
39



39) Wing pattern at most with one short band and apical spot, or with subbasal spot only. First flagellomere rounded or slightly angulate apically.

Images: *Otites stigma*, lateral habitus (B) and with closer view of antennae (A). Arrows in (A) show rounded first flagellomere, and in (B) show limited pattern with apical spot.

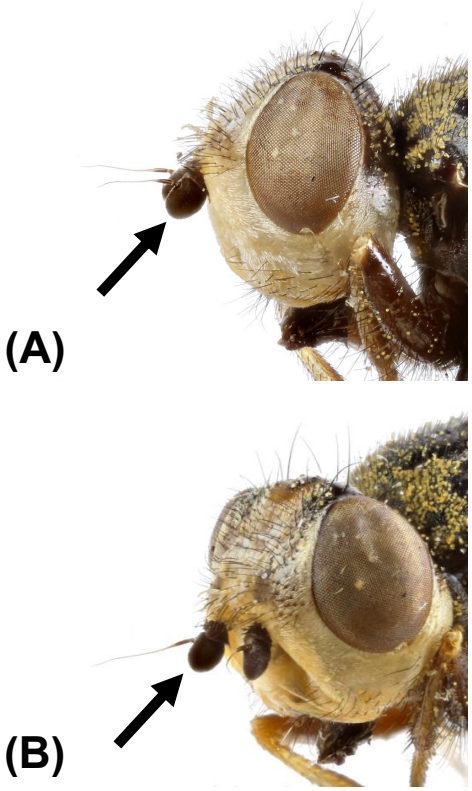
Otites Latreille



39') Wing with six spots and short bars, including one over each crossvein. First flagellomere curved and claw-like, with a sharply pointed tip.

Images: *Ceroxys latiusculus,* represented by its wing (A) and head (B). Arrows indicate wing with six spots/short bars (A), and first flagellomere with sharply pointed tip (B).

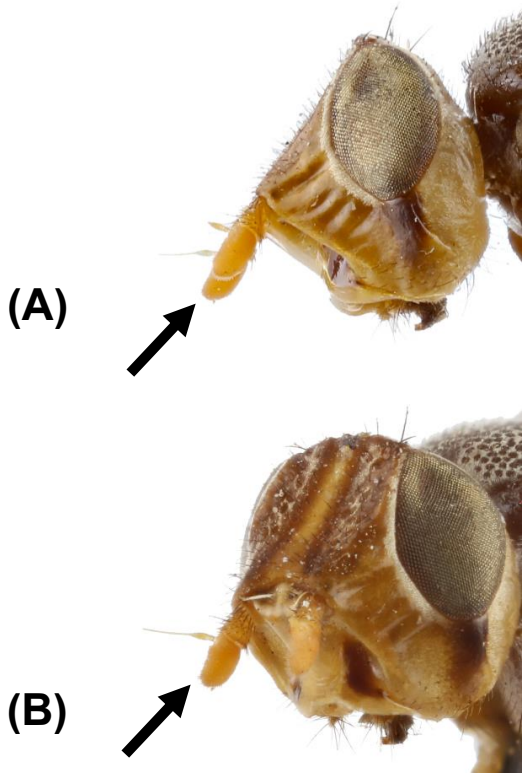
Ceroxys Macquart



40) Fronto-orbital plate smooth. First flagellomere nearly circular in profile.

Images: Head of *Tetropismenus hirtus* in profile (A) and three-quarters profile (B); first flagellomere shown to be nearly circular.

Tetropismenus Loew



40') Fronto-orbital plate usually with one or more grooves opposite antennae. First flagellomere at least 1.5 times as long as wide in profile.

Images: Head of *Tetanops magdalenae* in profile (A) and three-quarters profile (B); first flagellomere 1.5x as long as wide.

Tetanops Fallen

Acrosticta Loew, 1868

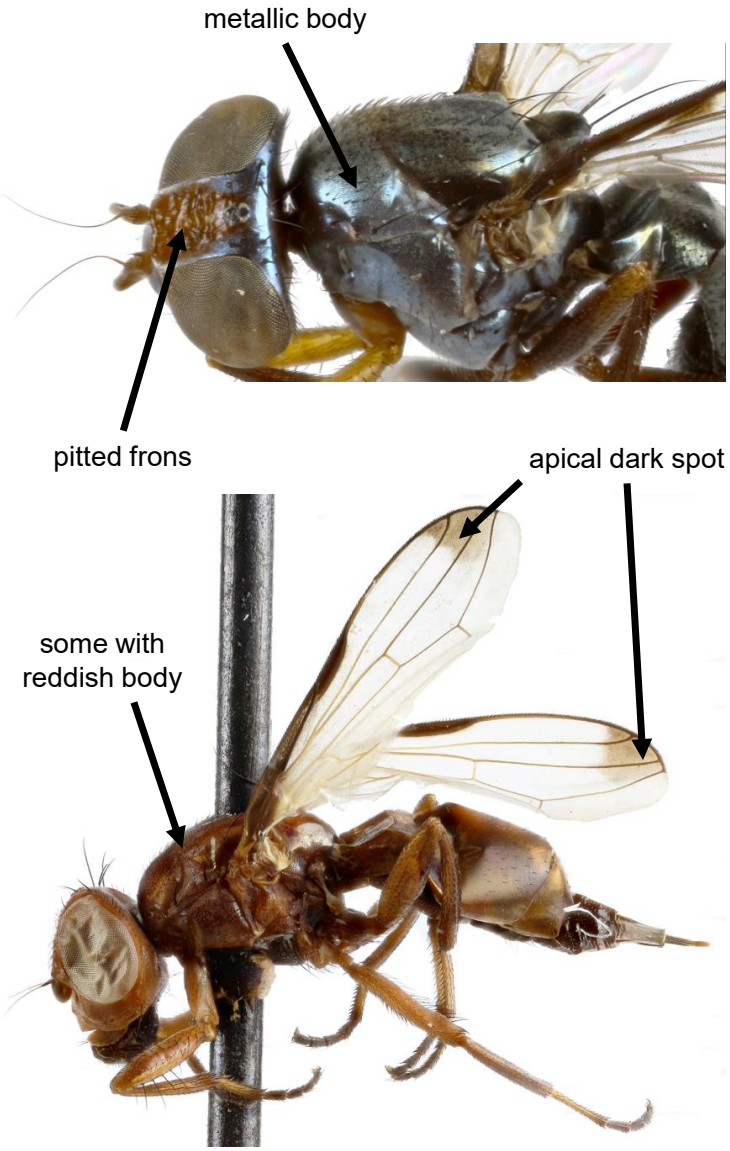
Species #
Worldwide: 14
Nearctic: 6

Distribution: USA, mostly limited to California and the American southwest

Recognition: Nearctic members of *Acrosticta* are typically metallic-bodied and have an apical dark spot on their wing. Both qualities are shared with many of the species of *Euxesta* which have overlapping distributions.

It is distinguished from *Euxesta*, however, by its frons, which is heavily wrinkled or pitted.

Ecology: *Acrosticta apicalis* has been documented on rotting vegetation (Ferrar 1987).



Top: *Acrosticta apicalis*
Bottom: *Acrosticta rubida*

doi:10.3752/cjai.2021.45

Axiologina Hendel 1909

Species #

Worldwide: 2*

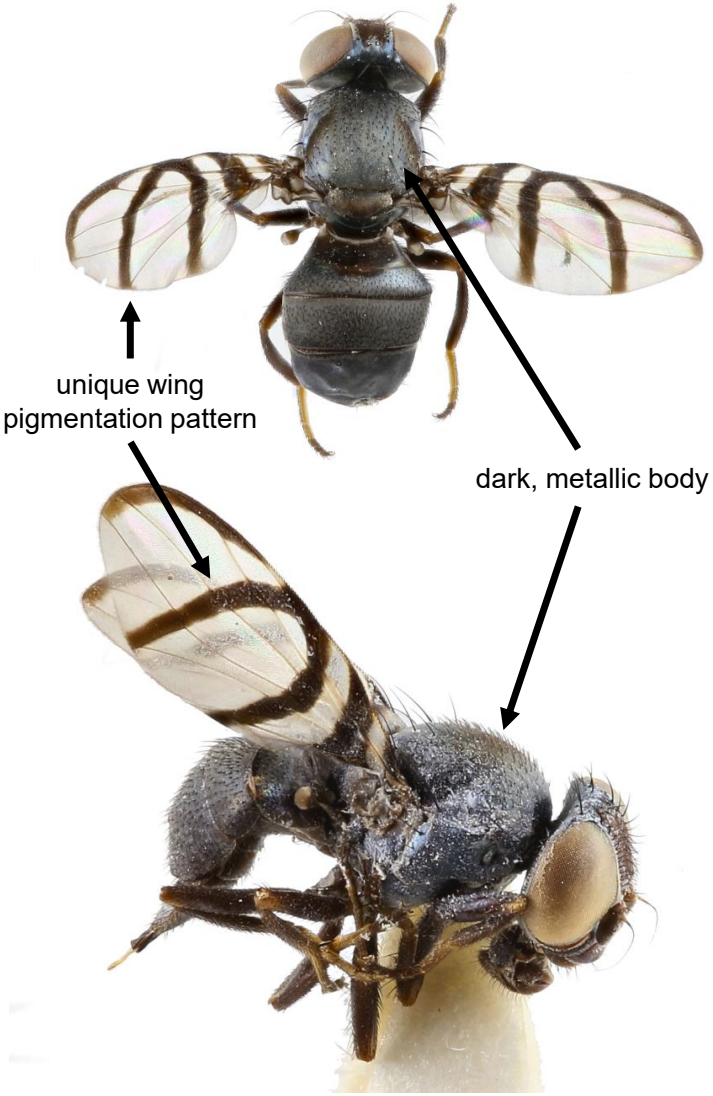
Nearctic: 1

*The species "*Axiologina ferrumeguinum*" is listed on Catalogue of Life and Systema Dipterorum; however, "*Axiologina ferrumequinum*" is discussed in Steyskal (1971), and a more recent publication, Kameneva and Korneyev (2010) mention two species of this genus.

Distribution: The genus is primarily Neotropical, and its Nearctic distribution is limited to Florida.

Recognition: This species is dark and metallic like some members of e.g. *Euxesta*, but its wing pattern is unique among Nearctic Ulidiidae.

Ecology: Unknown/undocumented



Axiologina ferrumequinum

Callopistromyia Hendel 1907

Species #
Worldwide: 2
Nearctic: 2

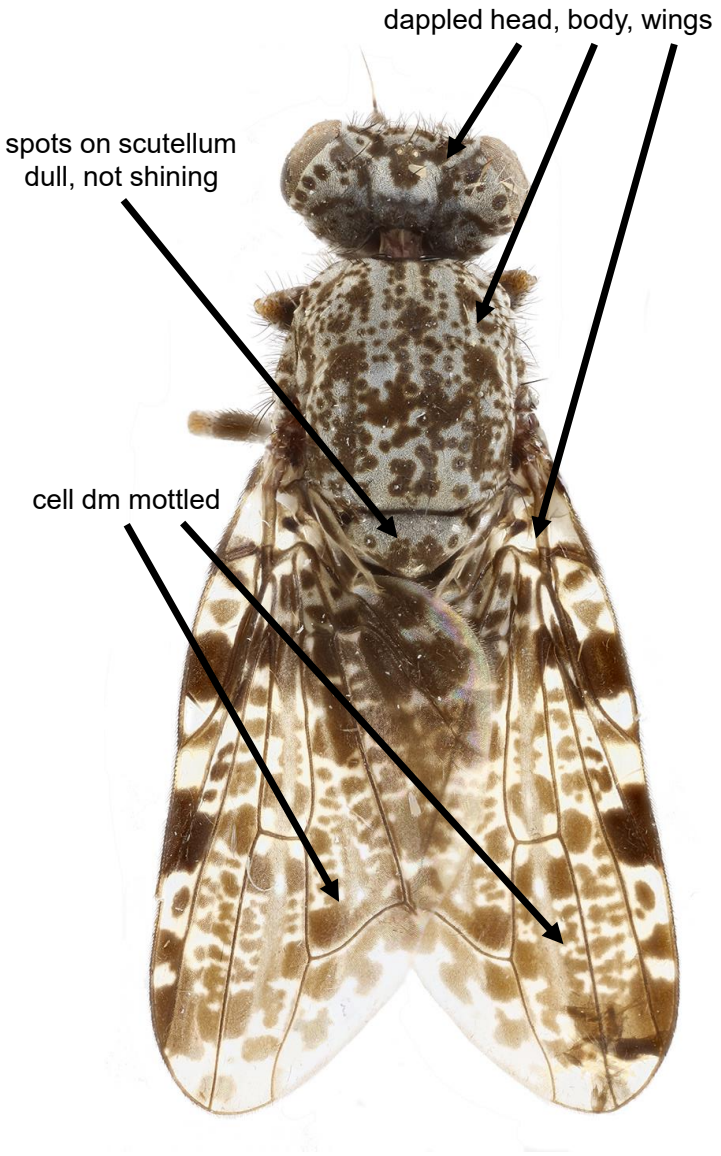
Distribution: broadly distributed from east to west coast in both the USA and southern Canada

Recognition: The bodies and wings of *Callopistromyia* are both distinctively dappled with dark spots.

Due to this trait, members may be easily confused with those of *Pseudotephritis* or *Pseudotephritina. Pseudotephritina* differs from both due to the twin laterally shining dark spots on its scutellum. *Callopistromyia* differs from *Pseudotephritis* in pigmentation of cell dm, as seen in Couplet 34 of the key.

Ecology: Members of *Callopistromyia* are known to be associated with wood (Ferrar 1987).

Key: Steyskal (1975)



Callopistromyia annulipes

Cephalia Meigen 1826

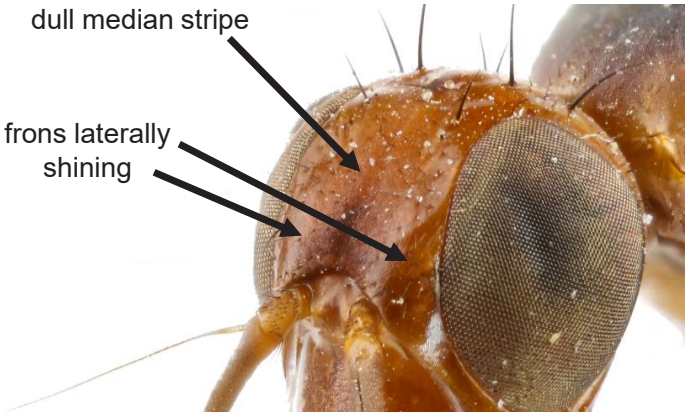
Species #
Worldwide: 2*
Nearctic: 2

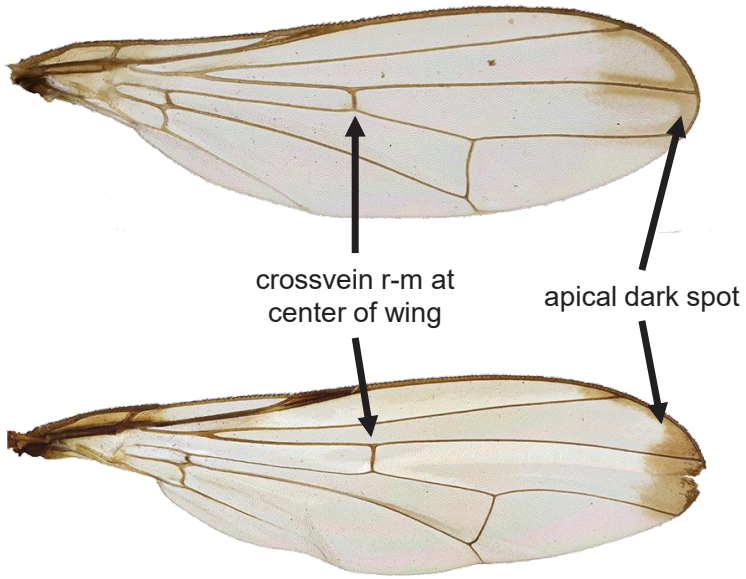
*Steyskal (1987) indicates 4 species; two were synonymized into other genera since the publication of *The Manual of Nearctic Diptera*

Distribution: western mountains

Recognition: Dark reddish flies. Wing 0.31 as wide as long, crossvein r-m at midlength of wing, color hyaline with apical dark spot, cell cua without extension. Frons with dull median strip (vs. frons wholly shining in *Myiomyrmica,* with whom *Cephalia* shares several diagnostic characters).

Ecology: Unknown/Undocumented





Top, bottom: *Cephalia rufipes*
Middle: *Cephalia flavoscutellata*

doi:10.3752/cjai.2021.45

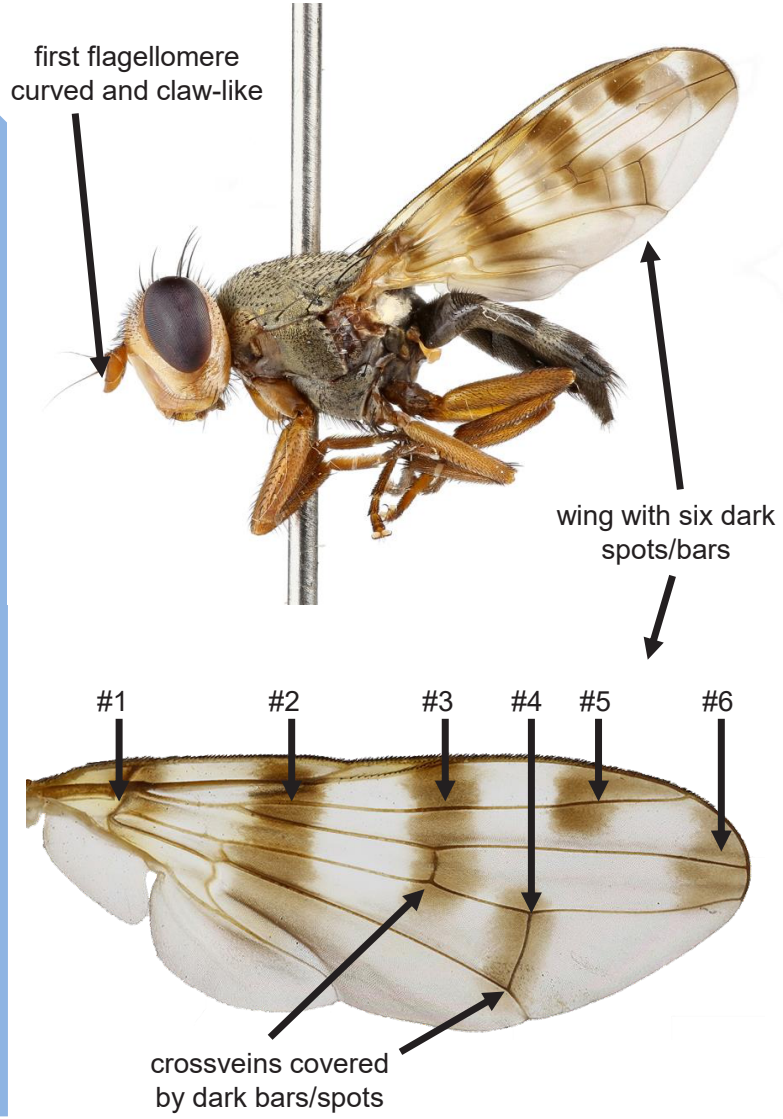
Ceroxys Macquart 1835

Species #
- Worldwide: 22
- Nearctic: 1

Distribution: Western half of the continent, from Canada south into Mexico

Recognition: Lighter-colored, medium-sized flies. Wings with six spots or dark bars, including one over each crossvein. First flagellomere curved and claw-like, with sharply pointed tip.

Ecology: Unknown/Undocumented



Ceroxys latiusculus

doi:10.3752/cjai.2021.45

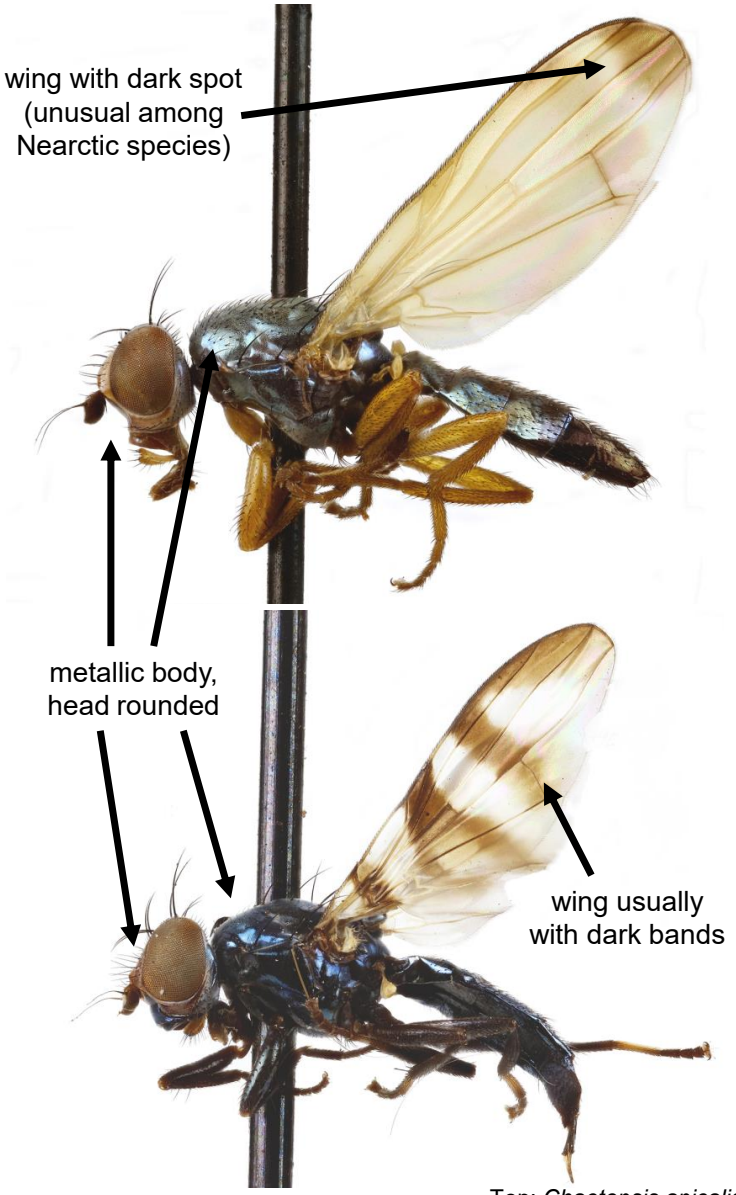
Chaetopsis Loew 1868

Species #
Worldwide: 14
Nearctic: 7

Distribution: widespread, 1 species documented in Canada

Recognition: Mid-size members of Ulidiidae with metallic coloration and typically barred wing pigmentation. Similar to *Euxesta* and *Stenomyia. Stenomyia* has a more retreating face in profile than *Chaetopsis*, whose heads is rounded; both are distinguished from *Euxesta* by characters of their first flagellomere, frontal vitta and ovipositor.

Ecology: *Chaetopsis massyla*, like *Euxesta*, is known to be pestiferous in larval form on corn plants (Goyal et al. 2010, 2011, 2012).



Top: *Chaetopsis apicalis*
Bottom: *Chaetopsis quadrifasciata*

doi:10.3752/cjai.2021.45

Curranops Harriot 1942

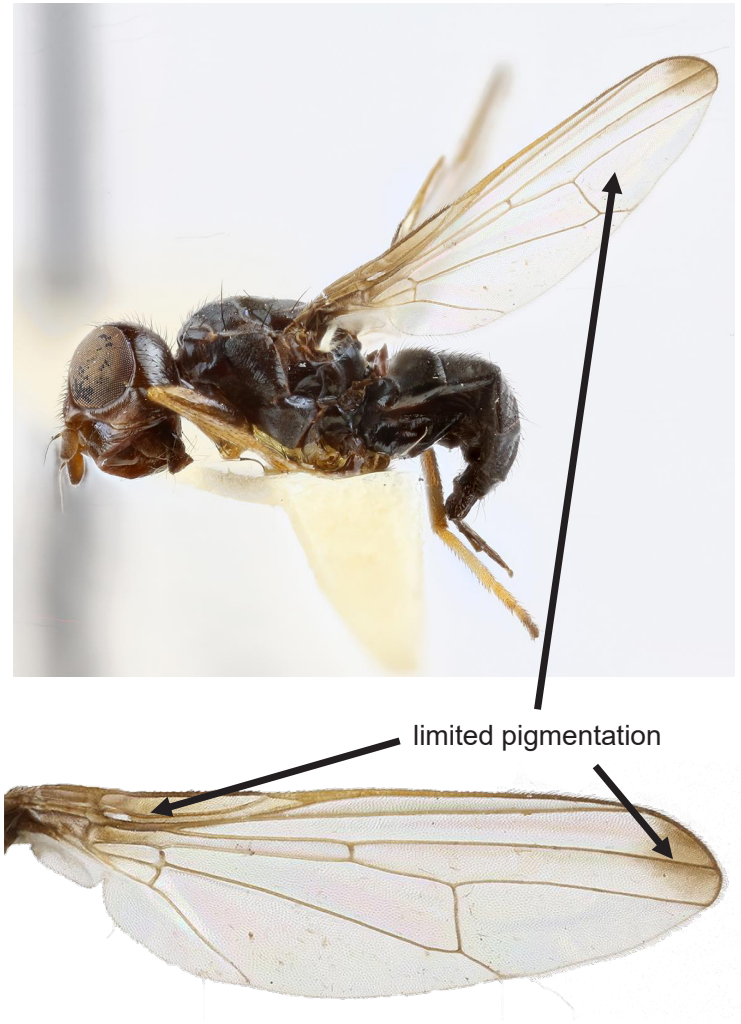
Species #
Worldwide: 2
Nearctic: 2

Distribution: western Canada and USA, south to California and Arizona

Recognition: Dark-bodied fly. Wing with limited pigmentation pattern.

Ecology: Unknown/Undocumented

Key: Steyskal (1962).



Curranops scutellaris

doi:10.3752/cjai.2021.45

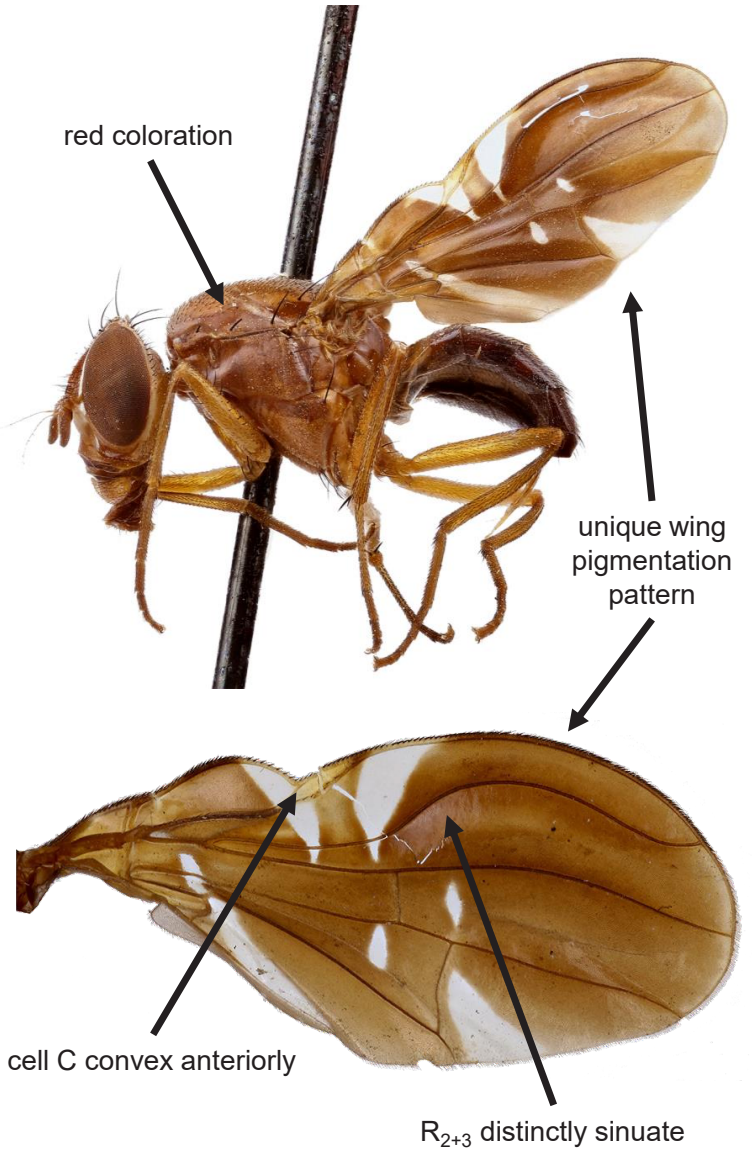
Delphinia Robineau-Desvoidy 1830

Species #
- Worldwide: 1
- Nearctic: 1

Distribution: widespread through eastern half of continent, in both Canada and the USA

Recognition: A monospecific genus, *Delphinia* is easily recognizable within its range by its wing, whose pattern is unique among Nearctic Ulidiidae.

Ecology: *Delphinia picta* has been documented in association with rotting vegetation (Ferrar 1987, author's observation).



Delphinia picta

Diacrita Gerstaecker 1860

Species #
- Worldwide: 2
- Nearctic: 2

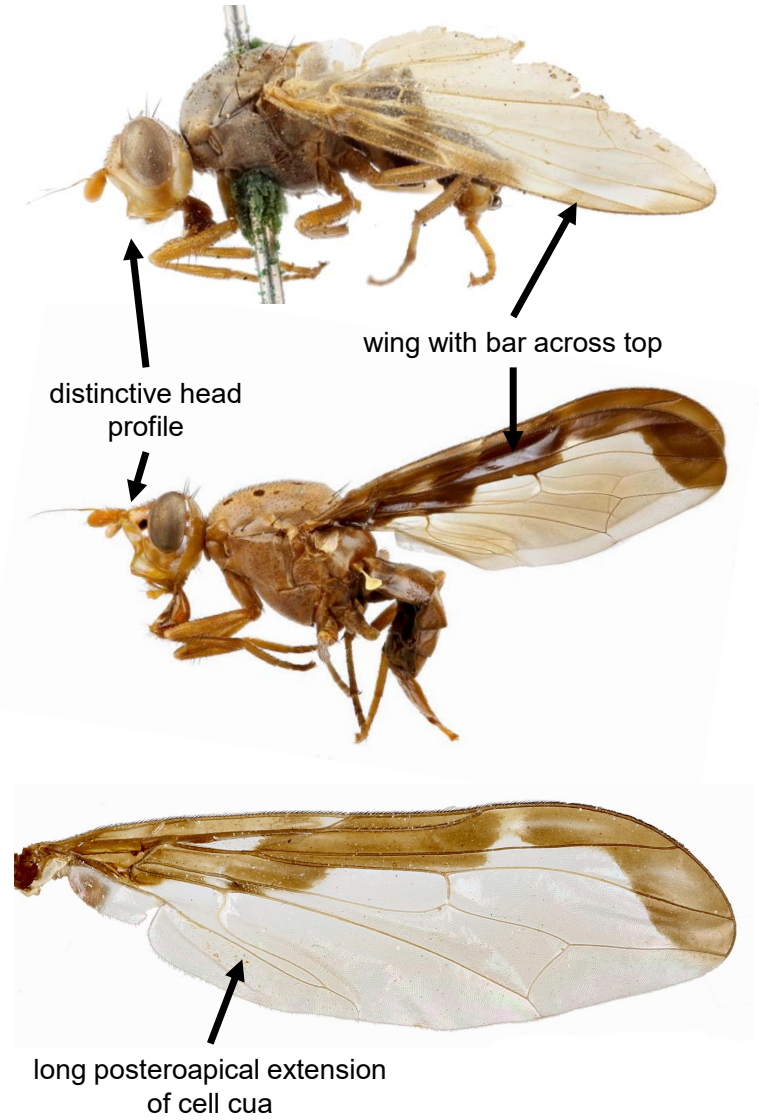
Distribution: American southwest

Recognition: *Diacrita* are among the largest ulidiids. Overall robust and reddish, additionally recognizable from the long lobe of the cua cell.

Both species share a distinctive head profile, with a concavity beneath the protruding antennae.

Ecology: Unknown/Undocumented

Key: Steyskal (1941)



Top: *Diacrita plana*
Middle, bottom: *Diacrita costalis*

doi:10.3752/cjai.2021.45

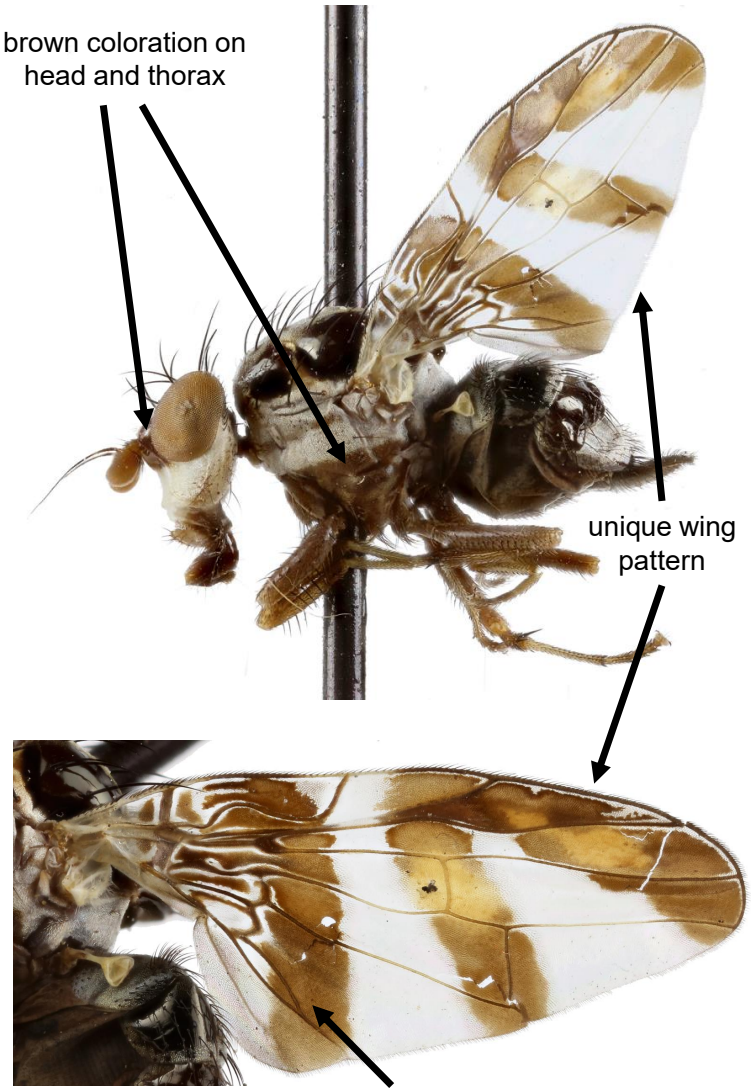
Dyscrasis Aldrich 1932

Species #
- Worldwide: 1
- Nearctic: 1

Distribution: American southwest

Recognition: The singular species of the genus, *Dyscrasis hendeli*, is recognizable for its coloration, wing pattern, and shape.

Ecology: Unknown/Undocumented



Dyscrasis hendeli

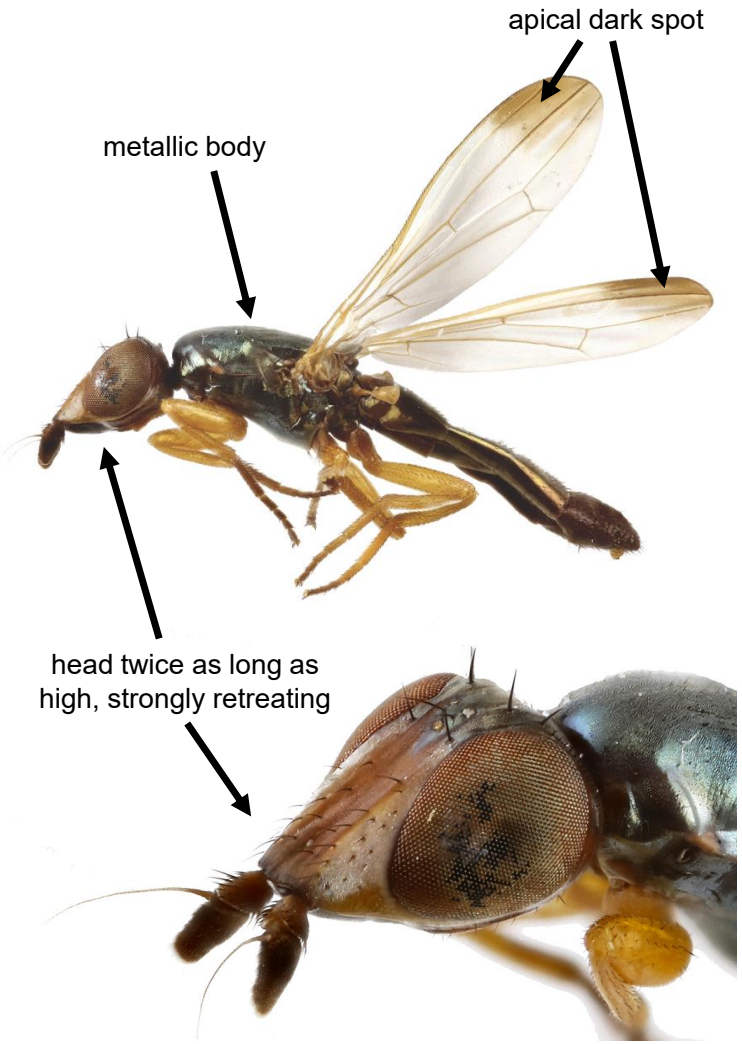
Eumetopiella Hendel 1907

Species #
Worldwide: 4
Nearctic: 2

Distribution: eastern Canada and USA

Recognition: Head nearly twice as long as high with face strongly retreating. Slim, metallic colored flies. Wings with single apical dark spot.

Ecology: The larval stage of *Eumetopiella rufipes* has been documented attacking living plant tissue in the inflorescences of *Echinochloa* grass (Ferrar 1987).



Eumetopiella rufipes

Euxesta Loew 1868

Species #
Worldwide: 97
Nearctic: >30*

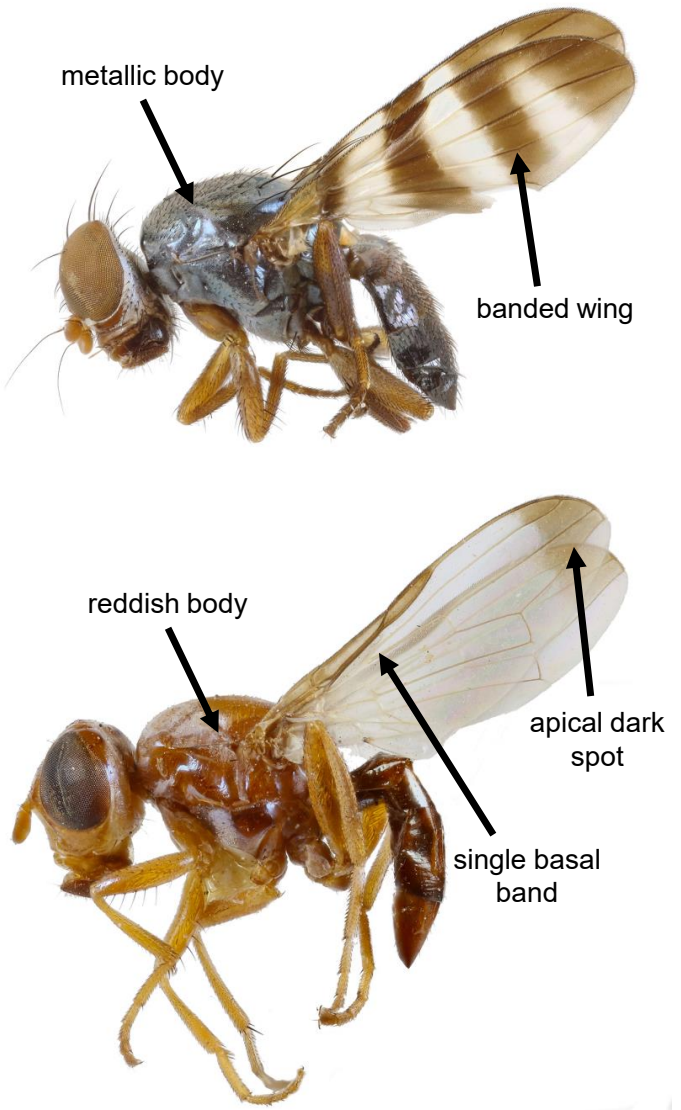
**Euxesta* is the most speciose genus of Ulidiidae with a Nearctic distribution; the exact number of species both worldwide and in the United States and Canada are unclear. The taxonomy of the genus remains unresolved, and may not be monophyletic (Kameneva and Korneyev 2006).

Distribution: Widespread across Canada and the USA. The genus is predominantly Neotropical, and many Nearctic species are known only from extensions of their distribution through Florida or other parts of the American south.

Recognition: Body usually metallic and/or reddish. Wings usually with banded pattern, or with band and single apical spot. Most easily mistaken for *Chaetopsis* but distinguishable by features of frontal vitta, flagellomere, and ovipositor (in females).

Ecology: *Euxesta*, with *Chaetopsis*, are known to be pestiferous on corn plants in their larval state (Goyal et al. 2010, 2011, 2012). They are among a handful of Ulidiid species which have been documented as primary invaders of plant tissue, most of the family being saprophagous (Ferrar 1987).

Key: Partial key available in Steyskal and Ahlmark (1995).



Top: *Euxesta abdominalis*
Bottom: *Euxesta luteocesta*

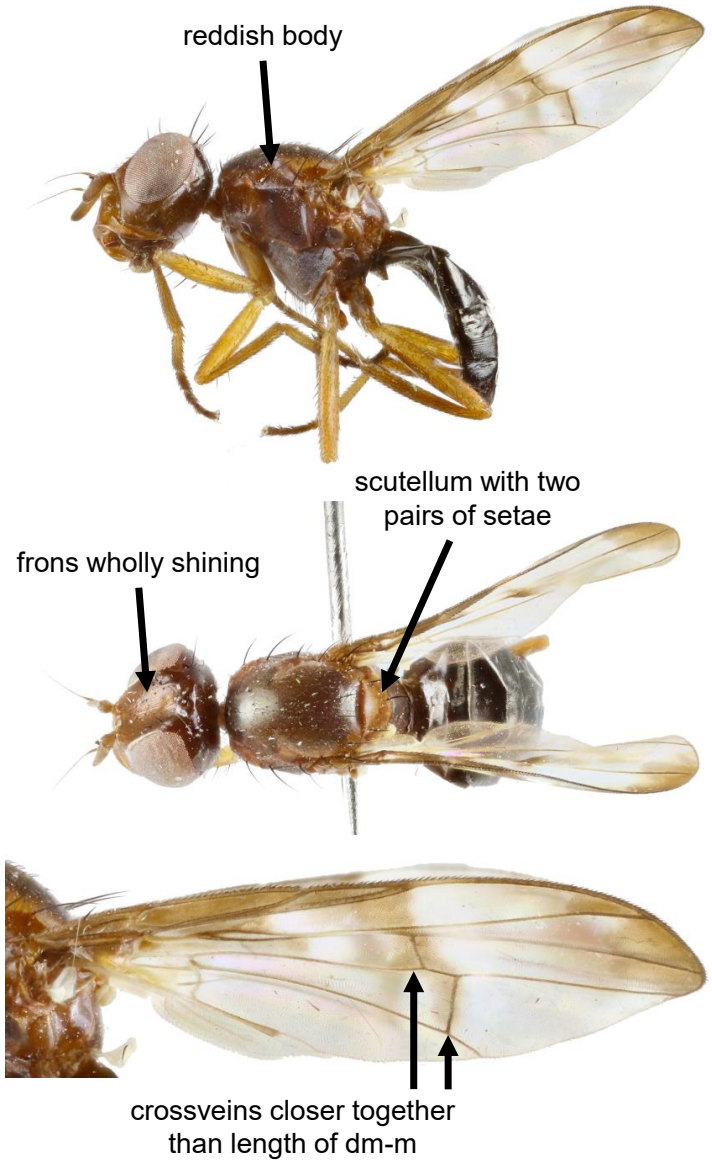
Haigia Steyskal 1961

Species #
- Worldwide: 1
- Nearctic: 1

Distribution: Washington state

Recognition: Reddish, medium-sized fly. Scutellum with two pairs of setae, wing with several pigmented bands, frons wholly shining. Crossveins r-m and dm-m closer together than length of crossvein dm-m.

Ecology: Unknown/Undocumented



Haigia nevadana

Herina Robineau-Desvoidy 1830

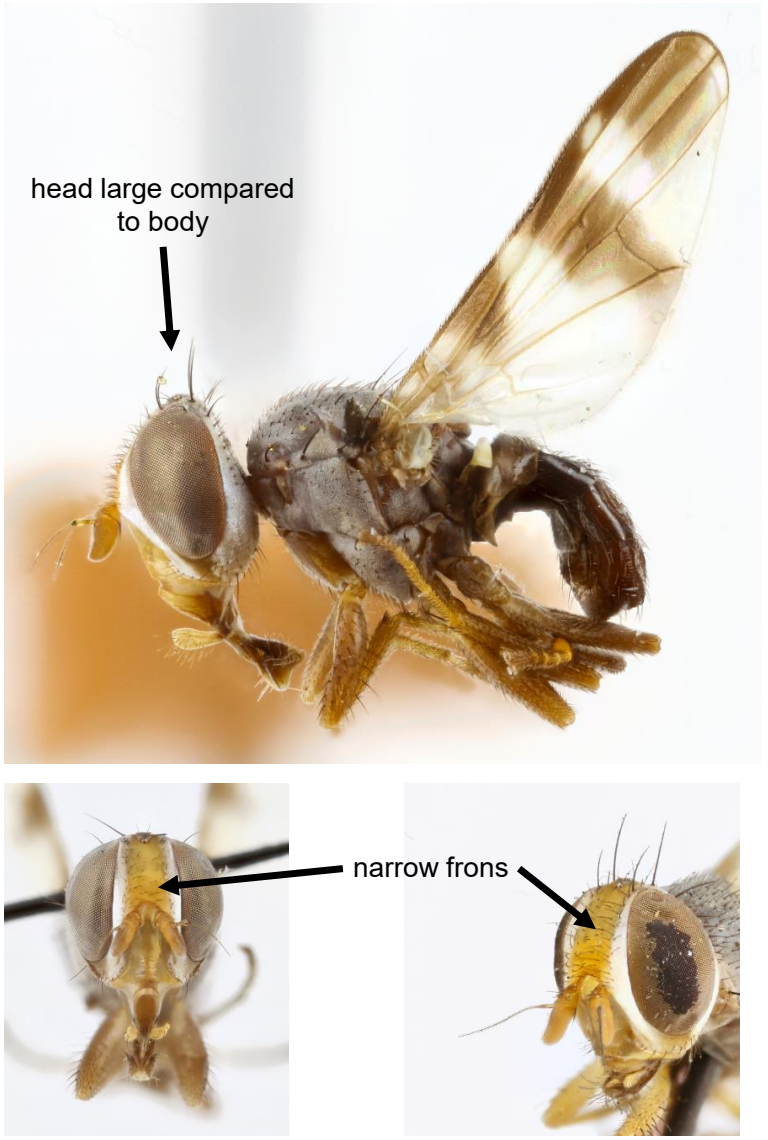
Species #
- Worldwide: 41
- Nearctic: 4

Distribution: widespread; present in both Canada and the USA

Recognition: *Herina* are among the smallest Ulidiidae (wing length 2–5 mm), and have proportionally large heads with a narrow frons. Wings patterned with bands or spots.

Ecology: Unknown/Undocumented

Key: Key to four nearctic species in McAlpine (1951), and to worldwide species groups in Morgulis et al. (2016).



Top, left: *Herina canadensis*
Right: *Herina narytia*

doi:10.3752/cjai.2021.45

Hiatus Cresson 1906

Very little has been written about *Hiatus* since its description. Images used in this key drawn anew based on Plate VI of Cresson 1906.

Species #

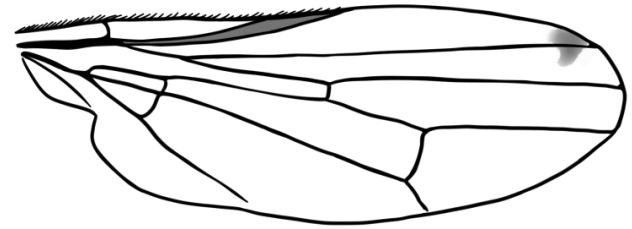
Worldwide: 1

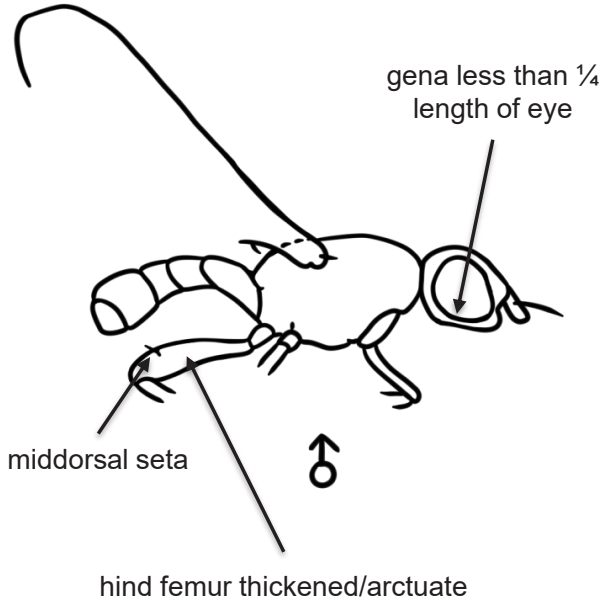
Nearctic: 1

Distribution: New Mexico

Recognition: Gena less than ¼ length of eye; in males, hind femur thickened/arctuate, with middorsal seta.

Ecology: Unknown/Undocumented





Hiatus fulvipes

doi:10.3752/cjai.2021.45

Homalocephala Zetterstedt 1838

Species #

Worldwide: 9

Nearctic: 3*

*The species which have a Nearctic distribution are listed in the included checklist. Images from species from outside the United States and Canada were used to illustrate features in the key, due to poor quality of Nearctic specimens available.

Distribution: “boreal and montane forest” (Steyskal 1987)

Recognition: Head distinctly broader than high.

Ecology: Both Nearctic *Homalocephala* have been documented under bark (Allen and Foote 1967).

Two specimens of *Homalocephala albitarsis* from the USNM

doi:10.3752/cjai.2021.45

Idana Loew 1873

Species #
- Worldwide: 1
- Nearctic: 1

Distribution: southeastern Canada /northeastern USA

Recognition: A monospecific genus, *Idana* is recognizable by both its unique yellow and brown wing pattern and the alternating bands of yellow and black visible on both its thorax and abdomen.

Ecology: Larvae of *Idana marginata* have been documented in association with rotting vegetation (Allen and Foote 1967).

Idana marginata

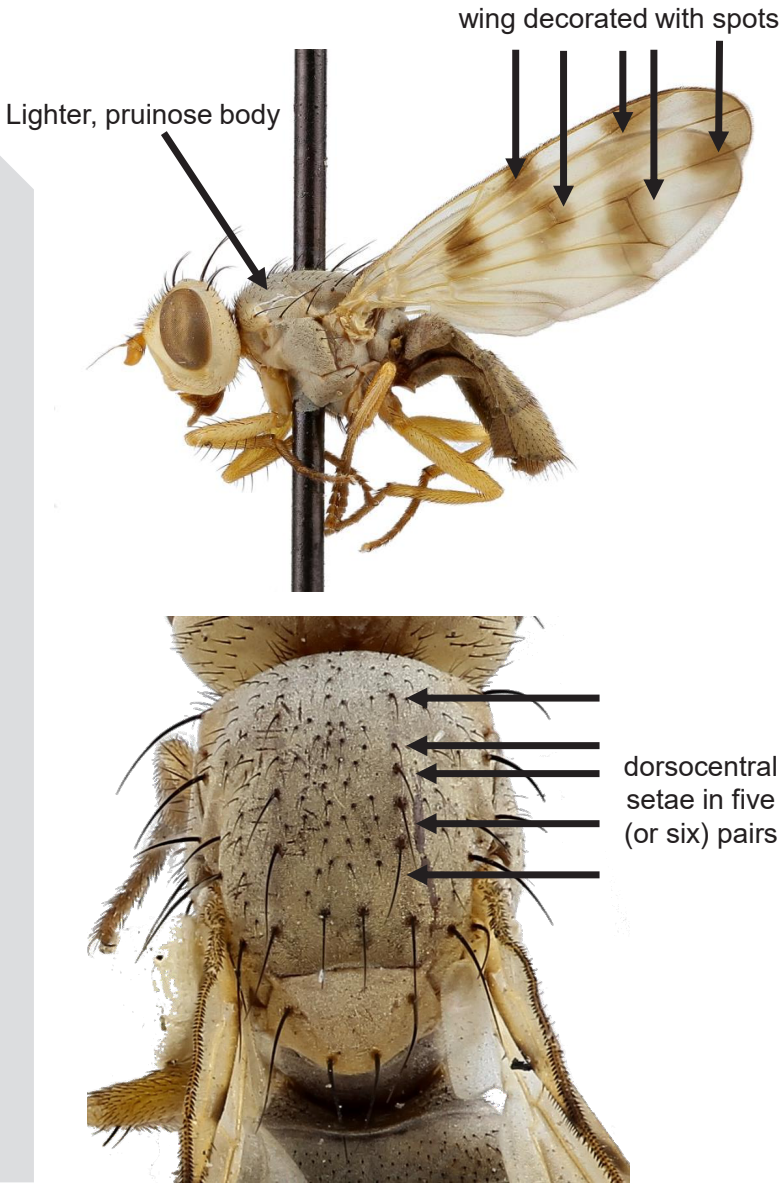
Melieria Robineau-Desvoidy 1830

Species #
- Worldwide: 35
- Nearctic: 6

Distribution: Canada, northern USA, western mountains

Recognition: Medium-sized, light-colored, pruinose flies; wings decorated with yellow-brown spots. Dorsocentral setae in five or six pairs.

Ecology: Unknown/Undocumented



Melieria ochricornis

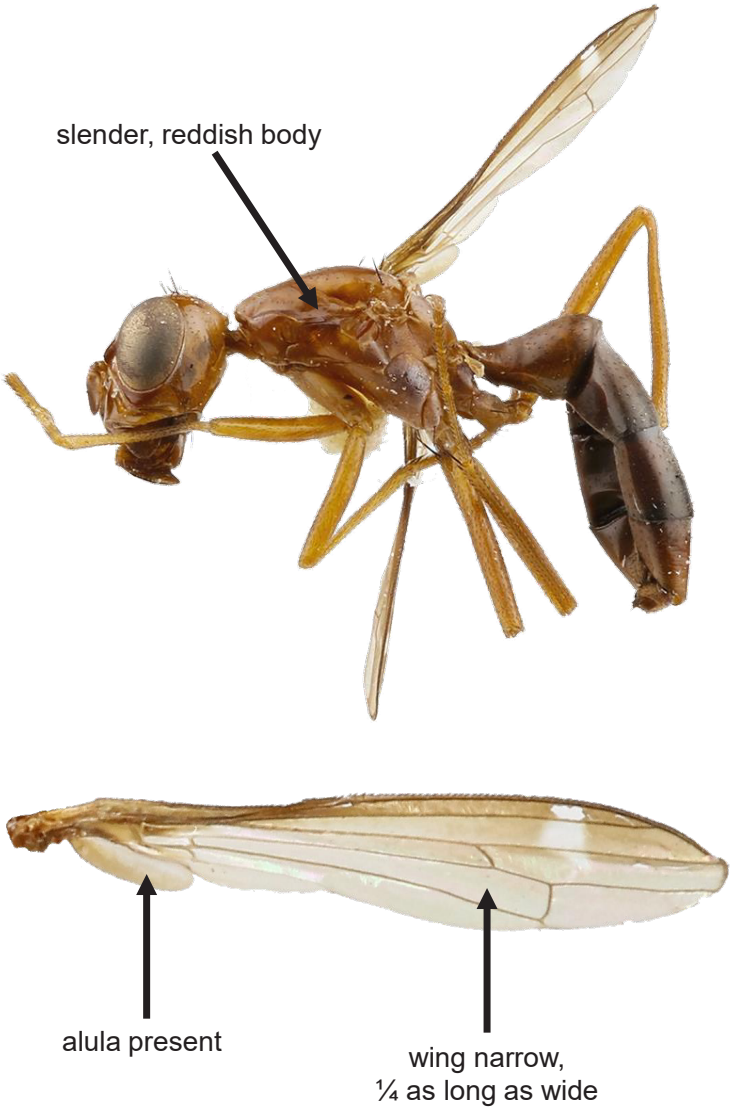
Myiomyrmica Steyskal 1961

Species #
- Worldwide: 1
- Nearctic: 1

Distribution: Illinois, Iowa, Wisconsin

Recognition: Slender reddish flies (ant mimics). Wings very narrow, 5.3 times as long as wide. Similar in appearance to other ant-mimicking Nearctic ulidiid, *Myrmecothea myrmecoides*, but differs from that species in coloration and the presence of alula on wing.

Ecology: Unknown/Undocumented



Myiomyrmica fenestrata

doi:10.3752/cjai.2021.45

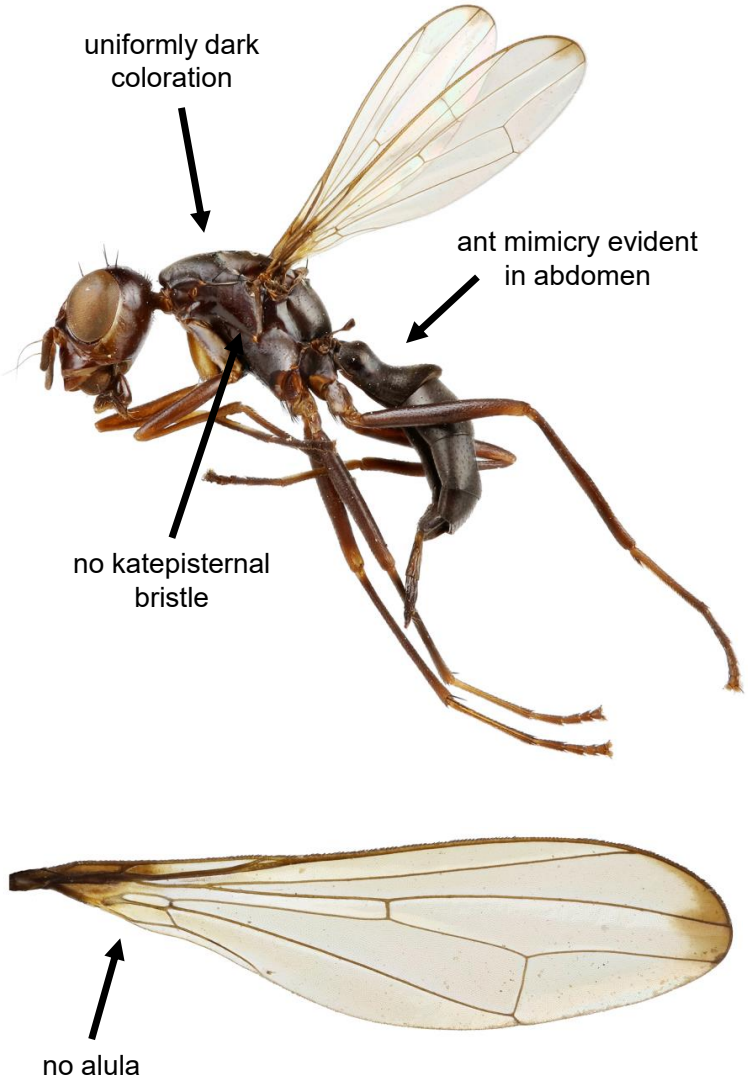
Myrmecothea Hendel 1910

Species #
- Worldwide: 1
- Nearctic: 1

Distribution: northeast USA, south along east coast to SC

Recognition: A monotypic genus, *Myrmecothea* is recognizable among Ulidiidae by its ant-like form, and the absence of a katepisternal seta and alula.

Ecology: The larval form of *Myrmecothea myrmecoides* has been documented in association with rotting vegetation (Ferrar 1987).



Myrmecothea myrmecoides

Notogramma Loew 1868

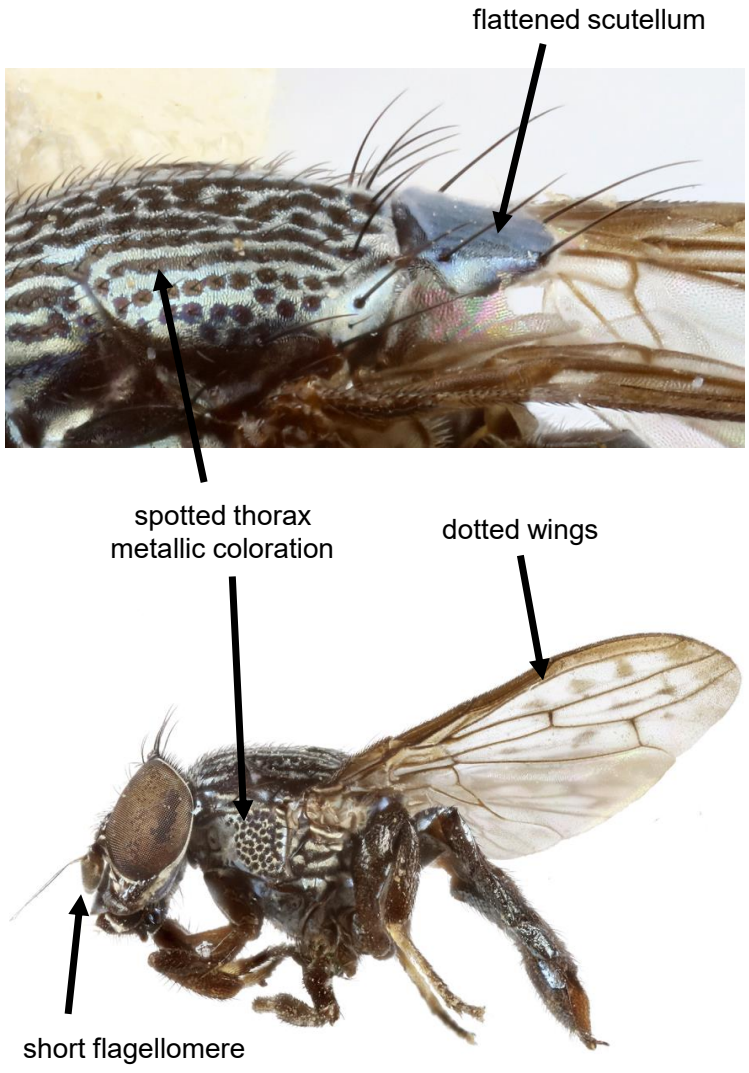
Species #
- Worldwide: 4
- Nearctic: 2

Distribution: southern USA, from California to Florida

Recognition: *Notogramma* shares its geographical distribution and dappled wings and body with *Stictomyia*. The two can be distinguished by the metallic coloration of the two Nearctic *Notogramma*, their shorter antennae, their pitted/wrinkled frons, and their flattened scutellum.

Ecology: *Notogramma* have been documented in association with cactus plants and fruits (Ferrar 1987).

Key: Steyskal (1963, 1991)



Top: *Notogramma purpuratum*
Bottom: *Notogramma cimiciforme*

Oedopa Loew 1868

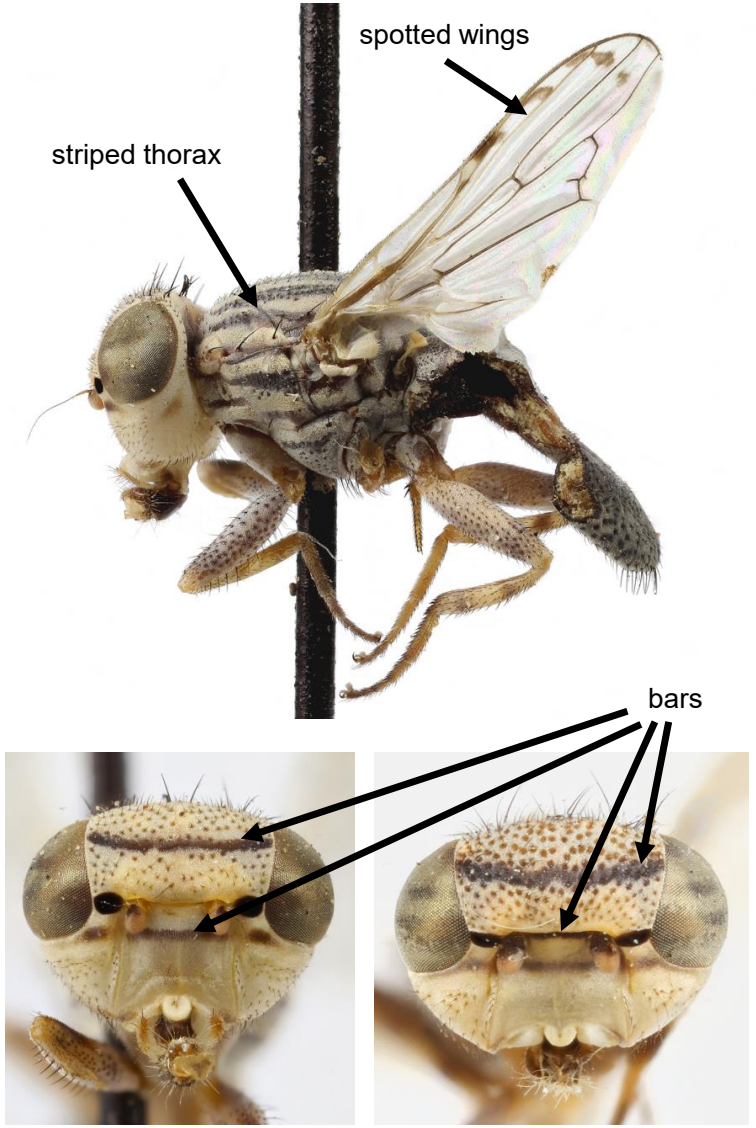
Species #
- Worldwide: 3
- Nearctic: 2

Distribution: USA west coast, south to Mexico

Recognition: Crossvein dm-m may be biangulate, face with brown bar across middle. Similar in appearance to *Paroedopa punctigera* (approximately same size, both with striped thorax and spotted wings); distinguishable by bar across face (instead of dots).

Ecology: Unknown/Undocumented

Key: Steyskal (1974)



Top, left: *Oedopa capito*
Bottom: *Oedopa ascriptiva*

doi:10.3752/cjai.2021.45

Otites Latreille 1804

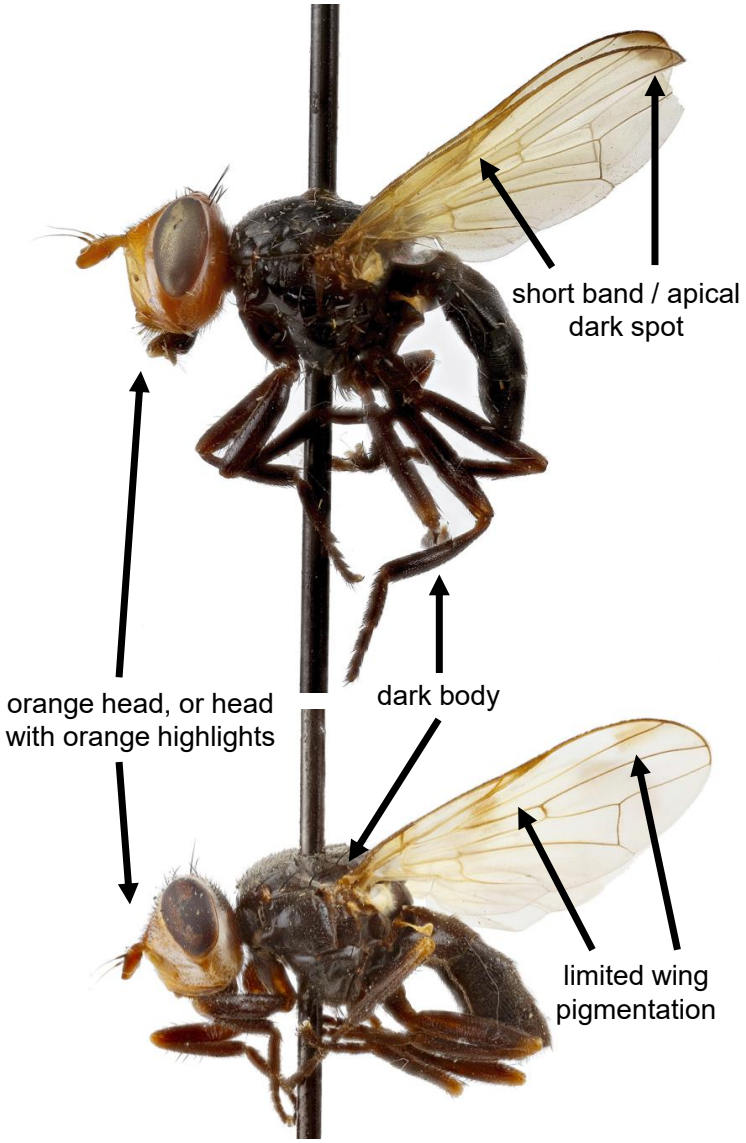
Species #
- Worldwide: 34
- Nearctic: 7

Distribution: central, western USA and Canada

Recognition: Medium-sized flies; generally dark-bodied with lighter (sometimes orange) head. Wing pattern limited, at most with one short band and apical spot.

Ecology: Unknown/Undocumented

Key: Steyskal (1966a)



Top: *Otites erythrocephala*
Bottom: *Otites bimaculatus*

doi:10.3752/cjai.2021.45

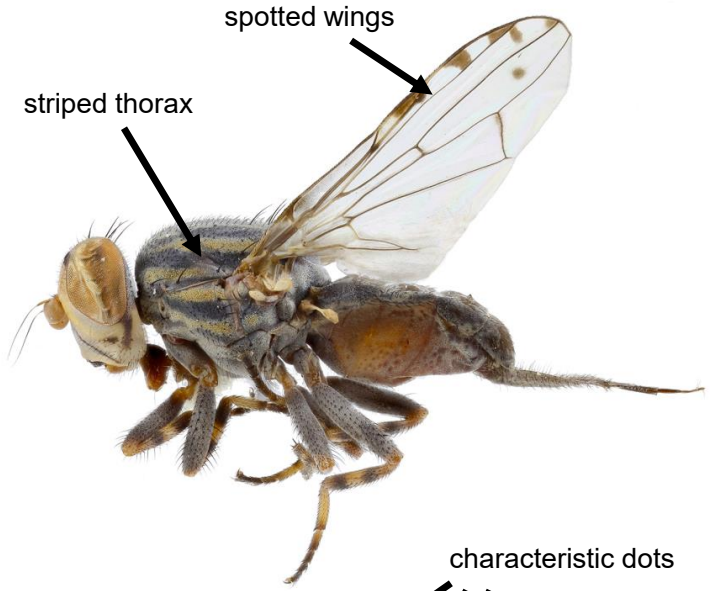
Paroedopa Coquillett 1900

Species #
- Worldwide: 1
- Nearctic: 1

Distribution: southwest USA, Arizona to Texas

Recognition: *Paroedopa*, a monospecific genus, is recognizable within its range by the combination of its spotted wings, striped thorax, and pattern of dots on its head; one between the antennae and two bordering the frons.

Ecology: Unknown/Undocumented



Paroedopa punctigera

doi:10.3752/cjai.2021.45

Physiphora Fallen 1810

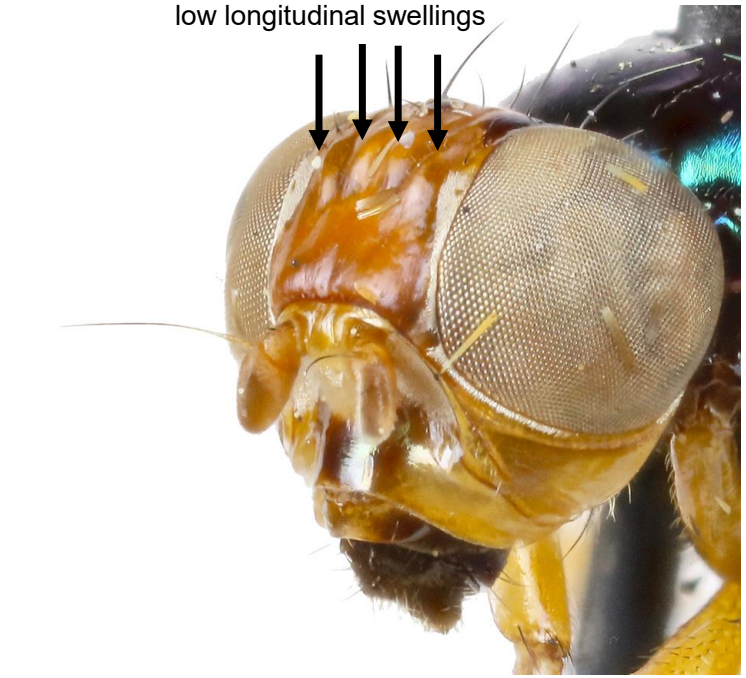
Species #
- Worldwide: 25
- Nearctic: 2

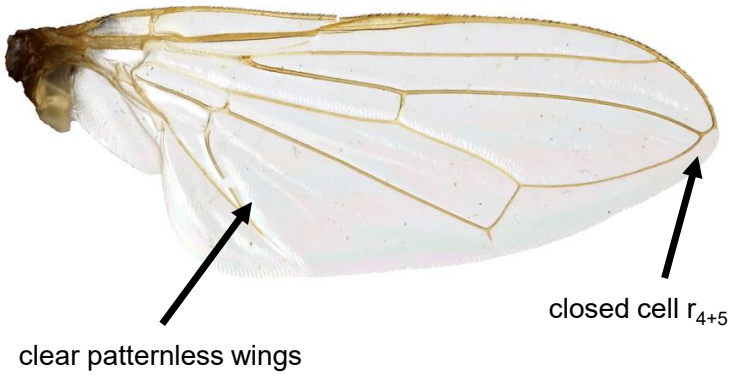
Distribution: *Physiphora* is a primarily Afrotropical genus; in its introduced range in the Nearctic region, it is widely distributed across both Canada and the USA

Recognition: This genus features bright metallic bodies, clear patternless wings whose cell r_{4+5} is fully closed, and four low longitudinal swellings on a bare frontal vitta.

Ecology: Larvae primarily saprophagous on palms, *Euphorbia*, poplars, and baobab; some species associated with ungulate dung (Kameneva and Korneyev 2016).

Species key: Kameneva and Korneyev (2016)





Physiphora clausa

doi:10.3752/cjai.2021.45

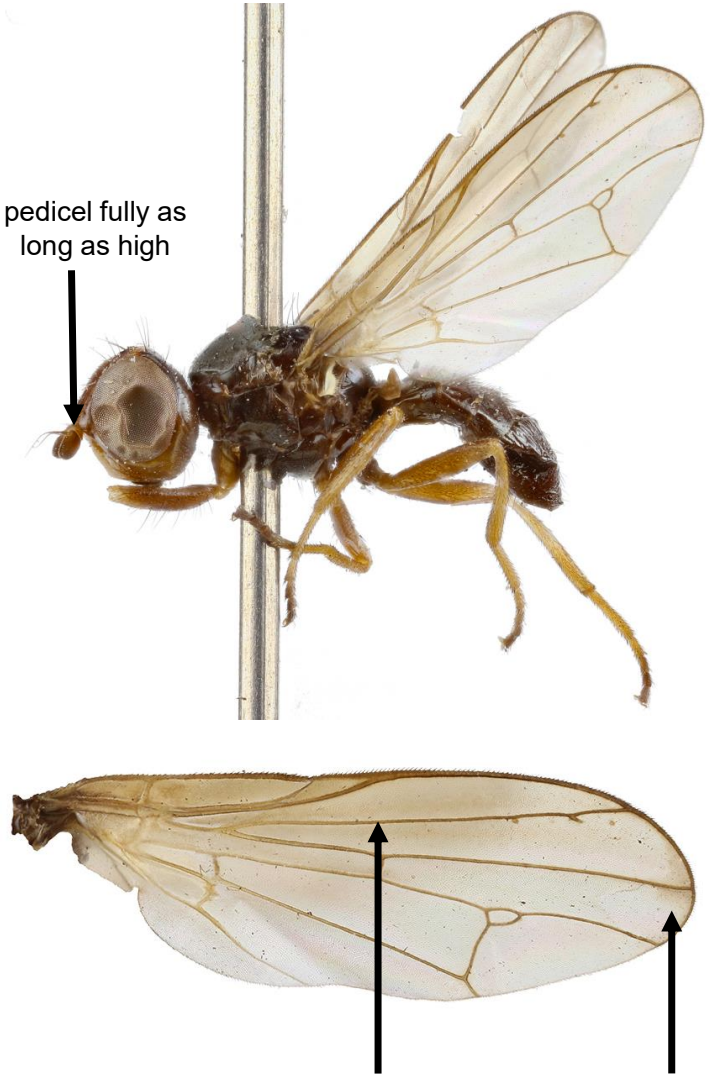
Psaeropterella Hendel 1914

Species #
- Worldwide: 2
- Nearctic: 2

Distribution: west coast; one species documented in California, and the other in British Columbia

Recognition: Similar in appearance to members of *Haigia*; dark-colored, medium-sized flies without many immediately distinct features. In *Psaeropterella*, pedicel fully as long as high.

Ecology: Unknown/Undocumented



Psaeropterella macrocephala

doi:10.3752/cjai.2021.45

Pseudoseioptera Stackelberg 1955

Species #
Worldwide: 3
Nearctic: 2*

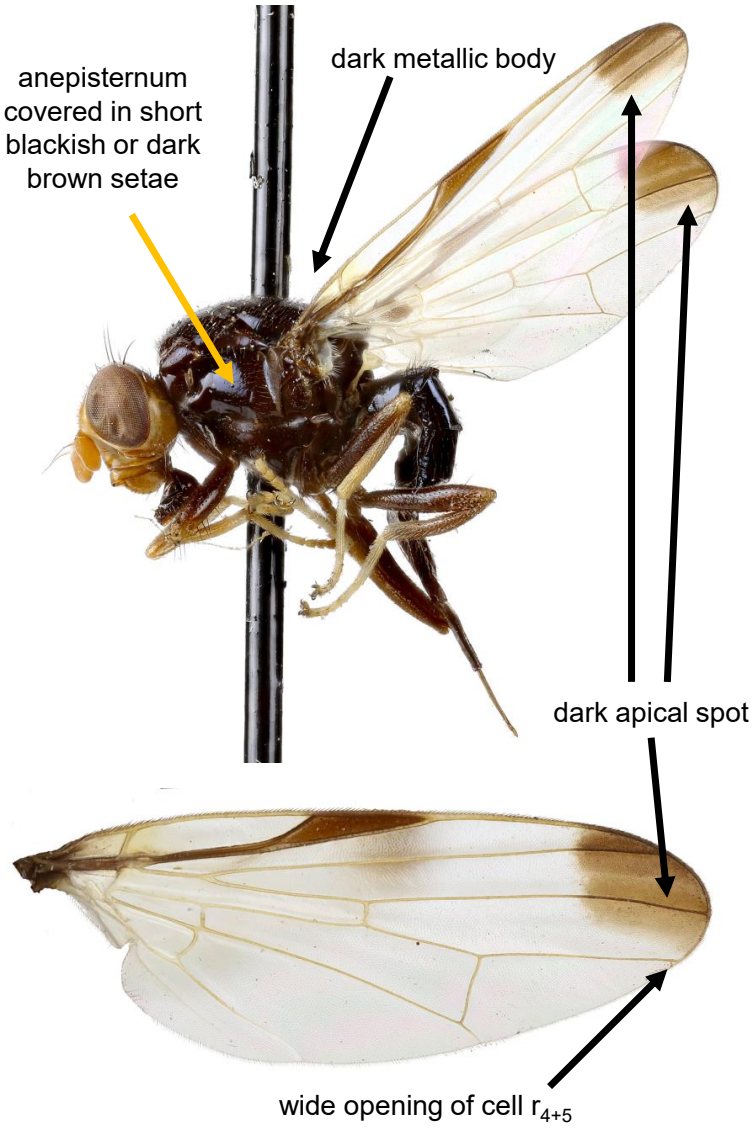
*Both Nearctic species (*P. albipes* and *P. dubiosa*) originally assigned to *Seioptera*

Distribution: eastern half of the continent, Northeast south to Georgia and west to Kansas / Manitoba

Recognition: Both *Seioptera* and *Pseudoseioptera* have dark metallic bodies, wings with an apical dark spot, and setulose R1. *Pseudoseioptera* differs from *Seioptera* by a wide opening of cell r_{4+5} and short course black or dark brown setae covering the anepisternum.

Ecology: Unknown/Undocumented

Key: Key to *Seioptera* in Steyskal (1956) includes species which have since been reassigned to *Pseudoseioptera*.



Pseudoseioptera albipes

Pseudotephritina Malloch 1931

Species #
- Worldwide: 2
- Nearctic: 2

Distribution: widespread in both Canada and USA

Recognition: *Pseudotephritina* shares with *Callopistromyia* and *Pseudotephritis* the appearance of a mottled body and wings; it is distinguishable from both by a small stump vein projecting from M_{1+2} into cell dm or by the twin shining lateral dark spots on its scutellum (a character it shares with *Xanthacrona bipustulata*, which is otherwise very visually distinct).

Ecology: Unknown/Undocumented

Pseudotephritina inaequalis

Pseudotephritis Johnson 1902

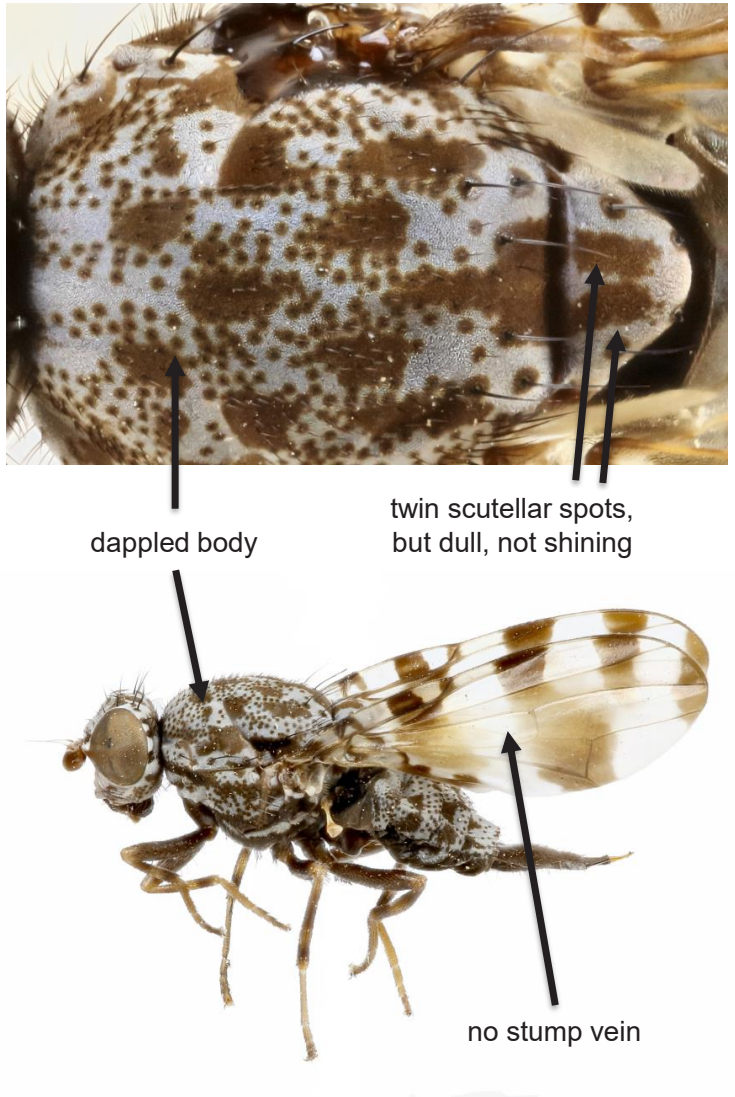
Species #
- Worldwide: 6
- Nearctic: 4

Distribution: widespread across both Canada and the USA

Recognition: *Pseudotephritis* shares with *Callopistromyia* and *Pseudotephritina* the traits of a dappled body and wings. It is distinguishable from the former by the pattern of its wings (specifically, the coloration of cell dm) and by the latter by the absence of a stump vein into cell dm / twin shining dark scutellar spots.

Ecology: Unknown/undocumented.

Key: Malloch (1931)



Pseudotephritis approximata

Seioptera Kirby & Spence 1817

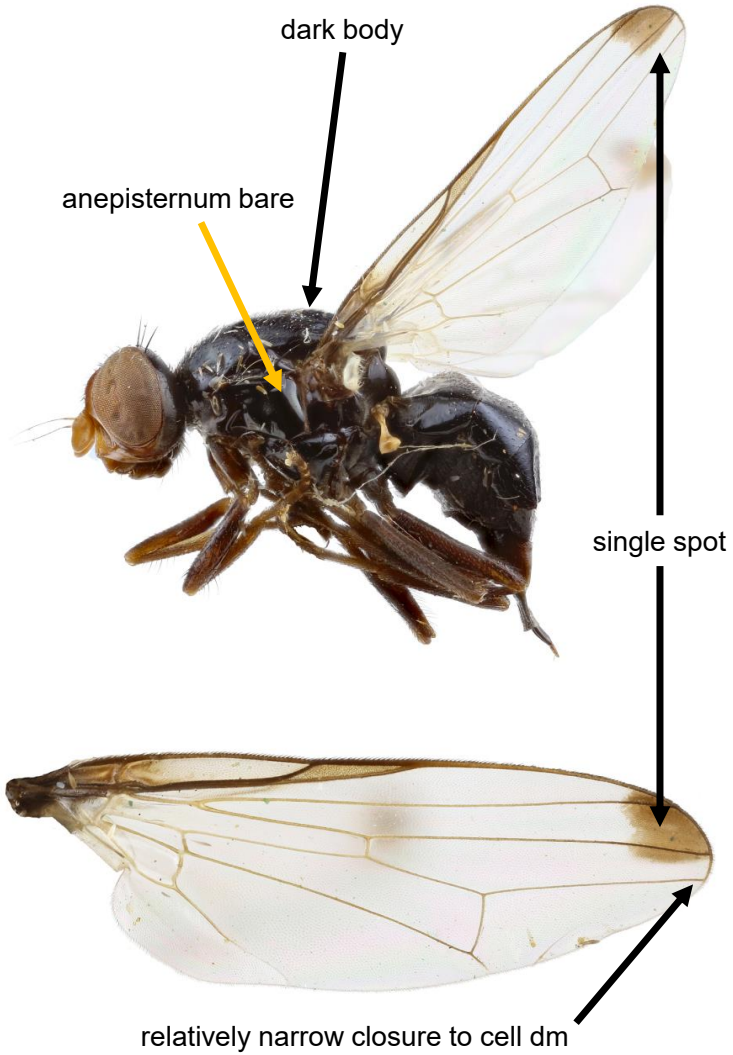
Species #
Worldwide: 5
Nearctic: 3

Distribution: Canada coast to coast, widespread in USA

Recognition: *Seioptera* looks very similar to *Pseudoseioptera;* both are dark flies with spotted wings. The two can be told apart by the condition of the anepisternum, which in *Seioptera* is bare or very barely pale pruinose in as well as by the closure of cell dm, which is relatively narrow.

Ecology: *Seioptera* has been documented in association with rotting vegetation, garden compost, and dung (Allen and Foote 1967).

Key: Steyskal (1956); includes several species which now belong to *Pseudoseioptera*



Seioptera colon

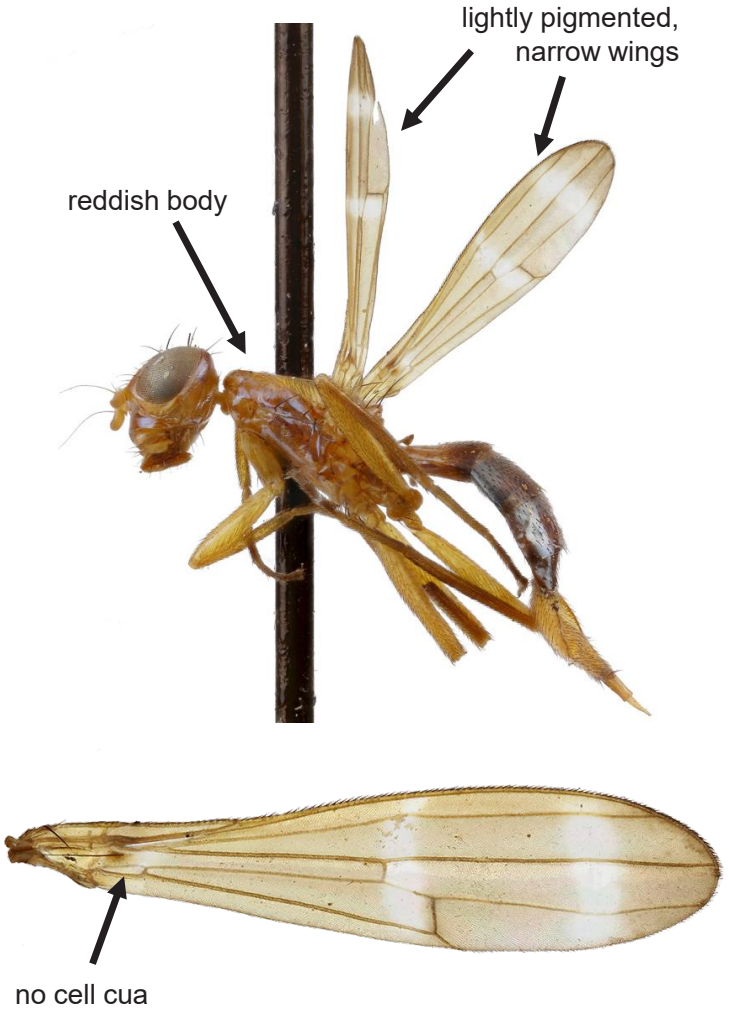
Steneretma Loew 1873

Species #
- Worldwide: 1
- Nearctic: 1

Distribution: central and southeastern USA

Recognition: Visually similar to *Zacompsia*; both are reddish and slender, with lightly pigmented wings. *Steneretma* distinguished by absence of cell cua and relative narrowness.

Ecology: Unknown/Undocumented



Steneretma laticauda

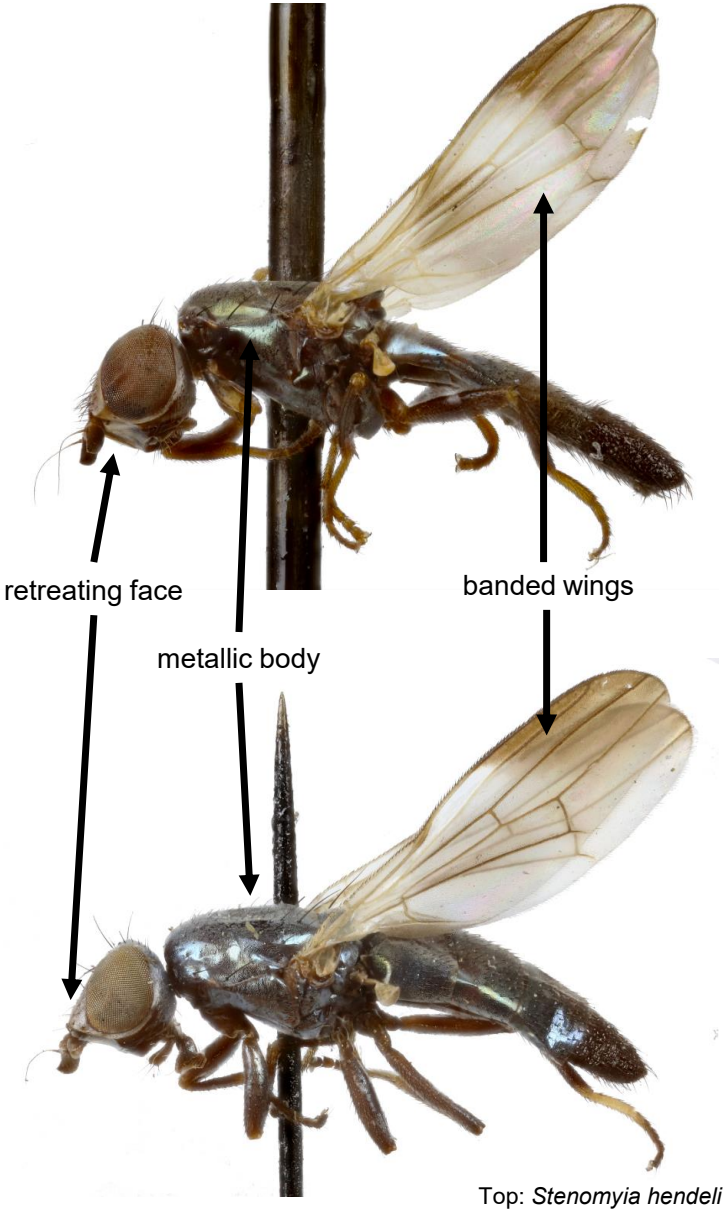
Stenomyia Loew 1868

Species #
- Worldwide: 5
- Nearctic: 3

Distribution: southwestern USA

Recognition: Visually similar to *Chaetopsis* (often metallic, with striped wings), but with noticeably retreating face.

Ecology: Unknown/Undocumented



Top: *Stenomyia hendeli*
Bottom: *Stenomyia nasoni*

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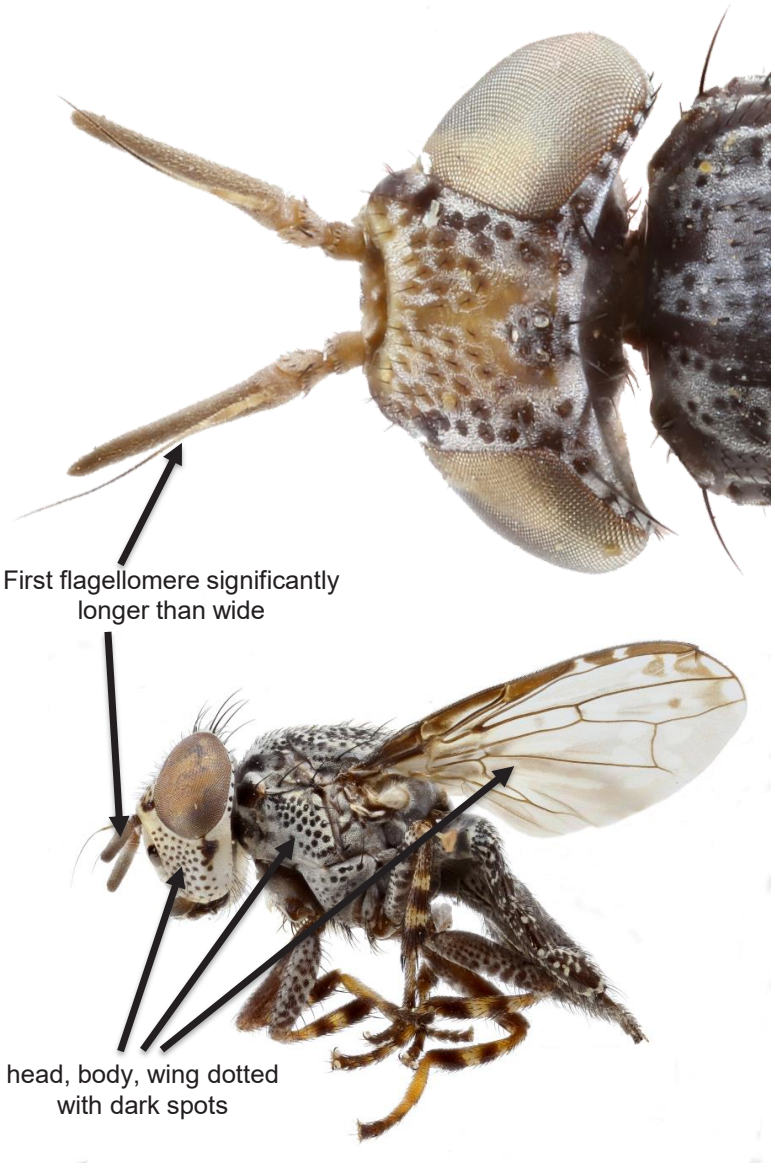
Stictomyia Bigot 1885

Species #
- Worldwide: 2
- Nearctic: 2

Distribution: southwestern USA

Recognition: First flagellomere more than three times as long as wide. Body, head, and wing dotted with dark spots. Visually similar to *Notogramma* but immediately distinguishable by the length of their first flagellomere.

Ecology: *Stictomyia longicornis* has been documented in association with rotting cactus (Allen and Foote 1967).



Top: *Stictomyia longicornis*
Bottom: *Stictomyia punctata*

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Tetanops Fallen 1820

Species #*

Worldwide: 15

Nearctic: 7

*The original "Otitidae" key in the Manual of Nearctic Diptera distinguishes between *Tetanops* and *Tetanops (Eurycephalomyia*); this distinction has been removed from this key, as the two have been synonymized.

Distribution: USA and Canada, widespread

Recognition: Relatively large for Ulidiidae, Nearctic members of *Tetanops* share a generally distinctive profile, with a pointed head (except *Tetanops myopaeformis),* frequently with distinctively wrinkled fronto-orbital plates / parafacial.

Ecology: *Tetanops myopaeformis,* the "sugarbeet root maggot," is well-documented as a larval pest on the commercially grown sugarbeet, *Beta vulgaris* L. (Bjerke et al. 1992). Other members of *Tetanops* have been documented in association with dung and dead plant material (Ferrar 1987).

Key: Steyskal (1970)

Top: *Tetanops cazieri*
Middle: *Tetanops luridipennis*
Bottom: *Tetanops myopaeformis*

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Tetropismenus Loew 1876

Species #
- Worldwide: 1
- Nearctic: 1

Distribution: California

Recognition: Dark-bodied, relatively large member of Ulidiidae, with unpigmented wings.

Similar in appearance to members of *Tetanops*, *Tetropismenus hirtus* differs by its scutellum (three or four pairs of setae) and first flagellomere (nearly circular in profile).

Ecology: Unknown/Undocumented

Tetropismenus hirtus

Texasa Steyskal 1961

Species #
Worldwide: 1
Nearctic: 1

Distribution: Texas

Recognition: *Texasa chaetifrons* is unique among Nearctic Ulidiidae for having a uniformly dark-pigmented wing, further distinguished by its very short R_1. First flagellomere more than three times as long as wide, as in *Stictomyia*, from which it is otherwise strongly visually distinct.

Ecology: Unknown/Undocumented

Texasa chaetifrons

Tritoxa Loew 1873

Species #
Worldwide: 7
Nearctic: 7

Distribution: widespread in Canada and the USA

Recognition: Wing pattern of large portions darkly pigmented with equal or smaller unpigmented stripes, cell c narrow, and cell cua closed apically by straight or outwardly arcuate vein, no point/extension in posteroapical corner.

Closely related, and similar in appearance, to *Delphinia picta, Tritoxa* is easily distinguished by the completely straight anterior edge of cell c.

Ecology: *Tritoxa flexa*, commonly known as the "black onion fly," demonstrates primary invasion of living plant tissue as larvae (Bjerke et al. 1992).

Key: Sinclair et al. (1971)

From top to bottom, wings of *Tritoxa cuneata, T. flexa, T. incurva,* and *T. pollinosa*.

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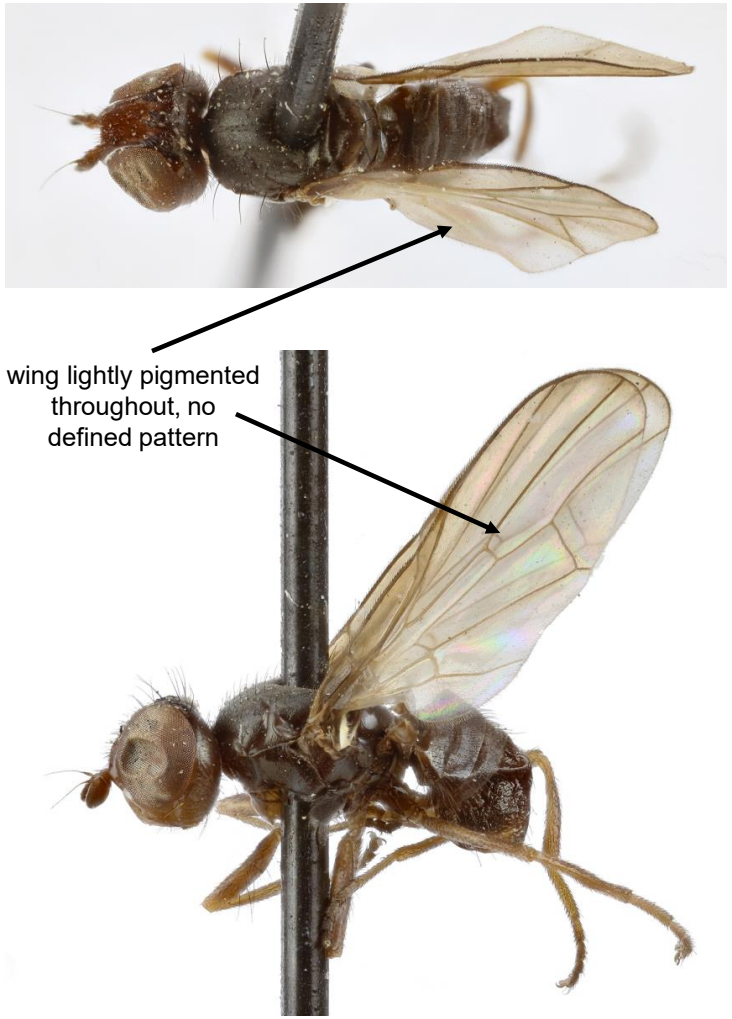
Tujunga Steyskal 1961

Species #
- Worldwide: 1
- Nearctic: 1

Distribution: California

Recognition: Visually similar to members of *Psaeropterella* and *Haigia*, *Tujunga mackenziei* is distinguished by its wings, which lack a color pattern and have a mostly bare R_1.

Ecology: Unknown/Undocumented



Tujunga mackenziei

doi:10.3752/cjai.2021.45

Ulidiotites Steyskal 1961

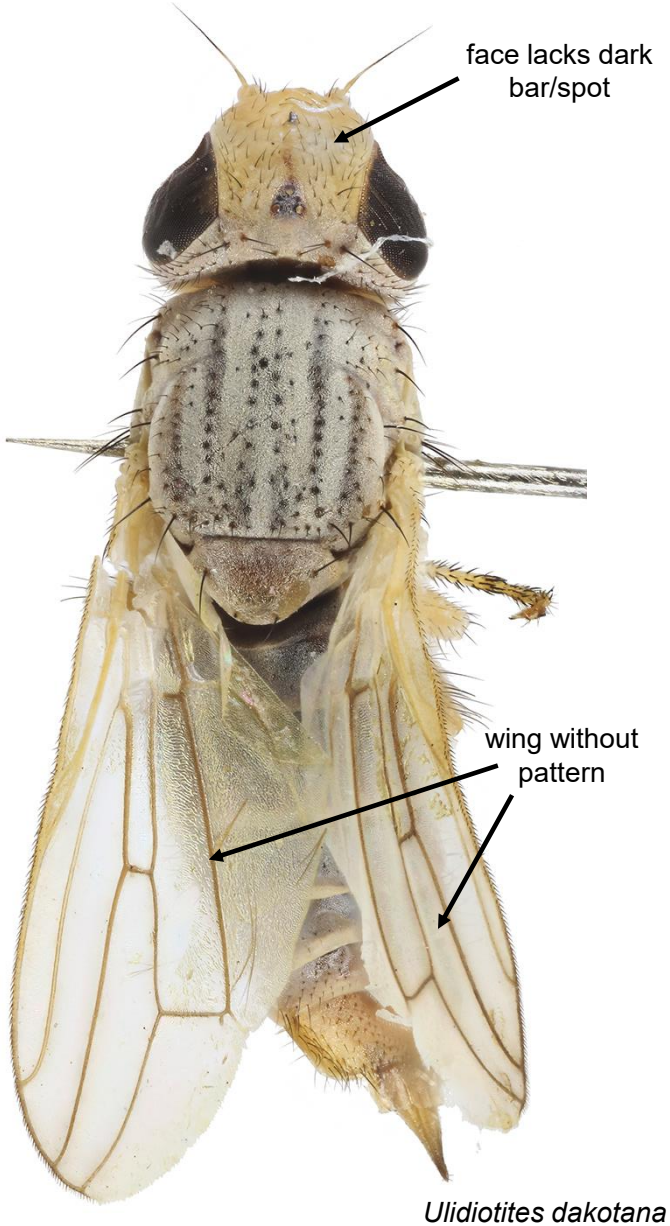
Species #
- Worldwide: 1
- Nearctic: 1

Distribution: “noncoastal sand areas of western USA” (Steyskal 1987)

Recognition: *Ulidiotites dakotana* is a sandy-colored pruinose species lacking any pigmented pattern on its wings.

It is similar to members of *Oedopa* and *Paroedopa* but differs by the absence of any dark bar or spot on its face.

Ecology: Unknown/Undocumented



Ulidiotites dakotana

Xanthacrona Wulp 1898

Species #

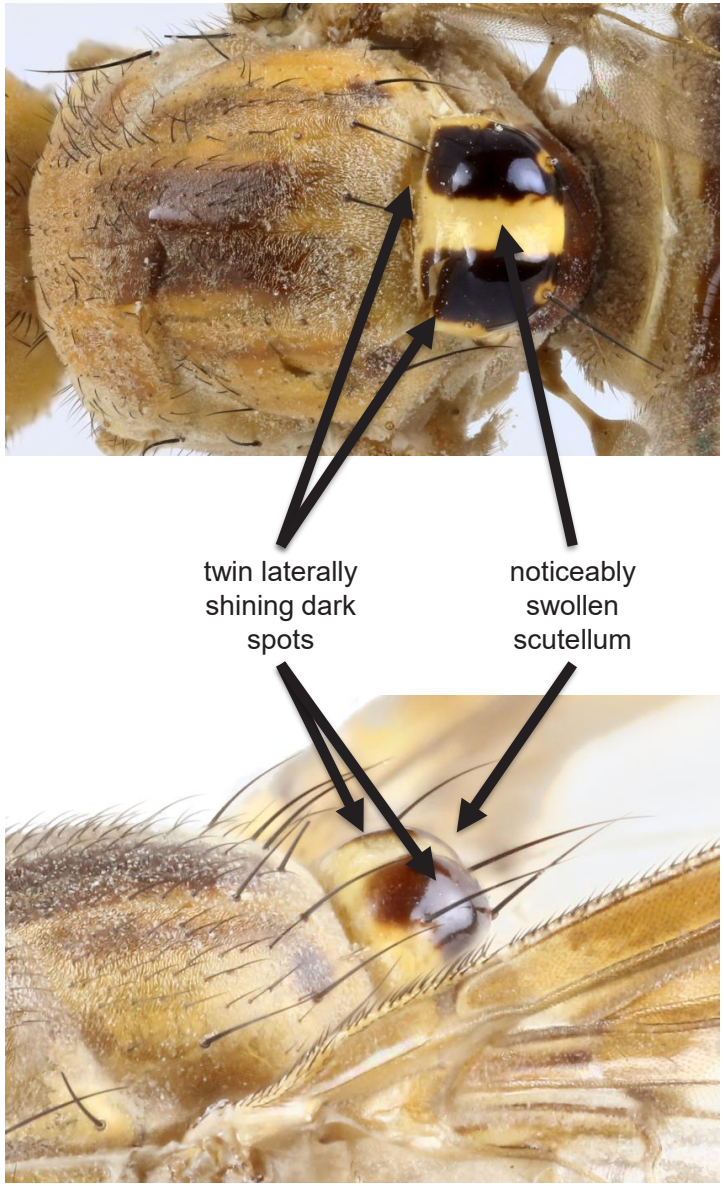
Worldwide: 5
Nearctic: 1

Distribution: *Xanthacrona* is a primarily Neotropical genus found in Central and South America; its singular extension north into the USA is in Texas.

Recognition: *Xanthacrona* is distinct among Nearctic Ulidiidae both for the characteristic pigmentation of its wings, and for it noticeably swollen scutellum. *Xanthacrona bipustulata* is recognizable as such by the twin laterally shining dark spots on its scutellum.

Ecology: Unknown/Undocumented

Key: Steyskal (1966b)



Xanthacrona bipustulata

Zacompsia Coquillett 1901

Species #
- Worldwide: 3
- Nearctic: 1

Distribution: southeastern USA, including Texas and Florida

Recognition: *Zacompsia fulva,* the only Nearctic species of the genus, is wholly reddish and nonmetallic. It has neither prescutellar acrostichal setae nor any pigmented pattern on its wing.

Ecology: Unknown/Undocumented

Key: Steyskal (1971)

Lacks prescutellar acrostichal setae

no pigmented pattern on wings

Zacompsia fulva

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